HACKH'S
CHEMICAL DICTIONARY

Hackh's Chemical Dictionary

[AMERICAN AND BRITISH USAGE]

Containing the Words Generally Used in Chemistry, and Many of the Terms Used in the Related Sciences of Physics, Astrophysics, Mineralogy, Pharmacy, Agriculture, Biology, Medicine, Engineering, etc.

BASED ON RECENT CHEMICAL LITERATURE WITH NUMEROUS TABLES, DIAGRAMS, PORTRAITS AND OTHER ILLUSTRATIONS

THIRD EDITION

COMPLETELY REVISED AND EDITED

BY

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PREFACE TO THE THIRD EDITION

It is my sad duty to record the sudden death of Ingo Hackh on 18th October, 1938, and to pay tribute to the bold imagination which conceived this Dictionary, and to the untiring energy which secured for it an established place in chemical literature on both sides of the Atlantic.

Having collaborated closely with Hackh in the earlier editions it falls to my lot to continue the work in the way he would have desired. The objects and scope of the Dictionary are stated clearly in the Prefaces to the earlier editions, and there has been no important departure from them except in one respect. This is the omission of the pronunciations, which it has been felt, can be of little real use while every chemist remains a law unto himself on such matters. This omission and certain other modifications have however, enabled substantial economies in space to be made without detriment in any way to the completeness of the Dictionary or the clarity of the definitions, so that although a considerable number of additions have been made, the book has not increased in bulk to anything like a proportional extent.

In addition the whole Dictionary has been completely revised and brought up-to-date in every respect, special care being taken to balance the treatment from the American and British points of view. The desirability for this has always been felt strongly in the past, but in a post-war world every line of approach to community of thought between the English-speaking nations has an added significance.

The writer hopes that this third edition will maintain the present status of the Dictionary in chemical literature, which he believes to be unique by reason of the number of definitions it contains (now totalling over 57,000) and its many points of contact with other spheres of scientific activity. He hopes, too, that future editions will benefit in the same way as this edition from readers' suggested additions, deletions and corrections.

Finally, he feels that he owes a special acknowledgment to the publishers for their general collaboration, but in particular for their assistance in smoothing out the inevitable difficulties of communicating across the Atlantic in War time.

JULIUS GRANT.

LONDON, ENGLAND.

PREFACE TO THE SECOND EDITION

The words of Berzelius a hundred years ago hold true today; namely that "the devil should write books on chemistry, for every few years the science changes."

During the seven years which have elapsed since the first edition of this work appeared, there have come revolutionary discoveries and many other changes in chemistry. Nothing was known of heavy hydrogen and its series of deuterium compounds; nothing was known of artificial radioactivity with its radioelements. The neutron, neutrino and positron were not yet discovered and little of the chemical nature of vitamins and hormones was revealed (today some of them are even synthesized in industrial quantities). There was little known of molecular structure or of nuclear reactions. This edition contains information on these developments. It also offers some new and original tables on porphin derivatives in which are shown the relationship of chlorophyll and hemoglobin pigments; on cholane derivatives, which brings together vitamins, bile acids, sex hormones, toad poisons and aglycones; also on carotenes; on quantum relations; on plastics and many other topics. Thus this edition is a witness of the coming coordination and systematization of our knowledge, for it assembles apparently unrelated and widely different substances and concepts.

The first edition witnessed the completion of the periodic system, the formulation of the quantum theory, the recognition of isotopes and the spectral classification of stars. The second edition gives an indication of future developments in molecular structure with its concepts of atomic distances; ionic radii and space lattices; of catalysis and adsorption; and of nuclear structure and its interesting reactions. All these will become of increasing importance not only for industrial purposes, but also for modern pharmacology, which is the basis of modern scientific medicine.

A dictionary to be a good companion should be like a wife or bosom friend, *above reproach.* I feel intensely the great responsibility inherent in my task and am aware of human limitations. The book was started twenty years ago under circumstances arising through war-time conditions. It has become a hobby now, also an "old man of the sea." The inaccuracies which crept into the first edition have been eliminated and the inconsistencies corrected by the truly helpful work of Mr. C. J. Saunders. But despite even the most diligent and constant efforts exerted ever since the first edition appeared, I am conscious that the ideal has not been reached. It will be found that the book is not a mere compilation of revamped definitions or descriptions, but a compendious presentation of specialized knowledge.

The dictionary writer must, above all, *record usage* of the terms he defines, regardless of his personal opinion as to appropriate derivation, spelling or definition. Thus there may be some who will demur at the simplified spelling of *sulfur* (adopted by the American Chemical Society and the United States Pharmacopoeia XI) and other words—may even be ready to protest that such spelling vitiates the etymology. Before protesting, such persons will do well to consider deeply what defence they can offer in regard to oeconomy, gangraene, aether, aeternal, paenalty and many other words which are not spelled with the diphthong in England or elsewhere.

In respecting customary usage I have still retained phosphorus and oestrone, which are the favored spellings of today. But the good work of simplification will continue, regardless of the Greco-Latinists who, enmantled in their academic environment, are becoming ghostly in the gloom of desuetude.

I am extremely grateful for the general reception which the first edition was accorded, also for the many helpful and suggestive criticisms of the reviewers which have been followed in practically all cases. Mr. C. J. Saunders, of Barcombe Mills (Sussex, England) rendered great service by voluntarily checking all cross references and suggesting many new definitions. Professor J. F. Snell of McDonald College (Montreal, Canada) frequently sent long lists of new compounds and definitions. Dr. Willis A. Boughton (Harvard) suggested a number of terms, so did Dr. J. A. Jacobson (West Virginia). Frequent correspondence with Dr. Austin M. Patterson and Dr. E. J. Crane (both of the Nomenclature, Spelling and Pronunciation Committee of the American Chemical Society) has greatly helped in obtaining accepted and preferred nomenclature. My collaborator, Dr. Julius Grant (London) contributed several hundreds of words which reflect British usage.

Valuable information also came from the following, to whom I offer my sincere thanks for their interest: Jerome Alexander (New York); E. F. Barringer (General Electric Co.); Hermann Becks (California); H. L. Bender (Bakelite Corp.); M. S. Biskind (Committee on Nomenclature, A. M. A.); Charles W. Boxton (Coll. Phys. Surgeons); W. L. Caldwell (Am. Rubber Prod. Co.); E. H. Carus (La Salle); Leon W. Cook (Bayonne); N. C. Cooper (Roessler Hasslacher Co.); D. S. Davis (Mead Corp.); W. E. Deming (U. S. Bureau of Chemistry and Soils); J. G. F. Druce (London); E. G. Eberle (Baltimore); A. A. Elston (Editor Double-Bond); E. E. Enck (Foote Mineral Co.); John Field II (Stanford); L. F. Fieser (Harvard); D. K. French (Dearborn Chemical Co.); H. Groll (Shell Development Co.); J. Heyrovsky (Prague); H. E. Howe (Ind. Eng. Chem.); David Katz (Milwaukee); A. B. Lamb (Harvard); Paul Logue (St. Louis); F. H. Loring (London); H. J. Lucas (California Tech.); G. Lutz (Cleveland); Chas. G. Maier (U. S. Bureau of Mines); P. R. Mallory (Carboloy Corp.); J. W. McBain (Stanford); E. V. McCollum (Johns Hopkins); Jas B. McNair (Field Museum, Chicago); E. C. Moffat (Am. Cyanamid Co.); A. V. H. Mory (Bakelite Corp.); Jos. N. Nielson (Bakelite Corp.); Maximilian Nierenstein (Bristol, Eng.); Arne Olander (California); Kurth Passoth (New York); Linus Pauling (California Tech); John Read (St. Andrews, Edinburgh); P. Rothemund (Kettering Foundation); Pierre van Rysselberghe (Stanford); John H. Schmidt (Bakelite Corp.); Kurt Schuette (San Francisco); E. Schultz (Stanford); Wilhelm Segerblom (Exeter, Pennsylvania); G. Frederick Smith (Illinois); Wm. Steinschneider (Zinsser and Co.); M. L. Tainter (Stanford); J. S. Vanick (International Nickel Corp.); E. A. Vuilleumier (Dickinson); Frank B. Wade (Indianapolis); Willis Wagener (Palo Alto); J. M. Watt (Univ. Witwatersrand, South Africa); C. E. Weinland (John Mansville Corp.); Clarence J. West (Nat. Research Council); E. H. Westling (San Francisco); Frank C. Whitmore (Pennsylvania State Coll.); E. C. Williams (Shell Development Co.); and John K. Young (Stanford).

For various drawings I am indebted to Paul Brown (*radiations*) E. H. Westling (*porphin ring*); Harold Rosenthal (*molecular diagrams* and *isotopes*); E. C. Pozzi (*periodic spiral*); G. W. Ekins (*cholane ring*); and to "Contact Point," in which these and other illustrations appeared for the first time. I also thank Dr. Otto Reinmuth and the "Journal of Chemical Education" for the use of several portraits. Illustrations have also been received from Paul O. Abbe, Inc.; Bausch and Lomb;

Buffalo Foundry and Machine Co.; Baker Chemical Co.; Fisher Scientific Co.; Kipp and Zonen; and, Scientific Materials Co. To all these I tender my appreciation for their courtesy.

Between the manuscript and the finished book there is many a slip despite the careful work of the craftsmen. My thanks go to the compositors, the proof readers, and the make-up men for their intelligent work. The reading of the galleys and pages was done faithfully by my wife and sister; while Mr. C. V. Brownlow, the editor of P. Blakiston's Son and Co., corrected many pronunciations; all of this is gratefully acknowledged. In closing, I hope that it may still be said of this book: "the more it is used, the more it is valued."

INGO W. D. HACKH.

SAN FRANCISCO, CALIFORNIA.

PREFACE TO THE FIRST EDITION

Progress in chemistry has been so rapid that even the most expert have been unable to keep pace with its development. Consequently, a more and more intensified specialization has resulted, which reflects itself in the modern, growing, and fluctuating terminology. New ideas require new words and both are multiplying rapidly as the entire province of physical science, which now reaches from the gigantic island universes down to the sub-atomic microcosmos, is being developed. Hence the need for a dictionary which records the old and new phenomena in the terms of our new concepts of matter and energy.

Crane and Patterson in their book "A Guide to the Literature of Chemistry," state that "*There has been, in modern times, no adequate general dictionary or word-book of chemistry . . . a book which gives the meanings of the large and increasing number of technical words.*" My work on this dictionary was begun many years before I read that passage and my aim has been not to make a mere compilation or collection of facts, but to re-state and re-define in simple modern terms the phenomena of science, and to connect these phenomena with each other . . . . . Imperfections will creep into a pioneer work of this nature, a work in which typographical and other mistakes such as errors of fact, omissions, etc., are least tolerated, especially by those who cannot realize the drudgery (fitful though it be), and the weariness of a task long drawn out that overcome one despite the promptings of enthusiasm and the spur toward achievement. I hope that my readers will let me know what additions, deletions and corrections should be made to render the volume a more helpful guide for the worker in science.

A chemical dictionary should state clearly and precisely the theories, laws and rules; describe accurately the elements, compounds, minerals, drugs, vegetable and animal products; list concisely the important reactions, processes, and methods; mention briefly the chemical apparatus, equipment and instruments; and, finally, should note the names of the investigators who have built up the science. As chemistry reaches into nearly every branch of human endeavor it should not forget to bring in the collateral vocabulary of physics, astrophysics, geology, mineralogy, botany, zoology, medicine and pharmacy and, also, the pertinent jargon of industry, mining, and commerce. Competent chemists will know how near I have measured up to these postulates . . . . . .

INGO W. D. HACKH.

EXPLANATORY NOTES

Capital initial letters for the words defined are used according to established custom. Thus, "Acacia" the plant, "acacia" the gum; "Bunsen law," but "bunsen burner."

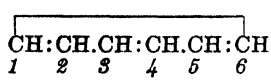
Capitals are always used in the definitions for the initial letter of the first word of a sentence.

Nomenclature and spelling generally, follow the system adopted in the American Chemical Society publications, but British renderings are also included in all instances, and cross-references are given where necessary.

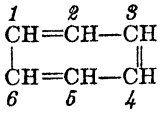
Nomenclature recommended by the International Union of Chemistry is asterisked thus (*); *e.g.*, "dipicolinic acid" is either, "1.5-" or "2.6-pyridinedicarboxylic acid*." However, absence of an asterisk does not indicate that the rendering given is unacceptable.

Ring systems are represented by one of the three following methods, and are numbered as shown.

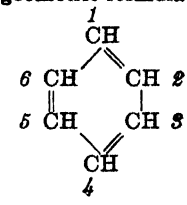
line-formula

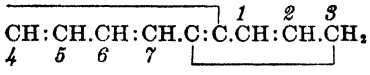


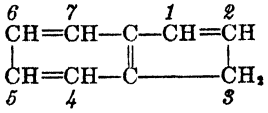
square-formula

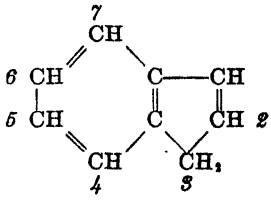


geometric formula









Synonyms are given under each definition in order of approximate importance. Most of them are also listed separately in the dictionary, with a cross-reference to the word under which the actual definition is to be found in the form of the word itself only. Thus, "brassil. Pyrite" means "for 'brassil,' 'see pyrite' " or "same as 'pyrite' ".

Commercial names are referred to the scientific synonym, unless the compound is of special commercial importance. *E.g.*, "soda ash" is defined under that heading.

In the case of a few complex organic compounds having abbreviated or trade names for which a full definition is not justified or is unobtainable, the only definition given under the shorter name is the full chemical name. Thus, "hydrargyrol. Mercuric phenyl thionate."

Italics are not used for the words defined. They are used in the definitions as follows: (*a*) according to custom (thus "*Acacia*" the plant, but "acacia" the gum); (*b*) for cross-reference (*e.g.*, "acaricide. A mite killer. Cf. *insecticide*"); (*c*) for the titles of publications, etc.; (*d*) for some sub-headings of the definitions.

Where a cross-reference consists of a double word, the portion of the word under which the definition is to be found is italicized if it is not the first portion. This applies also to synonym cross-references. *E.g.*, "seekay. C.K. *wax*"; and "chromone, 3-phenyl. Iso*flavone*."

Compound words are usually defined under the heading of the first of the words, and should be sought under this heading in the first instance. Thus "soda ash" is to be found under "soda," and not under "ash." Cross-references are however, usually given under the second word, and in some cases where importance and general custom demands the actual definition will be found under the latter, and a cross-reference under the former. Thus, "high-speed ferrotungsten" is defined under "ferrotungsten" with a cross-reference under "high-speed."

Hyphens are used only when necessary to avoid errors. Thus, "diphenylmethane" may mean either "diphenyl-methane, Ph_2CH_2"; or "di-phenylmethane, $MeC_6H_4.C_6H_4Me$."

Water of Crystallization is shown in the usual way; *e.g.*, $Na_2SO_4.10H_2O$. For didactic reason the method recommended by the Committee on Chemical Education; *e.g.*, $Na_2SO_4(H_2O)_{10}$, may be preferred.

Ambiguous terms and spelling are avoided; thus "bromethane" may mean either "bromo-methane" or "bromo-ethane."

Derivatives of organic compounds are to be found under the parent compound; thus, "p-nitrophenol" is under "phenol." The letters, o-, m-, p-, etc., have been ignored in the alphabetical arrangement, and are listed in the above order; thus, for "orthoanisidine" see "anisidine. o-". Similarly α-, β-, γ-, etc. are listed under the compound referred to; thus, for "α-naphthol" or "alphanaphthol", see "naphthol, α-."

The usual order of presenting or describing a compound is:

Name. Formula = Molecular weight. Synonyms. Occurrence, preparation or type of substance. Appearance, (crystalline form, color), density, melting-point, boiling-point; and solubility in water, alcohol or ether. Chemical, industrial, and medicinal uses.

Abbreviations commonly used are:

Å.U., or Å. for Ångstrom units.

α for specific rotation. *E.g.*, $[\alpha]_D^{20}$ is the value of α for the D-line at 20°C.

Ac for acetyl, CH_3CO—. *E.g.*, AcOH is acetic acid.

Am for ammonium, NH_4—. *E.g.*, AmCl is ammonium chloride. (Sometimes Am for amyl, C_5H_{11}—. i-Am for isoamyl.)

at. for atomic. *E.g.*, at.wt., at.no.

b. for boiling-point in °C. *E.g.*, $b._{600mm}$. 60 means, boils at 60°C. under a pressure of 600 mm. of mercury.

Bu for butyl, C_4H_9—, i-Bu for isobutyl.

Bz for benzoyl, $PhCO^-$. *E.g.*, BzOH is benzoic acid.

Cf. for compare.

cryst. for crystalline or crystallizing.

d. for density at room temperature. $d._0°$ for density at 0°C. $d._{air=1}$ for density compared to air.

decomp. for decompose, -osing, -oses, or -osed. *E.g.*, decomp. 20, means decomposed at 20°C.

Et for ethyl, $C_2H_5^-$. *E.g.*, EtOH is ethyl alcohol.

m. for melting-point in °C. (used similarly to b., boiling-point).

M for any monovalent metal.

Me for methyl, CH_3^-. *E.g.*, MeOH is methyl alcohol.

mol. for molecule. *E.g.*, mol. wt.

n. for refractive index. *E.g.*, $[n]_D^{20}$ is the value for the D-line at 20°C.

no. for number. *E.g.*, at. no.

Ph for phenyl, $C_6H_5^-$. *E.g.*, PhH is benzene.

pl. for plural.

Pr for propyl, $C_3H_7^-$. i-Pr for isopropyl.

q.v. for (1) which see (in cross-references);
(2) as much as desired (in prescriptions, etc.).

R for any monovalent radical.

sapon. for saponification. *E.g.*, sapon. val.

unsap. for unsaponifiable. *E.g.*, unsap. matter.

val. for value. *E.g.*, iodine val.

vol. for volume.

X for any halogen or monovalent anion.

Symbols are defined in the appropriate places (see especially the first entries under each letter), and under *constants, notation, nomenclature,* and *symbols;* they follow the commonly-accepted conventions.

Where the word defined is continuously repeated in its main definition or sub-definitions, it is represented by its initial letter followed by a stop so long as the meaning is not thereby obscured.

A CHEMICAL DICTIONARY

A

A. (a) Symbol for *argon*. (b) Abbreviation for (1) *ampère*, (2) *anode*, (3) *alternate*, (4) *year*, (5) *atomic weight*. **A acid.** 1.7-Dihydroxynaphthalene-3.6-disulfonic acid. **A.C.** Alternating current. **A.U.** Ångström unit. Atom unit.

°A. The symbol for "*degree Absolute.*"

Ä. See æ (German).

Å. Abbreviation for *Ångström* unit.

a. Abbreviation for (1) *asymmetric*, (2) *ana*-position, (3) *area*. **a-, an-** Prefix indicating "without" or "not," as in abiosis, anhydrous.

a. A constant in van der Waal's equation (q.v.) [*a*]. Symbol for specific rotation; $[a]_D$ measured with the D line; $[a]^t_D$ and at the temperature, *t*.

A_n. Abbreviation for normal atmosphere. 760 mm. Hg (d.13.59509), or 1.013249×10^6 dyne/cm².

α. The first letter of the Greek alphabet, *alpha*, which is used as an abbreviation for: (1) *alpha*-position (2) *alpha*-particles, (3) A mutation isomer of a sugar; as, α-glucose. [α]. See [*a*]. **α-acid.** 2.8-Naphthylamine sulfonic acid.

abaca. Manila hemp. A native name for the inner fiber of *Musa textilis*, a banana species of the Philippine Islands.

abasin. A brand of acetylcarbromal.

abati drying oven. A constant temperature oven with a xylene bath for maintaining temperatures at 100–200°C.

abaxial. Not in the line of axis.

Abbé, Ernst. 1840–1905. A German physicist. **A. apertometer.** A device for measuring microscope apertures. **A. camera lucida.** An optical device for drawing microscopical objects attached to the eye-piece of a microscope. **A. condenser.** An arrangement of lenses that increases the illumination of an object under the microscope. **A. refractometer.** A device for rapid, direct determination of refractive index, extensively used in analytical chemistry. **A. theory.** The limit of microscopic visibility is determined by $w = \lambda/2n \cdot \sin \mu$, where w is the width of the object, $n \cdot \sin \mu$ the aperture, and λ the wave-length of the light. With an oil-immersion lens ($n \cdot \sin \mu = 1.4$) and extreme violet light ($\lambda = 0.4\mu$) the smallest visible thread has a width of 0.15μ.

abbreviations. See *atomic weight, electrical units, notation, quantum, radical*, etc.

Abderhalden, Emil. 1877– . A Dutch-born German chemist, noted for physiological and pathological research. **A. dialysator.** An apparatus used in sero-diagnosis for separating proteins by dialysis. **A. reaction.** A. test. **A. test.** A serum reaction used for diagnostic purposes, as in pregnancy. Cf. *complement fixation, ninhydrin, placentin.*

Abegg, Richard. 1869–1910. A German chemist noted for his theory of valence.

Abel, Sir Frederick Augustus. 1827–1902. An English chemist noted for research on explosives and petroleum. **A. fuse.** See *fuse*. **A. reagent.** A 10 % solution of CrO_3 used for etching steel in microanalysis. **A. tester.** An apparatus for the determination of the flash point of petroleum and other oils.

abelmoschus. See *musk* seed.

aberration. Deviation from the normal. **astronomical-** The apparent angular displacement of light from a star. **chromatic-** The unequal refraction of white or multi-colored light. The index of refraction is slightly different for each color, which cannot therefore be brought to a single focus by a simple lens; consequently a series of tinted images is produced. **spherical-** The deviation of light passing through a lens, or reflected from a mirror, caused by the inequality in the degree of convergence; hence, the image appears distorted, especially at the outer portions. See aplanatic *focus*.

abienic acid. Abieninic acid.

abieninic acid. $C_{18}H_{30}O_2$ = 208.2. Abienic acid. An acid resin from *Abies pectinata* the European silver fir.

Abies. A genus of evergreen trees, the Coniferae (Pinaceae) or firs, which yield turpentine, resin and pitch, as:

A. balsamea	Silver fir
A (Tsuga) canadensis	Hemlock spruce
A. excelsa	Norway spruce
A. pectinata	European silver fir.

abietene. $C_{19}H_{30}$ = 258.3. Diterebentyl. A liquid hydrocarbon, d.0.99, b.340–345, distilled from the resin of *Pinus sabiniana*. Cf. *colophene*. **a. sulfonic acid.** A black paste produced by the slow action of sulfuric acid on a. at 10°C.; used as a wetting agent in the textile industry.

abietic acid. $C_{19}H_{29}COOH$ = 302.32. Sylvic acid. An acid from the resin of pine species (colophony). Yellow crystalline leaflets, m.161; insoluble in water but soluble in alcohol or ether. It is used in varnishes and dryers. Cf. *pimaric acid*. **a. anhydride.** $C_{44}H_{36}O_4$ = 654.6. The anhydride (?) of abietic acid and the chief constituent of colophony.

abietin. (1) $C_{51}H_{76}O_9$ = 841.8. A crystalline resinous compound from the pitch of the European silver fir. (2) Abietene. (3) Coniferin.

abietinic acid. $C_{19}H_{28}O_2$ = 288.3. A crystalline acid derived from rosin, which occurs in 3 isomeric forms.

abietinolic acid. $C_{16}H_{24}O_2$ = 248.2. An acid resin from the pitch of the European silver fir, which occurs in 2 isomeric forms.

abietite. $C_4H_8O_4$ = 152.1. A tetrose sugar from the needles of the European silver fir.

abiogenesis. Autogenesis. The spontaneous generation of life from inanimate or lifeless matter. It is opposed to the generally accepted theory of biogenesis.

abiophysiology. The study based on the theory that life phenomena are purely dynamic and chemical processes.

abiosis. Absence of life.

Abney clinometer. A reflecting level or pocket altimeter for measuring the heights of trees, buildings, etc. or fixing the slopes of drainage ditches, roads, etc.

abnormal. Irregular, or different from the normal.

abradant. Abrasive.

Abraham consistometer. A device for determining the hardness of bituminous materials or substances, from soft semi-liquids to hard brittle materials.

abrasion. Mechanical grinding or wearing away.

abrasive. Any grinding or polishing material; as burstone, corundum, emery, garnet, infusorial earth, pumice, silicon carbide, etc.

abrastol. $Ca(SO_3C_{10}H_6OH)_2,3H_2O$ = 540.3. Asaprol, calcium β-naphthol-α-monosulfonate. A white or pinkish scaly powder, decomp. 50, soluble in water or alcohol; darkens on exposure to light; has a bitter-sweet taste and is a germicide, preservative antipyretic, and antirheumatic.

abraum salts. (Ger. abräumen—to put away). The potash salts of Stassfurt, carnallite, kainite, boracite, sylvine etc., which used to accumulate near the salt mines as valueless minerals before their great value as fertilizer material was recognized. See *Stassfurt* salts.

abrazite. Gismondite.

abriachanite. An amorphous earthy form of blue asbestos.

abric acid. $C_{31}H_{34}NO_3$ = 334.3. An acid obtained from the abrus seeds or prayer beads, the seeds of *Abrus precatorius*.

abrin. Jequiritin. A poisonous mixture of albumose and paraglobulin from abrus seeds which resembles snake venoms in its physiological action; an ophthalmic irritant.

abrodil. Sodium mono-iodomethane sulfonate. A compound containing 52 % I used for intravenous injections (15–20 gm.) to obtain x-ray pictures of the body.

abrotanum. Southern wood. A garden plant whose leaves are used as an aromatic, formerly for medicinal purposes.

abrotine. $C_{31}H_{33}NO_3$ = 318.19. An alkaloid from Southern wood, *Artemisia abrotanum*, a Compositae.

abrus root. Indian licorice. The roots of *A. precatorius*, a Leguminosae of India, tropical Africa and Brazil, used as licorice substitute. **a. seeds.** Jequirity, prayer or jumble beads, love peas, crab's eye. Red seeds with black tips, of *A. precatorius*, containing abrin and resin. Used in ophthalmology, and in India as a weight (rati).

abscess. An inflammation or collection of pus in the tissues of the body.

abscissa. The distance of any point measured perpendicularly to a horizontal scale (the ordinate); *x*-axis. See *co-ordinates*.

absinthe. (1) Absinthium. (2) A strong alcoholic beverage containing anise and wormwood oil. **a. oil.** Wormwood oil.

absinthic acid. An acid of unknown composition, found in wormseed and supposed to be succinic acid.

absinthiin. $C_{15}H_{20}O_4$ = 264.15. A crystalline, poisonous, principle, m.68, from absinthium.

absinthin, absynthin. $C_{40}H_{56}O_8,H_2O$ = 682.6. A glucoside from the dried leaves and flowering tops of *Artemisia absinthium*, wormwood. A yellowish-brown amorphous powder, m.120–125; insoluble in water, soluble in alcohol or chloroform.

absinthium. Vermouth, wormseed, matterwood. The dried leaves and flowering tops of *Artemisia absinthium*, a Compositae of the United States and Europe. Used as a bitter tonic. **oil of-** Wormwood oil.

absinthol. Thujol.

absolute. (1) An actual condition, independent, unrestrained, and non-relative. (2) Pure, refined. **a. alcohol.** Ethanol(100 %). **a. boiling point.** Critical temperature. The temperature above which the liquid phase cannot exist, even under great pressure. **a. density.** The density or specific gravity reduced to standard conditions. In the case of gases, *e.g.*, 760 mm. pressure and 0°C. **a. humidity.** The water vapor content of the atmosphere in grams per cubic meter. **a. temperature. °A.** The degree of heat based upon the standard temperature scale which begins with absolute zero = −273°C. Indicated by K. (abbreviation for Kelvin). **a. units.** Ultimate rational units. The three simplest and fundamental units of all measurements, viz., the centimeter, gram, and second in the C.G.S. system, or the foot, pound, and second in the F.P.S. system. **a. zero.** The temperature at which a substance is entirely devoid of heat, and at which all molecular movement ceases; hence, all gases and liquids are solidified. Absolute zero, 0°K. (also *T.*) or 0°A. = −273.-09°C. = −459.4°F. = −219°R.

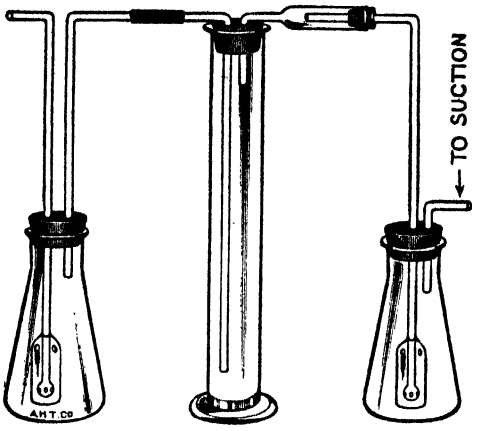
absorbent. (1) Able to take up gases or liquids. (2) Any agent which imbibes or attracts moisture, gases, or wound secretions, and renders them inert or inactive; *e.g.*, absorbent cotton. **gas-** A substance capable of absorbing gases; *e.g.*, for oxygen, potassium pyrogallate or phosphorus; for carbon monoxide, ammoniacal Cu_2Cl_2; for carbon dioxide, soda lime or KOH; **light-** Any transparent material solid, liquid or gaseous, which retains certain radiations when these fall on it. **medicinal-.** A purified fat-free cotton.

absorbing power. See *absorption* coefficient.

absorptiometer. (1) An apparatus devised by Bunsen for measuring the absorption of a gas by a liquid. It consists essentially of a glass vessel containing the gas and the liquid, which is connected with a mercury reservoir thereby enabling variations of pressure to be obtained. (2) A device for regulating the thickness of a liquid used in spectrophotometry.

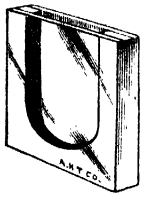
absorption. The apparent disappearance of one or more substances or forces by being taken into another substance or transformed into another form of energy. Generally absorption implies physical transformation. Cf. *adsorption*. (1) *Chemical.* Holding by cohesion or capillary action in the pores of a solid; *e.g.*, condensation of gases or imbibition of liquids by platinum sponge or charcoal; or gaseous molecules held between the molecules of a liquid. (2) *Physical.*

Retaining of characteristic waves (*e.g.*, heat or light radiations) by a solid, liquid or gas. The



Absorption apparatus.

radiations may be transformed into either: (*a*) kinetic energy or greater molecular vibrations, when the temperature of the absorbing substance rises; (*b*) excited atoms or molecules, when the substance becomes fluorescent. (3) *Physiological.* The transformation of non-living into living matter, *i.e.*, the change from food to protoplasm; *e.g.*, the imbibition of nutritive materials into the circulation. Also the process of taking up waste products from tissues. (4) *Therapeutic.* The time interval between the administration of a drug and the first signs of the effect. **heat of** The number of calories evolved when a gas is absorbed by a liquid.

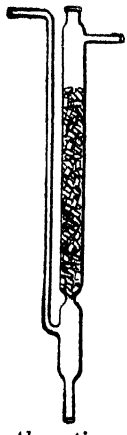


Absorption cell.

a. apparatus. An absorptiometer or other device for the absorption of gases or vapors, used in the laboratory or manufacturing plants (*e.g.*, Gay-Lussac tower). **a. band.** A group of light waves which are absorbed by molecules. Cf. *a. spectrum.* **a. cell.** A small glass cup with parallel walls which is filled with a colored solution and used, for the production of absorption spectra. **a. coefficient.** (1) *Chemical:* The amount, x, of a gas at standard temperature and pressure, which will saturate a quantity, q, of a liquid solvent. According to the units selected, there are:

Bunsen a.c.	x cc.	in	1 cc.
Kuenen a.c.	x cc.	in	1 gm.
Raoult a.c.	x gm.	in	100 cc.

Ostwald a.c. . . . Ratio of the concentration of a gas in the liquid to its concentration in the gas phase. (2) *Light:* The constant, k, in the equation $I = I_0 e^{-kcd}$, where I_0 and I are the intensities of the incident and transmitted lights, respectively, c the concentration and d, the thickness of the solution, and e the base of natural logarithms. (3) *X-rays:* The constant k in the formula $I = I_0 e^{-kd}$. **a. law.** See *Beer's law, Dalton's law* (3), *Henry's law* and *Draper's law.* **a. of food.** See *metabolism* or *absorption* (3). **a. of gases.** See *absorption* (1). **a. of light.** See *absorption* (2). **a. lines.** The wavelengths of light absorbed by atoms. Cf. *a spectrum.* **a. paper.** A fat-free filter paper used for the determination of fat in milk according to Adams' method, or for similar methods of fat or resin determination. **a. ray.** A light ray transformed into heat by passing through matter. **a. spectrum.** The visible or invisible (*e.g.*, ultraviolet) image produced by rays when passing in series through an absorbing medium and a spectroscope. In the passage of light through gases, liquids or solids, some light waves may be converted into heat and thereby partially or totally retained in the interposing substance; *e.g.*, a green solution retains the red waves in white light, and therefore the passing light appears green. In general, *molecules* absorb groups of wavelengths, giving *bands*, while *atoms* absorb single wavelengths, giving *lines.* See also *spectrum.* **a. tube.** Glass apparatus used in the laboratory for the absorption of gases by liquids or solids—*e.g.*, potash bulbs, etc. **a. value.** Iodine value.



Absorption tube.

absorptive power. The capacity to absorb expressed numerically.

abstergent. Detergent.

abstract. A summary of essential features.

absynthin. Absinthin.

abundance of elements. The estimated relative proportions of chemical elements in the earth.

ABUNDANCE OF RARER ELEMENTS

		Lithosphere	Coal ash (max.)
1	Zr	0.023	0.5
2	Ni	0.018	0.8
3	Zn	0.017	1.0
4	Sn	0.005	0.05
5	Co	0.004	0.15
6	Pb	0.0016	0.1
7	Mo	0.0015	0.05
8	Ga	0.0012	0.04
9	Y	0.001	0.08
10	Be	0.0007	0.1
11	Ge	0.0006	1.0
12	As	0.0005	0.8
13	Sc	0.0005	0.04
14	B	0.0003	0.3
15	Sb	?	0.1
16	Bi	.0002	0.003
17	Ag	.000006	0.001
18	Pt	.000005	0.00007
19	Au	.000005	0.00005
20	Pd	?	0.00002
21	Rh	?	0.000002

The tables show the percentage distribution in the solid (lithosphere), liquid (hydrosphere), and gaseous (atmosphere) portions of the earth, and the probable order of abundance; also that of the rarer elements in the lithosphere and coal ash (biosphere).

A.C. Abbreviation for alternating current.

Ac. (1) Symbol for actinium. (2) Abbreviation for: (1) acetyl, (2) acetate, (3) acyl radical.

ac- A prefix which indicates substitution in an *alicyclic* nucleus. Cf. *ar-*.

ABUNDANCE OF CHEMICAL ELEMENTS

Order	Lithosphere		Hydrosphere		Atmosphere		Meteorites			
							Iron		Stone	
1	O	47.33	O	85.79	N	75.53	Fe	72.06	O	35.43
2	Si	27.74	H	10.67	O	23.02	O	10.10	Fe	23.32
3	Al	7.85	Cl	2.07	Ar	1.40	Ni	6.50	Si	18.03
4	Fe	4.50	Na	1.14	H	0.02	Si	5.20	Mg	13.60
5	Ca	3.47	Mg	0.14	C	0.01	Mg	3.80	S	1.80
6	Na	2.46	Ca	0.05	Kr	0.01	S	0.49	Ca	1.72
7	K	2.46	S	0.05	Xe	0.005	Ca	0.46	Na	1.64
8	Mg	2.24	K	0.04	Remainder	0.005	Co	0.44	Al	1.53
9	Ti	0.46	N	0.02		—	Al	0.39	Ni	1.52
10	H	0.22	Br	0.01		—	Na	0.17	Cr	0.32
11	C	0.19	C	0.01		—	P	0.14	Mn	0.23
12	P	0.12	I	0.006		—	Cr	0.09	K	0.17
13	S	0.12	Fe	0.002		—	C	0.04	C	0.15
14	Mn	0.08	Remainder	0.002		—	K	0.04	Co	0.12
15	Ba	0.08		—		—	Mn	0.03	Ti	0.11
16	F	0.07		—		—	Ti	0.01	P	0.11
17	Cl	0.06		—		—	Cu	0.01	H	0.09
18	Cu	0.03		—		—	Remainder	0.03	Cl	0.09
19	N	0.02		—		—		—	Cu	0.01
20	Sr	0.02		—		—		—	Remainder	0.01
	Remainder	0.48		—		—		—		—

The data of Colums 2, 3, and 4 are taken from F. W. Clarke, U. S. Geol. Survey, Bull. 770, 1924. Those of Column 5 from Farrington, O. C., (*Field Museum Nat. History, Publication* 120, 1907; *Publication* 151, 1911), whose report contains analyes of 318 iron and 125 stone meteorites. Col. 6 from Merrill, *Mem. Nat. Acad. Sc.* 14, p. 28, 1916.

acacatechin. $C_{15}H_{14}O_6$ = 290.11. 4-catechol-3.5.7-trihydroxychroman. A constituent of *catechu*.

acacia. Gum arabic. The dried, gummy exudation of *Acacia senegal*, etc., a Leguminosae. Cf. *babool, catechu*. Oval beads used extensively in pharmacy for making suspensions, emulsions, tablets, or pills; also used in glues and pastes.

acacipetalin. $C_{11}H_{19}NO_6$ = 261.16. A cyanogetic glucoside, m.176, $[a]_D$ − 36.6°, from *Acacia* species.

acadialite. A variety of chabazite.

acajou. The fragrant heart wood of *Cedrela brasiliensis* (mahogany). **a. balsam.** An extract of the seeds of *Anacardium occidentale* (mahogany nuts) containing chiefly cardol and used as a blistering agent. **a. nut.** Semecarpus.

acalypha. The Indian herb *A. indica*, which is used as a substitute for ipecac.

Acanthaceae. A family of tropical plants comprising 175 genera and 1400 species. Cf. *adhatotic acid, ibogaine*.

acanthite. A native silver sulfide, Ag_2S, occurring in black, slender, prismatic needles, but rarer than the isomeric argentite, d.7.2 to 7.3.

acari. A mite which flourishes on flour, grain, etc. and has four pairs of walking legs.

acaricide. A mite killer. Cf. *insecticide*.

acaroid resin. Earth shellac, yellow resin, grass tree gum, botany bay gum, accroides gum, yacca gum. The exudation of the stems of *Xanthorrhoea hastilis*, a Liliaceae of Australia.

accelerated. Increased in speed, motion, or force. **a. motion.** The increase in the velocity of a body due to gravitation or other force.

acceleration. (1) *Chemical.* A change in the speed of a chemical reaction, cf. *catalysis*. The a. is *positive* if the reaction increases in speed, and *negative* if the reaction decreases in speed. (2) *Physical.* The increase in velocity per second, measured in cm. per sec. per sec. for terrestial objects, and in m. per sec. per sec. for astronomical objects. Cf. *force*.

accelerator. A substance which hastens or increases the speed of a chemical reaction. Cf. as a *catalyst, retarder*. **catalyst-** Promoter. **impregnation-** Introfier. **rubber-** A compound which hastens and improves the curing of rubber, *e.g.*, thiocarbanilide, hexamethylenetetramine, diphenylguanidine, and triphenylguanidine. Cf. *vulcanization*. **super-** A quick-acting vulcanizing agent, *e.g.*, thiuram and thiocarbamic acid derivatives. **ultra-** Super-.

acceptable explosives. A group of unstable chemicals and mixtures which may be transported on railways and steamers subject to certain restrictions by the Bureau of Explosives.

acceptor. See *induced* reactions.

accessory. Supplementary in function. **a. food factors.** Vitamins.

accretion. The increase in size of a body or mass by external addition, by the formation of additional deposits, or by adhesion, or inclusion.

accroides gum. Acaroid resin.

accumulator. A device for storing electricity; a storage or secondary battery or cell, as the lead accumulator, Edison, or Regnier cell, the action of which is based on a reversible chemical reaction. **steam-** An iron vessel, similar to a boiler, in which steam is stored under pressure in contact with hot water.

a. metal. An alloy containing 0.75 % Sb, 9.25 % Sn and 90 % Pb, used for a.

ace- (1). A prefix indicating relationship to acetylene (or the ethylene radical). (2). The group, —C—C—, attached to a bicyclic system; as the carbon atoms 7 and 8 in acenaphthene. Cf. *aci-*.

acecoline. A brand of acetylcholine hydrochloride.

acedicon. An alkaloidal isomer of acetylated codeine, in which the double bond is attached to the same C atoms as the acetylated enolic group, m.152–153.

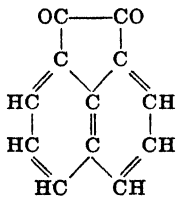
acele. Trade-mark for cellulose acetate rayon yarn and staple.

acenaphthene. $C_{12}H_{10}$ = 154.1. Ethylene naphthalene, ethylene naphthene, 7.8-dihydroacenaphthylene. $C_{10}H_6(CH_2)_2$. A hydrocarbon from coal tar distillates.

Colorless needles, m.95, b.227°, d.1.0678; insoluble in water, and soluble in hot alcohol. It is used in organic synthesis and the manufacture of dyes. **bi-** Same as biacene. **7, 8-diketo-** Acenaphthenequinone.

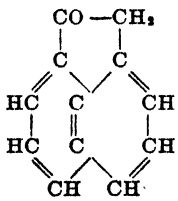
a. dione. Acenaphthenequinone.

acenaphthenequinone. $C_{12}H_6O_2$ = 182.2. Diketoacenaphthene, acenaphthenedione, 7.8-diketoacenaphthene. The compound,



derived from acenaphthene. Colorless crystals, m. 261°; soluble in alcohol.

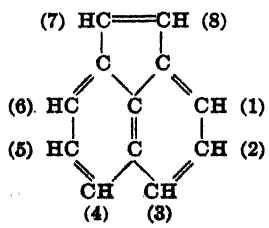
acenaphthenone. $C_{12}H_8O$ = 168.2. The compound,



derived from acenaphthene. Colorless crystals, m.121, and soluble in alcohol.

acenaphthenyl. The monovalent radical, $C_{12}H_9$—, derived from acenaphthene.

acenaphthylene. $C_{12}H_8$ = 152.1.



An unsaturated hydrocarbon obtained from acenaphthene. Colorless crystals, m.92, b.270; insoluble in water, but soluble in alcohol. **7, 8-dihydro-** Acenaphthene.

Acer. The maples. **A. saccharum.** The sugar maple.

acerdese. Manganite.

acerdol. Calcium permanganate.

aceric acid. An acid from the sap of the maple (*Acer rubrum*), supposed to be identical with malic acid.

aceroides gum. A misnomer for *acaroid resin*.

acet. (1) The trivalent radical, $CH_3C\equiv$ or $MeC\equiv$; as in *acetals*, $MeCH(OR)_2$. (2) The monovalent radical, Me.CO—, derived from acetic acid (aceto).

acetal (*as'-e-tal*) $C_6H_{14}O_2$ = 118.14. Diethylacetal, 1,1-diethoxyethane*, acetol, ethylidene diethyl ether, diethylaldehyde, ethidene diethylic ether. The compound, $MeCH(OEt)_2$. A volatile, colorless liquid, b.103, d.0.831; slightly soluble in water but soluble in alcohol or ether. It is formed by imperfect oxidation of alcohol and is used medicinally as a hypnotic and as a solvent. (Cf. *acetals, hydrins.*) **amino-** Aminoacetal. **dichloro-** Dichloracetal. **trichloro-** Trichloroacetal.

acetaldehyde. C_2H_4O = 44.04. Ethanal*, aldehyde, ethyl aldehyde, acetic aldehyde, Me.CHO. A volatile colorless liquid of aromatic odor m. −123.5, b.20.8, d.0.806; soluble in water, alcohol or ether. It is used commercially as solvent; industrially as a reducing agent, (silvering mirrors); and in the manufacture of dyestuffs and organic compounds. **m-** Metaldehyde. **p-** Paraldehyde. **amino-** Glycinaldehyde. **amyl-** Heptaldehyde. **benzal-** Cinnamaldehyde. **benzol-** Benzoyl. **hydroxy-** Glycolaldehyde. **keto-** Pyruvic aldehyde. **met-** Metaldehyde. **phenyl-** α-Tolualdehyde. **tribromo-** Bromal. **trichloro-** Chloral. **trimethyl-** Pivaldehyde.

a. ammonia. C_2H_7ON = 61.08. *1*-Aminoethanol, α-aminoethyl alcohol. An addition compound of aldehyde and ammonia, $CH_3.CHOH.NH_2$. A colorless solid, m.97, b.100, soluble in water. **a. cyanohydrin.** C_3H_5OH = 71.06. The addition compound, $CH_3.CHOH.CN$. A liquid, b.183 (decomp.), soluble in water or alcohol. **a. semicarbazone.** $C_3H_7N_3O$ = 101.1. The addition compound $MeCH:N.NHCONH_2$. A colorless solid, d.1.030, m.162.

acetaldol. Aldol.

acetaldoxime. Aldoxime.

acetaldoxine. Me.CHNO = 58.05. Colorless crystals or a liquid, d.0.9645, m.13 or 47, b.114; soluble in alcohol.

acetals. (1) Dialkyl ethers of the hypothetical ethylidene glycol. They are named as *1.1*-dialkoxy alkanes; i.e., $CH_3.CH(OR)_2$ = *1.1*-diethoxyethane (acetal). (2) Analogous ethers of higher or lower glycols, as, formal. Cf. *hydrins*. **ketone-** Ketals.

acetalphanaphthylamine. Acetnaphthalide.

acetamide. C_2H_5NO = 59.05. Ethanamide*. The amide of acetic acid, $Me.CO.NH_2$. Colorless crystals, m.82, b.222, d.1.139; readily soluble in water or alcohol. Used in organic synthesis. **acetyl-** Diacetamide. **benzal-** Cinnamamide. **benzyl-** α- is hydrocinnamamide; N- is benzylacetamide. **bromo-** Acetbromamide. **bromodiethyl-** Neuronal. **cyan-** $CN.CH_2.CO.NH_2$ = 84.1. Colorless crystals,

m.118. **di-** Diacetamide. **dichloro-** $CHCl_2.CO.NH_2$ = 127.98. Colorless, monoclinic crystals, m.98, b.233; soluble in alcohol, water or ether. **hydroxy-** Glycolamide. **methylphenyl-** Exalgin. **N-phenyl-** Acetanilide. **α-phenyl-α-**Toluamide.

a. chloride. $Me.CCl_2.NH_2$ = 113.0, b.90. **a. nitrate.** $C_2H_5N_3O_4$ or $MeCO.NH_2.ONO_2$ = 121.1. Colorless crystals, formed by the action of nitric acid on acetamide.

acetamidine. $C_2H_6N_2$ = 58.1. Ethanamidine*, ethenylamidine. The amidine of acetic acid, $Me.C(:NH)NH_2$., m.166.

acetamido. Acetamino. **a. ethyl salicylic acid.** Benzacetin. **a. phenetol.** Phenacetin.

acetamino. Acetamido. A compound containing the monovalent $CH_3.CO.NH$— or $MeCONH$— radical. **a. naphthol.** $C_{12}H_{11}NO_2$ = 201.16. 1.2- White crystalline leaflets, m.235; insoluble in water and soluble in alcohol. **1.4-** White crystalline needles, m.187; soluble in alcohol. **a. phenol.** $C_8H_9O_2N$ = 151.12. The compound, $C_6H_4(OH).NH.CO.Me$. **1.2-** White leaflets, m.201; soluble in hot water. **1.3-** Colorless needles, m.149; soluble in water or alcohol. **1.4-** Colorless monoclinic crystals. d.1.293, m.168; soluble in water or alcohol. **a. salol.** Same as salophen.

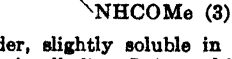
acetanilide. C_8H_9ON = 135.12. Acetylaminobenzene; antifebrin, acetanil, phenylacetamide- The acetyl derivative of aniline, $PhNH.CO.Me$. Colorless shining leaflets, m.114.2, b.303.8, d.1.211; soluble in water or alcohol. Extensively used in medicine as an antipyretic, anodyne, antirheumatic and cardiac and also as a preservative (*e.g.*, for hydrogen peroxide solution) and in lacquers. **aceto-** $MeCOCH_2CONHPh$ = 177.15. Colorless crystals, m.85; sparingly soluble in water or alcohol. **acetyl-** Diacetanilide. **amino-** $NH_2C_6H_4.NH.CO.Me$ = 150.14. **p-** Colorless crystals, m.160; soluble in water, alcohol or ether. Used in organic synthesis. **brom-** Same as acetbromanilide. **di-** $PhN(MeCO)_2$ = 177.1. Colorless leaflets, m.37, $b._{11mm}142$. ***ar*-ethoxy-** Acetphenetide. ***p*-ethoxy-** Phenacetin. ***ar*-methoxy-** Acetaniside. ***N*-methyl-** Exalgin. ***ar*-methyl-** Acetotoluide. **oxymethyl-** Methacetin. **α-phenyl-α-**Toluanilide.

a. bromide. Antisepsin.

acetaniside. $C_9H_{11}O_2N$ = 165.14. Methoxyacetanilide, $C_6H_4(OMe)NH.COMe$. **ortho-** Colorless crystals, m.80, b.304; soluble in water. **meta-** Methacetin.

acetannin. $C_{14}H_8(COCH_3)_2O_9$ = 406.2. Diacetyltannin, tannylacetate, tannigen. The acetic acid ester of tannin, a light, creamy-white, odorless, tasteless powder, m.160; used in treatment of diarrhea.

acetarsone. $C_8H_{10}O_5NAs$ = 275.05. Stovarsol, acetylaminohydroxyphenylarsonic acid, *N*-acetyl-4-hydroxy-*m*-arsanilic acid.



A white powder, slightly soluble in water or alcohol, readily in alkalis. It is used in amebic dysentery and Vincent's infection. Cf. *carbarsone, tryparsamide.*

acetate. A salt of acetic acid containing the monovalent MeCOO— or CH_3COO— radical, abbreviated Ac. Most normal acetates are freely soluble; the least soluble are those of U, Hg and Ag. Acetates are readily decomposed by strong acids or by heat.

acetbromamide. $CH_2Br.CONH_2$ = 138.0. Bromacetamide. Colorless leaflets, m.108; soluble in ether. **N-** $CH_3CONHBr$. **diethyl-** Neuronal.

acetbromanilide. $BrC_6H_4NHCOCH_3$ = 214.0. **para-** p-bromacetanilide, antisepsin, asepsin, acetanilide bromide. Colorless needles, m.165.5; sparingly soluble in water. An antipyretic and antiseptic.

acetene. Ethylene.

acetenyl. Ethinyl. The monovalent radical, HC:C—, derived from acetylene; *e.g.*, acetenylbenzene, $Ph.C_2H$.

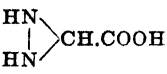
acet extract. See *extract.*

acethydrazide. A compound containing the monovalent $NH_2.NH.CO.CH_3$— radical. Cf. *hydrazide.*

acetic. Compounds containing acetyl, CH_3CO—. **a. acid.** Acetic acid. **a. aldehyde.** Acetaldehyde. **a. anhydride.** Acetic acid anhydride. **a. ester, a. ether.** Ethylacetate. **a. peracid.** Peracetic acid. **a. peroxide.** $(CH_3CO)_2O_2$. An explosive derivative of a. anhydride.

acetic acid. $C_2H_4O_2$ = 60.04. Ethanoic acid*, ethylic acid, vinegar acid, acetone carboxylic acid, CH_3COOH (or MeCOOH or AcOH or incorrectly, HAc). A saturated fatty acid, *q.v.* (1) 99.5 % or glacial-. A clear, colorless liquid or crystalline mass miscible with water or alcohol, d.1.048, m.16, b.118. It is used as a reagent, as a solvent for essential oils, resins and gums; as a precipitant for albumin; and as a general neutralizing and acidifying agent. (2) 36 % or common-. A clear colorless liquid, d.1.049, miscible with water or alcohol. (3) 6 % or dilute-. An aqueous solution containing not less than 5.7 % nor more than 6.3 % of a. a. It is used as above and is an official test solution of the U.S.P. It is produced by the oxidation of alcohol (vinegar), and in the pyroligneous acid resulting from the destructive distillation of wood. **aceto-** Acetoacetic acid. **acetyl-** Acetoacetic acid. **allyl-** γ-Pentenoic acid. **m-amidophenyl-** $NH_2.C_6H_4.CH_2.COOH$. Colorless crystals m.149. **amino-** Glycine. **aminobutyl-** Norleucine. **benzal-** Cinnamic acid. **benzamino-** Hippuric acid. **benzoyl-** $C_9H_8O_3$ = 164.06. β-Ketohydrocinnamic acid, *3*-oxo-*3*-phenylpropanoic acid, $PhCOCH_2COOH$. Colorless needles, m.103. **benzyl-** Hydrocinnamic acid. **bromo-** $C_2H_3O_2Br$ = 139.0. Bromoethanoic acid*. Colorless hexagonal crystals, d.1.011, m.50, b.208; soluble in water, alcohol or ether. **butyl-** Caproic acid. **carbamido-** Hydantoic acid. **carbazyl-** Carbazolacetic acid. **chloro-** $C_2H_3O_2Cl$ = 94.5. Chloroethanoic acid*. Colorless, rhombic crystals, d.1.398, m.51, b.189.5; soluble in water, alcohol or ether. **cyano-** Cyanacetic acid. **di-** (1) Acetoacetic acid. (2) Diacetic acid. **diacetyl-** Diacetic acid. **dibromo-** $C_2H_2O_2Br_2$ = 217.9. Dibromoethanoic acid*. Colorless crystals, m.48, b.232; soluble in water, alcohol, or ether. **dichloro-** $C_2H_2O_2Cl_2$ = 128.9. Dichloroethanoic acid*. A colorless liquid, d.1.572, m. −4, b.190; soluble in water, alcohol, or ether. **dicarbamido-** Allantoic acid. **diethyl-** $C_6H_{12}O_2$ = 116.1. 3-carboxy-pentane, $Et_2CH.COOH$. A colorless liquid, d.0.920, b.190; slightly soluble in water. **dihydroxy-** Glyoxylic acid. **diiodo-** $C_2H_2O_2I_2$ = 311.97. Diiodoethanoic acid*.

Yellowish crystals, m.110; slightly soluble in water. **dimethyl-** Isobutyric acid. **dimethylethyl-** $C_6H_{12}O_2$ = 116.13. The aliphatic acid $EtCMe_2.COOH$. A colorless liquid, m. −14, b.187; slightly soluble in water, soluble in alcohol or ether. It is an isomer of caproic acid. **dioctyl-** Isostearic acid. **diphenyl-** $C_{14}H_{12}O_2$ = 212.17. $Ph_2CHCOOH$. Colorless needles, m.148; soluble in water, alcohol, or ether. **diphenylene-** Fluorene carboxylic acid. **ethoxy-** Ethylglycollic acid. **ethyl-** Butyric acid. **formyl-** Malonaldehydic acid. **furfuryl-** Furoric acid. **guanido-** Glycocyamine. **hydrazi-** $C_2H_6O_2N_2$ = 88.0. The compound



hydroxy- Glycollic acid. **imino-** $NH(CH_2COOH)_2$ = 133.1. Colorless rhombic crystals, m.227, insoluble in water and soluble in alcohol or ether. **iodo-** $C_2H_3O_2I$ = 185.9. Iodoethanoic acid. Yellow crystals, m.82, insoluble in water, soluble in alcohol or ether. **isoamyl-** $C_7H_{14}O_2$ = 130.1. A colorless liquid, d.0.910, b.209, slightly soluble in water and soluble in alcohol. **isobutyl-** *i*-Caproic acid. **isopropyl-** Isovaleric acid. **isopropylidene-** Senecioic acid. **keto-** Pyruvic acid. **mercapto-** $C_2H_4O_2S$ = 92.09. *2*-Mercaptoethanoic acid*, thioglycollic acid, $HS.CH_2.COOH$. A colorless liquid, d.1.3253, m. −16.5, b_{6mm}101. **methoxy-** $C_3H_6O_3$ = 90.05. Methylethanoic acid*, methylglycolic acid, $MeOCH_2COOH$. Colorless liquid, d.1.1768, b_{7mm}90. **methyl-** Propionic acid. **methylamino-** Sarcosine. **nitro-** See *nitro acids*. **oxybis-** Diglycollic acid. **per-** Peracetic acid. **phenyl-** Toluic acid. **pyro-** Pyroligneous acid. **sulfo-** $C_2H_4O_5S$ = 140.1. Sulfoethanoic acid*. The compound $HSO_3.CH_2.COOH$. Colorless crystals, m.86, soluble in water. **thiol-** C_2H_4OS = 76.09. Ethanethiolic acid*, thioacetic acid, methanecarbothiolic acid, MeCOSH. A colorless liquid, d.1.074, m. −17°C, b.93, soluble in water. **trimethyl-** Pivalic acid. **triphenyl-** $C_{20}H_{16}O_2$ = 240.2. The compound $Ph_3C.COOH$. Colorless crystals, m.264. **ureido-** Hydantoic acid. **vinyl-** β-Butenic acid.

a. acid. amide. Acetamide. **a. acid amine.** Acetamide. **a. aldehyde.** Acetaldehyde. **a. anhydride.** $C_4H_6O_3$ = 102.05. Acetic acid anhydride, acetyl oxide, Ac_2O, acetic oxide, ethanoic anhydride*. The compound $(MeCO)_2O$. A colorless liquid with pungent odor, d.1.081, m. −73, b.137; soluble in alcohol or ether, decomp. by water to acetic acid. Used as a reagent in organic synthesis and analysis, for acetylation and in the examination of fats. **a. ester.** Ethyl acetate. **a. ether.** Ethyl acetate. **a. oxide.** A. anhydride. **a. peracid.** Peracetic acid.

acetidin. Ethyl acetate.

acetifier. An apparatus for hastening the process of acetification, or the production of vinegar from fermented liquids by atmospheric oxidation.

acetimeter. An obsolete term for a hydrometer.

acetimetry. The determination of acetic acid in vinegar by titration with alkali.

acetimido. The monovalent radical MeC(:NH)—.

acetin. Esters obtained by reaction of glycerol and acetic acid; *e.g.*, **mono-** Acetin, $C_3H_5(OH)_2(O.COMe)$ = 134.11. A colorless liquid, d.1.2212, b.240. It is used in the manufacture of explosives (smokeless powder, dynamite), and as a solvent for dyes. **di-** See *diacetin*. **tri-** See *triacetin*.

acetnaphthalide. $C_{12}H_{11}ON$ = 185.16. The compound, $MeCONHC_{10}H_7$. **1-**Acet-α-naphthylamine. Colorless or slightly pinkish crystals, b.159; soluble in hot water or alcohol. **2-**Acet-β-naphthylamine. Colorless leaflets, m. 132; soluble in hot water or alcohol.

aceto. Acet.

acetoacetate. A salt containing the monovalent $MeCOCH_2COO$— radical derived from acetoacetic acid.

acetoacetic acid. $C_4H_6O_3$ = 102.07. Acetylacetic acid, diacetic acid, butanone acid, $Me.CO.CH_2.COOH$. A colorless liquid, decomposed by heat at 100, into acetone and carbonic acid, and miscible with water or alcohol. It is derived from β-hydroxybutyric acid in the body and increases in amount during diabetes. Cf. *acetone*. **a. ester.** (1) Acetoacetic ether. (2) A group of compounds derived from acetoacetic acid by replacing the acid hydrogen by an organic radical. They are of the general type, $R—C_3H_4O.COO—R$, and occur in two isomeric forms: enolic-form, $R—CH_2.CO.CH_2.COO—R$, and ketonic-form, $R—CH_2.C(OH):CH.COO—R$. **a. ester condensation.** The formation of acetoacetic esters by means of metallic sodium from the corresponding alkyl esters. **a. ester decomposition.** The decomposition of acetoacetic esters, which may occur in two ways. Strong acids or weak alkalis will split the ester to a ketone alcohol and carbon dioxide. Strong bases will decompose it to acids (acetic acid, etc.). **a. ester synthesis.** The formation of organic compounds by hydrolyzing their a. esters. **a. ether.** $C_8H_{10}O_3$ = 130.11. Ethyl-aceto-acetate, ethyl-*3*-oxobutanoate*, ethyl-acetoacetic ester ($MeCOCH_2COOEt$). A colorless liquid, $d_{20°}$.1.0284, m. −80, b.181, miscible water, alcohol, or ether. It is used in organic synthesis; cf. *a. ester condensation decomposition*.

acetoamidophenol. Acetaminophenol.

acetbenzoic anhydride. Benzoyl acetate.

acetobrom-. Acetbrom-.

acetocaustin. Trichloracetic acid.

acetochloral. Chloral.

acetocinnamene. Benzylidene *acetone*.

acetoglyceral. $C_5H_{10}O_3$ = 118.08. Glycerol-ethylidene ether, $HO.C_3H_5\begin{matrix}O—CH_2\\|\\O—CH\end{matrix}$ A colorless liquid, d.1.081, b.184.

acetoin. $C_4H_8O_2$ = 98.1. 3-hydroxy-2-butanone*, methylacetylcarbinol. $MeCO.CHOH.Me$ or $Ac.CHOH.Me$, a condensation product of two molecules of acetic acid. A colorless liquid, d.1.002, m.15, b.142.

acetol. $C_3H_6O_2$ = 74.06. Acetyl carbinol, 1-hydroxy-2-propanone;* propanolon, $MeCOCH_2OH$. A colorless liquid, d.1.082; m. −17, b.145; it is soluble in water, alcohol or ether. Used as a reducing agent in organic synthesis.

acetoluide. Acetotoluide.

acetolysis. The breaking up of an organic molecule by acetic anhydride or acetic acid.

acetomenaphthone. Menadiol diacetate; methyl-1, 4-naphthohydroquinone-diacetate. Used medicinally for its vitamin K effect.

aceton acid. Acetonic acid.

acetonamine. A group of organic compounds containing both the NH_2— and CO— radicals. **di-** $NH_2.CMe_2.CH_2.CO.Me$.

acetonaphthone. Naphthylmethyl ketone. **1-hydroxy-2-.** $C_{12}H_{10}O_2$ = 186.08. *1*-Hydroxy-*2*-naphthylmethylketone, *2*-acetyl-*1*-naphthol, $MeCOC_{10}H_6OH$. Yellow needles, m.100, b.325.

acetone. C_3H_6O = 58.06. Dimethylketone, 2-propanone*, methylacetal, ketopropane, dimethylketal, $CO.Me_2$. A clear, colorless, inflammable liquid of characteristic ethereal empyreumatic odor, d.0.792, m. −94.3, b.56.5; miscible with water, alcohol or ether. It is a constituent of wood spirit, and is formed in the body during diabetes by decarboxylation of acetoacetic acid. Used as a solvent for oils, fats, resins, cellulose nitrate; as a precipitant for albumin; as reagent for aniline dyes, cuprous and silver salts, alkaloids and blood; and medicinally as an anthelminthic and tonic. **acetonyl-** See *acetonyl*. **acetyl-** Acetylacetone. **allyl-** Allylacetone. **amido-** Aminoacetone. **benzal-** $C_{10}H_{10}O$ = 146.08. *4*-Phenyl-*3*-butene-*2*-one*, benzylidene acetone, cinnamyl methyl ketone, acetocinnamene, methyl styryl ketone, cinnamyl methyl ketone. The compound, PhCH:CH.COMe. Colorless crystals, m.41, b.262; insoluble in water, soluble in alcohol, ether or chloroform. Used in organic synthesis. **benzylidene-** Benzal a. **bromo-** Monobromacetone. $CH_2Br.CO.Me$ = 136.98. A colorless liquid, b.140, soluble in alcohol. **chloro-** Monochloracetone. $CH_2Cl.CO.Me$ = 92.51. A colorless liquid, d.1.162, b.119; slightly soluble in water, but miscible with alcohol or ether. **diamido-** $CO(CH_2NH_2)_2$ = 88.1. **dibenzal-** Styryl ketone. **dichloro-** (alpha-) $CHCl_2.CO.CH_3$ = 126.95. A colorless liquid, d.1.572, m. −4, b.190; soluble in water, alcohol or ether. (beta-) $CH_2Cl.CO.CH_2Cl$ = 126.95. A colorless liquid, d.1.236, b.120; soluble in water, alcohol or ether. **diethoxy-** $CO(CH_2OEt)_2$. **diisonitroso-** $CO(CH:NOH)_2$. Colorless crystals, m.144, **dimethoxy-** $CO(CH_2OMe)_2$. **dioxy-** $CO(CH_2OH)_2$. **ethoxy-** See *ethoxyacetone*. **ethylidene** *3*-Penten-*2*-one.* **hydroxy-** Acetol. **meta-** Diethyl ketone. **monobromo-** See *bromo-*. **monochloro-** See *chloro-*. **oxalyldi-**, $Me.CO.CH_2.CO.CO.CH_2.CO.Me$. Colorless crystals, m.120; insoluble in water but soluble in alcohol. **sulfocyan-** $MeCO.CH_2.SCN$. A colorless liquid, d.1.180; soluble in water or alcohol.

a. acid. Acetonic acid. **a. alcohol.** Acetol. **a. bodies.** The aliphatic ketones and hydroxyketones found in blood and urine. **a. bromoform.** $C_4H_7OBr_3$ = 331.1. Brometone, 1, 1, 1-tribrom-2-methyl-propan-2-ol, tribrom-tert.-butanol. $CBr_3.COHMe_2$. Colorless crystals, used medicinally as a sedative. **a. carboxylic acid.** Acetic acid. **a. chloride.** $C_3H_6Cl_2$ = 112.98. *2.3*-Dichloropropane*. $MeCCl_2Me$; d.-1.83 at 16°C, m. −35, b.69. **a. chloroform.** $C_4H_7OCl_3$ = 177.1. Chloretone, chlorbutanol, 1,1,1-trichlor-2-methyl-propan-2-ol, trichlor-tert.-butylalcohol, aneson, anesin, $CCl_3.CMe_2OH$. Colorless crystals, m.80; slightly soluble in water, but more soluble in alcohol, glycerol or oils. Used in hypodermic solutions as an antiseptic, hypnotic and anesthetic. **a. collodium.** Collodion. **a. cyanhydrin.** $Me_2C.OH.CN$ = 85.1. m. −20; b.120. **a. diacetic acid.** Hydrochelidonic acid. **a. dicarboxylic acid.** $C_5H_6O_5$ = 146.1. *β*-ketoglutaric acid, *β*-oxyglutaric acid, pentanone diacid, *3*-oxo-pentanedioic acid*. The dibasic acid, $CO(CH_2COOH)_2$, which occurs in colorless crystals, m.130, decomp. 250. **a. oil.** The oily residue from the distillation of crude acetone. Used as a solvent, a denaturating agent and in the purification of anthracene. **a. phenyl hydrazone.** $C_9H_{12}N_2$ = 148.2. The crystalline compound $Me_2:C:N.NPh$, m.16; b.165 (90 mm.) **a. semicarbazone.** $C_4H_9ON_3$ = 115.12. The crystalline compound $Me_2:C:N.NH.CONH_2$, m.190. **a. sodium bisulfite.** $NaSO_3.CMe_2OH$. Colorless crystals which are soluble in water. **a. sugar.** Isopropylidine sugar. A condensation compound of sugar and a. containing a —$O.CMe_2.O$— group.

acetonic acid. $C_4H_8O_3$ = 104.1. Acetone acid, butyl-lactic acid, *α*-hydroxyisobutyric acid. $Me_2C(OH)COOH$. Colorless crystals, m.79, b.212; soluble in water, alcohol or ether.

acetonitrile. C_2H_3N = 41.1. Methylcyanide, ethanenitrile*, cyanomethane. The nitrile of acetic acid, Me.CN, which occurs in coal tar and the residue of molasses. A colorless liquid, d.0.783, m. −44, b.81; soluble in water or alcohol. Used in organic synthesis and perfumery. **allyl-** See *allyl*. **amino-** Glycinonitrile. **benzoyl-** C_9H_7ON = 145.06. Cyanoacetophenone, *β*-ketohydrocinnamonitrile, $PhCOCH_2CN$. White leaflets, m.80. **phenyl-** Is *α*-tolunitrile. **triethoxy-** Cyanoformic ester, oxalnitrilic ethyl ester. The compound, $(EtO)_3C.CN$. A colorless liquid, b.160. **trinitro-** $(NO_2)_3C.CN$. Colorless crystals, m.41. **trinitro-** $C_2N_4O_6$ = 176.03. Trinitroethanenitrile*, $CN.C(NO_2)_3$. White waxy leaflets, m.41.5, exploding on further heating. **vinyl-** Allylcyanide.

acetonitrolic acid. $C_2H_4N_2O_3$ = 104.05. Ethylnitrolic acid, $Me(NO_2)C:NOH$. Yellow rhombic crystals, m.88 (decomp.); soluble in water.

acetonuramic acid. $MeCO.CH_2.NH.CH_2.COONH_2$ = 146.2.

acetonyl. The monovalent radical, $CH_3.CO.CH_2-$ or $MeCOCH_2-$. **a. acetone.** $C_6H_{10}O_2$ = 114.1. Hexan-2, 5-dione, g-diketohexane, *2*, *5*-hexane dione*, γ-diketo-hexane. The diketone, $Me.CO.CH_2CH_2.CO.Me$. A colorless liquid of pleasant odor, b.188 used as a solvent. **a. amine.** *1*-Amino-*2*-propanone. **a. urea.** $C_5H_8O_2N_2$ = 123.1, m. −41, b.175, very soluble in water, alcohol or ether.

acetonylidene. The divalent radical, $MeCOCH=$.

acetophenetide. $C_{10}H_{13}O_2N$ = 179.16. **p-** Phenacetin, p-ethoxyacetanilide, acetphenetidine, oxyethylacetanilide. $1,4\text{-}EtO.C_6H_4.NH.COMe$. A colorless, crystalline powder, m.134; soluble in 1500 pts. water, 16 pts. alcohol or 90 pts. ether. Used medicinally as an antipyretic, analgesic and antirheumatic. **o-.** *N*-acetyl-*o*-phenetidine. Colorless leaflets, m.79. **amino-** Phenocoll.

acetophenine. $C_{24}H_{19}N$ = 321.3. Colorless crystals, m.135; slightly soluble in alcohol.

acetophenetidin. The U.S.P. XI name for *acetophenetide*.

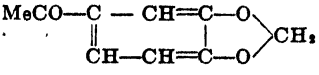
acetophenone. C_8H_8O = 120.1. Phenylmethylketone, benzoyl hydride, acetyl benzene, hypnone. $Me.CO.Ph$. A colorless liquid or transparent crystals, m.20.5, b.202, d.1.0285; insoluble in water, but soluble in alcohol, ether, chloroform or oils. Used medicinally as a hypnotic, and also in perfumes (orange blossoms). **allyl-** The compound, $Ph.CO.CH_2.CH_2.CH:CH_2$. A colorless liquid, b.236; soluble in alcohol. **amido-** Amidoacetophenone. **benzal-** Chalcone. **benzyl-** *phenyl* propiophenone. **chloro-** See *tear gases*. **cyano-**

Benzoyl acetonitrile. *ar*-hydroxy- See *hydroxy*. *ω*-hydroxy- $PhCOCH_2.OH$. Phenacyl alcohol. Colorless crystals, d.1.013, m.86. nitroso- Benzoylformoxime. phenyl- Acetophenone acetone.

a. acetone. $C_{11}H_{12}O_2$ = 176.1. Phenyl acetyl acetone, $PhCO.CH_2.CH_2.COMe$. a. carboxylic acid. Acetyl benzoic acid. a. oxime. $Me.C(NOH).Ph$ = 135.2. Colorless crystals, m.59.

acetophenones. The homologs of acetophenone: $PhCOCH_2$—R . . . acidulated benzenes. Ph—R—COMe . . . phenylated fatty ketones. R—C_6H_4.COMe . . . nucleus substituted phenones.

acetopiperone. $C_9H_8O_3$ = 164.1. 3.4-methylenedioxy-1-methylketo-benzene.



Colorless crystals, m.87.

acetopyrine. $C_{11}H_{12}N_2O.C_7H_7OOC_6H_4COOH$. Acopyrin. A combination of antipyrine and acetyl salicylic acid, used for fevers and rheumatism.

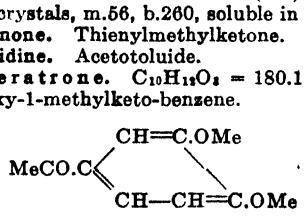
acetosalicylic acid. Acetylsalicylic acid.

acetotoluide. $C_9H_{11}ON$ = 149.09. Acetotoluidine, *ar*-methylacetanilide, *N*-acetyl-*o*-toluidine, $Me.C_6H_4.NHCOMe$. ortho- Colorless crystals, m.107, b.296°; slightly soluble in water and soluble in alcohol or ether. Used medicinally as an antipyretic, and said to be less toxic than acetanilide. meta- Colorless crystals, m.65, b.303. para- Colorless needles, m.151, b.307; slightly soluble in water or alcohol. Used medicinally as an antipyretic. Cf. *exalgin*. *N*-methyl- $C_{10}H_{13}NO$ = 163.11. *N*-acetyl-*N*-methyl-*o*-toluidine. $MeCON(Me).C_6H_4Me$. White crystals, m.56, b.260, soluble in alcohol.

acetothienone. Thienylmethylketone.

acetotoluidine. Acetotoluide.

acetoveratrone. $C_{10}H_{12}O_3$ = 180.1. 3.4-dimethoxy-1-methylketo-benzene.



Colorless crystals, m.48; soluble in alcohol. Used in perfumery.

acetoxime. C_3H_7ON = 73.08. Propanoxime, *2*-propanone oxime*, acetone oxime. The simplest ketoxime which occurs in two isomeric forms; as, the compound, $Me_2C{:}NOH$. Colorless prisms, d.0.887, m.58, b.135; soluble in water, alcohol or ether.

acetoximes. A group of ketoximes derived from acetoximes and occurring in two isomeric forms; as,

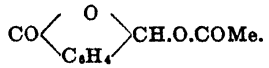
anti- syn-

where *R'* is a radical of greater radical weight than R.

acetoxy. The monovalent radical AcO—, or MeCOO— or $CH_3.COO$—.

acetoxylide. $C_{10}H_{13}NO$ = 163.11. Aceto-*as*-*m*-xylidide, *2,4*-dimethylacetanilide, $MeCONHC_6H_3Me_2$. White needles, m.129.

acetoxyphthalide. The compound,



acetozone. Acetylbenzoyl peroxide. An unstable compound, which is slightly soluble in water or ether and is marketed as a 50% mixture of an inert substance as a disinfectant and antiseptic.

acetphenetid. Acetophenetide.

acet-theocin sodium. Acet-theophylline sodium, soluble theocine, theophylline sodium acetate. A white powder which is soluble in water but insoluble in alcohol or ether. Used medicinally as a diuretic.

acettoluide. Acetotoluide.

acetum. Latin for vinegar.

aceturic acid. Acetyl glycine.

acetyl. Symbol: Ac. The monovalent acyl radical, MeCO- or CH_3CO-, of which acetic acid and acetyl chloride are the hydroxide and chloride, respectively. a. hydrate. Acetic acid. a. number. A measure of the amount of oxyacids and alcohols in a vegetable or animal fat. It is the number of milligrams of potassium hydroxide required to neutralize the acetic acid obtained by saponification of one gram of a fat wax which has been acetylated with acetic anhydride. Cf. *Cook formula*. a. value. Same as a. number.

acetylacetonate. A compound of acetylacetone with aluminum beryllium or rare earth, of the type, $M[CH\text{-}(COMe)_2]_3$.

acetylacetone. $C_5H_8O_2$ = 100.09. Pentane-2.4-dione, *2.4*-pentane dione*. The diketone, $MeCO.CH_2.COMe$. A colorless liquid, d.0.987, b.137; slightly soluble in water but miscible with alcohol or ether. Used in organic synthesis.

acetylamine. (1) The monovalent radical, MeCONH- or $CH_3.CO.NH$-, derived from acetamide. (2) Acetamide.

acetylamino. Acetylamine. a. acetic acid. Acetyl glycine. a. benzoic acid. $MeCONH—C_6H_4—COOH$ = 179.13. ortho- Colorless needles, m.185; slightly soluble in water, and soluble in alcohol or ether. meta- Colorless crystals, m.243, decomp.; slightly soluble in water, alcoholor ether. para- Colorless needles, m.250; slightly soluble in water or ether but soluble in alcohol. a. phenetole. Acetphenetid. a. salol. Salophen.

acetylate. To introduce an acetyl radical into an organic compound.

acetylation. The process of introducing an acetyl radical into an organic molecule; *e.g.*, by boiling the compound with glacial acetic acid or acetyl-chloride.

acetylbenzene. Acetophenone.

acetylbenzoate. Benzoyl acetate.

acetylbenzoic acid. Acetophenone carboxylic acid. $C_9H_8O_3$ = 164.11. The compounds $MeCO.C_6H_4COOH$. ortho- Crystals, m.114; soluble in hot water. para- Crystals, m.205 (subliming), and slightly soluble in water, alcohol or ether.

acetylbiuret. $MeCO.NH.CO.NH.CO.NH_2$ = 145.11. Colorless needles, m.193; soluble in water, alcohol or ether.

acetylbromide. C_2H_3OBr = 122.95. Ethanoyl bromide*. The compound, Me.COBr. A colorless fuming liquid, m. −96.5, b.76.7; decomposes in water or alcohol but is soluble in

ether. Used as a reagent in analysis and organic synthesis. **bromo-** $C_2H_2Br_2O$ = 201.85. Bromoethanoyl bromide*, $CH_2Br.COBr$. Colorless liquid, b.148, decomposed by water.

acetylcannabinol. The compound, $MeCO.O.C_{21}H_{29}O$, obtained by heating cannabinol with acetic acid anhydride.

acetylcarbamide. Acetylurea.

acetylcarbazole. $C_{12}H_8N.COCH_3$ = 209.2. A crystalline solid, m.70, b.360, slightly soluble in water, very soluble in alcohol or ether.

acetylcarbinol. Acetol.

acetylcarbromal. $C_8H_{13}N_2O_3Br$ = 279.03. Abasin, acetylbrom-diethyl-acetyl-carbamid, $BrCEt_2.CO.NH.CO.NH.COMe$. White crystals, slightly soluble in water, readily in alcohol. Used as sedative.

acetylchloride. C_2H_3OCl = 78.49. Ethanoyl chloride*. Me.COCl. A colorless fuming liquid, d.1.105, m. −112, b.55; decomposes in water or alcohol but is soluble in ether. Used as a reagent in analysis and in organic synthesis. **chloro-** $C_2H_2Cl_2O$ = 112.93. Chloroethanoyl chloride*, $CH_2Cl.COCl$. A colorless liquid, b.107, d.1.495; decomposes in water or alcohol. **dichloro-** $CHCl_2.COCl$ = 147.37. Dichloroethanoyl chloride*. A colorless liquid b.105; decomposes in water or alcohol. Used in organic synthesis. **trichloro-** CCl_3COCl = 181.83. Colorless liquid, d.1.629, b.118, decomposed by water. **trimethyl-** Pivalyl chloride.

acetylcholine. $C_7H_{17}O_3N$ = 163.2. Acetylethanol-trimethyl-ammonium hydroxide. $CH_3.CO.OCH_2.CH_2.NMe_3.OH$. An alkaloid from ergot which lowers the blood-pressure and increases peristalsis. **a. hydrochloride.** $Me_3NClC_2H_4COOMe$. Acecoline. White hygroscopic crystals of characteristic odor. Used as vasodilator.

acetylcyanide. C_3H_3ON = 69.1. Pyruvonitrile. Me.COCN. A colorless liquid, b.93.

acetylene. (1) A member of the acetylene series. (2) C_2H_2 = 26.03. Ethine, ethyne*. An unsaturated hydrocarbon and the simplest compound containing a triple bond, HC≡CH. A colorless gas with garlic odor, d.0.91, $m._{895mm.}$ −85, b. −83; slightly soluble in water but soluble in alcohol. It is used as a general anesthetic; technically for oxy-acetylene welding, and cutting of metals; in organic synthesis; and as an illuminant. It is produced by the action of water on calcium carbide and is shipped in steel cylinders (red label). (3) The tetravalent radical, =CH.CH=. **butyl-** Hexyne*. **carboxy-** Propiolic acid. **di-** Diacetylene. **dimethyl-** Crotonylene. **diphenyl-** Tolane. **ethyl-** Butyne*. **hexyl-** Caprilidene. **methyl-** Allylene. **pentyl-** Heptyne*. **phenyl-** Acetenylbenzene. PhC≡CH. A colorless liquid, b.139, soluble in alcohol. **phenylmethyl-** Phenylallylene. PhC≡CMe. A colorless liquid, b.185; soluble in alcohol. **propyl-** Pentine. **vinyl-** Vinylacetylene.

a. acids. Tetrolic acids. A series of organic acids of the general formula $C_nH_{2n-3}COOH$, which contain the bivalent —C:C— group; as,

propiolic acid, propynoic acid*	HC:C.COOH
tetrolic acid, *2*-butynoic acid*	MeC:C.COOH
pentinoic acid, *2*-pentynoic acid*	EtC:C.COOH
amylpropiolic acid	C_5H_7C:CCOOH
palmitolic acid	$C_{14}H_{27}C$:COOH
stearolic acid	$C_{17}H_{31}C$:CCOOH
behenolic acid	$C_{21}H_{39}C$:CCOOH

a. alcohols. A group of organic compounds which contain both an OH- and —C:C— group; as,

propin-3-ol, *2*-propyn-*1*-ol*	HC:C.CH_2OH
butin-3-ol, *2*-butyn-*1*-ol*	MeC:C.CH_2OH

a. carboxylic acid. Propiolic acid. **a. dicarboxylic acid.** $C_4H_2O_4$ = 114.0. Butynedioic acid*. HOOC.C:C.COOH. Colorless crystals, m.178; insoluble in water. Cf. glutinic acid, muconic acid. **di-** Diacetylene dicarbonic acid. HOOC.C:C.C:C.COOH. **tetra-** Tetracetyl dicarbonic acid. $HOOC.(C:C)_4.COOH$. **a. dichloride.** $C_2H_2Cl_2$ = 96.95. Dioform, dichloroethylene, CHCl = CHCl. *cis*-d.1.269, m. −50°C, b.48.4. *trans*-d.1.291, m. −80.5, b.60.3. Colorless liquids, immiscible with water but miscible with alcohol or ether. **a. dinitrile.** C_4N_2 = 76.0. Carbon subnitride. NC.C:C.CN. **a. diurein.** Glycoluril. **a. series.** Alkines, ethines. A group of unsaturated hydrocarbons of the general formula C_nH_{2n-2} which contain a triple bond, —C:C—.

C_2H_2....	ethyne*, ethine, acetylene
C_3H_4....	propyne*, propine, allylene
C_4H_6....	butyne*, butine, crotonylene
C_5H_8....	pentyne*, pentine, valerylene
C_6H_{10}...	hexyne*, hexine, hexoylene
C_7H_{12}...	heptyne*, heptine, oenanthylidene
C_8H_{14}...	octyne*, octine, caprylidene
$C_{10}H_{18}$...	decyne*, decine, menthene
$C_{12}H_{22}$...	dodecyne*, dodecylidene
$C_{13}H_{24}$...	tridecyne*, tridecylidene
$C_{14}H_{26}$...	tetradecyne*, tetradecylidene
$C_{15}H_{28}$...	pentadecyne*, pentadecine, benylene
$C_{16}H_{30}$...	hexadecyne*, hexadecine, cetenylene
$C_{18}H_{34}$...	octodecyne*, octadecylidene

a. stones. Acetylith. **a. tetrabromide.** $C_2H_2Br_4$ = 345.71. Tetrabromoethane, Muthmann's liquid. $CHBr_2.CHBr_2$. A yellow oily liquid, d.2.973, b.136 (36 mm.); insoluble in water and miscible with alcohol or ether. Used for the separation of mineral mixtures and in microscopy. **a. tetrachloride.** Tetrachloroethane. **a. urea.** $C_2H_2(CON_2H_2)_2$ = 142.11. A liquid, decomp. 300°C.

acetylfluoride. C_2H_3OF = 62.03. Ethanoyl fluoride*. MeCOF. A colorless liquid, d.-1.0369, m. −55, b.10; miscible with ether and decomposing in alcohol or water. Used in organic synthesis.

acetylformic acid. Pyruvic acid.

acetylglycine. $C_4H_7O_3N$ = 117.09. Acetylaminoacetic acid, aceturic acid. $MeCO.NH.CH_2.COOH$. Colorless crystals, m.206, decomp. 130; soluble in water or alcohol but insoluble in ether.

acetylide. A derivative of acetylene in which the hydrogen atoms are replaced by metals; as,

cuprous acetylide	Cu_2C_2
cobalt acetylide	CoC_2
silver acetylide	Ag_2C_2

acetylidene. The hypothetical isomer of acetylene, C=CH_2, in which it is assumed that one carbon atom is divalent.

acetyliodide. C_2H_3OI = 169.16. Ethanoyl iodide*. MeCOI. A brown fuming liquid, d.-

1.98, b.107. It is used for acetylation in organic synthesis.

acetylith. Acetylene stones. Sugar-coated granules of calcium carbide used for the generation of acetylene.

acetylization. Acetylation.

acetylize. Acetylate.

acetylperoxide. $C_4H_6O_4$ = 118.07. Ethanoyl peroxide*. $(MeCO)_2O_2$. Colorless leaflets, m.-30, b.63; slightly soluble in water and soluble in alcohol or ether.

acetylphenol. $C_8H_8O_2$ = 136.10. $PhO.COCH_3$. A colorless liquid, d.1.092 at 0, b.193.

acetylphenylene diamine (p). $C_8H_{10}ON_2$ = 150.14. Amino-acetanilide. $Me.CO.NH.C_6H_4.NH_2$. Colorless needles, m.159; slightly soluble in water, and very soluble in alcohol or ether. Used medicinally and in organic synthesis.

acetylphenylhydrazine. Pyrodin.

acetylpropyl alcohol. $C_5H_{10}O_2$ = 102.11. The hydroxy ketone, $MeCO.CH_2.CH_2.CH_2OH$. A colorless liquid, d.1.0159, b.208; miscible with water, alcohol or ether, and used as a solvent.

acetylrosaniline. $C_{20}H_{18}N_3COMe$ = 343.3. Red crystals, m.218, soluble in alcohol, carbon disulfide or chloroform, insoluble in water or ether.

acetylsalicylate. A compound containing the monovalent $MeCO.C_6H_4.COO$—radical, derived from acetylsalicylic acid.

acetylsalicylic acid. $C_9H_8O_4$ = 180.06. Aspirin, xaxa, acid aceticosalicylas, acetosal, acetosalic acid, acetophen, salacetin. The acetate derivative of salicylic acid, $MeCOO.C_6H_4.COOH$ (1:2). A colorless crystalline powder, m.135; slightly soluble in water and soluble in alcohol or ether and, with decomposition, in alkaline solutions. Used extensively in the manufacture of tablets, as an antirheumatic and antipyretic. **a. methyl ester.** Methyl acetylsalicylate.

acetylsalol. Spiroform.

acetyltannin. Tannigen.

acetylthymol. $C_{12}H_{16}O_2$ = 192.1. Thymylacetate. A slightly yellow liquid, d.1.009, b.244, used medicinally as an antiseptic.

acetyltropeine. $C_{10}H_{17}O_2N$ = 183.2. $MeCO.C_8H_{14}ON$. A syrupy liquid, b.236; soluble in water, alcohol or ether.

acetylurea. $C_3H_6O_2N_2$ = 102.08. Acetylcarbamide. $MeCO.NH.CONH_2$. Colorless crystals, m.218°C; slightly soluble in water or alcohol.

Achard, Franz Karl. 1753–1821. A German chemist, and pioneer in the manufacture of sugar from beets.

achilleic acid. An acid obtained from *Achillea millefolium*, identical with aconitic acid.

achilleine. $C_{20}H_{38}O_{15}N_2$ = 546.4. An alkaloid from *Achillea millefolium*, yarrow, or milfoil. Brownish-red masses of bitter taste; soluble in water. Sometimes used as an antipyretic.

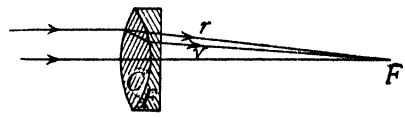
achilletin. $C_{11}H_{17}O_4N$ = 227.0. A split-product obtained from achilleine by the action of sulfuric acid.

achmatite, achmite. An epidote from the Ural Mountains.

achrodextrins. Achroodextrins.

achroite. A colorless tourmaline from Elba.

achromatic. Transmitting white light without breaking it up into colored rays. Cf. *apochromatic, chromatic, pantachromatic.* **a. lens.** A combination of lenses of different refractive indices with which chromatic aberration is corrected by bringing two spectral color rays to a common focus. A combination of a convex lens of crown glass with a concave lens of flint glass. **a. objectives.** Any system of lenses which brings light of different wave-lengths to a common focus; *i.e.*, avoids chromatic aberration. **a. substage.** A device for microscopes which corrects chromatic aberration. **a. system.** Any combination of prisms or lenses with a common focus for different colors; *e.g.*, an achromatic lens.



Achromatic lens.

C = crown glass *r = red ray*
F = flint glass *v = violet ray*
F = *focus*

achromic. Without color. **a. method.** The evaluation of diastase preparations by means of the a. period. **a. period.** The time needed for a 1 % starch solution to reach the a. point; *i.e.*, become transformed into achroodextrin. **a. point.** That point in the hydrolysis of starch by enzymes when iodine no longer produces a blue color.

achromobacteria. Small Gram-negative bacteria, usually motile. They produce no pigment or gas on gelatin, but a brown color on potato.

achroodextrins. $C_{36}H_{62}O_{31}$ = 990.7. A series of intermediate split products that are formed after erythrodextrin by the hydrolysis of starch or dextrin, termed alpha-, beta-, etc. They are not colored blue by iodine, and are converted into glucose by boiling with dilute acid.

aci. A prefix that indicates acid character, as in aci-phenylnitromethane, $PHCH:NO(OH)$, which differs from α-phenyl nitromethane, $PhCH_2.NO_2$. Cf. *ace.*

acicular. Slender, needle-like or hair-like in shape, as crystals or bacteria. **a. oxylepidine.** Di-benzoyl *stilbene.*

acid. (1) A chemical compound which yields hydrogen ions when dissolved in water; whose hydrogen can be replaced by metals or basic radicals; or which reacts with bases to form salts and water (neutralization). Antonym: base. (2) An extension of the term includes substances dissolved in media other than water. Cf. *base, ammonia system.* (3) Any substance which gives up protons (*proton donor*) or which reacts as $A \rightleftharpoons B + H^+$, where A is acid and B is base (Brönsted, Lowry, etc.) *e.g.*,

$$HAc \rightleftharpoons Ac^- + H^+$$
$$H_2O \rightleftharpoons OH^- + H^+$$
$$H_3O^+ \rightleftharpoons H_2O + H^+$$
$$HSO_4^- \rightleftharpoons SO_4^{--} + H^+$$
$$NH_4^+ \rightleftharpoons NH_3 + H^+$$

NH_4^+ and H_2O are acids, while Ac^{--} and SO_4^- are bases. Cf. *protophilia.*

A-, α-, β-. See *A* and *sulfonic acids.* **acrylic-** An organic a. of the general type, $C_nH_{2n-2}O_2$. **alcohol-** See *alcohol.* **aldehyde-** An organic a. containing aldehyde and carboxyl radicals. **aliphatic-** An a. derived from chain-compounds; *e.g.*, acrylic and fatty acids. **amic-** Amido acid. **amido-** An organic acid containing the monovalent —$CONH_2$ group and the carboxyl radical. **amino-** An organic a. containing the monovalent

—NH_2 and —COOH groups. **aromatic-** An organic compound containing a closed chain (*e.g.*, benzene ring) and the carboxyl group. **battery-** Electrolyte a. Sulfuric acid of d.1.150–1.835. **bromo-** An organic a. containing bromine. **carboxylic-** See organic acids. **carbylic-** See carbylic acids. **chloro-** An organic a. containing chlorine. **diatomic-** An a. containing two hydrogen atoms which are replaceable by metals or basic radicals. Cf. oxalic acids, fumaric acids. **dibasic-** Same as diatomic. **dihydric-** Same as diatomic. **dihydroxy-** An organic a. containing two hydroxy groups and one or more carboxyl groups. **effective-** See acidity. **electrolyte-** Battery a. **fatty-** An organic a. of the general type, $C_nH_{2n}O_2$. **halogen-** An inorganic a. containing a halogen: as, HCl, $HClO_3$. **haloid-** An inorganic a. containing a halogen element and no oxygen: *e.g.*, HCl, HBr. **hexabasic-** Hexatomic. **hexatomic-** An a. containing six hydrogens replaceable by metals or basic radicals. **hydrogen-** Hydracid. **hydroxy-** An organic a. containing one hydroxy group and one or more carboxyl groups. Cf. *phenol* acids. **inorganic-** A compound of hydrogen with a nonmetal other than carbon, or an acid radical containing no carbon. **labile-** A grouping such as the —SO_3H or —OSO_2H groups the acidic properties of which are unstable and depend on the other groups present. **meta-** (1) An inorganic a. of a trivalent nonmetal containing one replaceable hydrogen; *e.g.*, HPO_2, HBO_2, etc. (2) An organic, aromatic a. with radicals in the meta-position. **mineral-** Inorganic a. **mixed-** A mixture of nitric acid and sulfuric acid used for nitration. **monamino-** An organic a. containing one amino group and one or more carboxyl groups. **monatomic-** An a. having only one hydrogen atom which can be replaced by metals or basic radicals. **mono- amino-** Monamino a. **monoatomic-, monobasic-, monohydric-** Monatomic. **monohydroxy-** An organic a. containing one hydroxy group and one or more carboxyl groups. **nitro-** See nitro acid, nitroic acid, etc. **normal-** (1) Inorganic ortho- a. (2) A straight chain fatty a.; as, *n*-valeric acid. (3) A solution containing one gram-equivalent a. per liter; as, *N*-HCl. **organic-** Any carbon compound containing one or more carboxyl groups —COOH. This radical is indicated by the *prefix:* carboxy, or the *suffixes:* carboxylic, carbonyl or simply -oic or -oyl. For classification, see *acids*. **ortho-** (1) An inorganic a. of trivalent elements containing three hydrogen atoms replaceable by basic radicals; *e.g.*, H_3PO_4. (2) An organic a. containing a closed chain (*e.g.*, benzene ring) and radicals in the ortho position. **oxy-** (1) An inorganic a. containing oxygen, thereby differing from the haloid or hydrogen acids. Those of the type having least oxygen have the suffix *-ous;* those having most oxygen, the suffix *-ic*. (2) An organic a. containing an ether or oxy group in addition to the carboxyl

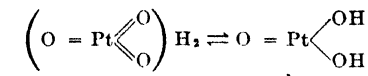
COMMON ACIDS, RADICALS AND SALTS

Acid	*Radical or ion*	*Salt*
acetic	CH_3COO—	acetate
adipic	—$OOC(CH_2)_4COO$—	adipate
anisic	$C_6H_4.OCH_3.COO$—	anisate
arsenic	$AsO_4\equiv$	ortho-arsenate
	AsO_3—	meta-arsenate
arsenous	$AsO_3\equiv$	ortho-arsenite
	AsO_2—	meta-arsenite
	$As_2O_5\equiv$	pyro-arsenite
benzoic	$PhCOO$—	benzoate
boric	$BO_3\equiv$	ortho-borate
	$B_4O_7=$	pyro-borate
	$BO_2=$	meta-borate
	BO_3—	perborate
bromic	BrO_3—	bromate
bromous	BrO_2—	bromite
butyric (n)	$Me(CH_2)_2COO$—	butyrate
camphoric	$C_8H_{14}(COO)_2=$	camphorate
capric	$Me(CH_2)_8COO$—	caprate
caproic (n)	$C_5H_{11}COO$—	caproate
carbolic	same as phenol	
carbonic	$CO_3=$	carbonate
	HCO_3—	bicarbonate
cerotic	$C_{25}H_{51}COO$—	cerotinate
chloric	ClO_3—	chlorate
chlorous	ClO_2—	chlorite
chromic	$CrO_4=$	chromate
	$Cr_2O_7=$	dichromate
chromous	$CrO_3=$	chromite
cinnamic	$PhCH:CHCOO$—	cinnamate
citraconic	—$OOCMeC:CHCOO$—	citraconate
citric	$C_3H_4(OH)(COO)_3\equiv$	citrate
cresotinic	$C_6H_3(OH)MeCOO$—	cresotinate
cresylic	Same as cresol	
cyanacetic	$NC.CH_2.COO$—	cyanacetate
cyanic	CNO—	cyanate
elaidic	$C_{14}H_{29}CH:CHCH_2COO$—	elaidinate
ferricyanic	$Fe(CN)_6\equiv$	ferricyanide
ferrocyanic	$Fe(CN)_6\equiv$	ferrocyanide
fluosilicic	$SiF_6=$	fluosilicate

COMMON ACIDS, RADICALS AND SALTS—(*Continued*)

Acid	*Radical or ion*	*Salt*
formic	$HCOO-$	formate
fumaric	$-OOCCH:CHCOO-$	fumarate
gallic	$C_6H_2(OH)_3COO-$	gallate
glutaric	$-OOC(CH_2)_3COO-$	glutarate
glycollic	$HOCH_2COO-$	glycolate
hippuric	$PhCONHCH_2COO-$	hippurate
hydrobromic	$Br-$	bromide
hydrochloric	$Cl-$	chloride
hydrocyanic	$CN-$	cyanide
hydrofluoric	$F-$	fluoride
hydroiodic	$I-$	iodide
hypochloric	$ClO-$	hypochlorite
iodic	IO_3-	iodate
iodous	IO_2-	iodite
lactic	$MeCH(OH)COO-$	lactate
levulinic	$MeCO(CH_2)_2COO-$	levulinate
lauric	$C_{11}H_{23}COO-$	laurate
maleic	$-OOCCH:CHCOO-$	maleate
malic	$-OOCCH_2CHOHCOO-$	malate
malonic	$-OOC.CH_2.COO-$	malonate
mellitic	$C_6(COO)_6\equiv$	mellitate
molybdic	$MoO_4=$	molybdate
nitric	NO_3-	nitrate
nitrous	NO_2-	nitrite
oleic	$C_{17}H_{33}COO-$	oleate
oxalic	$-OOC.COO-$	oxalate
	$HOOC.COO-$	bioxalate
oxaminic	$NH_2COCOO-$	oxaminate
oxybenzoic	HOC_6H_4COO-	oxybenzoate
palmitic	$C_{15}H_{31}COO-$	palmitate
perchloric	ClO_4-	perchlorate
periodic	IO_4-	periodate
phosphoric	$PO_4\equiv$	ortho-phosphate (triphosphate)
	PO_3-	meta-phosphate
	$P_2O_7=$	pyro-phosphate
	H_2PO_4-	acid phosphate
	$HPO_4=$	phosphate
	$P_2O_7\equiv$	pyrophosphate
phosphorous	$PO_3\equiv$	ortho-phosphite
	PO_2-	meta-phosphite
	$P_2O_5\equiv$	pyro-phosphite
phthalic	$C_6H_4(COO)_2=$	phthalate
picric	Same as trinitrophenol	
propionic	C_2H_5COO-	propionate
pyrogallic	Same as trihydroxybenzene	
pyruvic	$MeCO.COO-$	pyruvate
salicylic	HOC_6H_4COO-	salicylate
selenic	$SeO_4=$	selenate
selenious	$SeO_3=$	selenite
silicic	$SiO_4\equiv$	ortho-silicate
	$SiO_3=$	meta-silicate
stearic	$C_{17}H_{35}COO-$	stearate
suberic	$C_6H_{12}(COO)_2=$	suberate
succinic	$-OOC.CH_2CH_2.COO-$	succinate
sulfonic acid	$-SO_2OH$	(see sulfonic acids)
sulfanilic	$NH_2C_6H_4SO_3-$	sulfanilate
sulfuric	$SO_4=$	sulfate
	HSO_4-	bisulfate
sulfurous	$SO_3=$	sulfite
	HSO_3-	bisulfite
tannic	$C_{14}H_9O_9-$	tannate
tartaric	$(CHOH)_2-(COO)_2=$	tartrate
	$C_2H_2(OH)_2COOH.COO-$	bitartrate
	$-OOC.CHMe.CH_2.COO-$	pyrotartrate
tartronic	$-OOC.CHOH.COO-$	tartronate
telluric	$TeO_6\equiv$ and $TeO_4=$	tellurate
tellurous	$TeO_3=$	tellurite
thioacetic	$MeCOS-$	thioacetate
thiocyanic	$SCN-$	thiocyanate
titanic	$TiO_3=$	titanate
toluylic	$C_6H_4MeCOO-$	toluylate
tungstic	$W_2O_7=$ or $WO_4=$	tungstate
wolframic	Same as tungstic	

radical. **oxygen-** Oxy a. (inorganic). **oxyhalogen-** An a. containing oxygen and a halogen; as, $HClO_3$. **para-** An organic a. derived from aromatic hydrocarbons and containing the radicals in the para-position. **pentatomic-** An a. containing five hydrogen atoms which can be replaced by metals or basic radicals. **pentabasic-** Pentatomic. **phenol-** Phenol acids. **plant-** Those derived from vegetable sources. **polyatomic-** An a. containing more than one hydrogen atom which can be replaced by metals or basic radicals. **polybasic-** Polyatomic. **pseudo-** (1) A tautomeric form of an organic a. (2) An a. containing hydroxyl radicals:



true a. pseudo a.

pyro- An acid derived by the action of heat; usually an intermediate compound between acids and acid anhydrides. **racemic-** An organic acid consisting of a molecular mixture of optically active dextro- and levo- compounds. Cf. *tartaric acid*. **resin-** Acids derived from resins, *q.v.* **soldering-** Hydrochloric a. of varying strength used for soldering. **Spekker-** A mixture of equal volumes of sulphuric acid (d.1.84) and phosphoric acid (d.1.75) used to dissolve iron alloys in preparation for analysis, particularly with the Spekker photoelectric absorptiometer. **sulfinic-** An acidic organic compound in which an H atom is replaced by the SO_2H group. They are named from the hydrocarbon; as, ethanesulfinic acid*, $EtSO_2H$. **sulfo-** An organic acid in which sulfur replaces the carbon atom of the carboxyl group. Cf. *thioacids*. **sulfonic-** An acidic organic compound in which a H atom is replaced by the SO_2OH group. They are named from the hydrocarbon; as, ethanesulfonic acid*, $EtSO_3H$. **tetrabasic-** Tetratomic. **tetrahydric-** Tetratomic. **tetrahydroxy-** An organic acid containing four hydroxy groups and one or more carboxyl groups. **tetratomic-** An acid containing four hydrogen atoms which can be replaced by a metal or basic radical. **thio-** An acid in which one or more sulfur atoms replaces the oxygen of the acid radical; *e.g.*, thiosulfuric, thiolic, thionic acid, etc. Cf. *sulfo-acids*.

a. of air. Carbon dioxide. **a. albuminate.** A metaprotein soluble in weak alkali. **a. of amber.** Succinic acid. **a. amide.** An organic compound containing the monovalent formamyl radical, $—CONH_2$. Cf. *a. imide*. **a. anhydride.** An acid from which one or more molecules of water have been removed; *e.g.*, SO_3 is the anhydride of H_2SO_4, MeCO.O.OCMe is the anhydride of MeCOOH. **a. of ants.** Formic acid. **a. of apples.** Malic acid. **a. of benzoin.** Benzoic acid. **a. bordeaux.** Bordeaux B. **a. brown.** Naphthylamine brown. **a. capacity.** The number of OH^- ions which a molecule of a base yields in an aqueous solution; thus, NaOH is monoacid, $Ca(OH)_2$ is diacid and, hence, have an **a. capacity** of one, two, respectively. **a. chloride.** A compound containing the monovalent —COCl radical; *e.g.*, acetyl chloride, MeCOCl. **a. dyes.** Any coloring matter for wool or silk which acts as a base and is used as a dye in an acid bath. **a. egg.** An earthenware jar used for storing acids. **a. esters.** The derivatives of polyvalent organic acids in which some of the acid hydrogen atoms are and some are not replaced by a radical (R); hence, compounds that contain both the COOH and COOR groups. **a. fuchsin.** Acid magenta II, acid rosein. The di- and tri-sulfonic acids of rosaniline and pararosaniline which are used as a stain and indicator. **a. function.** Hydrogen ion. **a. group.** The monovalent carboxyl radical, —COOH, which is present in all organic acids. **a. halide.** An organic compound containing the monovalent —COX radical in which X is a halogen (Cl, Br, I, or F), as,

acid bromides, R-oyl bromide*.....	R—COBr
acid chlorides, R-oyl chloride*.....	R—COC
acid fluorides, R-oyl fluoride*.....	R—COF
acid iodides, R-oyl iodide*.....	R—COI

a. hydrazide. An organic compound containing the monovalent $—CONHNH_2$ radical; as, acethydrazide $MeCONHNH_2$. **a. hydrogen.** The hydrogen of the —COOH group in organic compounds which can be replaced by metals, alkyls, aryls or basic radicals. **a. ions.** A negatively charged atom (*e.g.*, Cl^-) or radical (*e.g.*, SO_4^{--}). See the table of acid radicals. **a. amide.** A compound containing the —C(:NH)OH radical. Cf. *a. amide*. **a. infraprotein.** An acid metaprotein. **a. of lemon.** Citric acid. **a. of milk.** Lactic acid. **a. mordant dyes.** An acid dye requiring a mordant for its fixation upon fibres. **a. number.** A measure of free fatty acids in animal and vegetable fats. It is the number of mg. KOH necessary to neutralize the free fatty acids in one gram of fat. **a. nitriles.** Nitriles. **a. peroxides.** An organic compound containing the bivalent —CO.O—O.CO— radical; *e.g.*, acetyl peroxide $(C_2H_3O)_2O_2$. Cf. *a. anhydride*. **a. proof material.** Any substance resisting the corroding effect of a.; as, stoneware or certain alloys. **a. proof stain.** See *table* top impregnation. **a. pump.** A pressure pump used for drawing a. or ammonia from carboys. **a. radicals.** (1) A mono- or polyvalent radical derived from a mono- or polyvalent a. by subtracting one or more hydrogen atoms. See the table. (2) In organic chemistry the acyl radical is sometimes known as the acid radical and has the suffix carbonyl or -oyl; as, benzoyl, PhCO—. **a. rock.** A rock containing more than 60 % Si. **a. salt.** A compound derived from a. and bases in which only a part of the hydrogen of the a. is replaced by a basic radical; *e.g.*, an acid sulfate $NaHSO_4$ or an acid carbonate, $NaHCO_3$. They are usually designated with the prefix, bi-; *e.g.*, bisulfate, bicarbonate, etc. **a. solution.** An aqueous solution containing more hydrogen ions than hydroxyl ions (see *hydrogen-ion concentration*). **a. of sugar.** Oxalic acid. **a. sulfate.** Bisulfate, disulfate. An inorganic compound containing the monovalent $—HSO_4$ radical derived from sulfuric acid. **a. value.** (1) Acidity expressed in terms of normality. (2) A. number.

acidamide. An organic compound containing the radical $—CONH_2$. Cf. *acid imide*.

acidation. (1) Acidylation. Conversion into an acid. (2) Acidification, or making a solution acidic.

acidify. To add an acid to a solution until the pH value falls below 7.0.

acidimeter. Obsolete term for hydrometer.

acidimetry. The titration of an acid with a standard alkali solution (see *quantitative analysis*).

acidity. (1) Sourness. See *taste.* (2) An excess of hydrogen ions in aqueous solution, which is measured in two ways: (*a*) the intensity of action (*=degree* of acidity) expressed as pH value (where 10^{-7} gm. H^+ per liter is neutral) and (*b*) the amount of action (*=amount* of acidity) expressed as normality (gram-equivalent per liter). Antonym: Alkalinity. (3) The power of a base to unite with one or more equivalents of an acid. Antonym: Basicity. **amount of-** The normality or percentage of an acid as determined by titration (effective acid). **degree of-** The strength of an acid expressed by its hydrogen ion concentration (free acid). Cf. pH.

acidol. $C_5H_{11}O_2N.HCl$ = 153.6. Betaine hydrochloride. Colorless crystals; soluble in water. It is used as substitute for HCl in digestive disturbances.

acids. See the tables:

R.COOH	
$C_nH_{2n+1}COOH$	fatty acids
$C_nH_{2n-1}COOH$	acrylic acids, alicyclic acids
$C_nH_{2n-3}COOH$	acetylene acids, fatty acids (C).
$C_nH_{2n-7}COOH$	aromatic acids (1).
$R(COOH)_2$	
$C_nH_{2n}(COOH)_2$	oxalic acids
$C_nH_{2n-2}(COOH)_2$	fumaric acids
$C_nH_{2n-4}(COOH)_2$	acetylenedicarboxylic acids
$C_nH_{2n-8}(COOH)_2$	aromatic acids (2).
HO.R.COOH	alcohol acids, phenol acids
R(CO)COOH	ketone acids
NH_2.R.COOH	amino acids
$R.SO_3H$	sulfonic acids
$H_xS_yO_z$	sulfuric acids
R.COSH	thiocarbonic acids

acidulation. Acidation.

acidulate. Acidify.

acidulin. A brand of glutamic acid hydrochloride.

acidum. The Latin for acid; *e.g.*, **a. aceticum.** See *acetic acid;* **a. benzoicum.** See *benzoic acid;* etc.

acidylate. Acylate. The introduction of an acid radical into an organic compound; as, *acetylate, benzoylate*

acidylation. Acylation. The process of introducing an acid radical into an organic compound; *e.g.*, acetylation (acetyl radical), benzoylation (benzoyl radical), formylation (formyl radical), etc.

acieral. An aluminum alloy containing 3–6 % Cu, 0.1–1.4 % Fe, 0–1.5 % Mn, 0.5 %–0.9 % Mg and 0–0.4 % Si. Cf. *aerometal.*

acinitro compound. A colored isomer of a nitro compound which contains a monovalent —OR and monovalent —NO group. They are derived from nitro-compounds by a metatenomeric change.

acitrin. $C_{18}H_{15}O_2N$ = 277.1. 2-Phenylcinchonic acid ethyl ester, ethyl phenylcinchonate. A pale yellow, crystalline powder, odorless, tasteless, m.61; soluble in water or alcohol. Used medicinally in gout and rheumatism.

acivinil alcohols. Unsaturated *ketols.*

Acker process. The manufacture of sodium hydroxide by electrolysis of molten salt using molten lead as cathode and steam as reagent.

Ackermann automatic reckoner. A calculating device consisting of two circular disks with scales and pointer, used for determining the dry substance of milk from its specific gravity and fat content.

acme burner. A bunsen burner with regulators for gas and air, constructed so that the flame cannot strike-back.

acmite. $NaFeSi_2O_6$. Aegirite. A rock-forming monoclinic pyroxene, d.3.53, hardness 6–6.5, Mol. Vol. 65.5, which occurs as a brownish, greenish or black *silica* mineral, *q.v.*

acne bacillus vaccine. A vaccine containing the acne bacillus, used in the treatment of mild forms of acne.

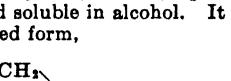
acocantherin. A crystalline glucoside from *Acocanthera abyssinica.* It is the active principle of the shashi arrow poison used by the natives of Eastern Africa, and is supposed to be identical with ouabain.

acoin. Di-p-anisyl-phenetyl-guanidin-chlorhydrate. A white crystalline powder, m.176; soluble in water. Used as a local anesthetic.

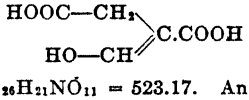
acolytine. Lyaconine. An alkaloid of *Aconitum.*

aconic acid. $C_5H_4O_4$ = 128.06. Formylsuccinic acid lactone, *4.5*-dihydro-5-keto-3-furan carboxylic acid.

The monobasic acid,



Colorless, triclinic crystals, m.164; sparingly soluble in water and soluble in alcohol. It also exists in the hydrated form,



aconine. $C_{26}H_{21}NO_{11}$ = 523.17. An amorphous alkaloid from the root of aconite. **acetylbenzoyl-** Aconitine. **pseudo-** Pseudaconine.

aconite. Aconitum, monkshood, wolf's bane, blue rocket, friar's cowl. The ranunculaceous plant *Aconitum napellus,* whose root and leaves are used medicinally as a fluid extract. **a. alkaloids.** A number of alkaloids occurring in *Aconitum* species, *e.g.*,

aconine	$C_{26}H_{21}O_{11}N$
lycoctonine	$C_{27}H_{41}O_9N$
indaconine	$C_{27}H_{47}O_9N$
neopelline	$C_{32}H_{45}O_8N$
pyraconitine	$C_{32}H_{41}O_9N$
lappaconitine	$C_{32}H_{43}O_9N_2$
aconitine	$C_{34}H_{47}O_{11}N$
japaconitine	$C_{34}H_{49}O_{11}N$
indaconitine	$C_{34}H_{47}O_{10}N$
cynoctonine	$C_{36}H_{34}O_{12}N_2$
pseudaconitine	$C_{36}H_{51}O_{12}N$
bikhaconitine	$C_{36}H_{51}O_{11}N$
jesaconitine	$C_{40}H_{51}O_{12}N$

a. leaves. The dried leaves of *A. napellus*, used similarly to a. *root*. **a. root.** The dried tuberous roots of aconite, containing not less than 0.5% alkaloids. Used as an antineuralgic, sudorific and sedative.

aconitic acid. $C_6H_6O_6$ = 174.1. Citridic acid, equisetic acid, 1-trans-tricarballylic acid, achilleic acid, adonic acid, 1.2.3-propene tricarboxylic acid*. The tribasic acid $COOH.CH_2.C(COOH):CH.COOH$. Colorless crystalline leaflets, m.190, obtained from *Aconitum, Equisetum* (horsetail), *Adonis* and *Achillea* species, or made from citric acid. It occurs also in beets and sugar cane.

aconitine. $C_{34}H_{47}O_{11}N$ = 645.4. Acetyl-benzoyl-aconine. An extremely poisonous alkaloid from the root of *Aconitum napellus*. Colorless, rhombic prisms, or an amorphous powder, m.195; slightly soluble in water, readily soluble in alcohol or ether. Used as a circulatory sedative. Cf. *benzaconine, aconite alkaloids*. **pseudo-** Pseudaconitine. **a. arsenate.** Colorless crystals, soluble in water or alcohol. **a. hydrobromide.** $C_{34}H_{47}O_{11}N.HBr.2\frac{1}{2}H_2O$ = 771.5. Colorless crystals, m.163, soluble in water or alcohol. Used as a cardiac, respiratory or spinal sedative, vasodilator, diuretic, antipyretic and diaphoretic. **a. hydrochloride.** $C_{34}H_{47}O_{11}N.HCl.3H_2O$ = 736.1. Colorless l-rotatory crystals, soluble in water or alcohol and used as the hydrobromide. **a. nitrate.** $C_{34}H_{47}O_{11}N.HNO_3.5H_2O$ = 798.65. Colorless, l-rotatory crystals, which are soluble in water or alcohol. Used instead of the hydrobromide for hypodermic medication. **a. phosphate.** $C_{34}H_{47}O_{11}N.H_3PO_4$ = 743.4. A white crystalline powder which is soluble in water or alcohol. **a. salicylate.** $C_{34}H_{47}O_{11}N.C_7H_6O_3$ = 783.5. White crystals, soluble in water or alcohol. **a. sulfate.** $(C_{34}H_{47}O_{11}N)_2.H_2SO_4$ = 1389.02. Colorless l-rotatory crystals, soluble in water or alcohol.

Aconitum. A genus of poisonous plants of the Ranunculaceae family. See *aconite*.

aconityl phenetidine. Apolysin.

acopyrin. Acetopyrin.

acoretin. A neutral resin obtained by the oxidation of the aqueous extract of sweet flag root, *Acorus calamus*.

acorin. $C_{36}H_{60}O_6$ = 588.6. A glucoside from calamus; the rhizome of *Acorus calamus* (sweet flag), (Araceae); used in perfumery.

acorn. The fruit of the oak, *Quercus robur*, used as astringent in diarrhea. **a. flour.** Racahout. **a. sugar.** Quercitol. **a. tube.** A small thermionic valve.

acoustics. A branch of science dealing with sound, and its effects.

acqua. The Italian word for water.

acquired immunity. The resistance of an organism resulting from an attack by an infectious disease. It can also be artificially produced by treatment with a vaccine, serum, etc.

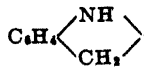
acraldehyde. Acrolein.

acre. A surface measure, 1 acre = 0.4047 hectare = 4 rods = 160 poles = $\frac{1}{640}$ sq. mile.

Acree-Rosenheim reaction. A test for proteins and tryptophane. When the solution plus dilute formaldehyde is layered on concentrated sulfuric acid, a purple ring indicates proteins.

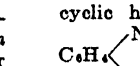
acrid. Pungent, bitter, burning or irritating; as, a drug, or sensation.

acridan. $C_{13}H_{11}N$ = 181.15. 5,10-dihydroacridine. The compound



acridic acid. $C_{11}H_7O_4N$ = 217.0. Acridinic acid, α,β- or 2.3-quinoline dicarboxylic acid, $C_9H_5N(COOH)_2$. Colorless crystals which decompose at 130. It is an oxidation product of acridine.

acridine. $C_{13}H_9N$ = 179.15. A tricyclic, heterocyclic hydrocarbon obtained from coal tar.



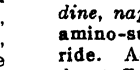
Colorless leaflets, m.109, b.346; soluble in water or alcohol. Used in the synthesis of dyes and drugs and the treatment of trypanosomiasis. Cf. *benzacridine, naphthacridine, chrysaniline, rivanol*. **diamino-sulfate.** Proflavine. **diamino- -chloride.** Acriflavine. **diaminodimethyl-** A yellow dyestuff. **dihydro-** Acridan. **dihydroketo-** Acridone. **diphenanth-** Diphenanthacridine.

a.-dye. Any dyestuff derived from acridine; as, *acriflavine*. They are characterized by fluorescent solutions.

acridinic acid. Acridic acid.

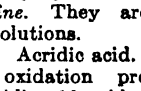
acridol. An oxidation product of acridine, probably acridine-10-oxide.

acridone. $C_{13}H_9ON$ = 195.08. Ketodihydroacridine,



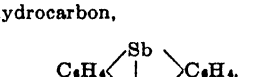
Colorless crystals, m.354; insoluble in water and slightly soluble in alcohol or ether.

acridostibine. $C_{13}H_9Sb$ = 286.92. The heterocyclic hydrocarbon,



acridyl. The monovalent radical $C_{13}H_8N$—, derived from acridine.

acriflavine. $C_{14}H_{14}N_3Cl$ = 261.8. 4,8-diamino-1-methylacridine chloride, trypaflavine



A brownish-red, crystalline powder, soluble in water or alcohol giving a fluorescent solution. An antiseptic and disinfectant. **a. hydrochloride.** A more soluble form containing 1 mol. HCl. **a. neutral.** The less soluble form, without HCl.

acrimonious. Bitter, caustic, sharp; as, a taste.

acrinyl. p-hydroxybenzyl. The monovalent C_7H_7O— radical. ($HO.C_6H_4.CH_2$—). **a. isothiocyanate.** C_8H_7ONS = 165.1. The compound, $C_7H_7O.NCS$, which occurs in white mustard oil and is a splitproduct of sinalbin. **a. sulfocyanate.** $C_7H_7O.CNS$ = 165.13. An oily, colorless liquid found in white mustard oil, which is insoluble in water.

Acrocomia. The coyol palm of Central and South America. An oil is extracted from the nuts.

acro-dextrin. Achroodextrin.

acrol. The divalent $CH_2:CH.CH=$ radical derived from acrolein, (cf. *acryl*).

acrolactic acid. Glucic acid.

acroleic acid. Acrylic acid.

acrolein. C_3H_4O = 56.05. Acrylic aldehyde, propenal*, allyl aldehyde, ethylene aldehyde, $CH_2:CH.CHO$. A decomposition product of

glycerol and glycerides. A yellow or colorless liquid with pungent odor, d.0.84, b.52.4; soluble in water, alcohol or ether. Used in chemical warfare as an irritant, and also in organic synthesis. Inflammable. Cf. *acrol, acryl.* **di-methyl-** Tiglaldehyde. **furfur-** *Furfuracrolein.* **met-** See *metacrolein.* **methyl-** Crotonaldehyde. **2-naphthyl-** $C_{13}H_{10}O$ = 182.1. Pale yellow needles, m.48, $b._{0.4mm}$160–170. **phenyl-** Cinnamaldehyde.

acrolite. A synthetic resin from phenol and glycerol.

acromelin. $C_{17}H_{16}O_9$ = 364.12. A lactone obtained from *Physcia acromela.*

acrometer. A hydrometer for determining the specific gravity of oils.

acronarcotic. A drug which is acrid and narcotic; as, aconite, sanguinaria or veratrum.

acronol. A trade name for basic dyestuffs.

acropeptides. Complex amino acids produced by the action of hot glycerol on gelatin.

acrose. $C_6H_{12}O_6$ = 180.09. A synthetic carbohydrate obtained by the action of dilute NaOH on glycerose. *α-* Same as *i*-fructose.

acrosite. Pyrargyrite.

acryl. The organic, monovalent radical C_3H_3O— derived from acrolein. **alpha-** The monovalent radical $CH_2{:}C(CHO)$— **beta-** A monovalent radical occurring in two isomeric forms:

HC.CHO	HC.CHO
‖	‖
HC—	—CH
cis-	trans-

acrylaldehyde. Acrolein.

acrylate. A salt of acrylic acid containing the monovalent $C_3H_3O_2$- radical.

acrylic acid. $C_3H_4O_2$ = 72.05. Acroleic acid, propenoic acid*, propene acid, ethylenecarboxylic acid, $CH_2{:}CH.COOH$. An oxidation product of acrolein. A colorless liquid with pungent odor, m.10, b.140, $d._{16}$ = 1.062; soluble in water. *α,β-*dimethyl- See *angelic* and *tiglic* acid. *β,β-*dimethyl- Senecioic acid. *β-*ethyl- *α-*Pentenic acid. *α-*hydroxy- Pyruvic acid. imidoazole- Urocanic acid. *α-*methyl- $CH_2{:}$-$CMe.COOH$ = 80.046. Methacrylic acid. An isomer of butenic acid, d.1.015, m.16, b.160.5. *β-*methyl- See *crotonic* and *isocrotonic acid.* *α-*phenyl- Atropic acid. *β-*phenyl- Cinnamic acid. propyl- Hexenoic acid*.

a. acids. Olefine acids. A series of unsaturated aliphatic acids of the general formula, $C_nH_{2n-2}O_2$; as:

acrylic acid	$C_2H_3.COOH$
butenic acids (crotonic, isocrotonic, vinylacetic and methylacrylic acid).	$C_3H_5.COOH$
pentenic acids (tiglic, angelic and senecioic acid).	$C_4H_7.COOH$
hexenic acids	$C_5H_9.COOH$
teracrylic acid	$C_6H_{11}.COOH$
hypogeic acid	$C_{15}H_{29}.COOH$
oleic, elaidic acid	$C_{17}H_{33}.COOH$
erucic, brassidic and behenic acid	$C_{21}H_{41}.COOH$

a. aldehyde. Acrolein.

acrylonitrile. Vinylcyanide.

acrylophenone. C_9H_8O = 132.06. Phenylvinyl ketone, $CH_2{:}CH.COPh$. An isomer of cinnamaldehyde. *β-*phenyl- Chalcone.

acrylyl. The monovalent radical $CH_2{:}CH.CO$—, derived from acrylic acid.

Actæa. A genus of ranunculaceous herbs:

acterol. An irradiated *ergosterol,* q.v.; 1 cc. = vitamin D of 100 cc. cod liver oil.

actiniasterol. A sterol, m.145, from sea anemone, *Anemonia sulcata.*

actinic. Pertaining to radiations; especially light that produces a chemical change. **a. rays.** Those rays of the spectrum which produce chemical changes; they occur in the violet and ultra violet regions. Cf., *irradiation, activation, ultraviolet, quantum efficiency.*

actinine. $C_{13}H_{24}O_5N_2$ = 288.3. An alkaloid from *Actinea equina.*

actinism. The study of chemical changes produced by radiations. Cf. *photochemistry, irradiation, excitation, activation.*

actinium. Ac = 227. A radioactive element, atomic number 89. It was discovered in 1899 by DeBierne in pitchblende, and is identical with the anemium of Giesel (1902). It is trivalent, an isotope of mesothorium 2, and the predecessor of the actinium series. See *radioactive substances.* **a. emanation.** Actinon. **a. series.** A series of radioactive disintegration products derived from uranium 2.

actinodaphnine. $C_{19}H_{19}NO_4$ = 325.15. An alkaloid from *Actinodaphne* species, Lauraceae, resembling laurotetanine, *q.v.* Cf. *bulbocapnine.*

actinolite. A green, rock-forming calcium, magnesium and iron amphibole resembling tremolite, $Ca(MgFe)(SiO_4)_3$, d. 3–3.5; its fibrous variety is asbestos.

actinometer. (1) A screen which fluoresces under the influence of radioactive rays and is used as a photometer. (2) A device for measuring the power of actinic rays. Cf. *uroxameter.*

actinomycetin. An antibiotic substance obtained from cultures of *Streptomyces albus.*

actinomycin. An antibiotic substance found in cultures of *Streptomyces antibioticus;* it consists of two fractions, A and B.

actinon. An = 222. Actinium emanation, Act-Em, an isotope of niton, Nt, atomic number 86. It is the gaseous disintegration product of actinium. Cf. *radioactive series.*

actinouranium. An isotope of uranium and a primary radio-element of At. No. 92. Cf. *radioactive series.*

actinozoa. A class of animals of the phylum Coelenterata, or jelly-fishes, which are characterized by star-like structures.

action. The physical concept of activity or work performed in unit time; hence: *action = energy × time* or *momentum × distance;* hence, a = mv^2t = mvs, where m is the mass, v the velocity, t the time and s the distance traversed. **chemical-** Any reaction, q.v., or a change in which the atoms of a molecule or molecules are rearranged. **electronic-** The change of an electron from one to another energy level, q.v. Cf. *excitation.* **physical-** Any transformation of matter which does not affect molecular structure.

activated. Rendered active, reactive, or excited. **a. atom.** See *atom*. **a. carbon.** Charcoal produced by the destructive distillation of vegetable matter; as, wood, rice-hulls, nut-shells, etc., with or without the addition of chemicals. It is used in powdered form for decolorizing sugar solutions, oils, fats, etc., or in granular form as an adsorbent in gas-masks and for the recovery of solvent vapors. Cf. *norit, boneblack, revivification*. **a. molecule.** A molecule with one or more excited atoms. Cf. *irradiation, excitation*. **a. sludge.** The oxidized and flocculent sediment of sewage which contains different types of bacteria. **a. s. process.** A method of sewage disposal in which the sewage is agitated in contact with air, causing thereby oxidation and flocculation by bacterial action; it is left to settle in separation tanks, and yields a harmless and clear effluent.

activation. (1) Any method by which a metallic catalyst is rendered active or is regenerated; as, heating platinum sponge. Cf. *revivification*. (2) The transformation of an inactive enzyme (zymogen) into an active enzyme by a third substance (kinase); *e.g.*, pepsinogen (the *zymogen*) is transformed by HCl (the *kinase*) into pepsin (the *active enzyme*). (3) Excitation. (4) Irradiation. (5) A. of carbon, *e.g.*, by heating with chlorine, steam, carbon dioxide, or sulfuric acid.

activator. (1) A catalyst. (2) A substance used in flotation to produce a coating having metallic properties; as, sodium sulfide for lead carbonate ores; or copper sulfate for sphalerite.

activatory. See *phase*.

active. (1) Dynamic or working, as opposed to static or inert. (2) Having optical properties, as an asymmetric carbon atom. Cf. *optical activity*. **a. deposit.** The formation of a radioactive layer on a substance which is exposed to the emanation of radio-elements. **a. immunity.** The stimulation of an organism which produces protective substances against infection by bacteria. **a. immunization.** The processes by which the protective agencies of an organism are caused to resist a bacterial invasion. **a. mass.** The number of moles (gram-molecules) in a unit volume (1 liter). **a. oxygen test.** A test for rancidity in fats, by the liberation of iodine from potassium iodide in acetic acid. **a. principle.** The substance which is the cause of the physiological action of a drug: *e.g.*, an alkaloid, glucoside, or essential oil.

activin. An organic iodine compound of casein used medicinally.

activity. (1) The rate at which an agent works. Compare *action*. It is measured in watts. (2) The ratio of the escaping tendency (*fugacity*) of two phases at the same temperature: $a = f_1/f_1^\circ = p_1/p_1^\circ$; one phase taken as standard. A correction applied to the actual concentration (c) of a strong electrolyte, which enables it to satisfy Ostwald's dilution law (q.v.). (3) A measure of interionic forces. Cf. *a. coefficient*. **a. of activated carbon.** The percentage of carbon disulfide vapor absorbed by carbon (generally 50 %). **amylolytic-** The digestive power of amylase. **enzyme-** The rate at which an enzyme works. **excited-** Active deposit. **ionic-** Thermodynamic concentration. In a dilute solution which obeys the gas laws, the i.a. equals the concentration; in other solutions it is that value, which with the fugacity (q.v.), ensures that the gas laws still hold. **optical-** The capacity of a substance to rotate the plane of polarized light. This depends on the presence of, at least, one asymmetric carbon atom in the structure of the compound. **peptic-** The digestive power of pepsin. **radio-** See *radioactivity*. **tryptic-** Digestive power of trypsin.

a. coefficient. The ratio, a/c; see activity (2).

actol. Silver lactate.

acton. Ethyl orthoformate.

actor. A compound which takes part in both primary and secondary reactions. See *induced reactions*.

acute. Quick, short or sharp. Cf. *chronic*. **a. poisoning.** See under *poisoning*.

acyclic. The structure of organic compounds which contain no ring-system, as in the methane series. Synonym: Aliphatic or chains. Antonym: Cyclic, aromatic or rings.

acyl. An organic radical derived from an organic acid by the removal of the hydroxyl group; hence, R.CO—is the a. radical of R.CO.OH, $R.SO_2$—is the a. radical of $R.SO_2.OH$. It is also known as the acid radical. See *acetyl, benzenesulfonyl, benzoyl*, etc. **a. derivatives.** Any organic compound containing an a. radical, such as amides, $R.CO.NH_2$, acyl chlorides, R.CO.Cl. **a. radical.** Acyl.

acylation. Acidylation. The formation or introduction of an acyl radical in or into an organic compound.

acyloin. An organic compound of the type R.CO.CHOH.R, formed by condensation of aldehydes, which readily oxidizes to diketones; as, Ph.CO.CHOH.Ph, benzoin.

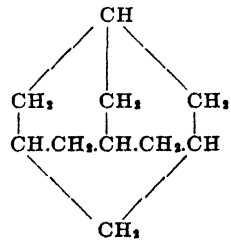
aczol. An ammoniacal solution of zinc and copper phenolates used as a wood preservative.

adaline. $C_7H_{13}O_2N_2Br = 237.1$. Carbromal, bromodiethyl-acetyl-carbamide, α-bromo-α-ethyl-butyryl urea, $Et_2CBr.CO.NH.CO.NH_2$. A white, odorless, crystalline powder, m.116°; slightly soluble in water and soluble in alcohol. Used medicinally as a hypnotic and sedative.

Adam galactometer. A graduated burette with two glass bulbs, used in milk analysis.

adamant. A hard mineral or substance; as, diamond.

adamantane. $C_{10}H_{16} = 136.2$. Tricyclodecane. The hydrocarbon



adamantine. Diamond. **a. boron.** See *boron*. **a. spar.** A dark-grayish, smoky variety of corundum from India; it is green in transmitted light.

adamellose. An igneous rock of the andesite-diorite series, containing hornblende, feldspar, quartz, chlorite, agnetite, apatite, and rutile. It is found at Pigeon Point, Minnesota.

Adami's theory. The lateral chain theory of heredity expressed in terms of biophoric molecules.

adamine. Adamite.

adamite. Zn_2HAsO_5. Adamine. A native zinc arsenate, which occurs in yellow orthorhombic crystals in Chile, Greece, France.

Adamkiewicz reaction. A test for proteins made by layering on glacial acetic acid and concentrated sulfuric acid; proteins give a violet ring.

adamon. Dibromo-dihydro-cinnamic acid ester of borneol. Used medicinally as a sedative and anaphrodisiac.

Adam's apple. (1) The fruit of the plantain tree, *Musa paradisiaca*. (2) The projection of the thyroid cartilage of the larynx. **A's. needle.** Yucca.

adamsite. (1) A greenish-black variety of mica. (2) Diphenylamine chlorarsine.

Adansonia. A genus of trees of the Bombacaceae. *Adansonia digitata*, the baobab tree of Africa, yields boui or monkey bread which is used by natives as food. The bark is used as emollient, the dried leaves, lalo, are used by the natives as an antipyretic; the fibers are used for paper.

adansonine. An alkaloid from the bark and leaves of *Adansonia baobab* or *A. digitata* of Africa and India. Colorless white crystals, used medicinally as a febrifuge.

adaptation. The advantageous adjustment of an organisms to a change in its surrounding.

adapter. A tapered glass tube which is used to connect a retort or condenser with the receiving vessel.

adatom. An atom adsorbed on a surface in such a way that it will migrate over the surface like a two-dimensional gas (at certain temperature). Cf. *adion*.

addition. A chemical reaction which involves no change of valency; usually the union of two binary molecules to form a more complex compound; as, $HCl + NH_3 = NH_4Cl$. **a. compound.** An inorganic compound formed by addition; *e.g.*, NH_4Cl.

additive. Added to. **a. compound.** An organic compound formed by the saturation of an unsaturated compound containing one or more double or triple bonds. *E.g.*, benzene dichloride, $C_6H_6Cl_2$ is an additive compound of benzene, C_6H_6. It differs from substituted compounds, *e.g.*, dichlorobenzene, $C_6H_4Cl_2$. **a. properties.** A property of a molecule which is the sum of the individual properties of the atoms or linkages composing it. Thus, in absence of molecular association, the molecular refractivity of a molecule is given by the sum of the atomic refractivities of its atoms, due allowance being made for the types of linkage which bind them.

adduction. Oxidation.

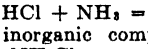
adelite. $MgCaHAsO_5$. A native calcium magnesium arsenate of the wagnerite group, which occurs in monoclinic gray crystals.

adelomorphic cell. Any living cell of uncertain or indefinite shape; *e.g.*, an ameba.

adenantherine. A crystalline alkaloid resembling physostigmine, obtained from *Adenanthera pavonia*, order *Leguminosae*.

adenase. A deamidizing enzyme in animal tissues which hydrolyses adenine to hypoxanthine.

adenine. $C_5H_5N_5$ = 135.12. 6-aminopurine. A purine base derived from nucleic acid and found in the pancreas, spleen and other glands. White needles, m.360; slightly soluble in water or alcohol. **a. nucleotide.** Adenosin triphosphoric acid, adenylpyrophosphoric acid. The compound: $H_4P_2O_7[(C_5H_4N_5)$-$CH.(CHOH)_2CH.CH_2OPO_3H_2]$, the primary



constituent of resting muscle.

adenoid. Resembling a gland or pertaining to glands.

adenos. A fine quality of cotton from Aden, Asia Minor.

adenosin. $C_{10}H_{13}N_5O_4$ = 267.1. Adenine riboside. A glucoside from nucleic acid consisting of adenine and d-ribose. Colorless needles, m.229°, soluble in water. **a. phosphoric acid.** Adenylic acid. **a. triphosphoric acid.** Adenine nucleotide.

adenylic acid. $C_{10}H_{13}N_5O_4.HPO_3$ = 347.18. Adenine-ribose phosphate, adenosin phosphoric acid. A nucleotide from red blood corpuscles, muscle, yeast, etc. consisting of adenine, ribose and phosphoric acid. White needles, m.197. It lowers the blood pressure and intestinal motion. Cf. *adenine nucleotide, inosinic acid, guanylic acid*.

adeps. Any animal grease or fat, *e.g.*, lard. **a. lanae.** Lanolin. **a. mineralis.** Vaselin.

adermin. The anti-dermatitic vitamin B_6, obtained from yeast extract by dialysis.

adfluxion. Affluxion.

adglutinate. Agglutinate.

adhatotic acid. An organic acid from the leaves of *Adhatoda vasica*, an Acanthaceae. Cf. *vasicine*.

adhere. To be attached to or to stick to a different substance. Cf. *cohere*.

adhesion. The attraction or force which holds unlike molecules together. Cf. *cohesion, wetting, adsorption*.

adhesive. Any substance that sticks or binds materials together; as, adhesive plaster or paste. **a. meter.** An apparatus to determine the relative viscosity of materials; chiefly asphalts and road materials.

adiabatic. A change occurring without a loss or gain of heat. Cf. *Reech's theorem*. **a. calorimeter.** An instrument for the study of reactions in which there is a minimum loss of heat; *e.g.*, *Riehe calorimeter*. **a. elasticity.** The modulus of elasticity of a gas undergoing a change in volume without transference of heat; *e.g.*, in explosions. **a. expansion.** The expansion of a gas considered without the production of a cooling effect. **a. processes.** Any experiment carried out under such conditions that no heat can leave or enter the system.

adiactinic. A substance which does not transmit photo-chemically active radiations.

adicity. Valency.

adinole. A mineral consisting of metallic silver and albite.

adion. An adsorbed ion. Cf. *adatom*.

adipaldehyde. $C_6H_{10}O_2$ = 114.08. Hexanedial*, adipic dialdehyde, $CHO(CH_2)_4CHO$. An oily liquid, b.94.

adipamide. $C_6H_{12}O_2N_2$ = 144.11. Adipic diamide 1.4-butanedicarboxamide, hexanediamide*, $NH_2CO(CH_2)_4CONH_2$. An isolog of succinamide, m.220.

adipic acid. $C_6H_{10}O_4$ = 146.11. Adipinic acid, butane dicarboxylic acid, hexanedioic acid*. The dibasic acid, $COOH(CH_2)_4COOH$. Colorless or yellowish needles, m.149, b.265; sparingly soluble in water and soluble in alcohol or ether. It is formed during the oxidation of C_6H_{12}, or by the treatment of oleic acid and other fats with nitric acid. **tetrahydroxy-** See

saccharic acids. **a. dialdehyde.** Adipaldehyde. **a. diamide.** Adipamide. **a. ketone.** Cyclopentanone*.

adipinic acid. Adipic acid.

adipoin. $C_6H_{10}O_2$ = 114.08. β-Hydroxy cyclo hexanone. White powder, m.91, very slightly soluble in water.

adipyl. The divalent radical —OC$(CH_2)_4$CO—, derived from adipic acid. **a. chloride.** $C_6H_8O_2Cl_2$ = 192.98. Hexanedioyl chloride*. A colorless liquid, b_{10mm}113.

adjacent position. Adjoining, near. The consecutive arrangement of radicals in an organic ring compound; as, the 1.2- or 1.2.3.-position in the benzene ring (ortho- or adjacent position).

adjective. Supplemental or accessory. **a. dyes.** Those dyes which require a mordant, *q.v.*

adjoining. Adjacent.

adjuvant. An auxiliary drug, which assists the action of another drug.

Adler benzidine reaction. A sensitive test for blood in urine. Cf. *benzidine test.*

adlumine. $C_{21}H_{21}NO_6$ = 383.17. An alkaloid from *Adlumia fungosa*, a Papaveraceae. Cf. bicuculline.

adnephrine. Adrenaline.

adnic. Admirality nickel. An alloy of 70 % Cu, 29 % Ni and 1 % Sn.

adobe. A soil of arid regions, formed by the disintegration of rocks and deposited in microscopic particles consisting essentially of CaO, SiO_2, CO_2, and Fe_2O_3. Brown, clay-like masses used by the natives of Egypt and New Mexico for buildings, bricks and potteries.

adonic acid. $C_5H_3(CO_2H)_3$ = 174.2. An acid occurring in *Adonis vernalis* and supposedly identical with aconitic acid.

adonidin. $C_{24}H_{42}O_9$ = 474.3. A glucoside from *Adonis vernalis*. A hygroscopic, canary-yellow powder of intensely bitter taste; soluble in water or alcohol, but insoluble in ether or chloroform. Used as a heart stimulant and diuretic. Cf. *picroadonidin.*

adonidulcite. A carbohydrate of unknown composition from *Adonis vernalis.*

adonin. $C_{24}H_{40}O_9$ = 472.3. A glucoside from *Adonis vernalis*, used as a heart stimulant and resembling digitalin in its action.

adonis. False hellebore, pheasant's eye. The dried over-ground leaves and stems of *A. vernalis*, (Ranunculaceae) of America and Europe. Used as a fluid extract as a heart stimulant.

adonite. $C_5H_{12}O_5$ = 152.12. Adonitol. A pentatomic alcohol, obtained from *Adonis vernalis.* Colorless needle-like prisms, m.102; soluble in water or alcohol. It changes on oxidation to ribose.

adonitol. Adonite.

adrenal gland. A small gland above each kidney.

adrenalin. $C_9H_{13}O_3N$ = 183.1. Adrenaline, adrenine, adrine, adrenamine, adnephrine, chelafrin, epirenan, epinephrine, hemisin, hemostatin, paranehrin, suprarenine, suprarenaline, supracapsuline, supranephrane, *l*-methylaminoethanol catechol, o-dioxyphenylethanol-methylamine. $C_6H_3(OH)_2.CHOH.CH_2.NHMe$. A light-brown microcrystalline powder, m.205; slightly soluble in water and insoluble in alcohol. It combines with acids to form water-soluble compounds and is decomp. when heated above 210°C. It is obtained from the suprarenal glands of animals and is used for intravenous injections to raise the blood pressure, and as an astringent, hemostatic and heart tonic. **d-.** Dextro-. Is one-fifteenth as active as the l-. **i-.** Inactive-. Is one-half as active as the l-. **l-.** Levo-. The natural or synthetic, physiologically active compound (see above). **a. hydrochloride.** The epinephrine of the trade which is used as adrenalin. **a. bitartrate.** The suprarenine of the trade.

adrenalone. $C_9H_{11}O_3N$ = 181.1. Methylaminoacetocatechol. The ketone of adrenalin, $C_6H_3(OH)_2.CO.CH_2.NHMe$.

adrenine. Adrenaline.

adsorbate. That which is adsorbed.

adsorbent. A substance that adsorbs; as, carbon, charcoal, clay, silica, etc. Cf. *absorbent.* **crystallogenetic-** A crystalline substance which can be dehydrated without loosing its shape. Its structure becomes porous and thus, absorbent; as, chabazite.

adsorption. The ability of a substance (*adsorbent*) to hold or concentrate gases, liquids or dissolved substances (*adsorbate*) upon its surface, a property due to *adhesion*, *q.v.*; hence, producing a change of concentration of the adsorbate on the surface of the adsorbent with respect to the interior concentration of the adsorbate. Cf. *sorption, absorption, desorption, persorption, wetting.* **anomal-** a. which does not follow the a. isotherm; as, with certain colloidal dyes. **apolar-** Nonpolar a. **co-** a. in which two substances are held on a surface, on which neither is adsorbed alone. **differential-** See *differential* a. **heat of-** The calories liberated during a. **negative-** a. in which the surface concentration of the adsorbate is lowered because of preferential a. of the liquid. **nonpolar-.** Apolar-. a. in which nonelectrolytes or equivalent ions of electrolytes are held on a surface. **oriented-** a. in which the molecules are grouped on the surface in a definite direction. Cf. *mono*-molecular film. **polar-** a. in which definite anions or cations are held in nonequivalent amounts. **positive-** a. in which the surface concentration of the adsorbate is higher. **preferential-** Pronounced a. of one substance compared with another of similar physical properties; called *chemo-sorption* in extreme cases. **specific-** (1) Preferential-. (2) The quantity of adsorbate on 1 cm.^{2} surface. **water of-** The water of crystallization of precipitates, which can be driven off below 100°C.

a. analysis. Separation of mixtures by means of the different absorbability of the components. Cf. *capillary* and *chromatographic analysis.* **a. catalysis.** A chemical reaction in which the adsorbent acts as a catalyst, *q.v.* **a. coefficient.** The quantity x of the *a. isotherm.* **a. displacement.** The replacement of one adsorbate on a surface by another. **a. equilibrium.** The distribution of molecules on a surface and in the surrounding medium as expressed by the *a. isotherm.* **a. exponent.** The quantity 1/n of the a. isotherm; its value at constant temperature varies between 1 and 0.1 or less. **a. isotherm.** The approximate, empirical relationship existing between the concentration x, held upon the surface and the amount, c, which is not adsorbed: $x/m = \alpha . c^{1/n}$, where m is the amount of adsorbent and α, 1/n are experimental constants. **a. potential.** The work obtainable when an adsorbate is brought into the *a. space.* **a. space.** The zone between the surface of the adsorbent and

the limit of the adsorbent; the limit of the adsorptive layer.

adsorptive. Adsorbate.

adstringent. Astringent.

adubiri. A fish poison obtained from *Paulowilhelmia speciosa*, used by the natives of the Gold Coast.

adularia. A variety of *orthoclase*.

adulterant. A substance of cheaper or inferior quality, sometimes harmful, which is added to an article, compound or food.

adulteration. (1) The fraudulent addition of a foreign substance, especially harmful preservatives, to food products. (2) The removal of an essential constituent of a substance, as the skimming of milk.

adurol. A hydroquinone derivative, used as a photographic developer.

advection. Heating or cooling effects due to horizontal currents in air or water. Cf. *convection*.

adventitious. Not typical or normal; accidental.

advitant. A proposed name for *vitamin*.

Æ- see also under E.

aegerite. Wurtzite.

aegirite. Acmite.

aenigmatite. A triclinic amphibole, consisting of a mètasilicate of sodium and ferrous iron, which contains some Ti instead of Si. It occurs in black masses of sp. gr. 3.8.

aeolotropic. Anistropic.

aeonite. Wurtzite.

aequum. The amount of food which is just sufficient to support an organism doing work.

aer. Atmos.

aerated water. A water artificially impregnated with oxygen or carbon dioxide; as, soda water.

aerobe. An organism that requires an atmosphere of oxygen for respiration. Cf. *aerobic bacteria*, *anaerobe*.

aerobic bacteria. Certain protophyta which require gaseous oxygen for the maintenance of their vitality. Cf. *anerobic*.

aerobioscope. A device for determining the number of bacteria in air.

aerobiosis. Life sustained in an atmosphere containing oxygen.

aerodynamics. Pneumatics. The study of the motion of gases.

aerofloat. The trade name for flotation agents of the dithiophosphoric acid type.

aeroklinoscope. An air-cell used to float algae upon water.

aerolite. Meteoric stone. A meteorite consisting of a stony mass of silicates. Cf. *siderolite*.

aerometal. An aluminum alloy containing 0.2–4 % Cu, 0.3–1.3 % Fe, 0–0.2 % Mn, 0–3 % Mg, 0–3 % Zn and 0.5–1.0 % Si. Cf. *acieral*.

aerometer. An instrument for determining the density of gases.

aeron. An aluminum alloy containing 1.5–2.0 % Cu, 1.0 % Si and 0.75 % Mn.

aeronautics. The art and science of flying and navigation in the air.

aeroplankton. The organisms (pollen, bacteria, etc.) carried by air.

aerophone. An apparatus to amplify sound waves.

aeroscope. A glass apparatus used to obtain bacteria from air.

aerosiderite. An iron meteorite. Cf. *siderite*.

aerosite. Pyrargyrite.

aerosol. (1) A colloidal system *q.v.* with gas as the surrounding medium; as, smokes and fogs. (2) A trade name for a powerful wetting agent of the sulphonated bicarboxyacid ester type.

aerosphere. Atmosphere.

aerostatics. The branch of physics which deals with gases in mechanical equilibrium. Cf. *hydrostatics*.

aerotherapeutics. The treatment of disease by varying the pressure or composition of the atmosphere in which the patient lives.

aerotonometer. An instrument for determining the pressure of gases in blood.

aerotropic. Attracted by air; as an organism, organ or cell.

ærugo. (1) Cupric subacetate. (2) The oxide or rust of a metal.

æchynite. A resinous, black, orthorhombic mineral which consists of the columbates of calcium, iron, cerium, lanthanum, titanium and thorium.

æscigenin. $C_{12}H_{20}O_2$ = 196.2. A glucoside from the horse chestnut or *Aesculus hippocastanum*.

æscinic acid. $C_{24}H_{40}O_2$ = 360.32. Capsuloesic acid. A monobasic acid obtained from the seeds of *Aesculus hippocastanum*, horse chestnut.

æscorcin. $C_9H_8O_4$ = 180.1. Escorcin. A split-product of aesculin. A brown powder which is soluble in alkalis. A 10–20 % aqueous solution is used in ophthalmology for the detection of defects in the cornea.

æsculetin, aesculetin. Esculetin.

æsculetinic acid. Esculetinic acid.

æsculin, aesculin. Esculin.

æsculinic acid. Esculin.

æthan. German for ethane.

æther. (1) The official Latin; also German, for *ether*, (q.v.), formerly also for ester. (2) The hypothetical universal medium through which electromagnetic waves (*e.g.*, light and heat) are propagated.

ætherische oel. German for essential oil.

aethusine. A volatile alkaloid from *Aethusa cynapium*, which appears to be identical with coniine.

æthyl. German for ethyl.

æthyleni. Official Latin for ethylene.

æthylis. Official Latin for ethyl.

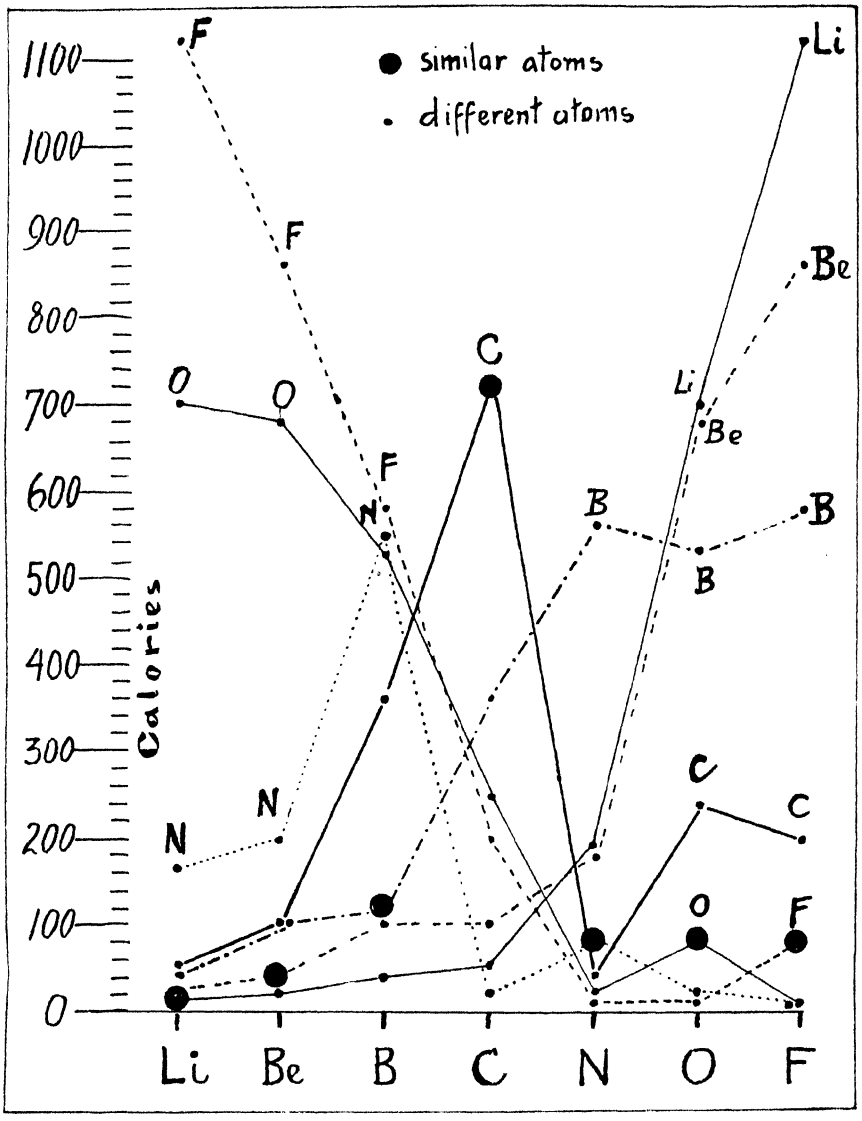
ætioporphyrin. $C_{31}H_{36}N_4$ = 464.5. A split product of hemoglobin and of chlorophyll.

afenil. A brand of calcium chloride urea, $CaCl_2 \cdot 4(NH_2)_2CO$, used in calcium therapy.

affination. A centrifugal filtration process in which a large proportion of the molasses contaminating the raw sugars obtained by the initial concentration of sugar liquors are removed from the sugar crystals.

affinity. The selective tendency of elements to combine with one, rather than another element, when physico-chemical conditions are equal or slightly in favor of the "rejected" element. It is expressed thermodynamically by the *reaction isotherm* (q.v.). See *affinity curve*. **electro-.** See *electro affinity*. **electron-.** See *electron*. **residual-.** See *residual bond*.

a. bond. See *bond*. **a. constant.** The ratio, F_a/F_b, where F_a is the intrinsic tendency of substance *a* to decompose, and F_b the tendency of substance *b* to combine (see *equilibrium* and *dissociation constant*). **a. curve.** A graph obtained when the heat of formation is plotted against the types of combining atoms. It is an expression of the respective electromotive forces and the affinities. In the diagram the first period of the elements is shown. The peak



Affinity curve.

shown by Li:F and F:Li is caused mainly by the electromotive force, whereas the peak shown by C:C is considered to be due to affinity and thus explains the many carbon compounds.

affluxion. Adfluxion. Flowing or coming together.

African kino. Kino. **A. pepper.** Capsicum. **A. saffron.** Carthamus.

afridol. $C_8H_7O_2Hg$ = 351.7. Sodium mercuric hydroxy toluylate, $Hg(OH).C_6H_3Me.COONa$. An odorless, tasteless, white powder, used in the treatment of parasitic skin diseases.

afsal. Urasol.

after. Behind, following in point of time. **a. contraction, a. expansion.** The percentage difference in length of a brick or refractory maintained at high temperature in service. In testing the brick is measured before and after being heated to 1410°C for two hours.

Ag. The symbol for silver (argentum).

agalmatolite. Pyrophyllite.

agamy. Agamogenesis. Asexual reproduction, as opposed to gamogenesis or sexual reproduction.

agaphite. A Persian turquoise.

agar-agar. Agal-agal, Bengal isinglass, Japanese gelatin, Japanese isinglass. The dried mucilaginous substance extracted from marine algae or sea weeds such as, *Gelidium corneum*, *Gracilaria lichenoides* or *Gigartina speciosa*. (Class Rhodophyceae.) It occurs in bundles of thin, transparent membranes, or yellowish-white shreds which are insoluble in cold water, and slowly swelling and soluble in hot water. It is used extensively as a culture medium

in bacteriology; as a glue; and for making silk and paper transparent. **glucose-** See *glucose*-agar. **glycerin-** See *glycerin*-agar. **lactose-** See *lactose*-agar. **litmus-** See *litmus*-agar. **plain-** A culture medium which consists of 15 gm. agar-agar, 10 gm. peptone, 5 gm. sodium chloride, and 1000 cc. of bouillon stock solution, neutralized with sodium hydroxide, and filtered through a heated filter.

agar hanging block. A small cube of nutrient agar placed over a culture on the surface of a cover-slip glass. It is examined under the microscope in the same way as a hanging drop; *i.e.*, upside down.

agaric. *Agaricus albus*, touchwood, spunk, tinder. The dried fruit body of the fungus, *Polyporus officinalis*, a Polyponaceae, which grows on the *Larix* species. **fly-.** See *Amanita*. **surgeon's-.** Amadonu. **white-.** Agaric.

a. acid, $C_{19}H_{36}(OH)(COOH)_3.1\frac{1}{2}H_2O$ = 443.45. Laricic acid, agaricic acid, agaricinum. A tribasic acid from agaric. An odorless, colorless, tasteless, glistening, microcrystalline powder, m.140; slightly soluble in water. It is supposed to be the active principle of agaric, and is used as a local irritant. **a. mineral.** Rockmilk. A soft, white deposit of calcite occurring as microscopic crystals.

Agaricaceae. The mushrooms or toadstools, which comprise 4600 species of plants; some are poisonous (*Amanita*), others edible (*Agaricus*, *Cantharellus*).

agaricic acid. Agaric acid.

agaricin. An alcoholic extract of white *Agaric* or *Polyporus officinalis*. A brownish powder, soluble in water or alcohol and containing impure agaric acid. It is used as a purgative and to arrest perspiration.

agaricinum. Agaric acid.

agaricol. $C_{10}H_{16}O$ = 152.1. A monoatomic alcohol in white agaric. It is a colorless powder, m.223.

agarythrine. An alkaloid obtained by ether extraction from the fungus *Agaricus rubra*. A yellow, bitter substance, which on oxidation yields the red coloring matter of fungi.

agate. A cryptocrystalline quartz or chalcedony, SiO_2, composed of colored layers or clouds. It is used as a semi-precious stone, for ornaments, for pebbles in ball mills, and for the knife-edges of chemical balances. **blood-** Hemachate. **Iceland-** An obsidian. **oriental-** A translucent variety used as a gem. **white-** Chalcedony.

agathin. $C_{14}H_{14}ON_2$ = 226.2. Cosmin. Salicyl-α-methyl-phenylhydrazine, $HO.C_6H_4.CH:N.NMe.Ph$. A yellow, odorless, tasteless crystalline powder; m.74; insoluble in water, but soluble in alcohol or ether. Used medicinally in neuralgia and rheumatism.

Agathis. A conifer of Australia and Malaya which furnishes the kauri resin.

Agave. American aloe. A genus of Central American plants of the order Amaryllidaceae. The fibres are used for threads and ropes, while the leaves and juice are used as a diuretic. The fermented juice (pulque) is a moderately stimulating drink which is popular in Mexico; from it is distilled a spirit (mescal). Cf. *henequen*, *sisal*.

agedoite. Asparagine.

ageing. Aging.

Agene process. The bleaching of flour with nitrogen trichloride.

agent. A substance or force that effects a change. Cf. *reagent*. **balancing-** See *buffer* and *poiser*. **catalytic-** See *catalyst*. **emulsifying-** See *emulsifier*. **freezing-** See *freezing mixtures*. **frothing-** See *frother*. **oxidizing-** See *oxidizing* agent. **reducing-** See *reducing* agent. **refrigerating-** The gases, NH_3, SO_2 or MeCl, which are used in refrigerators. **refining-** Substances *e.g.*, H_2SO_4 or NaOH, used to purify organic compounds. **vulcanizing-** See *vulcanization*. **warning-** An odorous substance used to indicate danger in mines, or to detect leakage in pipes.

agerite. Aldo-α-naphthylamine; an anti-aging agent for rubber. Cf. *ohmoil*.

Agfa. A trade name for dyes, fine chemicals, etc. (Aktien Gesellschaft für Anilin farben). **A. silk.** A viscose rayon.

agglomeration. A clustering together or accumulation of particles or substances.

agglutinant. A substance which causes agglomeration or agglutination of cells.

agglutinate. (1) To cause agglutination. (2) The product of agglutination.

agglutination. The clumping together of cells or bacteria which results from the interaction of bacteria and the corresponding immune serum. It is used in serodiagnosis.

agglutinins. A group of substances formed in the blood as a result of bacterial infection or inoculation which cause the clumping together of the bacteria. Cf. *conglutinin*, *hemaglutinin*.

agglutinogen. A substance present in bacteria which stimulates the production of agglutinins in animals.

aggregation. The gathering of units into a whole, or the crowding or clustering together of particles. **state of-** The physical form of matter; as, solid, liquid, gaseous, or colloidal.

aggresin. Any toxic substance given off by an infecting organism (bacteria) that inhibits the defensive reactions of the host; *e.g.*, substances which protect micro-organisms from phagocytosis.

aging, ageing. Natural, or, artificial maturing or ripening; as of cheese, wine, or rubber. **a. test.** A test involving exaggerated conditions of a., the object of which is to determine rapidly how a material will behave over a period of time.

agitator. A device to keep liquids in motion; as, a stirrer.

aglucone. The non-sugar part of a glucoside.

aglycone. That component of a glycoside, *e.g.* plant pigment, which is not a sugar. Cf. *crocetin*, *cyclamiretin*, etc.

agmatine. $C_5H_{14}N_4$ = 130.2. Aminobutyl guanidine, $NH_2C(NH).NH(CH_2)_4NH_2$. An amine isolated from herring spawn and ergot. Cf. *synthalin*.

agnetite. A mineral constituent of adamellose.

agnin. Lanolin.

agon. The active radical of an enzyme. Cf. *pheron*.

agoniadin. $C_{21}H_{26}O_{12}$ = 470.2. Plumierin. The active principle of the bark of *Plumeria succuba*, or pagoda tree. Used medicinally as an antipyretic, anthelminthic and emmenagogue.

Agricola, Georg Bauer. 1490–1555. A German physician and alchemist.

agriculture. The science and art of the cultivation of the soil.

agrimonia oil. The volatile oil of agrimony.

agrimony. A rosaceous plant, *Agrimonia eupatoria*, used medicinally in the form of a fluid extract as a tonic and astringent.

agrinite. A trade name for a tankage (q.v.) containing 8¼ % nitrogen.

agrostemma. Corncockle. The plant, *A. githago*, a Caryophyllaceae, poisonous to animals and man. **a. saponin.** $C_{35}H_{54}O_{10}$ (*Brandl*) or $C_{29}H_{44}O_4$ (*Wedekind & Schicke*). A hemolytic substance, m.286. It causes paralysis.

agucarina. Saccharin.

ague tree. Sassafras.

aguilarite. Ag_4SSe. A sulfoselenide of silver, occurring as a black mineral.

aguirin. Theobromine sodium acetate.

Agulhon's reagent. A 0.1 N-solution of chromic acid in dilute nitric acid, used to titrate primary alcohols.

agurin. Aguirin.

Aich's metal. An alloy containing 56 pts. copper, 42 pts. zinc and 1 pt. iron which is very malleable at red heat.

aikinite. $CuPbBiS_3$. Aikenite. A black, orthorhombic, copper lead bismuth sulfide.

ailanthic acid. A bitter, nitrogenous acid from the bark of *Ailanthus excelsa* or "tree of heaven," a Simarubaceae.

air. The mixture of gases that forms the atmosphere, q.v. **alkaline-** Ammonia. **azotic-** Nitrogen. **dephlogisticated-** An obsolete term for oxygen. **enriched-** a. to which oxygen has been added. **expired-** The warm a. coming from the lungs having less oxygen and more carbon dioxide and moisture than normal a. **fixed-** An obsolete term for carbon dioxide. **inspired-** The air which is taken into the lungs. **liquid-** A clear water-like liquid obtained by alternate compression and expansion of air in a refrigeration machine; b. −181. Used commercially for manufacturing oxygen, in the production of low temperatures, and applied externally as a cure for poison ivy or poison oak inflammations. **mephitic-** An obsolete term for carbon dioxide. **phlogisticated-** An obsolete term for nitrogen or air from which oxygen has been removed by a burning substance. **reserve-** The air that can still be exhaled after an ordinary expiration. **residual-** (1) The air that remains in the lungs after the most complete expiration possible. (2) The air that remains in an evacuated container, *e.g.*, an incandescent lamp bulb or vacuum tube. **tidal-** The air that is taken in and given out at each respiration. **vital-** Oxygen.

a. bath. A drying oven utilizing a current of heated air for maintaining a certain temperature. **a. compressor.** A pump which compresses the atmosphere. **a. conditioning.** The control of humidity and temperature of air by filtering and washing with water of definite temperature, either for human comfort (45–55 % humidity) or for industries (viscose, textile, candy, paper, etc.). **a. dry.** To expose to air without heating. **a. gas.** Producer gas. **a. liquefying apparatus.** An arrangement of high pressure pump, valves, and expansion orifices for the liquefaction of air. **a. melting oven.** A cylindrical copper box with mica windows which is used for melting pitch in a current of hot air. **a. meter.** Anemometer. **a. pump.** A mechanical device for compressing or withdrawing air, *e.g.*, blowers, blast apparatus, filter pumps, vacuum pumps, or compressors. **a. proof.** Hermetically sealed, or gas-tight. **a. sampler.** A device for taking samples of dust and bacteria from the air. **a. tester.** An instrument to determine the CO_2 content of the atmosphere.

airoform. Airol.

airol. A registered trade-mark for a bismuth oxyiodide-subgallate compound. It is a greenish-gray powder, used as an antiseptic for local application.

airosol. Aerosol.

ajacine. $C_{18}H_{21}O_4N$ = 279.17. A crystalline alkaloid, m.143, from larkspur, *Delphinium ajacis*. **a. hydrochloride.** $C_{18}H_{21}O_4N.HCl$ = 315.64. Colorless crystals, m.93, soluble in water.

ajakol, ajacol. Thanatol.

ajava. The ripe fruit of *Ammi* or *Carum copticum*, (Umbelliferae) of India; used as a carminative.

Ajax metal. A bearing alloy consisting of 25–50 % Ni, 70–30 % Fe and 5–20 % Cu.

aji-no-moto. Sodium glutamate made by acid hydrolysis from gluten of wheat. It is a white powder of cheesy odor and meaty taste, used as a condiment.

ajowan. Ajava. **a. oil.** The essential oil from the seeds of *Carum copticum* or ajava. It resembles caraway seed oil, d.0.900–0.930, $[\alpha]_D$ + 1.3, and contains thymol and cymene as chief constituents.

akazgine. An alkaloid from the bark and leaves of *Strychnos akazga*, a Loganiaceae of Africa. Colorless crystals resembling strychnine in therapeutic effect.

akcethin. Thioacetin.

akee oil. A non-drying, yellow, butter-like fat from *Blighia sapida*, (Sapindaceae) from Jamaica and the Guineas.

åkermanite. A melilite, $4CaO.3SiO_2$.

akuammine. $C_{22}H_{28}O_4N_2$ = 382.23. An alkaloid from the seeds of *Picralima kleincana* an Apocynaceae of Gaboon. Cf. *ditaine*.

akundarol. $C_{28}H_{51}O.OH$ = 550.5. A sterol from akanda, *Calotropis gigantea*, an Asclepiadaceae. Cf. *calotropin, mudaric acid*.

Al. (1) The symbol for aluminum. (2) Alkyl radical.

-al. A suffix indicating an aldehyde structure.

alabamine. Ab = 221. Ekaiodine. The element No. 85 discovered in monazites and by the magneto-optic method by Allison, et al. (1931). It is a homotope of iodine, but its existence has not been verified. Cf. *anglohelvetium*.

alabandite. Manganblende. A black, isometric, native manganous sulfide, MnS.

alabaster. A fine grained, colorless, compact gypsum, $CaSO_4$, $2H_2O$. See *selenite*.

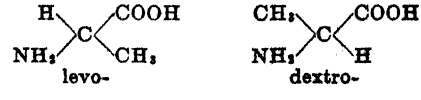
alabastrine. Naphthalene.

alacreatine. $C_4H_9O_2N_3$ = 131.2. Lactyl guanidine. Guanidopropionic acid. An isomer of creatine, which is formed by the union of alanine and cyanamide.

alamandite. Almandite.

alangine. An alkaloid from the bark of *Alangium lamarckii*, (Cornaceae) of India, used as a febrifuge and emetic.

alanine. $C_3H_7O_2N$ = 89.08. α-Aminopropionic acid, propionic glycocol, lactamine, 2-aminopropanoic acid*, lactamic acid. White crystals, dl- or i-. m.295. d- m.297, l- 295°C, subl. 200; soluble in water or alcohol; insoluble in ether. It is prepared synthetically from acetaldehyde, ammonia and HCl or HCN and occurs as a constituent of many proteins. (See *polypeptides*.) It forms two stereoisomers:



β- or *beta-* *β*-Aminopropanoic acid*. ***N*-benzoyl-** $C_{10}H_{11}NO_3$ = 193.09. *α*-Benzamidopropionic acid, PhCONH.CHMe.COOH. Colorless crystals, m.163; soluble in water. **dithiobis-** Cystine. **hydroxy-** Serine. **hydroxyphenyl-** Tyrosine. **imidazolyl-** Histidine. **indyl-** Tryptophane. **mercapto-** Cysteine. **phenyl-** Phenylalanine. **salicyl-** *o*-Tyrosine. **sulfo-** Cysteic acid.

alant acid anhydride. See *helenin*. **a. camphor.** Helenin. **a. root.** Inula. **a. starch.** Inulin.

alantic acid. $C_{15}H_{22}O_3$ = 250.2. Inulic acid. A monobasic acid from the roots of *Inula elecampane*. **a. anhydride.** $C_{15}H_{20}O_2$ = 232.2. Colorless crystals from the roots of *Inula elecampane*. It is sometimes found as an incrustation on roots kept for some time.

alantin. Inulin.

alantol. $C_{10}H_{16}O$ = 152.1. Pinguin. A yellowish-brown oily liquid, b.200; soluble in alcohol, ether, or chloroform. It is obtained from the roots of *Inula elecampane* and is used as an internal antiseptic.

alantolactone. See *helenin*.

alanyl. (1) The monovalent radical Me.CHNH$_2$.CO—. (2) The divalent radical —NH.CHMe.CO—, derived from alanine. **a. alanine.** $C_6H_{12}N_2O_3$ = 160.11. A dipeptide. White needles, m.276, slightly soluble in water.

alaskite. An igneous rock of the rhyolite-granite group containing quartz and feldspar (aplite).

alaskose. A rhyolite containing phenocrysts of quartz and feldspar.

alaterite. Mineral caoutchouc.

albahaca oil. See *tolu* oil.

albamine. Alabamine.

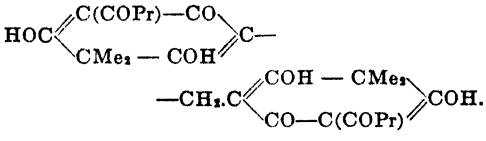
albane. $C_{10}H_{16}O$ = 152.1. A crystalline resinous product obtained by boiling gutta-percha in alcohol. It is soluble in ether, chloroform or carbon disulfide.

albanose. A leucite rock containing leucite, melilite, diopside, and magnetite.

albargin. Silver gelatose. A colloidal silver preparation used medicinally.

albarium. A white lime obtained by burning marble. It is used for stucco.

albaspidin. $C_{25}H_{32}O_8$ = 460.2.



A crystalline principle occurring in *Aspidium* and resembling *albopannin*.

albata. A white alloy of Cu, Ni and Zn. A German silver.

albedo. The degree of whiteness of a reflecting surface. It is expressed as the ratio of the reflected light to the incident light: *e.g.*,

black velvet	0.004
moist earth	0.08
blue paper	0.26
pinewood	0.40
white paper	0.60
snow	0.78

albene. An insoluble white precipitate obtained by boiling melam in water.

alberene. A fine grade of soapstone used for electrical insulation.

albertite. Albert coal. A black, brittle, asphaltum-like hydrocarbon with conchoidal fracture, d.1.1. It is used as fuel.

albertol. A plastic q.v., of the phenolformaldehyde type. Cf. *bakelite*.

Albertus, Magnus. 1203–1280. Albrecht Graf von Bollstädt. A German alchemist noted for his writings.

albite. $NaAlSi_3O_8$. Pericline. A white, triclinic soda-feldspar which is a common constituent of granite and many other rocks. d.2.605. Hardness 6–6.5, Mol. Vol. 101.1. Cf. *anemonsite*.

albocarbon. Naphthalene.

alboferrin. Phospho-albuminate of iron. A light-brown, odorless powder, used as a ferruginous tonic.

albolene. A brand of medicinal Russian mineral oil. Cf. *petrolatum*.

albopannin. $C_{21}H_{24}O_7$ = 388.2. Silky white, crystalline needles, m.147, obtained from the rhizome of *Aspidium* or male fern.

albumate. Albuminate. **tannin-** Tannalbin.

albumen. White of egg. The liquid white of fresh eggs, consisting chiefly of albumin.

albumin. (1) $C_{72}H_{112}N_{18}O_{22}S$. A protein found in the white of egg, and occurring in blood, lymph, chyle, and many other animal and vegetable tissues and fluids. It is soluble in water, coagulates on heating, and is hydrolyzed to a number of amino acids. It occurs in commerce as white or yellowish scales. (2) A simple *protein*, q.v., which is insoluble in pure water or dilute salt solution and is coagulable by heat. Cf. *globulin*. **blood-** Serum a. A. prepared from blood and used in the manufacture of photographic papers, in textile printing, leather industry and as a clarifying agent. **egg-** Ovalbumin. A. prepared from eggs. It is used in food stuffs and as a clarifying agent. **milk-** Wheyalbumin A. prepared from milk by coagulating the casein. It is used in the manufacture of adhesives, varnishes and ivory substitutes. **nucleo-** See *nucleo*albumin. **osso-** A protein from ossein. **ov-** Egg a. **phospho-** Any albuminous substance which contains phosphorus. **serum-** Blood a. **whey-** Milk a. **a. tannate.** Tannalbin.

albuminate. A compound of albumin with some other substance, often of a basic character; as, metals (bismuth, iron, manganese, mercury) or creosote, ichthyol, quinine, tannin, etc. **acid-** A metaprotein soluble in weak alkali. **alkali-** A compound of albumin and alkali metals.

albuminoid. (1) Resembling or like albumin. (2) Scleroproteins. A class of simple proteins, q.v., which are insoluble in all neutral solvents. *e.g.* collagen, gelatin, kelatin, chitin.

albuminometer. A graduated glass tube for the quantitative determination of albumin in urine. Cf. *Esbach's a. horismascope*.

albuminose. A decomposition product of fibrin.

albuminuria. The presence of albumin in the urine, and the resulting pathological condition of the human body.

albumoscope. A U-shaped glass tube for the detection of albumin in urine. One arm is filled with nitric acid and the other with urine, and at the point of contact a white ring forms in presence of albumin.

albumose. A cleavage product of albumin formed during its hydrolysis. Cf. *artose*, *dysalbumose*, *heteroartrose*, *syntonin*.

albumosease. An enzyme from the stomachic secretions which hydrolyzes albumin to albumose.

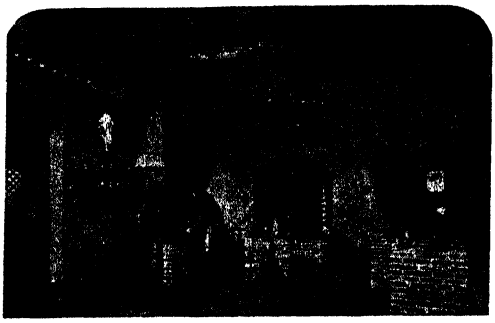
alburnitas. A disease of trees, which hinders the transformation of sapwood into hardwood.

alburnum. The sapwood of a tree.

alcahest. Alkahest.

alcamines. Alkamines.

alcarraza. An unglazed bottle used in the Mediterranean countries for cooling water by evaporation.



Alchemical laboratory.

alchemical. Pertaining to alchemy; alchemistic. **a. laboratory.** The alchemist workshop. **a. symbols.** See *alchemistic* symbols.

alchemistic period. The time period extending from about 300 to 1550 A.D. **a. symbols.** The characters or ideographs used by the alchemists. They indicate the relationship of astrological and alchemical speculations. In the development of chemistry the conception of the atomic theory can be followed by comparing a few of the alchemical symbols of elements and noting the transitional Dalton symbols. See figure.

alchemy. The empirical stage of chemical knowledge, which was characterized by many attempts to impose the speculative theories formed by philosophical imaginations. The chief aim of alchemy during the Middle Ages was the transmutation of base metals into gold, and the search for the alkahest or philosopher's stone which was supposed to confer eternal youth and health. During this period much chemical knowledge accumulated which led to a change of attack, namely to the experimental and deductive method of modern science.

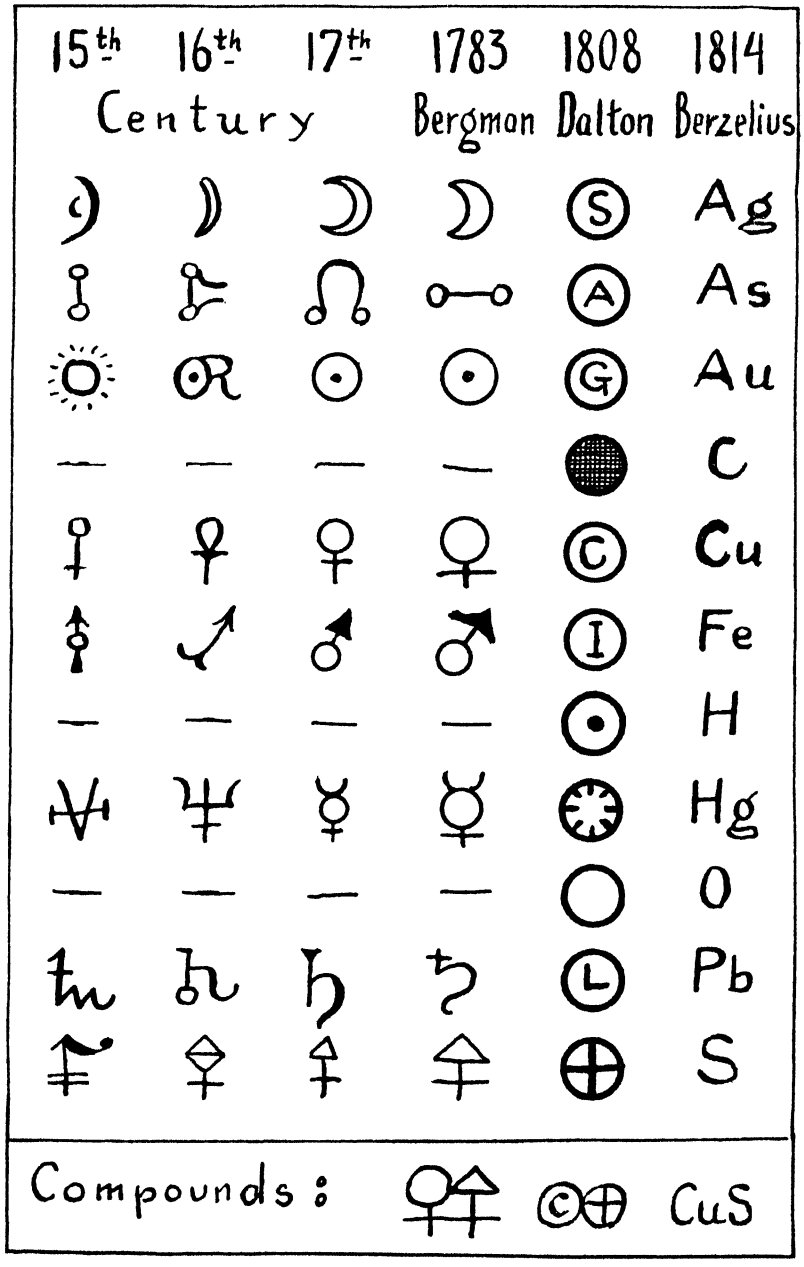
alclad. A strong, light aluminum alloy which is coated with pure aluminum to resist corrosion.

alcohol. (1) Ethanol or ethyl alcohol. (2) See *alcohols*. **absolute-** See ethanol, 100 %. **acetone-** See *acetol*. **allyl-** See *allyl* alcohol. **amyl-** See *amyl* alcohol. **benzyl-** See *benzyl* alcohol. **butyl-** See *butanol*. **butyric-** See *butanol*. **capryl-** See *octyl* alcohol. **cetyl-** See *cetyl* alcohol. **cinnamyl-** See *cinnamic* alcohol. **dehydrated-** See *ethanol*, 100 %. **denatured-** See *ethanol*. **ethyl-** See *ethanol*. **ethylene-** See *glycol*. **ethylic-** See *ethanol*. **glycyl-** See *glycerol*. **grain-** See *ethanol*, 95 %. **hexadecatylic-** See *cetyl* alcohol. **isobutyl-** See *isobutanol*. **isopentylic-** See *amyl* alcohol. **isopropyl-** See *i-propanol*. **methyl-** See *methanol*. **octoic-** See *caprylic*. **octylic-** See *caprylic* alcohol. **palmityl-** See *cetyl* alcohol. **phenylallyl-** See *cinnamic* **a. solid-** A gelatinous mixture of ethanol with solid fatty acids or with soaps. Used as household fuel for chafing dishes. **sulfur-** See *carbon* disulfide. **wood-** See *methanol*.

a. acid. A group of organic compounds which contain the carboxyl and the hydroxyl radicals. See table. **a. aldehyde.** A compound of the type HO.R.CHO; as, aldol. **a. amide.** Hydroxy amide. A compound of the type HO.R.CONH$_2$; as, glycolamide. **a. amine.** Hydroxyamine. A compound of the type, HO.R.NH$_2$; as, ethoxyamine **a. ether.** Hydroxyether. A compound of the type R.O.R.-OH; as, diethyline, cellosolve. Cf. *lacquer*

ALCOHOL ACIDS

(1) *Aliphatic, monohydroxy, monobasic acids*	
carbonic acid, hydroxyformic acid	HO.COOH
glycolic acid, hydroxyacetic acid	HO.CH$_2$.COOH
lactic acid, 1-hydroxypropionic acid	Me.CHOH.COOH
hydracrylic acid, 2-hydroxypropionic acid	HO.CH$_2$.CH$_2$.COOH
3-hydroxybutyric acid	HO.CH$_2$CH$_2$CH$_2$.COOH
2-hydroxybutyric acid	Me.CHOH.CH$_2$.COOH
1-hydroxybutyric acid	Et.CHOH.COOH
(2) *Aliphatic, dihydroxy, monobasic acids*	
glyoxylic acid, dihydroxyacetic acid	(HO)$_2$CH.COOH
glyceric acid, 1-2, dihydroxypropionic acid	CH$_2$OH.CHOH.COOH
(3) *Aliphatic, polyhydroxy, monobasic acids*	
erythric acid	CH$_2$OH(CHOH)$_2$COOH
arabitic acid	CH$_2$OH(CHOH)$_3$COOH
mannitic acid	CH$_2$OH(CHOH)$_4$COOH
(4) *Aliphatic, monohydroxy, dibasic acids*	
tartronic acid, hydroxymalonic acid	HOOC.CHOH.COOH
malic acid, hydroxysuccinic acid	HOOC.CH$_2$CHOH.COOH
(5) *Aliphatic, dihydroxy, dibasic acids*	
tartaric acid, dihydroxysuccinic acid	HOOC.(CHOH)$_2$COOH
(6) *Aliphatic, polyhydroxy, dibasic acids*	
trihydroxyglutaric acid	HOOC(CHOH)$_3$COOH
saccharic acid, tetrahydroxyadipic acid	HOOC(CHOH)$_4$COOH
(7) *Aliphatic, monohydroxy, tribasic acids*	
citric acid	$\begin{matrix} HO \\ HOOC \end{matrix}>C<\begin{matrix} CH_2COOH \\ CH_2COOH \end{matrix}$
(8) *Aromatic, monohydroxy, monobasic acids*	
mandelic acid	PhCHOHCOOH
phenyl-lactic acid	PhCH$_2$.CHOH.COOH
tropic acid	Ph.CH(COOH).CH$_2$OH



Alchemical and chemical symbols.

The first one to *join* symbols in order to represents compounds was Bergman. Next Dalton simplified the symbols by using circles and letters and Berzelius introduced our present notation.

solvents. a. fuel. A blend of ethyl, methyl or butyl alcohol with benzol, petrol, acetone and/or ether. **a. ketone.** Hydroxyketone. A compound of the type R.CO.R.OH; as, ketol **a. phenols.** ar-Hydroxyphenols. A group of organic compounds that contain hydroxy groups attached both to a ring and to a side-chain, as;

o-hydroxybenzyl alcohol,
salicyl alcohol..... $C_6H_4OH.CH_2OH$

dihydroxybenzyl alcohol,
pyrocatechuic alcohol... $C_6H_3(OH)_2.CH_2OH$
trihydroxybenzyl alcohol,
pyrogallic alcohol..... $C_6H_2(OH)_3.CH_2OH$

alcoholic. (1) A preparation containing an alcohol (usually ethanol); as, a. extract, a. solution. (2) Leading to the formation of alcohol; e.g. a. fermentation. (3) Dissolved in alcohol; as, a. potash.

alcoholate. A compound derived from an alcohol by replacing the hydroxyl hydrogen by a base; as, sodium ethylate or alcoholate, EtONa.

alcoholometer. An apparatus for estimating the alcohol content of a liquid; a hydrometer, or apparatus for determining the b.p. of an alcohol-water mixture.

alcohols. Alkyloxides. A group of organic alkyl-compounds containing a hydroxyl group. R.OH. A: are classified: (1) according to the relation of the carbon atom, as

primary a	$R.CH_2OH$
secondary a	R_2CHOH
tertiary a	R_3COH

(2) according to the number of OH groups; as,

		prefix		*suffix*
R.OH	mono-	-hydroxy*		ol*
$R.(OH)_2$	di-	-atomic	a. or	diol*
$R(OH)_3$	tri-	-basic		triol*
$R(OH)_4$	tetra-	-hydric		tetrol*
$R(OH)_5$	penta-	-valent		pentol*
$R(OH)_x$	poly-			—

(See also aromatic *alcohol*, *alcohol* phenol and *alcohol* acid.)

(1) *Monatomic aliphatic alcohols*, $C_nH_{2n+1}OH$

methyl alcohol, methanol	CH_3OH or MeOH
ethyl alcohol, ethanol	C_2H_5OH or EtOH
propyl alcohol, propanol	C_3H_7OH or PrOH
butyl alcohol, butanol	C_4H_9OH or BuOH
amyl alcohol, pentanol	$C_5H_{11}OH$
hexyl alcohol, hexanol	$C_6H_{13}OH$
heptyl alcohol, heptanol	$C_7H_{15}OH$
octyl alcohol, octanol	$C_8H_{17}OH$
nonyl alcohol, nonanol	$C_9H_{19}OH$
decyl alcohol, decanol	$C_{10}H_{21}OH$
dodecyl alcohol, dodecanol	$C_{12}H_{25}OH$
tetradecyl alcohol	$C_{14}H_{29}OH$
cetyl alcohol	$C_{16}H_{33}OH$
carnaubyl alcohol	$C_{24}H_{49}OH$
ceryl alcohol	$C_{26}H_{53}OH$
melissyl alcohol	$C_{30}H_{61}OH$
tarchonyl alcohol	$C_{50}H_{101}OH$

(2) *Diatomic aliphatic alcohols*

glycols, *e.g.*, glycol	$C_2H_4(OH)_2$
pinacols, *e.g.*, pinacone	$C_6H_{12}(OH)_2$

(3) *Triatomic aliphatic alcohols*

glycerol	$C_3H_5(OH)_3$

(4) *Polyatomic aliphatic alcohols*

tetritol, *e.g.*, erythrol	$C_4H_6(OH)_4$
pentitol, *e.g.*, arabitol	$C_5H_7(OH)_5$
hexitol, *e.g.*, mannitol	$C_6H_8(OH)_6$
heptitol, *e.g.*, perseite	$C_7H_9(OH)_7$

Cf. *Agulhon's* reagent.

aldehyde- A compound containing both, the —CHO and —OH groups. **aromatic-** A cyclic compound containing the —OH group in a side chain; cf. the *phenols*. **diatomic-** or **dihydric-** An aliphatic compound containing two —OH groups (see *glycol*). **hexatomic-** or **hexahydric-** An aliphatic compound containing six —OH group derived from hexoses. **keto-** A compound containing both, the =CO and —OH groups. **monatomic-, monobasic-,** or **monohydric-** A compound containing one —OH group. **nitrated-** A compound containing the $—ONO_2$ group. **pentatomic-, pentabasic-,** or **pentahydric-** A compound containing five —OH groups. **primary-** A compound containing the monovalent carbinol group, $—CH_2OH$. **secondary-** A compound containing the divalent =CHOH group. **tertiary-** A compound containing the trivalent ≡COH group. **triatomic-, tribasic-** or **trihydric-** A compound containing three —OH groups, (see *glycerol*).

a. of crystallization. The alcohol contained in a crystalline salt in a molecule; *e.g.* $KOH.2C_2H_6O$.

alcoholysis. The cleavage of a C—C bond by the addition of an alcohol: $R.CH_2.R' + R''OH \rightarrow R''OCH_2R + R'H$. Cf. *hydrolysis*.

alcosol. A sol in alcohol.

alcumite. A steel-like and corrosion resistant alloy of 88–90 % Cu, 7.5 % Al, 2.8–3.5 % Fe and 1 % Ni.

alcyl. Alicyclic. An aliphatic-cyclic radical; a saturated aromatic radical.

aldalcoketose. A carbohydrate containing the aldehyde (—CHO), alcohol (—OH), and ketone (=CO) radicals.

aldarsone. Phenarsone sulfoxylate. Sodium 3-amino-4-hydroxyphenylarsonate-N-methanal sulfoxylate; used in treating Trichomonas vaginalis vaginitis and central nervous system syphilis.

aldebaranium. Ad = 173.60. A rare earth metal, isolated in 1907 by Auer von Welsbach and identical with thulium, q.v.

aldehydase. An oxydase (cf. *enzymes*) which forms acids from aldehydes.

aldehyde. (1) Acetic aldehyde or acetaldehyde. (2) See *aldehydes*. **acetic-** Acetaldehyde. **anisic-** Anisaldehyde. **cinnamic-** Cinnamaldehyde. **cuminic-** Cumic aldehyde. **heptylic-** Oenanthal. **meta-** Metaldehyde. **oenanthic-** Oenanthal. **para-** See *paraldehyde*. **propionic-** Propionic aldehyde. **pyromucic-** Furfural. **salicylic-** Salicylaldehyde.

a. ammonia. (1) A member of a class of compounds formed by the combination of an aldehyde and ammonia. They are crystalline and decompose on warming with dilute acid, and are consequently used for the purification of aldehydes. (2) $(CH_3.CHO,NH_3)_3 = 183.24$. Colorless crystals, m.70–80, b.100; soluble in water, alcohol or ether. **a. condensation** See *aldol* condensation. **a. group.** The monovalent —CHO radical, in which the H is not replaceable by a positive radical, but can be replaced by negative atoms or groups (Cl_2, etc.) Cf. *aldehydes*. **a. ketone.** Ketoaldehyde. A compound of the type, R.CO.R.CHO.

aldehydes. Organic compounds containing the monovalent —CHO radical. They are oxidized to acids and reduced to alcohols. They are indicated by the *prefix* oxo-, aldo- (for O of CO) or formyl- (for CHO); or by the *suffix* -al*, -dial*, -trial*, etc. **amido-** Compounds containing both, the amido and aldehyde groups. **di-** Compounds containing two aldehyde groups. **olefine-** Compounds containing a double bond and the aldehyde group. **paraffin-** Compounds containing the aldehyde group attached to a saturated aliphatic chain. **thio-** Compounds containing the —CHS group, *i.e.*, an aldehyde group in which the oxygen is replaced by sulfur.

ALDEHYDES

a. aliphatic and saturated:

formaldehyde	H.CHO
acetaldehyde	Me.CHO
propionaldehyde	Et.CHO
butyraldehyde	$Me(CH_2)_2$.CHO
i-butyraldehyde	Me_2CH.CHO
valeraldehyde	$Me(CH_2)_3$.CHO
i-valeraldehyde	$Me_2CH.CH_2$.CHO
caproaldehyde	$Me(CH_2)_4$.CHO
enanthaldehyde	$Me(CH_2)_5$.CHO
nonaldehyde	$Me(CH_2)_7$.CHO
palmitic aldehyde	$Me(CH_2)_{14}$.CHO

b. aliphatic and unsaturated:

acrolein	CH_2:CH.CHO
crotonaldehyde	MeCH:CH.CHO
tiglic aldehyde	MeCH:CMe.CHO
citral, geranial	C_9H_{15}.CHO
propiolaldehyde	CH:C.CHO

c. aliphatic dialdehydes:

glyoxal	CHO.CHO
succinaldehyde	$CHO(CH_2)_2$.CHO
adipaldehyde	$CHO(CH_2)_4$.CHO

d. aromatic aldehydes:

benzaldehyde	Ph.CHO
tolualdehyde	$Me.C_6H_4$.CHO
α-tolualdehyde	$Ph.CH_2$.CHO
cinnamaldehyde	Ph.CH:CH.CHO
salicylaldehyde	$HO.C_6H_4$.CHO
anisaldehyde	$MeO.C_6H_4$.CHO
naphthaldehyde	$C_{10}H_7$.CHO
anthraldehyde	$C_{14}H_7$.CHO

aldehydene. Acetylene.

aldehydic hydrogen. The hydrogen atom of the aldehyde group which is not readily replaced by metals.

aldehydine. $C_8H_{11}N$ = 121.14. *2*-Ethyl-*5*-methyl pyridine C_5H_3NMeEt. A colorless liquid, $d._{23°}$0.9918, b.173; insoluble in water, and soluble in alcohol or ether.

aldime. An acid imide of the type, R—CH(:NH) derived from an aldehyde.

aldobionic acids. A group of oxidized trisaccharides; as, gluco-β-glycuronic acid, found in bacteria, or obtained by the hydrolysis of flaxseed mucilage.

aldohexose. A hexose containing the aldehyde group; as glucose or galactose, cf. *ketohexose, sugars.*

aldoketens. A group of homologs of ketene, RHC:CO, (see *keto*ketene). It comprises ketene, and monoalkylated derivatives of carbon suboxide. They are colorless and are polymerized by pyridine.

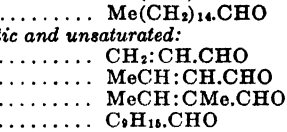
aldol. $C_4H_8O_2$ = 88.08. (1) β-Hydroxy-butyric aldehyde, *3*-hydroxybutanal*, acetaldol oxybutanol, $Me.CHOH.CH_2.CHO$. A condensation product or dimer of acetaldehyde. A clear colorless liquid, d.1.109; soluble in hot water or alcohol. Its solution leaves a polymerized product, paraldol, on evaporation. It is used medicinally as a hypnotic and sedative. Cf. *paraldehyde* (trimer), *metaldehyde* (tetramer), *paraldol.* (2) One of a class of condensation products formed from an aldehyde.

a. condensation. The polymerization of an aldehyde in presence of dilute acid or alkali, *e.g.*, the formation of aldol. The aldol polymer differs from the meta- and para-polymers by reason of its stability. There are three types: (1) true aldol condensation $R_2CO + H.CH_2COR \rightarrow R_2C(OH).CH_2.COR \rightarrow R_2C{=}CH.COR$. (2) Cannizzaro reaction: $2R.CHO \rightarrow R.COOCH_2R + R.COOCH_2R + H_2O \rightarrow R.COOH + R.CH_2OH$. (3) Claisen condensation: $2R.COOR' \rightarrow RC(OH):CH.COOR' + R'OH$.

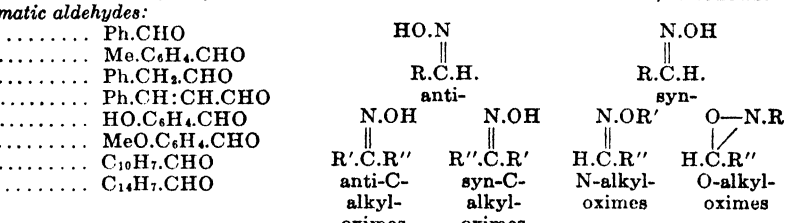
aldopentose. A pentose containing the aldehyde group; as arabinose.

aldose. Any carbohydrate (pentose, hexose, etc.) which contains the aldehyde group. Cf. *ketose, sugars.*

aldoxime. C_2H_5ON = 59.05. Acetaldoxime. A colorless liquid, m.45, b.115, d.0.965, soluble in water, alcohol or ether. It is used in organic synthesis and occurs in two isomeric forms:



aldoximes. A group of organic compounds containing the monovalent —CHNOH, or the divalent $\rangle C.NOH$ group, from which different stereo-isomeric forms are derived, as follows:



N.B. In the formula the alkyl is replaceable by aryl.

aldrey. A non-corroding aluminum alloy, used for transmission lines. It contains 0.4 % Mg, 0.6 % Si, and 0.3 % Fe.

alembic. A retort. Figuratively, anything that purifies.

aletris. False unicorn, starwort, blazing star, colic root, star grass, bitter grass, devil's bit. The dried rhizomes of *Aletris farinosa* (Haemodoraceae) of the United States. Used medicinally as a tonic. Cf. *helonoid.*

aletroid. Aletrin. A resinoid from the rhizome of *Aletris farinosa.* Used as a uterine stimulant.

Aleurites. (1) The Chinese wood or tung oil plant. (2) A genus of trees, Euphorbiaceae, of the warmer zones of Asia which yield important oils:

A. ambina	bancoul nut oil
A. cordata	tung oil
A. mollucana	lumbang oil
A. triloba	wood oil

aleutric acid. $C_{16}H_{32}O_5$ = 304.3. A trihydroxy-palmitic acid, m.102, from the shellac of *Aleurites montana.*

aleurometer. A baking cylinder for testing the baking capacity of flour by measuring the expansion of its gluten.

aleuronate. A vegetable protein used as food for diabetics. It is a tasteless, yellowish powder.

a. powder. A baked flour mixed with cooked starch used for injection into the pleural cavity of animals (rabbits) to stimulate the production of leucocytes. Cf. *leucocyte* extract.

aleurone. Protein grains in the endosperm of ripe seeds.

Alexander tester. An apparatus for determining the gel-strength of glue and gelatin.

alexandrite. An emerald green variety of chrysoberyl with ruby-red fluorescence. Used as a gem.

alexandrolite. A clay-like silicate containing chromium.

alexin. Complement, cytase. A defense protein of body fluids that partly destroys pathogenic microorganisms. It is thermo-labile, non-specific, not increased by immunization and present in leucocytes and serum. It has also the property of combining with the antigen-antibody. See *immunity, Ehrlich's theory, antilysin.*

alfa. Halfa. A variety of esparto grass grown in Algeria and Tunis. Paper is made from its bast fibers.

alfalfa. Lucerne. The plant *Medicago sativa*, a Leguminosae; used as fodder.

alfalfone. $C_{21}H_{42}O$ = 310.3. A ketone from alfalfa.

alferric. Containing alumina and ferric oxide. **a. minerals.** A groupof igneous rocks which contain aluminum and iron; intermediate between the salic and femic groups.

alga. pl. **algae.** A group of unicellular or polycellular plants of the order Thallophytae, a class of cryptograms, which live in fresh or salt water and are distinguished from other microorganism (fungi) by the presence of chlorophyll and response to photosynthesis. Cf. *lichens.* They include the sea weeds, kelps, chondrus, agar-agar, diatoms and spirogyra and are classified into

Cyanophyceae..... *blue-green* or *fission* a.
Phaeophyceae..... *brown* a.
Chlorophyceae..... *green* a.
Rhodophyceae..... *red* a.

calcareous- A. containing Ca, as *Lithothamnium*, whose skeletons consist of 95 % $CaCO_3$ and 5 % $MgCO_3$, and whose deposits are limestone. **siliceous-** The slimy ooze at the bottom of oceans, consisting of 77 % silica; it is formed by diatoms and radiolarians, and includes the skeletons of algae. Cf. *oceanic* sediments.

algarites. The naturally occurring protobitumens formed during the acid hydrolysis of algae. They consist of algarose with metallic salts, sulfur and nitrogen derivatives.

algaroba. Algarobilla. The sweet pods of *Prosopsis dulcis*, a herb of South America. It contains 45 % tannin and is used for tanning, and in the preparation of a gum.

algarose. A protobitumen formed by acid hydrolysis of carbohydrates; it reduces Fehling's solution.

algaroth. Antimony oxychloride. A white powder, used as a purgative and emetic.

algin. Alginic acid, norgine. A protein of marine algae, obtained as by-product in the preparation of iodine from kelps, principally from *Laminaria digitata.* It is used as a fabric dressing and for thickening jellies. Its solution in sodium carbonate is used as a mucilage.

alginate. Any of the salts of algin, as the iron or sodium alginate. They are used as protective colloids, for thickening solutions; for forming films on drying, and for textile dressing.

alginic acid. Algin.

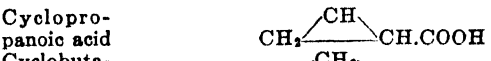
algiron. Iron alginate. A preparation used medicinally in anemia.

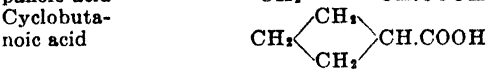
algodonite. Cu_6As. A silver-white to steel-gray native copper arsenide.

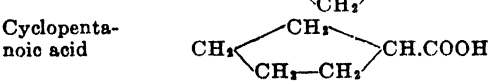
algulose. The almost pure cellulose obtained, to the extent of 15 %, in the extraction of iodine from kelp. Used in paper making.

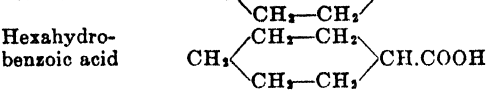
alibate. To cover with a protective layer of aluminum.

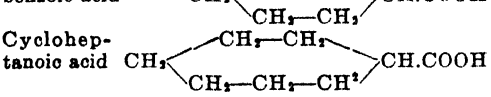
alicyclic. Aliphatic-cyclic. The group of cyclic organic compounds derived from the corresponding aliphatic compounds by ring-formation; those compounds having a saturated ring; as, the cyclo-paraffins and naphthenes. **a. acids.** A group of acids whose molecules contain a saturated ring; as:

Cyclopropanoic acid 

Cyclobutanoic acid 

Cyclopentanoic acid 

Hexahydrobenzoic acid 

Cycloheptanoic acid 

Other a. acids of interest are chaulmoogric acid, norpinic acid, pinic acid, camphoric acid, truxillic acid, etc. **a. compounds.** A compound containing a carbon ring, whose properties are aliphatic rather than aromatic (Bamberger).

alignment chart. Nomograph.

aliphatic. Acyclic. Pertaining to an open chain carbon compound; as, paraffins or olefines. Cf. *aromatic, alicyclic.* **a. acids.** Fatty acids. The organic acids derived from the a. hydrocarbons. See *acids.* **a. amino group.** The NH_2 radical, when attached to a chain. **a. amino group apparatus.** Van Slyke apparatus. **a. compounds.** See *organic* compounds. **a. hydrocarbon.** Any compound of carbon and hydrogen having an open chain, as in the methane, ethylene, or acetylene series. See *hydrocarbons, nomenclature,* and *organic compounds.*

alipin. Alypine.

alipite. A nickel mineral of uncertain composition, which contains nickel silicates, magnesium and free silica.

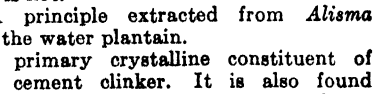
aliquot. A divisible part of a whole; *i.e.*, a part which, when multiplied makes a whole without leaving any remainder; thus 4 is an a. of 12 and 20, but 7 is not.

alismin. A principle extracted from *Alisma plantago*, the water plantain.

alite. The primary crystalline constituent of Portland cement clinker. It is also found native, and has the probable formula, $8CaO.SiO_2.Al_2O_3$. Cf. *belite.*

alival. $C_3H_7O_2I$ = 202.3. Iodopropyleneglycol, 3-iodopropan-1.2-ol, 3-iodo-1.2-dihydroxypropane, $CH_2I.CHOH.CH_2OH$. A colorless powder, used medicinally as an iodoform substitute.

alizaramide. $C_{14}H_9O_3N$ = 239.1 Amidoxyanthraquinone, 1-amino-2-hydroxy-anthraquinone.

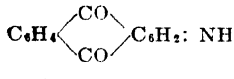


A substance derived from alizarin by heating with ammonia water. Brown needles, subliming at 150, insoluble in water, but soluble in alcohol or ether.

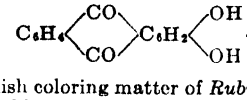
alizarate. (1). A derivative of alizarin in which the H of both OH groups is replaced by a metal. Cf. *lake.* (2) Phthalate.

alizaric acid. Phthalic acid.

alizarimide. $C_{14}H_7O_2N$ = 221.1. Alizarinimide, 1, 2-iminoanthraquinone.



alizarin. $C_{14}H_8O_4$ = 240.13. Anthraquinonic acid, 1.2-dihydrozyanthraquinone.



The reddish coloring matter of *Rubia tinctorium,* dyers' madder. It is also synthetically prepared from anthracene and the hydrolysis of ruberythric acid. Orange-red crystals, m.290, b.430, insoluble in cold water, but soluble in alcohol or ether. It is used in dyeing wool, cotton, and silk and in the manufacture of dyestuffs; also as a reagent and indicator as a 0.5 % alcoholic solution (alkalis—red, acids—yellow) and pH indicator (changing at pH 9.5). **a. black.** Naphthazarine. A black dye, the alizarin of the naphthalene series made by the reduction of α-dinitro-naphthalene. It behaves like an alizarin. **a. blue** $C_{17}H_9O_4N$ = 291.1. Anthracene blue, dihydroxyanthraquinonequinoline. Brownish-violet needles of metallic luster, m.270; soluble in alcohol. Used as a blue coloring matter and dye and pH indicator (acids—green, alkalis—blue) changing at pH 12. **a. blue amide.** $C_{17}H_{10}O_2N_2$ = 290.1. Amino-hydroxy-anthraquinone quinoline. A derivative of alizarin blue in which one —OH group is replaced by a NH_2- group. Used as a dye. **a. bordeaux, a. brown.** See *a.* dyes. **a. carboxylic acid** $C_{14}H_7O_4.COOH$ = 284.14. 2-Carboxyl-alizarin. Red triclinic crystals, m.305; soluble in water, alcohol, or ether. Used in the manufacture of dyestuffs. **a. carmine.** Sodium alizarin sulfonate. **a. dyes.** A group of dyes derived from anthraquinone (see table). They are used as sodium salts of their sulfonic acids and employed largely in the textile industry. **a. red.** Sodium sulfalizarate, alizarin sodium monosulfonate. A brown powder, readily soluble in water. It is used as an indicator in titrating acids (yellow) and bases (red) and is superior to methyl orange. It changes at pH 5.5. **a. sulfonate.** Any salt of a. sulfonic acid. **a. sulfonic acid.** $C_{14}H_7O_4.SO_2H$ = 320.1. 1.2-Dihydroxy-7-sulfonic-anthraquinone. Orange crystals; soluble in water or alcohol; insoluble in ether. Used in the manufacture of dyes. **a. yellow.** Sodium p-nitraniline salicylate. A 0.1 % aqueous solution; used as pH indicator changing at pH 11.1 from yellow (acid) to purple (basic).

alizarinic acid. Phthalic *acid.*

alkahest. See *alchemy.*

alkalamides. A group of organic compounds derived from ammonia by replacing two or more hydrogen atoms by acid or basic radicals.

alkalescent. Slightly alkaline.

Alk. Abbreviation for (1) alkaloid, (2) alkyl.

alkali. Essentially a hydroxide of lithium, sodium, potassium, rubidium or cesium; but the carbonates of these metals and of ammonia, also the amines are often included. **mineral-** An inorganic base. **vegetable-** An organic base. **volatile-** Ammonia.

a. albuminate. A compound of albumin and an alkali metal. A water-soluble, alkaline powder used for culture media (cholera and diphtheria bacillus). **a. blue.** The sodium salt of a triphenylrosaniline sulfonic acid, which is used as pH indicator changing at pH 12.5 from blue (acid) to red (basic) and in dyeing wool. **a. cell.** See *photo-electric* cell. **a. earth metals.** The divalent elements, Ca, Sr, Ba, of the second group in the periodic system. **a. earths.** The oxides of Ca and Ba (lime, baryta). **a. metals.** The monovalent element of the first group of the periodic system: Li, Na, K, Rb,

ALIZARIN DYES (ANTHRAQUINONES)

alizarin	1.2-dihydroxy-anthraquinone
quinizarin	1.4-dihydroxy-anthraquinone
anthrarufin	1.5-dihydroxy anthraquinone
chrysazin	1.8-dihydroxy-anthraquinone
hystazarin	2.3-dihydroxy-anthraquinone
anthraflavin	2.6-dihydroxy-anthraquinone
isoanthraflavin	2.7-dihydroxy-anthraquinone
alizarin OR and OG	2-hydroxy-3-nitro-anthraquinone
alizarin RG	1.2.7-trihydroxy-anthraquinone
alizarin SG	1.2.9-trihydroxy-anthraquinone
anthragallol	1.2.3-trihydroxy-anthraquinone
purpurin	1.2.4-trihydroxy-anthraquinone
brilliant bordeaux	1.2.5-trihydroxy-anthraquinone
anthrapurpurin	1.2.9-trihydroxy-anthraquinone
flavopurin	1.2.6-trihydroxy-anthraquinone
quinalizarin	1.2.5.8-tetrahydroxy-anthraquinone
anthrachrysone	1.3.5.7-tetrahydroxy-anthraquinone
alizarin cyanin	1.2.4.5.8-pentahydroxy-anthraquinone
alizarin bordeaux	1.2.5.8-tetrahydroxy-anthraquinone
alizarin brown (anthragallol)	1.2.3-trihydroxy-anthraquinone
alizarin cyanin	1.2.4.5.8-pentahydroxy-anthraquinone
alizarin garnet	1.2-dihydroxy-4-amino-anthraquinone
alizarin maroon	1.2.3-trihydroxy-3-amino-anthraquinone
alizarin orange	2-hydroxy-3-nitro-anthraquinone
rufigallol	1.2.3.6.7.9-hexahydroxy-anthraquinone

Cs. All are strongly electro-positive, have a low specific gravity, a low melting point, are silver-white and ductile, and react vigorously with water, liberating hydrogen and forming hydroxides. **a. metaprotein.** A protein cleavage product that is soluble in alkalis. **a. reaction.** Basic reaction. See *alkaline* reaction. **a. series.** See *quantum* numbers. **a. waste.** The waste calcium sulfide from the LeBlanc process.

alkalimeter. An apparatus for the determination of carbon dioxide in carbonates, *e.g.*, Schrötter's apparatus.

alkaline. Producing hydroxyl ions in an aqueous solution; as, any base. **a. reaction.** The color changes caused by alkalis, or the hydroxyl ion, as, red litmus turning blue, blue congo red turning red, colorless phenolphthalein turning red. (See *indicators*.) **a. solution.** A solution containing more hydroxyl ions than hydrogen ions; a solution reacting alkaline. (See *hydrogen-ion* concentration.) **a. tide.** The reduced acidity of tissue fluids and urine which follows eating.

alkalinity. An excess of hydroxyl ions in an aqueous solution; the reverse condition of acidity in which the hydrogen ion concentration is less than the hydroxyl ion concentration. See also *bases*, *acidity* and *hydrogen ion*.

alkalize. To make alkaline or basic. Antonym: acidify, q.v.

alkaloid. An organic nitrogenous base. Many alkaloids are of great medical importance; as, morphine, strychnine, atropine, cocaine, quinine. They occur in the animal and vegetable kingdoms, and some have been synthesized.

CHEMICAL CLASSIFICATION OF ALKALOIDS

	Derivatives of	*Example*	*Occurring in*
1.	Pyridine	piperine	pepper
		coniine, trigonelline	hemlock
		arecoline, arecaidine	areca-nut
		nicotine	tobacco
2.	Pyrrolidine	atropine, hyoscyamine, sparteine	Solanaceae
		cocaine	coca-nut
		pelletierine	pomegranate
3.	Quinoline	quinine, cinchonine, quinidine, cinchonidine	cinchona
		strychnine, brucine	nux vomica
4.	Isoquinoline	papaverine, morphine, codeine, thebaine	morphium
		narcotine, hydrastine	hydrastis
		corydaline, berberine	corydalis
		laudanosine	opium
5.	Purine	caffeine, theobromine, theophylline, xanthine, adenine	coffee, tea, beets, bamboo shoots
6.	Glyoxaline	pilocarpine, ergotoxine, ergometrine	jaborandus, ergot
7.	Amines	aspargine, leucine	
		muscarine, betaine, sinapine, choline	
8.	Glucosides	solanine	
9.	Unknown constitution	aconitine, veratrine, yohimbine	

Cf. tables for aconite, areca, opium, quinine, solanaceae, spartium and staphisagrine alkaloids.

animal- A base derived from animals; as, xanthine, adenine, etc. **cadaveric-** A cleavage product of animal tissues which results from putrefaction; as, betaine, muscarine. (See *ptomaines*.) **putrefactive-** Cadaveric a. **vegetable-** An alkaloid obtained from vegetable tissues; such as, roots, stems, leaves, barks and flowers of plants.

alkaloidal. Pertaining to alkaloids.

alkalometry. (1) The medication of alkaloids for therapeutic purposes. (2) The determination of alkaloids.

alkamine. Amino alcohol. An organic compound containing both the amino and alcohol groups (amino-alcohols). **a. esters.** An organic compound formed by the esterification of an acid with an alcohol containing the amino group.

alkanes. A group of aliphatic hydrocarbons, C_nH_{2n+2}; cf. the *methane series*.

alkanet. Alkanna root. The root of *Alkanna tinctoria*, a Boraginaceae. Used as a red color for oils or fats.

alkanisation. The combination of isobutane and butenes from petroleum, in presence of sulfuric acid, to form iso-octane and trimethyl butene.

alkannic acid. An organic acid extracted by alcohol and ether from alkanet.

alkannin. $C_{15}H_{14}O_4 = 258.19$. Anchusin. A red amorphous powder, softening at 100; insoluble in water and soluble in alcohol or acetone. Used as color for fats or oils and as an indicator. **a. extract.** Extract alkanet. A crude a. **a. paper.** Boettger's paper. A filterpaper stained with a. and used as test for alkalis (green), carbonates (blue) and acids (red).

alkanol. Trade name of a group of wetting agents.

alkargen. Cacodylic acid.

alkarsin. A mixture of cacodyl and its oxidation products.

alkasal. A mixture of aluminum salicylate and potassium acetate.

alkenes. A group of aliphatic unsaturated hydrocarbons of the general type, C_nH_{2n}, which contain double bonds; the *ethylene series*, q.v.

alkenyl. A generic term for trivalent aliphatic radicals.

alkines. A group of aliphatic, unsaturated hydrocarbons of the general type, C_nH_{2n-2}, which contain triple bonds; the *acetylene series*, q.v.

alkone. A hydrocarbon of the type C_nH_{2n-4}. See *hydrocarbon* series.

alkoxides. A group of organic compounds in which the hydrogen atom of the hydroxyl group is replaced by a metal; as, in alcoholates and phenates.

alkoxy. Any alkyl radical which is attached to the remainder of the molecule by oxygen; hence the monovalent radical RO—; as, methoxy, ethoxy.

alkyd resin. A group of tacky and adhesive resins made from unsaturated fatty acids (phthalic anhydride) and glycerol. Used as bonding materials.

alkyl. Alphyl, aphyl. A monovalent radical derived from an aliphatic hydrocarbon by removal of one hydrogen atom, as methyl-, ethyl-, or propyl-. Their general formula is C_nH_{2n+1}—. Cf. *alkyle, alkylene.* **a. halide.** A compound of the type R.Cl. **a. nitrite.** A compound of the type $R.NO_2$. **a. oxide.** See *ethers.* **a. sulfide.** See *mercaptan.*

alkylamine. An organic compound containing the $—NH_2$ group and an unsaturated hydrocarbon.

alkylation. The substitution of an aliphatic hydrocarbon radical for a hydrogen atom in a cyclic compound; as, the introduction of a side chain into an aromatic compound. **acid-** or **hot-** To introduce the alkyl into the amino- or hydroxy- group by heating under pressure with alcohol in presence of mineral acid. **basic-** or **cold-** Treatment with alkyl sulfate in the presence of sodium hydroxide.

alkylbenzaldoxime. A series of compounds derived from benzaldoxime by replacing one hydrogen atom of the aldoxime group by another radical. There are four series of isomeric compounds and eight stereoisomers:

anti-C-alkylbenzaldoxime.....	PhCHON—R
syn-C-alkylbenzaldoxime.....	PhCHON—R
N-alkylbenzaldoxime.....	PhCHON—R
O-alkylbenzaldoxime.....	PhCHNO—R

Ph is phenyl, and R a radical. The other isom rs are derived by exchanging the positions of Ph and R. Cf. *aldoxime.*

alkyle. (1) The unsaturated hydrocarbons of the general formula C_nH_{2n+1}. (2) Alkylide. A compound of a metal (Al, Pb, Hg, Zn, etc.) and an alkyl radical; as, tetraethyl lead.

alkylene. An organic radical derived from an unsaturated aliphatic hydrocarbon; as, ethylene-, propylene-. Their general formula is, C_nH_{2n}—. **a. oxides.** (1) Alcohol ethers. The aliphatic compounds that contain both the carbinol and ether groups; as, diethyline. (2) Epihydrins. Alicyclic compounds which are the inner anhydrides (ethers) of glycols; as, ethylene oxide, butylene oxide.

alkylhalides. Alkylogen. A combination of an alkyl and halogen grouping of the type $C_nH_{2n+1}X$.

alkylide. See *alkyle* (2).

alkylidene. A divalent organic radical derived from an aliphatic hydrocarbon; as, ethylidene or propylidene, in which two hydrogen atoms are taken from the same carbon atom. Their general formula is C_nH_{2n}—.

alkylogens. Alkyl halides.

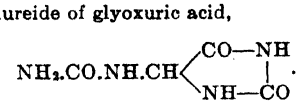
alkyls. See (1) *alkyl,* (2) *alkyle.*

allanic acid. $C_4H_5O_5N_5 = 203.2$. A monobasic crystalline acid obtained by the oxidation of allantoin with nitric acid.

allanite. Bagrationite. Orthite. A monoclinic, brown to black, orthite of the zoisite group which resembles epidote, but in which a rare earth metal partly replaces the aluminum and iron; d.3.5–4.2, hardness 5.5–6.

allantoic acid. $C_4H_8O_4N_4 = 176.2$. Dicarbamidoacetic acid, $(NH_2CONH)_2CHCOOH$. A crystalline monobasic acid obtained by boiling allantoin in alkaline solution.

allantoin. $C_4H_6O_3N_4 = 158.11$. Glyoxyl diureide, *5*-carbamidohydantoin, *5*-ureido hydantoin. The diureide of glyoxuric acid,

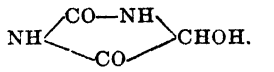


Colorless crystals, m.227 (partial decomp.); soluble in hot water. It is produced by the oxidation of uric acid and is widely distributed in nature, occurring in the urine of animals and the seeds and roots of plants. It hastens epithelial formation.

allantoxaidine. $C_3H_3O_2N_3 = 113.1$. A crystalline compound derived from allantoxanic acid.

allantoxanic acid. $C_3H_3O_4N = 117.0$. Colorless crystals obtained by the action of potassium ferricyanide on allantoin.

allanturic acid. $C_3H_4O_3N_2 = 116.1$. *5*-Hydroxy-*2.4*-imideazole-dione, glyoxalylurea. A pentacyclic and heterocyclic compound obtained by hydrolyzing allantoin,



On reduction it yields hydantoin, which when hydrolyzed, gives hydantoic acid and finally glycine and ammonium carbonate.

allelomorph. (1) One of a mixture of isomers in a solution which will first separate or crystallize out. (2) One of the many character units existing in the germ-plasm of hybrids and which may, consequently, appear in their offspring.

allelomorphism. Desmotropism.

allelotrope. A member of a system of two isomeric or desmotropic substances in equilibrium with one another; hence the substance may react according to one or the other molecular structure.

allelotropism. The phenomenon of two isomeric or desmotropic substances existing in an unstable equilibrium, so that either one or the other rearrangement of the atoms may take place.

allemontite. $SbAs_3$. A native antimony arsenide, occurring as a rhombohedric, gray or reddish mineral.

Allen's test. A modification of Fehling's test for sugar in urine.

allene. Propadiene*. **ethyl-** *1.2*-Pentadiene*. **methyl-** *1.2*-Butadiene*.

allergen. Anaphylactin. A toxic substance which causes anaphylaxis.

allergia. The hypersensitivity of an organism toward a later re-injection of the same serum. This condition is known as *anaphylaxis,* q.v.

allergic protein. An extract prepared from various vegetable or animal substances, which is used for diagnosis or desensitization; e.g. pollen extract in hay fever.

allergy. The hypersusceptibility or increased resistance of an organism to a certain antigen, demonstrable by a local reaction.

alligation. If two substances when mixed retain their specific values (A and B) of a property, the value for the mixture can be calculated from the equation $\frac{aA + bB}{a + b}$, where a and b are the proportions. Cf. *additive.*

Allihn condenser. A condenser in which the condensing surface consists of a series of glass bulbs.

Allium. A group of liliaceous plants which contain a pungent, volatile oil (allyl sulfide).

Their bulbs are used as a food, condiment and aid to digestion.

A. cepa..... common **onion**
A. porrum..... leek
A. sativum..... garlic (q.v.)

allo- Prefix from the Greek "other," and applied to the more stable form of 2 isomers.

allochroite. A light green to black manganese *garnet*, q.v.

allochromy. A *phosphorescence* or radiation effect, q.v., in which the wavelength of the emitted light differs from that of the incident light.

allocinnamic acid. $C_9H_8O_2 = 148.11$. White crystals, d.0.845, $b._{19mm}125$, existing in three allotropic forms, m.42, 58 and 68, respectively.

alloclasite. A steel-gray mineral, which consists of the sulfides of cobalt, bismuth and arsenic with some iron. It is similar to glaucodot.

allocyanine. Neocyanine.

alloisomerism. Stereo-isomerism.

allomaleic acid. Fumaric acid.

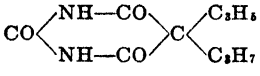
allomerism. A similarity of crystalline form with a difference of chemical composition; as, $KClO_4$ and $KMnO_4$.

allomerization. The dehydrogenation of chlorophyll in alcoholic solution by the action of atmospheric oxygen, which occurs on standing.

allomorphism. A similarity of chemical composition but a difference in crystalline form, especially of minerals; as $CaCO_3$ in calcite and aragonite.

allomucic. $C_6H_{10}O_8 = 200.1$. The optically inactive, dibasic acid, $HOOC(CHOH)_4COOH$, derived from *d-* and *l-* allose, m.166–171; soluble in hot water or alcohol.

allonal. $C_{10}H_{14}O_3N_2 = 210.12$. Registered trade mark for 5-allyl-5-isopropylbarbiturate of phenyldimethyl-dimethylamino pyrazolon.



Used as a soporific. Cf. *barbital*.

allo-palladium. See *palladium*.

allophanamide. Biuret.

allophane. An amorphous native hydrated calcium silicate.

allophanic acid. $C_2H_4O_3N_2 = 104.1$. Ureacarbonic acid, carbamyl carbamic acid. $NH_2.CO.NH.COOH$. A hypothetical acid known as its esters; ethyl allophanate, $EtOOC.NH.CO.NH_2$. **a. amide.** Biuret.

allose. $C_6H_{12}O_6 = 180.15$. A synthetic hexose, isomeric with glucose.

allotelluric acid. See *telluric* acid (anhydrous).

allotoxin. A substance formed by living tissue, which tends to counteract the harmful effect of bacterial toxins on an organism.

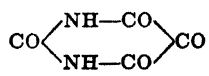
allotrope. One of two or more isomeric forms of an element; as, red and white phosphorus.

allotropic. Occurring in two or more isomeric forms; *e.g.*, carbon as graphite, diamond, or charcoal. **a. modification.** Allotrope.

allotropism. Allotropy.

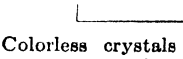
allotropy. Allotropism. A change in the properties of an element without a change of state, q.v.; isomerism of a chemical element which occurs in different amorphous and crystalline forms; as, with sulfur, phosphorus or carbon. Cf. *monotropy*, *pseudomonotropy*. **dynamic-** Tautomerism.

alloxan. $C_4H_2O_4N_2 = 142.1$. Mesoxyalylurea, hexahydrotetraketo pyrimidine, pyrimidinetetrone, the "erythric acid" of Brugnatelli.



It occurs in two crystalline forms, with 1 mol. H_2O as small colorless crystals, and with 4 mol. H_2O as large, colorless, efflorescent prisms. It decomposes at about 170, and is soluble in water or alcohol. It appears in the intestinal mucus during diarrhea. If bottled it sometimes explodes. **oxime-** Violuric acid.

alloxanic acid. $C_4H_4O_5N_2 = 160.1$. Tetrahydro-*4*-hydroxy-*2.5*-diketo-*4*-imidazole-carboxylic acid. The compound, $NH_2.CO.NH.CO.CO.COOH$ or its ring form

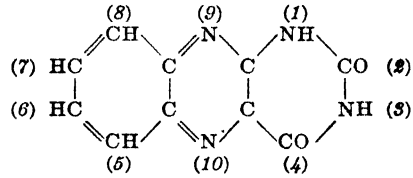


Colorless crystals obtained from alloxan by treatment with alkalis. They decompose if heated.

alloxanthin. Alloxantin.

alloxantin. $C_8H_4O_7N_4 = 286.2$. A purine base occurring in colorless, small prisms, or rhombic crystals, soluble in water, alcohol or ether. **tetramethyl-** Amalinic acid.

alloxazin. $C_{10}H_6N_4O_2 = 214.12$.
The heterocyclic compound



which occurs in some plant pigments. **iso-** Flavin.

alloxuric bodies. Purine bases.

alloy. A mixture of two or more metallic elements (or non-metals, as C, Te, P) which has a metallic appearance and which is either:

1. A molecular mixture, microscopically homogeneous; as,

(*a*) a solid solution of A-in-B or B-in-A, in which case the properties are intermediate between those of A and B; or

(*b*) a metallic compound, A_xB_y, with properties differing from A and B; or

(*c*) a combination of (*a*) and (*b*); as, A-in-A_xB_y.

2. A colloidal mixture, microscopically heterogeneous; as, two or more phases, [—], consisting of crystals:

(*d*) of metallic elements, [A] + [B]

(*e*) of metallic compounds, $[A_xB_y] + [AB_z]$

(*f*) of solid solutions [A-in-B] + [B-in-A]

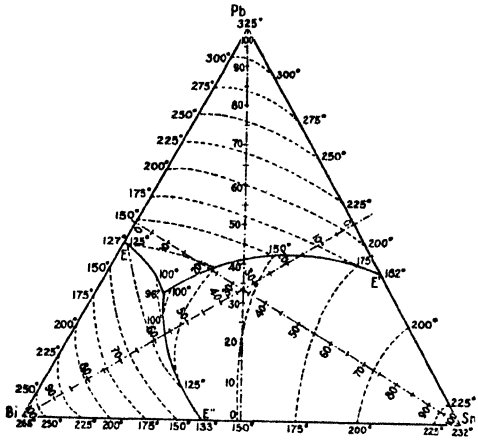
(*g*) of combinations of *d*, *e*, and *f*; as, [A] + $[A_xB_y]$ + [A-in-B], etc.

Generally the fusing point of an alloy is lower than the fusing point of its highest-melting constituent; in some cases it is lower than that of any or all constituents. Each set of metals has its own particular system, (see *diagram*), and with 3 metallic elements, there are possible:

666 binary systems (two components)
7770 ternary systems (three components)
66054 quarternary systems (four components)

See *steel* and each metallic element.

antifriction- A. which are sufficiently plastic to fit themselves to the shape of a shaft. They contain generally, tin or lead alloyed with copper or antimony. **coinage-** A. used for coins. Cf. *gold* a., *silver* a. **eutectic-** An a. which has the



Alloys of Pb, Bi, and Sn. (Molinari.) Showing the fusing points of a ternary system (for explanation of this graph see *diagram*).

lowest constant melting point; *i.e.*, whose constituents are present in such proportions that it solidifies completely at the *eutectic* temperature, q.v. **fusible.** Low-fusing a. **heavy-** An a. of 90 % W, 7.5 % Ni and 2.5 % Cu. It has a high density (16.5–17.0 grm./cc.), a tensile strength equal to that of steel, and good machining properties. **Heussler's.** A group of magnetic a. which do not contain iron but metals which are separately nonmagnetic; as, 60 pts. Cu, 20 pts. Mn and 14 pts. Al. **light-** An alloy containing aluminum as distinct from magnesium. Cf. *ultra-light* a. **low-** An alloy containing a large proportion of one constituent. **low-fusing-Fusible** a. An a. melting below the m. of tin. The lowest melting a. (15°C) consists of 88 % Ga and 12 % Sn. Others are: Newton's 8 Bi, 5 Pb, 3 Sn (m.94°C); Lipowitz' 5 Bi, 2.7 Pb, 1.3 Sn, 1.0 Cd (m.65°C). Cf. *D'Arcet* metal a., *Wood's* a., *Rose* metal. **master-** An alloy containing a known amount of a particular metal, which is used instead of the pure metal for making up finished alloys. **mercury-** Amalgam. **pyrophoric-** Iron-cerium alloys which spark when rubbed with a coarse file. **ultra-light-** An alloy containing magnesium, as distinct from aluminum. Cf. *light* a.

alloying. To produce an alloy by fusing metals together.

allspice. Pimenta.

allulose. $C_6H_{12}O_6$ = 180.0. d-Ribo-2-ketoheose, d-pseudo-fructose, d-piscose. $CH_2OH.CO.(CHOH)_3.CH_2OH$, an epimer of d-fructose. A reducing, non-fermentable constituent of cane sugar molasses, cf. *glutose.*

alluvium. The deposit of sand, earth etc., carried down by a river.

allyl. The monovalent radical, $—C_3H_5$, which contains a double bond, α- or Δ^2- $—CH_2.CH:CH_2$, β- or Δ^1-iso-, (propenyl), $—C(CH_3):CH_2$, γ- or Δ^1-, (isopropenyl), $—CH:CH.CH_3$. **a. acetate.** $C_5H_8O_2$ = 100.09. The ester, $MeCOOC_3H_5$. A colorless liquid, d.0.938, b.103; slightly soluble in water and miscible with alcohol or ether. **a. acetic acid.** $C_5H_8O_2$ = 100.09. The monobasic acid $C_3H_5.CH_2.COOH$. A colorless liquid, d.0.984, b.187, slightly soluble in water, and miscible with alcohol or ether. **a. acetone.** $C_3H_5.CH_2.CO.CH_3$ = 98.11. *5*-Henene-*2*-one*. A colorless liquid, $d_{27°}$.0.834, b.129; insoluble in water. **a. acetonitrile.** $C_3H_5CH_2CN$ = 81.09. A colorless liquid, d.1.184, b.140; insoluble in water. **a. alcohol.** $CH_2:CH.CH_2OH$ = 58.06. Propenol, propenyl alcohol, *-2*-propen-*1*-ol*. A colorless liquid, d.0.849, m. −129, b.96, insoluble in water and miscible with alcohol or ether. Used in organic synthesis, in chemical warfare, and as antiseptic in 0.5 % solution. **a. aldehyde.** Acrolein. **a. amine.** $CH_2:CH.CH_2NH_2$ = 57.08. *2*-Propenylamine*. A yellowish, oily liquid, d.0.761, b.53.2; miscible with water, alcohol or ether. It is prepared from mustard oil. (*methyl-*) $C_3H_5.NH.CH_3$ = 71.10. A colorless liquid, b.65; miscible with water, alcohol or ether. (*phenyl-*) Allyl aniline. **a. aniline.** $C_3H_5.NH.C_6H_5$ = 133.14. Phenyl allyl-amine. A colorless liquid, d.0.982, b.208; slightly soluble in water and soluble in alcohol. **a. benzene.** $CH_3.CH:CH.C_6H_5$ = 118.13. **n-,** Phenyl propine, phenyl allylene. A colorless liquid, d.0.914, b.160; soluble in alcohol. *iso-* Benzylethylene, $BzCH:CH_2$. A colorless liquid, d.0.909, b.155. **a. benzoate.** $C_6H_5.COOC_3H_5$ = 162.13. A colorless liquid, d.-1.059, b.228. **a. bromide.** $CH_2:CH.CH_2Br$ = 120.98. Bromallylene, γ-monobromopropylene, 3-bromo-1-propine, 3-bromopropene*. A colorless liquid, d.1.436, b.70.5; insoluble in water and miscible with alcohol or ether. **a. butyrate.** $CH_3(CH_2)_2COOC_3H_5$ = 128.13. A colorless liquid, b.142, miscible with alcohol. **a. carbinol.** $CH_2:CH.CH_2.CH_2OH$ = 72.1. A colorless liquid. *methyl-* $CH_2:CH.CH_2.CH(OH)CH_3$ = 86.11. A colorless liquid, $d_{20°}$.0.834, b.115; soluble in 8 pts. water and miscible with alcohol or ether. **a. chloride.** $CH_2:CH.CH_2Cl$ = 76.52. Chlorallylene, *3*-chloropropene*, α.-monochlorpropylene. A colorless liquid, d.0.937, b.46; insoluble in water and miscible with alcohol or ether. **a. cinnamate.** $C_6H_5.CH:CH.COOC_3H_5$ = 188.16. Colorless crystals, $d_{20°}$.1.052, b.285; insoluble in water, and soluble in alcohol or ether. **a. cyanamide.** Sinamin. **a. cyanide.** C_4H_5N = 67.07. *3*-Butanenitrile*, vinylacetonitrile, β-butenonitrile, $CH_2:CH.CH_2CN$. A colorless liquid, d.0.835, b.119; soluble in alcohol or ether. **a. disulfide.** $C_3H_5.S.S.C_3H_5$ = 146.02. Colorless liquid, d.0.9, b.138; it occurs in garlic. **a. ether.** $C_6H_{10}O$ = 98.11. Diallyloxide, *3*-(2-propenoxy)propene*. $(CH_2:CH.CH_2)_2O$. A colorless liquid, $d_{15°}$.0.805, b.94.3; slightly soluble in water and miscible with alcohol or ether. *methyl-* $CH_2:CH.CH_2.O.CH_3$ = 72.08. A colorless liquid, d.0.773, b.46; slightly soluble in water, and miscible with alcohol or ether. **a. ethyl ether.** $C_5H_{10}O$ = 86.11. The mixed ether $C_3H_5.O.C_2H_5$. A colorless liquid, b.64. **a. fluoride.** $CH_2:CH.CH_2F$ = 60.04. *3*-Fluoropropene*. Colorless gas, b. −10, slightly soluble in water. **a. formate.** $HCOOC_3H_5$ = 86.07. A colorless liquid, d.0.932, b.82; insoluble in water and soluble in alcohol. **a. iodide.** $CH_2:CH.CH_2I$ = 167.98. *3*-Iodopropene*. A yellow liquid, $d_{15°}$.1.890, b.101; insoluble in water, and miscible with alcohol or ether. **a. isoamyl**

ether. $C_8H_{16}O$ = 128.17. Allyl-i-amyl oxide. $C_3H_5.O.C_5H_{11}$. A colorless liquid, b.120; slightly soluble in water and miscible with alcohol or ether. **a. isocyanide.** $CH_2:CH.CH_2NC$ = 67.07. A colorless liquid, $d_{17°}$.0.794, b.100; slightly soluble in water and miscible with alcohol or ether. **a. isothiocyanate. a. mustard oil. a. malonic acid.** $C_6H_8O_4$ = 144.09. The compound $C_3H_5.CH:(COOH)_2$. Colorless crystals, m.103, (decomp.), and soluble in water, alcohol or ether. **a. mercaptan.** $CH_2:CH.CH_2SH$ = 74.12. Allyl sulfhydrate, *2*-propene-*2*-thiol*. A slightly yellow liquid, b.90; miscible with alcohol or ether. **a. mustard oil.** $CH_2:CH.CH_2NCS$ = 99.13. A. isosulfocyanic ester, a. isothiocyanate, a. thiocarbimide. A colorless liquid, $d_{10°}$.1.017, b.151; slightly soluble in water and miscible with alcohol or ether. It occurs in mustard seeds (*Sinapis nigra*) as *potassium* myronate, q.v., combined in the form of glucoside, and in horseradish. Used as a vesicant poison gas. **a. oxalate.** $(COOC_3H_5)_2$ = 170.12. A colorless liquid, d.1.055, b.217; insoluble in water, soluble in alcohol. **a. phenyl cinchonine ester.** Antiquinol. **a. phenyl ether.** $C_6H_5.O.C_3H_5$ = 134.13. A colorless liquid, d.0.986, b.192; insoluble in water. **a. phenylmethyl ether.** Anethol. **a. phenyl urea.** $C_{10}H_{12}ON_2$ = 176.16. The urea derivative $Ph.NH.CO.NH.C_3H_5$. Colorless crystals, m.115. **a. pyridine.** $C_5H_4N.C_3H_5$ = 119.12. A colorless liquid, $d_{0°}$.0.959, b.190. **a. pyrocatechol methylene ester.** Safrol. **a. sulfhydrate.** a. mercaptan. **a. sulfide.** $(C_3H_5)_2S$ = 114.17. Thioallyl ether, a. thioether, *3*-(*2*-propenylthio)-propene*, *2*-propenylsulfide*, diallyl sulfide. A colorless or slightly yellowish liquid, $d_{27°}$.0.888, b.138; slightly soluble in water and miscible with alcohol or ether. It is a constituent of garlic, and is used hypodermically in tuberculosis and cholera. **a. sulfocarbamide.** $C_3H_5.NH.CS.NH_2$ = 116.16. Thiosinamine rhodalline, a. thiourea, a. sulfourea. Colorless monoclinic crystals of slight garlic-like odor, m.74; soluble in water, alcohol, or ether. Used medicinally in the treatment of scar tissue in photography, and as a reagent in the analysis of feces. (Cf. *a.* mustard oil). **a. sulfocyanide.** $CH_2:CH.CH_2SCN$ = 99.13. a. thiocyanate. A colorless liquid, d.1.056, b.161, insoluble in water. **a. sulfourea.** a. sulfocarbamide. **a. thiocarbimide.** a. mustard oil. **a. thiocyanate.** a. sulfocyanide. **a.-i-thiocyanate.** a. mustard oil. **a. thioether.** a. sulfide. **a. thiourea.** a. sulfocarbamide. **a. tribromide.** $C_3H_5Br_3$ = 280.9. Tribromallylene, *1.2.3*-tribromopropane*, tribromopropylene, propargyltribromide, tribromhydrin, $CH_2Br.CHBr.CH_2Br$. Colorless crystals, or oil, d.2.436, m.18, b.219; soluble in alcohol or ether. Used as an antispasmodic and sedative in hysteria, asthma and whooping cough. **a. trisulfide.** $(C_3H_5)_2S_3$ = 178.26. Diallyl trisulfide. Colorless liquid, d.1.085, b.140, insoluble in water.

allylene. $CH_3.C:CH$ = 40.05. Propyne*, propine, methyl acetylene. A colorless gas, m. −110, b. −23.5, and soluble in ether. Cf. *propadiene.* **dimethyl-** Methyl butine. **methyl-** Butine. **phenyl-** See *phenylmethyl* acetylene.

a. dichloride. $C_3H_4Cl_2$ = 110.97. *1.2*-Dichloropropene*. The compound $CH_3.CCl:CHCl$. A liquid, $d_{27°}$.1.23, b.55. **a. oxide.** $(CH_3.C:CH)_2O$ = 56.05. *1.2*-Epoxypropene*. A colorless liquid, b.62, slightly soluble in water.

allylin. $C_6H_{12}O_3$ = 132.1. Allyloxy-glycerol. The compound $CH_2:CH.CH_2.O.CH_2.CHOH.CH_2OH$. A heavy liquid, b.230, formed on heating glycerol with oxalic acid.

almadina. Euphorbia gum.

almandine. Almandite.

almandite. (1) Almandine. $Fe_3Al_2Si_3O_{12}$. An isometric, reddish-brown to black garnet, d.3.9–4.2, Mol.W.499.1, Mol.Vol.118.0, used as a gem. (2) A violet variety of *spinel*, q.v.

Almen test. The detection of carbohydrates by the reduction of alkaline bismuth ions.

almond. The dried ripe seeds of *Prunus amygdalus* (*communis*), a Rosaceae of Southern Europe and California; 2 varieties: **bitter-** the seeds of variety *amara*, used in the manufacture of a. oil, amygdalin and for flavoring; **sweet-** the seeds of variety *dulcis*, used in the manufacture of oil.

a. cake. The crude remains of a. after the expression of oil; used for a. meal. **a. camphor.** Benzoin. **a. furnace.** A remelting furnace of the *reverberatory* type, q.v. **a. meal.** The residue remaining after the expression of oil from almonds. It is used in cosmetics, cooking, confectionery and as a perfume base. **a. oil, (artificial-)** Benzaldehyde. **(artificial bitter-)** Nitrobenzene. **(bitter-)** An oil obtained from bitter a. by macerating with water and distilling. A colorless liquid, d.1.045–1.060, b.180; soluble in water, alcohol, or ether. Used for flavoring **(sweet-)** An oil obtained by expressing sweet a. A yellow liquid, d.0.915–0.920; soluble in alcohol, ether, chloroform or benzene. Used as a perfume, and as a lubricant for delicate mechanisms such as watches. **bitter almond water.** A solution containing hydrocyanic acid, ammonium cyanide and mandelic acid nitrile.

alneon. An alloy of aluminum with zinc (10–20 %) and small amounts of copper and nickel; Used for castings.

alnuoid. An extract from the bark of *Alnus serrulata* or American alder. Used as a tonic.

Alnus. Alnus bark. The bark of the American alder, *A. serrulata*, a Betulaceae, which contains tannic acid; used as astringent.

alochrysine. $C_{15}H_8O_5$ = 268.1. A decomposition product of barbaloin obtained by oxidation with chromic acid mixture.

aloe. (1) A genus of liliaceous plants; the juices are the aloes of commerce and the fibres are used for cords and nets. (2) An extremely bitter, black, shining resin from the juice of the leaves of several aloe species. Used medicinally as a cathartic. **American-** Agave. **Barbados-** The resin from *Aloe vulgaris* of Jamaica and Barbados. **Cape-** The resin from *Aloe ferox* and other species of South Africa. Used in the manufacture of a brown dye. **hepatic-** The resin from *Aloe chinensis* and other species from the Dutch Indies. **Socotrine-** The resin from *Aloe perryi* from Socotra.

a. emodin. $C_{15}H_{10}O_5$ = 270.1. A crystalline constituent of all aloes which is also found in cascara sagrada, frangula and senna leaves. Yellowish crystals, m.224. Used medicinally as a cathartic.

aloeresic acid. $C_{30}H_{22}O_{14}$ = 616.3. A yellowish-brown, micro-crystalline powder obtained from Cape aloes.

aloe-wood. Eagle wood, lignum, aloe. A fragrant resinous heart-wood from *Aquilaria agallocha*, a tree of tropical Asia. Used by the Chinese as a tonic, stimulant and diuretic, and as a constituent of incense and perfumery.

aloetic acid. $C_{14}H_4O_{10}N_4$ = 388.2. Tetranitroanthraquinone. An orange-red amorphous powder obtained by treating aloin with nitric acid.

aloin. $C_{30}H_{18}O_9$ = 402.14. A neutral, bitter principle of aloes. Yellow, prismatic needles, m.147, soluble in water, alcohol or bases. It is considered to be the strong purgative glucoside of aloes and is named according to its origin: barbaloin, nataloin, socaloin or zanaloin.

alonigrin. $C_{22}H_{18}O_8$ = 410.2. An amorphous principle obtained from Barbados aloes.

aloxite. The registered trade-mark for certain artificial aluminum oxide products made by fusing materials high in alumina (as bauxite) in an electric furnace. White to dark red crystalline masses result; these are used as abrasives, filters and refractories. Cf. *alundum*.

alpaca. The long, silky, lustrous wool from the alpaca, a type of llama (Auchenia paco).

alpax. A light aluminum-silicon eutectic alloy which contains 13 % Si. It is used for moulded articles, as it has a low shrinkage when quenched.

alpha. α = The first letter of the Greek alphabet. **a. acid.** 2.8-Naphthylamine sulfonic acid. **a. derivatives.** (1) Substitution products of straight chain compounds in which the substituting atom or radical is attached to the carbon atom to which the principal group is also attached; *e.g.*, α-hydroxy propionic acid: $CH_3.CHOH.COOH$. (2) A substitution product of a polycyclic compound, in which the substituting atoms or radicals are attached to the carbon atom which is closest to the carbon atom shared by both rings; *e.g.*, in naphthalene, the 1, 4, 5, or 8 position. (3) Substitution products of heterocyclic compounds in which the substituting atom or radical is attached to the carbon atom which is closest to the heterocyclic atom; *e.g.*, in pyridine the 2, or 6 position. (4) The first of a series of derivatives to be discovered. This usage has no logical structural significance. (5) An even rotational quantum number; as,

α-hydrogen (or para-H)	0.2.4...
β-hydrogen (or ortho-H)	1.3.5...

(6) A stereoisomer of a sugar; as, α-glucoside. *Note.* For compounds beginning with alpha see under the main heading; thus for alphanaphthol see *α-naphthol*. **a. particles.** Positively-charged helium nuclei emitted from radio-active substances with a speed of 20,000 miles/second. (1.922×10^9 cm./sec.). They have a mass equal to that of a helium atom; when their charge is neutralized by the capture of two negative electrons, they form helium atoms. Cf. *alphatopic* change. **a. position.** See a. derivatives. **a. rays.** a particles.

alphatopic. Pertaining to 2 radioactive elements or isotopes which differ by an alpha particle and an atomic weight of 4.00. **a. change.** The spontaneous disintegration of certain radio-active elements in which an alpha particle is emitted and the element, thereby, changes its position in the periodic table by moving two places lower. See *radio-active* elements.

alphazurine. An indicator changing at pH 6.0 from purple (acid) to green (alkaline), used for improving the end-point of methyl red.

alphol. $C_{17}H_{12}O_2$ = 264.09. α-naphthyl salicylate. A white powder, m.83, insoluble in water; used medicinally. Cf. *betol*.

alphozone. A brand of succinic peroxide.

alphyl. Alkyl-phenyl. A radical having both aromatic and aliphatic structures; as, benzyl, phenylhexyl-, etc. Cf. *aralkyl*.

alpinin. $C_{17}H_{12}O_6$ = 312.1. A crystalline constituent of galangal, the rhizome of *Alpinia officinarum* (Zingiberaceae).

alquifou. Potters' lead. Black lead ore. A mineral zinc sulfide used to produce a green glaze on pottery.

Alsace gum. Dextrin.

alsol. Aluminum acetotartrate.

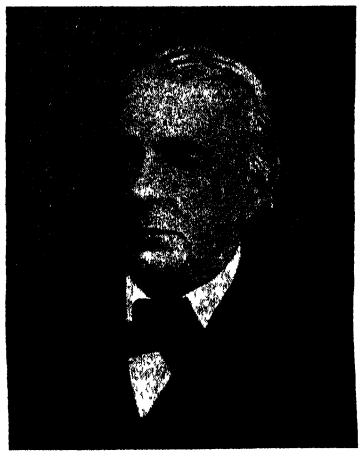
Alsop drying oven. A steam-chamber for holding crystallizing dishes, devised specially for tanning laboratories.

Alstonia. A genus of Apocynaceae of India and Malaya which yield *dita* bark, q.v.

alstonine. $C_{21}H_{20}N_2O_4.3\frac{1}{2}H_2O$ = 427.4. Chlorogenine. An alkaloid from the bark of *Alstonia constricta*, an Apocynaceae of Asia. Colorless crystals, m.195; insoluble in water, soluble in alcohol or ether. It is used as an antipyretic and antiperiotic. Cf. ditaine, porphyrine.

alstonite. Neotype. Baryto-calcite. Bromlite. The mineral $BaCO_3,CaCO_3$.

altaite. PbTe. A native lead telluride, a rare mineral occurring in tin ores as white isometric crystals. It is found in the Altai mountains of Central Asia.



David Alter.

Alter, David. 1807–1881. An American physician noted as the discoverer of spectrum analysis (1854).

alterative. A drug which stimulates the nutritive functions of the body without exerting an obvious influence upon any particular organ.

alternating current. A.C. An electric, pulsating current, in which the direction of the flow is rapidly changed so that a terminal becomes in rapid succession positive then negative. Cf. *alternator*, *commutator*, *rectifier*. **pure-** An A.C. which is constant in frequency and output, and which gives a correct sine-wave curve. It is obtained by the use of a double mercury-arc oscillator.

alternation. A series of changes following each other periodically or in turn. **a. of generations.**

The successive change from asexual to sexua reproduction and back again; a biological phenomenon observed in some lower forms of animals and plants (*e.g.*, mosses, ascidians). **a. law.** The arc spectra of the elements have alternately odd and even multiplicities when passing from the first to the higher groups of the periodic table. **a. rule.** Pauli's principle.

alternator. A dynamo with a large number of poles producing 120 or more alternations or cycles of current per second.

althea althæa. Marshmallow, hollyhock, q.v. The dried roots, flowers and leaves of *Altheae officinalis*, a Malvaceae. Used medicinally as an emollient and demulcent.

altheine. Aspargine.

althionic acid. Ethylsulfuric acid.

altimeter. An instrument for measuring the heights of objects; *e.g.*, trees, buildings, hills.

altiscope. Periscope.

altitude. The vertical elevation above any given point, cf. *co-ordinates;* in particular the height or distance above sea level. **a. gage.** A barometer used for determining altitude.

altrose. $C_6H_{12}O_6$ = 180.10. A hexose that is isomeric with glucose, talose and allose.

alucol. A colloidal aluminum hydroxide used as antacid.

aludel. A pear-shaped vessel open at both ends, used to connect other vessels. **a. furnace.** A furnace used for the reduction of mercurial ores.

alum. (1) A generic name for a group of double salts of the general formula $M_2'SO_4.M_2'''(SO_4)_3.24H_2O$, or $M'M'''(SO_4)_2.12H_2O$. M' is monovalent and may be Na, K, Rb, Cs, NH_4, Tl, Ag, hydroxylamine, or the radical of an organic quarternary base, (*e.g.* NMe_4). M''' is trivalent and may be Fe, Cr, Al, Mn, In, Tl, Ga, V, Co, Ti, Rh etc. SeO_4 or TeO_4 may replace SO_4. (2) A name applied to double salts of aluminum sulphate and the sulphate of a monovalent metal (M'), hence: $M_2'SO_4.Al_2(SO_4)_3.24H_2O$. (3) The original name of ammonium alum, $(NH_4)_2SO_4.Al_2(SO_4)_3.24H_2O$. See also pseudo*alum*. (4) Erroneously applied to aluminum sulfate; as, papermaker's a. (5) Generally applied to potassium aluminum sulfate. **ammonium-** Ammonium aluminum sulfate. **ammonium chrome-** Ammonium chromic sulfate. **ammonium iron-** Ferri ammonium sulfate. **burnt-** Aluminum potassium sulfate, calcined at 200° so as to lose its water. **cesium-** Aluminum cesium sulfate. **chrome-** Sodium chromic sulfate. **common-** Aluminum potassium sulfate. **copper-** Cupric aluminate. **iron-** A native ferric potassium sulfate. **manganese-** Manganous ammonium sulfate. **neutral-** Alunite. **official-** Either ammonium (U.S.P.) or potassium (B.P.) alum. **pearl-** A specially-prepared alum for paper manufacture. **pickle-** An alum prepared for canneries, packers, etc. **porous-** Aluminum sodium sulfate. **potassium-** Aluminum potassium sulfate. **potassium chrome-** Chromic potassium sulfate. **potassium manganese.** Potassium manganic sulfate. **pseudo-** Alums containing a divalent in place of the univalent metallic sulphate, as $MnSO_4.Al_2(SO_4)_3.24H_2O$. They are not isomorphous with the alums. **roman-** A native aluminum and iron sulfate from Tolfar, Italy. **rubidium-** Aluminum rubidium sulfate. **sodium-** Aluminum sodium sulfate. **thallium-** Aluminum thallium sulfate. **true-** a. containing aluminum **a. flour.** Aluminum potassium sulfate. **a. hematoxylin solution.** A staining solution containing 1 pt. hematoxylin, 100 pts. saturated aqueous solution of ammonium alum, 0.5 pt. thymol and 300 pts. water. **a. meal.** Aluminum potassium sulfate. **a. root.** The root of *Heuchera americana*, which contains gallic and tannic acids and is used as an astringent. **a. shale.** A clay containing iron pyrites and aluminum silicate. It is the source of ammonium alum. **a. stone.** Alunite.

alumel. An alloy of 94 % Ni, 2 % Al, 2.5 % Mn, 1 % Si and 0.5 % Fe, used in thermocouples.

alumian. $Al_2O(SO_4)_2$. A white, native, basic aluminum sulfate.

alumina. Aluminum oxide, Al_2O_3. α-Corundum. **ferric-** A colloidal solution of $Al(OH)_3$ and $FeCl_3$, used as a coagulant in water purification. **lime-** Essonite. **natural-** Corundum. Cf. *ruby, sapphire.* **a. cream.** The hydroxides of aluminum. It is a clarifying agent, used in optical experiments. **a. mordants.** A fixing agent used in dyeing; usually aluminum sulfate, alums, sodium aluminate or aluminum acetate. **a. white.** Soluble alumina, transparent alumina, alumina hydrate. A form of aluminum hydroxide used as a white pigment in paints and inks.

aluminate. (1) *ortho-* A salt of *aluminic* acid, q.v., or a compound of the type M_3AlO_3, (derived from $Al(OH)_3$); as, Na_3AlO_3, sodium aluminate. (2) *meta-* Salts of the type $MAlO_2$ which exist only in solution; as AlO_2^- ion. (3) A combination of Al_2O_3 with a metallic oxide; as, $MgAl_2O_4$, spinel.

aluminic acid. H_3AlO_3. A tautomeric form of aluminum hydroxide, $Al(OH)_3 \rightleftharpoons H_3AlO_3$. Aluminum hydroxide reacts as acid toward an alkaline solution.

aluminiferous. A rock yielding or containing aluminum.

aluminite. $Al_2(SO_4)(OH)_4.7H_2O$. A native, soft, white, hydrous aluminum sulfate occurring in monoclinic crystals. Cf. *websterite.*

aluminium. Aluminum.

alumino-ferric. A mixture of aluminum sulphate and a ferrous salt, used in the coagulation of sewage.

aluminon. $C_{22}H_{23}N_3O_9$ = 473.5. The dye, aurine tricarboxylic acid, used as a test for the aluminum ion with which it gives a bright red lake. It will detect 10^{-6} moles.

aluminothermy. A method of using finely powdered aluminum mixed with a metal-oxide and ignited by a cartridge, for the reduction of a metal oxide to metal or for obtaining a high temperature. (See *e.g., thermite,* and thermite process of welding.)

aluminum. Al = 26.96. Aluminium. An earth metal and element of atomic number 13. It is one of the most abundant metals, and was isolated by Wöhler (1817) from sodium and $AlCl_3$. A silver-white, light, ductile metal, $d_{20°}$.2.70, m.658.5, b.1800; soluble in acids or alkalis. It is readily oxidized and covered with a fine film of resistant aluminum oxide which prevents further oxidation. Finely-powdered aluminum mixed with iron oxide and ignited with a magnesium ribbon will react violently and produce a temperature of about 3000°C, in which the iron melts and can be used for welding (*thermite*). Because of its lightness and resistance aluminum is used extensively for cooking utensils, airships, aeroplanes, boats,

automobiles. Aluminum foil is used as a substitute for silver foil in the printing and glass industry. Aluminum alloys with practically every other metal, and many of these alloys are of great importance; as, *magnalium, electron, duralumin* etc. Aluminum has a valency of three and forms only one series of compounds. Aluminates are derived from aluminum hydroxide in which the aluminum has a valency of three. Its ions and compounds are:

aluminum ion..... Al^{+++}
ortho-aluminate ion..... AlO_3'''
meta-aluminate ion..... AlO_2''
alums..... $M_2'Al_2(SO_4)_4.24H_2O$

a. acetate. $(CH_3COO)_3Al$ = 204.17. Normal acetate of alumina. An amorphous white powder that decomposes when heated and is soluble in water. (*-solution.*) A 5 % aqueous solution used medicinally as a gargle, astringent or antiseptic. **a. acetate, basic.** $Al(C_2H_3O_2)_2OH$ = 162.1. A white, crystalline powder, used as a mordant and disinfectant and also in embalming fluids. **a. aceto-glycerinate.** A white powder, used as an antiseptic. **a. aceto-tartrate.** Aluminum aceto-tartrate, alsol, $AlC_2H_3O_2.C_4H_4O_6$. White crystals, soluble in water but insoluble in alcohol or ether. A 50 % solution is used as a disinfectant and antiseptic. **a. ammonium sulfate.** $Al_2(NH_4)_2(SO_4)_4.24H_2O$ = 906. Ammonium alum. **a. alkyls.** A group of compounds of aluminum and alkyl radicals; *e.g.*, aluminum trimethyl, aluminum triethyl. **a. alloys.** Alloys of aluminum and other metals; as, aldrey, alnon, alpax, duralium, electron, magnalium, partinium, romanium, skleron, etc. The melting points of some alloys (in °C) are:

With	90 % Al 10 %	80 % Al 20 %	70 % Al 30 %	60 % Al 40 %	50 % Al 50 %
Ag	625	615	600	590	580
Au	675	740	800	855	915
Cu	630	600	560	540	580
Fe	860	1015	1110	1145	1145
Sb	750	840	925	945	950
Su	645	635	625	620	605

a. arsenate. $AlAsO_4$ = 166.02. A white powder, insoluble in water but soluble in acids. **a. benzoate.** $Al(C_7H_5O_2)_3$ = 390.15. A white crystalline powder, slightly soluble in water. **a. beta naphthol sulfonate.** Alumnol. **a. bifluoride.** $(Al_2F_6)_3(HF)_4.10H_2O$. Aluminum acid fluoride. A white crystalline powder, slightly soluble in water. **a. borate.** $2Al_2O_3.B_2O_3.3H_2O$ = 338.4. A granular, white powder which is soluble in water, used in the glass and porcelain industry. **a. boroformate.** $Al_2O_3B(OH)_3H_2CO_3.5H_2O$ = 316.2. Transparent white crystals, soluble in water or dilute alcohol; used as an antiseptic, astringent and disinfectant, in gargles. **a. borotannate.** Cutal, lutol. A brownish powder, used as a disinfecting dusting powder. **a. borotartrate.** Boral. Colorless crystals, soluble in water and used as an astringent. **a. bromate.** $Al(BrO_3)_3.9H_2O$ = 573.00. Colorless hygroscopic crystals, m.62.3 which decomp. at 100; soluble in water. **a. bromide.** $AlBr_3.6H_2O$ = 374.96. Colorless or slightly yellow hygroscopic crystals, m.93, b.165, d.2.54; soluble in water, alcohol or carbon disulfide. It is used in organic syntheses. *anhydrous-* $AlBr_3$ = 266.86. Yellowish scales that fume in air; used in organic syntheses. **a. bronze.** An alloy of 90 pts. copper, 10 pts. aluminum, d.7.6, m.1050. **a. butoxide.** $Al(OC_4H_9)_3$ = 246.18. A white powder, d.1.025, m.102, b.284.5, decomp. in water. **a. carbide.** Al_4C_3 = 144.4. Yellow hexagonal crystals, d.2.36, which decomp. with water and form methane, CH_4; used for generating methane. **a. carbonate.** $Al_2(CO_3)_3$ = 234.2. Chalk-like, brittle, white lumps, insoluble in water, and used as a mild antiseptic. **a. caseinate.** A yellowish-white, tasteless powder, insoluble in water. **a. cesium sulfate.** $AlCs(SO_4)_2.12H_2O$ = 568.2. Cesium alum. Colorless crystals, d.2.115, m.117; slightly soluble in water. **a. chloride.** $AlCl_3.6H_2O$ = 231.54. Colorless crystals, soluble in water, alcohol or ether. *anhydrous-*$AlCl_3$ = 133.48. Yellow crystalline masses, m.180; soluble in water, chloroform, carbon disulfide, ether, or carbon tetrachloride. It is used in organic synthesis (Friedel-Craft reaction); medicinally in locomotor ataxia; industrially as a catalytic agent and in refining petroleum; and as a reagent for naphthalene. **a. dichromate.** $Al_2(Cr_2O_7)_3$ = 702.2. Red crystals which are soluble in water. **a. dish.** (1) A flat, shallow vessel of aluminum, used in milk analysis. (2) A deep, hollow container of aluminum used for weighing powders. **a. ethoxide.** $Al(OC_2H_5)_3$ = 162.09. Triethoxyaluminum. White powder, d.1.142, m.134, b.205, soluble in hot water or alcohol; used as a reagent for water. **a. ethyl.** $Al(C_2H_5)_3$ = 114.2. Triethylaluminum. A colorless liquid, m. −18, b.190, decomp. explosively in water. **a. fluoride.** $AlF_3.3\frac{1}{2}H_2O$ = 147.2. Colorless crystals soluble in water and losing two mol. H_2O at 120. *anhydrous-* AlF_3 = 84.1. A white powder, d.3.1; soluble in water, acids, alkalis or alcohol; used in the glass industry for the manufacture of porcelain ware. **a. fluosilicate.** $Al_2(SiF_6)_3$ = 480.12. A. silicofluoride. White powder, insoluble in water; used in the glass industry and in the manufacture of enamels and artificial stones. **a. gallate.** Gallal. **a. gluconate.** See *gluconate.* **a. hydrate.** a. hydroxide. **a. hydroxide.** $Al(OH)_3$ = 78.0. An amorphous, white powder, d.2.3; insoluble in water and decomp. by acids or alkalis. It occurs native as gibbsite, hydrargylite and zirlite. With bases it forms salts, see *aluminic* acid. Used medicinally as an astringent and externally as a dusting powder; commercially as a mordant and in the preparation of lakes and colors; also as a filter aid and neutralizing agent. *basic-* There are various basic compounds: AlO(OH), e.g., *boehmite,* and $Al_2O(OH)_4$, e.g. *bauxite;* also mixtures with the normal hydroxide. **a. hypophosphite.** $Al(H_2PO_2)_3$ = 223.2. Colorless crystals, soluble in water. **a. iodide.** $AlI_3.6H_2O$ = 515.9. White crystals, soluble in water, alcohol, or carbon disulfide. *anhydrous-* AlI_3 = 407.9. A brown crystalline mass, soluble in water, d.2.63, m.180, b.360; used in organic synthesis. **a. lactate.** $Al(C_3H_5O_3)_3$ = 294.09. A yellowish powder, soluble in water. **a. methyl.** $Al(CH_3)_3$ = 72.1. Aluminum methide, trimethylaluminum. Al-Me_3. A colorless liquid, m.9, b.130; decomp.

by water. **a. naphtholsulfonate.** Alumnol. **a. nitrate.** $Al(NO_3)_3.9H_2O$ = 375.3. Colorless, rhombic crystals, m.73, decomp. at 150; soluble in water or alcohol, and used medicinally as an astringent. *anhydrous-* $Al(NO_3)_3$ = 213.1. A white powder, soluble in water, and used in the textile and leather industry. **a. minerals.** Aluminum is the most abundant metal and is an essential constituent of all rocks, except the limestones and sandstones. It is found chiefly in silicates, such as feldspar, clays, micas, sillimanite, andalusite, cyanite, but the principal ores are:

corundum	Al_2O_3
bauxite	Al_2O_3, $2H_2O$
cryolite	AlF_3, $3NaF$

a. nitride. AlN = 41.1. Yellow crystals, m.-2150; soluble in alkalis and slowly decomp. by water. **a. oleate.** $Al(C_{18}H_{33}O_2)_3$ = 870.8. A white powder; soluble in alcohol or ether and obtained by treating sodium oleate with alum. It is used as an antiseptic in skin diseases; commercially in the manufacture of waterproofing materials and as a dryer for paints. **a. oxalate.** $Al_2(COO)_6$ = 318.2. A white powder which is insoluble in water, alcohol, or ether, but soluble in strong acids. **a. oxide.** Al_2O_3 = 102. Alumina, corundum. An amorphous white powder, or colorless, hexagonal crystals, d.3.75, m.2020; insoluble in water, acids or alkalis, but soluble in conc. sulfuric acid. It occurs in 4 crystalline forms: α- or artificial corundum (the common form); β-, made by heating the hydroxide to 500–1000°C; γ-, by heating to 900–1100°C, and ζ-, by heating in molten Li_2O. It is used as an abrasive, as a refractory and filtering material and is the chief constituent of materials such as alundum, borolon, etc. **a. palmitate.** $Al(C_{16}H_{31}O_2)_3$ = 789.9. The salt of palmitic acid obtained from palm oil. A granular white powder, insoluble in water, alcohol, or ether, but miscible and turpentine or coal oil; used in lubricants and waterproofing materials. **a. phenolate.** $Al(OC_6H_5)_3$ = 306.09. A. phenoxide. Colorless powder, d.1.23, m.265, decomp. in water and used as antiseptic. **a. *p*-phenolsulfonate.** $Al(C_6H_4(OH)SO_3)_3$. Aluminum sulfophenylate, sozal. A pinkish powder, soluble in water or alcohol, and used medicinally as an antiseptic dusting powder for wounds. **a. phosphate.** $AlPO_4$ = 122.1. Colorless, hexagonal crystals or an amorphous, white powder; insoluble in water, but soluble in acids or alkalis; native as variscite, evansite, lucinite, sphaerite and turquoise. Used as a cement when mixed with gypsum and waterglass, and also in ceramics. **a. potassium chloride.** $AlCl_3.KCl$ = 208.0. A white, crystalline powder, soluble in water. **a. potassium phenolsulfonate.** $AlK(C_6H_4.OH.SO_3)_4$. A white or pinkish crystalline powder, soluble in water and used medicinally as an astringent, antiseptic, styptic and gargle. **a. potassium sulfate.** $Al_2K_2(SO_4)_4.24H_2O$ = 948.74. Potassium alum, potash alum, common alum, kalinite. A white powder or transparent, cubical crystals, d.1.757, m.84; soluble in water. It is used extensively in industry as a mordant, in the manufacture of lakes, colors, paper, glue and cements; medicinally as an astringent, emetic or styptic. **a. potassium tartrate.** $KAl(C_4H_4O_6)_2$ = 362.13. A white powder soluble in water. **a. propoxide.** $Al(OC_3H_9)_3$ = 204.13. A white powder, d.-1.0578, m.106, b.248 decomp. in water. **a. resinate.** $Al(C_{44}H_{63}O_5)_3$ = 2041.5. A brown soft mass, insoluble in water and used as a dryer in varnish and for water-proofing materials. **a. rectifier.** An apparatus which converts an alternating current into a pulsating direct current when the former is connected to two aluminum plates immersed in sodium bicarbonate solution. **a. rhodanate.** $Al(CNS)_3$ = 201.4. Aluminum sulfocyanide, rhodanide or thiocyanate. A yellowish powder, slightly soluble in water; used in the textile industry. **a. rubidium sulfate.** $AlRb(SO_4)_2.12H_2O$ = 520.85. Rubidium alum. Colorless crystals, d.1.87, m.99; slightly soluble in water. **a. salicylate.** $Al(C_6H_4OH.COO)_3$ = 438.2. Salumin. A faintly pink powder, insoluble in water, alcohol or ether but soluble in ammonium hydroxide or alkalis; used as an antiseptic in the treatment of nose and throat diseases. **a. screen.** A canvas covered with aluminum, used for projection of slides or films. **a. silicate.** $Al_2(SiO_3)_3$ = 282.4. White masses, insoluble in water or acids and used in the glass industry as a refractory lining for tanks and pots. Native as:

cyanite	d.3.60, decomp. 1325°C
andalusite	d.3.20, decomp. 1350°C
sillimanite	d.3.23, decomp. 1530°C
mullite	d.3.18, decomp. 1810°C

Cf. *kaolin.* **a. silico-fluoride.** $Al(SiF_3)_3$ = 283.3. A white powder, insoluble in water; used in the glass industry and in manufacturing enamels and artificial stones. **a. sodium chloride.** $AlCl_3.NaF$ = 191.94. Colorless crystals, m.183; soluble in water. **a. sodium fluoride.** $AlF_3.3NaF$ = 210.10. Colorless crystals, d.2.9–3.08; sparingly soluble in water. **a. sodium sulfate.** $AlNa(SO_4)_2.12H_2O$ = 458.42. Sodium alum, soda alum. Colorless rhombic crystals, $d_{20°}$.1.675, m.61; soluble in water and insoluble in alcohol. It is used for water purification, in dye, paper and the textile industries. **a. stearate.** $Al(C_{18}H_{35}O_2)_3$ = 877.2. The aluminum salt of stearic acid, obtained by saponifying tallow or animal fat and treatment of the soap with alum. A grayish-white powder or yellowish masses; soluble in warm water. Used in lubricating and water-proofing compounds. **a. sulfate.** $Al_2(SO_4)_3.18H_2O$ = 666.5. Colorless monoclinic crystals, d.1.62, which decomp. when heated; soluble in water. It is used similarly to alum. *anhydrous-* $Al_2(SO_4)_3$ = 342.4. White crystals or powder, d.2.59, decomp. 77; soluble in water. Used as a reagent for dyes, in wine, as an antiseptic, caustic or astringent for external use; and in the leather paper, and dye industries. **a. sulfide.** Al_2S_3 = 150.4. Yellow crystals, d.2.37, m.1100, decomp in water or acids. **a. sulfocyanate.** a. rhodanate. **a. sulfocyanide.** a. rhodanate. **a. sulfophenylate.** a. phenylsulfonate. **a. tannate.** Tannal. A light brown powder used as an antiseptic, astringent or styptic. **a. tartrate.** $Al_2(C_4H_4O_6)_3$ = 498.2. A white powder insoluble in water, but soluble in ammonia or acids. **a. thallium sulfate.** $AlTl(SO_4)_2.12H_2O$ = 639.4. Thallium alum. Colorless crystals, d.2.32; slightly soluble in water. **a. triethide.** $AlEt_3$ = 114.09. Triethyl a. Colorless liquid, decomp. by water to ethane and a. hydroxide. **a. trimethide.** $AlMe_3$ = 72.04. Trimethyl a.

Colorless liquid, decomp. in water to methane and a. hydroxide. **a. zinc sulfate.** $Al_2Zn(SO_4)_4$ = 503.8. Zinc alum. Colorless crystals, powder or sticks; soluble in water. Used as a caustic.

alumite. Alunite.

alumnol. Aluminum β-naphtholsulfonate. $Al_2[C_{10}H_6OH(SO_3)_2]_3$. A white powder, soluble in water; used externally as astringent, and as an antiseptic in the treatment of abscesses, as a gargle and for tonsilitis.

Alums. See *alum*.

alundum. A pure crystalline aluminum oxide in granular form, d.3.9–4.0 m.2050. It is used as reagent for the determination of carbon in steel, as an abrasive, a basic refractory, filtering material and for chemical apparatus. **a. boat.** A combustion tube made of alundum. **a. cement.** A carrier for catalysts prepared by heating 90 pts. Al_2O_3, 5 pts. SiO_2 and 5 pts. CaO. **a. crucible.** (1) A highly-refractive crucible for the electric furnace, used for melting platinum. (2) A porous filtering crucible. **a. dish.** A shallow dish used for incinerations. **a. filter cone.** An alundum filter cone which fits into a funnel. **a. filter dish.** A shallow filter dish that fits into a glass funnel. **a. muffle.** A muffle made of alundum and used in the assay of metals. **a. pyrometer tube.** A long thin tube made of alundum and used in pyrometers.

alunite. Probably $K_2SO_4.Al_2(SO_4)_3.4Al(OH)_3$. Alumite. Neutral alum. Alum stone. A native, white, hydrous potassium aluminum sulfate, d.2.83, hardness 3.5–4.0, which occurs in rhombic hexagonal crystals; sparingly soluble in water.

alunogen. $Al_2(SO_4)_3.18H_2O$. A native, silky-white, hydrous aluminum sulfate which occurs in monoclinic crystals.

alurate. A brand of allyl-isopropyl-barbituric acid.

alva marina. A prepared seaweed used for stuffing mattresses or chairs.

alveolar air. Respired air.

alvite. The mineral, $(ZnHfTh)SiO_4$.

alypine. $C_{15}H_{26}O_2.N_2HCl$ = 302.6. 2-benzoxy-2-dimethylaminomethyl-1-dimethylamino-butane hydrochloride. White hygroscopic crystals m.169; soluble in water. Used medicinally as a local anesthetic.

Am. An abbreviation for (1) NH_4 group (ammonium); (2) C_5H_{11} radical, (amyl).

am. The symbol for *atom-meter*, a proposed name for *Ångström* unit.

amadou. Surgeons' agaric, punk, tinder. The fungus *Boletus igniarius*, found on old tree trunks; used as tinder, for surgical pads and as a styptic.

amalgam. (1) An alloy of mercury, generally solid or semiliquid; as, ammonium a., gold a., silver a., sodium a. (2) An alloy of silver and mercury. **native-** An alloy of mercury with silver or gold; *e.g.*, $AuHg_3$, Hg_3Ag_2, etc., occurring as minerals as *arquerite*.

amalgamation. The formation of an alloy of a metal with mercury. **a. process.** A method of extracting noble metals, especially gold, from ores by alloying them with mercury.

amalgamator. An apparatus used in mines for extracting gold from ores.

amalic acid. Amalinic acid.

amalinic acid. $C_{12}H_{12}O_7N_4$ = 324.3. Amalic acid, tetramethyl alloxantine. Colorless crystals; m.245°, soluble in hot water, alcohol or ether.

amandin. A globulin from fruit kernels, e.g., peach seeds and sweet almonds.

Amanita. A genus of fungi (mushrooms), many of which are poisonous; as, *A. phalloides*, Death head fungus, death cup, containing *phallin*, q.v.; *A. muscaria*, fly agaric, fly amanita, containing muscarufin; *A. verna*, the "destroying angel." **a.-toxin.** A protein from *A. phalloides*, death-head fungus. It is the cause of many cases of mushroom poisoning.

amanitine. $C_5H_{15}O_2N$ = 121.1. (1) The tertiary amine $Me_2N(OH)CHOH.Me$. An alkaloid of Amanita species; as, *A. pantherina* and *A. muscaria*, identical with neurine. (2) $C_5H_{15}O_2N$ = 121.1. Isocholine. The tertiary amine, $Me_3N(OH)CH_2CH_2OH$. An alkaloid from mushrooms (*Agaricus muscari*) which is oxidized to muscarine. Cf. *choline*.

amaranth. A deep-red aniline dye, $NaSO_3.C_{10}H_6.N:N.C_{10}H_4(SO_3Na)_2OH$, used as a food-color.

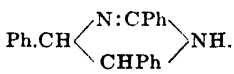
Amaranthaceae. A family of plants comprising 40 genera and 500 species of weeds, pot-plants, and fodder plants.

amaranthus. The fresh root of the shrub *A. spinosa*, used in India as a specific for gonorrhea.

amarbital. A brand of phenyl-ethyl-barbituric acid.

amargosa bark. The root bark of the goatbush, *Castela nicholsoni*, a Simarubaceae; it is a source of castelamarin.

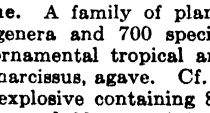
amarine. $C_{21}H_{18}N_2.\frac{1}{2}H_2O$ = 307.28. Triphenyl-dihydro-glyoxalin, 4.5-dihydro-2.4.5-triphenyl-imidazole,



Bitter, colorless prisms, anhydrous at 130; soluble in alcohol or ether, and insoluble in water. It is formed by the action of ammonia upon benzoic acid, and occurs in oil of bitter almonds.

amaroid. Bitter principles, other than alkaloids, glucosides, or tannins, which occur in plants; as, quassin, chamomillin.

amaron. $C_{28}H_{20}N_2$ = 384.32. Tetraphenyl-p-pyrimidine, benzoin imide, ditolanazotide, tetraphenyl pyrazine.



Small, colorless needles, m.245; insoluble in water, soluble in alcohol or ether.

Amaryllidaceae. A family of plants comprising about 75 genera and 700 species. Many of them are ornamental tropical and subtropical plants; as, narcissus, agave. Cf. *lycorine*.

amatol. An explosive containing 80 pts. ammonium nitrate and 20 pts. trinitrotoluene, used in coal-mines.

amazonite. Amazon stone, microcline. A bright green potassium aluminum silicate, used as a precious stone.

amber. $C_{10}H_{16}O$ (?). Electrum, succinum. A fossilized, bituminous resin, d.1.1, which occurs as hard, brittle and transparent masses of yellow to brown color. It is used as a precious stone and in experiments on static electricity. It occurs as succinite and gedanite. **artificial-** Colophony. **Baltic-** Succinite. **Cana-**

dian- Chernawinite. **synthetic-** A formal dehyde-phenol or -urea resin.

a. acid. Succinic acid. Cf. *ambreic* acid. **a. oil.** A brown essential oil of empyreumatic and balsamic odor distilled from amber, d.0.915–0.975; miscible with alcohol. **a. seed.** Musk seed.

Amberg swimming cup. A perforated porcelain tumbler with cork stopper, used for washing microscope specimens by floating them in a solvent.

ambergris. The opaque, grayish, waxy masses formed in the intestines of the sperm whale. d.0.7–0.92, m.60, b.100, soluble in alcohol or ether; used in perfumery. Cf. *ambrein*, *spermaceti*.

amberite. (1) A smokeless powder composed of guncotton, paraffin and barium nitrate. (2) Compressed amber scrap used for electrical insulation.

amberlite. The trade-mark for certain ion exchange resins.

amblygonite. $LiAlFPO_4$. A native lithium aluminum fluorspar occurring in California, as pale-green triclinic crystals.

amblystegite. Enstatite.

amboceptor. Fixator. A heat-resisting substance in blood which has two haptaphore groups (cytophile and complementophile); it unites the cell-body with the complement. Cf. *polyceptor*, *complement* fixation, immunity, and *Ehrlich's* side chain theory.

amboyna wood. An Indian wood from *Pterospernum indicum*, used in East India for inlay work.

ambreic acid. A yellowish-white substance derived from amber and probably identical with cholesteric acid.

ambrein. A cholesterin obtained from ambergris.

ambrette. Musk seed.

ambrettolic acid. $C_{16}H_{30}O_3$ = 270.25. ζ-hydroxy-ζ-hexadecenic acid. $Me(CH_2)_7CH:COH(CH_2)_5COOH$. **dihydro-** Juniperic acid.

ambrion. An insulating material consisting of asbestos impregnated with pitch or rosin.

ambrite. A fossilized resin found in New Zealand as greasy, yellowish-gray masses, sometimes used for semi-precious stones.

ambron. A proposed term for the positive nucleus of an atom.

Ambrosia. A genus of composite-flowered herbs, whose pollen causes of hay fever, as *A. artemisiifolia*, or rag-weed.

ameba. Amoeba. A unicellular animal without definite shape, resembling a mass of moving jelly, and exhibiting all the features of life; *e.g.*, growth, reproduction, metabolism, locomotion, etc.

amebicide. An agent that destroys ameba.

ameboid. Assuming various shapes, like a moving ameba.

ameliaroside. Piceoside. A glucoside from *Amelancher vulgaris*, a Rosaceae.

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American aloe. Agave. **A. colombe.** Fraserin. **A. ginseng.** Ginseng. **A. hellebore.** Veratrum. **A. ipecac.** Gillenia. **A. saffron.** Carthamus. **A. valerian.** See Cypripedium. **A. veratrum.** Veratrum. **A. wormseed oil.** Chenopodium oil.

Ames moisture tester. An apparatus for the determination of moisture in butter. It consists of a paraffin-jacketed container in which the butter, in an aluminum cup, is placed.

amesite. A ferromagnesium aluminum silicate of variable composition.

amethyst. A purple or bluish-violet quartz found in India, Ceylon, Brazil, etc., used as a precious stone for seals and ornaments. **oriental-** A purple, native alumina, Al_2O_3. **true-Oriental-.**

amianthus. Earth flax, mountain flax. A fine, silky variety of asbestos.

amicron. A particle whose diameter is less than 5mμ. See *micron*. It is invisible under the ultra-microscope.

amidase. A hydrolytic enzyme which splits ammonia from urea.

amidation. The process of forming an amide; *e.g.*, (a) heating the corresponding ammonium salt:

$$R.COONH_4 \rightarrow R.CONH_2 + H_2O$$

(b) reaction of NH_3 on an acid chloride:

$$R.COCl + 2NH_3 \rightarrow R.CONH_2 + NH_4Cl$$

(c) reaction of NH_3 with an ester:

$$R.COOR' + NH_3 \rightarrow R.CONH_2 + R'OH$$

Cf. *amination*.

amide. (1) An organic compound containing the monovalent —$CO.NH_2$ radical; as,

formamide	$H.CO.NH_2$
acetamide	$Me.CO.NH_2$
benzamide	$Ph.CO.NH_2$
oxamide	$(CONH_2)_2$

They are derived from acids by replacing the —OH group by —NH_2; as, —COOH → —$CONH_2$; or from ammonia by the replacement of a hydrogen by an acyl group: $NH_3 \rightarrow NH_2.OCR$. (2) Ammonobases. Compounds in which one H of NH_3 is replaced by a metal; as,

sodamide	$NaNH_2$
zincamide	$Zn(NH_2)_2$

alkyl- A group of compounds obtained by treating an acid chloride or acid anhydride with an amine and sodium hydroxide. They have the general formula $R.C\langle^{O}_{NHR}$. Cf. *anilide*.

keto- A compound containing the monovalent radical —$CO.CONH_2$. **oxy-** A compound containing both, the —OH and —$CONH_2$ groups. **thio-** A compound containing the —$CSNH_2$ group.

a. chloride. A chlorinated amide, $R.C\langle^{NR_2}_{Cl_2}$ derived from an alkyl a. The compound $R.C\langle^{NH_2}_{Cl_2}$ passes readily into the imide chloride $R.C\langle^{NH}_{Cl}$. **a. group.** The monovalent formamyl group, —$CO.NH_2$ which confers weakly basic properties.

amidin. A transparent solution of starch in water.

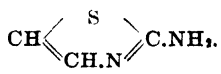
amidine. Any compound containing the monovalent radical —C(=NH)NH₂; as

formamidine..... H.C(:NH)NH₂
acetamidine..... Me.C(:NH)NH₂
cyanamidine..... NC.C(:NH)NH₂

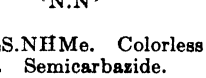
They are derived from the amides by the replacement of oxygen by the divalent amido residue, >NH or >NR. Cf. *benzimidazole, phasotropy.*

di- A compound containing two amidine groups; *e.g.*, oxalamidine, NH₂(HN:)C—C(:NH)NH₂.

amido. The monovalent —NH₂ radical when present in a compound with the —CO radical; otherwise it is termed "*amino.*" **a. acetophenone.** C₆H₄NH₂.COMe. Colorless crystals, m.106; soluble in water, alcohol or ether; used as a reagent in Ehrlich's diazo reaction. **a. aldehyde.** Any compound containing both the amino and aldehyde radical; as, NH₂—CH₂—CHO, a. acetaldehyde. **a. benzoyl formic acid.** Isatinic acid. **a. F. acid.** β- Naphthylamine-7-sulfonic acid. **a. ketone.** A compound containing both the amino and keto groups; as, NH₂.CH₂COMe, amido acetone; and NH₂.CHEt.COMe, amido propyl ketone. **a. mandelic acid.** Hydrindic acid. **a. mandelic acid lactame.** Dioxindole. **a. naphthol disulfonic acid.** H-acid. **a. oximes.** Amidoximes. **a. phosphoric acid.** Phosphamic acid. The compound, PO(NH₂)O₂. **a. pyrine.** Pyramidone. **a. thiazole.** C₃H₄N₂S = 100.1. The heterocyclic compound



α-methyl- NH₂.C₄HNS.Me. A colorless crystalline substance, m.42, b.136. **a. triazulfole.** CH₂N₄S = 102.2. Amidotriazosulfole. The heterocyclic compound



methyl- CN₂S.NHMe. Colorless crystals m.-96. **a. urea.** Semicarbazide.

amidogen. Amido.

amidol. $C_6H_8ON_2.HCl$ = 160.5. 3,4-diaminophenol hydrochloride. $(NH_2)_2C_6H_3OH.HCl$. Colorless crystals, slightly soluble in water; used as a photographic developer.

amidopyrine. $C_{13}H_{17}ON_3$ = 231.16. (U.S.P., XI.) Dimethylaminoantipyrine, ampydin, dimethylaminophenyl-dimethyl pyrazolone. White crystalline powder, m.108, soluble in water; used as an analgesic.

amidoxalyl. Oxamyl.

amidoxime. Oxamidine. A compound containing the monovalent amidoxime group, —C(:NOH)NH₂. *E.g.*, methenyl- or formamidoxime, HC(NOH)NH₂, ethenyl- or acetamidoxime $CH_3C(NOH)NH_2$.

amidoxyl. Hydroxylamino. A compound containing the monovalent amidoxyl group, —NHOH derived from hydroxylamine. *E.g.*, amidoxyl acetic acid, HONH.CH₂.COOH.

amidrazone. A compound containing the monovalent $C_6H_5.NH.N:C(NH_2)$-radical; *e.g.*, methyl-$C_6H_5.NH.N:C(NH_2).CH_3$. (See *hydrazidines.*)

amigen. A protein hydrolysis product used in aminoacid therapy.

amination. The formation of an amine; *e.g.*,

(a) reduction of a nitro compound:

$$R.NO_2 + 6H \rightarrow R.NH_2 + 2H_2O$$

(b) reduction of a cyanide:

$$R.CN + 4H \rightarrow R.CH_2.NH_2$$

(c) oxidation of an amide:

$$R.CONH_2 + NaOBr + NaOH \rightarrow R.NH_2 + NaBr + Na_2CO_3 + H_2O$$

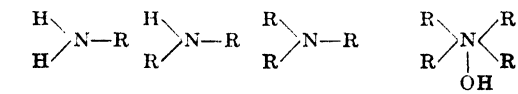
(d) treating isocyanate with alkali:

$$R.NCO + 2KOH \rightarrow R.NH_2 + K_2CO_3$$

Cf. *amidation.*

amine. (1) See *amines.* (2) A suffix indicating an —NH₂ group.

amines. A group of compounds derived from ammonia by substituting organic radicals for the hydrogens; as,



primary- secondary- tertiary- quarternary- (amines) (imines) (nitriles) (ammonium). Cf. *amino, amide, arsine, phosphine.* **di- a.** containing two NH₂-groups. **metallic-** An *amide* (2), q.v. **primary-** Amino-bases. Compounds in which one hydrogen is replaced by a radical; *e.g.*, NH_2CH_3. **quarternary-** Tetraalkyl ammonium bases. Compounds derived from ammonium hydroxide containing four radicals; *e.g.*, $N(CH_3)_4OH$. **secondary-** Imino bases. Compounds in which two hydrogens are replaced by a radical; *e.g.*, $NH(CH_3)_2$. **tertiary-** Nitrile bases. Compounds in which three hydrogens are replaced by radicals; *e.g.*, $N(CH_3)_3$. **thionyl-** A compound containing the —N:SO radical. **tri-** A compound containing three NH₂ groups; cf. *semidines.*

aminic acid. Formic acid.

amino. The monovalent basic —NH₂ group indicated by the *prefix* amino* or *suffix* amine*; as, aminomethane or methylamine. **a. acetal.** $C_6H_{15}O_2N$ = 133.16. The compound $NH_2.CH_2.CH(OEt)_2$. Colorless needles m.163 soluble in water, alcohol or ether. Cf. *glycinaldehyde.* **a. acetanilide.** $C_8H_{10}ON_2$ = 150.-14. Acetylphenylenediamine. The compound $NH_2.C_6H_4.NHCOMe$. Colorless needles, *ortho-* m.165, *meta-* m.90, *para-* m.160; slightly soluble in water and soluble in alcohol or ether. **a. acetic acid.** Glycine. **a. acetone.** NH_2CH_2COMe = 73.08. Colorless needles, m. (decomp.) 188; soluble in water or alcohol. **a. acetphenetidine.** See Phenocoll. **a. acetophenone.** C_8H_9ON = 135.1. p-aminophenylmethyl ketone $NH_2.C_6H_4.COMe$. A yellow powder, m.105, slightly soluble in water, soluble in alcohol or ether. *ortho-* a liquid, b.251. **a. acid.** See *amino-acids.* **a. alcohols.** Alkamines. **a. anthraquinone.** See *anthraquinone.* **a. azobenzene.** $C_{12}H_{11}N_3$ = 197.2. Aniline yellow. $PhN:NC_6H_4NH_2$. Yellow needles, m.-125, b.360; slightly soluble in water, soluble in alcohol or ether. An intermediate product in the preparation of dyes and medicinals, as acid

yellow and inulin, and is used as indicator changing at pH 2.5 from orange (acid) to yellow (alkaline). **a. azobenzene chlorhydrate.** $C_{12}H_{11}N_3.HCl$. Pale-blue needles, slightly soluble in water and soluble in alcohol; used in dye manufacture. **a. azobenzene-β-naphthol.** Sudan red III. **a. azonaphthalene.** $C_{20}H_{16}N_2$ = 297.25. The compound $C_{10}H_7N:NC_{10}H_6NH_2$. *alpha-* Red needles, m.174; slightly soluble in alcohol or ether. *beta-* Red needles, m.159. **a. azotoluene.** The compound $MeC_6H_4N:NC_6H_3(NH_2)Me$. Red crystals, m.100, insoluble in water, but soluble in alcohol; used medicinally in the treatment of ulcers. **a. azotoluene hydrochloride.** The compound $MeC_6H_4N:NC_6H_3(NH_2)Me.HCl$. Colorless crystals; soluble in water or alcohol. It exists in 4 isomeric forms, and is used in organic synthesis. **a. barbituric acid.** Uramil. **a. benzaldehyde.** See *benzaldehyde*. **a. benzamide.** See *benzamide*. **a. benzene.** Aniline. **a. benzene sulfonic acid.** *o-* Orthanilic acid. *m-* Metanilic acid. *p-* Sulfanilic acid. **a. benzoic acids.** See *benzoic acid*. **a. caproic acid.** Leucine. **a. dracilic acid.** See p-amino-*benzoic acid*. **a. diphenyl.** Xenylamine. **a. ethanol.** Ethanolamine. **a. ethionic acid.** Taurine. **a. formic acid.** See *formic acid*. **a. G-acid.** *2*-naphthylamine-*6.8*-disulfonic acid. **a. glutaric acid.** See *glutaric acid*. **a. guanidine.** See *guanidine*. **a. phenol.** C_6H_7ON = 109.1. A group of compounds of the type $NH_2.C_6H_4OH$. **1.2-,** or *ortho-* Aminophenol base. Colorless rhombic crystals, m.179; slightly soluble in water or alcohol, soluble in ether. **1.3-,** or *meta-* Colorless crystals, m.123; slightly soluble in water, very soluble in alcohol or ether. **1.4-,** or *para-* Rodinol. Colorless leaflets, m.-(decomp.) 184; slightly soluble in water, alcohol or ether. Used as a developer in photography and as a reducing agent in the dye industry. **a. propionic acid.** Alanine. **a. phthalhydrazide.** Luminol. **a. purine.** Adenine. **a. quinoline.** $C_9H_9N_3$ = 144.13. The crystalline compounds $C_9H_6N.NH_2$. *alpha-* Colorless crystals, m.125, soluble in ether, slightly soluble in water or alcohol. *beta-* Colorless crystals. decom. 280, insoluble in water or alcohol. **a, R-acid.** *2*-Naphthylamine-*3.6*-disulfonic acid. **a. sulfonic acid.** Sulfamic acid. **a. succinamic acid.** Aspargine. **a. thiophen.** Thiophenine. **a. toluene.** Toludine. **a. xylol.** Xylidine.

aminoacids. A group of organic compounds of the general type,

$$NH_2—R—COOH,$$

in which R is an aliphatic radical. They have both basic and acidic properties and form the units of peptides and proteins. **alpha-** or **primary-** General formula, $NH_2.CHR.COOH$, and are the commoner aminoacids. **beta-** or **secondary-** General formula, $NH_2.CHR.CH_2.COOH$. **gamma-** or **tertiary-** General formula, $NH_2.CHR.CH_2.CH_2.COOH$. **delta-** or **quarternary-** General formula, $NH_2.CHR.CH_2.CH_2.CH_2.COOH$.

AMINOACIDS

1. *Monoamino-monocarboxylic acids: $NH_2—R—COOH$*

carbamic acid	$NH_2.COOH$
glycine aminoacetic acid. Glycocol.	$NH_2.CH_2.COOH$
glycin (photographic developer) α-amino-β-*p*-hydroxyphenyl acetic acid	$NH_2.CH(C_6H_6OH).COOH$
alanine α-aminopropionic acid	$NH_2.CHMe.COOH$
aline α-amino-isovaleric acid	$NH_2.CH(CHMe_2).COOH$
norvaline α-aminovaleric acid	$NH_2.CH(CH_2.CH_2.Me).COOH$
leucine α-amino-isocaproic acid	$NH_2.CH(CH_2.CHMe_2).COOH$
norleucine α-amino-caproic acid	$NH_2.CH(CH_2.CH_2.CH_2.Me).COOH$
isoleucine α-amino-β-methylethyl-propionic acid	$NH_2.CH(CHMeEt).COOH$
isovaline α-amino-α-methylbutyric acid	$NH_2.CMe(CH_2Me).COOH$
phenylalanine α-amino-β-phenylpropionic acid	$NH_2.CH(CH_2Ph).COOH$
tyrosine α-amino-β-parahydroxyphenyl propionic acid	$NH_2.CH(CH_2.C_6H_4OH).COOH$
serine α-amino-β-hydroxypropionic acid	$NH_2.CH(CH_2OH).COOH$
α-amino-β-hydroxybutyric acid	$NH_2.CH(CHOH.CH_3).COOH$

AMINOACIDS—(*Continued*)

cysteine..... $NH_2.CH.COOH$
CH_2SH
α-amino-β-thiopropionic acid

methionine..... $NH_2.CH.COOH$
$CH_2.CH_2.SMe$
α-amino-γ-methylthio-butyric acid

thyroxine..... $NH_2.CH.COOH$
$CH_2.C_6H_2I_2.O.C_6H_2I_2OH$

2. *Monoamino-dicarboxylic acids:* $NH_2.R(COOH)_2$

aspartic acid..... $NH_2.CH.COOH$
$CH_2.COOH$
α-aminosuccinic acid

glutamic acid..... $NH_2.CH.COOH$
$CH_2.CH_2.COOH$
α-aminoglutaric acid

3. *Diamino-monocarboxylic acids:* $(NH_2)_2R.COOH$

arginine..... $NH_2.CH.COOH$
$CH_2.CH_2.CH_2.NH.CNH.NH_2$
α-amino-δ-guanidine valeric acid

lysine..... $NH_2.CH.COOH$
$CH_2.CH_2.CH_2.CH_2.NH_2$
α, ε-diaminocaproic acid

ornithine..... $NH_2.CH.COOH$
$CH_2.CH_2.CH_2.NH_2$
α-δ-diaminovaleric acid

asparagine..... $NH_2.CH.COOH$
$CH_2.CONH_2$
α-aminosuccinamic acid

citrulline..... $NH_2.CH.COOH$
$(CH_2)_3NH.CO.NH_2$
α-amino-δ-ureylvaleric acid

4. *Heterocylic amino acids:*

histidine..... $NH_2.CH.COOH$
$CH_2—(C_3H_3N_2)$
α-amino-β-imidazolepropionic acid

tryptophane..... $NH_2.CH.COOH$
$CH_2—C(CH)(C_6H_4)NH$
α-amino-β-indolepropionic acid

proline..... $NH—CH.COOH$
$CH_2\ CH_2$
CH_2
α-pyrrolidine carboxylic acid

hydrooxyproline..... $NH—CH.COOH$
$CH_2\ CHOH$
CH_2
γ-hydroxy-α-pyrrolidine carboxylic acid

aminoids. A protein hydrolysis product used in aminoacid therapy.

aminoketones. A group of aromatic compounds containing the monovalent —NHCHO radical; *e.g.*, formanilide, $C_6H_5.NHCHO$; or the divalent —NH.CO— radical. Cf. *peptides*.

aminophenols. A group of aromatic compounds containing both, the —OH and $—NH_2$ groups attached to the benzene ring; *e.g.*,

aminophenol.....	$HO.C_6H_4.NH_2$
diaminophenol.....	$HO.C_6H_3.(NH_2)_2$
triaminophenol.....	$HO.C_6H_2.(NH_2)_3$

aminopherases. A group of intracellular enzymes of the desmolase type, which produce transamination (q.v.).

aminophyllin. A brand of theophylline ethylenediamine used as a diuretic and cardiotonic.

amiodoxyl benzoate. $C_6H_4(IO_2)COONH_4$ = 305.1. Ammonium *o*-iodoxy-benzoate. Crystals, soluble in water; an antiarthritic.

amitosis. Cell-division, which differs from mitosis in that there is no apparent change in the structure of the cell nucleus; hence, it is also known as cell-cleavage or direct cell division.

ammate. Trade-mark for weed killer based on ammonium sulfamate.

ammelide. $C_3H_4O_2N_4$ = 128.1. Cyanin monamide, aminocyanuric acid, cyanuramide, *6*-amino-*s*-triazine-*2.4*-diol. The heterocyclic compound, $N(COH{=}N)(COH{—}N)C.NH_2$. A colorless powder, decomp. if heated, insoluble in water or alcohol and soluble in acids. **iso-** See *isocyanurimide*.

ammeline. $C_3H_5ON_5$ = 127.1. Diaminocyanuric acid, cyanuro diamide, cyanin, diamide, *4.6*-diamino-*s*-triazin-*2*-ol. The heterocyclic compound, $N(CNH_2{=}N)(CNH_2{—}N)C.OH$. Colorless, deliquescent needles, formed by boiling melam with hydrochloric acid; insoluble in water or

alcohol and soluble in bases, but decomp. by heating. **ethyl-** See *ethyl*. **iso-** Isocyanurimide.

ammeter. *Ampere* meter.

ammines. Ammoniates, ammonates, ammino compounds, metal ammines, ammono. A group of complex inorganic metal-ammonia compounds which may be regarded as metal salts with ammonia in a rôle analogous to that of "water" of crystallization; as, $CoCl_3.6NH_3$ which is written $[CO(NH_3)_6]Cl_3$, or $[Fe(NH_3)_6]_2(SO_4)_3$ can be regarded as $Fe_2(SO_4)_3.12NH_3$. Cf. *aquo* ions, *ammonia* system, *crystal* ammonia, tetrammines.

ammino. A prefix indicating the presence of NH_3 in a coordinate compound; as in *ammines*.

ammiolite. A native antimonate of mercury.

ammite. A sandstone or oolite.

ammonate. See *crystal* ammonia.

ammonchelidonic acid. Chelidamic acid.

ammonia. NH_3 = 17.01. A colorless gas, $d_{air=1}$ 0.5971, m. −77.7, b. −35.5; very soluble in water, forming ammonium hydroxide. It has a strong characteristic odor and is used in ice-machines as a refrigerant, as a fertilizer applied directly to irrigation water, and as a reagent in the chemical industries. **anhydrous-** Liquid a. A colorless liquid, $d_{-33°}$ 0.6382 m. −77.56, b. −33.3, which is compressed in steel cylinders and used in organic synthesis, as a solvent, and in refrigeration. **crystal-** See *crystal*. **hydroxy-** Hydroxylamine. **liquid-** Anhydrous a. **substituted-** See *amine*, *amide*, *ammine*, *amino*, *ammonium*.

a. absorption apparatus. A device for absorbing a.; as Folin's, Cumming's or Referees' tubes. **a. amalgam.** An amalgam of mercury and ammonium, made from sodium amalgam and ammonium chloride. **a. liquor.** Gas liquor. A by-product of gas and coke plants which is obtained by scrubbing the gases with water; it is used in the *Solvay* process, q.v., and in the manufacture of a. and ammonium salts. **a. nitrogen.** The nitrogen in an organic compound, especially proteins, which is in the form of a $—NH_2$ or $>NH$ radical (a. or imino nitrogen, respectively). **a. soda process.** A process introduced by Brunner and Mond in 1874 for the manufacture of sodium carbonate from salt, ammonia, limestone, and coke. Cf. *Solvay* process. **a. system.** A system of acids, bases and salts with liquid a. as solvent instead of water. Thus; in the *water* system:

$$MOH + HX \underset{\text{hydrolysis}}{\overset{\text{neutralization}}{\rightleftharpoons}} MX + HOH$$

aquo-base aquo-acid aquo-salt

and in the *ammonia* system:

$$M.NH_2 + HX \underset{\text{ammonolysis}}{\overset{\text{neutralization}}{\rightleftharpoons}} MX + H.NH_2$$

ammonio-base ammonio-acid ammonio-salt

a. tube. Faraday tube. **a. water.** Ammonium hydroxide, spirits of hartshorn, NH_4OH = 35.1. An aqueous solution of ammonia. (1) 35 %. *Concentrated* ammonium hydroxide. A clear colorless liquid, d.0.880, of strong, characteristic odor and alkaline reaction. Used extensively as a reagent, solvent, precipitant and neutralizing agent. (2) 28 %. d.0.900; used as above. (3) 20 %. d.0.925; it is used as above. (4) 10 %. *Dilute ammonium hydroxide.*, d.0.960. The test solution of the U.S.P., and a common reagent; used as above.

ammoniac. Ammoniacum. **sal-** Ammonium chloride. **a. oil.** A dark, yellow essential oil from ammoniacum, d.0.891; b.250–290; slightly dextro-rotatory.

ammoniacal. Pertaining to ammonia; as, its odor.

ammoniacum. Gum ammoniac. A resinous gum from *Dorema ammoniacum*, an Umbelliferae of Persia and Northern India. Used as a sedative and tonic in hysteria and externally in plasters; also as a cement for porcelain.

ammoniate. (1) Ammine. (2) An organic nitrogen compound, used as a fertilizer.

ammoniated iron. Ferric ammonium chloride. **a. mercury.** See *mercury*. **a. superphosphate.** A superphosphate treated with (1) ammonia or (2) dissolved bone and nitrogenous compounds; used as fertilizer.

ammonification. The enrichment of the soil with ammonia or ammonium compounds; *e.g.*, the production of NH_3 from proteins and decaying organic matter by the activity of soil bacteria.

ammonifying. (1) Producing or (2) adding ammonia.

ammonio. (1) Ammono. (2) A prefix indicating a double salt of ammonium and a metal; as, a. cupric chloride (see *cupric*).

ammonite. A fossil shell.

ammonium. Am. The monovalent radical, $—NH_4$, which has basic properties and resembles an alkali metal radical. Cf. *ammono*, *ferriammonium*, *tetraethyl ammonium*.

a. acetate. CH_3COONH_4 = 77.08. Colorless hygroscopic crystals, d.1.073, m.89, b.148; very soluble in water. Used as an antipyretic and diaphoretic, as antidote in formaldehyde poisoning, as a reagent in determining iron and lead and in separating Pb, Ca, Ba, and Sr sulfates. **a. aldehyde.** See *aldehyde a.* **a. aluminum sulfate.** a. alum. **a. alum.** $Al_2(NH_4)_2(SO_4)_4.24H_2O$ = 906.90. Aluminum ammonium sulfate. Colorless, regular crystals, d.1.645, m.94.5; soluble in water. Used for the purification of drinking water, as a constituent of baking powder and foam fire extinguishers, and in electroplating; also medicinally as an astringent, diuretic, emetic and purgative. **a. amino sulfonate.** $NH_4SO_3NH_2$ = 114.2. Deliquescent crystals, soluble in water. **a. anacardate.** A brown, syrupy liquid, used for coloring hair. **a. antimoniate.** $NH_4SbO_3.2H_2O$ = 222.27. Colorless crystals, decomp. when heated; soluble in water. **a. arsenate.** $(NH_4)_2AsO_4.3H_2O$ = 247.2. Colorless crystals, soluble in water. *acid-* $(NH_4)_2HAsO_4$ = 176.0. White crystals; soluble in water and used internally for the treatment of skin diseases. **a. arsenite.** NH_4AsO_2 = 125.0. Colorless prisms, or white powder soluble in water or alkalis. **a. atreolate.** Atreol. **a. aurichloride.** NH_4AuCl_4 = 357.10. Yellow plates, decomp. 100; soluble in water. **a. auricyanide.** $NH_4Au(CN)_4.H_2O$ = 337.32. Yellowish plates, decomp. 200; soluble in water or alcohol. **a. aurocyanide.** $NH_4Au(CN)_2$ = 293.3. Colorless plates, decomp. 150; soluble in water. **a. benzoate.** $NH_4.C_7H_5O_2$ = 139.1. White crystals, d.1.260, decomp. 198; soluble in alcohol or water. Used as an antipyretic, diuretic or alterative. **a. biarsenate.** a. arsenate, acid-.

a. biborate. $NH_4HB_2O_4.1\frac{1}{2}H_2O$ = 132.1. Colorless crystals, soluble in water. **a. bicarbonate.** NH_4HCO_3 = 79.1. Rhombic or monoclinic colorless crystals, d.1.586, decomp. 40–60; soluble in water or alcohol. Used to neutralize hyperacidity of the stomach, and in manufacturing ammonium salts. **a. bichromate.** $(NH_4)_2Cr_2O_7$ = 252.2. Orange crystals, d.2.367, decomp. when heated; soluble in water. Used as a reagent, and in the manufacture of inks, glass, leather and fireworks. **a. bifluoride.** $NH_4F.HF$ = 57.1. A. acid fluoride, matt salt, a. hydrogen fluoride. Colorless hexagonal crystals, $d_{12°}$ = 1.211; soluble in water. Used in the analysis of silicates, in the glass and porcelain industry for etching and as a preservative in breweries, wineries and dairies. **a. bimalate.** $NH_4H(C_4H_4O_5)$ = 131.1. White crystals, soluble in water. **a. bioxalate.** $HOOC.COONH_4$ = 107.1. Ammonium acid oxalate, ammonium binoxalate. Colorless crystals, d.1.556; soluble in water; used as an ink eraser and reagent. **a. biphosphate.** $NH_4H_2PO_4$ = 115.1. Monoammonium phosphate, diacid a. phosphate. Colorless tetragonal crystals, d.1.803; soluble in water. Used as a reagent, and (mixed with sodium bicarbonate) in baking powder. **a. bisulfate.** NH_4HSO_4 = 115.11. Mono-ammonium sulfate. Ammonium acid sulfate. Colorless crystals, d.1.787; soluble in water; used as a reagent. **a. bisulfite.** NH_4HSO_3 = 99.11. Mono-ammonium sulfite, sulfite acid. Colorless crystals, soluble in water and used as a preservative. **a. bitartrate.** $NH_4HC_4H_4O_6$ = 167.1. Mono-ammonium tartrate, a. acid tartrate. Colorless crystals, d.1.680; soluble in water. Used for the detection of calcium, and also in baking powders. **a. borate.** $(NH_4)_3BO_3$ = 113.1. Colorless crystals, d.2.38–2.95; soluble in water. **a. boro-benzoate.** A white powder, soluble in water, and used as an antiseptic for preservation of foods. **a. borofluoride.** NH_4BF_4 = 105.04. Colorless regular crystals, $d_{17°}$ = 1.851; soluble in alkali, water, alcohol or ether. **a. boro-citrate.** A white powder, soluble in water and used as an antiseptic. **a. bromide.** NH_4Br = 97.96. Colorless, regular crystals or white powder, d.2.327 sublimes on heating, and is soluble in water, alcohol or ether; used as a reagent and in the treatment of epilepsy, neuralgia, etc., also in the manufacture of photographic plates. **a. bromoplatinate.** a. platinic bromide. **a. camphorate.** $NH_4C_{10}H_{15}O_4.3H_2O$ = 271. A colorless crystalline powder, soluble in water; used as a sedative. **a. carbamate.** $NH_2.COONH_4$ = 78.1. A. carbaminate. A white crystalline powder, soluble in water, and used as a stimulant. It forms urea on dehydration. Cf. *a. carbonate carbamate.* **a. carbazotate.** a. picrate. **a. carbonate.** $(NH_4)_2CO_3.H_2O$ = 114.1. Colorless plates, decomp. 85, soluble in water, alcohol, or ether; used as a reagent. **a. carbonate acid.** a. bicarbonate. **a. carbonate carbamate.** $NH_4HCO_3.NH_4NH_2CO_2$ = 157.1. Hartshorn salt. The ammonium carbonate of commerce. White hard lumps or colorless crystals, m.85 (sublimes); soluble in 5 pts. of water and slightly soluble in alcohol. It should contain not less than 30 % and not more than 32 % ammonia. Used as a reagent in separating the alkali earth metals from magnesium (separating antimony and arsenic and Cl, Br, and I), and also as a heart stimulant in the treatment of pneumonia and phthisis; also externally as lotions, and in the manufacture of cocoa, baking powder, rubber goods and in the dye industry. **a. caseinate.** Eucasin. A white powder, soluble in water; either *mono-* or *di-* (0.011 % or 0.022 % NH_3, respectively). **a. chloraurate.** a. aurichloride. **a. chlorate.** NH_4ClO_3 = 101.50. Colorless, monoclinic crystals, $d_{17°}$ = 1.520, soluble in water or alcohol. It is explosive. **a. chloride.** NH_4Cl = 53.5. Sal ammoniac, salmiac, ammoniak. Colorless, regular or tetragonal crystals, or a white granular powder, d.1.52. It dissociates at 350 and sublimes without melting; soluble in water or alcohol. Used as a reagent in qualitative analysis for separation and precipitation, and for the determination of uric acid; medicinally as an expectorant, stimulant, diuretic or diaphoretic, and externally, as a cooling and stimulating wash for contusions; also for filling dry batteries, for soldering flux and in textile printing. **a. chloroiridate.** a. iridichloride. **a. chloropalladate.** $(NH_2)_2PdCl_6$ = 355.54. Ammonium palladic chloride. Brown crystals, d.2.418, decomp. when heated, sparingly soluble in water. **a. chloropalladite.** $(NH_4)_2PdCl_4$ = 284.62. Ammonium palladous chloride. Bright red crystals; soluble in water. **a. chloroplatinate.** $(NH_4)_2PtCl_6$ = 444.1. Yellow regular crystals, d.3.034, decomp. when heated; nearly insoluble in water, and used as reagent. **a. chloroplatinite.** $(NH_4)_2PtCl_4$ = 373.12. Yellow, regular crystals, nearly insoluble in water or alcohol. **a. chlorostannate.** $(NH_4)_2SnCl_6$ = 367.5. White crystals, soluble in water. **a. chromate.** $(NH_4)_2CrO_4$ = 152.1. Yellow, monoclinic crystals or needles, d.1.866, decomp. 185; soluble in water. Used as a reagent and as mordant in dyeing. *acid-* see ammonium bichromate. **a. chromic sulfate.** $Cr_2(SO_4)_3(NH_4)_2SO_4, 24H_2O$ = 956.71. Green octagonal crystals, soluble in water. **a. citrate.** $(NH_4)_3C_6H_5O_7$ = 243.2. White deliquescent powder; soluble in water; used as reagent and for determining phosphates in fertilizers. **a. crystals.** a. carbonate carbamate. **a. cuprate.** A deep blue ammoniacal solution of cupric hydroxide, used for waterproofing fabrics. **a. cyanate.** NH_4CNO = 60.1. Colorless crystals; soluble in cold water and decomp. in hot water. **a. cyanide.** NH_4CN = 44.1. Colorless, regular crystals, decomp. 37; soluble in water or alcohol. **a. dichromate.** a. bichromate. **a. dithiocarbamate.** $NH_2.CS.CNH_4$ = 90.1. Yellow prisms, soluble in water. **a. dithiocarbonate.** $NH_4S.CO.SH$ = 111.1. Yellowish crystals, used as a substitute for hydrogen sulfide in qualitative analysis. **a. dithionate.** $(NH_4)_2S_2O_6$ = 196.20. Colorless, monoclinic crystals, d.1.704; soluble in water and insoluble in alcohol. **a. embeliate.** $NH_4C_9H_{13}O_3$ = 187.1. A violet-gray powder, soluble in water or dilute alcohol and used as a taeniacide. **a. ethyl sulfate.** $(NH_4)(C_2H_5)SO_4$ = 143.1. Colorless crystals, m.99; soluble in water, alcohol or ether. **a. ferrichloride.** Ferric a. chloride. **a. ferricitrate.** Ferric a. citrate. **a. ferric oxalate.** $(NH_4)_3Fe(C_2O_4)_3.4H_2O$ = 446.06. Light gray crystals, d.1.778 decompose 165; soluble in alcohol or water. **a. ferricyanide.** $2(NH_4)_3Fe(CN)_6.H_2O$ = 550.05. Red crystals, soluble in water, and used as a reagent. **a. ferrocyanide.** $(NH_4)_4Fe(CN)_6.3H_2O$ = 338.20. Greenish-yellow crystals, soluble in water and used as a

reagent. **a. fluoride.** NH_4F = 37.0. Malt salt. Colorless, hexagonal crystals which sublime if heated and are readily soluble in water or alcohol. Used as a reagent in the analysis of silicates; medicinally as an alterative or antiperiodic; and for etching glass. **a. fluoride acid.** Ammonium bifluoride. **a. fluosilicate.** $(NH_4)_2SiF_6$ = 158.18. Colorless rhombic crystals, d.1.970, soluble in water. **a. formate.** $H.COONH_4$ = 63.06. Colorless crystals, d.1.266, m.116 decomp. 180; soluble in water and used as an antiseptic. **a. gallate.** $NH_4C_7H_5O_5.H_2O$ = 205.13. A yellowish crystalline powder, soluble in water. **a. glycerophosphate.** $(NH_4)_2PO_4C_3H_5(OH)_2$ = 206. Colorless crystals, soluble in water and used for treating influenza. **a. hepta molybdate.** a. molybdate basic. **a. hippurate.** $NH_4H(C_9H_8O_3N)_2.H_2O$ = 393.3. Colorless crystals, soluble in alcohol or water. **a. hydrogen fluoride.** a. bifluoride. **a. hydrogen phosphate.** a. phosphate. **a. hydrosulfide.** NH_4HS = 51.1. Colorless crystals soluble in water; used in solution as a reagent for metals. **a. hydrosulfide solution.** A solution prepared by passing H_2S through ammonium hydroxide. A colorless or slightly yellow liquid of alkaline reaction, used as a reagent. **a. hydroxide.** NH_4OH = 35.1. A hydrate of ammonia, crystalline below −79, otherwise only known in solution as *ammonia water*, q.v. Cf. *quarternary amines, hydroxylammonium compounds*. **a. hypophosphite.** $NH_4H_2PO_2$ = 83.10. White rhombic crystals, d.2.515, m.100, decomp. 240; soluble in water or alcohol, and used as nerve tonic. **a. hyposulfide.** a. thiosulfite. **a. hyposulfite.** $(NH_4)_2S_2O_3$ = 148.2 Ammonium thiosulfate. Colorless crystals, soluble in water or alcohol and used as an antiseptic. **a. ichthyolsulfonate.** Ichthyol. **a. iodoxyl benzoate.** Amiodoxyl benzoate. **a. iron chloride.** An orange powder, soluble in water; consists of a mixture of 2.5 % $FeCl_3$ and 97.5 % NH_4Cl. Used in anemia, chlorosis and scrofulosis. **a. iodate.** NH_4IO_3 = 192.96. Colorless, rhombic crystals, decomp. 125; soluble in water or alcohol. **a. iodide.** NH_4I = 144.96. Colorless regular crystals or powder, d.2.505, sublimes when heated, soluble in water or alcohol. It is a reagent for acetone and used in the treatment of syphilis, rheumatism, scrofula, and leprosy; also in photography. **a. iridichloride.** $(NH_4)_2IrCl_6$ = 441.9. a. chloroiridate, a. iridic chloride. A red powder, d.2.856, slightly soluble in water. **a. lactate** $NH_4C_3H_5O_3$ = 107.1. A colorless syrupy liquid, d.1.19, miscible with water or alcohol. **a. linoleate.** $C_{17}H_{31}COONH_4$ = 297.2. A soft mass used as an emulsifier for fats and waxes, for waterproofing, glazing and polishing. **a. magnesium arsenate.** $MgNH_4AsO_4.6H_2O$ = 289.4. Colorless tetragonal crystals, d.1.65, decomp. if heated; slightly soluble in water or acids, but insoluble in alcohol. **a. magnesium phosphate.** $MgNH_4PO_4$, $6H_2O$ = 245.6. Colorless tetragonal crystals, d.1.65, slightly soluble in water. **a. malate.** $NH_4C_4H_5O_5$ = 151.08. Rhombic crystals d.1.5, m.161, soluble in water. **a. mono-magnesium phosphate.** $Mg(NH_4)_4(PO_4)_2$ = 286.3. **a. mellitate.** $C_6(COONH_4)_6.9H_2O$ = 606. Colorless crystals, soluble in water. Used as an emulsifier for fats and waxes; in waterproofing, glazing and polishing. **a. metaborate.** a. biborate. **a. meta phosphate.** See *a. phosphate*. **a. meta vanadate.** a. vanadate. **a. molybdate.** $(NH_4)_2MoO_4$ = 196.1. Colorless monoclinic crystals, d.2.60, decomp. by water; insoluble in alcohol and soluble in acids. Used as a reagent, and in the manufacture of pigments. *basic-* $(NH_4)_6Mo_7O_{24}.4H_2O$ = 1236.6. Ammonium heptamolybdate. Greenish-yellow crystals, d.2.498, decomp. if heated; soluble in ammonium chloride solution. Used as a reagent and in the preparation of pigments. **a. molybdate solution** (6 %). A clear colorless or slightly yellow liquid, with strong acid reaction and slight odor of HNO_3; used as a reagent for orthophosphates and arsenates. **a. mucinate.** $(NH_4)_2C_6H_8O_8$ = 244. Colorless crystals, soluble in water. **a. muriate.** a. chloride. **a. nickel sulfate.** Nickel ammonium sulfate. **a. nitrate.** NH_4NO_3 = 80.1. German saltpeter, Norway saltpeter. Colorless tetragonal crystals or granular powder, d.1.725, m.170, decomp. 200; very soluble in water and slightly soluble in alcohol. Used as an oxidizing agent, as a flux for metals, in the preparation of laughing gas, in freezing mixtures and in explosives. **a. nitrite.** NH_4NO_2 = 64.1. Colorless crystals, d.1.69, decomp. when heated, into water and nitrogen; soluble in water or alcohol. **a. nitrosophenyl hydroxylamine.** Cupferron. **a. oleate.** $(NH_4)_2C_{18}H_{33}O_2$ = 317. Ammonia soap. A jelly-like colorless mass, soluble in alcohol or ether and used as a cleanser. **a. oxalate.** $(COONH_4)_2.H_2O$ = 142.1. Colorless prisms, d.1.502; soluble in 25 parts water; used as a reagent in the separation of Ca, Ce, Zr, Th, Sr, as a precipitant for Ba, Zn, Pb, and in determination of quinine. **a. oxalate acid.** a. bioxalate. **a. oxalurate.** $NH_4C_3H_3N_2O_4$ = 149. Pale yellow crystals, soluble in hot water. **a. oxaminate.** $NH_2.CO.COONH_4$ = 106.1. Colorless crystals, soluble in water. **a. pallidichloride.** a. chloropalladate. **a. palmitate.** $NH_4C_{16}H_{31}O_2$ = 274. Soft masses, soluble in alcohol or water; used as a cleanser. **a. perchlorate.** NH_4ClO_4 = 117.5. White rhombic prisms, d.1.95, decomp. when heated; soluble in water. It is a constituent of explosives. **a. perchromate.** $(NH_4)_2CrO_8$ = 234.13. Yellow rhombic crystals, decomp. 50; soluble in water. **a. permanganate.** NH_4MnO_4 = 137.1. Purple, rhombic crystals, d.2.207, decomp. when heated; slightly soluble in water. Used in pyrotechnics. **a. persulfate.** $(NH_4)_2S_2O_8$ = 228.2. Colorless monoclinic crystals or a white granular powder, decomp. when heated; soluble in water. Used as a disinfectant, deodorant, in gargles, for the preservation of foods; as a reagent for albumen and indican, as an oxidizing agent in analysis for removal of organic matter, in the analysis of steel, in the separation of metals; in photography, as a reducer; and in electroplating. **a. phenolsulfonate.** $C_6H_4(OH)SO_3.NH_4$ = 191.14. White crystals, soluble in water. **a. phenylate.** $C_6H_5O.NH_4$ = 111.1. White crystals soluble in water and used as an antiseptic and antipyretic. **a. phosphate.** $(NH_4)_2HPO_4$ = 132.2. Diammonium-ortho-phosphate, ammonium diphosphate. Colorless monoclinic crystals or white powder, d.1.619; soluble in 4 pts. water. It is a precipitant for Mg, Zn, Ni and U; used medicinally an antirheumatic; also as fertilizer and for fireproofing materials. *mono-* a. biphosphate; *tri-* a. phosphate, tribasic. *meta-* NH_4PO_3 = 97.8. Ammonium metaphosphate. Colorless crystals; soluble in water. **a. phosphate monobasic.** $NH_4H_2PO_4$ = 115.2.

Monoammonium phosphate, ammo-phos. Colorless powder, d.1.803, soluble in water; used as fertilizer. **a. phosphate tribasic.** $(NH_4)_3PO_4$ = 149.1. Triammoniumphosphate. Colorless crystals, soluble in water; used as a culture medium for spores and fungi. **a. phosphite.** (1) *mono-* $NH_4H_2PO_3$ = 99.10. Colorless crystals, m.123, decomp. 150; soluble in water. (2) *di-* $(NH_4)_2HPO_3$ = 116.1. Diammonium phosphite. Colorless crystals, soluble in water; used as a reducing agent. **a. phosphomolybdate.** $(NH_4)_3PO_4.12MoO_3.3H_2O$ = 1931.2. Yellow crystals or powder slightly soluble in water, but soluble in alkalis or aqua regia; used as a reagent for alkaloids. **a. phosphotungstate, a. phosphowolframate.** $(NH_4)_3PO_4.12WO_3.3H_2O$ = 2795. A white powder, soluble in water, and used as a reagent. **a. phthalate.** $C_6H_4(COONH_4)_2$ = 200.2. Colorless crystals, soluble in water. **a. picramate.** $C_6H_2NH_2(NO_2)_2.ONH_4$ = 216.09. Reddish-yellow crystals, soluble in water and used in bacteriology. **a. picrate.** $NH_4C_6H_2O(NO_2)_3$ = 246. Ammonium carbasotate, ammonium picronitrate. Yellow, explosive crystals, d.1.719, decomp. if heated; soluble in water or alcohol, and used for explosives **a. picrocarminate solution.** A dark red staining solution used for the differentiation of the nucleus and cytoplasm of cells. **a. picro nitrate.** a. picrate. **a. platinic bromide.** $(NH_4)_2PtBr_6$ = 710.80. Ammonium bromoplatinate. Red, regular crystals, decomp. when heated; slightly soluble in water. **a. platinic chloride.** $(NH_4)_2PtCl_6$ = 444.0. Yellow hygroscopic crystals, soluble in water and used as reagent. **a. purpurate.** Murexide. **a. pyrophosphate.** $(NH_4)_4P_2O_7$ = 246.3. White crystals soluble in water. **a. rhodanate.** a. thiocyanate. **a. salicylate.** $NH_4C_7H_5O_3$ = 155.1. White monoclinic crystals, soluble in water or alcohol and used as an antirheumatic, antipyretic, expectorant and bactericide. **a. selenate (acid).** NH_4HSeO_4 = 162.2. Colorless crystals, soluble in water. **a. selenate (normal).** $(NH_4)_2SeO_4$ = 179.28. White crystalline masses, soluble in water. **a. selenite.** $(NH_4)_2SeO_3$ = 163.2. White crystals, soluble in water, and used as a reagent for alkaloids and for producing red glass. **a. sesquicarbonate.** $2NH_4CO_3(NH_4)_2CO_3H_2O$ = 272.2. White crystals, decomp. if heated. **a. silicofluoride.** $(NH_4)_2SiF_6$ = 178.07. Colorless crystals or white powder, soluble in water; used as an antiseptic. **a. silvinate.** $NH_4C_{20}H_{29}O_2$ = 319. A yellow microcrystalline powder, slightly soluble in water or alcohol. **a. sozoiodate.** Colorless crystals, soluble in water. **a. stannic chloride.** a. chlorostannate. **a. stearate.** $C_{17}H_{35}.COONH_4$ = 301. A soft, white soap-like mass, soluble in hot alcohol. **a. succinate.** $C_2H_4(COONH_4)_2$ = 152.2. Colorless crystals, soluble in water and used in gynecology. **a. sulfate.** $(NH_4)_2SO_4$ = 132.2. Colorless rhombic crystals or white granular powder, d.1.77, m.140, decomp. at 280, and soluble in 2 pts. of water but insoluble in alcohol. Used as a precipitant for proteins, for the separation of Ca and Sr, and in the manufacture of fertilizers. *acid-* a. bisulfate. **a. sulfhydrate.** a. hydrosulfide. **a. sulfide.** $(NH_4)_2S$ = 68.2. White crystals, decomp. when heated, and soluble in water but insoluble in alcohol; used as a reagent. **a. sulfide solution.** An aqueous solution of a. hydrosulfide. **a. sulfite.** $(NH_4)_2SO_3.H_2O$ = 134.2. White monoclinic crystals, decomp. when heated, and soluble in water. Used as an antiseptic in dispepsia and skin diseases. *acid-* a. bisulfite. **a. sulfocarbonate solution.** A liquid prepared from ammonium carbonate and carbon disulfide; used as an insecticide and parasiticide. **a. sulfocyanate.** a. thiocyanate. **a. sultoichthyolate.** Ichthyol. **a. sulfophenylate.** $C_6H_4OH.SO_3NH_4$ = 191. A sulfocarbolate. Colorless crystals; soluble in water, and used as an antiseptic. **a. sulphate.** a. sulfate. **a. tartrate.** $C_2H_4O_2(COONH_4)_2$ = 184. Colorless monoclinic crystals, d.1.601, occurring in two forms having refractive index: α = 1.55 and β = 1.581; soluble in water. Used as an expectorant, and in the textile industry. *acid-* a. bitartrate, a. hydrogen tartrate, $NH_4HC_4H_4O_6$ = 167.08. Monoclinic prisms, d.1.636, having refractive indices of 1.519, 1.561 and 1.591, soluble in water. **a. tellurate.** $(NH_4)_2TeO_4$ = 227.2. A white powder, soluble in acids; a reagent for glucosides and alkaloids. **a. thioacetate.** CH_3COSNH_4 = 93.2. Slightly yellow crystalline masses, soluble in water and used as a reagent. **a. thioacetate solution.** A 30 % aqueous solution, used as a reagent in organic analysis and as a substitute for hydrogen sulfide. **a. thiocarbonate.** $(NH_4)_2CS_3$ = 144.27. Yellow crystals; soluble in water and insoluble in alcohol or ether. **a. thiocyanate, -ide.** NH_4CNS = 76.1. a. rhodanate. Colorless deliquescent, monoclinic crystals, d.1.3057, m.159; at 170 it changes into thiourea; soluble in water or alcohol. It is a reagent for Fe As, Sb, Hg, Ag, Cu, and the halogens, and is also used in the dye and textile industry. **a. thionurate.** $(NH_4)_2C_4H_3N_3SO_6$ = 257. White crystals, soluble in water. **a. thiostannate.** $(NH_4)_2SnS_3$ = 251. **a. thiosulfate.** $(NH_4)_2S_2O_3$ = 148.21. a. hyposulfite. Colorless rhombic crystals, decomp. 150; soluble in water, insoluble in alcohol or ether. **a. triborate.** $NH_4H(BO_2)_2$ = 105.1. Ammonium acid borate. Colorless crystals, soluble in water. **a. tungstate.** $(NH_4)_2WO_4$ = 284.1. a. wolframaet. Colorless crystals; soluble in water, but insolubl4 in alcohol. *meta-* $(NH_4)_2W_4O_{13}.8H_2O$ = 1204. e a. metawolframate. Colorless, octahedral crystals, which lose 7 mol. water at 100°C; soluble in water. *ortho-* $(NH_4)_2W_3O_{10}.8H_2O$ = 3276.2. a. orthowolframate. Colorless crystals; soluble in water. *para-* $(NH_4)_6W_7O_{24}.6H_2O$ = 1888 3. a. parawolframate. Colorless, rhombic crystals, which lose 4 mol. water at 100°C; slightly soluble in water. The ammonium tungstates are used in the preparation of ammonium phosphotungstate. **a. uranate.** $(NH_4)_2U_2O_7$ = 627.2. A yellowish-red amorphous powder, soluble in acids and used in ceramics for coloring porcelain. **a. uranylcarbonate.** *Uranyl* ammonium carbonate. **a. uranylfluoride.** *Uranyl* ammonium fluoride. **a. urate.** $(NH_4)C_5H_3N_4O_3$ = 185.1. Colorless crystals or white powder, soluble in water and used as an antiseptic. **a. valerate.** $C_4H_9.COONH_4$ = 119.1. Colorless, hygroscopic crystals, soluble in water, alcohol, or ether; used as a hypnotic, sedative and tonic. **a. valerianate.** a. valerate. **a. vanadate.** NH_4VO_3 = 155.2. A colorless powder, soluble in water and used in the textile industry, in the manufacture of vanadium catalysts, blue or green photographic dyes, indelible ink, and in ceramics. **a. wolframate.** a. tungstate.

ammono. Pertaining to the *ammonia* system, q.v. **a. base.** An inorganic amide, MNH_2. Cf. *base, ammonio.* **a. salt.** Cf. *ammonia* system.

ammonocarbonous acid. Hydrocyanic acid.

ammonolysis. (1) A reaction in the ammonia system which corresponds with the hydrolytic dissociation: $NH_3 \rightarrow H^+ + NH_2^-$. (2) The cleavage of a bond by the addition of ammonia; $R—R' + NH_3 \rightarrow RNH_2 + HR$. (3) Treatment (e.g. of oils) with hot ammonia gas under pressure.

ammo-phos. A commercial ammonium phosphate containing 13 % NH_3 and 48 % available P_2O_5; used as fertilizer.

amniotin. Oestrone.

amœba, amoeba. Ameba.

amoeboid. Resembling an ameba. **a. cell.** A leucocyte. **a. movement.** The motion of a unicellular organism consisting of a streaming or rolling movement of the protoplasmic jelly.

amoil. Amylphthalate used for high-vacuum pumps.

amorphism. The non-crystalline condition of a solid substance; due to an irregular molecular assembly.

amorphous. Unorganized. The property of a solid substance which does not crystallize and is without any definite geometrical shape. In bacteriology, any bacteria without visible differentiation in structure.

amosite. A long-fibred variety of asbestos, from the Transvaal.

amoxy. Amyloxy. The monovalent radical, $Me-(CH_2)_4O—$ derived from amyl alcohol.

ampelite. A sulfur-containing earth.

Ampère, André Marie. 1775–1836. A French physicist and mathematician, noted for the development of molecular theory.

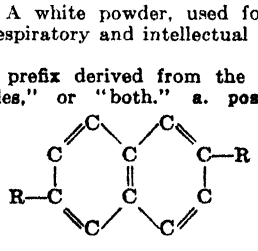
ampere. The practical unit of amount of electricity and current. One ampere is the strength of a current which, on passing through silver nitrate solution, will deposit 0.001118 gram of silver per·second; or, the strength of a current with an electromotive force of one volt passing through a resistance wire (or solution) of one ohm. 1 ampere = 1 coulomb per second = 1 volt through 1 ohm = 10^{-1} E.M.U.(C.G.S.) = 3×10^9 E.S.U. **international-** 1 Int. a. = 0.9999 absolute a. **micro-** One-millionth of an a. **milli-** One-thousandth of an a. **a. meter.** Ammeter. An instrument for measuring electric current. Cf. *voltammeter, ohmammeter.* **a. turn.** An ampere of electricity flowing through one turn of a coil. **a. volt.** A volt-ampere or a watt.

amperometer. Ampere meter.

amperometry. Chemical analysis by methods which involve measurements of electric currents, e.g. conductometric analysis, q.v. Cf. *polarography, potentiometry.*

amphetamine. Benzedrine. Racemic 1-phenyl-2-aminopropane, a colorless liquid. Its vapors shrink nasal mucosa. **a. sulfate.** Benzedrine sulfate. A white powder, used for its vasomotor, respiratory and intellectual stimulatory effects.

amphi. A prefix derived from the Greek "on both sides," or "both." **a. position.** The



positions of the hydrogen atoms in the 2.6-position of two condensed hexatomic rings (*e.g.*, naphthalene ring).

amphiboles. A group of rock-forming minerals, which contain occluded water, of the general type, $M_x(SiO_3)_y$, in which M is Ca, Mg, Fe, or the alkali metals (hornblende, tremolite, anthophyllite, crocidolite, etc.). They occur in elongated fibrous form, as black or dark green crystals. Cf. *silica* minerals.

amphibolites. A group of metamorphic rocks derived from argillaceous limestones and related to the glaucophane schists.

amphichroic, amphichromatic. A mixture of indicators whose color changes neutralise one another; *e.g.*, litmus and congo red.

amphigene. Leucite.

amphiprotic. Having the ability either to lose or gain a proton. Cf. *acid, base.*

ampholyte. Amphoteric electrolyte. A substance which in solution yields H^+ or OH^-, according to the pH value of the solvent. Cf. *isoelectric point, zwitterion.*

ampholytoid. Amphoteric colloid. A particle which, when in suspension, is capable of adsorbing either H^+ or OH^-, depending upon the pH value of the suspending media. At the isoelectric point the particles are electrically neutral.

amphoteric. A substance having both, acid and basic properties. Thus it may act either as a weak acid or as a weak base; as, aluminum hydroxide, $Al(OH)_3 \rightleftharpoons H_3AlO_3$, or the amino-acids, $NH_2.R.COOH$. **a. hydroxides.** The hydroxides of some metals which may dissociate to H^+ or OH^- ions; as, $2Al(OH)_3 \rightleftharpoons \begin{cases} H^+ + AlO_3 + H_2O \text{ (acid)} \\ Al^{+++} + 3OH^- \text{ (base).} \end{cases}$ **a. sulfides.** The sulfides of the metallic nonmetals, which may react as weak acids or weak bases; *e.g.*, $H_3AsS_3 \rightleftharpoons As(SH)_3$.

amphotropine. $[(CH_2)_6N_4]_2.C_8H_{14}(COOH)_2 = 480$. Hexamethylenamine camphorate. A colorless crystalline powder.

amplification. An increase or enlargement *e.g.*, of the visual area (microscope) or of sound (telephone).

amplifier. (1) A magnifier. (2) A vacuum tube acting as an electric valve, by which weak electric impulses are strengthened; as in radio transmission or reception.

amplitude. The maximum displacement of an oscillation, vibration or wave.

ampoule, ampul. The small, sealed, glass vial that contains a sterilized solution for hypodermic injections.

amrad gum. A gummy exudation from elephant apple, *Feronia Elephantum*, a Rutaceae of India and Java.

amyctic. An irritating stimulant, used especially on the skin.

amygdala. The seeds of *Prunus amygdalus*, containing emulsin and amygdalin. **a. amara.** See bitter *almond.* **a. dulcis.** See sweet *almond.*

amygdalic acid. (1) Mandelic acid. (2) $C_{20}H_{28}O_{18} = 476.22$. Gentiobioside. A glucoside from almonds.

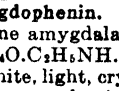
amygdalin. $C_{20}H_{27}O_{11}N.3H_2O = 511.37$. *d*-Mandelonitrile glucoside; amygdaloside. A glucoside from bitter almonds, wild cherry bark, and other drugs. Colorless, odorless, tasteless crystals, m.210; soluble in water,

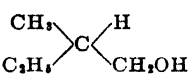
slightly soluble in alcohol and insoluble in ether. It hydrolyses to 2 mol. glucose, HCN and Ph.CHO, and is used as an expectorant; it is a source of oil of bitter almonds.

amygdalinic acid. Mandelic acid.

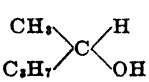
amygdaloid. Shaped like an almond.

amygdophenin. $C_{16}H_{17}O_3N$ = 271.2. Phenetidine amygdalate, phenyl-glycol-phenetidine $C_6H_4O.C_2H_5NH.CO.CHOH.C_6H_5$. A grayish-white, light, crystalline powder; used medicinally as an analgesic.

amyl. Am. Pentyl. The monovalent $-C_5H_{11}$ radical derived from pentane. **iso-** i-Am. The monovalent $-C_5H_{11}$ radical derived from isopentane. **tert-** The monovalent radical  , derived from pentane. **a. acetate.** $MeCOOC_5H_{11}$ = 130.13. Isoamyl acetate, i-amylacetic ester, banana oil, pear oil, pentylacetate, amylacetic ester. A colorless, inflammable liquid, d.0.8659, b.148; sparingly soluble in water and miscible with alcohol or ether. Used in making fruit ethers for the soda fountain and as a solvent for nitrocellulose, for varnishes and lacquers, for waterproofing materials, metallic paints, and liquid bronzes; also used as fuel for the Hefner standard candle. **a. acetic ether.** Amyl acetate. **a. alcohol.** $C_5H_{11}OH$ = 88.11. Fused oil, grain oil, potato spirit, fermentation amyl alcohol, amyl hydroxide, $CH_3(CH_2)_4OH$. A colorless liquid, d.0.870, m. −134, b.137.5, miscible with alcohol. It is a mixture of several isomeric alcohols (see table) and is used as a solvent and reagent in the preparation of chemicals and pharmaceuticals, artificial silk, varnishes, lacquers, mercury fulminate, and in photography. *active-* See iso- or secondary- *alpha-* See secondary-. *beta-* See tertiary-. *dextro-* See iso- or secondary-. *iso-* $CH_3.CH_2.CH(CH_3)CH_2OH$. Isobutyl-carbinol, 2-methyl-butyl-alcohol, 2-methyl-butanol, active amyl alcohol. It occurs in two stereoisomeric forms: dextro- and levo-



A colorless liquid, d.0.825, m. −117 b.131.6, the chief constituent of fusel oil or fermentation amyl alcohol. *levo-* See iso- or secondary-. *normal-* See primary-. *primary-* Butyl carbinol, normal amyl alcohol, *1*-pentanol*. A colorless liquid, d.0.817, m. −78 b.137–138; soluble in water, alcohol or ether. *secondary-* Alpha-amyl alcohol, secondary butyl carbinol, 1-methyl-butanol*, 1-methyl-butyl alcohol, *2*-pentanol*. It occurs in a dextro-, and levo-form.



A colorless inflammable liquid, d.0.8169, b.-118, miscible with water, alcohol or ether; used in organic synthesis and as a solvent. *tertiary-* Amylene hydrate, dimethyl-ethyl-carbinol, 1-dimethyl-propyl-alcohol. A colorless, inflammable liquid, d.0.8144, m. −12 b.102; soluble in water, alcohol or ether; used in organic synthesis and in the preparation of fruit ethers. **a. aldehyde.** Valeraldehyde. **a. amine.** $C_5H_{11}NH_2$ = 87.14. **n-** Normal amylamine, pentylamine*, *1*-aminopentane. A colorless liquid, d.0.766, b.104 miscible with water, alcohol or ether. **iso-** A colorless liquid, d.0.750, b.95; soluble in water, alcohol or ether. Used as an emulsifying agent and in dye manufacture. Cf. *diamyl-*amine, *triamyl*amine. *methyl-* Iso*hexylamine*. **a. amine hydrochloride.** $C_5H_{11}NH_2.HCl$ = 123.5. Colorless crystals, soluble in water and used as an antipyretic. **a. aniline** (iso). $PhNHC_5H_{11}$ = 163.20. A liquid, $d_{15°}$.0.928, b.260. **a. benzene.** $C_5H_{11}.C_6H_5$ = 148.18. Phenyl-pentane. A colorless liquid d.0.860, b.201; soluble in alcohol. **a. benzoate.** $C_6H_5COOC_5H_{11}$ = 192.19. **n-** A colorless liquid, d.1.004, b.260; soluble in alcohol. **iso-** A colorless liquid, d.0.993, b.262; insoluble in water and soluble in alcohol. **a. bromide.** $C_5H_{11}Br$ = 151.03. **n-** α-bromopentane, *1*-bromopentane*. A colorless liquid $d_{20°}$ = 1.223, $b._{740mm}$ = 128.7; soluble in alcohol. **i-** β-brompentane. A colorless liquid, d.1.219, b.120; insoluble in water and soluble in alcohol and used as an antiseptic. **a. butyrate.** $C_3H_7COOC_5H_{11}$ = 158.19. *i-amyl-n-butyrate* i-amyl butyric ester. A colorless liquid, $d_{0°}$ = 0.882, b.178.5; slightly soluble in water and soluble in alcohol or ether. It is used in fruit ethers. *n-amyl-i-butyrate.* A colorless liquid, d.0.859, b.154, slightly soluble in water, miscible with alcohol or ether. It is used in organic synthesis and in the preparation of artificial fruit essences. *i-amyl-i-butyrate.* A colorless liquid, $d_{0°}$ =0.876, b.168.8, miscible with alcohol or ether. **a. carbamate.** $C_5H_{11}CO_2NH_2$ = 131. Amyl-carbamic ester, amyl urethane. Colorless crystals, m.60, b.220; soluble in alcohol or ether. Cf. *aponal*, *hedonal.* **a. carbinol.** Hexyl alcohol. **a. carbylamine.** $C_5H_{11}NC$ = 97.13. A liquid, b.137, soluble in alcohol but insoluble in water. **a. chlorcarbonate.** $ClCOOC_5H_{11}$ = 150.58. **iso-** A colorless liquid, $d_{25°}$ = 1.024, b.100; insoluble in water, miscible with alcohol or ether. **a. chloride.** $C_5H_{11}Cl$ = 106.57. **n-** α-chloropentane, *1*-chloropentane*. A colorless liquid, $d_{20°}$ = 0.883, $b._{740mm}$ = 106.5; miscible with alcohol. **iso-** β-chloropentane. A colorless liquid, d.0.880, b.100; insoluble in water and miscible with alcohol or ether. **a. cyanide.** $C_5H_{11}CN$ = 97.13. Capronitrile. A colorless liquid, d.0.807, b.163; insoluble in water and miscible with alcohol or ether. **iso-** Isocapronitrile. A colorless liquid, d.0.806, m −51, b.155. **a. ether.** $(C_5H_{11})_2O$ = 158.23. **n-** α-amyl oxide, pentyloxypentane*, di-*n*-amylether, pentyloxide. A yellowish liquid, $d_{25°}$ = 0.775, b.169; insoluble in water and miscible with alcohol or ether. **iso-** i-amyl oxide. A colorless liquid, d.0.781, b.173; insoluble in water but miscible with ether. Used as a solvent. **a. ethyl ketone.** $C_2H_5COC_5H_{11}$ = 128.17. 3-octanone. A liquid, $d_{0°}$.0.8502, b.164. **a. formate.** $HCOOC_5H_{11}$ = 116.13. **n-** n-amyl formic ester. A colorless liquid, $d_{0°}$. = 0.894, b.123.2; slightly soluble in water but miscible with alcohol or ether. **iso-** i-amyl formic ester. A colorless liquid, d.0.9018, b.130; slightly soluble in water and miscible with alcohol or ether. It is used in fruit essences and syrups. **a. furoate.** $C_4H_3O.COOC_5H_{11}$ = 182.11. **n-** A colorless liquid, d.1.0335, b.233, used in perfumery and lacquers. **i-** $b._{25mm}$136. **a. hydrate.** See *amyl* alcohols. **a. hydride.** Pentane. **a. hydrosulfide.** Amyl mercaptan. **a. iodide.** $C_5H_{11}I$ =

AMYL ALCOHOLS

(The asymmetric C atom of No. 3 and 7 is in heavier type)

A. Primary:

(1) 1-pentanol*..... $CH_3.CH_2.CH_2.CH_2.CH_2OH$
d.0.817, m. −78.5 b.137.9
normal amyl alcohol, butylcarbinol, pentan-1-ol.

(2) 3-methyl-1-butanol*..... $CH_3CHMe.CH_2.CH_2OH$
d.0.812, m. −117.2, b.130.5
iso-amyl alcohol, prim. isobutylcarbinol, 2-methyl-butan-4-ol, 3-methyl-butan-1-ol

(3) 2-methyl-1-butanol*..... $CH_3.CH_2.CHMe.CH_2OH$
d.0.816, m.128
d-amyl alcohol, sec. butylcarbinol, 2-methyl-butan-1-ol

(4) 2.2-dimethylpropanol*..... $CH_3.CMe_2.CH_2OH$
m.53, b.114
isobutylcarbinol, tert. butylcarbinol,

B. Secondary:

(5) 2-pentanol*..... $CH_3.CH_2.CH_2.CHMeOH$
d.0.809, b.119
sec. amyl alcohol, methylpropylcarbinol, 1-methyl-1-butanol, pentan-2-ol

(6) 3-pentanol*..... $CH_3.CH_2.CHOH.CH_2.CH_3$
d.0.815, b.115.6
diethylcarbinol, 1-ethyl-1-propanol, pentan-3-ol

(7) 3-methyl-2-butanol*..... $CH_3.CHMe.CHMeOH$
d.0.819, b.114
methylisopropylcarbinol, 1.2-dimethyl-1-propanol, 3-methyl-butan-2-ol.

C. Tertiary:

(8) 2-methyl-2-butanol*..... $CH_3CH_2.CMe_2OH$
d.0.809, m. −11.9, b.101.8
tertiary amyl alcohol, dimethylethylcarbinol, amylene hydrate, 1.1-dimethyl-1-propanol, 2-methyl-butan-2-ol

198.03. **n-** n-iodopentane, *1*-iodopentane*. A colorless liquid, $d_{20°}$ = 1.517, b_{739mm} = 155.4; miscible with alcohol. **iso-** i-iodopentane. A colorless liquid, $d_{20°}$1.473, b.148.2, insoluble in water and miscible with alcohol or ether; used as a sedative and antiseptic, and for inhalations. **a. isobutyrate.** Amyl-i-butyrate. **a. isocyanide.** C_5H_{11} =97.09. Pentylcarbylamine*, $Me(CH_2)_4CN$. Colorless liquid, d.0.806, m. −51, b.155. **a. ketone.** 6-Hendecanone. **a. mercaptan.** $C_5H_{11}SH$ = 104.14. 1-Pentanethiol*. A liquid $d_{0°}$.0.8548, b.116; used as an odorant for natural gas and in organic synthesis. Cf. *diamyl* sulfide. **a. methyl ether.** $C_5H_{11}OCH_3$ = 102.14. A liquid, d.0.7807, b.92. **a. mustard oil.** $C_5H_{11}NCS$ = 129.21. **i-** i-amyl-i-thiocyanate. A colorless liquid, d.0.942, b.184; sparingly soluble in water and miscible with alcohol or ether. **a. nitrate.** $C_5H_{11}NO_3$ = 133.16. **iso-** A colorless liquid, $d_{7°}$ = 1.000, b.147; slightly soluble in water and miscible with alcohol or ether. It is used as an antimalarial. **a. nitris.** Amyl nitrite. **a. nitrite.** $C_5H_{11}NO_2$ = 117.10. Pentylnitrite*. **n-** A pale yellow, inflammable liquid, d.0.870, b.96; insoluble in water. **iso-** A colorless liquid, d.0.880, b.94; slightly soluble in water, but miscible with alcohol or ether. Used as an antispasmodic and as a reagent for phenols and wormseed oil; also in the manufacture of perfumes. **a. oxide.** Amyl ether. **a. oxyhydrate.** Amyl alcohol. **a. phenol.** $C_5H_{11}.C_6H_4OH$ = 164.18. i-amyl-p-phenol, 1-amyl-4-hydroxy-benzene. White needles, m.94, b.265, slightly soluble in water but soluble in alcohol or ether; used in the manufacture of synthetic resins, and for varnishes and antiseptic emulsions. **a. phenyl hydrazine.** $NH_2.NPhC_5H_{11}$ = 178.16. Colorless liquid, b.175, used as reagent for aldehydes. **a. phenyl ketone.** $C_5H_{11}COC_6H_5$ = 176.19. A colorless liquid, b.242; insoluble in water but miscible with alcohol or ether. **a. phthalate.** $C_6H_4(COOC_5H_{11})_2$ = 306.46. Amoil. Colorless crystals, b_{11mm} = 205, used in *vacuum* pumps, q.v., instead of mercury. **a. propionate.** $C_2H_5COOC_5H_{11}$ = 144.17. A colorless liquid, $d_{0°}$ = 0.888, b.160, sparingly soluble in water but miscible with alcohol or ether. **a. rhodanate.** a. thiocyanate **a. salicylate.** $C_6H_4(OH)COOC_5H_{11}$ = 208.19. **n-** A colorless liquid, d.1.052, b.276.5; soluble in water. **iso-** A colorless liquid $d_{25°}$ = 1.045 b.270; insoluble in water, but miscible with alcohol, ether, or chloroform. Used as an antirheumatic, and commercially in fruit essences. **a. sulfate.** $(C_5H_{11})_2SO_4$ = 238.23. Pentylsulfate, di-*n*-amylsulfate. Colorless liquid, d.1.026, $b_{2.5mm}$ 117, decomposed by water. **a. sulfocyanate.** a. thiocyanate. **iso-** amyl rhodanate. A colorless liquid, $d_{20°}$ = 0.905, b.197; miscible with alcohol or ether. **a. sulfide.** $(C_5H_{11})_2S$ = 174.18. **n-** A colorless liquid, d.0.881, b.203.7. **iso-** A colorless liquid, $d_{20°}$ = 0.843, b.215; insoluble in water and miscible with alcohol or ether. **a. thiocyanate.** a. mustard oil. $C_5H_{11}CNS$ = 129.21. **a. urea.** $NH_2CONHC_5H_{11}$ = 130.16. A white crystalline mass, m.90; slightly soluble in water. **a. urethane.** $C_5H_{11}.OCONH_2$ = 131.14. a. carbamate, a. carbamic ester. A crystalline solid, m.65, b.220, soluble in water, alcohol or ether. **a. valerate.** $C_4H_9COOC_5H_{11}$ = 172. **iso-** i-amyl-valeric ester, apple essence, apple oil. A colorless liquid, d.0.8812, b.196; insoluble in water, miscible with alcohol or ether. Used in the manufacture

of fruit ethers for soda water fountains, and medicinally as a sedative. **a. xanthate.** The amyl ester of xanthic acid; used as a flotation reagent.

amylan. A laevo-rotatory gum in malt and barley. $[\alpha]_D = -137.7$. It does not reduce Fehling's solution.

amylase. A starch-splitting or amylolytic enzyme in blood, hempseed or malt which hydrolyses polysaccharides to glucose. **pancreatic-** Amylopsin. **salivary-** Ptyalin. **vegetable-** Diastase.

amylate. A compound of starch.

amylene. $C_5H_{10} = 70.11$. **n-** or **1-** Propyl ethylene, ethyl propylene, Δ^1-pentene, Δ^1-valerene, *1*-pentene*, $MeCH_2CH_2CH{:}CH_2$. A colorless inflammable liquid, b.40; insoluble in water and soluble in alcohol or ether. **i-** or **2-** Ethyl-methyl-ethylene, Δ^2-pentene, Δ^2-valerene, *2*-pentene*. A colorless inflammable liquid, b.36.5; insoluble in water and soluble in alcohol or ether. There are three forms:

Et.CH	Et.CH	Et.C.Me
‖	‖	‖
HC.Me	Me.CH	HCH
trans-	*cis-*	*asymmetric*

β-iso- Pental.

a. alcohol. a. alcohol, tertiary-. **a. carbamate.** Aponal. **a. bromide.** $C_5H_9Br = 149.0$. A pale yellow liquid, d.1.550, b.105 (decomp.). **a. chloral.** Dormiol. **a. diamine.** Cadaverine. **a. ether.** a. oxide. **a. glycol.** Pentanediol. **a. hydrate.** See *amyl* alcohol. **a. hydride.** Amylene. **a. iodide.** $C_5H_9I = 196.00$. A yellow liquid, b.132 (decomp). **a. oxide.** (1) a. ether. The compound $(C_5H_9)_2O$. (2) Pentamethylene oxide, pentahydropyran. The ring compound, $C_5H_{10}O$, b.82. **a. o. linkage.** In sugars and related compounds the formation of a ring by an O atom connecting the first and fifth carbon atom. Cf. *pyranose.*

amylenum. The official Latin for amylene.

amyl hydride. Pentane.

amyl hydrate. Amyl alcohol.

amylic alcohol. Amyl alcohol.

amylidene. The divalent radical, pentylidene, $Me(CH_2)_3CH{=}$, derived from pentane.

amyline. The cellulose membrane of starch granules.

amylis. The official Latin for amyl.

amylit. A diastatic enzyme of malt, used in the textile industry.

amylo-. Pertaining to starch. (Gr. amylum.)

amylobacter. A bacillus acting on starch and causing butyric acid fermentation.

amylo-cellulose. A starch-cellulose complex which encloses the starch granulose of plants.

amyloclastic. Amylolytic.

amylodextrin. Soluble *starch.*

amyloform. An antiseptic powder, used like iodoform; it is a mixture of starch and formaldehyde.

amylogen. A soluble starch.

amylograph. An instrument which measures the baking quality of starch in terms of its viscosity at various temperatures.

amyloid. (1) $(C_6H_{10}O_5)x = (162.11)x$. An explosive, m.42, slightly soluble in water. (2) Parchment paper formed by the action of sulfuric acid on cellulose. (3) A substance produced in woody tissues as an intermediate stage in the process of lignification.

amyloin. Malto-dextrin.

amylolysis. The conversion of starch into sugar either by boiling with dilute acids (hydrolysis), or by the action of enzymes.

amylolytic. Amyloclastic. Capable of transforming starch into sugar. **a. activity.** The digestive power of amylase. **a. enzyme.** Amylase. **a. fermentation.** See *fermentation.*

amylopectin. The gel constituent of starch paste. Cf. *amylose.*

amylopsase. See *amylopsin.*

amylopsin, amylopsase. An amylase of the pancreatic juice, splitting starch to glucose (*i.e.*, similar to diastase).

amylose. (1) The sol constituent of starch paste. Cf. *amylopectin.* (2) Polysaccharide. **α-, β-** See *starch.*

amylum. (1) The Latin name for starch. (2) Corn starch. Cf. *paramylum.*

amyrin. $C_{24}H_{39}O = 343.4$. A crystalline resinous substance occurring in elemi and other gums. **α-** $C_{30}H_{50}O$. Ilicic alcohol.

Amyris. A genus of tropical trees and shrubs producing fragrant resins and gums, *e.g.*, *A. elemifera* (elemi) of Mexico.

amytal. $C_{11}H_{18}O_3N_2 = 226.16$. 5-ethyl-5-iso-amylbarbituric acid. Colorless crystals, m.156, used as anesthetic and sedative. Cf. *barbital.*

amythin. The ammonium salt of a mixture of sulfonated hydrocarbons.

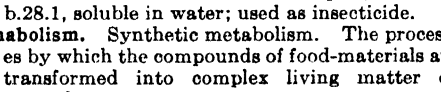
an- A prefix indicating, without or not.

-an. A suffix which indicates a sugar-body, glucoside or gum.

An. The symbol for *actinon.*

ana- A prefix derived from the Greek which indicates, again, along, over, through, without, or against. **a.-position.** The 1.5-position of the naphthalene ring; or the positions of the two hydrogen atoms attached to the first and fifth carbon atom of two condensed hexatomic rings; as, naphthalene, quinoline, etc.

anabasine. $C_{10}H_{14}N_2 = 162.12$. Neonicotine. *1-2-*(*3*-pyridyl)piperidine. An isomer of nicotine:



from *Anabasis aphylla*, a Chenopodiaceae of Central Africa. A colorless liquid, d.1.048, b.28.1, soluble in water; used as insecticide.

anabolism. Synthetic metabolism. The processes by which the compounds of food-materials are transformed into complex living matter or protoplasm.

Anacardiaceae. The cashew family, consisting of 60 genera and 500 species of trees or shrubs with gummy, milky, or resinous juices that are often poisonous; *e.g.*,

Rhus toxicodendron.....	poison ivy, poison oak
Rhus glabra.....	sumac
Rhus aromatica.....	sweet sumac
Pistacia lentiscus.....	mastic
Pistacia terebinthus.....	Chinese turpentine
Anacardium occidentale.	cashew nuts
Semecarpus anacardium.	oriental cashew nut

See also *Rhus, quebracho, mangiferin.*

anacardic acid. $C_{22}H_{32}O_3 = 344.3$. An acid from the seeds of *Anacardium occidentale.* A brown crystalline mass, m.26, soluble in alcohol or ether; used as an anthelmintic.

anacardium. Cashew nut, caje nut. The dried fruit of *A. occidentale*, a large shrub of tropical

America; used as a refreshing food. Cf. *acajou* balsam, *cardol*.

anaclastic. Having refracting powers.

anæ. See *anae* and *ane*.

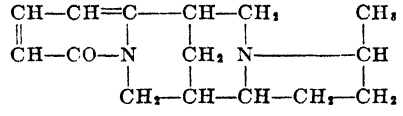
anaerobe. A bacterium which can grow in an oxygen-free atmosphere and which derives the oxygen necessary for its metabolism from solid or liquid compounds. **facultative-** A bacterium which prefers an atmosphere containing oxygen, but which is not dependent on gaseous oxygen for its metabolism. **obligatory-** A bacterium which cannot live in an atmosphere containing oxygen.

anaerobic. Growing in an oxygen-free atmosphere. **a. culture apparatus.** A glass container used for growing bacteria, from which the atmospheric oxygen is removed by chemicals, *e.g.*, pyrogallic acid.

anaesthesia. Anesthesia.

anaesthesin(e). Benzocaine.

anagyrine. $C_{15}H_{18}ON_2$ = 242.2. An alkaloid from the seeds of *Anagyris foetida*, a Leguminosae. A brittle, resin-like mass, b.245. It resembles cytisine and sparteine in structure:



a. hydrobromide. $C_{15}H_{18}ON_2.HBr$ = 323.3. Colorless or slightly yellow crystals, m.265; soluble in water or alcohol; used as a heart stimulant.

anahemin. A polypeptide from the liver, which is responsible for the maturation of the red blood cells in the bone marrow.

analcime. Analcite.

analcite. $NaAlH_2Si_2O_7$. Analcime. A native sodium aluminum silicate; a white isometric zeolite. It is also deposited in high-pressure boilers.

analeptic. A drug which restores health.

analgen(e). (1) $C_{18}H_{16}O_2N_2$ = 292.24. *5*-Benzamido-*8*-ethoxy-quinoline, o-ethoxy-mono-benzoyl-amidoquinoline, benzanalgen, quinalgene, labordin, $C_7H_5O.NHC_6H_3(OEt):C_2H_3N$. Colorless crystals, m.208; insoluble in water but soluble in hot alcohol; used as an antipyretic, antirheumatic and analgesic. (2) $C_{13}H_{14}O_2N_2$ = 230.12. 5-acetylamino-8-ethoxy-quinoline. Colorless crystals, m.155

analgesic. A drug that relieves pain either by direct action on nerve centers (brain), or by diminishing the conductivity of the sensory nerve fibers.

analgesine. Antipyrine.

analgic. Painless.

analgin. Creolin.

anallachrom. Esculin.

analogs, analogues. Analogous series. A group of compounds with similar electronic structures but different atoms; as, *isosteres* and *isologs*.

analogy. A similarity or a likeness in properties. Cf. *homology, isology*.

analoids. A patented group of tablets containing the exact quantities of reagents used in the analysis of iron, steel, ores and slags. Cf. *fixanal*.

analyser. Analyzer.

analysis. (1) Assay. The determination, detection, or examination of a substance. (2) The breaking down or splitting of a molecule into simpler constituents. (3) The reverse phenomena of synthesis. **bio-** (1) The detection of substances with the aid of microorganism; *e.g.*, by the selective action of yeasts on sugars. (2) The determination of the strength of substances, *e.g.*, hormones, by means of their effects on animals. **biochemical-** The chemical examination of biological material. **blowpipe-** The detection of metallic elements and acid radicals by means of the blowpipe. **clinical-** The examination of body fluids and tissues for the diagnosis of diseases. **colorimetric-** The quantitative determination of substances by means of the color intensity of their reaction products. **conductometric-** See *conductometric analysis*. **diffusion-** See *diffusion*. **dry-** A. without the use of solutions. **electro-** See *electrodeposition* analysis. **elementary-** The determination of the constituents of an organic compound by combustion; *e.g.*, C is determined as CO_2, H as H_2O. **gas-** Determination of gaseous mixtures by measuring the volumes before and after treatment with a selective absorbing agent. **gravimetric-** The determination of the percentage composition of a substance by weighing its constituents directly or indirectly. **iodimetric-** The titration of oxidizing substances with a standardized sodium thiosulfate and acid potassium iodide solutions. **mechanical-** See *mechanical*. **micro-** (1) The examination of substances with the microscope for the identification of

CLASSIFICATION OF COMMON TYPES OF ANALYSIS

QUALITATIVE (*detection* of the kind of substances present)	(chemical)		Precipitation or wet method.
	(thermal)		Flame tests and blowpipe analysis.
	(optical)		Spectroscopic and crystal structure.
	(electrical)		Electrolysis. High frequency spectra.
	(mechanical)		Microscope analysis. Spec. gravity, hydrometers.
	(biochemical)		By means of microorganisms (bacteria, yeasts).
QUANTITATIVE (*determination* of the amount of substances present)	(mechanical)	Gravimetric methods	(weighing the amount)
		Volumetric methods	(titrating the amount)
		Gas-volumetric methods	(measuring the quantity of gas)
	(thermal)		Combustion, and the absorption of the combustion gases.
	(electrical)		Conductometry, potentiometry, polarography. Mass-spectra.
	(optical)		Colorimetry, nephelometry. Fluoroscopy.

certain constituents; *e.g.*, starch. (2) The observation of characteristic reactions (precipitates, crystals) with the microscope for the detection of certain constituents. (3) Micro-modifications on the small scale of the ordinary processes of quantitative analysis, for use with small quantities of materials. **nephelometric-** The optical methods used to measure turbidity and thus determine the amounts of precipitates. **organic-** *Elementary* analysis. **proximate-** The determination of the chemical nature of the active constituents of a sample; *e.g.*, the carbohydrates, fats, proteins, alkaloids, glucosides, etc. in drugs. **qualitative-** The detection of the kind or nature of an element or compound in a substance. **quantitative-** The determination of the amount or quantity of an element or compound in a substance. **rational-** See rational analysis. **screen-** See *screen*. **spectroscopic-** See *spectroscopic*. **spectrum-** The detection of elements and binary compounds by their characteristic radiations as observed through the spectroscope. This method applies also to chemical analysis of celestial bodies; *e.g.*, stars, comets, etc. **spot-** See *spot*. **technical-** Practical methods used in industry for the evaluation of materials; they may be gravimetric, volumetric, conductometric, electrolytic, etc. **ultimate-** Elementary a. **volumetric-** The determination of elements and compounds in a substance by titration with standard solutions. **wet-** An a. made with solutions. (*See also bead tests, calorimetry, colorimetry, electrolysis, flame tests, reactions, spectroscopy, titration*, etc.; and table.)

analytical. Pertaining to the analysis or breaking down of a molecule. **a. balance.** See *balance*. **a. chemistry.** See *chemistry*. **a. metabolism.** Catabolism. **a. reactions.** The characteristic reactions of elements or ions, which are utilized for their identification or determination; *e.g.*, precipitate formation, color changes, etc. **a. weights.** The standardized weights used on an analytical balance.

analyzer. (1) A device which indicates a certain condition, change or phenomenon. (2) The Nicol prism of a polariscope nearest to the eyepiece. (3) The first tower of a coffee still. **curve-** A device for determining the slope of a graph. **gas-** An apparatus for the determination of the composition of gases; *e.g.*, flue gases. **micropolar-** An optical attachment for a microscope for the determination of polarization (q.v.) in crystals. **polarization-** The Nicol prism in a polariscope nearest to the eye, cf. *polarizer*.

anamirtin. (1) $C_{10}H_{26}O_{10}$. A glucoside from the fruits of *Anamirta paniculata*. (2) $C_{19}H_{24}O_{10}$. A glyceride from fishberries, *Cocculus indicus*. Cf. *cocculin*.

anamorphism. The change caused by the action of pressure, water or heat on rock; *e.g.*, the more compact portions of the lower geologic zone of the lithosphere. Cf. *catamorphism*.

anamorphoscope. A mirror which corrects distorted images.

anamorphosis. The distortion of objects by mirrors.

anaphase. A stage of cell division which follows the division of the nucleus.

anaphrodisiac. A drug which diminishes sexual desire.

anaphoresis. The antonym of *cataphoresis*, q.v.

anaphylactin. Allergen.

anaphylatoxin. A poisonous substance produced in anaphylaxis caused by the injection of proteins.

anaphylaxis. The increased sensitiveness of an organism to second and subsequent protein injections. The opposite of immunity. Cf. *allergia*.

anarcotine. An alkaloid found in Indian opium. It is not narcotic.

anasthol. A mixture of methyl chloride and ethyl chloride, used as a local anesthetic in dentistry.

anatase. TiO_2, Octahedrite. A native titanium oxide.

Anaxagoras. 500–428 B.C. The first Greek scientist. He distinguished physical from psychical phenomena, and assumed indivisible parts of matter.

anayodin. $HI.OH.C_9H_7N.HSO_3$. Iodoxy-quinoline sulfonic acid. Light yellow powder, soluble in water; used as an amebicide.

anchietine. An alkaloid from the root of *Anchietea salutaris* (Violaceae).

anchoic acid. Azelaic acid.

anchored compound. An organic compound which is attached to certain cells by a characteristic radical. See *chemotherapy*.

anchoring group. (1) An organic radical which combines with cell substance and connects the compound to which it belongs with the tissue material. (2) The salt-forming radical of a dyestuff.

anchovy. A small fish of the herring family, used in the preparation of savouries. **a. pear.** The fruit of a Jamaican tree used in the manufacture of pickles.

anchusic acid. An acid from the root of *Alkanna tinctoria* (Boraginaceae).

anchusin. $C_{33}H_{40}O_8$ = 588.4. A red coloring matter from the root of *Alkanna tinctoria*, a Boraginaceae. Cf. *alkanet, alkannin*.

andalusite. Al_2SiO_5. A native aluminum silicate, found in gray or pink rhombic prisms; used for gems. Cf. *silica*. It begins to decompose at 1410°C. to give mullite.

andesine. $NaCaAl_3Si_5O_{16}$. A native sodium, calcium, aluminum silicate that belongs to the triclinic feldspars. Cf. *andose*.

andesite. A rock-forming mineral consisting of andesine with hornblende and mica.

andirin. (1) $C_{40}H_{43}O_3N$ = 585.5. A yellow coloring matter from the bark of the cabbage tree (*Andira inermis*). (2) Rhatanin. Cf. *yaba* bark, *goa*.

andorite. $AgPbSb_3S_6$. A native, orthorhombic sulfostibide of silver and lead.

andose. A volcanic rock consisting of andesite with diorite.

andradite. An iron *garnet*, q.v.

Andrews, Thomas 1813–1885. An Irish chemist and physicist noted for his research on the critical temperature and pressure of gases.

androkin. Androsterone.

andromedotoxin. A poisonous principle of mountain laurel, *Kalmia latifolia*, an Ericaceae.

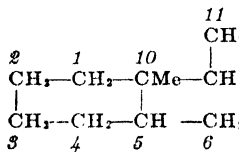
andrometoxin. A poisonous principle from *Andromeda, Azalea* and *Rhododendron* species. Colorless crystals, m.228; soluble in alcohol, ether, benzene or chloroform.

Andropogon. A genus of grasses, some of which yield essential oils used in perfumery; *e.g.*,

A. (or *Cymbopogon*) *citratus*.... lemongrass oil
A. (or *Cymbopogon*) *nardus*..... citronella oil

A. (or *Cymbopogon*) *odoratus*....	gingergrass oil
A. (*Cymbopogon*) *martini*.....	palmarosa oil
Cymbopogon caessius.....	inchigrass oil
Cymbopogon nervatus.....	naal oil
A. sorghum.....	sorghum

androstane. $C_{19}H_{32}$ = 260.0. A solid hydrocarbon and parent substance of sex-hormones, bile acids, sterols, etc. See *cholane* derivatives. **a. ring.** The saturated four-ring complex:



It occurs in many important biochemical compounds. See *cholane* derivatives.

androsterone. $C_{19}H_{30}O_2$ = 290.13. Androtin, androkin, *3-cis*-hydroxy-*17*-ketoandrostane. The male sex hormone, from urine, testes, plants or synthetically prepared. Colorless crystals, m.178, soluble in benzene Cf. *theelin*, *cholane* ring. **dehydro-** $C_{19}H_{28}O_2$ = 288.13. A male hormone from urine, or synthetically prepared. Colorless crystals, m.148, soluble in water.

androtin. Androsterone.

-ane. (1) A suffix which indicates a saturated hydrocarbon of the methane series. (2) A desoxy compound; as, quinane, cholesterane.

anemium. Actinium.

anemometer. An apparatus for measuring wind-velocity or pressure. Cf. *pitot* tube.

anemone camphor. A principle from pulsatilla (*Anemone pulsatilla*), which splits into anemonin and anemonic acid.

anemonic acid. $C_{10}H_{10}O_5$ = 210.1. Yellowish crystals obtained from anemone camphor; insoluble in water and decomposed by alkalis to anemoninic acid.

anemonin. $C_{10}H_8O_4$ = 192.1. Pulsatilla camphor. Yellowish crystals m.152 (decomp.); insoluble in water but soluble in hot alcohol. Used as an antispasmodic, sedative and anodyne. **hydro-** $C_{10}H_{12}O_4$ = 196.1. Large, colorless, scales, m.78 b_{10mm}.210.

anemoninic acid. $C_{10}H_{12}O_6$ = 228.1. Colorless crystals derived from anemonic acid, m.189, soluble in water.

anemosite. A mixed feldspar consisting of sodium anorthite associated with albite.

aneroid. See *barometer*. **a. battery.** Dry cell.

aneson. *Acetone* chloroform.

anesthesia. The loss of sensation. **local-** The loss of feeling at a definite part of the body.

anesthesin. Benzocaine.

anesthesiophore radical. The benzoyl group, $PhCO^-$, which produces anesthetic effects.

anesthetic, anæsthetic. A drug which causes the loss of sensation. **general-** A. which affect consciousness, hence deaden the sensations of the whole organism; such as, ether, chloroform, nitrous oxide, etc. **local-** A. which affect only a particular part of the body; *e.g.*, cocaine, ethyl chloride, novocaine, stovaine, quinine and urea hydrochloride. **a. gas.** Nitrous oxide.

anesthetizing valve. A device for mixing an anesthetic with air for respiration in animal experiments.

anethol. $C_{10}H_{12}O$ = 148.15. Anethole, p-allylphenylmethyl ether, anise camphor, p-methoxypropenyl benzene, methylallyl phenol, 1-methoxy-4-allyl-benzene, p-allyl-phenylic-methylic ester, *p*-propenylanisole, $MeO.C_6H_4.CH:CHMe$. A constituent of anise and fennel oils. Colorless leaflets or an aromatic liquid with fragrant odor, d.0.994, m.21.6, b.223; very slightly soluble in water, and soluble in alcohol or ether. Used as a reagent for the detection of lignin, as a flavoring agent in perfumery, medicinally as a carminative and antiseptic, and also in microscopy and for the preparation of anisaldehyde.

anethoquinine. Quinine anisate.

anethum. Garden dill, dill seeds. The fruits of *Paucedanum* (*Anethum*) *graveolens*, an Umbelliferae; used medicinally as carminative, and as a spice or condiment.

aneurin(e). Vitamin B_1.

angelic acid. $C_5H_8O_2$ = 100.08. Angelicic acid, *α*-methylisocrotonic acid, *cis-2*-methyl-*2*-butenoic acid*, $MeCH:CMeCOOH$. Colorless monoclinic crystals of spicy odor, $d_{76°}$.0.954, m.45.5, b.185; sparingly soluble in water, but soluble in alcohol or ether. It is a constituent of *Angelica*, *Chamomile*, and *Arnica* species, and is used as a flavoring agent. Its isomer is *tiglic* acid (q.v.). **cinnamenyl-** See *cinnamenyl*. **hydro-** *α*-Methylbutyric acid. **iso-** Tiglic acid.

angelica. The dried herb of *A.* or *Archongelica officinalis*, an Umbelliferae.

a. lactone. $C_5H_8O_2$ = 98.1. *alpha-* Colorless crystals, m.18, or a colorless liquid, b.167. *beta-* A colorless liquid, m. −10 b.83; used in flavoring extracts. **a. root.** The rhizomes and roots of *Angelica* species, used medicinally as a fluid extract, as a diuretic, diaphoretic and stimulant. **a. root oil.** A colorless, essential oil which is sometimes pale yellow, d.0.855–0.918, $[\alpha]_D$ + 16° to +32°, b.60–70, refractive index (20°C) 1.4800. Its chief constituents are phellandrene and valeric acid; soluble in alcohol, ether, benzene or chloroform. Used for flavoring. *Japanese-* Colorless crystals, d.0.915 m.62, b.300; soluble in alcohol, ether, chloroform or benzene, and used for flavoring. **a. seeds.** The ripe, dried fruits of *Angelica* species, used medicinally as a carminative, stimulant or aromatic as a fluid extract or oil. **a. seed oil.** An essential oil from angelica seeds. A pale-yellow liquid which darkens with age, d.0.856–0.890, $[\alpha]_D$ + 11° to +12°; miscible with alcohol, ether, benzene, or chloroform. Its chief constituents are phellandrene and valeric acid; used for flavoring. **a. tree.** The shrub or tree, *Xanthoxylum americanum*, a Rutaceae found in the United States. The crushed bark smells like angelica and is used as a purgative and emetic.

angelicic acid. Angelic acid.

angelicin. $C_{18}H_{10}O$ = 262.3. A constituent of the roots of *Angelica officinalis*. Colorless crystals, m.126.5, insoluble in water, but soluble in alcohol or ether.

angelin. Rhatanin.

Angelus still. A distillation apparatus that can be fixed to a wall.

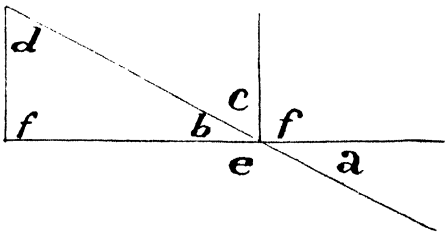
angico gum. Brazilian gum, Para gum. A mucilaginous secretion of *Piptadenia rigida*, a Leguminosae of Brazil; used similarly to gum arabic. Cf. *cebil* gum.

angiology. The science of blood and lymph vessels.

angioneurosin. *Nitro-*glycerin.

angiosperm. A flowering plant which has seeds enclosed in a fruit; *e.g.*, the pea-pod. Cf. *gymnosperm*.

angle. The difference in direction of any two lines; the figure formed by two converging lines when they meet; the vertex of the two lines. **acute-** An a. less than 90°, (a). **adjacent-** An a. which has one line common with another angle, (b). **complementary-** The complement of an a. (c) is 90° less the a.—*i.e.*, (b). **critical-** See *critical*. **meter-** See *meter*. **oblique-** An a. opposite to a right a., (d). **obtuse-** An a. greater



than 90°, (e). **right-** An a. of 90° (f). **supplementary-** The supplement of an a. (a) is 180° less the a.—*i.e.*, (e). **a. thermometer.** An L-shaped thermometer.

anglesite. A native lead sulfate, $PbSO_4$, which crystallizes in variously colored orthohombic crystals. Cf. sardinianite.

anglo-helvetium. Alabamine. The name proposed by Leigh-Smith and Minder for element No. 85 discovered by them in 1940, and isolated in 1943 from monazite sand.

angora. A breed of goats with long, silky, curly coats of valuable wool.

angostura. A South American tree, *Galipea cusparia* (*Cusparia febrifuga*). A Rutaceae. **a. alkaloids.** The alkaloids of a.; as, angosturine, cusparine, cusparidine, galipein, galipidine, etc. **a. bark.** Cusparia bark, carony bark. The bark of angostura, used as a bitter tonic and stimulant. **a. oil.** An essential oil from the bark of angostura. A yellow liquid of aromatic odor, d.0.930–0.960, $[\alpha]_D$ = −36° to −50°, soluble in alcohol, ether, chloroform, or benzene. Its constituents are galipene, galipol, cadinene and pinene; used in flavoring extracts.

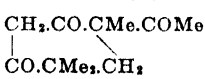
angosturine. $C_{10}H_{40}O_{14}N$ = 398.4. An alkaloid from angostura bark. Colorless crystals, m.85°; used as a tonic.

Angström, A. J. 1814–1874. A Swedish physicist, noted for optical research.

ångström. å, Å or A.U. A unit of wave length: 1å = 10^{-7} mm. = 10^{-10} m. = 0.000,000,0001 meter = 1 am (atom meter). Also 10å = 1$\mu\mu$ = 10^{-6} mm. *International* Å. I.Å. The wave length of the red line of cadmium which = 6438.4696 I.A. in air at 15°C. Thence the I.Å. = 10^{-10} m. Cf. λ (*lambda*).

angular. Pointed, having sharp cornered angles. **a. acceleration.** Angular acceleration, a, = $(v_t - v_0)/t$ where v_t is the velocity after time t, and v_0, the initial velocity. The unit is one radian per second per second. **a. aperture.** The largest angle subtended by a wave surface transmitted by an objective. **a. momentum.** Spin. The product of the a. velocity and moment of inertia of a body; hence, the mass of angular motion expressed in grams per cm.-second. **a. motion.** The motion of a line, fixed at one end in one plane, relative to a straight line through the center of rotation; as the hand of a clock. **a. velocity.** The ratio of the angle described in a given time to that time: v = θ/t, where θ is the angle traversed in the time, t. The unit is one radian per second.

angustione. $C_{11}H_{16}O_3$ = 196.11. A cyclohexane triketone isolated from the oil of *Backhousia*

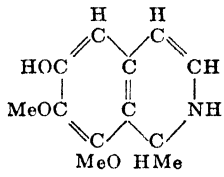


angustifolia, a Myrtaceae. A colorless liquid, d.1.089, b_{15mm}.129, $[\alpha]_D$ − 5.56°.

anhalamine. $C_9H_7(OCH_3)_2OH.NH$ = 209.1. An alkaloid from *mescal* buttons (q.v.).

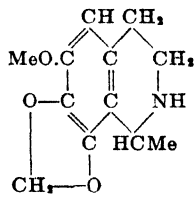
anhaline. $C_{10}H_{17}ON$ = 167.15. An alkaloid from *Anhalonium fissuratum*. It crystallizes in large crystals from sulfuric acid solution.

anhalonidine. $C_{12}H_{15}O_3N$ = 221.19. *1.2*-Dihydro-*6*-hydroxy-*7.8*-methoxy-*1*-methyl quinoline. An alkaloid from mescal buttons. Colorless octahedric crystals, m.-154, optically inactive;



soluble in water, alcohol or ether.

anhalonine. $C_{12}H_{15}O_3N$ = 221.19. *1.2.3.4*-Tetrahydro-*6*-methoxy-*1*-methyl-*7.8*-methylenedioxyquinoline. An alkaloid from *Anhalonium* species (Cactaceae). Colorless needles, m.254, extremely poisonous, optically inactive; soluble



in water, alcohol or ether. **methoxy-** Iopophorine.

a. hydrochloride. $C_{12}H_{15}O_3N.HCl$ = 257.7. Colorless crystals, soluble in water, and sparingly soluble in alcohol; used as a heart tonic.

Anhalonium. A Mexican cactus species, *A. lewinii* (peyotl), used for narcotic and intoxicating drinks by the natives. The cactus contains a number of alkaloids. Cf. *mescal* buttons. **a. alkaloids.** See *anhalamine*, *anhalonine*, *lophophorine*, *mexaline*, *pellotine*, etc.

anhidrotic. Antihidrotic. A drug which lessens perspiration.

anhydride. A compound (usually an acid) from which water has been removed; as, H_2XO_3 − H_2O = XO_2. **acid-** The oxides of nonmetals, which form acids with water. **basic-** The oxides of metals, which yield bases with water. **inner-** A ring compound formed by the abstraction of water; as, lactones, phthalic anhydride, etc. (See also *acetic-*, *chromic-*, *osmic-*, etc.)

anhydrite. $CaSO_4$. A native anhydrous calcium sulfate occurring in white or gray orthorhombic masses. Cf. *muriacite*, *tripestone*, *vulpinite*.

anhydro- A prefix to compounds from which one or more molecules of hydrogen have been extracted. They are, therefore, less saturated. Cf. *anhydrous*

anhydroecgonine. $C_9H_{13}O_2N$ = 167.55. Ecgonidine. Colorless crystals, m.235; soluble in water, alcohol or ether. **a. hydrochloride.** $C_9H_{13}O_2N.HCl$ = 203.63. It is derived from ecgonine. Colorless rhombic needles, m.241 $[\alpha]_D$ − 61.5°; soluble in water or alcohol.

anhydroformaldehyde aniline. $PhN:CH_2$ = 105.01. A solid, m.120, insoluble in water and soluble in alcohol or ether.

anhydroglycochloral. Chloralose.

anhydrone. Trade name for anhydrous, magnesium perchlorate prepared by igniting the trihydrate. It is a powerful desiccant.

anhydrosynthesis. The theoretical coupling of a functioning *group* q.v., with another compound, with the subsequent elimination of water. Cf. *derivative.*

anhydrotimboine. Timbonine.

anhydrous. A compound which has lost all its water; in particular water of crystallization. Cf. *anhydro-.*

anilides. (1) A group of compounds containing the monovalent C_6H_5NH—radical derived from aniline, *e.g.*,

benzanilide	Ph.NH.CO.Ph
acetanilide	Ph.NH.CO.Me
diacetanilide	$PhN(OCMe)_2$
cyananilide	PhNCN

(2) Sometimes applied to compounds containing the $NH_2C_6H_4$— group (anilinate); as, arsenic acid anilide (= arsanilic acid). **acet-** Acetanilide. **form-** $C_6H_5NH.CHO$. Colorless crystals, m.46, b.284. **methylacet-** Exalgin.

anilidothiobiazole. 1.2.3-Thiodiazole.

anilinate. A compound of aniline and a metal, $NH_2C_6H_4M$; as, mercury anilinate. Cf. *anilide.*

aniline. $C_6H_5NH_2$ = 93.10. Phenylamine, aminobenzene, phenylid, cyanol, aniline oil, benzidam, $PhNH_2$. A colorless or slightly brown liquid, darkening with age, $d_{20°}$.1.022, m. −6, b.184.4; soluble in 35 pts. water, and miscible with alcohol or ether. Used as a reagent, for aldehydes, chloroform, fusel oil, phenols, etc.; in bacteriology, for preparing staining solutions; in medicine, as an antiseptic; and extensively in the dye and rubber industries for organic synthesis and in the manufacture of resins, varnishes, and bakelite. Cf. *anilide, anilinate, nitrobenzene* reduction. **acetyl-** Acetanilide. **allyl-** See *allyl.* **amino-** Phenylenediamine. **aminodimethyl-** Dimethylphenylenediamine. **benzal-** Benzalaniline. **benzilidene-** See *benzalaniline.* **benzoyl-** Benzanilide. **benzyl-** See *benzyl.* **bi-** Benzidine. **bromo-** $NH_2C_6H_4Br$ = 172.0. Aminobromo benzene, bromophenylamine. **o-** Colorless crystals, m.31, b.150; soluble in alcohol. **m-** Colorless crystals, $d_{21°}$1.582, m.18, b.251; soluble in alcohol. **p-** Colorless rhombic crystals, m.66 (decomp.); insoluble in water, soluble in alcohol or ether. **chloro-** $NH_2C_6H_4Cl$ = 127.57. Aminochlorobenzene, chlorophenylamine. **o-** A colorless liquid, $d_{20°}$1.213, b.207; soluble in water or ether. **m-** A colorless liquid, $d_{20°}$1.216, b.230. **p-** Rhombic crystals, $d_{15°}$1.340; m.70, b.230; soluble in hot water, alcohol or ether. **cyano-** Cyananilide. **diacetyl-** Diacetanilide. **dibenzyl-** See *benzyl.* **dichloro-** $NH_2C_6H_3Cl_2$ = 162.01. Aminodichlorobenzene, dichlorophenylamine. **2.4-** Colorless needles, m.63, b.245; soluble in alcohol. **3.4-** Colorless needles, m.71.5, b.272; soluble in alcohol. **3.5-** Colorless needles, m.50.5, b.260; soluble in alcohol. **diethyl-** $C_6H_5N(C_2H_5)_2$ = 149.21. A yellow liquid, d.0.936, m.38, b.213.5; sparingly soluble in water, soluble in alcohol or ether. **dimethyl-** $C_6H_5N(CH_3)_2$ = 121.17. A yellow liquid, $d_{20°}$0.958, m.2.5, b.194; slightly soluble in water, but miscible with alcohol or ether. **dimethyl-** *ar-*Xylidine. *N-* See *dimethyl.* **dimethylamino-** Dimethylphenylenediamine. **dinitro-** Dinitraniline. **diphenyl-** Triphenylamine. **ethoxy-** Phenetidine. **ethyl-** $C_6H_5NH(C_2H_5)$ = 121.17. A colorless liquid, $d_{20°}$.0.963, *m.* −80, b.205; sparingly soluble in water and miscible with alcohol or ether. **formyl-** Formanilide. **hexahydro-** Cyclohexylamine. **hydroxy-** *ar-* Aminophenol. *N-* Phenylhydroxylamine. **iodo-** $NH_2C_6H_4I$ = 219.01. Aminoiodobenzene, iodophenylamine. **o-** Colorless needles, m.60; sparingly soluble in water, soluble in alcohol. **m-** Colorless leaflets, m.26; insoluble in water, soluble in alcohol. **p-** Colorless prisms or needles, m.63; insoluble in water, soluble in alcohol. **isopropyl-** Cumidine. **methenyltri-** Leucaniline. **methoxy-** Anisidine. **N-methyl-** $C_6H_5NHCH_3$ = 107.12. A yellow liquid, $d_{25°}$.0.987, m.195.5; slightly soluble in water, miscible with alcohol or ether. **ar-methyl-** Toluidine. **nitro-** $NH_2.C_6H_4.NO_2$ = 138.06. Aminonitrobenzene, nitrophenylamine. **o-** or **1.2-** Yellow rhombic needles, d.1.442, m.71.5, b.284. **m-** or **1.3-** Yellow needles, d.1.430, m.111.8, b.286, **p-** or **1.4-** Yellow monoclinic needles, d.1.424, *m.*147, b.331.7. **N-** Phenylnitramine, nitranilide, diazobenzolic acid, $Ph.NH.NO_2$ or $Ph.N:NOOH$. Pale yellow crystals, m.46, exploding at 98; soluble in water. **nitroso-** $NH_2C_6H_4NO$ = 122.10. **p-** Steel-blue needles, m.173; soluble in alcohol or benzene. **p-nitrosodiethyl-** $(C_2H_5)_2N.C_6H_4NO$ = 178.18. Colorless needles, m.84 slightly soluble in water, soluble in alcohol. **p-nitrosodimethyl-** $(CH_3)_2N.C_6H_4NO$ = 150.14. Green scales, m.87.8; slightly soluble in water, soluble in alcohol or ether. **pentachlor-** $NH_2C_6Cl_5$ = 265.36. Colorless needles, m.232; soluble in alcohol or ether. **phenyl-** *N-* Diphenylamine. *ar-* Biphenylamine. *p-* Xenylamine. **propionyl-** Propioanilide. **thio-** Thioaniline. **thionyl-** Thionylaniline. **tribromo-** Tribromoaniline. **trimethyl-** See *mesidine, pseudocumidine.* **trinitro-** Picramide.

a. acetate $C_6H_5NH_2.CH_3COOH$ = 153.1. A colorless liquid which readily freezes; soluble in water or alcohol. It is a reagent for furfural. **a. azo-β-naphthol.** *Sudan* yellow. **a. black.** Nigrosine. **a. blue.** A mixture of the salts of triphenylrosaniline sulfonic acids. A blue powder, soluble in water and used as a dye for cotton and silk. **a. brown.** Triaminoazobenzene. **a. camphorate** $(C_6H_5NH_2)_2.C_{10}H_{16}O_4$ = 386.3. Yellow crystals, sparingly soluble in water or glycerin; used as an antispasmodic. **a. chloride.** a. hydrochloride. **a. colors.** a. dyes. **a. dyes.** (1) Artificial or synthetic coloring matters. (2) Those derived from benzene or aniline. **a. fluoride.** a. hydrofluoride. **a. hydrobromide** $C_6H_5NH_2.HBr$ = 174. Gray or yellow crystals; soluble in water or alcohol. **a. hydrochloride** $C_6H_5NH_2.HCl$ = 129.6. Aniline salt, aniline chloride. Colorless crystals, d.1.2215, m.198, b.241, soluble in water or alcohol. Used as reagent for chlorates, and in organic synthesis mainly for preparation of dyestuffs. **a. hydrofluoride** $C_6H_5NH_2.HF$ =

113.1. Colorless crystals; soluble in water. **a. hydroiodide** $C_6H_5NH_2.HI$ = 221.07. Yellow crystals; soluble in water. **a. hydrosilicofluoride** $(C_6H_5NH_2)_2.H_2SiF_6$ = 330.1. Colorless crystalline powder; soluble in water or alcohol; used as a reagent. **a. nitrate** $C_6H_5NH_2.HNO_3$ = 156.1. Colorless or slightly yellow crystals, decomp. at 190; soluble in water or alcohol. **a. oil.** Crude aniline. **a. orange.** *Victoria* **orange. a. oxalate** $(C_6H_5NH_2)_2.C_2H_2O_4$ = 276.1. Colorless crystals; soluble in water. **a. point.** The critical solution temperature of a mixture of a. and a water-insoluble liquid. It is used for the determination of petroleum in mixtures by comparing their a. points with those of mixtures of known compositions. **a. purple.** Mauvein. The first aniline dye, discovered in 1856 by W. H. Perkin. **a. red.** Fuchsin. **a. salt.** a. hydrochloride. **a. sulfate** $(C_6H_5NH_2)_2.H_2SO_4$ = 294.1. White crystals; soluble in water or alcohol; used as a stimulant in epilepsy and chorea. **a. sulfonic acid. o-** Orthanilic acid. **m-** Metanilic acid. **p-** Sulfanilic acid. **a. tribromide.** Tribromoaniline. **a. yellow.** (1) Spirit yellow, amidoazobenzene hydrochloride. Steel-blue needles soluble in water and used for coloring lacquers. (2) The dye uranine yellow II.

anilino. The monovalent radical PhNH— or C_6H_5NH—, derived from aniline.

anilipyrine. A compound of acetanilide and antipyrine. Colorless crystals, m.75, soluble in water; used as an antipyretic and antineuralgic.

anilism. A form of poisoning produced by aniline vapors. The term now also includes cyanotic T.N.T. poisoning.

aniluvitonic acid. $C_{11}H_9O_2N$ = 187.08. Methylcinchoninic acid. Colorless crystals, m.241.

animal. A living organism, capable of locomotion and requiring organic food. Animal metabolism is analytic, destructive or energy-releasing, whilst that of plants is synthetic, constructive or energy-binding. **a. alkaloids.** A group of basic, organic compounds which are formed by the decomposition of animal matter; see *leucomaine, ptomaine.* **a. charcoal.** See *charcoal.* **a. dyes.** A coloring matter derived from the

Secretions

Animal	*Drug*
Astacus flaviatus	crab stones
Acipenser (sturgeon)	isinglass
Physeter (whale)	ambergris, spermaceti
Gadus morrhua (codfish)	cod liver oil
Apis (bee)	honey, bees' wax
Moschus (musk deer)	musk
Bos taurus (ox)	ox gall
Bos taurus (cow)	cows' milk, milk sugar
Ovis aries (sheep)	mutton suet, adrenal extract, lanolin
Sus scrofa (hog)	lard, pepsin, pancreatin
Castor fiber (beaver)	castoreum
Viverra zibetha	civet

Structural tissues

Spongia officinalis	sponge
Oculina virginea	coral
Ostrea species	oyster shell
Sepia officinalis	cuttlefish bone

animal world; as cochineal, kermes, Indian yellow, and sepia. **a. fibres.** A textile fiber derived from animals; as silk or wool. **a. holder.** A block of metal or wood with a cylindrical iron screen for holding small animals during injection. **a. oil.** (1) A fat or oil of animal origin. (2) Bone oil. **a. poisons.** A toxic substance of animal origin; as the animal alkaloids or the toxins from bees, wasps, hornets, toads, or snakes. **a. products.** A group of drugs or substances derived from animal species; *e.g.*, **a. secretions.** Animal products. **a. starch.** Glycogen. **a. tissues.** See *animal* products.

animalcule. A protozoon or microscopically small animal occurring in ponds or stagnant water. Cf. *ameba, paramecia.*

anime. *Animi* resin.

animi resin. A fossil copal from Zanzibar, Madagascar and the East Coast of Africa, used for varnishes and lacquers.

animikite. A native silver antimonide, Ag_9Sb, occurring in the Lake Superior region.

aninsulin. An antigenic, non-hypoglycemic substance made by heating insulin with formaldehyde.

anion. The negatively charged atom or radical liberated at the anode during electrolysis; as, Cl^-, NO_3^-, SO_4^{--}. Cf. *cation.*

anionotropy. A case of *ionotropy*, q.v., in which a OH^- or X^- group breaks off from a molecule and leaves a positive ion in a state of dynamic equilibrium. Cf. *prototropy.*

anisacetone. $C_{10}H_{12}O_6$ = 164.09. *p*-Methoxyphenylacetone, $MeO.C_6H_4CH_2COMe$. A constituent of anise oil.

anisal. Anisylidene. The divalent radical $MeO.C_6H_4.CH=$, derived from anisaldehyde.

anisalcohol. $C_8H_{10}O_2$ = 138.1. Anisyl-alcohol, p-methoxy-benzalcohol, $MeO.C_6H_4.CH_2OH$. Colorless needles, d.1.113, m.45, b.259; insoluble in water, but soluble in alcohol or ether.

anisaldehyde. $C_8H_8O_2$ = 136.1. Anisyl aldehyde, p-methoxy-benzaldehyde, para-anisic aldehyde, aubepine, $MeO.C_6H_4.CHO$. A colorless liquid, d.1.126, m. −2, b.245; sparingly soluble in water, but miscible with alcohol or ether. It occurs in Tahiti vanilla, and is used in perfumery. **3-hydroxy-** Isovanillin. **ortho-** o-Methoxybenzaldehyde.

anisaldoxime. $C_8H_9O_2N$ = 151.1. p-Methoxybenzaldoxime, $MeO.C_6H_4.CH:NOH$. *α*- Colorless crystals, m.64. *β*- Colorless crystals, m.133.

anisate. Any salt of anisic acid, or a compound of the type $MeO.C_6H_4.COOM$.

anise. Aniseed, anise fruit. The dried ripe fruit of *Pimpinella anisum*, an Umbelliferae. It is used as a condiment, and medicinally as an expectorant and aromatic carminative. **star-** The seeds of *Illicium verum*, a magnoliaceous tree, the source of anise oil.

a. bark oil. An essential oil from the bark of a Madagascar tree. A light-yellow oil of spicy taste, d.0.969; soluble in alcohol, ether, chloroform or benzene. Its chief constituent is methyl-chavicol. **a. camphor.** Anethol **a. fruit.** Anise. **a. oil.** The essential oil from the seeds of *Pimpinella anisum*, an Umbelliferae. A pale-yellow liquid or colorless crystalline masses of characteristic odor and aromatic, sweet taste, d.0.978–988, m.15, b.210; soluble in alcohol. Used as a flavoring agent, and medicinally as an aromatic carminative. Its constituents are anethol and methyl-chavicol. ***star-*** Illicium oil. An essential oil from the

seeds of *Illicium verum*, an evergreen magnolaceous tree. A colorless liquid, d.0.980–0.990, m.14–18; soluble in alcohol. It is used as a flavoring similar to a. oil, and contains anethol and methyl chavicol. **a. seed oil.** Anise oil. **a. water.** Aqua anisi. A saturated solution of a. oil in distilled water.

anisic acid. $C_8H_8O_3$ = 152.1. p-Methoxy-benzoic acid, umbellic acid, draconic acid, methyl-p-oxybenzoic acid, $MeO.C_6H_4.COOH$. Colorless monoclinic crystals, d.1.364, m.184, b.275; slightly soluble in water, soluble in alcohol or ether; used as an antiseptic and antipyretic. **4-hydroxy-** Vanillic acid. **hydroxymethyl-** Everninic acid. **3-methoxy-** Veratric acid.

a. alcohol. Anisalcohol. **a. aldehyde.** Ansaldehyde.

anisidine. C_7H_9ON = 123.1. Methoxy-aniline, aminophenolmethyl ether, $NH_2C_6H_4OMe$, methoxy-aminobenzene, methyloxyaniline. **o- ortho-** A brown oily liquid, d.1.098, m.6, b.224; slightly soluble in water. **m- meta-** A volatile liquid, b.251. **p- para-** Colorless needles, d.1.071, m.58, b.245; soluble in alcohol. **acet-** Methacetin. **di-** Dianisidine.

anisil. $C_{16}H_{14}O_4$ = 270.1. Bianisaldehyde, p,p'-dimethoxybenzil, dianisoyl, $MeOC_6H_4CO.COC_6H_4OMe$. Colorless crystals, m.133.

anisoin. $C_{16}H_{16}O_4$ = 272.1. Dimethoxybenzoin. The compound $MeOC_6H_4CO.CHOH.C_6H_4OMe$.

anisole. C_7H_8O = 108.1. Methoxybenzene*, methylphenyl ether, methylphenate, MeOPh. A colorless liquid, d.0.988, m. −38, b.155; insoluble in water, soluble in alcohol or ether. It is used in perfumery and to kill lice. **acetamido-** Acetaniside. ***p*-allyl-** Estragole. **amino-** Anisidine. **azoxy-** Azoxyanisole. **bromo-** $Br-C_6H_4OMe$ = 186.97. Bromomethoxybenzene*, bromophenylmethyl ether. **o-** or **1.2-** An oily liquid, d.1.573, b.222. **p-** or **1.4-** Colorless crystals, d.1.494, m.11, b.215. **dinitro-** $(NO_2)_2-C_6H_4OMe$ = 198.06. Dinitromethoxybenzene, *2.4*-dinitrophenylmethyl ether. Yellow leaflets, m.89. **hydroxy-** Guaiacol. **iodo-** Iodanisole. **methoxy-** Veratrole. **nitro-** Nitroanisole. **propenyl-** Anethole. **trinitro-** $C_7H_5N_3O_7$ = 243.06. Methyl picrate, methoxypicric acid, $(NO_2)_3-C_6H_4OMe$. Yellow crystals, d.1.408, m.68.4, insoluble in water; used as explosive. **vinyl-** $C_9H_{10}O$ = 134.08. Methoxystyrene, $CH_2:CH.-C_6H_4.OMe$. **o-** or **1.2-** Colorless liquid, d.1.0095, b.195. **m-** or **1.3-** An oily liquid b.90. **p-** or **1.4-** Colorless liquid, b.204, insoluble in water.

anisomeric. Not isomeric.

anisonitrile. C_8H_7ON = 133.06. Methoxybenzonitrile. $MeO.C_6H_4.CN$. **1.4-** or **p-.** Colorless crystals, m.60, b.256.

anisotonic. Not isotonic.

anisotropic. (1) Having different physical properties in different directions, as crystals. (2) A doubly-refractive substance is anisotropic. When viewed through a Nicol prism it shows prominent crosses, indicating that it has more than one index of refraction and therefore, is not optically homogeneous. Antonym: isotropic. **a. liquid.** *Liquid* crystal.

anisoyl. The monovalent radical $MeO.C_6H_4.CO—$, derived from anisic acid. **di-** Anisil. **a. chloride.** $C_8H_7O_2Cl$ = 170.6. Anisyl chloride, *p*-methoxybenzoyl chloride. The compound $MeO.C_6H_4.COCl$. Small colorless needles, m.26; insoluble in water or alcohol, and soluble in ether.

anisum. Anise.

anisyl. The monovalent radical $MeO.C_6H_4—$, derived from methoxybenzene or anethole. There are three isomeric forms; as, ortho- (-guaiacyl), meta-, and para-. **a. alcohol.** Anisalcohol. **a. amine.** Anisidine. **a. chloride.** Anisoyl chloride.

anisylidene. Anisal.

anitin. Anytin.

anitol. Anytol.

ankerite. A native carbonate of calcium, magnesium, iron, and manganese. $(CaMgFeMn)CO_3$.

annabergite. Nickel-bloom, nickel ocher. A native nickelous arsenate, $Ni_3As_2O_8.8H_2O$, which occurs in green, monoclinic crystals in Nevada.

annatto. Annotto, annotta, arnotta, orleana, roucou. The orange coloring matter from the pulp of the seeds in the fruits of the evergreen *Bixa orellana*, a Bixaceae. The active principle is supposed to be bixin. It is used for coloring cheese, cream and milk, and as a dyestuff for silk, wool and cotton. It is often adulterated with flour, chalk, soap, etc.

anneal. To temper by heating.

annealing. The tempering of glass or metals by heating then cooling, thus rendering them less brittle. See *tempering*. **a. color.** The tints of steel during annealing. **a. cup.** A small crucible of fine clay, used for silica fusions.

annerodite. A native uranium and yttrium columbate occurring in black orthorhombic crystals.

annidalin. *Thymol* iodide.

annotto. Annatto.

annular. A ring-shaped enclosed space.

anode. (1) Posode. The positive pole or electrode of a battery, vacuum tube, or electrolysing circuit. Usually made of carbon or platinum, according to the purpose for which it is to be used. **carbon-** A rod-shaped electrode for batteries or electrolytic cells. **platinum-** (1) A spiral shaped electrode for electrolysis. (2) A platinum wire fused in the glass of a vacuum tube.

anodic. Pertaining to the anode. **a. oxidation.** The protecting of metals, as aluminum, against corrosion by producing a thin film of oxide on the surface by making them the anode in a chromic acid bath.

anodyne. A drug which relieves pain; as, opium, belladonna or bromides.

anodynin. Antipyrine.

anodynon. Ethyl chloride.

anogen. Mercurous iodobenzene-p-sulfonate.

anol. $C_9H_{10}O$ = 134.08. Propenyl phenol(**para**), $MeCH:CH.C_6H_4.OH$. A crystalline solid, m.-98, b.250 (decomp.); a constituent of essential oils.

anolyte. The liquid in the immediate neighborhood of the anode during electrolysis. Cf. *catholyte*.

anomaly. An abnormal or irregular type or form.

anomite. A variety of the mineral, biotite, containing lithium.

anonaceine. An alkaloid from *Hylopeia aethiopica* an Anonaceae.

anorganic. Inorganic.

anorthic. Triclinic.

anorthite. $CaAl_2Si_2O_8$. A white, grayish or reddish triclinic feldspar. **sodium-** a. containing albite. Cf. *silica, anemonsite*.

anorthoclase. A triclinic sodium-potassium feldspar.

anorthosite. An igneous gabbro rock composed mainly of feldspar.

anoxemia. A pathological condition characterized by the lack of oxygen in the blood, as mountain sickness, balloon sickness.

anoxyscope. A glass apparatus for demonstrating the necessity for oxygen for plant growth.

Anschütz thermometers. A German make of standard thermometers.

anserine. $C_{10}H_{16}O_3N_4$ = 240.14. N-β-alanyl-1-methylhistidine. A dipeptide found in the muscles of birds, reptiles and fishes, m.238; a homolog of carnosine.

ant oil. Furfural.

antacid. A drug which neutralizes acids or relieves acidity; *e.g.*, lime water, milk of magnesia, carbonates.

antacidin. Calcium saccharate.

antagonism. Counter-action or opposition. **biological-** The inhibition of the toxic effect of certain substances by the action of other substances; *e.g.*, certain ions.

antagonist. Physiological *antidote.*

antagonistic. A drug which counteracts the physiological effect of another drug.

antalkaline. A drug which neutralizes alkalis or relieves alkalinity; *e.g.*, acetic acid, weak hydrochloric acid.

anthranthrene. $C_{28}H_{16}$ = 328.11. A group of hexacyclic hydrocarbons consisting of two fused anthracene rings.

anthelmintic. Helminthic. A drug which causes the expulsion of intestinal worms. Cf. *vermicide.*

anthemane. $C_{18}H_{38}$ = 254.4. Octodecane, a paraffin found in chamomile flowers.

anthemene. $C_{18}H_{36}$ = 252.4. Octadecylene. A hydrocarbon, d.0.791, m.18, b.179, from *anthemis*, q.v.

anthemidine. An alkaloid from mayweed (*Anthemis cotula*); used as an antispasmodic.

anthemis. Roman chamomile or ground apple. The flower heads of *Anthemis nobilis*, (Compositae). Used medicinally in the form of a fluid extract as a tonic and antispasmodic.

anthemol. $C_{10}H_{16}O$ = 152.1. Chamomile camphor. A constituent of anthemis.

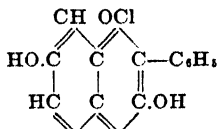
anther. The pollen-bearing part of a flower.

antheraxanthin. $C_{20}H_{28}O_3$(?). A carotenoid (q.v.), m.211, from the anthers of *Lilium tigrinum*, a Liliaceae.

anthion. Potassium persulfate.

antho- a prefix derived from the Greek "flower"; it indicates a relationship to flowers.

anthocyanidins. Vegetable principles occurring in the red, blue and purple coloring matter of flowers. They are derivatives of 3, 5, 7-trihydroxyflavylium chloride:



by the substitution of hydroxyl groups in the phenyl radical; thus:

—C_6H_4OH	Pelargonidin chloride
—$C_6H_3(OH)_2$	Cyanidin chloride
—$C_6H_2(OH)_3$	Delphinidin chloride.

Cf. *flavones.*

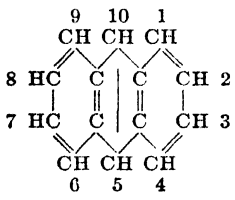
anthocyanins. Glucosides comprising the soluble coloring matter of blue, red and violet flowers; as, cyanin, delphinin, pelargonin, rutin. Cf. *flavylium.*

anthocyans. A group of red, blue and violet coloring materials of plants.

anthophyllite. $MgFe(SiO_3)$. A brownish-gray, orthorhombic amphibole.

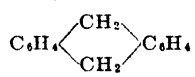
anthoxanthins. A group of glucosides comprising the coloring matter of yellow flowers; as, quercetin, lotusin, luteolin; they yield either flavone or xanthone derivatives on hydrolysis.

anthracene. $C_{14}H_{10}$ = 178.15. Anthracin, p-naphthalene, anthracene oil. A hydrocarbon

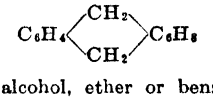


Another numbering is:
5- is *10-* or γ or *ms-*
6- is *5-* or α
7- is *6-* or β
8- is *7-* or β
9- is *8-* or α
10- is *9-* or γ or *ms-*

from coal tar distillation. Colorless, blue fluorescent needles, d.1.147, m.216.5, b.351; insoluble in water, soluble in benzene, alcohol or ether. Used in the manufacture of alizarin dyes. Anthracene oil of commercial grade contains also carbazole and phenanthrene. **amino-** Anthramine. **diamino-** Anthradiamine. **dibromo*-** $C_6H_4.C_2Br_2C_6H_4$ = 335.97. *9.10-* or *ms-* Yellow crystals, m.221; insoluble in water, sparingly soluble in alcohol or ether, soluble in chloroform. **dichloro*-** $C_6H_4.C_2Cl_2.C_6H_4$ = 247.05. *9.10-* or *ms-* Yellow needles, m.209; insoluble in water, soluble in benzene, sparingly soluble in alcohol or ether. **dihydro*-** $C_6H_4(CH_2)_2C_6H_4$ = 180.17. Hydroanthracene, diphenylene dimethylene. Colorless triclinic cry-

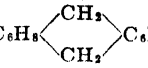


stals, m.108.5, b.313; insoluble in water and soluble in alcohol or ether. **dihydrodiketo-** Anthraquinone. **dihydroketo-** Anthranone. **dihydroxy-** See *anthradiol, rufol, flavol, chrysazol.* **dimethyl-** $C_{14}H_8(CH_3)_2$ = 206.20. **2.3-** Colorless leaflets, m.246; soluble in benzene. **2.4-** Colorless needles, m.71; soluble in ether or benzene. **ethyl*-** $C_{16}H_{14}$ = 206.11. *9-* or *ms-* Colorless leaflets, d.1.041, m.59, insoluble in water. **hexahydro-** $C_{14}H_{16}$ = 184.20. Colorless leaflets, m.63, b.290; insoluble in water,



soluble in alcohol, ether or benzene. **hydro-** Dihydro-. **hydroxy-** See *anthranol, anthrol.* **ketohydroxy-** Oxanthrol. **methyl-** $C_{14}H_9CH_3$ = 192.17. *alpha-* Colorless scales, m.200; soluble in alcohol, ether and benzene. *beta-* White crystals, m.24.5, d.1.168; slightly soluble in water, soluble in alcohol or ether. **nitro-** $C_{14}H_9NO_2$ = 223.15. α-Nitrosoanthrone. Yellow needles, m.146; insoluble in water and alcohol, soluble in benzene or carbon disulfide. **peri-** Chrysazol. **tetradecahydro-** a. perhydride. **tetrahydroxy-** Anthratetrol. **trihydroxy-** See anthratriol, *anthrarobin.*

a. blue. Alizarin blue. **a. carbinol.** Anthryl carbinol, $C_{14}H_9.CH_2OH$. **a. carboxylic**

acid. Anthroic acid. **a. diol.*** Anthradiol. **a. dione.** Anthraquinone. **a. oil.** A product of coal tar distillation (above 270°C) containing a. with carbazole, phenanthrene, etc. **a. perhydride.** $C_{14}H_{24}$ = 192.2. Saturated anthracene.  Colorless needles, m.88, b.270; soluble in alcohol. **a. sulfonic acid.** Anthraquinone sulfonic acid. **a. tetrol.** Anthratetrol. **a. tetrone.** Anthradiquinone. A group of ketone derivatives containing four oxygen atoms attached to the a. ring; there are 1, 4, 9, 10- and 1, 4, 5, 9-. **a. triol.** Anthratriol. **a. violet.** Gallein.

anthracenol. Anthrol.

anthracenone. Anthrone.

anthrachrysone. $C_{14}H_8O_6$ = 272.13. Anthraquinone-1.3.5.7-tetrol, 1.3.5.7-tetrahydroxyanthraquinone, anthrachrysazin. Orange red crystals, m.360; insoluble in water or ether, but soluble in alcohol.

anthracine. (1) A ptomaine produced by the anthrax bacillus. (2) Anthracene. Cf. *anthrazine.*

anthracite. Stone coal. A bright, lustrous, hard, brittle, mineral coal, q.v., containing 2–8 % of volatile carbon on a mineral-free basis; d.1.3–1.8. In a. the mineralization of wood has been carried a stage farther than in coal. **meta-** Contains less than 2 % of volatiles. **semi-** Contains 8–14 % of volatiles.

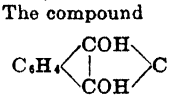
anthracometer. A device for determining the amount of CO_2 in gas mixtures.

anthraconite. Stinkstone. An earthy amorphous form of calcium carbonate containing bituminous matter.

anthracyl. The monovalent $C_{14}H_7$—radical derived from anthracene. There are the three isomers: α-, β-, and γ-.

anthradiamine. $C_{14}H_{12}N_2$ = 208.11. Anthracenediamine*, $C_{14}H_8(NH_2)_2$. Pale yellow needles, m.160.

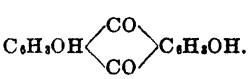
anthradiol. $C_{14}H_{10}O_2$ = 210 15. Anthrahydroquinone, anthra-quinol, oxanthranol, *9.10*-anthracenediol*, 5.10- or *9.10*-dihydroxyanthracene. The compound



Yellowish needles, m.180, insoluble in water. 1.6- or *1.5*- Rufol. 1.9- or *1.8*- Chrysazol. *2.6*- Flavol. **1.2-** *1.2*-Anthracenediol*. Green leaflets, m.160

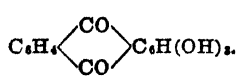
anthradiquinone. Anthracene tetrone.

anthraflavic acid. $C_{14}H_8O_4$ = 240.13. *2.6*- or 2.7-dihydroxyanthraquinone.



Yellow needles, m.330; insoluble in water or ether. **iso-** See *isoanthraflavic* acid.

anthragallol. $C_{14}H_8O_5$ = 256.03. 1.2.3-trihydroxanthraquinone, alizarin brown.



Brown needles, m.310; soluble in alcohol or ether, and in alkalis (green color). Used as a dye, and in the manufacture of dyes.

anthraglucorhein. A glucoside from *Rheum* species. It is a brown powder, soluble in alcohol, used as a cathartic.

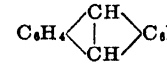
anthraglucosagradin. A glucoside from *Cascara sagrada.* A brown powder, soluble in alcohol, used medicinally as a cathartic.

anthraglucosennin. A glucoside from *Cassia angustifolia.* A dark-brown powder, soluble in alcohol; used as a cathartic.

anthrahydroquinone. Anthradiol.

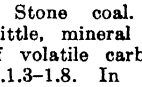
anthraldehyde. $C_{14}H_9.CHO$ = 208.08.

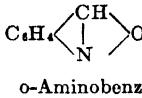
anthramine. $C_{14}H_{11}N$ = 193.17. Aminoanthracene, anthrylamine,



β- or **2-** Yellow needles, m.237; sparingly soluble in water, readily soluble in alcohol or ether. *γ*- or **5-** or **ms-** Yellow crystals, m.146; soluble in alcohol. Used in the manufacture of dyes.

anthranil. C_7H_5ON = 119.09. Anthroxan, o-aminobenzoic acid lactam, anthranilic acid lactam, benzo-*ψ*-oxazole, *β,γ*-benzisoxazole.

 Colorless crystals or liquid, d.1.189, m.18, b.210; slightly soluble in alcohol, soluble in alkalis. **iso-** i-o-aminobenzoic acid lactam.

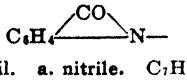


a. aldehyde. o-Aminobenzaldehyde. **a. carbonic acid.** Isatoic acid.

anthranilate. A salt of anthranilic acid, $NH_2.C_6H_4.COOM$.

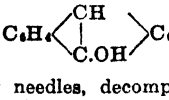
anthranilic acid. $C_7H_7O_2N$ = 137.1. o-Aminobenzoic acid, $NH_2.C_6H_4.COOH$. Yellow crystals, m.144; soluble in water, alcohol or ether, used in the manufacture of dyes and perfumes. Cf. *anthranoyl.* ***N*-carboxy-** Isatoic acid. **dinitro-** See *chrysalic* acid, *chrysanisic* acid. **a. di-*n*-propylaniline.** An indicator changing at pH 5.5 from red (acid) to yellow (basic). **oxalyl-** Kynuric acid.

anthranilo. The monovalent radical

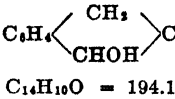


from anthranil. **a. nitrile.** $C_7H_6N_2$ = 118.08. *o*-Aminophenylcyanide, o-aminobenzonitrile, $NH_2.C_6H_4.CN$. Yellowish prisms, m.50, b.264.

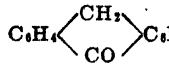
anthranol. $C_{14}H_{10}O$ = 194.15. *9*-Hydroxyanthracene*, *γ*-hydroxyanthracene, 5-anthrol, ms-oxyanthracene.



Pale yellow needles, decomp. 160; soluble in ether. Cf. *anthrone.* **dioxy-** Anthrarobin. **hydro-** $C_{14}H_{12}O$ = 196.15. The compound



anthranone. $C_{14}H_{10}O$ = 194.15. Anthrone, dihydroketoanthracene. An isomer of anthranol:

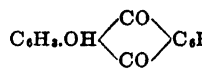


10-hydroxy- Oxanthrone. **nitroso-** Nitro-*anthracene*

anthranoyl. The monovalent radical $H_2N.C_6H_4.CO$—, from anthranilic acid.

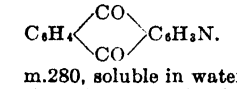
anthranylamine. Anthramine.

anthrapurpurin. $C_{14}H_8O_5$ = 256.13. *1.2.7-* or 1.2.8-trihydroxyanthraquinone.



Orange needles, m.325; slightly soluble in water or ether, soluble in alcohol. Used in the manufacture of dyes. **a. diacetate.** Purgatol.

anthrapyridine. alpha- 6.7-Benzoquinoline. **beta-** 6.7-Benzo-*i*-quinoline. **a.-quinone.** $C_{11}H_7O_2N$ = 185.1. The heterocyclic ketone

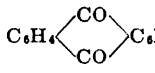


beta- Colorless crystals, m.280, soluble in water or alcohol.

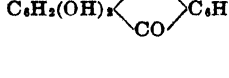
anthraquinol. Anthradiol.

anthraquinoline. $C_{17}H_{11}N$ = 229.2. Naphthoquinoline. Colorless crystals, m.170, b.446; insoluble in water, soluble in alcohol or ether.

anthraquinone. $C_{14}H_8O_2$ = 208.1. Dihydrodiketo-anthracene. The compound

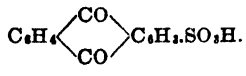


Pale yellow needles, d.1.410–1.438, m.285, b.380; insoluble in water, soluble in alcohol or ether. It is a constituent of *Cassia*, *Aloe*, *Mirabilis* and *Rumex* species, and is manufactured by oxidation of anthracene. Used in the manufacture of alizarin and other dyestuffs. **amino-** $C_{14}H_7O_2NH_2$ = 223.15. Anthraquinoylamine. **1-** or *α-*. Red, iridescent needles, m.242; insoluble in water, soluble in alcohol or ether. Used in organic synthesis for the preparation of alizarin-blue, cyananthrol, and other dyes. **2-** or *β-*. Red needles, m.302; insoluble in water, soluble in alcohol or ether. Used in organic synthesis in the preparation of indanthrene, flavanthrene and other dyes. *2*-**amino**-*1*-**hydroxy-** $C_{14}H_9NO$ = 239.08. *β*-Alizarinamide, $NH_2.C_{14}H_6O_2.OH$. Brown needles, m.226. **bromo-** $C_{14}H_6O_2Br$ = 286.97. Yellow crystals. **1-** m.188. **2-** m.204. **chloro-** $C_{14}H_6O_2Cl$ = 242.51. Pale yellow needles, **1-** m.162. **2-** m.211, insoluble in water. **dihydroxy-** 1:2- Alizarin. 1.3- Xanthopurpurin. 1.4- Quinizarin. *1.5* or 1.6- Anthrarufin. *1.8-* or 1.9- Chrysazin. 2.3- Hystazarin. *2.6-* or 2.7- Anthraflavic acid. *2.7-* or 2.8- See Isoanthraflavic acid. **dihydroxy-methyl-** 4.6.2- Chrysophanic acid. **dioxy-** *Alizarin* blue. **hexahydroxy-** Rufigallic acid. **hydroxy-** $C_{14}H_7O_3.OH$ = 224.1. Yellow leaflets, m.302; very soluble in water, alcohol, or ether. **methyl-** $C_{14}H_7O_2Me$ = 222.2. Yellow crystals, m.177; soluble in alcohol, ether or benzene. **nitro-** $C_{14}H_7O_3.NO_2$ = 253.1. Yellow needles, m.228, insoluble in water, soluble in alcohol or ether. **pentahydroxy-** Alizarin cyanine. **tetrahydroxy-** The compounds. *1.2.-5.6-* or *rufiopin*. *1.2.5.8-* or *quinalizarin*. *1.3.5.7-* or *anthrachrysone*.



tetrahydroxy-methyl- Fisetin. **trihydroxy-** 1.-2.3.- Anthragallol. 1.2.4- See Purpurin. *1.2.-6-* or 1.2.7- Flavopurpurin. *1.2.7-* or 1.-2.8- Anthrapurpurin. **trihydroxymethyl-** See *morin* and *emodin*. **trioxy-** Trihydroxy-.

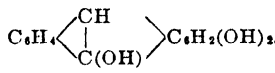
a. acridine. Naphthacridine-dione. **a. acridone.** Naphthacridine-trione. **a. aldehyde.** 5.10-dihydro-5.10-diketo-anthraldehyde. **a. methide.** 5-methylene-anthrone. **a. sulfonic acid.** *β*-acid, alizarin sulfonic acid.



An intermediate in the manufacture of alizarin. It is obtained by heating anthraquinone with conc. H_2SO_4 at 200-260°C. Cf. *silver* salt. **a. tetrol.** Tetrahydroxy a. **a. triol.** Trihydroxy a.

anthraquinonic acid. Alizarin.

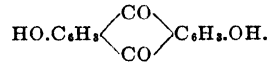
anthrarobin. $C_{14}H_{10}O_3$ = 226.1. Dioxyanthranol, 2.3.9-anthratriol, 2, 3, 9-trioxyanthracene, leuko-alizarin, desoxyalizarin,



A yellowish, granular powder; insoluble in water, soluble in hot alcohol. Used in the treatment of skin diseases, and as a substitute for chrysarobin.

anthrarobinate. A salt of anthrarobin.

anthrarufin. $C_{14}H_8O_4$ = 240.1. *1.5-* or 1.6-dihydroxyanthraquinone,

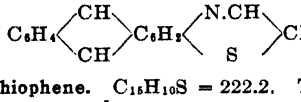


Yellow leaflets, m.280; soluble in water or benzene.

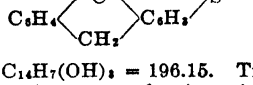
anthrasol. A colorless coal tar which is used medicinally in ointments.

anthratetrol. $C_{14}H_6(OH)_4$ = 242.15. Tetrahydroxyanthracene. A group of tetraatomic hydroxy derivatives of anthracene.

anthrathiazine. $C_{16}H_{11}NS$ = 249.2.



anthrathiophene. $C_{16}H_{10}S$ = 222.2. The heterocyclic compound

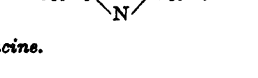


anthratriol. $C_{14}H_7(OH)_3$ = 196.15. Trihydroxyanthracene. A group of triatomic hydroxy derivatives of anthracene; as, anthrarobin.

anthraxolite. A metamorphic coal resembling anthracite. It is the end-product in the metamorphosis of petroleum.

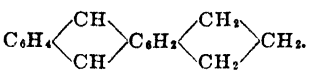
anthraxylon. A layer formation in coal of botanical origin. See vitrain (*coal*).

anthrazine. $C_{28}H_{16}N_2$ = 380.2. Anthracene diazine. The compound

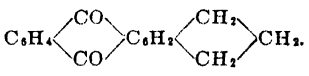


Cf. *anthracine*.

anthrindan. $C_{17}H_{14}$ = 218.2. The aromatic hydrocarbon



anthrindandione. $C_{17}H_{12}O_2$ = 248.2. The quinone of anthrindan, which corresponds with anthraquinone:

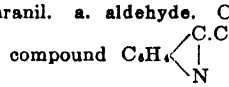


anthroic acid. $C_{15}H_{10}O_2$ = 226.16. Anthracene carboxylic acid*. $C_{15}H_{10}O_2$ = 226.16. The compound $C_{14}H_9.COOH$. **α-** or **1-** Yellow needles, m.260 (sublimes), insoluble in water, soluble in alcohol or ether. **β-** or **2-** Small yellow leaflets, m.280 (sublimes); insoluble in water, soluble in alcohol or ether. **γ-** or **5-** Yellow needles, decomp. 206; soluble in water or alcohol. These acids are used in organic synthesis and in the manufacture of dyes.

anthrol. $C_{14}H_{10}O$ = 194.15. Hydroxy-anthracene. **1-** Colorless needles, m.153. **3-** or **2-** Colorless needles decomp. 200; soluble in alcohol, ether, or acetone. **γ-** or **5-** (or **9-**). Anthranol.

anthrone. Anthranone.

anthroxan. Anthranil. **a. aldehyde.** $C_8H_5O_2N$ = 147.1. The compound



Colorless crystals m.72. Cf. *anthranilaldehyde.*

anthryl. The monovalent radicals $C_{14}H_9$—, derived from anthracene. There are five isomers. **a. amine.** Anthramine. **a. carbinol.** Anthracenecarbinol.

anthrylene. The divalent radicals —$C_{14}H_8$—, derived from anthracene. There are eleven isomers.

anti. A prefix derived from the Greek indicating (1) against or opposed, (2) antiposition. **a. position.** Opposite to the *syn*-position, q.v. Cf. *stereoisomerism.*

antiabrin. A substance formed in the blood after the injection of abrin.

antiagglutinin. A substance of the blood which prevents agglutination.

antiaggressin. A substance ormed in t he body counteracting the action of aggressins.

antialbumid. A decomposition product of albumin formed during gastric and pancreatic digestion.

antialbuminate. Antialbumate, parapeptone. An incompletely digested albumin. Cf. *syntonin.*

antialexin. A substance in the blood opposing the action of alexin.

antiamboceptor. A substance given off by protoplasm in order to combine with the cytophilic group of an amboceptor. Cf. *Ehrlich* side-chain theory.

antianaphylactin. A substance counteracting anaphylactin. Cf. allergen.

antiantibody. A substance formed in the blood of an organism after the injection of an antibody. Cf. *antiimmune.*

antiantidote. A substance which opposes the action of an antidote.

antiantienzyme. A substance which opposes the action of an antienzyme.

antiar. The milky juice of the upas (Javanese) or ipoh (Malayan) tree, *Antiaris toxicaria*, found in Malacca and Java, and used as an arrow poison.

antiarin. (1) $C_{14}H_{20}O_5$ = 268.16. A glucoside of antiar. It is a muscle poison and the active constituent of an arrow poison used by East Indian tribes. (2) $C_{14}H_{20}O_5.2H_2O$ = 304.2. The active principle of antiar.

antiarthrin. A condensation-product of gallic acid and saligenin. A brown powder, soluble in alcohol and alkalis, and used in uric acid diathesis.

antiarthritic. A drug that prevents or relieves arthritis; as, atophan, colchicum. Cf. *antipodagric.*

antiasthmatic. A drug relieving asthma; *e.g.*, atropine, chloroform, morphine, papaverine.

antibacterial. A substance which checks the growth of bacteria. Cf. *antiseptic, antimycotic, disinfectant.*

antiberberin. A black liquid prepared from rice and used to treat beri-beri.

antiberiberi. Is vitamin B.

antibilious. A drug that relieves a bilious condition.

antibiotic. (1) A substance destructive to life; a poison. (2) A naturally-produced, chemical inhibitor of the growth of organisms (e.g., *penicillin*).

antiblennorrhagic. A drug used in preventing or treating gonorrhea; *e.g.*, methylene blue, potassium permanganate, silver salts.

antibody. A substance in the body fluids of animals, which is formed after an injection and counteracts the effects of the injected substance. Antibodies consist of agglutinins, amboceptors, antienzymes, antitoxins, bacteriolysins, cytolysins, hemolysins, opsonins and precipitins, (see *Ehrlich's* theory).

anticachectic. A drug used in the treatment of malnutrition.

anticatalase. A substance opposing the action of a catalase.

anticatalyzer. A substance that inhibits the action of a catalyst.

anticatarrhals. Any drug subduing the inflammation of mucous membranes (bladder, bronchis, nose).

anticathode. Target. An electrode in a vacuum tube placed in such a position relative to the cathode that the rays from the latter impinge on or are reflected from it. See vacuum *tubes, X-ray* tube.

antichlor. A chemical used to remove Cl after bleaching; as, $Na_2S_2O_3$.

anticholerin. A substance derived from cultures of cholera bacillus and used in the treatment of cholera.

anticoagulin. A substance that prevents the coagulation of blood or milk.

anticol. A colloidal antimony solution used as parasiticide.

anticomplement. A substance formed by using cells to combine with the haptophore group of the complement. See *Ehrlich* side-chain theory.

anticrotin. The antitoxin of crotonallin.

anticytolisis. *Complement* fixation.

anticytotoxin. A substance opposing the action of cytotoxins.

antidiabetic. A drug used in the treatment of diabetes.

antidimmer. A preparation which prevents moisture from accumulating on glass.

antidolorin. A proprietary brand of ethyl chloride.

antidote. An agent counteracting or neutralizing the action of a poison on an organism. **chemical-** A substance which precipitates or alters the poison; as, oils, soaps, white of egg, iron salts, etc. **mechanical-** A means of removing the poison from the system; *e.g.*, stomach pump. **physiological-** A drug which counteracts the poison by having an opposite effect. **universal-** (1) A solution of 2 pts. magnesia and 1 pt. iron sulfate in water. (2) A mixture of 2 pts. charcoal, 1 pt. magnesium oxide and 1 pt. tannic acid in water. A tablespoon-full is given for an unknown poison.

antidysenteric. A drug which checks or prevents diarrhea; *e.g.*, bismuth salts, emetin, tannin.

antiemetic. A drug which prevents vomiting; *e.g.*, bismuth subnitrate, cerium oxalate.

antienzyme. Any substance that inhibits the actions of enzymes.

antierrhine. A drug which diminishes nasal discharges.

antifebrin. A proprietary brand of acetanilide.

antiformin. Hychlorite. A strongly alkaline solution of sodium hypochlorite, used as a disinfectant and in bacteriology.

antifreeze. Any substance which is added to the radiator water of automobiles or aeroplanes to prevent freezing, without injuring the metal parts or deteriorating after continued use, *e.g.*, alcohol or ethylene glycol.

antifriction alloy. An alloy used for bearings to reduce the friction of an axle.

antifungin. Magnesium borate; used as a gargle in diphtheria.

antigalactic. A drug that diminishes the secretion of milk; *e.g.*, atropine, camphor.

antigen. A substance which, when injected into an organism, causes the formation of antibodies. Antigens are either (1) *toxins:* (a) bacterial (diphtheria, tetanus), (b) vegetable (ricin, abrin); (c) animal (snake, spider, toad venoms); (2) *ferments* or *enzymes* (lipase, rennin, etc.); (3) *precipitinogens* (vegetable and animal proteins); (4) *agglutinogens* (bacteria erythrocytes); (5) *opsogens* (aggresins or bacterial endotoxins); (6) *lysogens* (vegetable or animal cells). See *Ehrlich's* theory.

antiglobulin. A precipitin that coagulates globulin.

antiglyoxalase. A substance which counteracts the action of glyoxalase.

antihemolysin. A substance which opposes the effect of a hemolysin.

antihemolytic. An agent that prevents hemolysis.

antihidrotic. Anhidrotic.

antihypo. Potassium percarbonate, used in photography.

antiimmune. A substance or agent that prevents immunity; *e.g.*, an anti-antibody.

antikinase. A substance which opposes the action of kinase.

antiknock. An agent that prevents *knock*, q.v., in the internal combustion engine; *e.g.*, lead tetraethyl.

antilab. Antirennin.

antilactase. An enzyme that counteracts the action of lactase.

antilipase. A substance which opposes the action of a lipase.

antilithic. A drug which prevents the formation of urinary stones; *e.g.*, colchicine, salicylates.

antiluetic. Anti-syphilitic.

antiluetin. Potassium ammonium antimonic bitartrate. $SbO(C_4H_4O_6)_2K(NH_4)_2.H_2O$; used in the treatment of syphilis.

antilysin. A substance formed in the blood of an organism which destroys the lysins of the bacteria; *e.g.*, the alexins can destroy bacteria.

antilyssic. A drug used in the treatment of rabies.

antimalarial. A drug relieving or preventing malaria; *e.g.*, quinine.

antimalum. A mixture of essential oils, chiefly camphor oil used externally for treating rheumatism.

antimellin. A glucoside from the bark of *Eugenia jambolana*, a Myrtaceae, used in treating diabetes.

antimers. Enantiomers, optical antipodes. A pair of isomers differing in structure like an object and its mirror image; they are identical in all properties, except those which can be described as right and left (+ and −), *e.g.*, hemihedral crystal form and direction of rotation of the plane of polarized light.

antimicrobin. A substance of the blood which destroys the bacteria present.

antimonate. Antimoniate, stibnate, stibiate, stibate. A salt of antimonic acids, (q.v.), viz.:

ortho-antimonate.....	M_3SbO_4
meta-.....	$M_4Sb_2O_6$ or $MSbO_3$
pyro-.....	$M_4Sb_2O_7$

antimonial glass. Antimonous sulfide. **a. lead.** Hard lead. An alloy of 15 parts of antimony and 85 parts of lead, which is resistant to sulphuric acid. **a. nickel sulfide.** Ullmannite. **a. silver.** Dyscrasite. The native silver antimonide, Ag_3Sb. **a. saffron.** Antimonous oxysulfide.

antimoniate. Antimonate.

antimonic. A compound of pentavalent antimony, $=Sb\equiv$. **a. acid.** *ortho-* H_3SbO_4 = 187.2. A white powder, d.6.6; decomp. when heated; slightly soluble in water or alcohol, soluble in acids. *meta-* $HSbO_3$ = 169.21. A white powder; sparingly soluble in water. *pyro-* $H_4Sb_2O_7$ = 356.43. A colorless powder; slightly soluble in water, soluble in alkalis. **a. chloride.** $SbCl_5$ = 295.5. Antimony pentachloride. A fuming yellowish liquid, $d_{20°}$.2.346, m.−6, $b._{30mm}$92, decomp. in water or alcohol; soluble in acids. It is a reagent for alkaloids. **a. fluoride.** SbF_5 = 215.2. Antimony pentafluoride. An oily liquid, $d_{22°}$.2.99; soluble in water. **a. oxide.** Sb_2O_5 = 320.4. Antimonic acid anhydride, antimony pentaoxide, antimony peroxide. A colorless or yellowish powder, d.3.78; insoluble in water or alcohol, and soluble in acids, bases or potassium iodide solution. **a. oxychloride.** $SbOCl_3$ = 243.28. A yellow powder decomp. when heated; insoluble in water, soluble in alcohol. **a. sulfide.** Sb_2S_5 = 400.8. Antimony pentasulfide, antimony persulfide. Orange-yellow powder, $d_{0°}$.4.120; insoluble in water, alcohol, or ether, soluble in alkalis and acids. It is a diaphoretic, emetic and expectorant.

antimonide. Stibide. A binary compound of antimony, analogous to arsenides, bismuthides, etc.

antimonii. The official Latin for "of antimony," antimonic or antimonous compounds.

antimonine. *Antimony* lactate.

antimonious. Antimonous.

antimonite. (1) A salt of antimonous acids, (q.v.); as, Na_3SbO_3. (2) Antimony glance. **sulf-** A salt of sulfantimonous acid containing the trivalent radical, $\equiv SbS_2$; as, $(NH_4)_3SbS_3$.

antimonium. Antimony.

antimonous. Stibous, stibious, stibnous, antimonious. A compound of trivalent antimony, Sb≡. **a. acid.** *ortho-* H_3SbO_3 = 171. *meta-* $HSbO_2$ = 153.21. This acid is hypothetical but forms salts. *pyro-* $H_4Sb_2O_5$ = 327.5. A white precipitate, which forms the trioxide when heated. **a. arsenate.** A mixture of a. oxide and arsenic acid, used in skin diseases. **a. arsenite.** A mixture of a. oxide and arsenous acid, used in skin diseases. **a. basic chloride.** Same as a. oxychloride. **a. bromide.** $SbBr_3$ = 361.3. Antimony tribromide. Yellow rhombic crystals, $d_{23°}$4.148, m.94.2, b.280, hydrolyzes in water, and soluble in acids, carbon disulfide, or alkalis. **a. chloride.** $SbCl_3$ = 228.3. A. trichloride, butter of antimony. White rhombic crystals, $d_{25°}$3.064, m.73.2, b.223.5; sparingly soluble in water, and soluble in alcohol, carbon disulfide, alkalis or acids. Antimony butter is a clear, acid, fuming solution, d.1.35. Used externally as a caustic, as a mordant, for manufacturing antimony salts, and for staining iron and copper articles. **a. fluoride.** SbF_3 = 178.97. Antimony trifluoride. Grayish-white octahedral crystals, d.4.379, m.292; soluble in water. It is a constituent of DeHaën's salt (q.v.); used in ceramics and as a mordant. **a. fluoride and ammonium sulfate.** DeHaën's salt. **a. hydride.** SbH_3 = 124.79. Stibine. A colorless, poisonous gas, $d._{(air=1)}$ 4.344, m. −91, b. −18; sparingly soluble in water, soluble in alcohol or carbon disulfide. **a. iodide.** SbI_3 = 502.97. Antimony triiodide. It occurs in three allotropic forms. (1) Red *hexagonal* crystals, $d_{20°}$4.848, (2) red *monoclinic* crystals, $d_{22°}$4.768, (3) yellow *rhombic* crystals, m.170.8, b.401°. It decomp. in water; soluble in alcohol, carbon disulfide, hydrochloric acid or potassium iodide solution. Used medicinally as an alterative, and externally in ointments for skin diseases. **a. nickel.** The native alloy NiSb. **a. oxalate.** $SbO.(C_2O_4)_2$ = 313.77. Antimonyl oxalate. A white powder, soluble in acids, and used as a mordant, especially as the potassium salt. **a. oxide.** Sb_2O_3 = 291.24. Antimony trioxide, antimonous acid anhydride, valentinite, antimony bloom, a. glass Sb_4O_6. Rhombic, colorless crystals, d.5.6, m.655, b.1560, insoluble in water, soluble in acids or tartaric acid. It is a powerful reducing agent; used medicinally as an expectorant and emetic. **a. oxychloride.** SbOCl = 173.47. Algaroth, mercurius vitae, basic antimony chloride. White regular crystals, insoluble in water, soluble in acids, carbon disulfide or alcohol. Used in the manufacture of tartar emetic and as an emetic and purgative. **a. oxyiodide.** SbOI = 262.8. A yellow crystalline powder, insoluble in water. **a. oxysulfide.** $Sb_2S_3.Sb_2O_3$ = 630.6. Antimony flowers, a. red. a. vermilion, antimonial saffron. A double salt of antimonous sulfide and oxide, of varying composition, containing some $SbOS_2$ (crocus metallorum). A gray-brown powder, soluble in hydrochloric acid and used in the vulcanization of rubber. **a. sulfate.** $Sb_2(SO_4)_3$ = 528.0. A white powder, soluble in acids. **a. sulfide.** Sb_2S_3 = 340.0. Antimony trisulfide. Stibnite, antimony red, black antimony sulfide. A gray-black powder or red crystals, d.4.62, m.555; insoluble in water, soluble in acids and alkali sulfide solutions. Used as a diaphoretic or alterative; as a pigment in the manufacture of safety matches, Bengal fire, torpedoes, cartridges, etc.; in enameled iron ware; and as an *opacifier*, q.v.

antimony. Sb = 121.76. Stibium. A metal of the arsenic or nitrogen family and element atomic number 51. A rhombohedric, bluish-white, brittle substance of lustrous, metallic appearance, d.6.62, m.630 b.1440; insoluble in water, dilute acids or alcohol, soluble in concentrated sulfuric acid or aqua regia. Basilius Valentinus described its preparation and properties in 1450. It is found native, but more frequently as sulfide (stibnite), and as antimonides and sulfantimonides of the heavy metals. Antimony occurs in three allotropic modifications: (a) ordinary metallic or β-antimony, Sb_1; (b) an unstable, yellow or α-antimony, Sb_4; and (c) amorphous, black antimony, Sb_2, d. 5.3, which on heating changes to the metallic modification. Antimony is tri- and penta-valent, and resembles arsenic and phosphorus in its chemical behavior; it forms the following series of compounds:

Derived from trivalent antimony—

antimonous (stibnous)	Sb^{+++}
stibines	SbR_3
antimonites	SbO_2^-
antimonyl	SbO^+

Derived from pentavalent antimony—

antimonic (stibnic)	Sb^{+++++}
stibonium	R_4SbX
meta-antimonate	SbO_3^-
ortho-antimonate	SbO_4^{---}

Antimony is used extensively as a constituent of important alloys, (Britannia metal, type metal, pewter), and in the preparation of antimony compounds, which are used in medicine and as pigments. **black-** Antimonous sulfide. **butter of-** Antimonous chloride. **flowers of-** Antimonous oxysulfide. **gray-a. glance. red-** (1) Kermesite. (2) Antimonous oxysulfide. **white-** Valentinite.

a. anhydride. See *antimonous* or *antimonic* oxide. **a. arsenide.** Allemontite. **a. ash.** See *antimony* oxides. **a. black.** Antimonous sulfide. **a. blende.** Antimony glance. **a. butter.** Antimonous chloride. **a. bloom.** Antimonous oxide. **a. chlorides.** See *antimonous-(ic)* chloride and oxychloride. **a. crocus.** An antimonous oxysulfide formed by the deflagration of equal parts of antimonous sulfide and saltpeter. **a. fluoride.** See *antimonous(ic)* fluoride. **a. flowers.** Antimonous oxysulfide. **a. glance.** Antimonite, stibnite, antimony blende, grey antimony. A native antimonous sulfide. **a. glass.** Antimonous oxide. **a. lactate** $Sb(C_3H_5O_3)_3$ = 389.97. Antimonine. Yellow crystals, soluble in water; used as a mordant in the dye industry. **a. minerals.** Antimony occurs in nature closely associated with arsenic and bismuth minerals; in addition to the antimonides and sulfantimonides of the heavy metals, it is found as:

native antimony	Sb
stibnite (a. glance)	Sb_2S_3
kermesite (q.v.)	Sb_2S_2O
senarmontite (valentinite, q.v.)	Sb_2O_3
cervantite	Sb_2O_4

Cf. *plagionite*, *antimonous* nickel. **a. mordants.** See *antimonous* fluoride, a. lactate and a. potassium tartrate. **a. needles.** Antimonous sulfide. **a. ochre.** Stibiconite. **a. oxides.** There are three oxides:

Sb_2O_3—antimony trioxide. See *antimonous* oxide.
Sb_2O_4—antimony tetroxide, q.v.
Sb_2O_5—antimony pentoxide. See *antimonic* oxide.

a. pentachloride. Antimonic chloride. **a. pentafluoride.** Antimonic fluoride. **a. pentamethyl.** $Sb(CH_3)_5$ = 197.17. Pentamethyl stibine. A colorless liquid, b.97; insoluble in water. **a. pentasulfide.** Antimonic sulfide. **a. pentoxide.** Antimonic oxide. **a. peroxide.** Antimonic oxide. **a. persulfide.** Antimonic sulfide. **a. potassium oxalate.** $SbK_3(C_2O_4)_3.6H_2O$ = 611.97. A white powder; soluble in water, and used as a mordant in the dye industry. **a. potassium tartrate.** $[SbOK(C_4H_4O_6)]_2.H_2O$ = 667.82. Tartar emetic, antimonyl potassium tartrate, tartar stibiatus. Colorless octahedral crystals, d.2.6; soluble in water or alcohol. Used medicinally as an emetic, expectorant and diaphoretic; in the dye industry as a mordant for textiles and leather; also as a reagent in qualitative analysis. **a. red.** Antimonous oxysulfide. **a. regulus.** Metallic antimony. **a. salt.** DeHaën's salt. **a. sulfate.** Antimonous sulfate. **a. sulfuret.** Antimonous sulfide. **a. sodium sulfate.** a. trifluoride sodium sulfate. $SbF_3.Na_2SO_4$. **a. sodium thioglycollate.** A white powder used as a trypanosomicide. **a. sulfide.** See *antimonous(ic)* sulfide. **a. tetroxide.** Sb_2O_4 = 307.54. Cervantite. A colorless powder, d.4.07; insoluble in water, soluble in alkalis or acids. **a. thioglycollamide.** $Sb(S.CH_2CONH_2)_3$ = 392.06. White crystals, m.139, slightly soluble in water; used as trypanosomicide. **a. tribromide.** Antimonous bromide. **a. trichloride.** Antimonous chloride. **a. triethyl.** $Sb(C_2H_5)_3$ = 209.12. Triethylstibine. A colorless liquid, $d_{15°}$.1.324, b.158.5; insoluble in water and miscible with alcohol or ether. **a. trifluoride.** Antimonous fluoride. **a. trifluoride sodium sulfate.** $SbF_3.Na_2SO_4$ = 320.8. A white crystalline solid, soluble in water. **a. trimethyl.** $Sb(CH_3)_3$ = 167.00. Trimethylstibine. A colorless liquid, $d_{15°}$.1.523, b.80.6; insoluble in water and miscible with alcohol or ether. **a. trioxide.** Antimonous oxide. **a. triphenyl.** Triphenyl *stibine*. **a. trisulfate.** Antimonous sulfate. **a. trisulfide.** Antimonous sulfide. **a. vermilion.** Antimonous oxysulfide. **a. white.** Antimonous oxide. **a. yellow.** Basic *lead* antimonate.

antimonyl. The monovalent radical, SbO—. **a. aniline tartrate.** A yellow crystalline compound used to treat trypanosomiasis. **a. compound.** A basic substance containing the antimonyl radical. **a. oxalate.** Antimonous oxalate. **a. potassium tartrate.** Antimony potassium tartrate. **a. sulfate.** $(SbO)_2SO_4$ = 375.27. A white amorphous powder. *basic*-$(SbO)_2SO_4.Sb_2(OH)_4$ = 676.89. A colorless powder.

antimosan. Potassium antimonyl pyrocatechol disulfonate. A white powder used in the treatment of schistosomiasis.

antimycotic. Antibacterial.

antinarcotic. A drug which opposes the action of narcotics.

antineuralgic. A drug used in the treatment of neuralgia; *e.g.*, acetanilide, opium, phenacetin, quinine, salicylates.

antineuritic vitamin. Vitamin B.

antinonnin. $C_6H_2(NO_2)_2CH_3ONa$. Sodium-o-dinitro cresolate. Victoria yellow. A yellow, odorless paste, used as a germicide and plant spray.

antinosin. $C_6H_2I_2ONa_2.CO.C_6H_4O$. Sodium tetraiodo phenolphthalein. Nosophen sodium. A dark blue amorphous powder; soluble in water. Used as an iodoform, antiseptic substitute, and for rendering visible the gallbladder by means of x-rays.

antioxidant. Age-resistor. A substance which retards the deterioration of rubber, such as tannic acid, hydroquinone or aniline.

antiparasite. Antiparasitic.

antiparasitic. A drug which inhibits the growth of vegetable and animal parasites.

antipepsin. A substance which prevents the action of pepsin.

antiperiodic. A drug used to treat malaria; *e.g.*, cinchona, quinine.

antiphlogistic. A drug which inhibits the progress of inflammation; *e.g.*, aconite, veratrum, mercury used internally, and glycerin used locally. **a. theory.** A theory proposed by Lavoisier which was in direct contradiction to the older phlogiston theory (q.v.).

antipodagric. A drug used in the treatment of gout; *e.g.*, colchicum, salicylates.

antipode. An antimer, q.v.

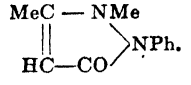
antipyonin. Sodium tetraborate.

antipyrene. Antipyrine.

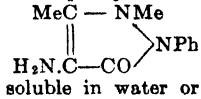
antipyretic. A drug relieving fever; as, aconite, acetanilide, antipyrine, cinchona.

antipyreticin. Resalgin.

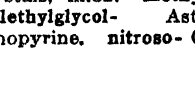
antipyrine. $C_{11}H_{12}ON_2$ = 188.17. Antipyrene, analgesine, phenazone, 2.3-dimethyl-1-phenyl-5(2)-pyrazolone, dimethyloxy-chinozine, phenyl dimethyl pyrazolone, pyrazole, anodynin, sedatine, methozan, parodyn, phenylon, oxydimethyl quinizine, dimethyloxyquinizine, pyrazin, metozine.



White leaflets or powder, $d_{20°}$.1.19, m.113; soluble in water, alcohol, or ether. It is an antipyretic, sedative, antineuralgic, antirheumatic and a reagent for nitrous and nitric acid, and for the determination of iodine number. **amido-** $C_{11}H_{13}ON_3$ = 203.2. 1.phenyl-2.3-dimethyl-4-aminopyrazolone.

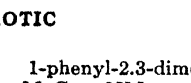


Colorless crystals, m.109; soluble in water or alcohol. **chloral-** Hypnal. **dimethylamino-** Pyramidon. **homo-** *Homo*antipyrine. **methyl-** $C_{12}N_{14}ON_2$ = 202.2. 1-phenyl-2.3.4-trimethyl pyrazolone.



Colorless crystals, m.82. **methylenedi-** Salubrol. **methylethylglycol-** Astrolin. **monobromo-** Bromopyrine. **nitroso-** $C_{11}H_{11}O_2N_3$ =

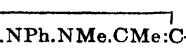
217.2. 1-phenyl-2.3-dimethyl-4-nitrosopyrazolone.



a. benzoate. Benzopyrine. **a. camphorate.** A compound of antipyrine and camphor. **a. carbolate.** Phenopyrine. **a. mandelate.** Tussol. **a. monobromide.** Bromopyrine. **a. phenate.** Phenopyrine. **a. resorcylate.** Resalgin. **a. salicylate.** Salipyrine. **a. tannate.** A compound of antipyrine and tannic acid. A yellowish powder; insoluble in water.

antipyrotic. A drug is used in the treatment of burns.

antipyryl. The monovalent radical,



derived from antipyrine.

antiquinol. Allylphenyl cinchonine ester. A yellow crystalline substance, m.30, insoluble in water, soluble in alcohol or ether; used as an antiseptic and analgesic.

antirachitic. Effective against rickets; as, cod liver oil, calciferol.

antirennin. A substance found in blood serum which prevents the enzymic action of rennin.

antirheumatic. A compound which relieves rheumatism; *e.g.*, colchicine, lithium salts and salicylates.

antirheumatin. A compound of sodium salicylate and methylene blue. Blue crystals, soluble in water and used as an antirheumatic.

antiricin. The substance which is formed in the blood of animals after the injection of ricin.

antirobin. The substance which is formed in the blood after the injection of robin.

antiscorbutic. A compound which is effective against scurvy by virtue of its ascorbic acid content; *e.g.*, lime or lemon juice.

antisepsin. C_8H_8ONBr = 213.99. Asepsin, acetanilide bromide, acetbromanilide. Colorless crystals, used as an antipyretic and antiseptic.

antiseptic. A substance that opposes sepsis, putrefaction or decay by arresting the growth of micro-organisms, either by inhibiting their activity or by destroying them; *e.g.*, alcohol, boric acid, chlorine, creosote, mercuric chloride, phenol, thymol, eucalyptol, iodoform. Cf. *disinfectant, germicide.*

antiseptin. A mixture of boric acid, zinc iodide and thymol, used as a dusting powder.

antiseptol. Cinchonine iodosulfate. A reddish powder, used as a dusting powder in skin diseases.

antispasmin. $C_{33}H_{32}O_9NNa.3NaC_7H_5O_3$. Narcein sodium salicylate. Narcein sodium and sodium salicylate. A white hygroscopic powder used as an antispasmodic, sedative, and hypnotic. Decomp. in air.

antispasmodic. A drug relieving convulsions or spasms; *e.g.*, camphor, chloroform chloral, valerian, bromides.

antisudorific. A drug that prevents excessive perspiration. Cf. *anhidrotic.*

antisyphilitic. Antiluetic. A drug used in the treatment of syphilis; *e.g.*, arsenic (cacodylates), mercury, iodides.

antitetrazin. A quinine derivative used as an antineuralgic.

antithermin. $C_{11}H_{14}O_3N_2$ = 206.2. Phenylhydrazine levulinic acid. Colorless crystals, m.108; insoluble in water and soluble in alcohol or ether. Used medicinally as an analgesic, antipyretic or antiseptic.

antithrombin. The substances of the blood which prevent coagulation.

antitode. A mixture of equal parts of magnesia, charcoal, and ferric hydroxide, used as an antidote in cases where the poison is unknown. Cf. *antidote.*

antitoxic. Antidote.

antitoxin. A protein antibody developed in the blood after the injection of a poison; a defensive protein derived from animals inoculated with a specific disease. **diphtheria-** A preparation from the blood serum of animals infected with diphtheria. **streptococcus-** A preparation from the serum of animals infected with streptococcus bacillus. **tetanus-** A preparation from the serum of animals infected with tetanus. Cf. *antigen, antibody.*

antitussin. $(C_6H_4F)_2$ = 190.1. Difluordiphenyl. Colorless crystals, m.87, used as an ointment in whooping cough.

antivenom. An antitoxin against snake venom.

antodyne. *Phenoxy* propandiol.

antozone. Mono-atomic oxygen.

anysin. Ichthyol.

anytin. Anitin. A sulfurated hydrocarbon derived from ichthyol. A brownish-black powder used as a germicide.

anytol. Anitol. A compound of anitin and aromatic phenols and alcohols. **cresol-** Metasol, meta-cresolanytol, used as a germicide, **eucalyptol-** Eucasol. Used as a germicide and disinfectant.

A.O.A.C. Association of Official Agricultural Chemists.

apa- Apo-.

apaconitine. An alkaloid derived from aconitine.

apagallin. Mercury tetraiodophenolphthalein, used as an antiseptic and indicator. Cf. *mercurochrome.*

apatite. $3Ca_3(PO_4)_2CaF_2$. A native calcium fluophosphate occurring in various colored, hexagonal crystals. Exported as fertilizer from Norway and Canada. Cf. *phosphorite, fluorapatite, osteolite, pyromorphite.*

apatropine. Apoatropine.

aperient. A laxative or mild purgative.

apertometer. See *Abbé* apertometer.

aperture. An opening into or through a body. The diameter of the open part of an objective or lens.

apex. The top, highest or farthest point of a cone, curve or orbit.

aphalerite. A native zinc sulphide, similar to wurtzite.

aphanesite. The native copper arsenate, $2CuO, As_2O_3, 4H_2O$.

aphanin. A biologically-active carotenoid from blue algae.

aphelion. (1) The position of a celestial body when farthest away from the sun, as opposed to perihelion. (2) Figuratively, the position of an electron in an elliptical orbit when farthest away from the nucleus. Cf. *apogee.*

aphicide. A substance that kills *Aphis.* Cf. *insecticide.*

aphrite. Earth foam, foamspar. A white pearl-like variety of calcite.

aphrizite. Black *tourmaline,* q.v.

aphrodine. Yohimbine.

aphrodisiac. A drug which arouses sexual desires; *e.g.*, nux vomica, phosphates, damiana.

aphrodite. $4MgO.SiO_{10}H_6$. A native basic magnesium silicate, which occurs in meerschaum-like masses.

aphrosiderite. $(Fe, Al)Si_4O_{20}.5H_2O$. Dark, olive-green, soft, hexagonal scales of an iron aluminum silicate.

aphthitalite. $NaKSO_4$. A native sodium potassium sulfate, which forms colorless, hexagonal crystals. Cf. *glaserite.*

aphthonite. A steel-gray silver ore which consists mainly of tetrahedrite.

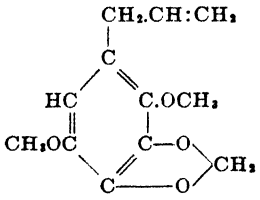
aphyl. Alkyl.

apigenin. $C_{15}H_{10}O_5$ = 270.08. 4'.5.7-trihydroxyflavone. A flavone, q.v., from many flowers and plants, e.g., parsley, and formed by hydrolysis of apiin.

apiin. $C_{27}H_{32}O_{16}$ = 612.3. A glucoside from the seeds of *Apium petroselinum.* A yellowish crystalline powder, m.228, soluble in hot water or alcohol.

apinol. $C_{10}H_{18}O$ = 154.14. Apinolum, levomenthone. A clear, amber-colored oil of pine-like odor obtained by the distillation of pine wood; d.0.946, b.182; insoluble in water, soluble in alcohol. Used as an antiseptic, germicide, and local anesthetic.

apiole. $C_{12}H_{14}O_4$ = 222.2. Parsley camphor, *2.5*-dimethoxysafrole, 2,5-dimethoxy-3,4-methenedioxy-1^2-propenylbenzene,

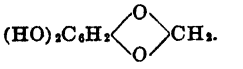


An aromatic ether occurring in the seeds of *Petroselinum* (parsley) and *Apium* (celery). Colorless, long needles of parsley odor, d.1.015, m.30, b.294; insoluble in water, soluble in alcohol. Used medicinally as an emmenagogue and antiperiodic. **iso-** Colorless crystals, d.1.197, m.56, b.304. **liquid-** The oleoresin of parsley seeds. A green oily liquid; soluble in alcohol, chloroform or ether. Used for the same purpose as apiol.

apiolic acid. $C_{10}H_{10}O_6$ = 226.08. Colorless crystals, m.175.

apionol. $C_6H_6O_4$ = 142.1. Phentetrol, v-tetrahydroxybenzene, $C_6H_2(OH)_4$. Colorless crystals, m.161. **dimethyl-** $C_6H_2(OH)_2(OMe)_2$ = 170.1. 1.2-dimethoxy-3,4-dihydroxybenzene. Colorless crystals, m.106, b.298°C; soluble in alcohol. **tetramethyl-** $C_6H_2(OMe)_4$ = 198.2. v-tetramethoxybenzene. Colorless crystals, m.81.

apionone. $C_7H_6O_4$ = 154.1. 1,2-methenedioxy-3, 4-dihydroxybenzene,



Colorless crystals m.69.

apiose. $C_5H_{10}O_5$ = 150.07. A methyl tetrose from the glucoside of celery and parsley leaves.

aplite. (1) A pink or red cobalt-silver ore from Canada. See *alaskite.* (2) A ceramic material mined in Virginia and composed chiefly of plagioclase with small amounts of microcline feldspar and sericite. Composition: $SiO_2$60, $Al_2O_3$24, CaO6, Na_2O6, K_2O3, $Fe_2O_3$0.2 %.

aplome. A yellowish green manganese garnet, q.v.

apo-, apa- A prefix derived from the Greek "from" and indicating a derived compound; as, apomorphine—derived from morphine.

apoatropine. $C_{17}H_{21}O_2N$ = 271.3. Apatropine, atropamine. An alkaloid derived from atropine by the action of nitric acid. Colorless prisms, m.61; insoluble in water, soluble in alcohol, ether, or chloroform. **a. hydrochloride.** $C_{17}H_{21}O_2N.HCl$ = 307.7. White leaflets, m.238; soluble in water, alcohol, or ether. **a. sulfate.** $(C_{17}H_{21}O_2N)_2.H_2SO_4$ = 640.5. Colorless crystals, soluble in water.

apobiotic. Decreasing vital activity.

apocamphoric acid. Campho acid.

apocholic acid. $C_{24}H_{38}O_4$ = 390.27. A dehydration product of cholic acid.

apochromatic. A lens combination in which chromatic aberration is corrected by bringing to a common focus three spectral color rays. Cf. *achromatic.*

apocodeine. $C_{18}H_{19}O_2N$ = 281.3. An alkaloid derived from codeine as a colorless, amorphous, gummy mass; sparingly soluble in water, soluble in alcohol or ether. **a. hydrochloride.** $C_{18}H_{19}O_2N.HCl$ = 317.7. A yellowish-gray, hygroscopic amorphous powder, soluble in water; used as an expectorant, sedative, hypnotic and emetic.

apocrenic acid. $C_{24}H_{12}O_{12}$ = 492.1. A brown amorphous substance derived from humus or crenic acid by oxidation, and also found in some mineral waters.

apocyanines. A group of cyanine dyes, q.v., the nitrogen rings of which are directly united; as, **erythro-** with 3:4' attachment, **xantho-** with 3:2' attachment.

Apocynaceae. The dogbane family. A group of tropical and sub-tropical plants with a milky juice that is often poisonous. There are 103 genera and 900 species of which the following yield drugs:

roots:

Apocynum cannabinum..... Canadian hemp
Apocynum androsaemifolium dogbane
Carissa schimperi..... wabain

barks:

Aspidosperma quebracho blanco.... quebracho
Alstonia constricta... Australian fever bark
Alstonia scholaris..... ditaine, chlorogenin
Holarrhena antidysenterica... conessiine, kurchi
Melouetia nitida..... guamachacine
Parameria vulneraria..... tagulaway
Plumiera species..... plumierine
Wrightia zeylanica..... conessine

leaves:

Nerium odorum..... karabin neriantin
Geissospermum species..... geissine, pereirine, velosine
Urechites suberecta..... urechitine

seeds:

Strophanthus kombe..... strophanthus strophanthine, etc.
Acocanthera venenata..... ouabain, acocantherin
Thevetia species..... thevetin, cerberin, cerberidin
Tanghinia venenifera..... tanghinine

apocynamarin. $C_{14}H_{18}O_3$ = 234.1. A glucoside from the rhizome of *Apocynum cannabinum*, or Canadian hemp. It is used as a cardiac tonic. Cf. *cynotoxin, cymarigenin.*

apocynein. An active constituent, probably a glucoside, of *Apocynum cannabinum*, Canadian hemp. White crystals soluble in alcohol. Cf. *apocynin.*

apocynin. A resinoid from *Apocynum cannabinum*, Canadian hemp, which occurs as a brown, amorphous powder and contains apocynein.

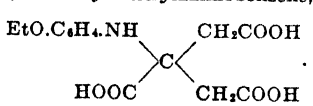
apocynoid. The combined active principles of *Apocynum cannabinum*, Canadian hemp; used medicinally as a tonic, emetic, and cathartic.

apocynum. Canadian hemp, black Indian hemp, Indian physic, dogbane. The dried rhizome and roots of *Apocynum cannabinum.* It is a heart tonic resembling digitalis and is used as a fluid extract.

apogee. (1) The point in its orbit at which the moon is farthest from the earth, as opposed to *perigee* (q.v.). (2) Analogously the point in the orbit of an electron farthest from the nucleus. Cf. *aphelion.*

Apollinaris water. A mineral water from Remage, Germany.

apolysin. $C_{14}H_{17}O_7N$ = 311.2. Phenetidin citric acid, aconityl-phenetidine, monocitryl-p-phenetidin, 1-ethoxy-4-citrylaminobenzene,



A white, crystalline powder, m.72; soluble in hot water, alcohol, glycerol or ether. Used as an antipyretic, antineuralgic and antiseptic.

apomorphine. $C_{17}H_{17}O_2N$ = 267.23. An alkaloid derived from morphine by the removal of one molecule of water. A colorless, amorphous mass becoming green on exposure to air; sparingly soluble in water, soluble in alcohol or ether. Used medicinally as an expectorant and emetic. **a. hydrochloride.** $C_{17}H_{17}O_2N.HCl$ = 303.71. Colorless or grayish monoclinic prisms, m.270; soluble in water or alcohol. Used as an hypnotic, emetic and expectorant, and also hypodermically in cases of poisoning.

apomyelin. A compound prepared from brain matter; it is a phosphatide but contains no glycerol.

apophyllite. A native, calcium potassium fluosilicate, $KCa_4H_{16}Si_8O_{28}$, occurring in white or pinkish octahedral crystals.

apopinol. Apiole.

apoquinamine. $C_{19}H_{22}ON_2$ = 294.4. An alkaloid derived from quinamine by the removal of a molecule of water.

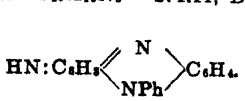
apoquinine. Homoquinine.

aporetin. A resin from the roots of rhubarb. A grayish-brown powder, insoluble in ether, but soluble in alkalis producing a dark-brown color.

aporphine. $C_{17}H_{17}N$ = 235.12. A derivative of morphine.

aporrhegma. The fragments of the aminoacids formed in the cells during the life of a plant or animal.

aposafranine. $C_{18}H_{13}N_3$ = 271.11, Benzeneinduline.



aposafranone. $C_{18}H_{12}ON_2$ = 272.11. Benzene indone, 3-aminophenylphenazine. A red crystalline powder, m.242; soluble in water, alcohol or benzene. Used as a dye.

apothecaries' weight. A system of weights and measures used in compounding medicines. The troy pound of 5760 grains is the standard, and is subdivided into 12 ounces; the ounce into eight drams; the dram into 20 grains. For fluid measure the quart of 42 fluid ounces is subdivided into 2 pints; the pint into 16 fl. oz., the fl. oz. into eight drams, and the dram into 60 minims. The following abbreviations are used:

♏.....	minim = 0.0616 cc.
gtt.....	gutta, a drop
℈.....	scruple = 20 grains = 1.296 grams
ʒ.....	dram = 60 grains = 3.888 grams
℥.....	ounce = 480 grains = 31.103 grams = 8 drams = 29.573 cc.
lb.....	libra, a pound = 5760 grains = 373.2417 grams
O.....	octarius, a pint = 7680 minims = 473.16 cc.

See *weights, conversion factors.*

apothesine. $C_{18}H_{23}O_2N.HCl$ = 297.74 γ-di-ethylaminopropylcinnamate hydrochloride, $Ph\text{-}CH{:}CHCOO(CH_2)_4NEt_2.HCl$. Colorless crystals, m.136, soluble in water or alcohol; used as a local anesthetic.

apotoxicarol. $C_{18}H_{16}O$ = 248.12. A colorless, phenolic hydrolysis product, m.247, derived from toxicarol.

apparatus. An instrument or device used for experiments, operations or manufacture, made of glass, metal, wood, etc. **laboratory-** Includes glass ware, devices for heating, cooling, shaking and other operations.

apple acid. Malic acid. **a. oil.** Amyl valerate.

applicator. A device for the local administration of a remedy; *e.g.*, a radium applicator.

approximate. Near or approaching; not exact and accurate.

aprotic. Not yielding or accepting a proton. **a. solvent.** One which neither yields a proton to the solute, nor gains one from it. **a. substance.** One which acts neither as an acid nor a base. Cf. *acid, base.*

apyonin. Auramine.

apyron. Lithium acetyl salicylate.

aqua. The Latin for water. Cf. *aquo.* Used to denote (1) water, (2) an aqueous solution or infusion, (3) in formulae (+ *aqua*) a variable amount of water, (4) water of crystallization. **a. ammonia.** See *ammonia* water. **a. anethi.** See *dill* water. **a. anisi.** See *anise* water. **a. carui.** See *caraway* water. **a. chlori.** *Chlorine* water. **a. compound.** Hydrate. **a. destillata.** Distilled *water.* **a. fervens.** Hot water. **a. fluvialis.** River water. **a. fontana.** Spring or well water. **a. fortis.** Nitric acid. **a. laurocerasi.** *Cherry-laurel* water. **a. marina.** Sea water. **a. nivialis.** Snow-water. **a. pluvialis.** Rain-water. **a. pura.** Pure water. **a. regia.** Nitro-hydrochloric acid. A mixture of 3 pts. HCl and 1 pt. HNO_3, used as a solvent for noble metals, *e.g.*, platinum or gold. **a. tepida.** Warm water. **a. vitae.** Brandy or whisky.

aquadag. A colloidal suspension of graphite in water used as a lubricant.

aquamarine. A beryl of sea-green color, used as a semi-precious stone.

aquation. The formation of aquo ions. Cf. *hydration, solvation.*

aquatone. A printing process similar to collotype, q.v., in which bichromated gelatin coated on thin zinc plates is the sensitive medium.

aqueous. Watery. **a. solution.** A solution prepared with water as the solvent.

aquinite. Chloropicrin.

aquo. Pertaining to water. **a. ions.** A complex ion which contains several molecules of water; as, $[M(H_2O)_8]^{++}$, $[M(H_2O)_6]^{++}$, $[M(H_2O)_4]^{++}$ or $[M(H_2O)_2]^{++}$, where M may be a divalent metal. Cf. *hydration.* **a. system.** The reactions taking place in water, including the concept of H^+ and OH^-. Cf. *ammonia system, hydrogen ion, base.*

A.R. Abbreviation for analytical reagent.

Ar. An alternative symbol for argon, A.

ar- A prefix which indicates substitution in the *aromatic* nucleus. Cf. *ac-.*

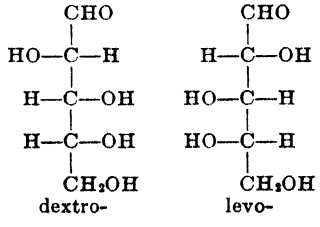
araban. $(C_5H_{10}O_5)n = 150.11n$. An arabinose polysaccharide occurring in the mucilage of Malvaceae and in acacia.

arabate. A salt of arabic acid.

arabic acid. $C_5H_{10}O_6.H_2O = 184.2$. Arabitic acid, d-tetrahydroxyvaleric acid. A white amorphous powder precipitated from gum arabic solution by alcohol; soluble in water.

arabin. $C_{10}H_{18}O_9 = 282.19$. An amorphous powder, soluble in water and insoluble in alcohol; a constituent of gums. **a. water.** A solution of the water-soluble constituents of gums in hydnocarpus oil.

arabinose. $C_5H_{10}O_5 = 150.11$. Pectin sugar, pectinose, gum sugar. The pentoses obtained by hydrolysis of acacia:



d- White, rhombic crystals, m.160; soluble in water, alcohol, or glycerol, insoluble in ether. It is prepared from arabic acid by boiling with HCl, and is used as a culture medium for certain bacteria.

arabinulose. $C_5H_{10}O_5 = 150.11$. The keto-pentose corresponding with arabinose.

arabite. Arabitol.

arabitic acid. Arabic acid.

arabitol. $C_5H_{12}O_5 = 152.13$. Arabite. The pentatomic alcohol $CH_2OH.(CHOH)_3.CH_2OH$ derived from arabinose. Colorless, sweet crystals or granules, m.102; soluble in water or alcohol. It exists in the d- and l-form, and is found in silage liquor.

arabonic acid. $C_5H_{10}O_6 = 166.11$. The tetrahydroxy acid, $CH_2OH.(CHOH)_3.COOH$, derived from arabinose. Colorless crystals, m.89; soluble in water.

araceae. Aroideae.

arachic acid. $C_{20}H_{40}O_2 = 312.42$. Arachidic acid, eicosanoic acid*, *n*-eicosoic acid. The twentieth member of the fatty acid series, $Me(CH_2)_{18}COOH$. White leaflets, m.77.5, b.328; insoluble in water, soluble in alcohol or ether. It is a constituent of arachis oil, butter and other fats.

arachidic acid. Arachic acid. **a. alcohol.** Eicosyl alcohol.

arachidonic acid. $C_{20}H_{32}O_2 = 304.25$. A liquid, unsaturated acid, b.245, occurring in lard and the fat of mammals.

arachin. A globulin obtained from peanuts, *Arachis hypogaea.*

arachis. See *peanuts.* **a. oil.** Peanut oil, groundnut oil. A fixed oil expressed fractionally from peanuts, $d_{25}°$.0.913. See *Bellier's test.*

arachnolysin. A hemolytic principle in the poison of the spider.

arack. Arrack.

araeometer. Areometer (see *hydrometer*).

aragonite. Pisolite. Needle spar. A dimorphic, orthorhombic native calcium carbonate, $CaCO_3$. Cf. *calcite, nicholsonite.*

aralac. A fibrous product made from skim milk casein. Cf. *lanital.*

aralia. Nard, American spikenard. The dried rhizomes and roots of *A. racemosa* (Araliaceae). It is used as a fluid extract as an alterative and diaphoretic.

Araliaceae. The Ginseng family, a group of aromatic plants which yield the following drugs:

Panax quinquefolium	ginseng
Aralia nudicaulis	false sarsaparilla
Aralia racemosa	American spikenard
Aralia hispida	dwarf elder
Fatsia Japonica	fatsin

aralin. A glucoside from the fresh leaves of *Aralia* species.

aralkyl. Arylated alkyl. A radical in which an aryl group is substituted for a hydrogen atom of an alkyl. Cf. *alphyl.*

aranein. A liquid obtained from the abdomen of spiders; used in homeopathic preparations.

araphite. A magnetic basalt from Colorado.

araroba. *Goa* powder.

arasan. Trade-mark for tetramethyl-thiuramdisulfide, used as a seed disinfectant.

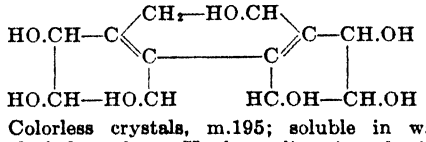
arbacin. A protein in the sperm of the sea urchin, (*Arbacia*).

arbor. The official Latin for tree. **a. Dianae.** Silver tree. The arborescent precipitate of silver formed on adding mercury to a silver salt solution. **a. Saturni.** Lead-tree. The arborescent precipitate of lead formed on adding zinc to a lead salt solution. **a. vitae.** Thuja.

arborescent. A branched, tree-like growth of bacteria or crystals.

arbusterol. A fat obtained from *Arbutus* species.

arbutin. $[C_{12}H_{16}O_7]_2.H_2O = 562.4$. Ursin, arbutoside. A glucoside from the leaves of *Arbutus* or *Arctostaphylos uva-ursi, Chimaphila umbellata,* and other Ericaceae and Pyrolaceae; it is hydrolyzed to hydroquinone and glucose.



Colorless crystals, m.195; soluble in water, alcohol or ether. Used as a diuretic and urinary disinfectant. **monobenzoyl-** Cellotropin.

Arbutus. A genus of ericaceous shrubs and trees:

A. menziesii	madrone
A. unedo	European arbutus
A. or *Arctostaphylos uva-ursi*	bearberry, arbutin.
Epigaea repens	trailing arbutus.

arc. (1) A portion of any curved line. (2) **a. lamp. electric-** The discharge of an electric current between electrodes. **mercury-** An electric discharge through mercury vapor. **oscillating-** A discharge which changes its position; *e.g.*, around the periphery of a disk. **voltaic-** The curved flame between two electrodes.

a. furnace. See *furnace*. **a. lamp.** A source of illumination in which a discharge passes between two electrodes. **a. spectrum.** The spectrum produced by arcing between electrodes of the element under investigation. Cf. spark *spectrum, alternation* law.

arcadian nitrate. Sodium nitrate made from synthetic ammonia and soda; used as a fertilizer. **a. sulfate.** Ammonium sulfate used as fertilizer.

arcaine. $C_6H_{16}N_6$ = 172.14. Tetramethylene diguanidine, $NH_2.C(:NH)NH.(CH_2)_4.NH.C(:NH).NH_2$. An animal base from the mussel Noah's Ark (*Areca Noae*), which lowers the sugar content of the blood.

arcanite. Glaserite.

arcanum. (1) A nostrum or secret medicine. (2) Potassium sulfate.

arceine. Arecoline hydrobromide.

archil. Orchil.

Archimedes. A famous Greek mathematician who lived in the 3rd century B.C. in Syracuse. **A. bridge.** A wooden platform across the pan of a balance, without touching it, which is used for weighing solids immersed in a liquid. **A. principle.** A body immersed in a liquid will lose weight equal to that of the liquid it displaces. It is applied in the determination of the specific gravity of dense, irregular bodies.

archon. The poisonous radical of proteins.

archyl. Protyl.

arciform. Curved or bow-shaped.

arcilla. Argol.

arcing. The conversion of electrical energy into light by means of a current flowing in air or a gas between two electrodes. It differs from sparking in that it depends on ionization of the vapor of the electrodes, while sparking depends on that of the air or gas between them.

arconium. A hypothetical element of atomic weight 2.9, similar to *nebulium* and *coronium*, q.v.

arcual. Arc-shaped or arched.

ardennite. A native manganese and aluminum vanadosilicate, $M_4Al_4H_5VSi_4O_{22}$, which occurs in yellowish or brownish orthorhombic crystals.

ardometer. An optical *pyrometer*, q.v.

are. (1) Latin for area. (2) The unit of surface measurement in the metric system: 1 are = 100 m^2. (square-meters) = 119.6 $yds.^2$ (square-yards).

area. Any region or surface, S, enclosed by boundaries. $S = CL^2$, where C is a constant depending on the contour of the surface (1, if square; $\pi/4$, if round) and L its length (or diameter, if circular).

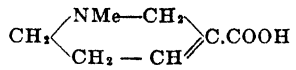
areametric. Pertaining to the measurement of areas. **a. analysis.** Chemical analysis by forming precipitates in definite areas, which are matched with precipitates similarly produced from standards.

Areca. A genus of Asiatic and Australasian palms, as *A. catechu pinang*, the areca-nut, betel-nut or catechu palm. **a. alkaloid.** Betel-nut alkaloids:

arecoline	$C_8H_{13}O_2N$
homoarecoline	$C_9H_{15}O_2N$
arecaine	$C_7H_{11}O_2N.H_2O$
arecaidine	$C_7H_{11}O_2N.H_2O$
guvacine	$C_6H_9O_2N$
guvacoline	$C_7H_{11}O_2N$
coniine, conicine	$C_8H_{17}N$

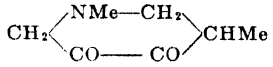
a. nut. Pinang, betel-nut (q.v.). The dried seeds of *A. catechu*, an East Indian palm. It is tonic, astringent and anthelminthic, and contains several alkaloids and an orange coloring matter (arecin) and chavicol. **a. red.** Arecin.

arecaidine. $C_7H_{11}O_2N$ = 141.1. *N*-Methyltetrahydro-nicotinic acid.



An alkaloid formed from arecoline. Colorless scales, m.223; soluble in water or alcohol, insoluble in ether or chloroform. Cf. *arecoline*.

arecaine. $C_7H_{11}O_2N$ = 141.1. *N*-Methylguvacine. An alkaloid,



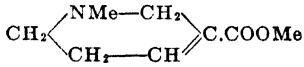
from the seeds of *Areca catechu* (betel nuts). Colorless crystals, m.213; soluble in water and insoluble in ether, alcohol or chloroform. Used as an anthelmintic.

arecaline. Arecoline.

arecane. Arecoline.

arecin. $C_{23}H_{26}ON_2$ = 346.3. Areca red. A red coloring matter from betel nuts. Cf. *aricine*.

arecoline. $C_8H_{13}O_2N$ = 155.1. Arekane, arecaline. An alkaloid in betel nuts. It is the methyl ester of methyltetrahydro-nicotinic acid (arecaidine). A yellowish oily liquid, d.2.02;



insoluble in water and used as an anthelmintic. **homo-** See *homo*.

a. hydrobromide. $C_8H_{13}O_2N.HBr$ = 236.08. Arceine. Colorless prisms, m.167; soluble in water or alcohol, and used as an anthelmintic and miotic. **a. hydrochloride.** $C_8H_{13}O_2N.HCl$ = 191.5. Colorless crystals, m.158°C; soluble in water or alcohol and used as an anthelmintic and miotic.

arecolineserine. A mixture of arecoline hydrobromide and eserine sulfate. Used for hypodermic injections and in ophthalmology.

arekane. Arecoline.

arendalite. A microcrystalline epidote.

arenolite. An artificial stone.

areometer. Hydrometer. **a. scales.** See *hydrometer* scales.

areometry. Hydrometry.

arepycnometer. A pycnometer for viscous liquids.

Arfvedson, Johann August. Afzelius. 1792–1841. A Swedish chemist and mineralogist, noted for the discovery of lithium (1817).

arfvedsonite. A black sodium amphibole containing soda.

Argand, Aimé. 1755–1803. A Swiss physicist, noted for his design of heating devices. **a. burner.** A gas or oil burner with a chimney and regulated air supply.

argatoxyl. Silver p-aminophenyl-arsenate, silver atoxylate. The compound $C_6H_7O_3NAg$, used medicinally.

argein. A colloidal silver protein, used to treat gonorrhea.

argemonine. An alkaloid of prickly poppy (*Argemone mexicana*), probably identical with protopine.

argenol. Argyrol.

argentamine. A colorless solution of 8 % silver phosphate and 15 % ethylene-diamine; used as an antiseptic, astringent, and disinfectant.

argenti. The official Latin for "of silver."

argentic. A compound containing silver.

argentiferous. Containing silver. **a. lead.** (1) An alloy of Ag and Pb. (2) A lead-silver sulfide.

argentiform. Silver hexamethylenamine. A snow-white powder used as antiseptic.

argentine. A finely-divided tin sponge obtained by precipitation of a tin salt solution with zinc; used in printing.

argentite. Ag_2S. Silver glance, argyrite, vitrous silver ore. A native vitreous silver sulfide, occurring in black or grayish isometric crystals. Cf. *acanthite*.

argentol. $C_9N_5N.OH.SO_3Ag$ = 231.94. Silver quinaseptol, silver oxyquinoline sulfonate. An antiseptic and astringent; used for treating venereal diseases.

argentometer. A hydrometer used for determining the silver content of photographic solutions.

argentometry. Volumetric analysis involving the use of silver salt solutions and the precipitation of insoluble silver salts; as chlorides, chromates.

argentopyrites. The native sulfide of silver and iron, $3FeS.3FeS_2.Ag_2S$.

argentous. A compound containing monovalent silver. See *silver*.

argentum. Latin for silver. **a. cornu.** Horn silver, chlorargyrite, cevargyrite. A native form of silver chloride. **a. virum.** Native mercury (Pliny).

argil. Argol

argilla. Kaolin.

argillaceus. Containing clay.

arginase. An enzyme of the mucus (intestine, liver, kidney, spleen) which transforms arginine to ornithine and urea.

arginine. $C_6H_{14}O_2N_4$ = 174.3. An amino acid from animal and vegetable proteins (albumin and seeds). $NH_2.CH(COOH).CH_2.CH_2.CH_2.NH.C:NH.NH_2$. Colorless crystals, m.238, soluble in water, and essential in nutrition. Cf. *arginase, hexone bases, lupine alkaloids*.

argochrome. A compound of methylene blue and silver, used medicinally as a bactericide.

argoflavine. The silver salt of acriflavine, used medicinally as a bactericide.

argol. $KH(C_4H_4O_6)$. Argil, arcilla. Crude potassium acid tartrate in the form of a fine crystalline crust deposited by grape-juice during fermentation. It is exported from Portugal, and used as raw-material for the manufacture of tartaric acid; as a reducing agent; and as a flux in assay processes.

argon. A = 39.944. A gaseous element, atomic number 18, which occurs in the atmosphere and was discovered in 1894 by Ramsay and Rayleigh. **gaseous-** $D_{(air=1)}$ 1.38, m. −189, b.-−186.1. **liquid-** $d_{(-186°C)}$ 1.405. A. occurs also in fumaroles and spring water and exists in two isotopic forms, A^{36} and A^{40}. It is absolutely inert, so possesses no valency and belongs to the zero-group of the periodic system. It is obtained by fractionation of liquid oxygen, and is shipped in steel cylinders. Used for filling incandescent lamps, rectifiers, radio audions and vacuum tubes.

argonin. Silver caseinate. A white amorphous powder; soluble in water. Used as an antiseptic in ophthalmology.

argyria. Poisoning by silver or its compounds.

argyrine. An alkaloid from horse chestnuts.

argyrite. Argentite.

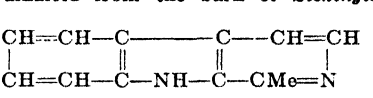
argyrodite. A native, monoclinic, steel-gray germanium silver sulfide, $4Ag_2S.GeS_2$.

argyrol. Vitellin silver, argenol. A trade brand of silver-protein (20 % Ag). Brownish-black, glistening, hygroscopic scales; freely soluble in water or glycerol, insoluble in alcohol or oils. Used as an antiseptic in the treatment of inflamed mucous membranes.

arheol. $C_{15}H_{24}O$ = 220.2. Santalol. A sesquiterpene alcohol from the oil of sandalwood. A colorless, oily liquid, d.0.979, b.300; insoluble in water, soluble in alcohol. Used as a urinary antiseptic.

arhovin. A compound of thymolbenzoic acid ester and diphenylamine used in the treatment of gonorrhea.

aribine. $C_{12}H_{10}N_2$ = 182.09. Harman, loturine. An alkaloid from the bark of *Sickingia* (or



Arariba) *rubra*, a Rubiaceae, and the seeds of *Peganum harmala*, a Rutaceae. Colorless crystals, m.237.

aricine. $C_{23}H_{26}O_4N_2$ = 394.22. Cusconine, cinchovatine. An alkaloid from the barks of *cusco* and *Cinchona cuprea*. Colorless crystals, m.188 insoluble in water, soluble in alcohol or ether; used medicinally as an anti-malarial. Cf. *arisin*.

aristin. A constituent of various *Aristolochia* species.

aristochin. Aristoquin, diquinine carbonic ester. A white, odorless, tasteless powder; insoluble in water; sparingly soluble in alcohol or ether; soluble in chloroform.

aristol. A brand of thymol iodide.

Aristolochia. A genus of plants of the birthwort family (*Aristolochiaceae*). See *serpentaria, guacine, aristolochine, clematidin* and *asarum*. **a. yellow.** The coloring matter of the roots and seeds of *A.* species; *e.g., A. clematitis, A. rotunda*.

aristolochine. $C_{32}H_{22}O_{13}N_2$ = 642. An alkaloid from the roots or seeds of *A.* species (*A. serpentaria* and *Bragantia wallichii*). It is a kidney poison, abortive and general toxic.

aristoquin. Aristochin.

arithmetical mean. Half the sum of two quantities. **a. progression.** A series of numbers in which the differences, d, between consecutive terms are equal. Let a be the first and l the last term, d the difference and n the number of terms, then $l = a + (n - 1)d$, while the sum, s, of n terms is $s = n(a + l)/2$.

arkansite. Brookite.

arkite. An igneous rock belonging to the leucite-syenite group.

arksutite. Chiolite.

armature. The rotating part of a dynamo which consists of the coil and core.

armoracia. The fresh root of *Cochlearia armoracia*, horse radish, used as a condiment.

armored thermometer. A thermometer enclosed in a metal case.

Armstrong, Henry Edward. 1847–1937. An English chemist noted for his research in organic chemistry and work on chemical education. **A. acid.** (1) Same as Schäffer's acid. (2) Naphthalene-1.5-disulfonic acid. **A. metal.** An alloy containing Mn 4–6, C 0.10, Ni 80, Cr 17.5, and Cu 2.9 %; used for corrosion-resisting drawn or pressed shapes.

arnatto. Annatto.

Arnaudon's green. Chromic phosphate.

Arndt tube. A bent glass tube with four bulbs used for the determination of hydrogen. **A. Schulz rule.** *Weak* stimuli greatly accelerate life processes; *moderate* stimuli promote them; *strong* stimuli inhibit them and the *strongest* destroy them. Cf. *Kötschau* hypothesis.

Arnica. A genus of the composite flowered plants, the aster family. **a. flowers.** The dried flower heads of *Arnica montana*, leopard's bane, wolf's bane, or mountain tobacco. It is used as a tincture and a fluid extract is a depressant and feeble rubefacient. **a. oil.** An essential oil distilled from arnica flowers. A yellow liquid of strong aromatic odor, d.0.906, acid value 75.1, sap. v.29.9; soluble in alcohol, ether, benzene, or chloroform. Used in liniments. **a. root.** The roots of *Arnica montana*. Used as fluid extract. **a. root oil.** Yellow oil from arnica root, d.0.990, $[\alpha]_D$ − 2; its chief constituent is thymoquinol-dimethylester.

arnicin. $C_{20}H_{30}O_4$ = 334.3. A glucoside from arnica roots and flowers. A yellow, bitter, amorphous powder.

arnicine. $C_{35}H_{54}O_7$ = 586.43. A resinous, basic principle from arnica flowers.

arnotta. Annatto.

arochlors. (1) The polychlorine derivatives of biphenyl; used as lubricants. (2) The chlorobiphenyl resins, which are odorless and resistant to light and flame.

Aroideae. Arum family, a group of herbs with an acrid, colorless, juice and fleshy corm or rhizome. Their fruit is a berry. The following species yield drugs:

Acorus calamus (sweet flag)	calamus
Symplocarpus foetidus (skunk cabbage)	symplocarpus
Arisaema triphyllum (Indian turnip)	arum
Colocasia esculenta	taro or poi

aromadendral. An aldehydic product from *Eucalyptus* species; a mixture of cuminaldehyde, phellandral and *l*-cryptal.

aromatic. (1) A spicy, fragrant, agreeable odor or taste. (2) A derivative of benzene or a carbon compound whose molecule contains one or more carbon rings. **a. acids.** A group of aromatic organic compounds which contain one or more carboxyl groups:

(1) *Monobasic acids*—

benzoic acid	PhCOOH
phenylacetic acid	$PhCH_2COOH$
toluic acids	$C_6H_4Me.COOH$
β-phenylpropionic acid	$PhCH_2CH_2COOH$
mesitylic, xylic acids	$C_6H_3Me_2.COOH$
ethylbenzoic acids	$C_6H_4Et.COOH$
γ-phenylbutyric acid	$PhCH_2CH_2CH_2COOH$
cuminic acids	$C_6H_4Pr.COOH$
trimethylbenzoic acids	$C_6H_2Me_3.COOH$

(2) *Dibasic acids*—

phthalic acids	$C_6H_4(COOH)_2$
uvitic, xylidinic acids	$C_6H_3Me(COOH)_2$
cumidinic acid	$C_6H_2Me_2(COOH)_2$

(3) *Polybasic acids*—

trimesinic, trimellitic acids	$C_6H_3(COOH)_3$
pyromellitic, prehnitic acids	$C_6H_2(COOH)_4$
benzenepentacarboxylic acid	$C_6H(COOH)_5$
mellitic acid	$C_6(COOH)_6$

a. alcohols. A group of aromatic organic compounds which contain an hydroxyl group in a side-chain:

C_7H_8O

benzylalcohol, phenylcarbinol	BzOH or $PhCH_2OH$

$C_8H_{10}O$

tolyl alcohol, methylphenylcarbinol	$C_6H_4Me.CH_2OH$
phenylethylalcohol, benzylcarbinol	$PhCH_2CH_2OH$

$C_9H_{12}O$

xylylalcohol, dimethylphenylcarbinol	$C_6H_3Me_2.CH_2OH$
phenylpropylalcohol	$PhCH_2CH_2CH_2OH$
tolylcarbinol	$C_2H_4Me.CH_2CH_2OH$

$C_{10}H_{14}O$

pseudocumene alcohol, trimethylphenylcarbinol	$C_6H_2Me_3.CH_2OH$
xylylcarbinol	$C_6H_3Me_2.CH_2CH_2OH$
cuminealcohol, propylphenylcarbinol	$C_6H_4Pr.CH_2OH$
unsaturated alcohols: cinnamyl alcohol	$Ph.CH:CH.CH_2OH$
diatomic alcohols: xylylenalcohols, phenylendicarbinols	$C_6H_4(CH_2OH)_2$.

$C_{11}H_{16}O$

mellityl alcohol	$C_6HMe_4.CH_2OH$

a. compound. A organic compound containing a closed and saturated ring, either homocylic or heterocyclic. See *organic* compounds and *aromatic*. **a. hydrocarbon.** A compound of carbon and hydrogen that contains in its molecular structure a closed and saturated ring of carbon atoms; *e.g.*, benzene, naphthalene, anthracene etc. **a. series.** A series of aromatic compounds. **a. tincture.** An alcoholic solution of cinnamon, ginger, cardamon, cloves and galangal, used as an aromatic and carminative. **a. vinegar.** A refreshing smelling mixture of acetic acid and essential oils, used to relieve headache.

aromatics. Spicy, fragrant, and stimulating drugs, with agreeable taste which is usually due to a small amount of an essential oil.

aromatin. A substitute for hops, prepared from gentian root.

Arons chromoscope. An instrument for measuring colors of industrial products (*e.g.*, paper, leather, yarns, textiles), and for physiological work.

aroxylamines. α-Hydroxylamines.

aroyl. A radical of the type R.CO—, where R is an aromatic radical (benzoyl, naphthoyl).

arphoalin. An albumin preparation containing arsenic and phosphorus.

arquerite. A native silver amalgam, $Ag_{12}Hg$, from Arqueros, Chile, which occurs in isomeric crystals.

arrack. A liquor distilled from malted rice.

arrhenal. *Sodium* methylarsenite.

arrhenate. A salt of arrhenic acid of the type MeHAsO.OM; used in medicine instead of *cacodylates.*

arrhenic acid. CH_5O_2As = 123.98. Monomethylarsenic acid. The compound

Used in organic synthesis and in the manufacture of arrhenates. *Cf. cacodylic acid.*

Arrhenius, Svante August. 1859–1927. A Swedish chemist and physicist noted for developing the theory of ions and ionization (1883) and for cosmic theories. **A. law.** A solution of high osmotic pressure conducts an electric current. **A. theory.** When an electrolyte dissolves it

Svante August Arrhenius.

(From McPherson & Henderson's "First Course in Chemistry." Courtesy of Ginn & Company.)

splits up into ions (ionization) to an extent which increases with a decrease in the concentration, and is indicated by the deviation of the solution from the Van't Hoff laws. The degree of ionisation (q.v.) can be calculated from conductivity measurements. **A. viscosity formula.** The relationship of the viscosity, x, of a solution to the volume c of the suspended particles present is $\log x = \theta c$, where θ is a constant.

arrow-poison. A poisonous plant juice (*e.g.* curare, q.v.) or venom of an animal (*e.g.*, snake, etc.) used by native tribes or primitive hunters in poisoning arrow-heads. See *acocantherin, antiar, batracin bufagin, calotropin, derrid, ipoh, guachamacine, nicoulin, upas, wagofo, muava, ibogaine.*

arrow-wood. (1) Frangula. (2) Euonymus.

arrowroot. Maranta. The starch from the rhizomes of the arrowroot plant, *Maranta arundinaceae*, Family Marantaceae. A light white powder which is used as a non-irritating food in fever, commercially as an adhesive, and in laundries. It is exported from Bermuda. **Bahia-, Para-, Rio-.** Tapioca.

arsabenzol. Arsphenamine.

arsacetin. Acetylatoxyl, sodium p-acetylaminophenylarsonate. Colorless crystals used as a syphilitic.

arsamin. Atoxyl.

arsaminol. A Japanese brand of arsphenamine.

arsan. Arsenglidin. A yellowish-gray powder; insoluble in water, soluble in alkalis.

arsanilate. Atoxylate. A salt of arsanilic acid of the type $M_2(C_6H_8O_3NAs)$.

arsanilic acid. $C_6H_8O_3NAs$ = 217.2. Atoxylic acid, p-aminobenzenearsonic acid, *p*-aminophenylarsinic acid. $NH_2.C_6H_4.AsO(OH)_2$, arsenic acid anilide, meta-arsenous acid anilide. Colorless crystals, m.232; soluble in ether, amyl alcohol, or alkalis; slightly soluble in alcohol. Used in organic synthesis. The m- and o-acids are also known. **acetyl hydroxy-** Stovarsol. *N*-**carbamyl-** Carbarsone. *N*-**carbamylmethyl-** Its sodium salt is tryparsamide (q.v.).

Arsem furnace. An electric vacuum furnace.

arsenate. A salt of arsenic acid containing the trivalent AsO_4 ≡ radical; as, Na_3AsO_4. **acid-** An a. containing hydrogen, as the monoacid or diacid arsenate. **basic-** An a. containing a metal oxide or hydroxide. **diacid-** A salt containing the monovalent radical H_2AsO_4—. **dihydric-** Diacid a. **meta-** An a. containing the AsO_3^- radical. **monoacid-** A salt containing the divalent radical, $HAsO_4$=. **monohydric-** Monoacid a. **pyro-** An a. derived from $H_4As_2O_7$. **triethyl-** $C_6H_{15}AsO_4$ = 226.08. The compound $(EtO)_3.AsO$. A colorless liquid, d.1.326, b.238.

arsenglidin. Arsan.

arsenhemol. A compound of arsenic and hemol which occurs as a brown, amorphous powder; used medicinally as an alterative and hematinic.

arsenic. As = 74.91. An element of the phosphorus group, atomic number 33. A rhombohedric, grayish-black brittle, nonmetal of metallic character, d_{14}°.5.727, m. (under pressure) 450 (sublimes), b.450; insoluble in water, alcohol or acids. It is found native as the sulfide, arsenide, and sulfarsenides of the heavy metals and is widely diffused through nature, even in organic matter. Arsenic occurs in a number of allotropic modifications analogous to those of phosphorus:

(a) Metallic arsenic, γ-As, d.5.727. The stable ordinary form.

(b) Gray or black arsenic, β-As, d.4.64, which changes at 303 to γ-As.

(c) Yellow arsenic, α-As_4, d.3.7, which represents the non-metallic form of arsenic and is formed at 500 by rapid condensation of arsenic vapor. It is soluble in carbon disulfide, resembles phosphorus, is photo-sensitive, and unstable, and changes to gray arsenic on exposure to light.

(d) Brown arsenic, As_8, d.2.03, an allotropic form of the non-metallic arsenic deposited from yellow arsenic solutions; it changes at 180 to gray arsenic. Arsenic may be tri- and pentavalent, and gives three series of compounds:

Derived from trivalent, negative As:

arsenides	M_3As
arsines	AsR_3
arsonium	AsH_4R

Derived from trivalent, positive As:

arsenous	As^{+++}
arsenite	AsO_2^- or AsO_3^{---}
arsinic acid	R_2AsO_2

Derived from pentavalent, positive As:

arsenic	As^{+++++}
arsenate	AsO_3^- or AsO_4^{---}
arsonic acid	R_2AsO_3

Orpiment or arsenic sulfide was known to the ancients. Theophrastus mentions it as arsenicon, meaning the "masculine one," as it was used to paint the sunburnt faces of men. Arsenic is used in medicine, especially in the form of cacodylates, and arsenic compounds are employed as germicides, insecticides, for certain pigments, and the preparation of arsenic salts. **butter of-** Arsenous chloride. **dimethyl-** Cacodyl. **flowers of-** Arsenous oxide. **red-, ruby-** Realgar. **triethyl-** Triethyl*arsine*. **white-** Arsenolite, arsenite. A native arsenous oxide. **yellow-** Is orpiment.

a. acid. (1) ortho- $H_3AsO_4.\frac{1}{2}H_2O$ = 151.0. Colorless crystals, d.2.0–2.5, m.35.5, soluble in water; used in the manufacture of arsenates. (2) meta- $HAsO_2$ = 124.0. A white powder, soluble in water with the formation of ortho- a. acid. (3) pyro- $H_4As_2O_7$ = 264.89. A colorless powder, decomp. 208, and soluble in water, forming ortho- a. acid. **a. apparatus.** See *Marsh* test. **a. bromide.** Arsenous bromide. **a. butter.** Arsenous chloride. **a. chloride.** Arsenous chloride. **a. diethyl.** $AsEt_2$ = 133.06. A heavy liquid, b.186; insoluble in water, soluble in alcohol or ether. **a. diiodide.** AsI_2 = 328.80. White crystals, decomp. 136. **a. dimethyl.** $AsMe_2$ = 105.02. A colorless liquid, d.1.15, b.150, insoluble in water, soluble in alcohol or ether. **a. disulfide.** As_2S_2 = 214.1. Realgar, red a. sulfide, red orpiment, a. ruby, red a. glass, A brownish-red powder or monoclinic crystals, d.3.55, m.307, b.565; insoluble in water, soluble in alkalis, alkali-carbonates and sulfides. Used as a pigment, in textile printing, in pyrotechnics, in tanneries and in the manufacture of shots. **a. fluoride** AsF_5 = 169.96. A colorless, poisonous gas, d.(H_{2-1}) 5.964, m.–80, b.–53; soluble in water. **a. glass.** (1) An indefinite term for a. compounds; *e.g.*, a. sulfides. (2) Arsenous oxide. **a. hydride.** (1) Arsenous hydride. (2) An ill-defined solid hydride, As_4H_2, AsH_2 or (AsH)x, formed from water and sodium arsenide. **a. iodide.** (1) a. diiodide. (2) arsenous iodide. **a. minerals.** Arsenic is usually associated with antimony and bismuth minerals and occurs in many sulfide minerals, *e.g.*,

native arsenic	As
realgar	As_2S_2
orpiment	As_2S_3
allemontite	$SbAs_3$
arsenolite, arsenite	As_2O_3

also the arsenides and sulfoarsenides of the heavy metals.

a. oxide. (1) As_2O_5 = 229.9. A. pentoxide, a. acid anhydride. A colorless amorphous powder, d.4.086, decomp. on heating, and soluble in water or alcohol. (2) See *arsenous* oxide. **a. oxychloride.** See *arsenous* oxychloride. **a. pentafluoride.** a. fluoride. **a. pentasulfide.** a. sulfide. **a. pentoxide.** a. oxide. **a. phosphide.** Arsenous phosphide. **a. ruby.** a. disulfide. **a. selenide.** Arsenous selenide. **a. sulfide.** (1) As_2S_5 = 310.4. A. pentasulfide. Yellow crystals, insoluble in water used as a pigment. (2) See a. disulfide. (3) Arsenous sulfide. **a. thiocyanate.** $As(SCN_3)$ = 249.0. **a. tribromide.** Arsenous bromide. **a. trichloride.** Arsenous chloride. **a. trifluoride.** Arsenous fluoride. **a. triethide.** Triethyl-*arsine*. **a. triiodide.** Arsenous iodide. **a. trimethyl.** Trimethyl-*arsine*. **a. trioxide.** Arsenous oxide. **a. trisulfide.** Arsenous sulfide.

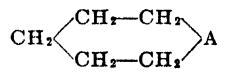
arsenical. Pertaining to As. **a. nickel.** Niccolite. **a. pyrites.** Mispickel.

arsenicals. A group of drugs, fungicides, or insecticides whose effects depend on their arsenic content; *e.g.*, cacodylates, salvarsan, paris green.

arsenicum. Latin for arsenic.

arsenide. A binary compound of arsenic, in which As is the negative element, As^{---}; *e.g.*, H_3As, Ag_3As, Zn_3As_2. Cf. *speise*.

arsenidine. $C_5H_{11}As$ = 146.0. Arsepidine. The heterocyclic compound and analog of piperidine:



arsenii. The official Latin for arsenic.

arsenious. Arsenous.

arsenite. (1) A salt of an arsenous acid.

ortho-arsenites	K_3AsO_3.
meta-arsenites	$KAsO_2$.
pyro-arsenites	$Ca_2As_2O_5$.

The acids from which these are derived are hypothetical. (2) White *arsenic*.

triethyl- $C_6H_{15}AsO_3$ = 210.08. $(EtO)_3As$. A colorless liquid, d.1.224, b.166.

arsenium. The element, arsenic.

arseniuretted hydrogen. Arsine.

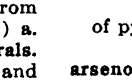
arsenius. See *arsenous*.

arseno. The bivalent group—As:As—which is isologous with the azo group.

arsenobenzene. PhAs:AsPh. An analog of azobenzene.

arsenobenzol. A French brand of arsphenamine.

arsenoferratin. An iron albuminate containing arsenic.

arsenofuran. C_4H_5As. Arsenophen. An analog of pyrrole,  .

arsenogen. A compound of iron, phosphorus, arsenic and paranucleic acid.

arsenohemol. Arsenhemol.

arsenolite. White arsenic.

arsenophen. Arsenofuran.

arsenophenol. $C_{12}H_{10}O_2As_2$ = 336.00. Dihydroxyarsenobenzene, $HO.C_6H_4.As:As.C_6H_4.OH$. **diamino-** Arsphenamine.

arsenopyrite. FeAsS. Mispickel. A native iron sulfarsenide.

arsenous. A compound of trivalent arsenic, As≡. **a. acid.** H_3AsO_3 or $HAsO_2$. A monobasic acid, from which the arsenites are derived. See *arsenites*. Ordinarily the name applies to arsenous oxide, As_2O_3. **a. acid anhydride.** a. oxide. **a. bromide.** $AsBr_3$ = 314.72. Arsenic tribromide. Yellowish-white crystals, d.3.66, m.31, b.220; soluble in water. Used in diabetes

and as a reagent in analytical chemistry. **a. chloride.** $AsCl_3$ = 181.3. Arsenic trichloride, arsenic butter. Yellowish liquid or needles, d.2.205, m. −18, b.130.2, soluble in water, alcohol, ether, or oils. **a. fluoride.** AsF_3 = 131.96. A pale yellow liquid, d.2.73, m. −8.5, b.63; decomp. by water, and soluble in alcohol or ether. **a. hydride.** AsH_3 = 78.0. Arsine. Hydrogen arsenide. A poisonous gas with strong garlic odor. $d_{(air=1)}$2.695, m. −113.5, b. −54.8; soluble in water or alkalis. It is shipped in steel cylinders and used in organic synthesis and in chemical warfare. **a. iodide.** AsI_3 = 455.72. Arsenic triiodide. Arsenic iodide. Orange-red crystalline masses, d.4.39, m.146, (sublimes), b. circ. 400; soluble in water and used as an antiseptic, externally in skin diseases or internally as a constituent of Donovan's solution. **a. oxide.** As_4O_6 or As_2O_3 = 197.9. Arsenic trioxide, "arsenic," arsenous acid anhydride, white arsenic. White, octahedral or rhombic crystals (d.3.7 and 3.79 respectively), or white, amorphous, glassy masses, d.3.65–4.15, subliming at 218, slightly soluble in water, and soluble in alkalis or acids. Used medicinally as an antiperiodic, alterant or antiseptic, and in the glass, leather, and pigment industries; also as an antiseptic and preservative of dead animals, poison for noxious animals and plants, in the manufacture of shots and arsenic salts. Antidotes: Stomach pump, emetics, iron hydroxide. **a. oxychloride.** AsOCl = 126.42. Brown masses, decomp. in water or if heated. **a. phosphide.** AsP = 106.0. Reddish-brown fragments which are soluble in carbon disulfide, and are decomp. by water or by heat. **a. selenide.** As_2Se_3 = 386.52. Arsenic triselenide. Brown crystals, d.4.75, m.360; insoluble in water, soluble in alkalis. **a. sulfide.** As_2S_3 = 246.1. Arsenic trisulfide, yellow arsenic sulfide, orpiment, auripigment, king's yellow. Yellowish-red monoclinic crystals or a yellow amorphous powder, d.3.46, m.310, b.700; insoluble in water and soluble in alkalis or acids. Used as a pigment.

arsenyl. Sodium methylarsenate.

arsepidine. Arsenidine.

arsindole. C_8H_7As = 178.02. The heterocyclic compound C_6H_4  .

arsine. (1) AsH_3 = 78.0. See *arsenous* hydride, *arsyl* and *arsylene*. (2) See *arsines*. **alk-** $Me_2As.O.AsMe_2$. Cacodylic oxide. A colorless liquid, d.1.462, m. −25, b.120. See also *alkarsine*. **diethyl-** (1) Et_2AsH or $C_4H_{11}As$ = 134.05. (2) Tetraethylarsine. **dimethyl-** Me_2AsH = 106.07. Cacodylhydride. A colorless liquid, d.1.213, b.36, miscible with alcohol, ether or chloroform. **diphenylene-** Dibenzoarsenole. **ethyl-** C_2H_5As = 105.98. Arsinoethane, $EtAsH_2$; a colorless liquid, d.1.217, b.36. **methyl-** CH_5As = 91.97. Arsinomethane, $MeAsH_2$. A colorless liquid or gas, b.2, soluble in alcohol. **methyldichloro-** CH_3Cl_2As = 160.87. Methylarsenic dichloride, $MeAsCl_2$. A colorless liquid, d.1.838, m. −59, b.133. **mono-R-** A compound of the type $RAsH_2$. **tetraethyl-** $Et_2As.AsEt_2$. Ethylcacodyl. A colorless liquid, b.188. **tetramethyl-** Cacodyl. **tri-R-** A compound of the type R_3As. **triethyl-** $C_6H_{15}As$ = 162.08. Arsenic triethyl, $AsEt_3$. A colorless liquid d.1.150, decomp. 141. **trimethyl-** C_3H_9As = 120.03. Arsenic trimethyl, arsenous methide, $AsMe_3$. A colorless liquid, d.1.124, b.52.8, soluble in water.

arsines. Derivatives of arsine in which the hydrogen is replaced by a hydrocarbon radical, as

$RAsH_2$	mono-alkyl arsine
R_2AsH	dialkyl arsine
R_3As	trialkyl arsine

They are analogs of amines, phosphines, stibines.

arsinic acid. (1) An organic compound derived from trivalent arsenic of the type

$RAsO_2H_2$	monoaryl or monoalkyl a. acid
R_2AsO_2H	diaryl or dialkyl a. acid
R_3AsO_2	triaryl or trialkly a. acid

(2) In British terminology an "arsinic" acid, as well as an "arsonic" acid of the American terminology. **aminophenyl-** Arsanilic acid. **dimethyl-** Cacodylic acid. **methyl-** Methanearsonic acid.

arsino- (1) A prefix indicating the presence of the divalent —As:As— group. (2) The divalent radical (OH)OAs =, derived from arsinic acid. **a. salicylic acid.** Colorless crystals, used in the same way as atoxyl.

arsinoline. C_9H_7As = 190.1. The heterocyclic compound C_6H_4  .

arsinoso. The monovalent radical O:As—, isologous with nitroso.

arsonate. A salt of arsonic acid containing the $RAsO_2$—radical.

arsonic acid. An organic compound derived from pentavalent arsenic of the type

$RAsO(OH)_2$	monoaryl or monoalkyl a. acid
$R_2AsO_2(OH)$	diaryl or dialkyl a. acid
R_3AsO_3	triaryl or trialkyl a. acid

p-**carbaminophenyl-** Carbasone. **phenyl-** Benzenearsonic acid.

arsonium. The univalent radical, AsH_4—, an isolog of ammonium and phosphonium.

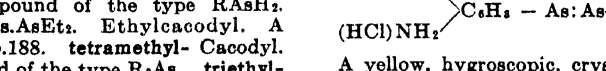
a. compounds. A group of addition compounds derived from arsine; they are of the general type, $AsH_3.HX$, or AsH_4X. **a. hydroxide.** AsH_4OH. An isolog of ammonium hydroxide and parent substance of a number of organic derivatives, *e.g.*,

R_4AsOH	tetra-R-arsonium hydroxide.

arsono. The monovalent radical $(HO)_2OAs$—, derived from arsonic acid.

Arsonval, A. d'. (1851– .) A French physicist, a pioneer in the application of high-frequency, interrupted electric currents for therapeutic purposes.

arsphenamine. $C_{12}H_{12}O_2N_2As_2.2HCl$ = 437.2. Salvarsan, diarsenol, arsphenolamine hydrochloride, arsaminol, arsenobenzol, 3-diamino-4-dihydroxyl-arsenobenzene, kharsivan, Ehrlich 606, six hundred six, six-o-six, S.O.S.



A yellow, hygroscopic, crystalline powder, unstable in air and soluble in water with acid reaction; used as a specific in syphilis and relapsing fever. **neo-** *Neo*arsphenamine.

arsycodile. Sodium cacodylate.

arsyl. The monovalent radical, H_2As—, derived from arsine.

arsylene. The divalent radical, HAs=, derived from arsine.

arsynal. Sodium methyl arsenite.

artabotrine. $C_{36}H_{55}O_6N$ = 597.42. An alkaloid, m.187, from the stems and roots of *Artabotrys suaveolens*, an Anonaceae.

artarine. $C_{21}H_{23}O_4N$ = 353.2. An alkaloid from artar root. It is a heart stimulant similar to veratrine.

artar root. A drug from West Africa, probably the root of *Zanthoxylum senegalense*, a Rutaceae.

Artemisia. A genus of plants belonging to the aster family (*Compositae*):

A. abrotanum	Southern wood
A. absinthium	worm wood
A. frigida	wild sage
A. maritima	worm seed, santonica
A. pontica	Roman worm wood
A. tridentata	sage brush
A. vulgaris	mug wort

a. oil. Wormwood oil.

artemisin. $C_{15}H_{18}O_4$ = 262.2. Oxysantonin. A constituent of the seeds of *Artemisia* species. White crystals, m.200, soluble in hot water, hot alcohol or chloroform; used as a gastric stimulant.

arterin. A red blood pigment of arterial blood. Cf. *oxyhemoglobin.*

arteriograph. An instrument for tracing and recording the pulse.

arteriosclerosis. An abnormal hardening of the walls of the arteries.

artery. Arteries. The blood vessels in which the blood passes from the heart to the organs of the body, as opposed to veins.

arthranitin. $C_{20}H_{34}O_{10}$ = 434.3. Cyclamin. A glucoside from arthanite (*Cyclamen europaeum*). A white, amorphous powder; soluble in water; it splits into glucose and cyclamiretin on boiling. A purgative and emetic.

arthriticin. (1) $(C_2H_5O)C_6H_4.N(CH_3).NH.CH_2.CO.NH_2$. A disinfectant used in arthritis. (2) Piperazine.

arthropods. A group of invertebrate animals with jointed limbs, *e.g.*, the spiders and crustaceans.

artiad (obsolete). An element having an even valency; *e.g.*, a diad, tetrad, hexad.

artic. Trade name for methylchloride used in refrigerators.

artificial. Made by man as opposed to natural; as artificial indigo or camphor. Cf. *synthetic.*

artolinantipeptone. Artose.

artose. $C_{185}H_{288}O_{88}N_{50}S$ = 4036.5. A water-soluble albumose produced by digestion of gliadin from wheat. Cf. *deutero*artrose, *hetero*artrose.

artotype. Collotype.

aruba acid. A naphthenic acid extracted from Columbian gas oil by alkali; d.0.961, acid val. 202.

arum. (1) A genus of plants (Aroidae) whose corms yield starchy products; *e.g.*, sago from *A. maculatum.* (2) A starch similar to sago from *A. maculatum* (Southern Europe), used as food.

aryl. A organic radical derived from an aromatic hydrocarbon by the removal of one hydrogen atom; *e.g.*, phenyl from benzene, tolyl from toluene, salicyl from salicylic acid. Cf. *alkyl.*

arylarsonate. A compound of arsenic containing aryl radicals; *e.g.*, salvarsan, arsphenamin, atoxyl.

aryle, arylide. A compound of a metal containing an aryl radical; as, PbR_4, HgR_2, etc.

arznei. The German term for drugs.

as- Abbreviation for asymmetric.

As. The symbol for arsenic.

asafetida. Asafoetida. A gum resin obtained by incising the roots or rhizomes of *Ferula asafetida* and other *Ferula* species (Umbelliferae). A soft mass of garlic-like odor, acrid, bitter taste, emulsifies with water; slightly soluble in alcohol. It is a carminative and sedative, and is used as fluid extract, and a tincture. Cf. *ferulic* acid. **milk of-** See *milk.*

a. oil. A light yellow, volatile oil distilled from asafetida, d.0.975–0.990, $[\alpha]_D$ + 13° — + 19; soluble in alcohol, ether, chloroform or benzene.

asalob. A beverage produced in Sudan by the fermentation of honey, containing about 9 % of alcohol.

asaprol. Abrastol.

asarin. Asarone.

asarite. Crude asarone.

asarol. $C_{10}H_{14}O$ = 154.2. An alcohol from *Asarum* species.

asarone. $C_{12}H_{16}O_3$ = 208.1. Asarum camphor, asarin, propenyl-2.4.5-trimethoxy benzene, $(MeO)_3C_6H_2.CH:CHMe$. A constituent of the roots of *A. europæum.* Colorless crystals, m.67, b.296, soluble in alcohol or ether. A tonic and antiseptic. Cf. *calamus* oil.

asaronic acid. $C_{10}H_{12}O_5$ = 212.09. *2.4.5*-Trimethoxybenzoic acid. $(MeO)_3C_6H_2COOH$. Colorless crystals, m.144, b.300.

Asarum. (1) A genus of plants of the birthwort family (Aristolochiaceae). (2) Canada snakeroot, wild ginger. The dried rhizomes and roots of *A. canadense.* It is a carminative and flavoring agent and is used as the fluid extract. **a. camphor.** Asarone. **a. oil.** An essential oil from asarum species. *Canadian-* From the roots of *A. canadense.* A colorless liquid, d.0.930–0.960, $[\alpha]_D$ — 3.5; soluble in alcohol, ether, chloroform or benzene. The chief constituents are asarol and methyleugenol; used in perfumery. *European-* From the roots of *A. europaeum*, d.1.015–1.068; soluble in alcohol, ether or benzene.

asaryl. The monovalent radical, $(MeO)_3C_6H_2$—, derived from asarone.

asbestos. Amianthus, earth-flax, mountain cork, stone flax. A fibrous form of actinolite; a native, fibrous, magnesium, calcium silicate which occurs in white, grayish or greenish masses either compact or as long, silky, flax-like readily-separated fibers. It is acid- and heat-resisting, and may be spun or woven; used for Gooch filters, fireproof objects (clothing, curtains, packings, etc.). See also *erocidolite, chrysotile, hornblende.* **blue-** Abriachanite. **Canadian-** Chrysotile.

a. board. Sheets of asbestos fibers, pressed to various thicknesses; used for fireproofing or insulating apparatus, to protect wood work and table tops. **a. cord.** A string made of asbestos, to support crucibles or retorts. **a. filter.** A Gooch crucible with a. fibers in its bottom, through which precipitates are filtered in analytical work. **a. gloves.** Asbestos gloves,

to protect the hands of workers from burns. **a. magnesia mixture.** A mixture of a. and magnesia used for steam packings. **a. sponge.** a. impregnated with platinum salt solution and ignited; used as a catalyzer. **a. stopper-** A stopper made from asbestos magnesia mixture, used for high temperatures and corrosive chemicals.

asbolane. Asbolite.

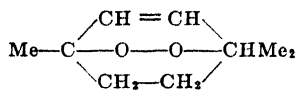
asbolin. A yellow oil from the distillation of pine roots, which contains pyrocatechin; used in tuberculosis.

asbolite. Asbolane, earthy cobalt. An earthy psilomelane or wad (q.v.) containing cobalt oxide.

ascaricide. A drug which destroys *Ascaris* parasites (intestinal worms).

ascaridic acid. Ascaridolic acid.

ascaridol. $C_{10}H_{16}O_2$ = 168.1. A terpene peroxide and the active constituent of chenopodium oil.



An explosive liquid, $d_{21°}$0.9985, $b._{8mm}$97. **a. glycol.** $C_{10}H_{18}O_3$ = 186.1. Colorless crystals, m.63, b.272.

ascaridolic acid. $C_{10}H_{16}O_5$ = 216.2. Cineolic acid, ascaridic acid. The oxidation product of ascaridol glycol, m.187. It exists in *d-* and *l-* forms, m.130, and as *dl-*, m.117.

Ascaris. A genus of round worms, some of which are intestinal parasites.

ascarite. A solid absorbent for CO_2 made from NaOH and asbestos. It changes from white to gray, thus indicating the need for recharging or regenerating the absorption tube.

ascaryl alcohol. $C_{33}H_{68}O_4$ = 528.48. A dihydric alcohol, m.84, from the fat of *Ascaris* species.

ascharite. $3MgB_2O_3.H_2O$. A native magnesium borate, found in saline deposits (*e.g.*, at Stassfurt).

aschistic process. A process in which work is converted directly into heat.

Asclepiadaceae. The milk-weed family. A group of herbs usually with a milky juice which contains caoutchouc.

Asclepias tuberosa	asclepias root
Asclepias cornuti	common silkweed
Asclepias incarnata	swamp milkweed
Asclepias curassavica	blood flower
Calotropis species	calotropin, mudaric acid, akundarol
Hemidesmus indicus	Indian sarsaparilla
Gonolobus condurango	condurango bark
Periploca graeca	periplocin
Tylophora astamatica	tylophorine

asclepiadin. A bitter principle of asclepias.

asclepias. Pleurisy root. The dried roots of *A. tuberosa* (Asclepiadaceae). It is a diaphoretic, diuretic, expectorant and tonic and is used as a fluid extract.

asclepidin. A concentration of asclepias principles, used medicinally.

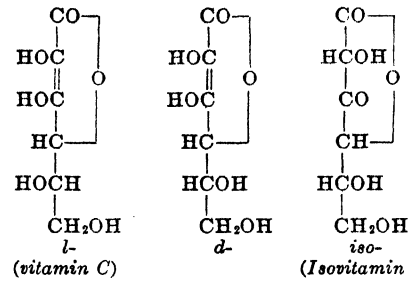
asclepidoid. The combined principles of asclepias.

asclepin. A resinoid from asclepias, used medicinally as a cathartic and diaphoretic.

asclepion. $C_{20}H_{34}O_3$ = 322.3. A camphor-like principle of *A. syriaca.*

Ascomycetes. A group of fungi (molds) *e.g.*, Aspergillus, Penicillium, etc.

ascorbic acid. $C_6H_8O_6$ = 176.05. Cevitamic acid, hexuronic acid, *3*-keto-*l*-gulonolactone, antiscorbutin, vitamin C, antiscorbutic principle. The *l-* form of the *δ*-lactone of *2.4.5.6*-tetrahydroxy-*3*-ketohexanoic acid. **d-** Has no vitamin effect. **iso-** Isovitamin C. Has a weak vitamin effect.



-ase. A suffix indicating, (1) an enzyme, or non-organized ferment, *e.g.*, diastase. This termination is at present restricted generally to enzymes of vegetable origin, but it should also be used for animal enzymes—which, however, usually end in "in"; thus pepsase and trypsase, rather than pepsin and trypsin; (2) certain ores, *e.g.*, orthoclase.

asebotin. A glucoside from the leaves of mountain laurel (*Kalmia latifolia*).

asebotoxin. A glucoside from *Andromeda japonica*, an Ericaceae.

asellin. $C_{25}H_{32}N_4$ = 388.5. An alkaloid from cod liver oil.

asepsin. Bromoacetanilide.

asepsis. Absence of or freedom from infection.

aseptic technic. The methods used to prevent infection; *e.g.*, sterilizing, disinfecting etc.

aseptol. $C_6H_4.OH.HSO_3$ = 174. o-phenol sulfonic acid, sulfophenol, sozolic acid, o-sulfocarbolic acid. A reddish oil, used as 33 % solution, d.1.55; soluble in water or alcohol. Used as an antiseptic or disinfectant, and a reagent for albumin, bile pigments, nitrites and nitrates.

aseptoline. Pilocarpine.

asexual. Without sex; as the lower forms of plants and animals.

asferryl. Iron arsenotartrate. A greenish-yellow powder, used in the treatment of anemia and chlorosis.

ash. (1) The mineral matter or incombustible residue remaining after a substance has been incinerated. (2) See *Fraxinus.* **caustic-** Sodium carbonate. **causticized-** A mixture of Na_2CO_3 and NaOH. **poison-** Ischionanthus. **pot-** Potash. **prickly-** Xanthoxylum. **soda-** Commercial sodium carbonate.

Ashcroft paper tester. A device to determine the bursting strength of paper.

ashing. The process of burning organic matter, especially in analysis.

ashphalt. Asphalt.

asiminine. An alkaloid from the seeds of papaw, *Asimina triloba*, an Anonaceae. It is a narcotic.

asiphyl. Mercuric atoxylate.

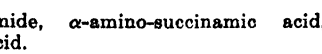
asonidin. Plumierin.

asparacemic acid. *dl* Aspartic acid.

asparagic acid. Aspartic acid.

asparagine. $C_4H_8O_3N_2.H_2O$ = 150.10. Asparagine, asparamide, agedoite, altheine, aminosuc-

cinic acidamide, α-amino-succinamic acid, aspartamic acid.



An alkaloid found in the sprouts of dicotyledons and in many seeds. White rhombic crystals, d.1.543, m.230; soluble in hot water, insoluble in alcohol or ether. It is a constituent of many proteins, and an isomer of malamide. **a. hydrargyrate.** A mercury compound of aspargine, which is used as a diuretic in syphilis. **a. sulfate.** $C_4H_8O_3N_2.H_2SO_4$ = 230.1. A white powder, soluble in water.

asparaginic acid. Aspartic acid.

asparagus. The root of *Asparagus officinalis*, a Liliaceae. It is used as fluid extract as an aperient and diuretic. Cf. *asparol, chrysoidin.*

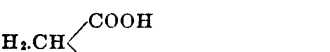
asparagyl. The monovalent radical, $NH_2.CO.CH_2.CHNH_2.CO—$, derived from aspargine.

asparamide. Aspargine.

aspargine. Asparagine.

aspartamic acid. Asparagine.

aspartic acid. $C_4H_7O_4N$ = 133.09. Aminosuc-



cinic acid, asparaginic acid, asparagic acid. **dl-** Asparacemic acid. White monoclinic prisms, d.1.663, m.278. **d-** Colorless leaflets m.251. **l-** Rhombic leaflets, d.1.661, m.270, slightly soluble in water, insoluble in alcohol, or ether; used in organic synthesis.

aspartyl. The divalent radical, $—CO.CH_2.CHNH_2.CO—$, derived from aspartic acid.

aspasiolite. A partly decomposed iolite.

aspergillic acid. An antibiotic substance produced by *Aspergillus flavus.*

aspergillin. Vegetable hematin. The black coloring matter of the spores of various *Aspergillus* species (molds).

Aspergillus. A genus of molds, many of which are parasitic. Cf. *mycogalactan, tané*-koji.

asphalt. Jews' pitch, petrolene, mineral pitch, earth pitch, Trinidad pitch, petroleum pitch. A native mixture of hydrocarbons which occurs as amorphous, solid or semi-solid, brownish-black pitch or bitumen, produced from the higher boiling-point mineral oils by the action of oxygen. They are divided into *asphaltenes* and *carbenes*, q.v. Used for pavements, roofing and waterproofing materials. Cf. *parintite.* **a. base.** See *petroleum.* **a. sludge.** A non-conducting sludge found in electrical transformers. It consists mainly of oxygenated bodies of high molecular weight. **a. stone.** Natural a. A limestone naturally impregnated with bitumen. **a. testing apparatus.** See *penetrometer, viscosimeter, adhesive* meter. **a. thermometer.** An armored thermometer graduated from 200° to 450°F.

asphaltenes. That portion of asphalt or bitumen which is soluble in CS_2 but insoluble in paraffin oils or in ether. Cf. *carbenes, kerotenes.*

asphaltic bitumen. A more accurate term for *asphalt.*

asphyxia. The suffocation caused by a deficiency of oxygen for respiration.

aspidin. $C_{33}H_{32}O_7$ = 420.3. A poisonous constituent of male fern, *Aspidium.*

aspidinol. $C_{12}H_{16}O_4$ = 224.2. An alcohol, m.-161, obtained from aspidium.

Aspidium. (1) A genus of ferns. *Filices.* (2) Male fern, the dried rhizome of *A. filix-mas*, a Poldiaceae. Used poymedicinally, as the fluid extract or oleoresin, as an anthelminthic and teniacide. It contains filicic acid, filmaron, aspidin, albopannin, flavaspidic acid, etc. Cf. *pannol, filix, fustin.*

aspidosamine. $C_{22}H_{28}O_2N_2$ = 352.4. An alkaloid from quebracho bark. A brownish powder, m.100, soluble in alcohol, ether, chloroform or benzene. Used medicinally as an emetic. **a. hydrochloride.** $C_{22}H_{28}O_2N_2.HCl$ = 387.8. A brown powder, soluble in water, alcohol or ether; used as an emetic.

aspidosperma. Quebracho. The bark of *Aspidosperma quebracho,* (Apocynaceae) a South American tree. It contains aspidospermine, aspidosamine, quebrachine and other alkaloids, and is used medicinally as an antiperiodic and respiratory tonic.

aspidospermine. $C_{22}H_{30}O_2N_2$ = 354.26. (1) An alkaloid from the bark of *Aspidosperma quebracho.* White needles or prisms, m.206; soluble in alcohol, ether or chloroform. Used in the treatment of dyspnea, asthma. (2) An amorphous brownish-yellow powder, which consists of a mixture of aspidospermine, quebrachine and other quebracho alkaloids. **a. citrate** $C_{22}H_{30}O_2N_2.C_6H_8O_7$ = 546.32. An amorphous, orange powder, soluble in water or alcohol; it consists of the citrates of quebracho alkaloids. **a. hydrochloride** $C_{22}H_{30}O_2N_2.HCl$ = 390.82. An amorphous orange powder; soluble in water or alcohol. **a. sulfate** $(C_{22}H_{30}O_2N_2)_2.H_2SO_4$ = 806.61. Colorless crystals, soluble in water or alcohol; used to treat typhoid fever and dyspnea. **a. sulfate, amorphous.** The sulfate of quebracho alkaloids. An orange-yellow amorphous powder; soluble in water or alcohol.

aspirator. A suction apparatus. **a. bottle.** A glass vessel with outlets leading to the top and bottom.

aspirin. *Acetyl* salicylic acid. **methyl-** See *methyl*acetyl salicylate.

aspirochyl. Mercuric atoxylate.

assafetida. Same as asafetida.

assay. Originally the analysis of ores or alloys. Now applied to analysis in general; the analysis of pharmaceutical and official drugs in particular. **dry-.** Assaying by dry methods. **wet-.** Assaying by wet methods.

a. balance. An analytical balance. **a. combination furnace.** A combination of three furnaces for roasting sulfides, fusing in a crucible, and cupellation. **a. crucibles.** Fireclay crucibles used in the analysis of ores and alloys. **a. flasks.** A glass vessel of shape intermediate between that of a tall beaker and an Erlenmeyer flask. **a. mill.** A small crusher or grinding device for pulverizing ores. **a. ton.** A.T. = 29.1667 grams. **a. ton system.** In the analysis of gold and silver ores, the number of mg. of gold and silver obtained from an assay ton represent the same number of ounces per short ton of 2000 pounds of ore. For a ton of 2240 lbs. A.T. = 32.6667 grams. **a. ton weights.** A set of weights (4 A.T. to $\frac{1}{20}$ A.T.) used in mineralogical analysis and gold assay.

asselline. A leucomaine from codliver oil.

assimilation. Constructive metabolism, or the transformation of non-living matter (food) into living matter (tissues).

associating. Forming complexes, *e.g.*, by polar molecules. Cf. *solvent.* **non-** Describing non-polar molecules which do not form complexes.

association. The combination, connection or correlation of substances or functions. **molecular-** The aggregation of similar molecules, especially in solutions; as, $(H_2O)_2$ and $(H_2O)_3$; or of gases, as, NO_2 and N_2O_4. Cf. coordinate bonds, *dissociation, liquids.*

astacin, astacene. $C_{40}H_{48}O_4$ = 592.34. A carotenoid produced by the oxidation of astoxanthin (q.v.); a pigment from the lobster, *Astacus gammarus;* sea spider, *Maja squinado;* and starfish, *Ophidiaster ophidianus.*

astatic. Forces in equilibrium. **a. couple.** See *astatic* galvanometer. **a. current.** An electric circuit arranged in such a way as to be unaffected by the electric field of the earth. **a. galvanometer.** A galvanometer in which an astatic couple effect is produced by two equally strong magnets. **a. needle.** Two magnetic needles placed above one another with reversed poles (N over S).

astaxanthin. $C_{40}H_{52}O_4$ = 596.4. See *astacene.*

asteriasterol. A sterol, m.70, from starfish.

asterium. A supposed element occurring in the hottest stars. Cf. *nebulium.*

asterubin. $C_6H_{13}N_3O_3S$ = 195.2. A guanidine derivative, $Me_2NC(:NH).NH.(CH_2)_2SO_3H$, from the starfish, *Aster rubens* and *A. glacialis.*

asthenics. Cerebro-spinal neurotics. A drug which produces weakness of muscular power; *e.g.*, aconite, conium, curare, physostigmine, gelsemium, veratrum.

astigmatism. The inability of the eye to focus light rays from different meridians on the same point.

A.S.T.M. American Society for Testing Materials. An organization which issues specifications and methods of testing for various materials. Cf. B.S.I.

Aston, Francis William. 1877–. An English physicist noted for the development of mass-spectra and Nobel Prize Winner (1922). **A. rule.** Not more than two isotopes are known for any element of odd atomic number, except among the radioactive elements. **A. spectrum.** A mass-spectrum, from which the isotopic weights of an element are determined.

astrakanite, astrochanite. $MgSO_4.Na_2SO_4.4H_2O$. Blödite. A native, magnesium, sodium sulfate, found at Stassfurt.

astral oil. Same as kerosene.

astringency. Sourness of taste combined with contracting power, as in tannins.

astringent. A drug which contracts tissues, and thereby lessens secretions. Used in diarrhea and also externally in wounds to check bleeding; *e.g.*, alum, tannin, silver nitrate, zinc sulfate.

astrolin. $C_{16}H_{22}O_4N_2$ = 306.2. Methylethylglycolic antipyrine. $C_5H_{10}O_3.C_{11}H_{12}ON_2$. A colorless crystalline powder with pleasant acid taste, m.64; soluble in water or alcohol. Used to relieve neuralgic headaches.

astronautics. The study of the physical possibilities of voyaging through space to other celestial bodies.

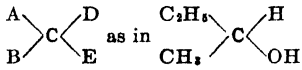
astronomical unit. (1) The mean distance from the sun to the earth, 149,500,000 km. (2) See *parsec, light year* and *magnitudes.*

astronomy. A branch of science dealing with the study of the cosmos, and the correlation, motions, and characteristics of celestial bodies.

astrophyllite. $H_4(K,Na)_2(Fe,Mn)_5(SiTiZr)_7O_{22}$. A native silicate, occurring in bronze-yellow orthorhombic crystals.

astrophysics. A branch of science dealing with the interpretation of spectral lines which indicate the movement, velocity, composition, temperature, and other characteristics of a celestial body (star, comet, etc.).

asymmetric. (1) Unsymmetric; *e.g.*, the 1.2.4-position of benzene. (2) Pertaining to an asymmetric atom. (3) Triclinic. **a. atom.** An atom which has each of its bonds satisfied or united to a different atom or radical. Thus an asymmetric N-atom has three different radicals, and an asymmetric carbon atom (q.v.). **a. carbon.** Any carbon atom of an organic compound which has four different radicals or atoms attached to it:



Compounds containing one or more a. carbon atoms are optically active. **a. compound.** A compound which contains one or more asymmetric atoms. Cf. *stereoisomerism.* **a. molecule.** See *asymmetric.*

asymmetry. A dissimilarity or absence of symmetry, as, an unequal distribution of radicals around a ring or atom.

asymptotes. Rectilinear or curvilinear lines which continually approach a curve without touching it.

A.T. See *assay* ton.

atabrine. Chinacrin. Trade-name for the dihydrochloride of methoxy chlorodiethyl amino pentylamino acridine used as anti-malarial. Cf. *atebrin.*

atacamite, atakamite. $CuOCl.Cu(OH)_2$. Remolinite. A native, dark-green hydrous copper oxychloride.

atalpo clay. A Cornish colloidal china clay, used as a soap filler and as a catalyst.

-ate. A suffix for compounds, (1) which contain a nonmetal in its higher positive valence (cf. *-ite);* (2) which are formed from an acid and base (salts).

atebrin. $C_6H_3(NH_2)_2Me$ = 122.1. Mecaprine hydrochloride. An antimalarial similar to plasmoquin, q.v. Cf. *atabrine.*

athamantin. $C_{24}H_{30}O_7$ = 430.3. A bitter principle from the roots and seeds of *Athamanta oreoselinum,* an Umbelliferae.

athermal. A cool spring or mineral water with a temperature below 15°C.

atherospermine. $C_{30}H_{20}O_5N$ = 474.2. An alkaloid from the bark of *Atherosperma moschatum,* the Australian sassafras, a Monimiaceae of Tasmania and Victoria; sometimes used as tea and, by the natives, as an anti-rheumatic and in secondary syphilis.

atisine. $C_{22}H_{31}NO_2$ = 341.25. Colorless powder, m.85, slightly soluble in water.

Atkinson hemin test. A method of preparing blood crystals (hemin) for microscopical examination and identification.

atm. Abbreviation for *atmosphere.*

atmolysis. The separation of gases by diffusion through porous walls; see *Graham's* law. **fractional-** A method for continuous diffusion of a gas, used in the separation of isotopes; *e.g.*, of chlorine.

atmometer. An instrument for the determination of the amount of water passing into the air by evaporation.

atmos. Aer. A unit of air pressure on one square centimeter; equal to a column of 760 mm. of mercury.

atmosphere. (1) The air or the gases surrounding the earth. (2) The pressure exerted by the air at sea-level. (3) A unit of pressure; *e.g.*, the pressure which equals the weight of mercury, d.13.5951, 760 mm. high = 29.922 inches = a pressure of 14.6974 pounds per square inch, or 1.0333 kg. per sq. cm. = 1,013,249 dynes $cm.^{-2}$.

atmospheric gases. The carbon dioxide varies in quantity (approx. 0.03 % by vol.), and the percentage volumes of the other gases (on the moisture- and carbon dioxide-free air) are:—

nitrogen	78.03
oxygen	20.99
argon	0.94
neon	0.0012
helium	0.0004
krypton	0.0001
xenon	0.00001

atmotherapy. The treatment of diseases with vaporized substances; *e.g.*, the application of atomizers in respiratory disorders.

atom. A chemical unit; the smallest part of an element which remains unchanged during any chemical reaction, and is thus chemically indestructible and indivisible; yet it may undergo physical changes, as, excitation, disintegration and transformation to other atoms. Cf. *radioactive* elements, *matter*. Evidence for the reality of a. is the seven different methods of determining Avogadro's number, by observing through a spinthariscope, by photographing Wilson tracks and by crystallograms. An a. has three fundamental numbers:

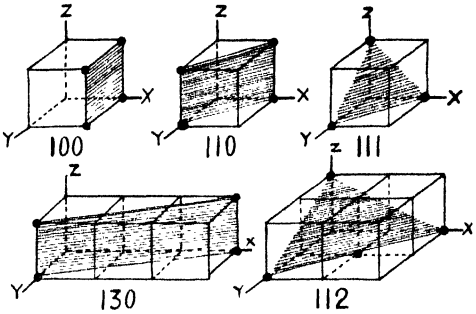
1. Mass number, giving the number of protons and neutrons. (=*isotopic weight*).
2. Atomic number, giving the number of extranuclear electrons.
3. Packing fraction, which is an indication of the forces binding nuclear particles together.

See also *atomic* structure. **activated-** Excited. **asymmetric-** See *asymmetric a.* **Bohr-** The concept of a dynamic atom derived from phenomena of radiations. Cf. *atomic* structure 5. **charged-** An electrically charged a.; an *ion*. **chemist's-** Lewis-. **cubical-** Lewis-. **dark-** An a. that does not emit radiations. **dynamic-** Bohr-. **excited-** Activated-. An a. in which the electrons are moving in elliptical orbits or on a higher *energy level*, q.v. Such a. are found in sun and stars, and are produced in the laboratory by exposing vapors and gases to strong electric fields or radiations. The chemical symbol plus asterisk differentiates the excited from non-excited a.; thus: $K \rightarrow K^*$, or $Cl_2 + h\nu = Cl^* + Cl$. **exploding-** An atom which undergoes rapid disintegration with the release of a large amount of energy. Cf. *a. disintegration*. **fluctuating.** Schrödinger-. **giant-** An entity so large in size and fixed in form as to surround all matter. It is supposed to fill and create space. **ionized-** An a. from which some of the valence electrons are removed (positive ion), or which has captured additional electrons (negative ion). **irradiated-** See *irradiation*. **kinetic-** Bohr-. **labelled-** *Radioactive* indication. **Langmuir-** An elaborated concept of Lewis-. Cf. *atomic* structure 4. **Lewis-** The concept of a static a. as derived from the phenomena of crystal structure and chemical bonds. Cf. *atomic* structures 3 and 4. **neutral-** An a. in which the positive nuclear charge is balanced by the negative electrons; the latter may be either in the normal or excited state and thereby differ from the stripped a. (q.v.) and ionized a. **normal-** An a. which is neither excited nor ionized, in which the electrons are supposed to be in their lowest energy levels. **nuclear-** Stripped-. **physicist's-** Bohr-. **planetary-** Rutherford's-. **pulsating-** Schrödinger-. **radiating-** An a. in which the electrons are passing from a higher to a lower energy level and which thereby, emits radiations. Cf. *quantum*. **recoil-** An a. from which an alpha particle is being thrown off and which thereby, recoils with a speed corresponding with its mass. Cf. *radioactivity*. **Rutherford's-** The original concept (1911) of a planetary a. which resembles a solar system. Cf. *atomic* structure 1. **Schrödinger-** The concept of a pulsating a. consisting of an electric field of different intensities. Cf. *atomic* structure 6. **static-** Lewis-. **stripped-** An a. whose electrons have been removed by strong electric fields or extremely high temperature. They are supposed to exist in the interior of stars, and to account for the extreme densities of some celestial objects. Cf. *spectral* classification. **tetrahedral-** An a. in which pairs of electrons are supposed to oscillate around centers located like the four corners of a tetrahedron. It is a later modification of Lewis a. Cf. *atomic* structure 4.

a. annihilation, The destruction of matter by its complete transformation into radiation, $Mc^2 = E$, where M is the mass in grams, c the velocity of light in cm. per sec., and E the energy in ergs. This is assumed to occur inside stars where pressure, temperature and density are extremely high, and it is the source of stellar energy. **a. building.** The formation of atoms from + and − electrons, especially the formation of He, O, Si, and Fe from H. This process is assumed to occur in interstellar space, where pressure, temperature and density are extremely low. It generates the highly penetrating cosmic rays; $\delta E/c^2 = \delta M$. **a. creation.** The creation of matter by the complete transformation of energy: $E/c^2 = M$, into positive and negative electrons, hydrogen atoms. This process is as yet hypothetical, but a necessary link in the mass-energy cycle. **a. disintegration.** The disintegration of atoms, either naturally, as in natural radioactivity, or artificially, as by the bombardment of atomic nuclei with protons, deuterons, alpha particles, neutrons or photons, whereby new atoms are formed and more or less energy is liberated. Very often the new atoms are unstable and undergo further disintegration. Practically all elements have been disintegrated by artificial means. Generally the product differs only slightly from the original but some atoms, as uranium 235, undergo fission into two atoms of approximately equal weight with release of much energy. **a. fragment.** The disintegration product of an atom that has been split by an α-particle; as observed by the *Wilson* method, q.v. **a meter.** *Ångström* unit. **a. model.** (1) Atomic model. (2) One of several

kinds of models, generally made of wooden component parts, by means of which certain properties of atoms, especially valency and isomerism, may be depicted. (3) An electrical or magnetic device which illustrates the structure of the a. or some of its properties. **a. of electricity.** Electron.

atomic. Pertaining to the ultimate electrical unit of an element. **a. bomb.** A military bomb utilizing the great energy liberated in the explosive disintegration of atoms of the type of neptunium, plutonium, and uranium 235; its destructive power exceeds that of any other military bomb. **a. diameter.** The imaginary line connecting the extreme electron orbits through the center of the a. **a. disintegration.** See *atom d.* **a. distance.** The average or equilibrium length between the centers of two atoms expressed in Ångström units. They are determined from crystal structure and band spectra data, and may be calculated from a. radii. **a. domain.** The imaginary sphere occupied by the a. structure. **a. energy.** The force which holds the a. together, or the amount of energy liberated when an atom disintegrates or is transformed. 1 gm. radium is equivalent to 2 billion calories. Cf. *packing* effect. **a. excitation.** See excited *atom, excitation.* **a. evolution.** Cf. *spectral* classification, "*old* age" theory. **a. field.** The space around an atom which cannot normally be penetrated by other atoms. See *molecular* diagram, *magnetic* field. **a. fragment.** Cf. *atom* fragment. **a. frequency.** Characteristic K radiations. Cf. Moseley *spectrum* and a. number. **a. group.** Radical. **a. heat.** The amount of heat required to raise the temperature of one gram atom of an element one °C; hence, the product of the specific heat, H, and the atomic weight, A, of an element: $H \times A = 6.4$. Cf. *heat* capacity. **a. kernel.** An atom stripped of its valence electrons; it differs from the a. nucleus. **a. mass.** The quantity of matter, q.v., contained in an atom. This has been measured for hydrogen by determining the ratio $m/e = 1.04 \times 10^{-4}$, where m is the mass of H atom and e the electric charge; hence, if $e = 1.57 \times 10^{-20}$, the mass of H is 1.64×10^{-24} gram, and the mass of any other atom is its a. weight multiplied by this quantity. **a. meter.** Ångström unit. **a. migration.** *Molecular* rearrangement. **a. model.** The concept of a. structure; as, Bohr's, Lewis', and Schrödinger's atoms. **a. nucleus.** The central, positively-charged part of an atom consisting of I positive charges and (I-N) negative charges, where I is the isotopic weight and N the atomic number. Cf. *neutron, proton, kernel.* **a. number.** Ordination number, N or Z (zahl). An integer which indicates the order of the elements in the periodic system, and which is assumed to represent the number of negative electrons located outside the a. nucleus. It is related to the frequency, ν, and wavelength, λ, of the x-ray spectrum of an element by $c/\lambda = \nu = C(A - b)^2$, where C and b are constants. A the a. number, and c the velocity of light. For the K radiations the equation becomes $\sqrt{\nu} = \frac{3}{4}R(A - 1)$; and for the L series $\sqrt{\nu} = \frac{5}{9}R(A - 7.5)$, where R is Rydberg's constant. **a. oscillations.** The vibrations of a. nuclei or atoms within a molecule. Cf. *activated* molecule. **a. percentage.** The percentage by weight of a mixture, or system of compounds divided by the atomic weight; hence, the relative abundance or number of atoms in 100 parts; thus, NaCl = 50 % Na-atoms, 50 % Cl-atoms; HNO_3 = 20 % H-atoms, 20 % N-atoms, 60 % O-atoms. **a. plane.** The imaginary surface which passes through a set of atoms in a space lattice, and indicated by the Miller indices 100, 110, 111, etc. (see figure). **a.**



Atomic planes.

potential. *Ionization* potential. **a. properties.** Those characteristics of an element which depend on a. structure (q.v.), as opposed to those properties due to molecular structure and molar states. **a. radius.** (1) The distance from the a. nucleus to the valence electrons. (2) The half-way distance between like atoms; it is relatively constant and depends on the type of bond between the atoms. By

ATOMIC RADII
(Ångström units)
Single bond radii

B	C	N	O	F
0.89	0.77	0.70	0.66	0.64
	Si	P	S	Cl
	1.17	1.10	1.04	0.99
	Ge	As	Se	Br
	1.22	1.21	1.17	1.14
	Sn	Sb	Te	I
	1.40	1.41	1.37	1.33

Double bond radii

B	C	N	O
0.80	0.69	0.63	0.59

Triple bond radii

C	N	O
0.61	0.55	0.52

adding the radii of different unlike atoms their distances can be found; thus the a. r. for the single bond C is 0.77; for single bond N is 0.70; hence the distance C—C is 1.54, C—N is 1.47 and N—N is 1.40. **a. refraction.** The product of the specific refraction and the a. weight of an element. **a. species.** (1) Any one of the atoms of the 92 elements. (2) Isotopic species. Any of the many types of a. structures characteristic of each isotope. Thus the element chlorine consists of the a. species Cl^{35} and Cl^{37}, or isotopes with isotopic weights of 35 and 37. **a. structure.** Theories of the composition or constitution of atoms, based upon a speculative interpretation of chemical and physical properties of the elements. Some of the

TABLE OF ELEMENTS
ATOMIC NUMBERS AND ATOMIC WEIGHTS (1943)

The *atomic weights* are those accepted by the International Committee; where none is given it indicates that no actual determinations have been made, but theoretical values can be obtained from the *periodic* system, q.v. *Synonyms* of elements are given where a symbol has been derived from them.

Element	Symbol	At. number	At. weight
actinium	Ac	89	
actinon	An	86	
alabamine	Am	85	
aldebaranium, Ad, is *thulium*			
aluminum	Al	13	26.97
anglo-helvetium, is *alabamine*			
antimony	Sb	51	121.76
argentum is *silver*			
argon	A	18	39.944
arsenic	As	33	74.91
aurum is *gold*			
azote, Az, is *nitrogen*			
barium	Ba	56	137.36
beryllium	Be	4	9.02
bismuth	Bi	83	209.00
bohemium, Bo, is *rhenium*			
boron	B	5	10.82
brevium, Bv, is *ekatantalum.*			
bromine	Br	35	79.916
cadmium	Cd	48	112.41
caesium is *cesium*			
calcium	Ca	20	40.08
cassiopeium, Cp, is *lutecium*			
carbon	C	6	12.010
celtium, Ct, is *hafnium*			
cerium	Ce	58	140.13
cesium	Cs	55	132.91
chlorine	Cl	17	35.457
chromium	Cr	24	52.01
cobalt	Co	27	58.94
columbium	Cb	41	92.91
copper	Cu	29	63.57
cuprum is *copper*			
denebium, De, is *thulium*			
dubhium, Db, is *ytterbium*			
dysprosium	Dy	66	162.46
ekatantalum, Et, is *protactinium.*			
eline	El	85	
emanation, Em, is *radon*			
erbium	Er	68	167.2
europium	Eu	63	152.0
ferrum is *iron*			
florentium, Ft, is *illinium*			
fluorine	F	9	19.00
gadolinium	Gd	64	156.9
gallium	Ga	31	69.72
germanium	Ge	32	72.60
glucinium, Gl, is *beryllium*			
gold	Au	79	197.2
hafnium	Hf	72	178.6
helium	He	2	4.003
holmium	Ho	67	164.94
hydrargyrum, is *mercury*			
hydrogen	H	1	1.0080
illinium	Il	61	
indium	In	49	114.76
iodine	I	53	126.92
ionium	Io	90	
iridium	Ir	77	193.1
iron	Fe	26	55.85
kalium is *potassium*			
krypton	Kr	36	83.7
lanthanum	La	57	138.92
lead	Pb	82	207.21
lithium	Li	3	6.940
lutecium	Lu	71	174.99
magnesium	Mg	12	24.32
manganese	Mn	25	54.93
masurium	Ma	43	
mercury	Hg	80	200.61
molybdenum	Mo	42	95.95
natrium, is *sodium*			
neodymium	Nd	60	144.27
neon	Ne	10	20.183
nickel	Ni	28	58.69
niobium, Nb, is *columbium*			
nitrogen	N	7	14.008
niton, Nt, is *radon*			
osmium	Os	76	190.2
oxygen	O	8	16.0000
palladium	Pd	46	106.7
phosphorus	P	15	30.98
platinum	Pt	78	195.23
plumbum, is *lead*			
polonium	Po	84	
potassium	K	19	39.096
praseodymium	Pr	59	140.92
protactinium	Pa	91	231
radium	Ra	88	226.05
radon	Rn	86	222
rhenium	Re	75	186.31
rhodium	Rh	45	102.91
rubidium	Rb	37	85.48
ruthenium	Ru	44	101.7
samarium	Sm	62	150.43
scandium	Sc	21	45.10
selenium	Se	34	78.96
silicon	Si	14	28.06
silver	Ag	47	107.880
sodium	Na	11	22.997
stibium, is *antimony*			
stannum, is *tin*			
strontium	Sr	38	87.63
sulfur	S	16	32.06
tantalum	Ta	73	180.88
tellurium	Te	52	127.61
terbium	Tb	65	159.2
thallium	Tl	81	204.39
thorium	Th	90	232.12
thoron	Tn	86	
thulium	Tm	69	169.4
tin	Sn	50	118.70
titanium	Ti	22	47.90
tungsten	W	74	183.92
uranium	U	92	238.07
vanadium	V	23	50.95
verium	Ve	87	
wolfram is *tungsten*			
xenon	Xe	54	131.3
ytterbium	Yb	70	173.04
yttrium	Y	39	88.92
zinc	Zn	30	65.38
zirconium	Zr	40	91.22

properties accounted for by the composition of a. nucleus and the arrangement of electrons are, classified:

ATOMIC STRUCTURE

Nucleus (*H, He,* ϵ)	Electrons (ϵ, *quanta*)	
	static, in shells	dynamic, in orbits.
atomic weight	valency	gaseous ionization
isotopic weight	polar and non-polar bonds	excitation
mass spectra	ionization	radiation
atomic number	crystal structure	luminescence
atomic frequency	oxidation-reduction	spectrum and spectral lines
radioactivity	density	irradiation
abundance		

(1) The atom consists of an extremely small, positively-charged nucleus containing the mass of the atom, surrounded by a number of electrons sufficient in number to neutralize the electric charge. The number of positive charges on the nucleus varies from 1 to 92 and corresponds with the a. number; the number of total charges varies from 1 to 238, and corresponds with the isotopic weight. Thus, in the case of uranium the nucleus contains 238 positive and 146 negative electrons, leaving a positive charge of 92, which is neutralized in the normal atom by 92 electrons arranged in a definite order, the outermost being the valence electrons. (*Rutherford, et al.*) Cf. *periodic* system.

(2) The nucleus itself, 10^{-12} cm. in diameter, consists of α-particles, (=He nuclei), protons (=H nuclei) and electrons, which are closely packed together. (*Prout, Harkins.*) Cf. *packing* effect, *isotopes.*

(3) The electrons are distributed in successive layers of 2, 8, 8, 18, 32, and 18 electrons, respectively. (*Kossel, Lewis.*) Cf. *orbits, shells, periodic* system, *Stoner* quanta, *Pauli's* principle.

(4) The electrons oscillate in shells, usually pairs, around centers corresponding with the corners of a cube or tetrahedron; as, in crystals, solids and liquid compounds. (*Lewis, Langmuir.*) Cf. *octet, kernel, valency.*

(5) The electrons rotate in orbits, which may be circular or elliptical and at different energy levels; as, in luminous gases and excited molecules. (*Bohr, Sommerfeld.*) Cf. *orbits, quantum, excitation.*

(6) The atom as a whole comprises electric fields of various intensities, which may pulsate or fluctuate in definite modes which corresponding with the various energy levels (*Schrödinger*). Cf. wave mechanics.

a. theory. (1) The modern concept of a. structure. (2) The idea of finite particles of matter, as conceived by Democritus (400 B.C.) Xenophanes, Lucretius, and others, and established by Dalton (1808) and others. Cf. *kinetic* theory. **a. transformation.** The building up of atoms of higher a. weight from those of lower a. weight. **a. transmutation.** An artificial process for changing one atom into another; as, in artificial disintegration. Cf. *nuclear* chemistry. **a. volume.** The space, AV, occupied by one gram atom of an element. It is obtained by dividing the atomic weight, AW, by the density, D, of the solid or liquid element: hence, AV = AW/D. **a. weight.** A number indicating the relative weight of an element as compared with hydrogen (=1.0080) or oxygen (=16.000). It is the mean value of the isotopic weights of an element. Its accuracy is indicated by the number of significant figures following the decimal point. From the most accurate determinations the most reliable are selected and published annually by an international committee. *absolute-* The actual weight of an atom. *chemical-* The a. w. determined by chemical methods and *weight* relations; they are based on oxygen gas = 16.000, the O_2 being a mixture of isotopes 16, 17, 18. *physical-* The a. w. determined by physical methods and *mass* relations. Thus *Chem. A.W.* = *Phys. A.W.*/1.00022.

RELATION OF ATOMIC WEIGHTS

	Physical	*Chemical*	*Absolute*
H.....	1.00755	1.00778	1.662*
He.....	4.0013	4.0018	6.5994*
F.....	18.996	19.00	——
proton.....	1.0072	——	1.661*
alpha particle.	4.00106	——	6.598*
electron.....	0.000548		9.040**

* × 10^{-24} gm.
** × 10^{-28} gm.

rational- The a. w. referred to weighings in vacuo, corrected for buoyancy in air. These weights should be used in accurate analytical work.

atomicity. Valency.

atomization. Breaking up a liquid into a fine spray.

atomizer. A device for breaking a liquid into a spray or fog; a nebulizer.

atom-meter. Ångström unit.

atomology. The study of atoms and their structure.

atophan. $C_{16}H_{11}NO_2$ = 249.1. Phenylquinoline carboxylic acid, phenylcinchoninic acid, quinophen, agotan, cinchophen, $Ph.C_9H_5N.COOH$. Colorless crystals subliming at 200, used as an antirheumatic and in gout. Cf. *acitrin.*

atopite. $Ca_2Sb_2O_7$. A native calcium antimonite, which occurs in yellow or brownish isometric masses.

atoquinol. $C_{16}H_{15}O_2N$ = 289.1. Phenyl cinchoninic acid, a yellow powder insoluble in water; used as antirheumatic.

atoxyl. $NaC_6H_7O_3NAs$ = 239.1. Sodium-m-arsenite-anilide, arsamin, sodium arsanilate. A white odorless powder, used in hypodermic medication. Cf. *maretin.* **acetyl-** Arsacetin. **a. mercury.** Mercuric atoxylate.

atoxylate. Arsanilate. A salt of arsanilic acid which contains the divalent $MH_2.C_6H_4AsO_3$ = radical.

atoxylic acid. Arsanilic acid.

atractylene. $C_{15}H_{24}$ = 204.19. A sesquiterpene, d.0.927, b_{14mm}.141, from the essential oil of *Atractylis*, a Compositae of Asia.

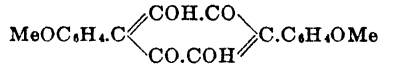
atractylol. $C_{15}H_{26}O$ = 222.2. A solid alcohol, d.1.511, m.59, b.292, from the essential oil of *Atractylis.*

atreol. Ammonium atreolate. An aqueous solution of a mixture of ammonium salts derived from organic acids, in which the N is in the sulfonic radical. A black, sirupy liquid; soluble in water, and used as mild antiseptic.

roglyceric acid. $C_9H_{10}O_4$ = 182.1. α-phenylglyceric acid, $CH_2OH.C(OH)Ph.COOH$. White crystals, m.146.

atrolactic acid. $C_9H_{10}O_3$ = 166.1. α-phenyl lactic acid, α-methyl mandelic acid, hydroxyhydratropic acid, atrolactinic acid, $Me.C(OH)Ph.COOH$, H_2O. Colorless crystals, m.90, soluble in water.

atromentin. $C_{20}H_{16}O_6$ = 352.12. *2.5*-Dihydroxy-*3.6*-bis (p-methoxy phenyl) quinone. A plant pigment having the formula:



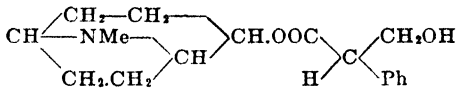
atronene. $C_{16}H_{14}$ = 206.11. Atronol, phenyldihydronaphthalene. A colorless hydrocarbon, m.326, insoluble in water.

atronic acid. $C_{17}H_{14}O_2$ = 250.21. Colorless prisms, m.164, soluble in water or alcohol.

atropamine. Apoatropine.

atropic acid. $C_9H_8O_2$ = 148.1. α-phenylacrylic acid, α-methylene-α-toluic acid, $CH_2:CPh.COOH$. Colorless, monoclinic scales, m.106, b.267 decomp.; sparingly soluble in water, soluble in alcohol or carbon disulfide. It is obtained from atropine by boiling with alkali. **iso-** Isatropic acid. **methyl-** $C_6H_5.C(NCH.CH_3)COOH$ = 176.1. Colorless crystals, m.135.

atropine. $C_{17}H_{23}O_3N$ = 289.28. Coromegine, daturine, i-tropine, tropyl tropate, tropin tropic ester, *dl*-hyoscyamine. The alkaloid



from *Atropa belladonna*, deadly nightshade, or *Datura stramonium*. Colorless needles, m.115; slightly soluble in water, alcohol, or ether. It is an antispasmodic, mydriatic and antidote for morphine, pilocarpine and prussic acid. The antidotes of atropine are emetics, stomach pump, pilocarpine, morphine. **a. arsenate** $(C_{17}H_{23}O_3N)_2H_3AsO_4$ = 720.56. Colorless crystals; soluble in water or alcohol. **a. borate** $(C_{17}H_{23}O_3N)_2B_4O_7$ = 733.6. White crystals; soluble in water or alcohol. **a. gold hydrochloride** $C_{17}H_{23}O_3N.HAuCl_4$ = 629.33. Yellow leaflets, m.136; slightly soluble in water. **a. hydrobromide** $C_{17}H_{23}O_3N.HBr$ = 370.2. Colorless crystals; soluble in water. **a. hydrochloride** $C_{17}H_{23}O_3NHCl$ = 325.78. White crystals; soluble in water or alcohol. **a. hydroiodate** $C_{17}H_{23}O_3N.HIO_3$. Colorless crystals, soluble in water. **a. iodate** $C_{17}H_{23}O_3N.HIO_3$ = 465.21. Colorless crystals; soluble in water. **a. methylbromide** $C_{16}H_{20}O_3N(CH_3)_2Br$ = 384.1. White crystals, m.222; soluble in water or alcohol. **a. methylnitrate** $C_{16}H_{20}O_3N(CH_3)_2NO_3$ = 366.1. Eumydrine. White crystals, which are odorless and soluble in water or alcohol. **a. nitrate** $C_{17}H_{23}O_3N.HNO_3$ = 352.28. Colorless crystals; soluble in water or alcohol. **a. salicylate** $C_{17}H_{23}O_3N.C_7H_6O_3$ = 410.3. Colorless, deliquescent powder; soluble in alcohol or water. **a. santonate** $C_{17}H_{23}O_3N.C_{15}H_{20}O_4$ = 553.3. Colorless crystals; soluble in water. **a. stearate** $C_{17}H_{23}O_3N.C_{18}H_{36}O_2$ = 573.3. A colorless powder, used in ointments. **a. sulfate** $C_{17}H_{23}O_3N.H_2SO_4$ = 387.36. Colorless crystals, m.192; soluble in water, alcohol or ether. It is extensively used in ophthalmology. **a. valerate** $C_{17}H_{23}O_3N.C_5H_{10}O_2.\frac{1}{2}H_2O$ = 400.33. Colorless crystals, m.42; soluble in water, alcohol or ether.

atroscin. Hyoscine hydrobromide.

atroscine. $C_{17}H_{21}O_4N.H_2O$ = 321.27. *i*-Hyoscine, *i*-scopolamine. An alkaloid from *Scopolia atropoides*, a Solanaceae. Transparent crystals; soluble in water, alcohol or ether.

atroxindole. C_9H_9ON = 147.1. Methyl-oxindole. Colorless crystals, m. 119.

attar of roses. An essential oil from damascene and cabbage roses, used in perfumery.

attemperator. A pipe through which water flows at a constant temperature. It is used to control the temperature of a vessel in which it is immersed.

attenuation. (1) The process of making less virulent or weakening the toxicity of a microorganism or virus. (2) The extent to which the specific gravity of a liquid has been lowered by alcoholic fermentation.

attraction. The force which holds the molecules of a solid or liquid together. **chemical-** Affinity. **capillary-** The forcing between dissimilar molecules of a fluid which raises or depresses the fluid in a capillary tube. **electric-** The force by which electrically oppositely-charged bodies are drawn together. **electron-** The force exerted by an atomic nucleus on the electron pair; it constitutes a *bond*. **gravitational-** Gravitation. **magnetic-** The action of a magnet in holding iron particles. **mechanical-** See *adhesion* and *cohesion*. **radiant-** See *relativity* (general).

attraxin. The radical of a compound which has a chemotactic effect on epithelial tissue.

attritus. A constituent of coal of botanical origin.

Atwater calorimeter. A bomb calorimeter for determining the heating value of foods, fats and oils, coal, etc.

Au. The symbol for gold (aurum).

aubepine. Anisaldehyde.

aucubin. A glucoside from greater plantain, *Plantago major*. White needles, m.180, soluble in water or alcohol.

audiometer. An apparatus for testing the hearing. Cf. *eudiometer*.

audion. *Electric* valve.

audiphone. A device for increasing the volume of sounds.

Auer metal. A mixture of 65 % mischmetal and 35 % Fe, used as pyrophoric alloy in gas lighters and for tracer bullets.

Auer von Welsbach. Welsbach.

auerbachite. A native, amorphous earthy zirconium silicate.

auerlite. A native thorium silico-phosphate from North Carolina. Cf. *monazite*.

augelite. A natural, basic aluminum phosphate.

augite. $CaMg_2Al_2Si_3O_{10}$. Malacolite. A dark aluminum pyroxene, which occurs in basalt. Cf. *sahlite*.

augmentation. (1) A proposed term for oxidation. (2) Opposed to diminution. Cf. *electronation*.

augustione. Angustione.

aura. (1) The current of air or breeze produced by the discharge of static electricity from a point. (2) A peculiar radiation said to emanate from living organisms, which can be photographed by the use of a fluorescent screen prepared from dicyanine solution. Cf. *scotography*.

auramine. $C_{17}H_{21}N_3$ = 267.28. Tetramethyl-p₂-diamidoimido benzophenone, yellow pyoktannin. Yellow scales, m.136; insoluble in water, soluble in alcohol. Used as a dye for silk, wool, paper and leather. **a. hydrochloride.** $Me_2N.C_6H_4.C(NH_2):C_6H_4:NMe_2Cl$. The auramine of commerce. A sulfur-yellow powder; soluble in alcohol, ether or water. Used to color foods, textiles, leather and paper; also as antiseptic.

aurantia. An orange nitramine aniline dye; used in foodstuffs, for light filters and as a biological stain.

Aurantiaceae. The orange family, a group of trees and shrubs with a juicy fruit with a leathery skin and contain a fragrant essential oil. See *Citrus*.

aurantiin. Naringin.

aurantine. An orange extract.

aurantium. The Latin term for orange.

aurate. A salt of auric acid containing the trivalent AuO_3 ≡ radical.

aureolin. Primulin.

auri. The official Latin for gold.

auribromhydric acid. $HAuBr_4.5H_2O$ = 607.96. A yellow crystalline mass, m.27, soluble in water.

auribromide. Bromaurate. A salt of the type $MAuBr_4$.

auric. A compound of trivalent gold, Au ≡. **a. acid** H_3AuO_3 = 248.2. Auric hydroxide. A yellow-brown powder, decomp. 150; insoluble in water, soluble in alkalis with the formation of aurates. **a. bromide** $AuBr_3$ = 436.96. Gold tribromide. A dark brown to black powder; soluble in water, ether or alcohol. It is an antiepileptic, nervine and anodyne. **a. chloride** $AuCl_3$ = 303.58. Gold trichloride. Red leaflets, d.3.9; soluble in water, alcohol or ether; used in photography. It sublimes if heated, and decomp. at 180. **a. chloride acid** $AuCl_3.HCl.4H_2O$ = 412.11. Aurochlorohydric acid. Yellow crystals; soluble in water, alcohol or ether. It contains 49 % gold. **a. chloride cryst.** $AuCl_3.2H_2O$ = 339.61. Cryst. gold trichloride. Orange-yellow leaflets; soluble in water. **a. chloride fused** $AuCl_3.HCl.xH_2O$. Brown masses, soluble in water, alcohol or ether. Used in photography and electroplating etc.; and medicinally, as an antituberculosis and alterant. It contains 50–51 % gold. **a. cyanide** $Au(CN)_3.6H_2O$ = 383.33. Gold tricyanide, gold cyanide. White hygroscopic crystals; soluble in water or alcohol. Used in the treatment of tuberculosis. **a. hydroxide** $Au(OH)_3$ = 248.22. Gold hydroxide, auric acid. Yellowish-brown powder, decomp. 150; insoluble in water, soluble in alkalis with the formation of aurates. **a. iodide** AuI_3 = 577.96. Gold triiodide. A dark green powder, decomp. when heated, and insoluble in water. **a. nitrate acid** $Au(NO_3)_3.HNO_3.3H_2O$ = 500.30. Gold hydrogen nitrate. Yellow triclinic crystals, decomp. on heating; soluble in water. **a. oxide** Au_2O_3 = 442.2. Gold oxide, gold trioxide. A black powder which loses oxygen on heating and is insoluble in water. **a. potassium bromide** $KAuBr_4.2H_2O$ = 592.4. Gold potassium bromide, Potassium auric bromide, potassium bromaurate. Yellow needles; soluble in water. Used as an antiepileptic. **a. potassium chloride** $KAuCl_4.2H_2O$ = 414.4. Gold potassium chloride, potassium auric chloride, potassium chloraurate. Yellow needles; soluble in water; used in photography and as a ceramic pigment. **a. potassium cyanide** $KAu(CN)_4.2H_2O$ = 376.5. Potassium auric cyanide. Yellowish crystals; soluble in water. **a. potassium iodide** $KAuI_4$ = 743.8. Gold potassium iodide, potassium auric iodide, potassium iodo aurate. Shining black crystals, which decomp. when heated; soluble in water. **a. sodium bromide** $NaAuBr_4.2H_2O$ = 576.2. Gold sodium bromide, sodium auric bromide, sodium bromaurate. Black crystals; soluble in water. An antiepileptic, used in 2 % solution for hypodermic medication. **a. sodium chloride** $NaAuCl_4$ = 362.2. Gold sodium chloride, sodium auric chloride, sodium chloraurate. Yellow crystals, soluble in water; used as a nervine and alterant. **a. sulfate** $Au_2O_3.2SO_3.H_2O$ = 620.54. Gold sulfate. Yellowish deliquescent crystals, decomp. on heating; soluble in water. **a. sulfide** Au_2S_3 = 490.58. Gold trisulfide. A brown powder, insoluble in water, soluble in alkali sulfide solutions.

aurichalcite. The native $2(ZnCu)CO_3$, $3(ZnCu)(OH)_2$.

aurichloride. A salt containing the monovalent $AuCl_4$—radical.

aurichlorohydric acid. *Auric* chloride acid.

auricome. *Hydrogen* peroxide.

auricyanhydric acid. $HAu(CN)_4$ = 302.24. Auric cyanide acid. Gold hydrocyanic acid. Colorless crystals; soluble in water.

auricyanide. A double cyanide containing the monovalent $Au(CN)_4$— radical; *e.g.*, potassium auricyanide.

auriferous. Containing gold, *e.g.*, an ore.

auriiodide. A compound containing the monovalent —AuI_4 radical.

aurin. $C_{19}H_{14}O_3$ = 290.22. Pararosolic acid. Coralline. A triphenylmethane dye obtained by diazotizing p-rosaniline $(HO.C_6H_4)_2 = C = C_6H_4:O$. Red needles, m.220 (decomp.); insoluble in water, soluble in alcohol, ether or alkalis. Used as a dye in textile printing, and in wall-paper manufacture; also as indicator, which changes at pH 7.5 from yellow (acid) to magenta (basic). Cf. *rosolic acid*. **a. carboxylic acid.** Aluminon.

auripigment. Arsenous sulphide.

auro. Aurous.

auroauric. A compound containing divalent gold or one atom each of mono- and trivalent gold. **a. bromide** $AuBr_2$ = 357.04 or Au_2Br_4 = 714.08. A black powder; insoluble in water. **a. chloride** $AuCl_2$ = 268.12, Au_2Cl_4 = 536.24. Gold dichloride. Dark red crystals, insoluble in water. **a. oxide** AuO = 213.2. An olive-brown powder, insoluble in water. **a. sulfide** Au_2S_2 = 458.5. A black powder, insoluble in water and decomp. by heat.

aurochin. Quinine p-amido-benzoate.

aurobromide. Bromaurite. A salt of the type $MAuBr_2$.

aurochloride. A double chloride containing the monovalent $AuCl_2$— radical; *e.g.*, sodium aurochloride, $NaAuCl_2$.

aurocyanide. A double cyanide containing the monovalent $Au(CN)_2$— radical; *e.g.*, potassium aurocyanide, $KAu(CN)_2$.

aurodiamine. $AuHN.NH_2$ = 228.3. Fulminating gold. A dirty olive-green powder prepared by digesting precipitated auric hydroxide with ammonia. When dry it explodes with great violence if struck or heated.

auroglaucine. $C_{19}H_{22}O_3$ = 298.1. A pigment produced on textiles by the action of *Aspergillus glaucus*.

auromine. $C_{17}H_{22}N_3$ = 269.30. Rose colored needles, m.96; soluble in alcohol or benzene, and insoluble in water.

aurora. Aurora Borealis. A display of variously-colored lights in the upper atmosphere, above 87 km. The spectrum shows a conspicuous green line, 5577.3Å., due to oxygen, and other lines due to nitrogen. In rare cases the aurora has been observed in the lower strata of the atmosphere. **a. tube.** A vacuum tube of uranium glass used for electric discharges.

aurorium. A hypothetical element said to produce the characteristic lines of the aurora, which are apparently due to ionized N and O atoms. Cf. *nebulium*.

aurosulfide. A salt containing the AuS— group.

aurous. A compound of monovalent gold, Au—. They resemble monovalent silver and copper compounds. **a. bromide** AuBr = 277.14. Gold monobromide. Green or grayish-yellow powder, decomp. 115; insoluble in water. **a. bromide acid** $AuBr.HBr.5H_2O$ = 448.2. Aurobromhydric acid. Red crystals, soluble in water. **a. chloride** AuCl = 232.66. Gold monochloride. Yellow crystals, decomp. on heating and in water. **a. cyanide** AuCN = 223.22. Gold monocyanide. Yellow crystals, decomp. on heating; insoluble in water, soluble in KCN solutions. Used to treat tuberculosis. **a. hydroxide** AuOH = 214.2. Brown crystals, decomp. 250. **a. iodide** AuI = 324.12. Gold monoiodide. A greenish-yellow powder, decomp. 120; slightly soluble in water. It is an alterant. **a. oxide** Au_2O = 410.4. A violet powder, decomp. 250, is insoluble in water or alcohol. **a. potassium cyanide** $KAu(CN)_2$ = 288.4. Gold potassium cyanide, potassium aurous cyanide, potassium cyanaurite, potassium aurocyanide. A white crystalline powder, soluble in water and used as an antiseptic and in electroplating. **a. sodium cyanide** $NaAu(CN)_2$ = 272.2. Gold sodium cyanide, sodium aurous cyanide, sodium cyanaurite. White crystals, soluble in water and used in electroplating. **a. sulfide** Au_2S = 426.46. A brownish-black powder, insoluble in water, soluble in alkali sulfide solutions.

aurum. Latin for gold. **a. vegetabile.** Pipitzahoic acid.

ausonium. See *ekarhenium* and *esperium*.

austenite. A carbon-iron compound formed in highly carbonized steel; it is γ-ferrite with Fe_3C formed by quenching. Cf. *martensite*.

australene. Pinene.

austrium. A supposed element, discovered (1900) by Przibram, which was shown to be gallium.

auto- A prefix from the Greek "self."

auto-activation. Activation of a gland by its own secretions.

autoantibiosis. The self-inhibition of a culture medium as a result of the previous growth of the organism in the medium.

autocatalysis. Catalysis produced by the products of a catalytic reaction.

autoclave. An apparatus for heating liquids, or sterilizing under high steam pressure.

autocoid. An early term for hormone.

autocollimation spectroscope. A spectroscope for comparing spectra.

autocytolysis. Autolysis.

autocytotoxin. A toxin formed in the body by the absorption of degenerated cells.

autodecomposition. A decomposition autocatalysis (q.v.).

autogenesis. Abiogenesis.

autogenor. A gas generator which produces oxygen automatically from "oxone" cartridges or cubes (q.v.).

auto-ignition. The temperature at which a compound ignites spontaneously. Cf. *flashpoint*.

autolysate. The liquid obtained by the self-liquefaction of organic cells or tissues.

autolyse. The act of liquefaction of organic cells.

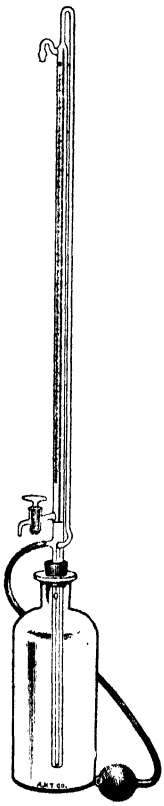
autolysis. The self-decomposition or self-disintegration of the tissue cells; or the dissolving of cells by their own serum. Cf. *heterolysis*.

autolyzate, autolyze. See *autolysate, autolyse*.

automatic. Self-working or self-regulating. **a. buret.** A buret provided with an overflow at the zero point. **a. pipet.** A pipet with an overflow at its mark used for rapidly measuring liquids. **a. respirator.** A gas mask.

automolite. Gahnite.

autooxidation. (1) The oxidation of substances by the atmosphere without the aid of other oxidizing agents. (2) An oxidation reaction which requires the presence of an inductor in order to take pla'ce. See induced *reaction*.



Automatic buret.

autophytes. Plants which can live on inorganic matter, as opposed to saprophytes, q.v.

autoprotolysis. Transfer of a proton from one molecule of a substance to another of the same substance, as $2H_2O \rightarrow H_3O^+ + OH^-$.

autotrophic. Describing an organism that is able to derive its energy by oxidation of inorganic substances, *e.g.*, sulfur, and does not depend on organic substances for its life; *e.g.*, certain bacteria.

autoxidation. Autooxidation.

autunite. $CaU_2P_2O_{20}H_{16}$ = 915.1. A native, yellow, calcium, uranium phosphate, forming orthorhombic crystals; found in Utah and South Dakota ($CaO.2UO_3.P_2O_5.8H_2O$).

auvergnose. A diorite from Mitchell County, North Carolina.

auximone. An agent that stimulates the growth of seedlings and plants; as, pantothenic acid, auxin, etc.

auxin. A. $C_{18}H_{32}O_5$ = 328.25. A plant hormone from *Avena*, m.196, which stimulates the growth of seedlings. **a.B.** $C_{18}H_{30}O_4$ = 310.23. A plant hormone from maize germ.

auxiometer. A device for measuring the magnifying power of lenses.

auxochrome. A group of atoms as $—NH_2$ or —OH, that intensifies the color of a chromophore, develops a color from a chromogen, or enhances the shade of a compound toward the violet, as > CO. Cf. *bathochrome*.

auxogluc. Any atom or radical which combined with glucophores yields compounds of sweet taste; examples —H, —CH_2OH and the lower alkyls.

auxograph. A device for recording the rate of growth of plants.

auxotox radical. The methylimine group = $N.CH_3$. It causes degeneration of the liver when a drug containing it is administered.

av. Avoirdupois.

ava. Kava.

available. That which can be utilized; **a. acidity.** Hydrogen ion concentration; **a. nitrogen.** The soluble N of fertilizers.

avalite. A clay-like silicate containing chromium.

Avena. A genus of grasses which yield important cereals; as, *A. sativa* (common oat).

avenalin. A globulin from oats.

avenin. Legumin. A protein from *Avena sativa*, oats, probably identical with gluten casein. A yellowish powder, used medicinally as a general stimulant and tonic.

avenine. $C_{56}H_{21}O_{18}N$ = 995.4. An alkaloid from oats, used as a nerve stimulant.

aventurine. (1) A brown glass with imbedded brass filings which is made in Venice. (2) A variety of feldspar containing iron. **a. quartz.** A variety of quartz from the Ural Mountains, which contains mica. Cf. *imperial* jade.

avenyl. 2-Myristo-oxy-mercury-3-oxy-benzaldehyde. A constituent of hydnocarpus oil, used for leprosy.

average. Mean.

avertin. $C_2H_3Br_3O$ = 282.77. Bromatol, tribromoethanol, ethobrome, CBr_3CH_2OH. Colorless crystals, m.80, b.$_{11mm}$94; used as rectal anesthetic.

Avicenna. 980–1037. Abu Ali en Hosein Ben Abdallah. A Persian mathematician and alchemist noted for his writings, which were translated into Latin.

avidin. A constituent of egg-white, which inactivates the biotin present and so injures the white.

Amadeo Avogadro.

(From Brownlee, Fuller and Hancock "Elementary Chemistry." Courtesy of Allyn & Bacon.)

avidity. An obsolete term for *affinity* or *activity*.

avitaminosis. A deficiency disease due to lack of a vitamin in the diet; as, beriberi and scurvy. Cf. *hypovitaminosis*.

avocado. The fruit of *Persea gratissima*, avocado or alligator pear, which is used as a delicacy in the United States, but as a staple food in Latin America. The seed yields a black, indelible ink. **a. oil.** An oil expressed from a. It contains vitamins A, D and E, phytosterol and lecithin; used as skin food and emollient. **a. sugar.** A mannoketoheptose isolated from avocado. Cf. *sugars*.

Avogadro, Amadeo (Conte di Quaregna). 1776–1856. An Italian chemist and physicist, who formulated the gas laws. **A. constant.** A. number. **A. hypothesis.** A. law. **A. law.** Equal volumes of all gases contain at the same pressure and temperature, the same number of molecules. **A. number.** A. constant, N. The number of molecules contained in one mole (gram-molecule).

$$N = (6.062 \pm 0.006) \times 10^{23}$$

Values of $N \times 10^{23}$ determined by various methods are:

kinetic theory (*Loschmidt*, 1865)	5.95–6.8
atmospheric diffusion (*Lord Rayleigh*, 1899)	6.04–6.4
heat radiation (*Planck*, 1900)	6.05
fog droplets (*J. J. Thomson*, 1903)	6.062
α-particle count (*Regener*, 1908)	6.04
Brownian motion (*Perrin*, 1909)	6.09
spectral line structure (*Sommerfeld*, 1916)	6.08

A. theory. A. law.

avoirdupois. The English system of weights and measures. See *weights*.

axerophtol. $C_{20}H_{29}.OH$ = 286.2. Vitamin A alcohol. The alcohol of which vitamin A is the fatty acid ester; it is the hydrolysis product of B-carotene.

axestone. A hard variety of jade found in Cornwall.

axinite. The plum-colored mineral $H_2(Ca,Fe,Mn)_4(BO)_2Al_2(SiO_4)_5$.

A. W. Abbreviation for atomic weight.

awaruite. A native nickel-iron containing 67 % Ni and 31 % Fe.

Awn hygrometer. An instrument that indicates the loss of moisture from a leaf surface.

axial. Pertaining to an axis. **a. angle apparatus.** Goniometer. **a. symmetry.** The trans-form of an organic compound: *e.g.*, fumaric acid. See *stereoisomerism*.

axin. A varnish-like fat from the Mexican cochineal (*Lacus axinus*), containing lauric and axinic acids; used as a vulnerary and as varnish.

axinic acid. $C_{18}H_{28}O_2$ = 276.3. A brown, oily acid from axin.

axinite. A native, brown, transparent, aluminum borosilicate containing Ca, Mn, Fe. It is sometimes used as a gem.

axiom. A self-evident proposition that requires no proof. Cf. *postulate*.

axis. A line, imaginary or real, passing through an object, around which all parts of the object may be arranged symmetrically. Cf. *coordinate*, *crystal system*, *pinakoids*. **electric-** The direction of a crystal which offers least resistance to the passage of an electric current. **principal-** See *principal*. **optic-** An imaginary line passing

through the center of any system of lenses. **x-, y-, z-.** See *coordinates*.

axonometry. Measurement of the axes in crystals and minerals.

Az. The French symbol for nitrogen (azote).

aza- See *tetra-arylaza*.

azacyclo- A prefix indicating the presence of an NH group in a saturated carbon ring; as **a. hexadecanine.** $NH(CH_2)_{15}CH_2$.

azadarach. Azadarichta, margosa bark, neem bark. The bark of the Indian lilac tree or bead tree, *Melia azadarichta*, a Meliaceae of Asia. It contains margosine, margosinic acid and neem oil; used as an anthelmintic, purgative and emetic.

azaleine. Fuchsin.

azarin. $C_{16}H_{17}O_4N_3S$ = 347.3. A nonpoisonous, bright red aniline dye for cotton.

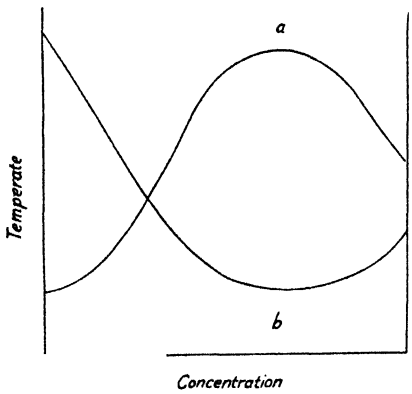
azafrin. $C_{28}H_{40}O_4$ = 440.28. A carotenoid pigment, m.212, from the roots of azafranilla, *Escobedia scrabifolia*, a Scrophulariaceae of tropical America.

azedarine. An alkaloid from the roots of *Melia azedarach*, an Asiatic tree. See *margosine*.

azelaic acid. $C_9H_{16}O_4$ = 188.17. Anchoic acid, lepargylic acid, 1:7 -heptane dicarboxylic acid, nonanedioic acid, $HOOC(CH_2)_7COOH$. An oxidation product of oleic acid. Colorless crystals or leaflets, m.106, b.360; soluble in water, alcohol, or ether. **a. acid value.** A chemical constant used in the analysis of fats; a measure of the potassium salts of the azelaic glycerides formed.

azelain. The glyceride of azelaic acid.

azeotropes. Any one of two or more compounds which form mixtures of constant boiling point; as, 0.6 mole carbon disulfide and 0.4 mole acetone. **negative-** A. with minimum boiling mixtures; as benzene-methanol or carbontetrachloride-methanol. **positive-** A. with maximum boiling mixtures; as, chloroform-acetone or chloroform-methylacetate.



Azeotropes.

a—positive azeotrope of A and B.
b—negative azeotrope of A and B.

azeotropy. The property of certain liquid mixtures of constant boiling-points to yield distillates having the same composition as the original mixture; Cf. *hylotropy*.

azerins. The digestive enzymes of insectiverous plants; as the ensyme of *Drosera rotundifolia*.

azete. C_3H_3N = 53.1. The heterocyclic compound $CH{=}N{-}CH{=}CH$. **dihydro-** Azetine. **tetrahydro-** Azetidine.

azetine. C_3H_5N = 55.1. Dihydroazete. The heterocyclic compound $CH_2{-}NH{-}CH{=}CH$.

azide. (1) A compound containing the monovalent $-N_3$ group; as benzyl a., silver a. (2) Triazo. **oxy-** Oxyazide.

azidinblue. Trypan blue.

azido. Triazo.

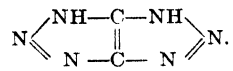
aziethane. Diazoethane.

aziethylene. Diazoethane.

azimethane. Diazomethane.

azimethylene. Diazomethane.

azimid. $C_2H_3N_6$ = 110.08. Osotriazol. The heterocyclic compound



azimide. Benzoylazide.

azimido. Azimino. The bivalent = HN_3 group, $-NH.N{:}N-$. **a. benzene.** Benzotriazole.

azimino. Azimido.

azimuth. The angle between the meridian and the vertical plane through an object; as, the angle of a star above the horizon. Cf. *coordinates*.

azine. Pyridine.

azino. The tetravalent radical $=N.N=$. **a. dyes.** Dyes containing the azo group.

azirane. Ethylenimine.

azo- A prefix which indicates the presence of the divalent radical $-N{:}N-$; derived from the French azote, nitrogen. **a. color.** A colored compound containing the azo group; as, methyl orange, congo red, bismarck brown. **a. compound.** An organic compound containing the $-N{:}N-$ radical; as azo-benzene. **a. group.** The divalent $-N{:}N-$ radical. Cf. *azino, diazo, trisazo, tetrazo, hydrazo, oxyazo*.

Azobacter. A group of aerobic bacteria of the soil that oxidize the nitrogen of the atmosphere. See *azotobacter*.

azobenzene. $C_{12}H_{10}N_2$ = 182.08. Azobenzide, azobenzol, azophenylenbenzene; benzene azobenzene, nitrogen benzide, diphenyldiimide. $PhN{:}NPh$. Orange leaflets, d.1.203 m.68, b.297.4; insoluble in water, soluble in alcohol or ether. Used in organic synthesis. **p-amino-** $C_{12}H_9N_2.NH_2$ = 197.2. Phenylazoaniline, benzene azoaniline. **o-** or **2-** Golden crystals, m.123, b.360. Its hydrochloride is spirit yellow (aniline yellow). **m-** or **3-** Orange needles, m.57. **p-** or **4-** Yellow monoclinic crystals, m.126. **p-diamino-** $C_{12}H_8N_2(NH_2)_2$ = 212.2. Colorless crystals, m.241, used in organic synthesis. The hydrochloride is chrysoidine. **dihydroxy-** Azophenol. **dimethyl-** Azotoluene. **diphenyl-** *Coupier's* blue. **hydroxy-** See *benzene*.

azobenzide. Azobenzene.

azobenzil. $C_{14}H_{10}ON_2$ = 222.2. $Ph.CO.C(:N_2)$-Ph.

azobenzoic acid. $(:N.C_6H_4.COOH)_2''$ = 270.23. Azobenzenedicarboxylic acid. **o-** Dark yellow needles, decomp. 237; sparingly soluble in water, soluble in alcohol or ether. **m-** Amorphous powder decomp. on heating; soluble in water, alcohol or ether. **p-** A red amorphous powder, decomp. on heating; insoluble in water, alcohol or ether.

azobenzol. Azobenzene.

azoblue. A blue azo color for cotton, wool or silk.

azochloramid. *N.N*-Dichloro azodicarbonamidine. A bactericide and antiseptic, soluble in water.

azocyanide. A compound containing the monovalent —N:N.CN radical; *e.g.*, benzene azocyanide, $C_6H_5N_2CN$.

azodermine. Acetyl-amidoazo-toluene. A reddish powder that stimulates epithelial growth.

azodicarbonamide. $C_2H_4O_2N_4$ = 116.08. Azoformamide. The compound, $NH_2.CO.N_2.CO.NH_2$. soluble in water, insoluble in alcohol, decomp. 180.

azodicarbon-diamidine. $NH_2C(NH).N:N.C(NH).NH_2$ = 114.11. **hydr-** $NH_2C(NH)NH.NH(NH)C.NH_2$ = 116.03.

azodiphenyl. *Coupier's* blue.

azo-dyes. A large group of organic synthetic coloring materials derived from azobenzene.

azofication. *Nitrogen* fixation.

azoflavin. Azoacid yellow, Indian yellow. A mixture of nitrated diphenylamine orange and nitrodiphenylamine. A brownish-yellow powder; soluble in hot water. Used as a dye for wool and silk.

azoformamide. Azodicarbonamide, $NH_2CO.N:N.CO.NH_2$.

azoformic acid. $C_2H_2O_4N_2$ = 118.1. Azodicarbonic acid, COOH.N:N.COOH.

azoic. An obsolete term for the earliest geological (Pre-Cambrian) formations.

azoimide. Hydrazoic acid. **methyl-** Methylenimine.

azoisobutyronitrile. $C_8H_{12}N_4$ = 164.2. $CN.CMe_2.N:N.CMe_2.CN$. Colorless crystals, m.105.

azole. Pyrrole.

azoles. A group of pentatomic heterocyclic ring compounds; *e.g.*, pyrrole, furfurane, isoxazole, oxazole, **diazoles.**

azolitmin. $C_7H_7O_4N$ = 169.1. The coloring matter of litmus. Dark violet scales, soluble in water, insoluble in alcohol, and very soluble in alkalis; is used as an indicator (acids = red, akalis = blue).

azomethin. Methylenimine.

azonaphthalene. $C_{10}H_7.N:N.C_{10}H_7$ = 282.30. Naphthyldiimide. **α-** or **1.1′-**Red needles, m.190; insoluble in water, slightly soluble in alcohol, soluble in benzene. **β-** or **2.2′-** m.204. **αβ-** or **1.2′-** m.136.

azonium. A compound of the type R_3N_2X; as, ethyl methyl phenyl azonium chloride.

azophenetole. $C_{16}H_{18}O_2N_2$ = 270.16. Diethoxyazobenzene. $(C_6H_4OEt)_2N_2$. **ortho-** m.131, decomp. at 240, insoluble in water, soluble in alcohol, ether or chloroform. **para-** m.167. Insoluble in water or alcohol, soluble in ether.

azophenol. $C_{12}H_{10}O_2N_2$ = 214.22. Dihydroxyazobenzene, azodiphenol. The compound $HO.C_6H_4.N:N.C_6H_4.OH$. **o-** or 2.2′ dihydroxyazobenzene. Yellow leaflets, m.171 (sublimes); insoluble in water, slightly soluble in alcohol or ether. **m-** or 3.3′-dihydroxyazobenzene. Brown scales, m.205; sparingly soluble in water, soluble in alcohol. **p-** or 4.4′-dihydroxyazobenzene. Brown, triclinic crystals, decomp. 216; slightly soluble in water, soluble in alcohol or ether. The azophenols are intermediates in the manufacture of dyes.

azophenyl. The monovalent PhN:N-group. Cf. *phenylazo, oxyazo* compounds. **a. ethane** $C_8H_{10}N_2$ = 133.2. Benzene azoethane, PhN:NEt. A colorless liquid, b.280. **a. methane** $C_7H_7N_2$ = 119.2. Benzene azomethane. PhN:NMe. A colorless liquid, b.150.

azophenylene. Phenazine.

azophosphin. A yellow azo-dye, $C_6H_3(OH)_2.N:N.C_6H_4.NMe_3Cl$.

azorite. $ZrSiO_4$. A native zirconium silicate.

azosulfime. 1.2.4-Thiodiazole.

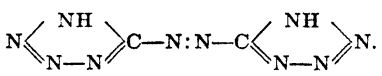
azosulfine. Thiodiazole.

azosulfonic acid. A compound containing the monovalent —N:N.SO_3H radical; as, $Ph.N_2.SO_3H$— benzene azosulfonic acid.

azotate. Nitrate.

azote. French for nitrogen, Az.

azotetrazole. $C_2H_2N_{10}$ = 166.12. The heterocyclic compound



azotic acid. Nitric acid.

azotized. (1) Nitrogenous. (2) Nitrogenized or changed to an azo-compound.

azotobacter. A group of soil bacteria, as, chroococcum, which convert atmospheric nitrogen to nitrates. Cf. *azobacter.*

azotoluene. $C_{14}H_{14}N_2$ = 210.27. Dimethylazobenzene, tolulazotoluene, ditolyldiimide, $MeC_6H_4N:N.C_6H_4Me$. **oo-** or **2.2′-** Red prisms, m.55; insoluble in water, sparingly soluble in alcohol, soluble in ether. **mm-** or **3.3′-** Orange colored, rhombic crystals, m.54; insoluble in water, soluble in alcohol or ether. **pp-** or **4.4′-** Yellow needles, m.114; insoluble in water, soluble in alcohol or ether. **amino-** Aminoazotoluene. **diacetylamino-** Dimazon. **diamino-** See *diamino.*

azotometer. An apparatus for determining the nitrogen content of compounds in solution gasometrically.

azoxazole. Furazan.

azoxime. 1.2.4-Oxdiazole.

azoxy. Divalent —NON— radical.

azoxyanisole. $C_{14}H_{14}O_3N_2$ = 258.20. $p(MeO.C_6H_4N)_2O$. White crystals, m.117, soluble in alcohol.

azoxybenzene. $C_{12}H_{10}ON_2$ = 198 22. Zinin, azoxybenzide. The compound Ph.NON.Ph. Yellow needles, d.1.248, m.36, decomp. on further heating; insoluble in water, soluble in alcohol or ether.

azoxybenzoic acid. $C_{14}H_{10}O_5N_2$ = 286.23. Azoxydibenzoic acid, azoxybenzenedicarboxylic acid. The compound $(C_6H_4COOH)_2NON$. **o-** or 1.1′-. Pale yellow leaflets, m.248, decomp. on further heating, sparingly soluble in water, alcohol, or ether. **m-** or 2.2′-.. Pale yellow needles, decomp. 320; insoluble in water, slightly soluble in alcohol, or ether. **p-** or 3.3′-. A yellow amorphous powder, decomp. 240; insoluble in alcohol, water, or ether.

azoxynaphthalene. $C_{10}H_7.NON.C_{10}H_7$ = 298.23. Azoxydinaphthalene. **1.1′** or **alpha-** Red rhombic crystals, m.127; insoluble in water, soluble in alcohol or concentrated H_2SO_4. **2.2′** or **beta-** m.167, insoluble in water.

azoxytoluidine. Diaminoazotoluene.

azulene. $C_{16}H_{26}O$ = 234.3. The blue coloring matter of chamomile, wormwood, and other essential oils; see also *cerulein.* An oily liquid, d.0.987, b.170, insoluble in water. It is a dehydrogenated azulogen.

azulin. A blue aniline dye formed by heating aniline with corallin.

azulmic acid. Azulmin.

azulmin. $C_4H_5ON_5$ = 139.2. A dark brown compound formed by the decomposition of cyanogen.

azulogens. A group of sesquiterpenes occurring in many essential oils. They give a blue color with bromine in chloroform, owing to the formation of azulene.

azurine. (1) Theobromine sodium acetate, used medicinally as a diuretic. (2) A bluish-black aniline dye.

azurite. $Cu_3H_2C_2O_8$ or $CuCO_3.Cu(OH)_2$. Chessylite, lazulite, lapis lazuli. Native copper carbonate. Blue malachite, an azure blue monoclinic mineral formerly used as a gem, now in paints and in ceramics. Cf. *malachite.*

azur malachite. A bluish-green malachite from Arizona.

azylase. A diastatic enzyme which degrades the amides of substituted acids, but does not attack true peptides.

azymic. (1) A reaction not caused by fermentation. (2) Describing an enzyme that does not cause fermentation.

azymous. Unfermented.

B

B The symbol for boron.

°B The symbol for degree of density on the *Beaumé* scale (q.v.).

b. An abbreviation for "boils at." b_{15mm}. **x.** Boils at x°C. under 15 mm. pressure.

b. A constant of van der Waal's equation: the co-volume or volume occupied by the molecules. See *equation* of state.

β. The Greek letter "beta." (1) A symbol for the specific heat constant. (2) In chemical names: substitution at the *second* carbon atom, or that following the *α*-carbon atom. See *beta*-position. **β acid.** Anthraquinone-2-sulfonic acid. **β particle.** See *beta*. **β position.** See *beta*. **β rays.** See *beta*.

b.p. Abbreviation for boiling point.

B.t.u. Abbreviation for British thermal unit (American usage). See *B.Th.U.*

B.T.U. Abbreviation for Board of Trade unit. (British usage.)

B.Th.U. Abbreviation for British thermal unit (British usage).

Ba. The symbol for barium.

bababudanite. $4NaFe(SiO_3)_2.2FeSiO_3.3MgSiO_3$. A soda amphibole from Mysore (India).

babassu oil. An oil from the fruit kernel of the Brazilian palm tree, *Orbignya martiana*, a Palmae. It resembles coconut oil.

babbitt. Babbitt metal. An alloy of about 65–95 pts. tin, 8–12 pts. antimony, and 1 pt. copper; used for bearings.

Babcock, Stephen Moulton. 1843–1931. An American chemist noted for work on milk analysis. **b. bottle.** A graduated glass flask used for the determination of fat in milk. **B. milk tester.** A centrifuge used in milk-fat analysis. **B. pipet.** A pipet which delivers 17.6 cc. in 5 to 8 seconds at 20°C; used in milk analysis.

babingtonite. A native pyroxene, (Ca,Fe,Mn)-$6Fe_2Si_5O_{27}$, which occurs in vitreous, greenish-black, triclinic masses.

babitt. Babbitt.

Babo, Clement Heinrich Lambert Freiherr von. 1818– . A German chemist who determined the vapor pressure of water (1847). **B. absorption tube.** A glass cylinder filled with glass beads, used for the absorption of gases by liquids. **B's law.** The relative lowering of the vapor pressure of a solvent, due to a substance in solution, is the same at all temperatures.

babool. An East Indian name for *Acacia arabica*. Its bark is used for tanning, and its gum is *gum arabic*.

babul. Babool.

bacca. Latin for berry.

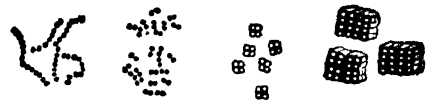
baccarine. An alkaloid from mio-mio, *Baccharis cordifolia*, a Compositae of South America.

bacciform. Berry-shaped.

Bachoune, Arnold. 1235–1315. Villanovanus. A French alchemist who noted the dangers of putrefaction and of copper utensils in cooking; author of twenty books.

bacillus. A non-sporing rod-shaped bacterium, a genus of Bacteriaceae. Cf. *bulgara, lactobacillus, ropiness, syncyanin, tetanus*.

Bacon, Roger. 1214–1294. An English alchemist and mathematician who wrote about gunpowder and the extinction of fire by removal of air. **B., Francis** [Baron Verulam, 1561–1626]. An English philosopher and exponent of the inductive method in science.



Streptococci Diplococci Tetrads Sarcina
Round Bacteria—cocci.

Rod-shaped bacteria—bacilli.

Spiral-shaped bacteria—spirillae.

bacteria. (Sing. bacterium.) A group of small, microscopical unicellular plants (Schizomycetes) belonging to the fungi. They contain 8–15 % proteins, 0.5–4 % fats, 0.5–3 % ash, and 80–85 % water. **acetic acid-** Bacillus aceti. A b. that oxidizes alcohol to acetic acid. **ammonifying-** A soil b. which reduces N to ammonia. **butyric acid-** Bacillus butyricus. A b. found in milk, water, dust, etc. that produces butyric acid from fats. **chromogenic-** A b. producing colored products. **denitrifying-** A soil b. that oxidizes ammonia to nitrogen. **lactic acid-** A b. occurring in air and sour milk that produces lactic acid. **nitrifying-** A soil b. that oxidizes N to nitrites and nitrates. **photo-** A b. that causes phosphorescence; as in decaying fish or wood. **soil-** B. essential for plant growth.

b. grinder. A device for powderizing bacteria, used in making vaccines and toxins. **b. membrane.** A scum or pellicle, which consists of bacteria. Cf. *bacterial* membrane.

GROUP NUMBERS OF BACTERIA

100.	Endospores produced
200.	Endospores not produced
10.	Aerobic (strictly)
20.	Facultative anaerobic
30.	Anaerobic (strictly)
1.	Gelatin liquefied
2.	Gelatin not liquefied
.1	Acid and gas from dextrose
.2	Acid without gas from dextrose

.3	No acid from dextrose
.4	No growth with dextrose
.01	Acid and gas from lactose
.02	Acid without gas from lactose
.03	No acid from lactose
.04	No growth with lactose
.001	Acid and gas from saccharose
.002	Acid without gas from saccharose
.003	No acid from saccharose
.004	No growth with saccharose
.0001	Nitrates reduced with evolution of gas
.0002	Nitrates not reduced
.0003	Nitrates reduced without gas formation
.00001	Fluorescent
.00002	Violet chromogens
.00003	Blue chromogens
.00004	Green chromogens
.00005	Yellow chromogens
.00006	Orange chromogens
.00007	Red chromogens
.00008	Brown chromogens
.00009	Pink chromogens
.00000	Non-chromogenic
.000001	Diastasic action on potato starch strong
.000002	Diastasic action on potato starch feeble
.000003	Diastasic action on potato starch absent
.0000001	Acid and gas from glycerin
.0000002	Acid without gas from glycerin
.0000003	No acid from glycerin
.0000004	No growth with glycerin.

E.g. the group number of *Bacillus coli* (Esch) is 222.111102, which means that the bacillus produces no endospores, is facultative anaerobic, does not liquefy gelatin, develops acid and gas from dextrose, lactose, saccharose, reduces nitrates with evolution of gas, is non-chromogenic, and has a feeble diastasic action on potato starch.

Bacteriaceae. A family of plants (Schizomycetes), which consists of unicellular organisms. Cf. *bacteria.*

bacterial. Pertaining to bacteria. **b. action.** The effect of bacteria or their metabolism on proteins; *e.g.*, hydrolizing, deaminizing, decarboxylating, toxin-forming, etc. **b. decomposition.** See *bacterial action.* **b. forms.** The shapes of bacteria; *e.g.*, round, short rods, long rods, short chains, long chains, filaments, "commas," short spirals, long spirals, clostridium, cuneate, clavate, curved, etc. (see figure). **b. membrane.** The cell wall of a bacterium. Cf. *bacteria* membrane. **b. poisons.** See *poison; e.g.*, food poisons, ptomaines, toxins, septic poisons. **b. precipitation.** (1) Precipitins. (2) Deposition of inorganic salts (*e.g.* calcium carbonate) caused by the action of bacteria.

bactericide. An agent that destroys or kills bacteria.

bactericidin. An antibody of the blood serum, which kills bacteria.

bacterin. Bacterial vaccine. A sterile suspension of dead pathogenic bacteria in physiological salt solution. Usually standardized in terms of a definite number of bacteria per cubic centimeter; used for hypodermic medication, to produce active immunity by stimulating the production of specific antibodies.

bacteriofluorescin. Fluorescent coloring matters produced by some bacteria.

bacteriological. Pertaining to bacteriology. **b. fermentation tube.** A U-shaped glass tube for bacteriological work, with a closed arm for the collection of carbon dioxide or other gases formed by the action of certain types of bacteria. **b. filter apparatus.** A device for filtering solutions that contain bacteria, thus rendering the solution sterile. See *Berkefeld* f. **b. incubator.** A closet which can be kept at a definite temperature, in which the cultures of bacteria are grown.

bacteriology. The science dealing with bacteria, their identification, culture and properties.

bacteriolysin. An antibody formed in the blood, which promotes the disintegration and dissolution of bacteria.

bacteriolysis. The destruction of bacteria by dissolution.

bacteriophage. An ultramicroscopic, transmissible, filter-passing and lytic agent of bacteria, the exact nature of which is undetermined. Their action is specific and bacteriolytic; used therapeutically.

bacteriophagy. (1) The experimental study of ultramicroscopic organisms. (2) The application of bacteriophages to the treatment of disease.

bacteriopurpurin. A purple coloring matter produced by bacteria; *e.g., Beggiatoa roseopersicina.*

bacteriostatic. An antibiotic (q.v.) which inhibits bacterial growth, as distinct from killing the organism.

bacterium. Latin (sing.) for bacteria. **b. aceti.** B. causing acetic acid fermentation. **b. lactis.** B. causing lactic acid fermentation.

baddeckite. A muscovite containing ferric iron.

baddeleyite. ZrO_2. Brazilite. A native zirconium oxide of Ceylon and Brazil.

baden acid. 2.8.-Naphthylamine sulfonic acid.

badische acid. 2.8-Naphthylamine sulfonic acid.

Badouin's reagent. See *Baudouin.*

Baekeland, Leo Hendrik. 1863–1944. A Belgian-born American chemist noted for development of synthetic resins (bakelite) and photographic processes.

bael. Bengal quince, Indian bel. The fresh unripe fruit of *Aegle marmelos,* a Rutaceae; used as specific for diarrhea and dysentery.

baeumlerite. $KCl.CaCl_2$. A native calcium-potassium chloride from Germany.

Baeyer, J. F. W. Adolf von. 1835–1917. A German chemist and pioneer in the organic synthesis of arsenicals, indigo, pyridine bases, phthaleins, and other compounds. **B. acid.** *Bayer* acid. **B. Strain Theory.** A theory which explains the relative stabilities of penta- and hexamethylene ring compounds in terms of the angles between the carbon atom valencies.

baffle. An obstruction in the path of a gas, fluid, sound, etc.

bagasscocis, bagassosis. A respiratory disease produced by the dust from dried bagasse used for board manufacture.

bagasse. The dried sugar-cane from which the juice has been extracted; used as a fuel, fertilizer, and for paper pulp. **b. cutter.** A revolving knife used for cutting bagasse and other dried material. **b. fiber.** A by-product of sugar manufacture, used for wallboards (as, celotex); or as a source of cellulose.

bagrationite. Allanite.

bahama white wood. Canella.

Bahia arrowroot. Tapioca.

baicalein. $C_{15}H_{10}O_5 = 270.08$. *5,6,7*-Trihydroxyflavone. A flavone from baicalin.

baicalin. A glucoside from the roots of *Scutellaria baicalensis*, a Labiatae; it yields glycuronic acid and baicalein.

Baier thermometer. A special thermometer for refractometers.

baikalite. Diopside. A silicate of calcium and magnesium, $MgO,CaO,2SiO_2$.

Bailey crucible holder. A rubber ring for holding a Gooch crucible in a funnel.

Bailey-Walker extraction apparatus. A glass flask, metal condenser, and glass syphon for continuous extraction.

Bain washing apparatus. A device of washing microscopic specimens.

baits. Chemicals used in traps to catch insects, *e.g.*, geraniol for Japanese beetle, and methyl cinnamate for fruit moth.

bakelite. A synthetic resin obtained by the condensation of formaldehyde with phenols. Used as plastic for insulation and lacquers; also as a substitute for vulcanite. Cf. *Baekeland*.

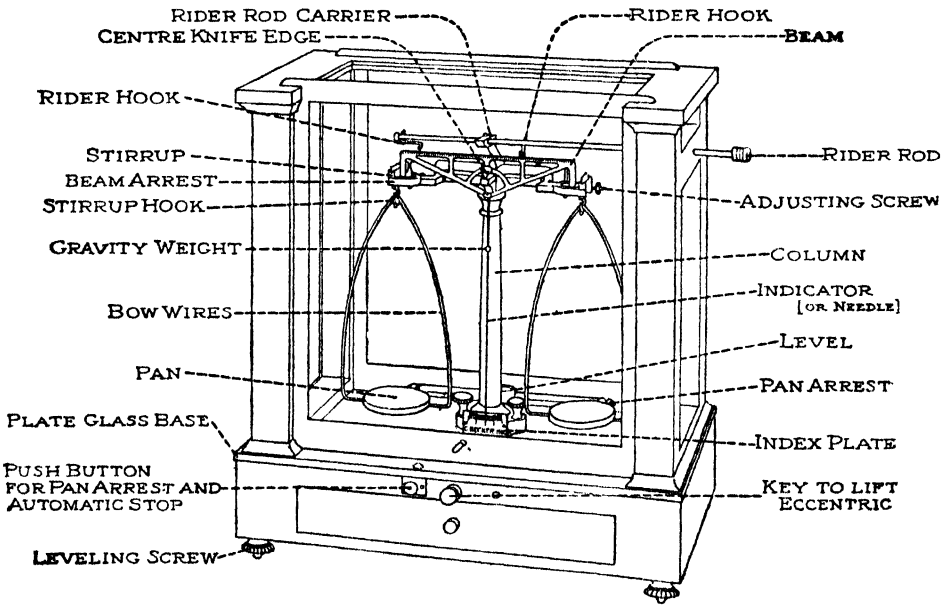
Baker, Herbert Brereton. 1862–1935. An English chemist noted as an educationalist, and for his work on the effect of intensive drying on chemical reactions.

bakerite. $8CaO.5B_2O_3.6SiO_2$. A native calcium boro-silicate found in the Mohave Desert.

baking powder. A powder containing sodium bicarbonate and tartaric acid (or other acid), with starch as a filler; used as a substitute for yeast in the production of carbon dioxide in bread-making. **b. soda.** *Sodium* bicarbonate.

balaban. The hydrocarbon of chicle.

balance. (1) A device for weighing. (2) The harmonious adjustment of related parts; as *nitrogen* balance. **alloy-** A b. adapted for metallurgical laboratories. **analytical-** A pair of highly-sensitive scales, used for quantitative analysis; sensitiveness, 0.1–0.01 mg. **assay-** An analytical b. for metallurgical work. **chain-** A b. in which the effects of weights of 100 mg. or less are produced by altering the length of a fine metal chain hanging from one of the beams; this length being measured by a pointer on a calibrated vertical scale. **chainomatic-** q.v. **chemical-** Analytical b. **cloth testing-** A specially constructed torsion b. for weighing textiles. **counter-** A b. of average sensitiveness. **cream test-** A torsion b. adapted for milk testing. **coin-** A sensitive b. used in mints. **damped-** A b. in which the equilibrium position is rapidly attained as a result of the damping action of a piston which fits closely and slides in a cylinder. **decimal-** An analytical b. designed for industrial laboratories, where a large number of consecutive equal weighings are made. **dispensing-** A small b. for prescription work. **gas-** A device for determining the specific gravity of gases. **hand-** A polished brass beam with silk cords and horn pans. **Jolly spiral spring-** A torsion b. for industrial laboratories. **lecture table-** A large b. for lecture experiments. **magnalium-** A b. made of magnalium. **micro-** A highly sensitive b. for weighing small quantities, *e.g.*, as indicated by the torsion of a quartz fibre; sensitiveness ranges from 0.001–0.000004 mg. **mohr-** A b. for measuring specific gravities of solids; similar to a Westphal b. **moisture-** A pair of scales for determining the moisture in ores and other samples. The b.-beam is divided into moisture percentages. **prescription-** A sensitive beam b. used in pharmaceutical laboratories. **projection-** A b. in which the movement of the beam pointer is magnified by means of an optical projector. **pulp-** A large beam b. mounted on a marble top for use in industrial laboratories. **soil-** A torsion b. used in soil analysis. **specific gravity-** Westphal b. **spring-** A pan suspended by a vertical coil of wire in a metal case with a pointer scale to indicate the strain on the pan. **torsion-** A balance which measures the twisting force



Analytical balance.
(Popoff, "Quantitative Analysis.")

necessary to turn a suspension thread or wire through a given angle. **transpiration-** A sensitive beam b. for measuring transpiration. **Westphal-** See *Westphal.*

b. cover. A rubber sheet for protecting balances. **b. pans.** Pairs of counterpoised watch glasses with handles for weighing powders. **b. reading glass.** A lens for reading the scale of an analytical b. **b. rest.** A glass or metal block for supporting b. pans. **b. rider.** A small platinum wire which is bent U-shaped with a hook, usually weighing 1 mg., and sliding along the beam of analytical b. **b. weights.** A set of accurately standardized weights which are either brass or aluminum, nickel-plated or gold-plated.

balanced. In a state of equilibrium. **b. reaction.** A reaction which can be made to proceed in either direction by variation of either temperature, pressure or concentration of the reactants. Cf. *equilibrium.*

Balard, Antoine Jerôme. 1802–1876. A French chemist, who discovered bromine (1826) and the nature of bleaching powder.

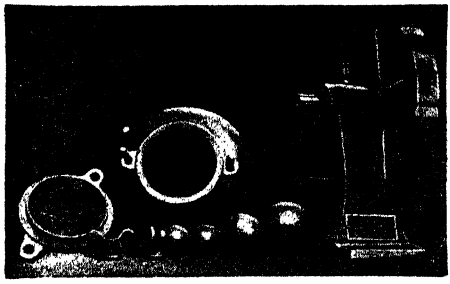
balas ruby. Spinel. Cf. *ballas.*

balata. (1) The dried juice of *Mimusops globosa,* a Spotaceae, a tree of the West Indies. Used for insulating as a substitute for guttapercha, and coated on canvas for driving-belts. Cf. *chicle.* (2) The hard dense, heart-wood of the bully tree, *Bumelia retusa,* a Sapotaceae.

baleen. *Whale* bone.

ball clay. A white or light cream burning clay of high plasticity, originally mined in balls of 30–35 lb. **b. mill.** A spherical container with balls of iron or quartz for grinding materials to a fine powder.

ball mill. A bowl of metal or porcelain containing metal balls of various sizes, which are used to crush materials. See figure. Cf. *pebble* mill.



Ball mill.

ballas. A variety of diamond intermediate between carbons and diamond. Cf. *balas.*

Balling, Carl Joseph Napoleon. A German professor noted for his work in fermentation chemistry. **B. degree.** A specific gravity scale. (1) x° Balling is equivalent to a specific gravity of $\frac{200}{200 \pm x}$ at 17.5°C. x is + or − according as the liquid is heavier or lighter than water, respectively. (2) Brix degree. See *hydrometers.*

ballistic galvanometer. A device which indicates small or intermittent currents. It depends on the accumulation of a charge of static electricity, which is suddenly released from a condenser to deflect a needle to an extent which is proportional to the amount of electricity present.

ballistite. A gelatinized nitroglycerin and nitrocellulose, used in smokeless powders.

balloelectric. Pertaining to the electrical charge of an atomized spray of a liquid.

ballometer. An instrument for measuring the electric charges conveyed by an atomized spray. It consists essentially of a metal plate connected to a quadrant electrometer.

balloons. See *gas* balloons.

balm. (1) Melissa, (2) Balsam. **bee-** Monarda. **Indian-** Trillium.

b. of Gilead or b. of Mecca. (1) Poplar buds. (2) The exudation of *Commiphera* (*Balsamodendron*) *opobalsamum,* a Burseraceae. **b. oil.** Melissa oil, lemon. A yellow essential oil, d.0.89–0.92; soluble in alcohol and obtained from the leaves and flowering tops of *Melissa officinalis.* Used in flavoring extracts.

Balmer formula. The wave-length, λ, and its reciprocal frequency $(1/\lambda)$ or wave-number, ν, of the lines in the hydrogen spectrum can be expressed by $\lambda = 3616.14 \frac{m^2}{m^2 - 4}$ or $\nu = 27{,}418.75 = \frac{109{,}675}{m^2}$, where m is any integer from 3 to 16. **B. series.** A series of lines in the spectrum of hydrogen which are related by $\nu = N(1/n_1^2 - 1/n_2^2)$, and which can be deduced from the quantum theory. The lines are called $H\alpha$, $H\beta$, $H\gamma$ etc. and correspond with an electron transition from an outer to the second orbit. Cf. *energy* levels, *Lyman* series, *Paschen* series, *quantum* number.

balneology. The study of the therapeutic properties of natural waters.

balopticon. Stereopticon.

balsam. A resinous or oleoresinous, fragrant juice or exudate from plants, which consists of a mixture of resins, essential oils, cinnamic and benzoic acid. *E.g.,* Canada b., cativo b., cebur b., copaiva, b., fir b., gilead b., gurjun b., lagam b., etc. The U. S. official balsams are Peru balsam, storax and tolu balsam. **b. apple.** The fruit of *Momordica balsamina,* a Cucurbitaceae. It contains elaterin. **b. bottle.** A wide-necked glass bottle with a loosely fitting cup-shaped cover and glass rod. **b. of Peru.** *Peru* balsam. **b. tree.** Mastic.

baltimoriase. A silicate of calcium, aluminum, and magnesium from Baltimore County, Md.

baltimorose. A pyroxenite of Baltimore County, Md.

Baly, Edwin Charles Cyril. 1871– . An English physicist, noted for spectroscopic and photochemical work. **B. spectrum tube.** A graduated tube in which slides another tube. The intermediate adjustable space is filled with the solution whose absorption spectrum is to be examined.

bamboo. (1) A tropical genus of tree-like grasses, with woody, light sectional stems, growing in clumps. (2) The hollow, siliceous, coated stems of bamboo species, used as a building material, for fishing rods. Cf. *tabashis.* **sacred-** *Nandina domestica* of Japan; it yields domesticine and nandinine.

b. oil. Vinifera palm oil. An oil from the fruit of *Gentiliana raphia;* used to soften leather.

bambuk. A vegetable butter.

banana. The fruit of *Musa sapientum* (banana plant) which is imported green from the West Indies and Honolulu and ripened in steam heated chambers. Cf. *plantain, pisang* **wax. b. oil.** An alcoholic solution of amyl acetate.

banana-oil. Amyl acetate.

bancoul nuts. The seeds of *Aleurites ambina* from which it expressed a tasteless oil resembling castor oil. Cf. *tung* oil.

Bancroft, Wilder Dwight. 1867– . An American chemist noted for research on colloids and the phase-rule.

band. A compact series of spectral lines due to molecules. **b. head.** The wavelength of the sharpest edge of a spectral b. **b. spectrum.** See *spectrum*.

bandoline. A gummy liquid made from tragacanth and quince seeds, and used for glossing the hair.

bandose. A quartz-mica-hornblende diorite from Cecil County, Md.

Bandrowski's base. $C_{19}H_{18}N_4$ = 290.1. Bis-diaminophenyl-*p*-phenylenediamine. The compound $(NH_2)_2C_6H_3.N.C_6H_4.N.C_6H_3(NH_2)_2$; used in organic synthesis.

bane. A pest or poison; *e.g.*, dogbane, wolfsbane, etc.

Bang method. The determination of glucose in urine by titration with alkaline cupric thiocyanate solution. Codliver oil.

banisterine. $C_{13}H_{12}ON_2$ = 212.1. An alkaloid, m.257 from *Banisteria* species, a Malpighiaceae of South America. It stimulates respiration and is similar in properties to harmine.

Banting, Sir Frederick. 1891–1941. A Canadian biochemist, noted for medical research, particularly in connection with the discovery of insulin.

baobab. A large tree of West Africa, the leaves of which are used in diarrhea, the bark for paper pulp and the fibres of the stem for ropes. See *adansonia*.

baphiin. $C_{12}H_{10}O_4$ = 218.08. Colorless crystals, decomp. on heating.

baptisia. Wild indigo. The dried roots of *Baptisia tinctoria* (Leguminosae); used as fluid extract as an astringent.

baptisin. $C_{26}H_{32}O_{14}$ = 540.3. A glucoside, m.240, from the roots of *Baptisia tinctoria*. A brownish powder; soluble in alcohol, used as a purgative. Cf. *rhamnomannoside*.

baptisoid. The total active principles of baptisia. It is a cholagogue, laxative, and cathartic.

baptitoxine. (1) An alkaloid from the root of *Baptisia tinctoria*. (2) Cytisine.

bar. The international unit of pressure. Cf. *barye*. 1 bar = 10^6 dyne/cm.^{2} = 1.013 kg./cm.^{2} = 0.987 atm.

bar magnet. A magnetized flat rod of iron.

baras camphor. Borneol.

barbados aloes. Aloes from Barbados.

barbados nuts. Purging nuts. The poisonous seeds of *Jatropha curcas* (Euphorbiaceae), a native of the West Indies and Brazil. See *curcin*.

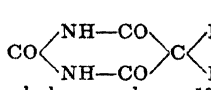
barbaloin. $C_{16}H_{18}O_7$ = 322.1. A constituent of Barbados aloes m.148.

barbatic acid. $C_{19}H_{20}O_7$ = 360.14. A depside from Usnea lichens, especially *Usnea barbata*. Colorless prisms, m.186.

barberry. The fruit of *Berberis vulgaris:* used for preserves and pickles. See *berberis, berberine, oxyacanthine*.

barbierite. A soda orthoclase from Norway.

barbital. $C_8H_{12}O_3N_2$ = 184.1. Diethylbarbituric acid, 2,4,6-trioxy-5-diethyl-pyrimidine, veronal, malonurea, diethyl malonyl urea, barbitone.

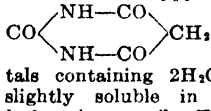


A white crystalline, odorless powder, m.191; soluble in 150 pts. cold water, 12 pts. hot water, ether or chloroform. Used medicinally as a hypnotic. **soluble b.** B. sodium.

b. sodium. Calmine, veronal sodium, sodium diethyl-barbiturate. A white powder; soluble in 5 pts. water; used as a hypnotic.

barbitone. Barbital.

barbituric acid. $C_4H_4O_3N_2$ = 128.09. Malonyl urea, 2,4,6-trioxypyrimidine, pyrimidinetrione.



Colorless rhombic crystals containing $2H_2O$, m.245, decomp. 260; slightly soluble in water or alcohol. Cf. *hydantoin, uramil*. There are over 100 different 5.5-disubstituted derivatives; among them are:

5-allyl-5-isobutyl-	sandoptal
5-allyl-5-isopropyl-	allonal
5-butyl-5-ethyl-	neonal
5.5-diallyl-	dial
5.5-dibromo-	dibromin
5.5-diethyl-	barbital
5.5-dipropyl-	propanal
5-ethyl-5-isoamyl-	amytal
5-ethyl-5-phenyl-	luminal
5-hydroxy-	dialuric acid
5-isonitroso-	violuric acid
5.5-sulfamido-	thionuric acid
5-ethyl-5(1-methylbutyl)-	embutal
5,β-bromoallyl-5.*sec*-butyl-	pernocton

barcenite. A native mercury antimonite.

Bardach reaction. Acetone and iodopotassium iodide give canary yellow needles, (instead of the hexagonal crystals of iodoform) in presence of proteins.

bardana. Lappa.

bardane oil. A semi-solid oil from the seeds of burdock, *Arctium lappa*.

Bardeen microtome. An attachment for carbon dioxide cylinders which facilitates the freezing and cutting of tissues for microscopical examination.

Barff boroglycerin. A saturated solution of boric acid in glycerin, used for the preservation of animal and vegetable specimens.

Barfoed, Christian Theodor. 1816–1889. A Danish analytical chemist. **B. solution.** A solution of 13.3 gm. cupric acetate in 200 cc. dist. water and 5 cc. 38 % acetic acid. **B. test.** A test for dextrose, (in presence of maltose), which is reduced by B. solution.

baric. An obsolete term for barium in a compound.

barilla. The fused ash of various plants (seaweeds, glasswort) which consists of sodium carbonate and sulfate. It was formerly used in the Mediterranean areas for making soaps, glass, etc. Cf. *kelp* ash. **b. de cobre.** Nodules of native copper in ores.

barite. $BaSO_4$. Barytes, cawk, heavy spar. A native crystalline barium sulfate, which occurs in snow white crystalline masses, or grayish, reddish, and greenish ores. Used in the manufacture of pigments, lithopones and as fillers for paper, inks, etc.

barium. Ba = 137.36. An element of the calcium family, atomic number, 56. Baryum plutonium. A white, soft, metal, d.3.46, m.850, b.950; readily soluble in water, forming barium hydroxide, and readily soluble in acids and

alkalis; insoluble in benzene and hydrocarbons. It is found widely-distributed in small quantities in feldspars and micas, and in deposits as sulfate (barytes) and carbonates (witherite); it never occurs native but always in oxy-compounds. Barium is divalent and forms only one series of compounds; the soluble compounds are poisonous. It was discovered in 1774 by Scheele in barytes, and was isolated in 1808 by Davy. Metallic b. is not used industrially at present. **b. acetate.** $Ba(C_2H_3O_2)_2.H_2O$ = 273.4. White prisms, d.2.02, decomp. on heating; soluble in water or alcohol. Used as a reagent for precipitating sulfates and chromates. **b. aluminate.** A white powder, used as water softener for steam boilers. **b. amylsulfate** $Ba(C_5H_{11}SO_4)_2.2H_2O$ = 507.5. Colorless crystals, soluble in water. **b. arsenate** $Ba_3(AsO_4)_2$ = 690.1. A black powder; insoluble in water and soluble in acids or ammonium chloride. (acid-), $BaHAsO_4.H_2O$ = 295.35. Barium biarsenate. Opaque crystalline masses, anhydrous at 150. **b. benzoate** $Ba(C_7H_5O_2)_2.2H_2O$ = 415.4. Colorless leaflets, soluble in water. **b. benzosulfonate** $Ba(C_6H_5SO_3)_2.H_2O$ = 487.1. Colorless crystals, soluble in water or alcohol. **b. biarsenate.** B. arsenate (acid). **b. bichromate** $BaCr_2O_7$ = 353.57. Red monoclinic prisms, soluble in water. (Crystalline) $BaCr_2O_7.2H_2O$ = 389.58. Orange crystalline needles; soluble in dilute acid. **b. binoxalate.** B. bioxalate. **b. binoxide.** B. peroxide. **b. bioxalate** $Ba(HC_2O_4)_2.2H_2O$ = 351.4. Barium dioxalate, acid barium oxalate. Colorless crystals; sparingly soluble in water. **b. bioxide.** B. peroxide. **b. bisulfate.** B. sulfate (acid). **b. borate** $BaB_2O_4.7H_2O$ = 349.5. A white powder, soluble in water. **b. boride** BaB_6 = 203.37. Black, regular crystals, $d_{15°}$.4.36; insoluble in water, soluble in acids. **b. borotungstate** $2BaO.B_2O_3.9WO_3.18H_2O$ = 2788.74. B. borowolframate, colorless crystals, soluble in water. **b. bromate** $Ba(BrO_3)_7(H_2O)$ = 411.2. Monoclinic colorless crystals, $d_{17°}$.4.04, decomp. 260; slightly soluble in alcohol or water. **b. bromide** $BaBr_2$ = 297.21. Colorless crystals, d.4.781, m.880; soluble in water or alcohol. (Cryst.) $BaBr_2.2H_2O$ = 333.24. Monoclinic white crystals, $d_{24°}$.3.852, m.880; soluble in alcohol or water. **b. butyrate** $Ba(C_4H_7O_2)_2.2H_2O$ = 347.55. A colorless powder, soluble in water. **b. carbide** BaC_2 = 161.38. Grayish, crystalline masses, d.3.75, decomp. by water or acids yielding acetylene. **b. carbonate** $BaCO_3$ = 197.4. Colorless rhombic crystals or a white powder, d.4.275, m.795, decomp. 1450; insoluble in water or alcohol, soluble in acids and ammonium chloride solution. It occurs native as witherite. Used as a reagent, as rat poison, in water purification, sugar refining, case hardening, manufacture of glass and enamel ware, and in ceramics. **b. chlorate** $Ba(ClO_3)_2.H_2O$ = 322.3. White monoclinic crystals, d.3.179, m.414; soluble in water or alcohol. Used as a reagent, and in pyrotechnics for green fires. **b. chloride** $BaCl_2.2H_2O$ = 244.32. White rhombic crystals, $d_{24°}$.3.097, m.960; soluble in water, insoluble in alcohol. It is a reagent for the detection and determination of sulfuric acid. Used in veterinary medicine; in the manufacture of barium salts; as poison for rats and mice; and for the purification or softening of water. **b. chloroplatinate** $BaPtCl_6.4H_2O$ = 617.4. Platinic b. chloride. Red monoclinic crystals, d.2.86; soluble in water, decomp. by acids. **b. chloroplatinite** $BaPtCl_4.3H_2O$ = 528.46. Platinous b. chloride. Orange-yellow, rhombic crystals, d.2.868; sparingly soluble in water. **b. chromate** $BaCrO_4$ = 253.5. Yellow ultramarine, lemon yellow. Heavy, yellow, rhombic scales, $d_{15°}$.4.498; insoluble in water, soluble in acids. Used as a pigment and in safety matches. **b. citrate** $Ba_3(C_6H_5O_7)_2.7H_2O$ = 918.23. A colorless powder, soluble in water. **b. cyanate** $Ba(CNO)_2$ = 221.40. Colorless crystals, sparingly soluble in water. **b. cyanide** $Ba(CN)_2$ = 189.40. Colorless crystals, soluble in water or alcohol, and used in metallurgy. **b. cyanoplatinite** $BaPt(CN)_4.4H_2O$ = 508.69. Platinous b. cyanide, b. platino-cyanide. Platinum b. cyanide. Yellowish-green crystals with bluish fluorescence, d.3.054; soluble in water; used in X-ray screens. **b. dichromate.** B. bichromate. **b. dioxalate.** B. bioxalate. **b. dioxide.** B. peroxide. **b. diphenylamine sulfonate.** An oxidation-reduction indicator. **b. diphosphate.** See *b. phosphates*. **b. dithionate** $BaS_2O_6.2H_2O$ = 333.52. B. hyposulfate. White, rhombic crystals, d.5.6; soluble in water. **b. ethylsulfate** $Ba(C_2H_5SO_4)_2.2H_2O$ = 423.5. Colorless crystals; soluble in water or alcohol, and used in organic synthesis. **b. ferrate** $BaFeO_4$ = 257.4. A purple colored powder, insoluble in water and decomp. in acid solutions. **b. ferrocyanide** $Ba_2Fe(CN)_6.6H_2O$ = 594.77. Yellow prisms; slightly soluble in water. **b. fluobromide** $BaBr_2.BaF_2$ = 472.58. White plates, d.4.96, decomp. by water; insoluble in alcohol, soluble in HCl. **b. fluochloride** $BaCl_2.BaF_2$ = 383.66. White plates, d.4.51, decomp. by water; insoluble in alcohol, soluble in HCl. **b. fluoiodide** $BaI_2.BaF_2$ = 566.68. Colorless plates, d.5.21 decomp. by water; insoluble in alcohol, soluble in acids. **b. fluoride** BaF_2 = 175.4. A white, heavy, amorphous powder, d.4.828, m.1280; insoluble in water, soluble in acids or ammonium chloride solution. It is a strong antiseptic; used for embalming and in enamels. **b. fluosilicate** $BaSiF_6$ = 279.67. A white powder, d.4.28; insoluble in water or alcohol, slightly soluble in acids or ammonium salt solutions; used as an insecticide in apple orchards. **b. formate** $Ba(HCOO)_2$ = 227.4. Barium formiate. Colorless crystals, d.3.21; soluble in water. **b. hexanitride** $BaN_6.H_2O$ = 239.45. White crystals which explode when heated; soluble in water. **b. hydrate.** B. hydroxide. **b. hydride** BaH_2 = 139.39. White, volatile crystals, d_0.4.21, m.1200, b.1400, decomp. by water. **b. hydrogen phosphate.** B. phosphate (acid). **b. hydrogen sulfide.** B. sulfhydrate. **b. hydroxide** $Ba(OH)_2.8H_2O$ = 315.5. Baria hydride, caustic baryta, hydrated barium. Colorless tetragonal crystals, d.1.656, m.78, b.103; soluble in water, alcohol or acids. It is a reagent, precipitant and alkaline reagent; used for fusing silicates, saponifying fats, refining vegetable and animal oils, and for neutralizing acids in sugar manufacture. **b. hydroxide solution.** A saturated solution of $Ba(OH)_2$ which contains about 3.5 % barium hydroxide; used as a reagent. **b. hypophosphate** $Ba_2P_2O_6$ = 432.82. White needles, soluble in water or alcohol. **b. hypophosphite** $Ba(H_2PO_2)_2.H_2O$ = 285.50. Colorless crystals, d.2.875; soluble in water, decomp. when heated. **b. hyposulfate.** B. dithionate. **b.**

hyposulfite. B. thiosulfate. **b. iodate** $Ba(IO_3)_2.H_2O$ = 505.2. White crystals, d.5.28, which lose water at 130 and are sparingly soluble in hot water or alcohol, but soluble in acids; decomp. when heated. **b. iodide** $BaI_2.2H_2O$ = 427.24. Heavy rhombic crystals, $d_{25°}$.5.150, m.740; soluble in water or alcohol. Used medicinally as an alterant. **b. lactate** $Ba(C_3H_5O_3)_2$ = 315.5. Colorless crystals, soluble in water or dilute alcohol. **b. malate** $BaC_4H_4O_5$ = 269.42. A white powder; slightly soluble in water. **b. malonate** $BaC_3H_2O_4.H_2O$ = 257.42. A white powder; slightly soluble in water. **b. manganate** $BaMnO_4$ = 256.4. Mangan green, Casseler green, Rosenstiel green. A green powder used as a non-poisonous pigment. **b. mercuryiodide.** See *Rohrbach's* solution. **b. metasilicate.** B. silicate. **b. metatungstate** $BaW_4O_{13}.9H_2O$ = 1243.5. White tetragonal crystals, d.4.298; soluble in water. **b. methylsulfate** $Ba(CH_3SO_4)_2.2H_2O$ = 401.5. Colorless crystals, soluble in water or alcohol. **b. minerals.** Barium is widely distributed in small quantities in many rocks, feldspars and micas. Its principal ores are barite, $BaSO_4$; witherite, $BaCO_3$. **b. molybdate** $BaMoO_4$ = 297.4. A white powder, insoluble in water or alcohol, and sparingly soluble in acids. **b. monophosphate.** See *b. phosphate.* **b. monosulfide.** B. sulfide. **b. monoxide.** B. oxide. **b. nitrate** $Ba(NO_3)_2$ = 261.4. White regular crystals, $d_{23°}$.3.244, m.575, decomp. on further heating; soluble in water, insoluble in alcohol. It occurs native as nitrobarite. Used as a reagent and precipitant, for standardizing soap solutions and also in pyrotechnics for green lights (*e.g.*, railroad torches, signal rockets, etc.). **b. nitrite** $Ba(NO_2)_2.H_2O$ = 247.4. Colorless hexagonal needles, $d_{29°}$.3.173, decomp. 115; soluble in water, alcohol, acids or alkalis. **b. oleate** $Ba(C_{18}H_{33}O_2)_2$ = 700.1. Granular white masses, insoluble in water, soluble in alcohol or ether. **b. oxalate** $Ba(C_2O_4).H_2O$ = 243.4. A white powder, d.2.658; insoluble in water or alcohol, soluble in acids or ammonium chloride solution. **b. oxide** BaO = 153.4. Baryta. b. monoxide, b. protoxide. A white or yellowish amorphous powder or crystals, d.4.73–5.74, m.1923, soluble in water, alcohol or acids. Used in the glass industry, and in the manufacture of barium salts. **b. perchlorate.** (1) *anhydrous-* $Ba(ClO_4)_2$. Desiccant. (2) *tetrahydrate,* $Ba(ClO_4)_2.4H_2O$ = 408.35. Colorless hexagonal crystals, m.505; soluble in water, alcohol or alkalis. The anhydrous salt, $Ba(ClO_4)_2$, is used in pyrotechnics. **b. periodate** $Ba_5(IO_6)_2$ = 1132.6. A white powder, insoluble in water, soluble in acids. **b. permanganate** $Ba(MnO_4)_2$ = 375.3. Brownish-violet crystals; soluble in water. Used in the manufacture of permanganates. **b. peroxide** BaO_2 = 169.4. B. dioxide, b. superoxide, b. binoxide. A white or grayish amorphous powder containing from 89–90 % BaO_2, d.4.958; insoluble in water, decomp. in acidulated water with the formation of hydrogen peroxide. Used in the manufacture of hydrogen peroxide, and formerly in the preparation of oxygen gas (Brin's method); as a bleaching agent for animal substances and plant fibres; as reagent for the detection of iodine and indican in urine; and in the glass industry. (Cryst.) $BaO_2.8H_2O$ = 313.45. Colorless crystals; insoluble in water, soluble in acids. **b. persulfate** $Ba(SO_4)_2$, $4H_2O$ = 401.55. White crystals decomp. by water. **b. phosphate** (di-) $BaHPO_4$ = 233.4. Acid b. phosphate. B. hydrogen phosphate. Colorless rhombic needles, $d_{15°}$.4.165; insoluble in water, soluble in acids or ammonium salt solutions. (mono-) $BaH_4(PO_4)_2$ = 331.5. Colorless triclinic crystals, $d_{4°}$.2.9, decomp. by water. (pyro-) $Ba_2P_2O_7$ = 448.8. White rhombic crystals, $d_{20°}$.3.9; insoluble in water, soluble in acids or ammonium salt solutions. (tri-) $Ba_3(PO_4)_2$ = 602.2. Colorless crystals, d.4.1; insoluble in water, soluble in acids. **b. phosphide** BaP_2 = 199.4. Grayish masses or powder, decomp. by water with the evolution of PH_3 gas. **b. phosphite** $BaHPO_3.1\frac{1}{2}H_2O$ = 244.4. A colorless powder, soluble in hot water. **b. platinic chloride.** B. chloroplatinate. **b. platinic rhodanate** $BaPt(CNS)_6$ = 680.8. B. platin rhodanide, b. platinum sulfocyanide, platinic b. thiocyanate. Red needles, soluble in water or alcohol. **b. platinocyanide.** B. cyanoplatinite. **b. platinous chloride.** B. chloroplatinite. **b. platinous cyanide.** B. cyanoplatinite. **b. potassium chlorate** $BaK(ClO_3)_3$ = 426.8. Colorless crystals, soluble in water; used in pyrotechnics. **b. propionate** $Ba(C_3H_5O_2)_2.H_2O$ = 301.50. A colorless powder, soluble in water. **b. protoxide.** B. oxide. **b. pyrophosphate.** See *b. phosphates.* (3). **b. rhodanate, b. rhodanide.** B. thiocyanate. **b. salicylate.** $Ba(C_7H_5O_3)_2.H_2O$ = 429.6. Colorless needles, soluble in water. **b. selenate.** $BaSeO_4$ = 280.57. A white amorphous powder, d.4.75, insoluble in water, decomp. by acids. **b. selenite.** $BaSeO_3$ = 264.57. White powder, used in the glass industry as decolorizer and for ruby glass. **b. silicate.** $BaSiO_3$ = 213.67. B. metasilicate. Colorless, rhombic crystals, $d_{.15°}$.4.44, m.1470, soluble in water or acids. **b. silicofluoride,** $BaSiF_6$ = 279.5. A white powder d.4.29, slightly soluble in water. **b. stearate** $Ba(C_{18}H_{35}O_2)$ = 704.12. A white, unctuous mass used as packing material for bearings in pumps handling alkaline solutions. **b. succinate.** $BaC_4H_4O_4$ = 253.5. Colorless crystals, slightly soluble in water, insoluble in alcohol. **b. sulfate.** $BaSO_4$ = 233.4. Artificial barytes, synthetic blanc fix. A rhombic microcrystalline powder, d.4.25–4.5, decomp. 1580, insoluble in water, alcohol, or dilute acids, but soluble in conc. sulfuric acid or ammonium nitrate solution. It is a reagent for detecting colloidal metals, a constituent of meals given before taking X-ray pictures of the stomach and intestines, used commercially (as "blanc fixe") as a white pigment, as a body for printing inks, etc. and similarly to barytes. Cf. *lithopone.* (acid-) $Ba(HSO_4)_2$ = 331.51. B. bisulfate. A white powder. **b. sulfhydrate** $Ba(SH)_2$ = 203.51. B. hydrosulfide. A yellowish or white powder, soluble in water; decomp. 250. **b. sulfide** (mono-) BaS = 169.4. Colorless rhombic crystals or an amorphous, yellow, phosphorescent powder, $d_{15°}$.4.25, decomp. if heated or by acids, with evolution of H_2S. Used as a depilatory and alterant, for the preparation of arsenic-free hydrogen sulfide gas and in making luminous paint; cf. *Bologna* phosphorus. (tri-), BaS_3 = 233.55. Yellowish-green crystals; soluble in water. (tetra-) BaS_4 = 265.61. Red rhombic crystals, d.2.987 soluble in water, insoluble in alcohol. **b. sulfite** $BaSO_3$ = 217.43. A white powder, insoluble in water, soluble in dilute acids. **b. sulfocyanate, b. sulfocyanide.**

Same as b. thiocyanate. **b. sulfophenylate** $Ba(C_6H_5SO_4)_2$ = 483.1. B. phenylsulfate. White crystals, soluble in water; used as an antiseptic. **b. sulfovinate.** B. ethylsulfate. **b. tannate.** A yellowish powder, soluble in water. **b. tartrate** $BaC_4H_4O_6.H_2O$ = 303.41. White powder, d.2.980, very slightly soluble in water. **b. tetrasulfide.** B. sulfide. **b. thiocyanate.** $Ba(CNS)_2.2H_2O$ = 289.55. B. thiocyanide, b. sulfocyanide. Colorless crystals soluble in water or alcohol; used in photography and the dye industry. **b. thiosulfate** $BaS_2O_3.H_2O$ = 267.51. A white powder, d.3.447; slightly soluble in water, insoluble in alcohol. **b. titanate.** $BaTiO_3$ = 233.5. A white powder, used in the manufacture of pigments. **b. triphosphate.** See *b. phosphates.* **b. trisulfide.** See *b. sulfides.* **b. trithionate** $BaS_3O_6.2H_2O$ = 365.6. Colorless shining scales, soluble in water. **b. tungstate** $BaWO_4$ = 385.4. B. wolframate, tungsten white. A white powder, insoluble in water, used as a pigment. **b. value.** The equivalent of the saponification value of an oil or fat, expressed as BaO. **b. white.** B. sulfate. **b. wolframate.** B. tungstate.

bark. Any portion of a stem or root of a tree outside the cambium circle. The following barks are official (U.S.P.):

Aspidosperma	Mezereum
Cascara sagrada	Pomegranate
Cascarilla	Quillaja
Cassia cinnamon	Rubus
Ceylon cinnamon	Saigon cinnamon
Cinchona	Sassafras
Cotton root bark	Viburnum opulus
Elm	Viburnum prunifolium
Euonymus	White oak
Frangula	Wild cherry
Juglans	Xanthoxylum

barkevite. Berkevilite. A black amphibole intermediate between hornblende and arfvedsonite, d.3.43.

Barkhausen effect. The magnetization changes *discontinuously* when the magnetic field-strength acting on a ferromagnetic material is changed.

barkometer. A hydrometer for tanning liquids, graduated from 0 to 60 degrees Baumé.

barley. The seeds of *Hordeum distichum*, a cultivated grass. **hulled-** B. grain deprived of its husk. **Indian-** Sabadilla. **pearl-** the polished and rounded b. seed which is rich in starch but devoid of hordein.

b. gum. A substance consisting mainly of pentosans, isolated from barley or malt.

barm. A suspension of yeast in a fermenting liquid.

barmagnet. See *magnet.*

barograph. A self-registering barometer. **b. chart.** The record produced by a barograph.

barometer. An apparatus that indicates the air-pressure. **aneroid-** A b. containing no mercury or other liquid. **alcohol-** A b. using colored alcohol. **Fortin-** A common type of mercury barometer in which the starting-point of the scale is the point of an ivory pin adjusted so as just to touch the surface of the mercury in the cistern. **glycerin-** A b. utilizing colored glycerin. **mercury-** A b. using mercury.

b. tube. A narrow tube closed at one end and more than 32 inches (760 mm) long.

barometrograph. A device for photographing on a moving film the changes in pressure shown by a baroscope.

barophoresis. Intertraction. Diffusion at a speed that is dependent upon extraneous forces; such as, density of adjacent phase, gravity etc. Thus in agar gels the upward and downward diffusions of methylene blue are unequal.

baroscope. A U-tube filled with a liquid and connected to the system the pressure changes of which are to be made visible.

Barosma. A genus of South African evergreen plants of the Rutaceae family. **B. betulina.** The source of *buchu.*

barosmin. (1) A concentration from *Barosma betulina* or *B. crenulata*, used medicinally as a diuretic. (2) $C_{27}H_{32}O_{16}$ = 612.2. Rutin, rutoside, eldrin. A rhamnoglucoside from buchu, m.183. Cf. *sophorin.*

barosmoid. The total principles from the leaves of *Barosma betulina;* used as a diuretic and stimulant tonic.

barotaxis. Stimulation of living cells caused by pressure.

barotropism. The reaction of living cells to changes in pressure.

barra. Burra gokero.

barrandite. A native iron phosphate.

barrel. (1) A unit of weight or volume whose magnitude varies according to the particular commodity for which it is employed, *e.g.,*

Wine	31 gallons
Ale	36 gallons
Petroleum	42 gallons
Rosin	180 pounds
Flour	196 pounds
Butter	224 pounds
Pork, Beef	200 pounds
Cement	376 pounds

(2) A cylindrical container of wood- or sheet-metal, for the shipment or storage of large quantities of solids or liquids.

barreter lamp. An electrical device used to smooth out fluctuating voltages; e.g. in a mains supply.

barringtonin. $C_{18}H_{28}O_{10}$ = 404.2. A colorless amorphous glucoside from *Barringtonia speciosa;* a Myrtaceae. It is a cardiac poison.

baru. The seeds of *Hibiscus tiliaceus*, a Malayan Malvaceae; a musk seed substitute.

barutin. A compound of theobromine and barium sodium salicylate.

barye. The cgs-unit of pressure; 1 barye = 1 dyne/cm.^{2}. Cf. *bar.*

barylite. The native barium silicate, $2BaO, SiO_2$.

barysilite. A native lead silicate, $Pb_3Si_2O_7$, which occurs in white hexagonal crystals.

baryta. Barium oxide. **calcined-** Barium oxide. **caustic-** Barium hydroxide. **hydrated-** Barium hydroxide. **b. mixture.** One part of saturated $Ba(NO_3)_2$ and two parts of saturated $Ba(OH)_2$ solutions; used in urine analysis. **b. water.** A saturated solution of barium hydroxide (3.5 %); it is alkaline, absorbs CO_2 from air; used as a reagent.

barytes. Barite.

baryto. A prefix indicating the presence of barium in a mineral. **b. calcite.** Alstonite.

baryum. Barium.

basalt. A compact, black, greenish or brownish igneous rock composed of particles of feldspar, augite and iron minerals. Cf. *diabase.*

basanite. A form of jasper used in the streak test for gold. Cf. *touchstone.*

base. (1) A compound which yields hydroxyl-ions in aqueous solution; or, a compound which reacts with an acid to form water and salt. (2) An extension of the term "base" covers substances dissolved in media other than water:

WATER SYSTEM (aquo system)

$$Ca^{+}{}_{+}{}^{-OH}_{-OH} + 2H^{+}{}^{-}Cl = H^{+}{}_{+}{}^{-}O + CaCl_2$$

$$K^{+}{}^{-}OH + MeCO.OH = H^{+}{}_{+}{}^{-}O + MeCO.OK$$

aquo-base *aquo-acid* *aquo-salt*

AMMONIA SYSTEM

$$Ca^{+}{}_{+}{}^{-NH_2}_{-NH_2} + HCl = NH_3 + Ca^{+}{}_{+}{}^{-NH_2}_{-Cl}$$

ammono-base *ammono-basic-salt*

$$K^{+}{}^{-}NH_2 + MeCO.NH_2 = NH_3 + MeCO.NHK$$

ammono-base *ammono-acid* *ammono-salt*

HYDROCARBON SYSTEM

$$Ca^{+}{}_{+}{}^{-CH_3}_{-CH_3} + HCl = CH_4 + Ca^{+}{}_{+}{}^{-CH_3}_{-Cl}$$

hydrocarbo-base *hydrocarbo-basic-salt*

(3) A proton acceptor, *i.e.*, a substance whose molecules are capable of taking up protons. **ammono-** A metallic amine which yields NH_2^- ion in liquid ammonia. **aquo-** A compound that ionizes in water to OH^- ions. **hydrocarbo-** Any metallic aryl- or alkyl compound which dissociates in hydrocarbons. **inorganic-** The hydroxide of a metal. **leuco-** Leucobase. **nitrogenous-** An amine, characterized by the ending *-ine*. Cf. diamine, triamine. **organic-** A carbon compound containing trivalent nitrogen. **primary-** See primary *amine*. Cf. *amines, alkaloids, ptomaines*. **secondary-** See secondary *amine*. **tertiary-** See tertiary *amine*.

b. exchange. The replacement of one cation adsorbed on a colloidal particle (e.g. soil) by another. **b. goods.** A mixture of fertilizer materials, usually superphosphates and nitrogenous materials. **b. metal.** (1) A metal whose hydroxide is soluble in water. (2) A metal which oxidizes rapidly as opposed to a noble metal.

basic. Having properties of a base. **di-** A base having *two;* **mono-** *one;* **tetra-** *four;* **tri-***three* replaceable hydrogen atoms.

b. anhydride. The oxide of a metal. **b. capacity.** Basicity. The property of an acid of yielding one or more hydrogen ions per molecule; hence, the number of hydrogen-atoms in an acid which can be replaced by a monovalent metal; as, HCl—monobasic, H_2SO_4—dibasic. **b. dyes.** A group of aniline colors used for dyeing mordanted cotton and silk. They are the salts of colorless bases with acetic, oxalic, nitric, sulfuric or hydrochloric acid, which decompose during the dyeing process. The free base combines with the acid constituent of the animal fibre or the acid constituent of the mordant in the case of vegetable fibres, thereby fixing the color in the fibre. **b. hearth.** See Thomas process. **b. lime phosphate.** A superphosphate neutralized with an excess of 6 % calcium carbonate. **b. nitrogen.** The nitrogen of a protein due to the basic amino acids and cystine precipitable by phosphotungstic acid. **b. phosphate slag.** B. slag. **b. principle.** An alkaloid. **b. rocks.** A class of igneous rocks which consist of free basic oxides; *e.g.*, corundum, magnetite, and some of the titaniferous iron ores. **b. salt.** A compound of bases and acids in which not all of the hydroxide of the base has been replaced by an acid radical; *e.g.*, bases that are not completely neutralized; *e.g.*, $Bi(OH)_2Cl$ and $Bi(OH)Cl_2$. **b. slag.** Thomas slag; Thomas phosphate. A finely-ground by-product of steel manufacture which contains 12–25 % P_2O_5, 40–50 % CaO and 5–15 % SiO_2; 80 % of the phosphoric acid should be soluble in 2 % citric acid.

basichromatin. The basic portion of the chromatin molecule.

basicity. (1) Basic capacity. (2) The reciprocal of acidity, measured either as (a) hydroxyl ion concentration (effective alkalinity or intensity of action) or (b) normality (free alkalinity or amount of action). Cf. *acidity*.

basil. (1) Sweet basil. The plant *Ocimum basilicum*, a Labiatae, used as flavoring in cooking, a carminative and an aromatic. (2) A tanned sheepskin. **b. oil.** The essential oil from the leaves of *Ocimum basilicum*. A yellow, aromatic liquid, d.0.945–0.987, $[\alpha]_D$ = +7° to +12°, soluble in alcohol. The chief constituents are cineol, chavicol, linalool; used for flavoring.

Basil Valentine. A Benedictine monk of Erfurt (Germany) and alchemist noted for his description of antimony salts and his recognition of the nitrates of bismuth, tin, mercury; the preparation of hydrochloric acid, sugar of lead; the discovery of methods for the manufacture of sulfuric acid and ammonia. His works are dated the 15th century but are supposed by some to date from the 17th century.

basophil. Capable of being stained by basic dyestuffs (*e.g.*, cells).

bass. Bast. **b. wood.** Linden.

bassisterol. $C_{27}H_{46}O$ = 383.3. An alcohol occurring in the unsaponifiable part of illipé *butter*, q.v.

bassora gum. A mixture of highly colored gums of the tragacanth type, from India; partly soluble in water.

bassorin. $C_6H_{10}O_5$ = 262.1. Tragacanthose. A carbohydrate from tragacanth and other gums. A colorless tasteless powder; soluble in alkalis, it produces a stiff gel and then a viscous paste with water.

bast. Bass. The fibrous inner part of *Calotropis gigantea*, an Asclepiadaceae, from Russia; used for ropes, mats and shoes. **b. fiber.** See *fiber*.

bastite. An altered pyroxene, resembling serpentine.

bastnasite. Hamartite. A rare earth carbonate [(Ce, La, Di)F]CO_3.

bastose. The cellulose of jute.

basylous. An obsolete term for basic.

bat guano. The droppings, dead bodies, etc. of bats, deposited in caves or in arid areas; used as fertilizer.

Bates polariscope. A polariscope with adjustable brightness of illumination, used in sugar refineries. **b. tube.** A metallic tube for the Bates polariscope.

bath. A vessel or device for keeping objects at a definite or varying temperature. **air-** A b. in which the object is surrounded by air of definite temperature. **metal-** A b. in which the object is suspended in a molten metal. **oil, paraffin-** A b. containing molten paraffin. **sand-** A shallow dish filled with sand. **steam-**

A device by which an object is heated by means of steam. **water-** A metallic container of varied design for keeping water heated to a certain temperature. Cf. *thermostat*.

bathochrome. A organic radical which, when introduced into an organic molecule, causes a shift in the absorption spectrum toward the red. Cf. *auxochrome*.

batholite. A molten granite having permeated sedimentary layers.

bating. Puering.

batrachiolin. A vitellin from frogs' eggs.

batracin. An arrow-poison of South American natives, prepared from the skin of an amphibian, *Phyllobates chocoensis*.

Battersea. A brand of crucibles, muffles, roasting dishes and scorifiers.

battery. Any two or more electrical cells, dynamos, or couples connected so that they behave as a single supply of electricity. **dry-** A number of dry cells, usually three, used for electrical pocket lights, etc. and other machines. **storage-** Accumulator.

batyl alcohol. $C_{21}H_{44}O_3$ = 344.3. The glyceryl ether $C_{18}H_{37}O—C_3H_5(OH)_2$ from shark liver oils; lustrous crystals, m.69. Cf. *chimyl* and *selachyl* alcohols.

Baudouin test. A test for sesame oil: cane sugar or an alcoholic solution of furfural is added to boiling HCl, and the oil gives a red color.

Baumann, Eugen. 1846–1896. A German chemist. **B.- Schotten reaction.** A reaction between alcohols and acid chlorides in alkaline solution to give an ester: $R.OH + R'.COCl + NaOH \rightarrow R'.COOR + NaCl + H_2O$.

Baumé, Antoine. 1728–1804. A French pharmacist who devised a hydrometer scale. **B. hydrometer.** A hydrometer with B.'s scale. See *hydrometers*. **B. scale.** A hydrometer scale for the determination of the densities of liquids.

bausteine. German for building stone. The amino acids of the proteins which are necessary as the "building stones" of the protoplasm of an organism. Cf. *polypeptides*.

bauxite. Beauxite. A native aluminum hydroxide, $Al_2O(OH)_4$, forming a white, grayish or reddish clay-like mineral which often contains iron; used in the manufacture of alum, aluminum and fire-bricks. See also *boehmite*, *alexite*.

bay. The sweet bay or laurel tree: *Laurus nobilis*, a Lauraceae. **indian-** *Laurus indica* (Lauraceae). **red-** *Persea carolinensis* (Lauraceae). Cf. *Bayberry*.

b. leaves oil. The essential oil distilled from bay leaves, *Laurus nobilis*. **b. oil.** Myrcia oil. An essential oil from *pimenta acris*. A pale, yellow liquid, d.0.965–0.995. The chief constituents are chavicol, eugenol and myrcene. **b. rum.** See *bay-rum*. **b. salt.** Crude sodium chloride, obtained by evaporating sea water in shallow pits. **b. wood.** A mahogany from Honduras (Campeche bay).

bayberry. (1) The fruit of *Laurus nobilis*, European laurel or sweet bay. (2) The fruit of *Myrica cerifera*, wax myrtle. (3) The fruit of *Pimenta acris*, allspice or pimenta. **b. bark.** Myrica, candleberry, waxberry. The dried bark of the root of *Myrica cerifera*, a Myricacea. It is used as a fluid extract as a digestive, carminative or nerve stimulant. **b. wax.** Myrtle wax, laurel wax, bayberry tallow. A green, wax-like mixture of fats, chiefly palmitin, derived from the fruits of myrica.

baycurine. An alkaloid from the roots of *Statice braziliensis* (baycuru root), a Plumbaginaceae of Brazil.

baycuru root. The roots of *Statice braziliensis* (Plumbaginaceae). It is one of the most powerful astringents known, and is used in the form of fluid extract.

Bayer acid. (1) *2.8-* or 2.7-Naphthylaminesulfonic acid. (2) Also applied to *β*-Naphthol sulfonic acid. **B. 205.** Germanin.

bayerite. A native aluminum hydroxide, $Al(OH)_3$, similar to boehmite.

bayldonite. A native lead vanadate.

bay-rum. Bay rum, spiritus myrciae. An aromatic liquid containing 8 cc. bay oil, 0.5 cc. orange oil, 0.5 cc. pimenta oil, 610 cc. alcohol, 320 cc. water per liter. Used as refreshing ablution, in cosmetics and perfumery.

B.B.C. Brombenzyl cyanide.

bbl. An abbreviation for *barrel(s)*.

bdella. Hirudo.

bdellium. An aromatic gum-resin from various sources; as, *Balsamodendron africanum*, *Balsamodendron mukul*. Cf. *Burseraceae*.

Be The symbol for beryllium, sometimes called glucinum, Gl.

Bé. Abbreviation for Baumé.

bead test. A qualitative flame test, made by placing a crystal of microcosmic salt or borax in the loop of a platinum wire, melting it to a bead in the bunsen flame, dipping it into the substance to be analysed and again holding it in the bunsen or blow-pipe flame, exposing it either to the oxidizing (OF), or reducing (RF) part of the flame. The color of the clear flux indicates the presence of metals as follows:

	Microcosmic salt		*Borax*	
	O.F.	R.F.	O.F.	R.F.
Cr	green	green	green	green
Co	blue	blue	blue	blue
Cu	blue	red	greenish-blue	red
Fe	brown	colorless or gray	yellow	green
Mn	violet	colorless	violet	colorless
Mo	colorless	green	colorless	brown
Ni	yellow	yellow	brown	gray
Ti	colorless	violet	colorless	yellow
W	colorless	blue	colorless	brown
U	green	green	red	green
V	yellow	green	colorless	green

beaded. Like a string of beads; as, disjointed colonies of bacteria along the line of inoculation.

beading. The production of bead-shaped drops *e.g.*, by condensing alcohol vapor.

beading oil. A mixture of sweet almond oil and ammonium sulfate, used for the production of artificial beading in distilled liquids.

beaker. A cup-shaped vessel made of glass, quartz, porcelain, aluminum or copper, used in laboratories for heating liquids. **b. flask.** A wide-lipped conical beaker or flask.

Beale's stain. An aqueous carmine solution containing some alcohol, ammonium and glycerin, used for staining nerve and connective tissue.

bean. (1) The seeds of Leguminosae or plants of the bean family. (2) Any other similarly shaped seed or seed pod. **bog-, buck-** Menyanthes. **broad-, common-** The seeds of

Vicia (Faba) vulgaris. **calabar-** Physostigma. **castor-** See *castor.* **French-, kidney-, navy-** The seeds of *Phaseolus vulgaris.* **Lima-** The seeds of *Phaseolus lunatus.* **ordeal-** Physostigma. **soja-, soya-** See *soy.* **St. Ignatius-** Strychnos. **vanilla-** See *vanilla.*

bearberry. Uva ursi. **b. bark.** Cascara sagrada.

bearing. The socket of an axle or rotating shaft. **b. metal solution.** A mixture of 400 cc. conc. HCl, 200 cc. conc. HNO_3, 40 gm. KCl and 1 l. of water.

bearsfoot. The root of *Polymnia uvedalia,* a Compositae of North America; used as fluid extract as a tonic or alterative. **English-** The plant *Helleborus foetidus,* a Ranunculaceae.

bearsweed. Eriodictyon.

bearwood. Cascara sagrada.

beater. An oval shaped vessel used in paper making. It contains a roll provided with blunt knives which circulates the pulp and cuts, fibrillates and hydrates it.

Beaudouin's Reagent. See *Baudouin.*

Beaumé. See *Baumé.*

beauxite. Bauxite.

beaverite. A highly-hydrated lead sulfate, from Beaver County, Utah, U. S. A.

bebeerine. $C_{18}H_{21}O_3N$ = 299.30. Bauxine, bebirine, cissampeline, pelosine. An alkaloid from bebeeru, the bark of *Nectandra rodiaei,* A Lauraceae of Guiana, and *Cissampelos pareira,* a Menispermaceae of S. Africa. A white amorphous powder, m.214, $[\alpha]_D$ −298°, soluble in alcohol or ether. It is an antipyretic and tonic similar to quinine. **b. hydrochloride.** $C_{18}H_{21}O_3N.HCl$ = 335.76. Reddish scales, m.259, soluble in water or alcohol. **b. sulfate.** $(C_{18}H_{21}O_3N)_2.H_2SO_4$ = 696.6. Brownish crystals, soluble in water.

bebeeru. The bark of the green-heart tree, *Nectandra rodiaei,* a Lauraceae of tropical America; used like cinchona bark. Cf. *chondroine.*

bebirine. Bebeerine.

beccarite. An olive-green, vitreous, native zirconium oxide, ZrO_2.

beche-de-mer. Trepang. A marine slug of the Pacific coral reefs, which is eaten as a delicacy by the Chinese.

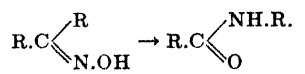
Becher, Johann Joachim. 1635–1682. A German physician, adventurer and alchemical writer, noted as the founder of the phlogiston theory.

Bechhold filter. An ultra-filtration apparatus for the separation of colloids by means of disks impregnated with nitrocellulose.

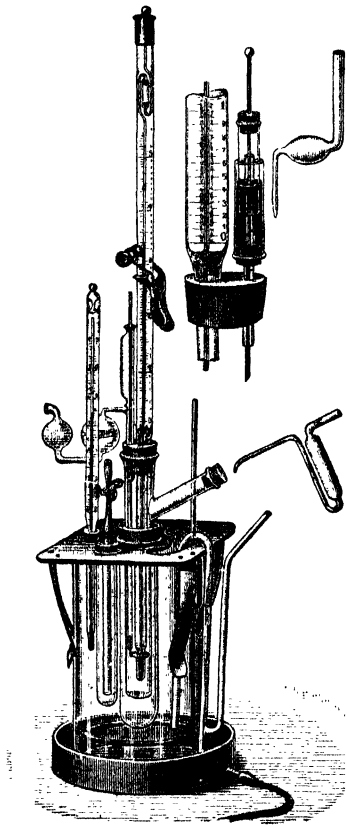
bechilite. Borocalcite.

beckelite. A calcium silicate containing cerium, lanthanum and didymium.

Beckmann, Ernst. 1853–1923. A German organic chemist noted for molecular weight determinations, and work on isomerism and hydroxylamine. **B. apparatus.** A glass apparatus for the determination of the molecular weight by (a) the lowering of the freezing point, or (b) raising of the boiling point of a solution. See figure. **B. burner.** A glass tube used as a burner and supported over a dish in which vapors or gases are evolved; it is used for producing colored flames. **B. reaction. B. rearrangement.** An intramolecular rearrangement, during which a ketoxime forms its isomeric amide, when treated with phosphorus pentachloride:



B. thermometer. Ultrathermometer. A thermometer used in the B. apparatus to read temperatures accurately to 0.01°C over any desired small range (about 6°C). The amount of mercury in the bulb, and therefore the temperature at which the thermometer is used, may be altered at will.



Beckmann apparatus.

Becquerel, Antoine Henri. 1852–1908. A French physicist and discoverer of radioactive radiations. **B. rays.** The radiations emitted from uranium and similar substances which affect the photographic plate. Cf. *radioactive* rays.

becquerelite. $2UO_3.3H_2O$. A hydrous, radioactive mineral of the Belgian Congo; it contains 70 % uranium, and is the most radioactive mineral.

beda nuts. The dried ripe seeds of *Terminalia belerica* (cf. *myrobalan*), exported from India; used for tanning and in the preparation of a black dye.

bee balm. Monarda.

beech. A genus of trees, *Fagus sylvatica.* Cf. *fagine.* **b. nut.** The seeds of b. used for expression of oil and for b. nut cake. **b. wood creosote.** The distillation product of b. wood, used as antiseptic and preservative.

beef extract. An aqueous extract of lean beef, partly desiccated, which contains the soluble

fibrin and proteins; it is used as a nutrient and in the preparation of culture media.

beegerite. A native lead sulfobismuthide, $Pb_6Bi_2S_9$ or $6PbS,Bi_2S_3$; d.7.2.

beehive. A small circular glass shelf with a hole in the top, used for collecting gases in pneumatic troughs.

beemerose. A nephelite rock or elaeolite syenite from New Jersey.

beer. A beverage containing from 3 to 7 % alcohol; a fermented infusion or decoction of malted barley with hops. Cf. *brewing wort.* **near-** One containing less than 0.5 % alcohol, in use during prohibition in U.S.

Beer's law. The intensity of a color or of an emergent ray of light is inversely proportional to the depth of liquid through which it travels; hence the absorption depends on the number of molecules present. Cf. *Lambert's* law.

beerbachose. A diorite rock from Butte County, California.

beeswax. (1) Wax from the honeycomb of bees. It contains cerolein, cerotic acid, myricyl alcohol, melissic acid and the alkanes: $C_{25}H_{52}$, $C_{27}H_{56}$, $C_{29}H_{60}$, $C_{31}H_{64}$. (2) White wax, cera alba. The bleached wax from the honeycomb of bees, d.0.965–0.969, m.63; used in pharmacy and industry.

beet. The plant *Beta vulgaris*, a Chenopodiaceae, cultivated for its root (sugar beet) containing up to 20 % sugar. **b. slop.** The liquid product remaining after extraction of b. sugar. It contains from 3–4 % N, and 8–10 % K; used as fertilizer. **b. sugar.** Sugar obtained from the beet by a process of liquid extraction. See *sucrose.*

Beggiatoaceae. A family of bacteria, which consist of motile cells in sheathless threads containing sulfur granules.

behenic acid. $C_{22}H_{44}O_2$ = 340.44. Docosanoic acid*, *n*-docosoic acid, $Me(CH_2)_{20}COOH$. A constituent of ben oil and the roots of *Centaurea behen.* Colorless needles, m.84, b.306, insoluble in water, sparingly soluble in alcohol or ether.

behenolic acid. $C_{22}H_{40}O_2$ = 336.43. T*-docosanoic acid, *13*-docosynoic acid*, $Me(CH_2)_7C{:}C(CH_2)_{11}COOH$. White needles, m.57.5; insoluble in water, soluble in alcohol or chloroform.

behenolyl. The monovalent radical, $C_{21}H_{39}CO$—, derived from behenolic acid. **b. amide.** $C_{22}H_{41}ON$ = 335.3. Colorless crystals, m.90. **b. chloride.** $C_{22}H_{39}OCl$ = 342.3. Colorless crystals, m.29.

Behr, Arno. An American chemist; a pioneer in the corn-products industry.

beidellite. A clay mineral from Beidell, Colo., inactive in base exchange. $Al_2O_3.3SiO_2.4H_2O$.

Beilby layer. The amorphous atomic layer formed on the surface of a metal when it is polished, or when two crystal surfaces are rubbed together.

Beilstein, Friedrich Konrad. 1838–1906. A Russian-born German chemist noted as compiler of **B.'s Handbuch.** A general reference book of 18 volumes describing 200,000 organic compounds. Cf. *Prager*-Jacobson classification.

bel. A unit of comparative loudness (not intensity) of sound. The log of the ratio of the intensities of two sounds. The smallest change in the loudness that the ear can detect. Cf. *sound, loudness.*

belcherose. A pyroxenite rock from Massachusetts.

beldongrite. A native manganese iron oxide.

belite. A crystalline constituent of portland cement clinker, probably $2CaO.SiO_2$. Cf. *alite.*

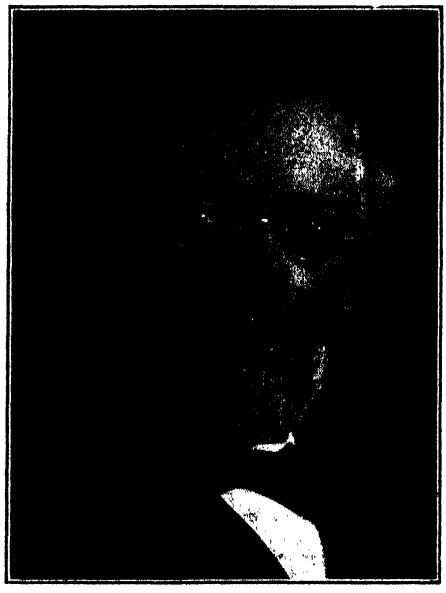
Bell, Jacob. 1810–1859. A British pharmaceutical chemist noted as the founder of the Pharmaceutical Society of Great Britain and the Pharmaceutical Journal.

bell. A hollow cup-shaped vessel. **b. glass.** Bell jars. A glass b. with or without tubulations, used to cover specimens and for experiments in a vacuum. **b. metal.** An alloy of 4 parts copper and 1 part tin, d.8.7; m.890, used for bells. **b. metal ore.** Stannite.

belladonna. Deadly nightshade, bane wort, poison cherry, death's herb. The European herb, *Atropa belladonna*, a Solanaceae whose leaves and roots are used in medicine. **b. leaves.** The dried leaves of *Atropa belladonna.* Used as fluid extract or tincture, as a narcotic, antihydriotic, antispasmodic or anodyne. **b. roots.** The roots of *Atropa belladonna;* used as fluid extract, as an antispasmodic.

belladonnine. $C_{17}H_{21}O_2N$ = 271.26. An alkaloid from belladonna. Cf. *atropine.*

Bellier's Test. A means of detecting upwards of 2 % of arachis oil in a saponified oil, by the formation of arachidic acid (q.v.).



Arno Behr.

belonesite. A molybdenum ore, $MgO.MoO_3$, occurring in needle-shaped crystals.

belonites. The small needle-shaped crystals found in volcanic rocks.

Bemberg silk. An artificial silk made by a cuprammonium process.

ben oil. The expressed oil from the seeds of *Moringa pterygosperma* and *M. oleifera*, a Moringaceae. It is a laxative and bland, and is used for extracting odors. Cf. *benne* oil.

Bence-Jones protein. A protein in the urine of patients with myeloma; it coagulates at 60 and redissolves at 100.

Benedict, Stanley Rossiter. 1884–1936. An American biochemist noted for analytical research. **B's. solution.** Dissolve 173 gm. Na-K tartrate and 200 gm. Na_2CO_3 in 800 cc.

boiling water, filter, add 17.3 gm. $CuSO_4$ in 100 cc. and dilute to 1 liter. **quantitative.** For direct determination of reducing sugars, 25 cc. reduce 50 mg. glucose. Use 18.0 gm. $CuSO_4$, 200 gm. Na or K citrate, 200 gm. $Na_2CO_3.10H_2O$, 125 gm. KCNS and 5 cc. 5% potassium ferrocyanide solution per liter. **B. test.** A test for glucose. Add 5 cc. of B. solution to about 8–10 drops of the sample, heat; if glucose is present a red or yellowish precipitate forms.

Bengal isinglass. Agar. **b. kino.** *Butea* gum. **b. lights.** A mixture of sulfur, sugar, and potassium nitrate to which either barium or strontium salts are added. This gives a green or red light, used in pyrotechnics.

benjamin. *Benzoin* gum.

benne oil. Sesame oil.

Bennert manometer. A U-shaped, graduated glass tube mounted on a board and used as a manometer.

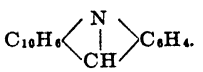
bentonite. Sodium montmorillonite. A clay of the Pacific Coast States, which swells when wetted, and has strong adsorbing properties.

benz. Benzo-.

benzacetin. (1) $C_{11}H_{13}O_4N$ = 223.11. Acetamido-ethylsalicylic acid. Colorless crystals, m.190. Cf. *phenacetin.* (2) $C_{10}H_{11}O_4N$ = 209.09. Acetamido-methyl-salicylic acid. Colorless crystals, m.205.

benzaconine. $C_{32}H_{43}O_{10}N$ = 601.1. Benzoylconine, picraconitine, napelline. An alkaloid produced by the partial hydrolysis of aconitine, m.130.

benzacridine. $C_{17}H_{11}N$ = 229.1. Phenonaphthacridine. The heterocyclic compound



dihydro- b. carboxylic acid. Tetrophan.

benzal. Benzilidene, benzenyl. The divalent radical, Ph.CH<, derived from toluene. Cf. *benzylidene, benzenyl.*

benzalacetone. $C_{10}H_{10}O$ = 146.1. Benzylidene acetone, cinnamyl methyl ketone, acetocinnamone, methyl styryl ketone, PhCH:CH.CO.Me. Colorless crystals, m.41, b.262. It has coumarin-like odor, is soluble in alcohol or ether; used in organic synthesis.

benzalacetophenone. $C_{15}H_{12}O$ = 208.17. Cinnamyl phenyl ketone, PhCH:CH.CO.Ph. Colorless crystals, m.62, b.346; insoluble in water, soluble in alcohol or ether.

benzalagen. Analgen.

benzalaniline. $C_{13}H_{11}N$ = 181.1. Benzilidene aniline. PhCH:NPh. Colorless crystals, m.45; used in organic synthesis.

benzalazine. $C_{14}H_{12}N_2$ = 208.1. Benzilideneazine, benzaldehyde azine, dibenzalhydrazine. PhCH:N.N:CHPh. Yellow prisms, m.93, decomp.; insoluble in water, soluble in hot alcohol, ether or chloroform.

benzalbromide. $C_7H_6Br_2$ = 249.87. Benzylidene bromide, α-dibromotoluene, $PhCHBr_2$. A fuming oily liquid, d.1.51, b.140.

benzalchloride. $C_7H_6Cl_2$ = 160.99. Benzylidene chloride, benzyl bichloride, benzylene chloride, chlorobenzal, α,α′ dichlorotoluene, bitter almond oil chloride, $PhCHCl_2$. A colorless liquid, d.1.2577, m. −16, b.206; insoluble in water, miscible with alcohol or ether. Used in chemical warfare and in the manufacture of dyes.

benzalcohol. Benzyl alcohol.

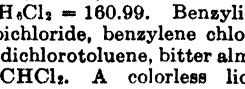
benzalcyanhydrin. C_8H_7ON = 133.11. Benzaldehyde cyanohydrin, mandelonitrile. The additive compound PhCH(OH)CN, formed from benzaldehyde and hydrocyanic acid. A colorless liquid, d.1.121, m. −10, decomp. 170; insoluble in water, soluble in alcohol or ether.

benzaldehyde (*ben-zal′-de-hid*) C_7H_6O = 106.09. Phenylaldehyde, benzene carbonal*, benzene methylal, benzoylhydride, artificial almond oil, Ph.CHO. A colorless liquid of bitter almond odor, d.1.0504, m. −13.5, b.179; sparingly soluble in water, miscible with alcohol, ether or chloroform. Used in the manufacture of dyes, perfumes, and drugs; also as a reagent for detecting alkaloids and fusel oil. **o-amino-** $NH_2.C_6H_4CHO$ = 121.1. Anthranilaldehyde. Colorless leaflets, m.39, decomp. on further heating; slightly soluble in water, readily soluble in alcohol or ether. **m-amino-** A yellow amorphous powder. **p-amino-** Colorless scales, m.70; soluble in water. **α-bromo-** Benzoylbromide. **α-chloro-** Benzoylchloride. **cyano-** Benzoylcyanide. **diethylamino-** See *diethyl-*, **dihydroxy-** *2.3-* Pyrocatechualdehyde. *2.4-* β-Resorcylaldehyde. *2.5-* Gentisaldehyde. *3.4-* Protocatechuic aldehyde. **dimethoxy-** Veratraldehyde. **dinitro-** $(NO_2)_2C_6H_4CHO$ = 196.05. Dinitrobenzene carbonal*. Yellow crystals **2.4-** m.72 $b._{10mm}$195. **2.6-** m.123. Slightly soluble in water. *3-***ethoxy-***4-***hydroxy-** Bourbonal. **ethoxy-methoxy-** Vanillin ethyl ether. **hexahydro-** Cyclohexane aldehyde. **o-hydroxy-** Salicylaldehyde. **m-hydroxy-** Colorless needles, m.104, b.240; soluble in water, alcohol or ether. **p-hydroxy-** Colorless needles, m.115, sublimes on further heating, sparingly soluble in water, soluble in alcohol or ether. **hydroxy-methoxy-** Vanillin. **isopropyl-** Cumaldehyde. **p-methoxy-** Anisaldehyde. **methyl-** Tolylaldehyde. **methylenedioxy-** Piperonal. **o-nitro-** $NO_2.C_6H_4CHO$ = 151.09. Yellow needles, m.44, $b._{22mm}$153; slightly soluble in water, soluble in alcohol or ether. **m-nitro-** Colorless needles, m.58, $b._{22mm}$ 164; very slightly soluble in water, soluble in alcohol or ether. **p-nitro-** Colorless prisms, m.106 insoluble in water, soluble in alcohol or ether. **trihydroxy-** *3.4.5-* Gallaldehyde. **trimethyl-** Durylaldehyde. **trinitro-** $(NO_2)_3C_6H_2CHO$ = 241.05. Trinitrobenzene carbonal*. **2.4.6-** Yellow scales, m.119, insoluble in water.

b. azine. Benzalazine. **b. cyanhydrin.** See *benzalcyanhydrin.* **b. green.** Malachite green. **b. hydrazone.** Benzalhydrazine. **b. oxime.** Benzaldoxime. **b. phenylhydrazone.** $C_{13}H_{12}N_2$ = 196.18. Benzalphenylhydrazone, benzilidenephenylhydrazine, PhCH:N.NHPh. Colorless crystals, m.155, $b._{15mm}$236; slightly soluble in ether.

benzaldiphenyl maleid. $PhCH:(C_2O_2)Ph_2$ = 312.08.

benzaldoxime. C_7H_7ON = 121.10. Benzaldehydeoxime. The compound PhCH:NOH, which occurs in several isomeric forms, each giving two series of derivatives:



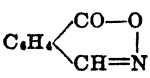
alpha- Benzantialdoxime, antibenzaldoxime. Colorless leaflets, d.1.11, m.35, $b._{6mm}$117. **beta-**

Benzsynaldoxime, **synbenzaldoxime, isobenzaldoxime.** Colorless needles, m.125, insoluble in water, slightly soluble in benzene or ether. The substitution products and their terminology are:

N—OR	N—OR	R—N:O	R—N:O
HCPh	PhCH	HCPh	PhCH
O-syn-	*O-anti-*	*N-syn-*	*N-anti-*
β-O	*α*-O	*β*-N	*β*-N

p-**methoxy-** PhCHOHMe = 135.08. Anisaldoxime. Colorless crystals, m.45. **N-methyl-** Benzantialdoxime-N-methylether. **O-methyl-** (1) Benzantialdoxime-O-methylether, PhCN:NOMe = 135.08. Colorless liquid, b.191. (2) Benzsynaldoxime-O-methylether. Colorless crystals, m.82. **N-phenyl-** Antibenzaldoxime-N-phenylether, PhCH:NOPh = 197.08. Colorless crystals, m.109. **m-nitro-alpha-** Colorless crystals, m.117. **p-nitro-alpha-** Colorless crystals, m.129. **o-nitro-beta-** Colorless crystals, m.136. **m-nitro-beta-** Colorless crystals, m.118. **p-nitro-beta-** Colorless crystals, m. 174.

b. acetate. $PhCH:NO.COCH_3$ = 163.08. **anti-** Colorless crystals or liquid, m.15; soluble in water. **b. acetic acid, anti-O-acetic acid.** $PhCH:NO.CH_2COOH$ = 179.09. Colorless crystals, m.98. **anti-N-acetic acid.** $PhCH(ON)CH_2COOH$ = 179.09. Colorless crystals, m.183. **b. carboxylic anhydride.** $C_8H_5O_2N$ = 147.09. The ring compound



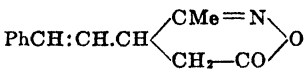
which, at 145°C, becomes $C_6H_4(CN)COOH$.

benzalethylamine. $C_9H_{11}N$ = 133.1. $PhCH:NC_2H_5$. Colorless liquid, b.195.

benzal green. Malachite green.

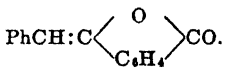
benzalhydrazine. $C_7H_8N_2$ = 120.1. Benzylidene hydrazine, benzaldehyde hydrazone, $PhCH:N.NH_2$. Colorless crystals or liquid, m.16, $b._{14mm}140$.

benzallevoxime. $C_{12}H_{13}O_2N$ = 203.1. The heterocyclic compound,



benzalphenylhydrazone. Benzaldehyde phenylhydrazone.

benzalphthalide. $C_{15}H_{10}O_2$ = 222.1. Benzylidene phthalide. Colorless crystals, m.99,



benzamarone. $C_{35}H_{28}O_2$ = 480.7. *α*-Benzalbisdesoxybenzoin, *1.2.3.4.5*-pentaphenyl-*1.5*-pentanedione*. $PhCH(CHPh.COPh)_2$. Colorless crystals, m.219; slightly soluble in hot water.

benzamide. C_7H_7ON = 121.14. Benzoylamide, benzene carbon amide*, benzoic amide. The amide. $PhCONH_2$. Colorless monoclinic tables, $d_4°$1.341, m.128, b.290; slightly soluble in water, soluble in alcohol, ether or ammonia. **o-amino-** Aminobenzene carbon amide*. $NH_2.C_6H_4.CONH_2$ = 136.12. Colorless leaflets, m.108; soluble in water, alcohol or ether. **m-amino-** Yellow leaflets, m.79, b.298; slightly soluble in water, soluble in alcohol or ether. **p-amino-** Yellow crystals, m.179; slightly soluble in water. **benzoyl-** Dibenzamide. **bromo-** C_7H_6NOBr = 199.97. Colorless crystals, *o-* m.156; *m-* m.150; *p-* m.190. **chloral-** See *chloral*. **choro-** C_7H_6NOCl = 155.56. Chlorobenzene carbon amide*. Colorless crystals, *o-* m.141; *m-* m.135.4; *p-* m.178.3. **di-** Dibenzamide. **fluoro-** C_7H_6NOF = 139.05. Colorless crystals, *o-* m.116; *m-* m.130; *p-* m.154.5. **hydro-** See *hydrobenzamide*. **o-hydroxy-** $HO.C_6H_4CONH_2$ = 137.10. Salicylamide. Yellow leaflets, m.140, decomp. 270; soluble in water. **m-hydroxy-** Colorless leaflets, m.170; soluble in water, alcohol or ether. **p-hydroxy-** Colorless needles, m.158; sparingly soluble in water, soluble in alcohol or ether. **hydro-** $(PhCH)_3N_2$ = 298.17. Tribenzalamine. Colorless needles, m.101; insoluble in water, soluble in alcohol or ether. **iodo-** C_7H_6NOI = 246.99. Colorless crystals, *o-* m.183.6; *m-* m.186.5; *p-* m.217.6. **methyl-** Toluamide. **o-nitro-** $NO_2C_6H_4CONH_2$ = 166.10. White needles, m.174, b.317°C; soluble in water, alcohol or ether. **m-nitro-** Yellow needles, m.141, b.315; sparingly soluble in water, soluble in alcohol or ether. **p-nitro-** Colorless needles, m.153; sparingly soluble in water, soluble in alcohol or ether. **n-phenyl-** Benzanilide. ***m*-semicarbazido-** Cryogenin. **silver-** $PhCONHAg$ or $PhC(:NH)OAg$ = 227.94. **sodium-** $PhCONHNa$ or $PhC(:NH)ONa$ = 143.06. **tri-** $(PhCO)_3N$ = 329.13. Tribenzalamine. Colorless crystals, m.202. **thio-** See *thiobenzamide*.

b. oxime. Benzamidoxime.

benzamidine. $C_7H_8N_2$ = 120.14. Benzenylamidine, iminobenzylamine, benzene carbonamidine*, $PhC(NH_2):NH$. Colorless crystals, m.75; soluble in water, alcohol or ether. **b. urethane.** $PhC(:NH)NHCO.OC_2H_5$ = 192.12. Colorless crystals, m.38.

benzamido. The monovalent radical, $PhCONH—$, derived from benzamide.

benzamidoxime. $C_7H_8N_2O$ = 136.08. Benzenylamine oxime, benzamide oxime, $PhC(:NOH)NH_2$. White crystals, m.80, slightly soluble in water.

benzamine. *β*-Eucaine. **b. lactate.** $C_{15}H_{21}O_3N.C_3H_6O_3$ = 337.24. Benzoyl vinyl diacetone alkamine lactate. Colorless crystals; soluble in water or alcohol and used for the synthesis of eucaine.

benzaminic acid. *m*-Amino *benzoic acid*.

benzamino acids. Amino-*benzoic acids*. **b. acetic acid.** Hippuric acid.

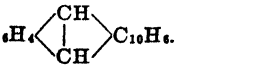
benzanalgen. Analgen.

benzanilide. $C_{13}H_{11}ON$ = 197.2. Phenylbenzamide, benzoylaniline, Ph.CO.NH.Ph. White or pinkish crystals, d.1.32, m.160; insoluble in water, slightly soluble in alcohol or ether; used as an antipyretic. **ethoxy-** Benzophenetide. **hydroxy-** $C_7H_7O_2N$ = 137.06. Benzoylaminophenol, $HO.C_6H_4.CONH_2$. Colorless crystals, *o-*m.140; *m-* m.170.5; *p-* m.162; used in organic synthesis. **methoxy-** Benzaniside. **methyl-** Benzotoluide. **nitro-** See *nitrobenzanilide*. **thio-** See *thiobenzamide*.

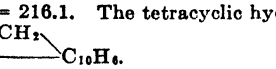
benzaniside. $C_{14}H_{13}O_2N$ = 232.3. Methoxybenzanilide. $MeO.C_6H_4.CONHPh$.

benzanthracenes. $C_{18}H_{11}$ = 227.1. A group of hydrocarbons in which a benzene and anthracene ring have a double bond in common. Many of them are carcinogenic. Cf. *benzpyrene*.

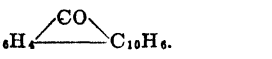
benzanthrene. $C_{18}H_{12}$ = 228.1. Naphthanthracene. The tetracyclic hydrocarbon



meso- $C_{17}H_{12}$ = 216.1. The tetracyclic hydrocarbon



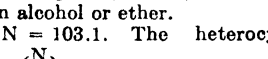
benzanthrenone. $C_{17}H_{10}O$ = 230.1. The tetracyclic ketone.



benzantialdoxime. See *benzaldoxime.*

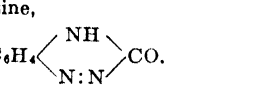
benzaurine. $C_{19}H_{16}O_2$ = 274.21. Phenyldiphenylcarbinol. The compound $PhC:C_6H_4:O.C_6H_4OH$. Yellow crystals, m.100, insoluble in water, soluble in alcohol or ether.

benzazete. C_7H_5N = 103.1. The heterocyclic compound



benzazide. Benzoylazide.

benzazimide. $C_7H_5ON_3$ = 147.1. Phenketodihydro-β-triazine,



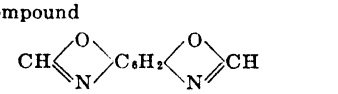
Colorless crystals, m.212.

benzazine. (1) Quinoline. (2) *Iso*quinoline.

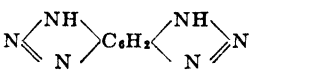
benzazole. 1- Indole. 2- *Iso*indole. **iso-** Indolenine.

benzb . . . See also *benzob . . .*

benzbioxazole. $C_8H_4O_2N_2$ = 160.1. The heterocyclic compound



benzbitriazole. $C_6H_2N_6$ = 158.3. The heterocyclic compound



benzdiazine. Benzodiazine.

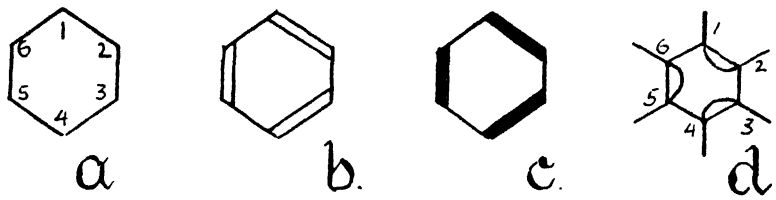
benzdifuran. Benzodifuran.

benzdioxazine. Benzodioxazine.

benzedrine. A brand of amphetamine; racemic 1-phenyl-2-aminopropane, $C_6H_5.CH_2.CHNH_2.CH_3$, a colorless liquid, slightly soluble in water. **b. sulfate.** A white powder, freely soluble in water.

benzene. C_6H_6 or PhH = 78.08. Benzol (Ger.), benzole (Fr.), phenylhydride, cyclohexatriene, phene*. A colorless liquid or crystals, $d_{20°}$.0.879, m.5.4°, b.80.3°; insoluble in water, miscible with alcohol, ether, acetone or glacial acetic acid. It is a solvent for alkaloids, fats, rubber, and resins and is used in organic synthesis, in the manufacture of dyes, in photography, as a motor fuel and in electrotechnics. Medicinally it is a narcotic and destroys leucocytes. Cf. *b. structure.* **acetenyl-** Phenyl*acetylene.* **acetyl-** Acetophenone. **allyl-** See *allyl.* **amino-** Aniline. **aminoethoxy-** Phenetidine. **aminoethyl-** $C_6H_4NH_2C_2H_6$ = 121.14. **o-** A colorless liquid, $d_{22°}$.0.983, b.215, **m-** A colorless liquid, $d_{0°}$.0.990, m.214, **p-** White leaflets, $d_{22°}$.0.995, m.5, b.260. **amyl-** PhC_5H_{11} = 148.18. Phenyl pentane, n-amylbenzene. A colorless liquid, $d_{20°}$.1.223, b.129; soluble in alcohol. **anilino-** Diphenylamine*. **arsenobis-** Arsenobenzene. **azimino-** Benzotriazole. **azo-** Azobenzene. **azoxy-** Azoxybenzene. **benzoyl-** Benzophenone. **benzyl-** Diphenylmethane. **bromo-*** Phenyl bromide. **bromo-chloro-*** BrC_6H_4Cl = 191.40. **1.3-** or **m-** A colorless liquid, d.1.6302, m.−21, b.196. **1.4-** or **p-** White prisms, m.67.4, b.196.3. **bromo-fluoro-*** BrC_6H_4F = 174.95. **1.4-** or **p-** A colorless liquid, b.153. **bromo-iodo-*** BrC_6H_4I = 282.86. **1.2-** or **o-** Colorless liquid, d.2.257, m.2.1, b.258. **1.3-** or **m-** An oily liquid, m.−9.3, b.252. **1.4-** or **p-** White needles, m.92, b.251. **bromo-nitro-*** $Br.C_6H_4.NO_2$ = 201.96. **o-** Colorless crystals, m.38, b.264; insoluble in water, soluble in alcohol or ether. **m-** Colorless crystals, d.1.704, m.52.6, b.257.5; insoluble in water, soluble in alcohol or ether. **p-** White monoclinic crystals, $d_{22°}$.1.934, m.125, b.259; insoluble in water, soluble in alcohol. **chloramido-** Chloraniline. **chloro-*** Phenyl chloride. **chloronitro-*** $ClC_6H_4NO_2$ = 157.55. **o-** Colorless needles, $d_{22°}$.1.368, m.32.5, b.246; insoluble in water, soluble in alcohol or ether. **m-** Colorless rhombic needles, d.1.534, m.44.2, b.235.6; insoluble in water, soluble in alcohol, ether, or benzene. **p-** White monoclinic prisms, $d_{18°}$.1.520, m.83, b.240; insoluble in water, soluble in alcohol. **chlorotrinitro-*** Picrylchloride. **cyano-** Benzonitrile. **diamino-** Phenylenediamine. **diaminoazo-** $(NH_2)_2C_6H_3.N:NPh$ = 212.20. **2.4-** Yellow needles, m.117.5; slightly soluble in water, soluble in alcohol or ether. The hydrochloride is chrysoidine orange. **diazo-** See *diazo.* **diazoamino-** $PhN:N.NHPh$ = 197.27. Yellow leaflets, m.96; insoluble in water, soluble in alcohol or ether. **dibromo-*** $C_6H_4Br_2$ = 235.98. Benzene dibromide. **o-** Colorless needles. $d_{18°}$.1.977, m.−1, b.224; insoluble in water, soluble in alcohol or ether. **m-** Colorless crystals, $d_{19°}$.1.955, m.1, b.219.5; insoluble in water, soluble in alcohol or ether. **p-** White monoclinic crystals, d.2.22, m.89, b.219; insoluble in water, sparingly soluble in alcohol. **dichloro-*** $C_6H_4Cl_2$ = 146.96. Benzene dichloride. **o-** A colorless liquid, $d_{0°}$.1.325, m.−17.6, b.179; insoluble in water, soluble in alcohol. Used as solvent, insecticide, spray, metal polish and sweeping compound. **m-** A colorless liquid, $d_{0°}$.1.307, m.−24.8, b.173; insoluble in water, soluble in alcohol or ether. **p-** Paradow. White needles, $d_{18°}$.1.268, m.53, b.174; insoluble in water, soluble in alcohol or ether. Used as antiparasitic; in herbarium collections and museums as a deodorant; and in eliminating the peach tree borer. **o-dicyano-** Phthalonitrile. **m-** *m-* Phthalonitrile. **p-** Terephthalicnitrile. **diethoxy-*** $C_6H_4(OCH_3)_2$ = 166.11. **1.2-** Pyrocatechol diethyl ether. White crystals, m.166.1. **1.3-** Resorcinol diethyl ether. White prisms, m.12, b.235. **1.4-** Hydroquinone diethyl ether. White scales, m.71, b.246, **diethyl-*** $C_6H_4(C_2H_5)_2$ = 134.17. **o-** A colorless liquid, $d_{18°}$.0.866, b.185; insoluble in water miscible with alcohol or ether. **m-** A colorless liquid, $d_{20°}$.0.860, b.181; miscible with alcohol or ether. **p-** A colorless liquid, $d_{18°}$.0.862, b.183; insoluble in water, miscible with alcohol or ether. **difluoro-*** $C_6H_8F_2$ = 114.03. **p-** Colorless liquid, d.1.164, m.−23.7, b.88.9, insoluble in water, soluble in alcohol or ether. **dihydro-** Cyclohexadiene*. **dihydrodiketo-** Quinine. **dihydroimino-** Benzenimine. **dihydroketo-** Benzenone. **dihydroxy-** $C_6H_4(OH)_2$. **1.2-** or **o-.** Catechol. **1.3-** or **m-.** Resorcinol. **1.3-** or **p-.** Hydroquinol. **diiodo-*** $C_6H_4I_2$ =

330.01. **1.2-** or **o-**. Colorless prisms, m.23.4, b.286.5; insoluble in water, soluble in alcohol or ether. **1.3-** or **m-** White rhombic prisms, m.34.2, b.285; insoluble in water, soluble in alcohol. **1.4-** or **p-** White leaflets, m.129.4, b.285, insoluble in water, soluble in alcohol. **dimethoxy-*** **1.2-** Veratrole. **1.4-** Hydroquinoldimethyl ether. **dimethyl-*** Xylene. **dimethylethyl-*** $C_6H_3(CH_3)_2C_2H_5$ = 134.17. *1-ethyl-3.4-dimethyl-* A colorless liquid, d_{20}°.0.878, b.183.4; insoluble in water. *2-ethyl-2.4-dimethyl.* A colorless liquid, d_{20}°.0.861, b.185; insoluble in water. **dinitro-*** $C_7H_4(NO_2)_2$ = 168.14. **1.2-**, or **o-** Colorless scales, d_{16}°.1.565, m.117, b.319; sparingly soluble in water, slightly soluble in alcohol, soluble in benzene. **1.3-** or **m-** Yellowish needles, d_{17}°.1.546, m.90 b.297; sparingly soluble in water, soluble in alcohol, ether, or benzene. Used in the manufacture of phenylendiamine and explosives. **1.4-**, or **p-** White needles, d_{17}°.1.587, m.171, b.298.2; sparingly soluble in water or alcohol, soluble in benzene. **diphenyl-** $C_6H_4Ph_2$ = 230.21. **para-**Terphenyl. White leaflets, m.205, b.383; insoluble in water, soluble in alcohol, ether or benzene. **ethenyl-*** Styrolene. **ethoxy-*** Phenetole. **ethyl-*** PhC_2H_5 = 106.12. Phenylethane. A colorless liquid, d_{14}°.0.874, m. −94, b.136.5; insoluble in water soluble in alcohol or ether. **ethylmethyl-*** MeC_6H_4Et = 120.1. **1.2-**or **o-** A colorless liquid, d.0.8731, b.159, **1.3-** or **m-** A colorless liquid, d.0.8690, b.159, **1.4-** or **p-** A colorless liquid, d.0.8652, b.162. **fluoro-*** See *fluobenzene.* **formamido-**Formanilide. **hexachloro-*** C_6Cl_6 = 284.73. White monoclinic crystals, d_{23}°.2.044, m. 229, b.326; insoluble in water, sparingly soluble in alcohol or ether. It differs from b. hexachloride. **hexaethyl-*** $C_6(C_2H_5)_6$ = 246.33. Colorless monoclinic crystals, d_{20}°.0.831, m.129, b.298; insoluble in water, soluble in alcohol or ether. **hexahydro-** Cyclohexane. **hexahydrohexahydroxy-** Inosite. **hexahydropentahydroxy-** Pinite. **hexahydroxy-** $C_6(OH)_6$ = 174.13. B. hexol*. Colorless needles, decomp. 200, slightly soluble in water, alcohol or ether. **hexaiodo-*** C_6I_6 = 833.55. Red-brown needles, decomp. 150. **hexamethyl-*** $C_6(CH_3)_6$ = 162.21. Mellitene. White rhombic crystals, m.164, b.264, slightly soluble in alcohol. **hexaoxy-** See *triquinoyls.* **hydrazino-**Phenylhydrazine. **hydrazo-** PhNH.NHPh = 184.24. Diphenylhydrazine. Colorless crystals, d.1.158, m.131; sparingly soluble in water or alcohol, soluble in ether. **hydroxy-** Phenol. **hydroxyazo-** $HO.C_6H_4N:NPh$ = 198.16. **1.2-** or **o-** White needles, m.82.5; slightly soluble in water, soluble in alcohol, ether or alkalis. **1.4-** or **p-** White



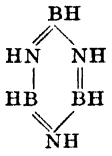
Benzene ring
Substitutions are designated by

ortho-	*o-*	1.2- and	*vicinal*	*v-*	1.2.3-
meta-	*m-*	1.3-	*symmetric*	*s-*	1.3.5-
para-	*p-*	1.4-	*asymmetric*	*a-*	1.2.4-

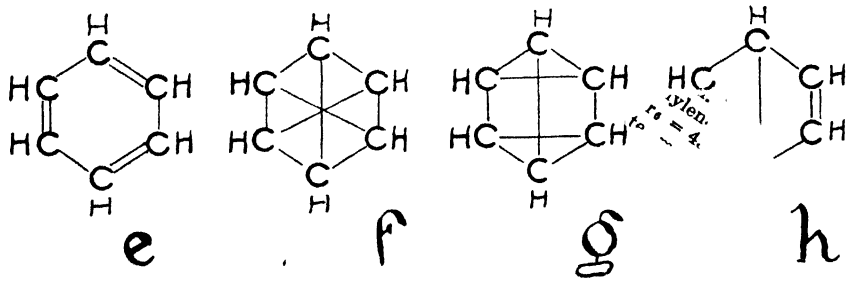
BENZENE SERIES

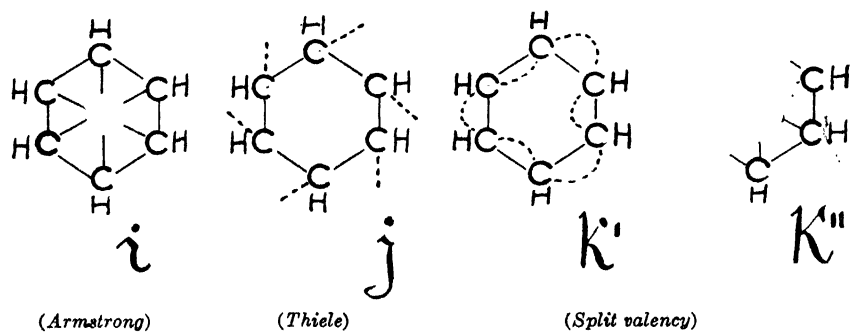
	No. of isomers	*Formula*
benzene, phenylhydride	1	C_6H_6 or PhH
toluene, methylbenzene	1	C_7H_8 or PhMe
xylene, dimethylbenzene	3	C_8H_{10} or $C_6H_4Me_2$
ethylbenzene, phenylethane	1	PhEt
mesitylene, hemimellitene, ψ-cumene, trimethylbenzene	3	C_9H_{12} or $C_6H_3Me_3$
methylethylbenzene	3	C_6H_4MeEt
propylbenzene, 1-phenylpropane	1	C_6H_5Pr
cumene, isopropylbenzene, 2-phenylpropane	1	C_6H_5Pr
durene, tetramethylbenzene	3	$C_{10}H_{14}$ or $C_6H_2Me_4$
butylbenzene, phenylbutane	3	PhBu
propylmethylbenzene, cymene	6	C_6H_4PrMe
diethylbenzene	3	$C_6H_4Et_2$
pentamethylbenzene	1	$C_{11}H_{16}$ or C_6HMe_5
amylbenzene	9	PhC_5H_{11}
butylmethylbenzene	9	C_6H_4BuMe
propyldimethylbenzene	10	$C_6H_3PrMe_2$
propylethylbenzene	6	C_6H_4PrEt
ethyltrimethylbenzene	6	$C_6H_2EtMe_3$
diethylmethylbenzene	6	$C_6H_3Et_2Me$
hexamethylbenzene	1	$C_{12}H_{18}$ or C_6Me_6
hexylbenzene	25	PhC_6H_{13}
amylmethylbenzene	27	$C_6H_4(C_5H_{11})Me$
butylethylbenzene	27	C_6H_4BuEt
butyldimethylbenzene	54	$C_6H_3BuMe_2$
propyltrimethylbenzene	36	$C_6H_2PrMe_3$
propylethylmethylbenzene	14	$C_6H_3PrEtMe$
dipropylbenzene	9	$C_6H_4Pr_2$

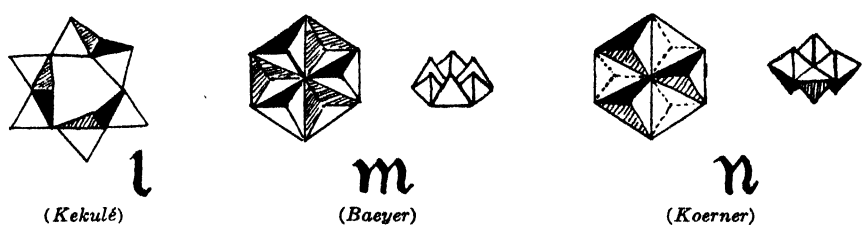
prisms, m.152; slightly soluble in water, soluble in alcohol or ether. **inorganic-** The substance formed by the action of ammonia on borane. It is a colorless and transparent liquid, and resembles benzene in its physical properties.



iodo-* PhI = 203.99. A colorless liquid, m. −28.5, b.188.2; insoluble in water, miscible with alcohol or ether. **iodoso-** $PhIO$ = 219.99. A white amorphous powder which explodes at 210; soluble in water, alcohol or benzene. **iodoxy-** $PhIO_2$ = 235.99. Colorless needles which explode at about 230; sparingly soluble in water, soluble in alcohol, ether, chloroform or benzene. **isocyano-** Phenylisocyanide. **isopropyl-** Cumene. **isopropylmethyl-** Cymene. **methoxy-*** Anisole. **methoxypropenyl-** Anethole. **methyl-*** Toluene. **methylethyl-*** See *b. ethylmethyl-*. **methyl-i-propyl-** Cymene. **nitro-** $PhNO_2$ = 123.08. A yellow liquid, m.5.4, b.210, with the odor of almonds; very slightly soluble in water, soluble in alcohol or ether. It occurs in two tautomeric forms: $PhNO_2$ and $PhONO$. **nitroso-*** PhNO = 107.08. Colorless monoclinic prisms, m.67.5; insoluble in water, soluble in alcohol or ether. **nitroxy-** $PhNO_3$. Phenyl nitrate. **penta amino-** See *pentamino-*. **pentabromo-*** C_6HBr_5 = 472.64. Colorless needles, m.160; insoluble in water, slightly soluble in alcohol or ether, soluble in benzene. **pentachloro-*** C_6HCl_5 = 250.34. Colorless needles, $d_{21°}$.0.769, m.85, b.275; insoluble in water, slightly soluble in alcohol, soluble in ether or benzene. **pentaethyl-*** $C_6H(C_2H_5)_5$ = 218.21. A colorless liquid, $d_{19°}$.0.899, m. −20, b.277; insoluble in water. **pentamethyl-*** $C_6H(CH_3)_5$ = 148.21. White crystals, m.53, b.230; insoluble in water. **pentamino-** $C_6H(NH_2)_5$ = 153.17. Colorless needles; soluble in water, insoluble in alcohol or ether. **phenyl-** Biphenyl. **propenyl-** Allyl b. **tetrahydro-** Cyclohexene. **tetrahydroxy-** Apionol. **tetramethyl-*** $C_6H_2Me_4$ = 134.3. **1.2.3.4-** Prehnitene. **1.2.3.5-** Isodurene. **1.2.4.5-** Durene. **trihydroxy-** $C_6H_3(OH)_3$ = 126.2. **1.2.3-** Pyrogallol. **1.2.4-** Benzenetriol. **1.2.5-** Phloroglucinol. **trimethyl-*** $C_6H_3Me_3$. **1.2.3-** Hemimellitene. **1.2.4-** Pseudocumene. **1.3.5-** Mesitylene. **trinitro-** See *trinitrob.* **trinitro-triazido-** $C_6(NO_2)_3(N_3)_3$ = 336.09. Greenish-yellow solid, m.131, insoluble in water, soluble in acetone; used as a detonator and substitute for mercury fulminate. **vinyl-** Styrene.



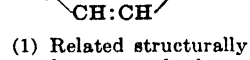




Benzene structure

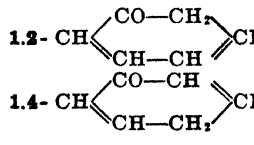
b. arsonic acid. $C_6H_7O_3As$ = 201.01. Phenyl- arsonic acid. $PhAsO(OH)_2$. Used as a reagent for Sn, Zr and Th. ***amino-*** Arsanilic acid. **b. aizmide.** See *benzotriazole.* **b. azoaniline.** See *diazoamino benzene.* **b. azobenzene.** See *azobenzene.* **b. azo-α-naphthylamine.** $C_{16}H_{13}N_3$ = 247.21. $PhN:NC_{10}H_6NH_2$. Red needles, m.123; soluble in alcohol, ether, or benzene. Used in organic synthesis. **b. carbinol.** Benzyl alcohol. **b. carbonal*.** Benzaldehyde. **b. carbonamidine*.** Benzamidine. **b. carbonitrile*.** Benzonitrile. **b. carboxylic acid*.** Benzoic acid. **b. diamine.** Phenylenediamine. **b. diazonium chloride.** Ph.NClN. A product formed by diazotizing aniline with nitrous acid in a strongly acid solution. It hydrolyzes to b. diazonium hydroxide, and is explosive when dry. **b. diazonium hydroxide.** PhN:N.OH. An intermediate in the formation of diazoaminobenzene from aniline. **b. dibromide.** See *dibromo-b.* **b. dicarbinol.** Xylenediol. **b. dicarbonal*.** Phthalaldehyde. **b. dicarbonitrile*.** Phthalonitrile. **b. dicarboxylic acid*** $C_6H_4(COOH)_2$. **1.2-** or **o-** Phthalic acid. **1.3-** or **m-** Isophthalic acid. **1.4-** or **p-** Terephthalic acid. **b. dichloride.** Dichloro b. **b. diol*** $C_6H_4(OH)_2$. **1.2-** or **o-** Pyrocatechol. **1.3-** or **m-** Same as Resorcinol. **1.4-** or **p-** Hydroquinol. **b. disulfochloride** $C_6H_4(SO_2Cl)_2$ = 275.10. A colorless, viscous liquid, d.0.8791, m.5, b.80.2; slightly soluble in water, soluble in alcohol or ether. Used in the manufacture of dyes. **b. disulfonic acid** $C_6H_4(SO_3H)_2$. A group of three isomeric acids, used in organic synthesis. **b. disulfoxide** $C_{12}H_{10}O_2S_2$ = 250.1. PhSO.SOPh Colorless crystals, m.45. **b. dithiol.** Phe e dimercaptan. **b. hexabromide** C_6H_6B 57.84. Hexabromocyclohexane*. Whi oclinic crystals, m.212; slightly solubl ol or ether. Cf. *hexabromo* b. **b.** xylic acid $C_6(COOH)_6$. Mellitic ac xachloride $C_6A_6Cl_6$ = 290.78. Hex lohexane*. Colorless monoclinic pr 7, m.157, b.$_{345mm}$218; soluble in wate ether. Cf. *hexachloro b.* **b. hexaiod** = 839.58. Hexaiodocyclohexane*. ystals. Cf. *hexaiodo b.* **b. indon** none. **b. induline.** Aposafranin al. **Benzaldehyde. b. monosulfo** lfonic acid. **b. nucleus.** See *t* itacarboxylic acid* $C_6H(COOH)_6$ lorless crystals, decomp. 238; solu r. **b. pentamine*** $C_6H(NH_2)_5$ = 153.1. Pentaaminobenzene. Colorless needles, very soluble in water. **b. positions.** See *b. ring.* **b. ring.** The graphical representation of the benzene structure, which is generally a hexagon with numbers representing the carbon atoms, as in fig. a; illustrating the double bonds, as in fig. b; indicating the double bonds by heavier lines, as in fig. c; or in the more explicit structure symbol, fig. d. **b. series.** A group of aromatic hydrocarbons and homologues of benzene of the general formula C_nH_{2n-6}. **b. siliconic acid*** C_6H_5SiOOH = 138.11. Silicobenzoic acid. Glassy scales, m.92, insoluble in water. **b. structure.** The theories of the arrangement of the carbon atoms in the benzene molecule are: fig. e—the plane formula of Kekulé (1865); fig. f—the diagonal formula of Claus (1867); fig. g—the prism formula of Ladenburg (1869); fig. h—the bridge formula of Claus (1870); fig. i—the centric formula of Armstrong, developed by Baeyer (1892); and fig. j—the partial valence formula of Thiele (1899). One modern conception is that of a dynamic formula, as in fig. k, in which the carbon atoms are joined by one bond and a shifting bond, or each pair of carbon atoms possesses a doublet of electrons and a shifting doublet of electrons, the later oscillating or rotating around the ring from atom to atom. See *Pauling* structure. **(geometrical-)** An arrangement of tetrahedra which illustrates the arrangement of the atoms in the benzene molecule, as fig. l—Kekulé's, fig. m—Baeyer's, and fig. n—Koerner's centroid arrangement. **b. sulfamide.** See *b. sulfonic* amide. **b. sulfide.** Phenyl sulfide. **b. sulfinic acid** $C_6H_6O_2S$ = 142.1. PhSO.OH, which is isomeric with b. sulfonyl. Colorless prisms, m.83, decomp. 100; soluble in water, alcohol or ether. **b. sulfochloride.** B. sulfonic chloride. **b. sulfonanilide.** $C_{12}H_{11}O_2NS$ = 233.2. $Ph.SO_2.NH.Ph$. **b. sulfone amide*.** See *b. sulfonic amide.* **b. sulfone chloride.** See *b. sulfonic chloride.* **b. sulfonic acid*** $C_6H_6O_3S.1\frac{1}{2}H_2O$ = 185.2. $PhSO_2.OH$. Colorless leaflets, m.65, b.135; soluble in water or alcohol, insoluble in ether. **b. sulfonic amide** $PhSO_2NH_2$ = 157.2. B. sulfamide, b. sulfoneamide. White lustrous plates, m.156 (decomp); soluble in water, alcohol, or ether. **b. sulfonic chloride** $PhSO_2Cl$ = 176.6. B. sulfone chloride, b. sulfonylchloride*. A colorless, oily liquid, d.1.384, m.14, b.251; insoluble in water, miscible with alcohol or ether. Used as a reagent for amines. **b. sulfonic hydroxamide** $PhSO_2NHOH$ = 173.2. Benzsulf-hydroxamic acid. Colorless crystals, m.126. **b. sulfonitramide** $C_6H_6O_4N_2S$ = 202.2. The compound $PhSO_2NHNO_2$. **b. sulfonyl.** The monovalent acyl radical derived from b. sulfonic acid: $Ph.SO_2$-. The isomer of b. sulfinic acid. **b. sulfoxide** $C_{12}H_{10}O_2S$ = 218.14. Ph_2SO_2. Colorless crystals, m.128; insoluble in water, soluble in alcohol or ether. **b. tetracarboxylic acid*** $C_6H_2(COOH)_4$. **1.2.3.4-** or **v-** Prehnitic acid. **1.2.3.5-** or **a-** Mellophanic acid. **1.2.4.5-** or **s-** Pyromellitic acid. **b. tetrol.** Tetrahydroxy b. **b. tricarboxylic acid*** $C_6H_3(COOH)_3$. **1.2.3-** or **v-** Hemimellitic acid. **1.2.4-** or **a-** Trimellitic acid. **1.3.5-** or **s-** Trimesic acid. **b. triol*** $C_6H_3(OH)_3$ = 126.2. Hydroxyquinol, hydroxyhydroquinone. **1.2.4-** Colorless crystals, m.140.5. **1.2.3-** or **v-** Pyrogallol. **1.3.5-** or **s-** Phloroglucinol. **b. trisulfonic acid*** $C_6H_6O_9S_3$ = 318.3. $C_6H_3(SO_3OH)_3$. Colorless, deliquescent crystals, used in organic synthesis.

benzenimine. C_6H_7N = 93.3 Dihydroiminobenzene.



benzenoid. (1) Related structurally to benzene. (2) A suggested structure for benzene involving 6 carbonoids, q.v.

benzenone. C_6H_6O = 94.05. Dihydroketobenzene.



hydroxy- Quinol. **imino-** Quinonimine. **methyl-** Toluenone.

benzenyl. The trivalent radical, PhC≡, derived from toluene.

benzenylamidine. Benzamidine.

benzenylamidothiophenol. $C_{13}H_9NS$ = 211.1. Benzenylaminothiophenol, *μ*-phenylbenzothiazole. Ph.C(N)(S)C$_6$H$_4$. Yellow needles, with a pleasant rose-like odor, m.115, b.360; soluble in alcohol or ether. Used in perfumery.

benzenylamidoxime. $C_7H_8ON_2$ = 136.20. Benzamideoxime, $PhC(NH_2):NOH$, which occurs in two isomeric forms:

N.OH ‖ NH$_2$.C.Ph (anti-) and HO.N ‖ NH$_2$.C.Ph (syn-)

Colorless crystals, m.89. **acetyl-** $PhC(NH_2):NO.COMe$. A colorless liquid or crystalline masses, m.16.

benzenylamino- See *benzenylamido-*

benzenylazoxime. $C_8H_6ON_2$ = 146.20. *3*-Phenyl-*1.2.4*-oxdiazole. The heterocyclic compound

Ph.C(=N—O—N=)CH.

b. ketone. $C_8H_6O_2N_2$ = 162.20. Benzenylcarbonyl azoxime,

Ph.C(=N—O—NH=)CO.

Colorless crystals, m.198. **b. thiocarbino.** $C_8H_6ON_2S$ = 178.14. Benzenylthiocarbonyl azoxime,

Ph.C(=N—O—N=)C.SH.

Colorless crystals, m.131.

benzenylcarbonylazoxime. Benzenylazoxime ketone.

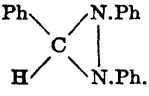
benzenylhydrazidine. $C_7H_9N_3$ = 135.10. Amidrazone, $PhC:NH(NHNH_2)$.

benzenyltetrazoic acid. Phenyltetrazole.

benzenyltrichloride. Benzotrichloride.

benzerythrene. $C_{24}H_{18}$ = 306.1. 4-*pp'*-Diphenylbiphenyl. The hydrocarbon, $PhC_6H_4.C_6H_4.Ph$.

benzhydrazoin. $C_{19}H_{16}N_2$ = 272.2.



Colorless crystals, m.55.

benzhydrol. Benzohydrol. **b. ether.** $C_{26}H_{22}O$ = 350.31. $(Ph_2CH)_2O$. Colorless crystals, m.109, b.$_{15mm}$ 267; sparingly soluble in water, soluble in alcohol or ether.

benzhydroxamic. See *benzohydroxamic.*

benzidam. Aniline.

benzidine. $C_{12}H_{12}N_2$ = 184.1. Bianiline, benzidine base, p-diamino-diphenyl, *pp'*-bianiline. The compound $NH_2C_6H_4.C_6H_4NH_2$. White or slightly grayish scales, or a crystalline powder, m.133, b.401; slightly soluble in water, soluble in alcohol, ether or boiling water. Used as a reagent for detecting sulfates in water analysis and the identification of blood, and a delicate reagent for metals in their higher valencies; also in organic synthesis. **dimethoxy-** Dianisidine. **dimethyl-** Tolidine.

b. conversion. The formation of b. from hydrazobenzene by boiling with mineral acids. **b. dicarboxylic acid.** Diaminophenic acid. **b. sulfate** $C_{12}H_{12}N_2.H_2SO_4$ = 282.3. A white crystalline powder, soluble in water or alcohol. It has similar uses to benzidine. **b. sulfone** $C_{12}H_{12}N_2SO_2$ = 246.22. Dibenzothiophene-2.7-diamine-9-dioxide, $(NH_2C_6H_3)_2SO_2$. Colorless crystals, m.350, insoluble in water, alcohol, or ether. **b. test.** Adler's reaction, for the detection of blood pigment. Add 1 cc. glacial acetic acid to 10 cc. suspected liquid, and shake with 4 cc. of ether. Transfer the ether to another test tube containing 0.5 cc. benzidine solution in glacial acetic acid and 2 cc. hydrogen peroxide. If blood is present, a green or bluish color will develop which turns to a dirty purple in a few minutes. Metallic iron, lead oxides and many other substances also give this test.

benzidino. The monovalent radical, $NH_2.C_6H_4.C_6H_4.NH$—, derived from benzidine.

benzil. $C_{14}H_{10}O_2$ = 210.15. Dibenzoyl, diphenylglyoxal, bibenzoyl, diphenyldiketone, PhCO.COPh. Yellow needles, d.1.521, m.95.2, b.348; insoluble in water, soluble in alcohol or ether. Used as a reagent, and in organic synthesis. **bisazo-** See *bisazobenzil.* **bishydrazi-** See *bishydrazibenzil.* **dimethoxy-** Anisil. **dimethyl-** Tolil.

benzilam. $C_{21}H_{15}ON$ = 297.2. Triphenyloxazol. The heterocyclic compound

O(CPh=CPh—N=)CPh

benzilamphioxime. Benzi amma-.

benzilaniline. Benzylanil

benzilantioxime. Benzil a-.

benzildianil. $C_{26}H_{20}N_2$ iC:N(Ph).-(Ph)N:CPh. Colorle .142.

benzildioxime. $C_{14}H_{12}C$. The compounds,

HO.N ‖ Ph.C.C.Ph ‖ N.OH — α- or *b. anti-dioxime* m.237

Ph. HO. — β *b. sy* ›

N.OH ‖ Ph.C.C.Ph ‖ N.OH — γ- or *amphidioxime* m.165

Crystalline solids, ı ›le in water, soluble in alcohol or ether; decomp. by heat. It is a delicate reagent for nickel. **b. peroxide.** $C_{14}H_{10}O_2N_2$ = 238.2. $Ph_2C_2N_2O_2$. Colorless crystals, m.114.

benzilic acid. $C_{14}H_{12}O_3$ = 228.17. Diphenylglycolic acid, *α*-phenylmandelic acid. The monobasic hydroxyacid: $Ph_2C(OH)COOH$. White monoclinic crystals, m.150; slightly soluble in water, soluble in alcohol or ether.

benzilidene. Benzal. **b. acetophenone** $C_{15}H_{12}O$ = 208.1. $PhCH:CH.COPh$. Colorless crystals, m.58, b.346. **b. aniline.** Benzalaniline. **b. hydrazine.** Benzal hydrazine. **b. phthalide.** Benzal phthalide.

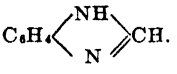
benzilmonoxime. $C_{14}H_{10}N_2O$ = 225.17. The compound

N(=C(Ph)—C(Ph)=O)N.

A crystalline substance, which occurs in two isomeric forms: *alpha*, m.137, *beta*, m.114. Both are insoluble in water and soluble in alcohol or ether.

benzilsynoxime. Benzildioxime, beta-.

benzimidazole. $C_7H_6N_2$ = 118.2; 1.3-benzodiazole, o-phenylene formamidine, benzoglyoxaline. The heterocyclic compound:

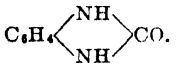


Colorless crystals, m.167. Cf. *naphthimidazole.*

benzylene- Pseudo isoindolebenzimideazole.

methyl- $C_7H_5N_2.CH_3$ = 132.1. o-phenyleneacetamidine, mesomethylbenzimidazole. Colorless crystals, m.176.

benzimidazolone. $C_7H_6ON_2$ = 134.2. o-phenylene-urea.



Colorless crystals, m.308. **thio-** Phenylenesulfone.

benzimidazolyl. The monovalent radical, $C_7H_5N_2$—, derived from benzimidazole.

benzimido. The monovalent radical, PhC(:NH)—.

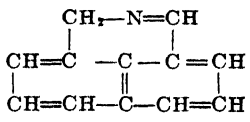
benzin, benzine. Benzoline, gasoline, petroleum benzin. A mixture of hydrocarbons obtained from the second distillate in the fractional distillation of crude petroleum; it consists of the fraction b.70–90. A clear colorless liquid, d.0.640–0.675; insoluble in water, miscible with alcohol, ethe carbon disulfide. Used as a solvent oils, resins, alkaloids and rubber; as agent for textiles; and as a motor fue *ne.*

benzindulin nine.

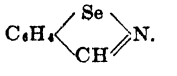
benzisodiaz = 118.2. **1.2-** Indiazene. Th compound

1.3- The co

benzisoquinoline. = 167.05. The heterocyclic compound:

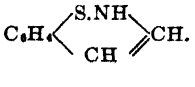


benzisoselenazole. C_7H_5NSe = 182.3. The heterocyclic compound

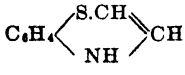


benzisosulfonazole. Saccharin.

benzisothiazine. C_8H_7NS = 149.1. **1.2-** The heterocyclic compound

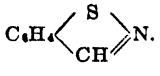


1.4- The heterocyclic compound

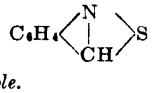


Cf. *benzothiazine.*

benzisothiazole. C_7H_5NS = 135.1. Benzo-*i*-thiazole. The heterocyclic compound

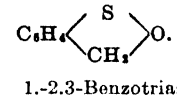


pseudo- Benziso-ψ-thiazole. The heterocyclic compound



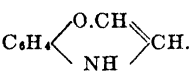
Cf. *benzothiazole.*

benzisothioxole. C_7H_6OS = 138.2. The heterocyclic compound

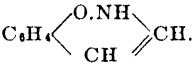


benzisotriazole. 1.-2.3-Benzotriazole.

benzisoxazine. C_8H_7ON = 133.1. **1.4-** The heterocyclic compound

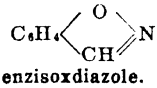


1.2- The heterocyclic compound



Cf. *benzoxazine.*

benzisoxazole. C_7H_5ON = 119.1. Indoxazene, isoindoxazene. The heterocyclic compound



$\beta.\gamma$- Anthranil.

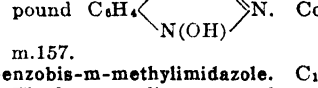
benzisoxdiazole. Benzofurazan.

benzo- A prefix indicating the divalent radical C_6H_4=, derived from benzene.

benzoate. A salt of benzoic acid; an organic compound of the type PhCOOR or PhCOOM.

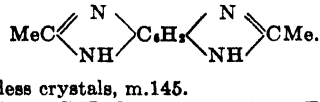
b. of soda. See *sodium benzoate.*

benzo-azimidole. $C_6H_5ON_3$ = 135.1. The compound



Colorless crystals m.157.

benzobis-m-methylimidazole. $C_{10}H_{10}N_4$ = 186.3. The heterocyclic compound



Colorless crystals, m.145.

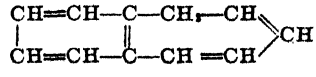
benzocaine. $C_9H_{11}O_2N$ = 165.2. Ethyl *p*-aminobenzoate, anesthesin, $NH_2C_6H_4COOEt$. Colorless, odorless, tasteless, crystals, m.90, insoluble in water, soluble in alcohol, benzene or acids; used as a local anesthetic.

benzocarbolic acid. Phenylbenzoate.

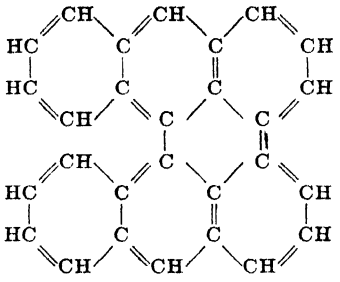
benzocinnoline. *5.6*-Naphthisodiazine.

benzocoumaran. Naphthofuran.

benzocycloheptadiene. $C_{11}H_{10}$ = 142.07. The hydrocarbon.



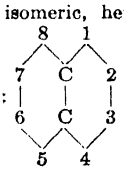
benzodianthrene. $C_{28}H_{16}$ = 352.2. The aromatic hydrocarbon



Cf. *naphthodianthrene.*

benzodianthrone. Helianthin.

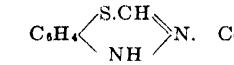
benzodiazine. $C_8H_6N_2$ = 130.06. Benzdiazine. A group of nine isomeric, heterocyclic compounds of the type:



They contain 2N atoms in the following positions: **1.2-** Cinnoline. **1.3-** Quinazoline. **1.4-** Quinoxaline. **1.5-** Pyridopyridine. **1.8-** Naphthyridine. **2.3-** Phthalazine. **alpha-** Cinnoline. **beta-** Phthalazine. **para-** Quinoxaline.

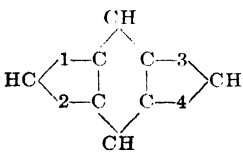
benzodiazole. $C_7H_6N_2$ = 118.1. **1.2-** Isoindazole. **2.1-** Indazole. **1.3-** Benzimidazole.

benzodiazthine. $C_7H_6N_2S$ = 150.1. Phenylsulfocarbizine. The heterocyclic compound

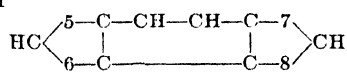


Colorless crystals, m.129.

benzodifuran. $C_{10}H_6O_2$ = 158.0. A group of

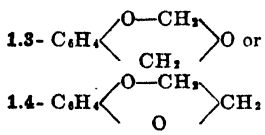


and



five isomeric, heterocyclic compounds of the types shown, in which the numerals indicate the position of two oxygen atoms and two CH-groups as follows: **o-alpha-** Oxygen at 6 and 8, CH-groups at 5 and 7. **m-alpha-** Oxygen at 1 and 3, CH-groups at 2 and 4. **m-beta-** Oxygen at 5 and 7, CH-groups at 6 and 8. **p-alpha-** Oxygen at 6 and 7, CH-groups at 5 and 8. **p-beta-** Oxygen at 2 and 3, CH- groups at 1 and 4.

benzodioxane, -an. $C_8H_8O_2$ = 136.06. A group of compounds; as,

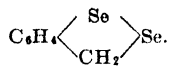


benzodioxazine. $C_7H_5O_2N$ = 135.1. A group of heterocyclic compounds of the benzodiazine type, but containing two oxygen atoms and one nitrogen atom; as, **1.2.3-** Oxygen at position 1 and 2, nitrogen at 3. **1.2.4-** Oxygen at position 1 and 2, nitrogen at 4. **1.4.2-** Oxygen at position 1 and 4, nitrogen at 2.

benzodioxdiazine. $C_6H_4N_2O_2$ = 136.1. A group of heterocyclic compounds, similar to benzodiazine, but which contain two oxygen atoms and two nitrogen atoms; as, **1.2.3.4-** Oxygen at position 1 and 2, nitrogen at 3 and 4. **1.4.2.3-** Oxygen at position 1 and 4, nitrogen at 2 and 3. **2.4.1.3-** Oxygen at position 2 and 4, nitrogen at 1 and 3.

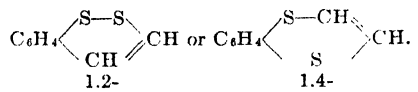
benzodioxtriazine. $C_6H_3O_2N_3$ = 137.1. A group of heterocyclic compounds, similar to benzodiazine, but which contain two oxygen and three nitrogen atoms; as, **1.2.3.4.5-** Oxygen at position 1 and 2, nitrogen at 3, 4, and 5. **1.2.3.4.8-** Oxygen at position 1 and 2, nitrogen at 3, 4, and 8. **1.2.4.5.8-** Oxygen at position 1 and 2, nitrogen at 4, 5, and 8.

benzodiselenole. $C_7H_6Se_2$ = 248.4. The heterocyclic compound

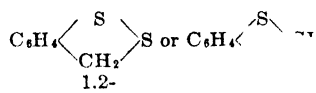


benzodisulfole. Benzodithiole.

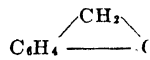
benzodithiin. $C_8H_8S_2$ = 168.2. The heterocyclic compounds:



benzodithiole. $C_7H_6S_2$ = 154.2. Benzodisulfole. The heterocyclic compounds

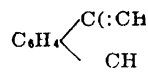


benzofluorene. $C_{17}H_{12}$ = 21 › of aromatic hydrocarbons of th



1.2- Chrysofluorene.

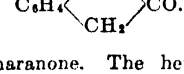
benzofulvene. $C_{10}H_8$ = thylene-indene. The aromatic h



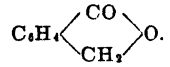
benzofuran. Coumarone. ·· Coumaran. **dihydroketo-** Benzofura:

benzofurancarboxylic acid. Co arilic acid.

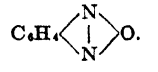
benzofuranone. $C_8H_6O_2$ = 134.1. **1(2)-** The heterocyclic compound



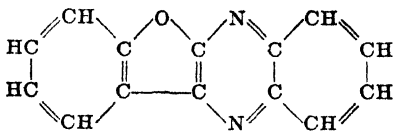
2(1)- Coumaranone. The heterocyclic compound



benzofurazan. $C_6H_4ON_2$ = 120.1. Benzisoxdiazole. The heterocyclic compound



benzofuroquinoxaline. $C_{14}H_7ON_2$ = 219.1. The heterocyclic compound



benzofuryl. The monovalent radical, C_8H_5O—, derived from coumarone.

benzoglycollic acid. Amygdalic acid.

benzoglyoxaline. Benzimidazole.

benzohydrol. $C_{13}H_{12}O$ = 184.09. Diphenylcarbinol, Ph_2CHOH. Colorless needles, m.68, b.298.5; insoluble in water, soluble in alcohol or ether. **tetramethyl diamino-** *Michler's* hydrol.

benzohydroxamic acid. $C_7H_7NO_2$ = 137.11. A compound existing in two isomeric types: *anti-* or *alpha-* N.OH ‖ HO.C.Ph and *syn-* or *beta-* HO.N ‖ HO.C.Ph *Syn-* m.124.

benzohydryl. The monovalent radical, $(C_6H_5)_2$-CH— or Ph_2CH—, derived from diphenylmethane. **b. amine.** $C_{13}H_{13}N$ = 183.18. Ph_2-$CH.NH_2$. Colorless liquid, b.288. **b. benzoic acid.** $C_{14}H_{12}O_2$ = 288.2. $Ph.CHOH.C_6H_4CO$-OH. A crystalline solid, m.164, decomp. if further heated; slightly soluble in water, soluble in alcohol or ether. **b. hydrazine.** Ph_2CHNH-NH_2. **b. hydroxylamine** $C_{13}H_{14}N_2O$ = 214.11. $Ph_2CH.NH.NHOH$. Colorless crystals, m.78.

benzohydrylidene. Diphenylmethane.

benzoic acid. $C_7H_6O_2$ = 122.09. Phenylformic acid, benz- arboxylic acid*. The mono- bas- OOH. White needles, d.1.266, m. 3; sparingly soluble in water, so- hol or ether. It occurs in be- nberries, and is poisonous to m- ntipyretic, antiseptic or expec- tor- calico printing and in the ma- aniline dyes. **acetylamino-** CH_3- OOH = 179.13. Acetamido b. o- dles, m.185; slightly soluble in w- hol. **m-** White crystals, decom- y soluble in alcohol, water or et- ss needles, decomp. 250; slight- water, alcohol or ether. **alde-** C_6H_4COOH = 150.09. **o-** White n- 04, m.97.2, b.191; soluble in water, a- ether. **m-** White needles, m.164, **p-** Co- needles, m.246; soluble in water, alcoh- r ether. **amino-** $NH_2.C_6H_4$-$COOH$ = 137.09. **o-** Anthranilic acid. Yellow leaflets, m.144; slightly soluble in water, soluble in alcohol or ether. **m-** Benzaminic acid. Yellow crystals, m.174, slightly soluble in water, alcohol or ether. **p-**Dracilic acid, vitamin B_x, anticanitic factor, growth factor for bacteria. It is part of the vitamin B complex (q.v.), and occurs in yeast; a deficiency of it causes prematurely grey hair. Yellow crystals, m.186; slightly soluble in alcohol, water or ether. **4-amino-3.5-dinitro-** Chrysanisic acid. **azo-** See *azo.* **azodi-** Azobenzoic acid. **azoxy-** See *azoxy-* b. **bromo-** BrC_6H_4COOH = 201.04. **o-** Colorless needles, m.150; slightly soluble in water, soluble in alcohol or ether. **m-** White needles, m.155, sparingly soluble in water, soluble in alcohol or ether. **p-** Colorless monoclinic prisms, m.251; slightly soluble in water, soluble in alcohol or ether. **carbamyl-** Phthalamic acid. **carbamylphenyl-** Diphenamic acid. **carboxyformyl-** Phthalonic acid, terephthalonic acid. **chloro-** ClC_6H_4-$COOH$ = 156.53. **o-** Colorless, rhombic crystals, d.1.540, m.137; sparingly soluble in water, soluble in alcohol or ether. **m-** White crystals, m.153°C; slightly soluble in water and soluble in alcohol and ether. **p-** Colorless monoclinic crystals, $d_{24°}$1.541, m.236; slightly soluble in water, soluble in alcohol or ether. **dichloro-** $Cl_2C_6H_3COOH$ = 190.97. **a-** or **2.5-** Colorless needles, m.156, b.301; slightly soluble in water, soluble in alcohol or alkalis. **v-** or **2.6-** White needles, m.126.5; soluble in alcohol or alkalis. **s-** or **3.4-.** White needles, m.203; sparingly soluble in water or alcohol, soluble in alkalis. **dihydroxy-** $(OH)_2C_6H_3COOH$ = 154.09. **2.3-** Pyrocatechoic acid. ($+2H_2O$ = 190.12). Colorless needles, m.204; soluble in water. **2.4-** ($+3H_2O$ = 208.14). *β*-Resorcylic acid. White needles, m.206; slightly soluble in water, soluble in alcohol or ether. **3.5-** ($+1\frac{1}{2}H_2O$ = 181.12) *α*-Resorcylic acid. Colorless prisms, m.232; soluble in water, alcohol or ether. **2.5-** Gentisic acid. Colorless needles, m.199; soluble in water, alcohol or ether. **3.4-** Protocatechuic acid. **2.6-** *γ*-Resorcylic acid. Colorless needles, m.167. **dihydroxymethyl-** Orsellic acid. **dimethoxy-** Veratric acid. **dimethoxyformyl-** Opianic acid. **dimethoxyhydroxy-** Syringic acid. **dimethyl-** $Me_2C_6H_3COOH$ = 150.13. **2.3-** *v*-Xylic acid. Colorless prisms, m.144, soluble in water or alcohol. **2.4-** Xylic acid. Colorless monoclinic crystals, m.126, b.268; insoluble in water, soluble in alcohol or ether. **2.5-** Isoxylic acid. White needles, m.132, b.268; insoluble in water, soluble in alcohol. **2.6-** White needles, m.116, b.274.5; slightly soluble in water, soluble in alcohol or ether. **3.4-** White prisms, m.163; slightly soluble in water or alcohol. **3.5-** 1.3.5-mesitylinic acid. White monoclinic crystals, m.166; very slightly soluble in water, soluble in alcohol or ether. **dinitro-** $(NO_2)_2$-C_6H_3COOH = 212.15. **2.3-** Colorless crystals, m.201. **2.4-** Colorless prisms, m.179; sparingly soluble in water, soluble in alcohol. **2.5-** Colorless needles, m.177, slightly soluble in hot water. **2.6-** Colorless needles, m.202, soluble in hot water. **3.4-** Colorless needles, m.163; slightly soluble in water, soluble in alcohol or ether. **3.5-** Colorless crystals, m.-203°C; soluble in alcohol or water. **ethoxy-** Et-$O.C_6H_4.COOH$ = 166.13. **o-** A colorless liquid or crystals, m.19; slightly soluble in water. **m-** Colorless needles, m.137; soluble in water, alcohol or ether. **p-** Colorless needles, m.195; very slightly soluble in hot water. **ethyl-** EtC_6H_4COOH = 150.13. **o-** Colorless needles, m.68, b.259; sparingly soluble in water, soluble in alcohol or ether. **m-** Colorless needles, m.47; very slightly soluble in water. **p-** Colorless leaflets, m.112; soluble in hot water, alcohol or ether. **formyl-** Phthalaldehydic acid. **formyl-dimethoxy-** Opianic acid. **disulfo-** Dithiobenzoic acid. **fluoro-** Fluobenzoic acid. **hexahydro-** $C_6H_{11}COOH$ = 128.14. Naphthenic acid, cyclohexane carboxylic acid. Colorless monoclinic crystals, d.1.048, m.30, b.233; slightly soluble in water, soluble in alcohol or ether. **hydrazinehydroxy-** Orthin. **hydrazino-** $NH_2NH.C_6H_4COOH$ = 152.08. **o-** Colorless crystals, m.155. **m-** Colorless crystals, m.231, **p-** Colorless needles, m.258; soluble

in alcohol. **hydrazo-** $(NH.C_6H_4COOH)_2$ = 272.25. **o-** Colorless leaflets, m.205; insoluble in water and soluble in alcohol or ether. **hydroxy-** $HO.C_6H_4COOH$ = 138.08. **o-** Salicylic acid. **m-** Colorless rhombic crystals, m.201.03; slightly soluble in water, soluble in ether. **p-** Colorless monoclinic crystals, $d_{22°}$.1.404, m.213; insoluble in water, slightly soluble in alcohol or ether. **hydroxydimethoxy-** Syringic acid. **hydroxy-methoxy-** Vanillic acid. **hydroxymethyl-** Cresotic acid. **isopropyl-** Cumic acid. **methoxy-** $MeO.C_6H_4COOH$ = 152.10. **o-** White monoclinic leaflets, d.1.180, m.98.5, b.200; sparingly soluble in water. **m-** White needles, m.102, b.245; soluble in water or alcohol. **p-** Anisic acid. **methyl-** Toluic acid. **methylene dioxy-** Piperonylic acid. **nitro-** $NO_2C_6H_4COOH$ = 167.08. **o-** Colorless needles, d.1.575, m.147.5; slightly soluble in water, soluble in alcohol or ether. **m-** Silky needles, d.1.494, m.141.4; sparingly soluble in water, soluble in alcohol or ether. **p-** White scales, d.1.550, m.242.4; sparingly soluble in water or alcohol, soluble in ether or chloroform. **pentamethyl-** C_6Me_5COOH = 192.19. Colorless needles m.210; slightly soluble in water, soluble in alcohol. **phenyl-** PhC_6H_4COOH = 198.15. **o-** Colorless needles, m.111, b.343; sparingly soluble in water, soluble in alcohol. **m-** White leaflets, m.160; slightly soluble in water, soluble in alcohol or ether. **p-** White needles, m.219; insoluble in water, soluble in alcohol or ether. **sulfamine-** $NH_2SO_2C_6H_4COOH$ = 201.1. **o-** Colorless crystals, m.167. The anhydride is saccharin. **m-** Colorless crystals, m.238. **p-** Colorless crystals, decomp. 280. **sulfo-** $HOSO_2.C_6H_4COOH,3H_2O$ = 256.18. **o-** Colorless crystals, m.250; soluble in water or alcohol, insoluble in ether. **m-** (+$2H_2O$ = 236.16). Colorless crystals, m.141. **p-** Colorless needles, m.259; soluble in water, alcohol or ether. **tetrahydro-** C_6H_9COOH = 126.08. A solid, d.1.072. **tetramethyl-** Me_4C_6HCOOH = 178.1. **2.3.4.5-** Colorless crystals, m.165. **2.3.5.6-** Colorless crystals, m.127. **trihydroxy-** **2.3.4.-** See *trihydroxy*. **3.4.5-** Gallic acid. **trimethoxy-** Asaronic acid. **trimethyl-** $Me_3C_6H_2COOH$ = 164.1. **2.3.4-** Prehnitilic acid. Colorless crystals, m.167. **3.4.5-** alpha-i-durylic acid. Colorless crystals, m.215. **2.3.5-** gamma-i-durylic acid. Colorless crystals, m.127. **2.4.5-** Durylic acid. Colorless crystals, m.150. **2.4.6-** beta-i-durylic acid, mesitylene carboxylic acid. Colorless crystals, m.152.

b. acid anhydride. $PhCO.O.COPh$ = 226.14. Colorless crystals, d.1.199, m.42, b.360; soluble in alcohol or ether. It is a strong antiseptic. **b. alcohol.** Benzyl alcohol. **b. aldehyde.** Benzaldehyde. **b. amide.** Benzamide. **b. anhydride.** Benzoic acid anhydride. **b. ether.** Ethylbenzoate. **b. sulfimide, b. sulfinide.** Saccharin. **b. trichloride.** Benzotrichloride.

benzoin. (1) $C_{14}H_{12}O_2$ = 212.17. Oxyphenyl benzoyl ketone, (ω)-benzyl alcoholphenyl ketone, phenyl benzoyl carbinol, bitter almond oil camphor. $PhCO.CH(OH)Ph$. White hexagonal crystals, m.132, b.343 soluble in hot water, alcohol or ether. It does not occur in gum benzoin. It is an antiseptic; used in ointments. (2) Benzoinum, gum benzoin. The balsamic resin *Styrax* species. See *b. gum*. **diisopropyl-** Cuminoin. **dimethoxy-** Anisoin. **hydro-** $PhCH(OH)CH(OH)Ph$ = 214.19. White leaflets, m.138, b.302, sparingly soluble in water, soluble in alcohol. **i-hydro-** Colorless monoclinic crystals m.119.5; soluble in alcohol or ether.

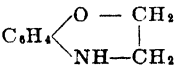
b. condensation. A reaction between two aromatic aldehydes under the influence of KCN, to form water and a compound $X.CH(OH).CO.X$. With benzaldehyde X is Ph, and the resulting compound in benzoin. Cf. *aldol* condensation. **b. gum.** Benjamin gum benzoinam, kemenian (Malay), luban jawi (Arabic). *Siam-* The resin from *Styrax benzoin* and other species. The chief constituents are benzoic acid, an essential oil and vanillin; used in perfumery and cosmetics. *Sumatra-* The resin from *Styrax* species. The chief constituents are cinnamic and benzoic acids; used for varnishes and in the manufacture of cinnamic acid. **b. oxime** $C_{14}H_{13}NO_2$ = 227.2. Phenyl-α-oxybenzyl ketoxime, $Ph.CHOH.C(:NOH).Ph$. (1) *d-* Colorless needles, m.132, $[\alpha]_D$ + 120.5. (2) *l-* White powder, m.174, $[\alpha]_D$ − 3.2. (3) *syn-d, l-* or β-crystals, m.99. (4) *anti-d, l-* or α- crystals, m.152; a very sensitive reagent for copper or molybdenum.

benzoiodohydrin. $C_{10}H_{10}O_2ClI$ = 324.4. Chloriodoglycerin benzoic ether, $PhCOOC_3H_5ClI$. A brownish fatty mass, soluble in alcohol, ether or benzene.

benzol. See *benzene*. **b. bichloride.** See *benzene* dichloro-. **b. bromide.** See *benzene*, bromo-. **b. chloride.** See *benzene, chloro-*.

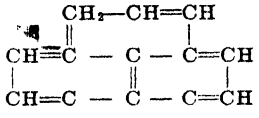
benzoline. Benzine.

benzomorpholine. C_8H_9ON = 135.1. A colorless oily liquid, b.268.



benzonaphthacene. α- Dibenzanthracene. β- Pentacene.

benzonaphthene. $C_{13}H_{10}$ = 166.07. The hydrocarbon



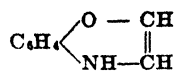
benzo-α-naphthindole. $C_{16}H_{11}N$ = 217.1. Phenyl-α-naphthylcarbazole. A heterocyclic system, isomeric with hydrindochroman.

benzonaphthol. Naphthol-benzoate.

benzonitrile. C_7H_5N = 103.08. Phenylcyanide, cyano-benzene, benzenecarbonitrile*, PhCN. A colorless liquid, d.1.008, m.−13, b.191, miscible with alcohol or ether. It resembles bitter almond oil in odor; used in the synthesis of dyes and drugs. **amino-** $NH_2C_6H_4CN$ = 118.10. Anthranilo nitrile. **m-** Colorless needles, m.53, b.289; slightly soluble in water, soluble in alcohol or ether. **p-** Colorless needles, m.86; soluble in alcohol, water or ether. **dimethyl-** Xylonitrile. **hydroxy-** Salicylonitrile. **methoxy-** Anisonitrile. **methyl-** Tolunitrile. **nitro-** $NO_2C_6H_4CN$ = 148.09. **o-** White silky needles, m.109; soluble in hot water, alcohol or ether. **m-** Colorless needles, m.117; sparingly soluble in water, soluble in alcohol or ether. **p-** White leaflets, m.147; slightly soluble in alcohol or water, soluble in ether or chloroform.

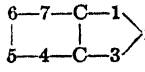
benzoparadiazine. Quinoxaline.

benzoparoxazine. C_8H_7ON = 133.1. The heterocyclic system



2-phenyl- Colorless crystals, m.103.

benzopentazole. $C_4H_3N_5$ = 79.1. A group of heterocyclic compounds of the type:



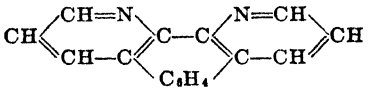
which contain five nitrogen atoms in the two rings. The position of a NH group is indicated by the initial numeral, thus **1.2.3.4.7-** NH at 1, N at 2.3.4. and 7; or **2.1.3.4.7-** NH at 2, and N at 1, 3, 4 and 7.

benzoperoxide. Commercial benzoyl peroxide.

benzophenanthrazine. Dibenzophenazine.

benzophenanthrene. (*a*-) Chrysene. (*def*-) Pyrene. (*l*) Triphenylene.

benzophenanthroline. $C_{16}H_{10}N_2$ = 230.2. The heterocyclic hydrocarbon



benzophenazine. $C_{16}H_{10}N_2$ = 230.2. Naphthophenazine, phenonaphthazine. The heterocyclic compound $C_{10}H_6\langle{}^{N}_{N}\rangle C_6H_4$. Yellow needles, m.142.5, insoluble in water.

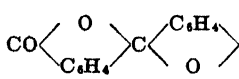
benzophenetide. $C_{15}H_{20}O_2N$ = 246.5. ar'-ethoxybenzanilide, PhNH.CO.C_6H_4.OEt.

benzophenid. Phenylbenzoate.

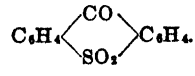
benzophenol. Phenyl benzoate.

benzophenone. $C_{13}H_{10}O$ = 182.12. Diphenylketone, *α*-oxodiphenylmethane, benzoylbenzene, Ph.CO.Ph. Colorless, rhombic, prisms, occurring in four allotropic forms: *α*- d.1.083, m.48.5, b.305; *β*- d.1.108, m.26.5, b.306; *γ*- m.46; *δ*- m. −51. Insoluble in water, soluble in alcohol or ether. It is a mild hypnotic; used in organic synthesis. **benzoyl-** Phthalophenone. **diamino-, dihydroxy-** See *di-*. **nitro-** $NO_2.C_6H_4COPh$ = 227.15. **o-** Orthonitrobenzophenone. Colorless crystals, m.105; slightly soluble in alcohol. **m-** Metanitrobenzophenone. Colorless needles, m.94; soluble in alcohol. **p-** Paranitrobenzophenone. White leaflets, m.138; soluble in alcohol. **pentahydroxy-** Maclurin. **tetramethyldiamino-** *Michler's* ketone. **thio-** Thiobenzophenone. **trihydroxy-** $C_{13}H_{10}O_4$ = 230.08. Benzophloroglucinol. *2.6.2'-*. A white solid, m.133.

b. carboxylic acid. Benzoylbenzoic acid. **b. dicarboxylic acid.** $C_{15}H_{10}O_5$ = 270.16. The dibasic keto-acid, $C_6H_4COOH.CO.C_6H_4$. **2.2-** or **o.o-** Ortho-ortho-b. Colorless crystals, m.150–200; sparingly soluble in water, soluble in alcohol or ether. **b. dicarboxylicdilactone.** $C_{15}H_8O_4$ = 252.1. The spiro-compound



Colorless crystals m.212. **b. oxime.** Benzophenoxime. **b. sulfide.** Thioxanthone. **b. sulfone.** $C_{13}H_8O_3S$. The heterocyclic compound



benzophenothiazine. $C_{16}H_{11}NS$ = 248.15. Naphthophenothiazine, thiophenylnaphthylamine. The heterocyclic compound $C_{10}H_7\langle{}^{S}_{N}\rangle C_6H_4$.

benzophenothioxine. $C_{16}H_{10}OS$ = 250.15. The heterocyclic compound $C_{10}H_6\langle{}^{S}_{O}\rangle C_6H_4$.

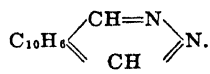
benzophenoxazine. $C_{16}H_{11}ON$ = 233.2. Naphthophenoxazine. $C_{10}H_6\langle{}^{O}_{NH}\rangle C_6H_4$. **iso-** $C_{16}H_{10}ON$ = 232.2. $C_{10}H_7\langle{}^{O}_{N}\rangle C_6H_4$.

benzophenoxime. $C_{13}H_{11}ON$ = 197.16. Benzophenone oxime, $Ph_2C{:}N.OH$. White crystals, m.140; insoluble in water, soluble in alcohol.

benzophloroglucinol. $C_{13}H_{10}O_4$ = 230.12. **2.4.6-** trihydroxy benzophenone. $Ph.CO.C_6H_2(OH)_3$.

benzophosphinic acid. $C_7H_7O_5P$ = 202.13. $HOOC.C_6H_4PO(OH)_2$. Colorless crystals, m.300; soluble in water.

benzophthalazine. $C_{12}H_8N_2$ = 180.1.

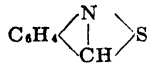


benzopinacol. $C_{26}H_{22}O_2$ = 366.31. Tetraphenylethylglycol, benzopinacone, *α.α'*-bibenzohydrol, tetraphenyl-1.2-ethanediol. $Ph_2COH.COH.Ph_2$. Colorless crystals, m.185; used in organic synthesis.

benzopinacone. Benzopinacol.

benzo-pseudoselenazol. C_7H_5NSe = 182.1. The heterocyclic compound, $C_6H_4\langle{}^{N}_{CH}\rangle Se$.

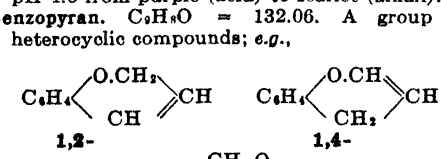
benzo-pseudo-thiazole. C_7H_5NS = 135.1. The heterocyclic compound



benzo-pseudoxazole. Anthranil.

benzopurpurin. Ozamin 4B. A red aniline dye, soluble in water; used for dyeing cotton. It is the sodium salt of o-toluidinedisazo-binaphthylamine-sulfonic acid, and is used as biological stain and indicator, changing at pH 4.0 from purple (acid) to scarlet (alkali).

benzopyran. C_9H_8O = 132.06. A group of heterocyclic compounds; *e.g.*,

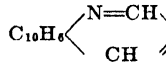


1,2- **1,4-**

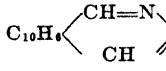
2,1-

dihydro- Chroman. **keto-**Coumarin (1,2), or chromone (1,4).

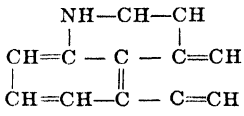
benzopyranyl. The monovalent radical, C_9H_7O—, derived from benzopyran.
benzopyrazine. Quinoxaline.
benzopyrazole. Isoindazole.
benzopyrazolon(e). Indazolone.
benzopyrene. $C_{20}H_{11}$ = 251.1. A hydrocarbon consisting of an anthracene ring with a naphthalene ring attached in the 1:2 position. It is the principal carcinogen in coal tar pitch. Cf. *benzanthracene, benzopyrine.*
benzopyridine. Quinoline.
benzopyrilium. A group of compounds derived from benzopyran, the oxygen of which is assumed to be tetravalent.
benzopyrine. $C_{15}H_{18}O_3N_2$ = 310.16. Antipyrine benzoate. $Ph.COOH.C_{11}H_{12}ON_2$. Cf. *salipyrine, benzopyrene.*
benzopyrone. 1.2- Coumarin. **1.4-** Chromone. **2.1-** Isocoumarin. **dihydro-phenyl-** Flavonone. **phenyl-** Flavone.
benzopyrrole. Indole.
benzopyrylium. Benzopyrilium.
benzoquinol. Quinol.
benzoquinoline. $C_{13}H_9N$ = 179.2. **6.7-** α-anthrapyridine. The heterocyclic compound



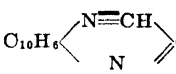
Colorless crystals, m.275, soluble in alcohol. **6.7-iso-** β-anthrapyridine.



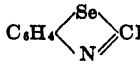
Colorless crystals, m.166, soluble in alcohol. **4.5-** or meso- $C_{12}H_9N$ = 167.2.



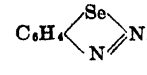
3.4- Phenanthridine.
benzoquinone. Quinone.
benzoquinoxaline. $C_{12}H_8N_2$ = 180.2. Naphthopyrazine. The heterocyclic compound



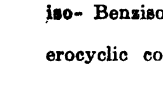
benzosalin. $C_{15}H_{12}O_4$ = 256.1. Methyl benzoyl salicylate, benzoyl salicylic acid methyl ester, $C_6H_4(OMe)COO(PhCO)$. Fine white, crystalline powder of faintly aromatic odor, m.85; slightly soluble in water. Used as an antiseptic.
benzoselenazole. C_7H_5NSe = 182.1. The heterocyclic compound



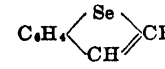
iso- Benzisoselenazole. **pseudo-** Benzopseudoselenazole.
benzoselenodiazole. $C_6H_4N_2Se$ = 183.1. Isopiaselenol. The heterocyclic compound



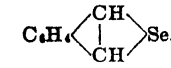
iso- Benzisoselendiazole, piaselenol. The heterocyclic compound



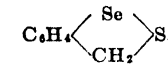
crystals, m.76.
benzoselenofuran. C_8H_6Se = 181.1. Selenonaphthene. The heterocyclic compound



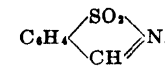
iso- Benzo-*i*-selenofuran. The ring structure



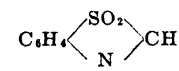
benzoselenothiole. C_7H_6SSe = 201.1. The heterocyclic compound



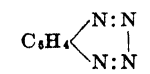
benzosol. $C_{14}H_{12}O_3$ = 228.09. Guiacol benzoate, $PhCOOC_6H_4OMe$. A colorless solid, m.61; used as disinfectant.
benzosulfinide. Saccharin.
benzosulfonazole. $C_7H_5O_2NS$ = 167.1. **1-** The heterocyclic compound



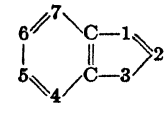
2- Benzisosulfonazole.



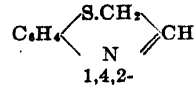
benzosulfonazolone. Saccharin.
benzotetrazine. $C_6H_4N_4$ = 132.2. The heterocyclic compound



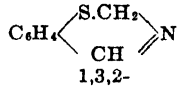
benzotetrazole. $C_6H_4N_4$ = 120.2. A group of heterocyclic compounds of the type containing



four nitrogen atoms, one of which is NH. The 1,3,4,6-compound is identical with purine (q.v.), in which, according to Fisher's notation, the atoms are numbered differently.
benzothiazine. C_8H_7NS = 149.2. A group of heterocyclic compounds; as

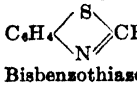


1,4,2-



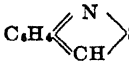
1,3,2-

Cf. *benzoisothiazine.*
benzothiazole. C_7H_5NS = 135.1. Methenylamidothiophenol. The heterocyclic compound

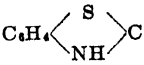


A colorless liquid, b.234. **bis-** Bisbenzothiazole. **dihydro-** Benzothiazoline. **iso-, iso-pseudo-** Benzisothiazole. **phenyl-** Ben-

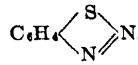
senylamidothiophenol. pseudo- Benzopseudothiazole. The heterocyclic compound



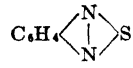
benzothiazoline. C_7H_7NS = 137.1. 1,2-dihydrobenzothiazole. The heterocyclic compound



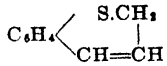
benzothiodiazole. $C_6H_4N_2S$ = 136.1. Isopiazthiole, diazosulfide, phenylenediazosulfide, i-piazothiole. The heterocyclic compound



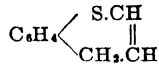
iso- Benzisothiodiazole, piazthiole. The heterocyclic compound



benzothiofuran. Thionaphthene.
benzothiophene. Thionaphthene.
benzothiopyran. C_9H_8S = 148.1. A group of heterocyclic compounds, *e.g.*,

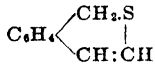


1,2-



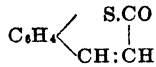
1,4

(Thiochromene)

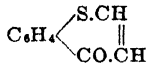


2,1-

dihydro- Thiochroman. **2-keto-** Thiocoumarin. **4-keto-** Thiochromone.
benzothiopyrone. C_9H_6OS = 162.1. Thiochromone. A group of heterocyclic compounds; as,

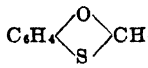


1,2-
thiocoumarin, q.v.

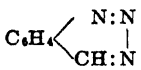


1,4-
thiochromone, q.v.

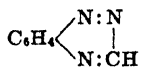
hydroxy- Thiochromonol. **phenyl-** Thioflavol.
benzothioxole. C_7H_6OS = 138.11. The heterocyclic compound



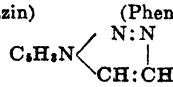
benzotoluide. $C_{14}H_{13}ON$ = 211.3. Methylbenzanilide, *N*-benzoyltoluidine. The compound $PhCONH.C_6H_4Me$. **o-** Rhombic needles, d.-1.205, m.146. **m-** Monoclinic prisms d.1.170, m.125. **p-** Rhombic needles, d.1.202, m.158, b.232, insoluble in water, soluble in alcohol.
benzotriazine. $C_7H_5N_3$ = 131.2. A group of heterocyclic compounds; as,



1,2,3-
(Phentriazin)

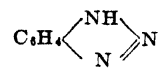


1,2,4-
(Phenpyrrodiazole)

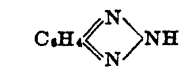


1,2,6-

benzotriazole. $C_6H_5N_3$ = 119.2. A group of heterocyclic compounds; as

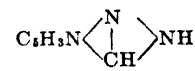


1,2,3-
benzisotriazole



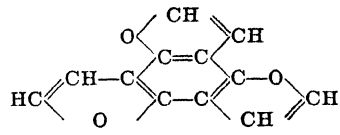
2,1,3-
ψ-azimidobenzene

(azimidobenzene, q.v.)

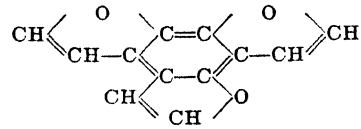


2,1,5-

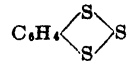
1.2.3- Colorless crystals, m.99, d.1.2, soluble in alcohol or benzene.
benzotrichloride. $C_7H_5Cl_3$ = 195.4. Toluene trichloride, *α*-trichloro toluene, phenyl-chloroform, benzoic trichloride, benzenyl chloride, $PhCCl_3$. A colorless or yellowish liquid of penetrating odor, d.1.38, m. −21, b.214, decomp. in water; used in the synthesis of aniline dyes.
benzotrifuran. $C_{12}H_6O_3$ = 198.04. **1.3.5-** The heterocyclic compound:



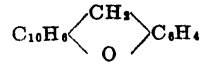
1.2.4- The heterocyclic compound:



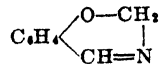
benzotrisulfole. $C_6H_4S_3$ = 172.4. The heterocyclic compound



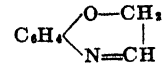
benzoxanthene. $C_{17}H_{12}O$ = 232.1. Naphthoxanthene, phenonaphthoxanthene. The heterocyclic compound;



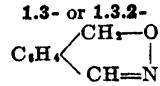
Cf. *naphthoxanthine*.
benzoxazine. C_8H_7ON = 133.1. A group of heterocyclic compounds:



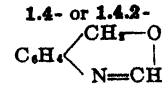
1.3- or 1.3.2-



1.4- or 1.4.2-



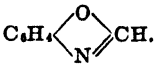
2.3- or 2.3.1-



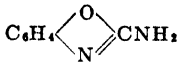
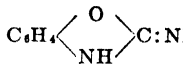
2.4- or 2.4.1-

dihydro- Phenomorpholine. **b. dione.** Isatoic anhydride.

benzoxazole. C_7H_5ON = 119.09. Methenylamidophenol.

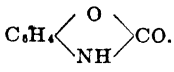


Colorless crystals, m.32, b.183. Cf. *benzisoxazole.* **amino-** $C_7H_6ON_2$ = 134.1. Colorless crystals, m.130. It occurs in two isomeric forms.

 and 

anilido- $C_7H_4ON.NHPh$ = 210.13. Colorless crystals, m.137. **methyl-** Ethenylamidophenol. **phenyl-** $C_7H_4ON.Ph$ = 195.1. Colorless crystals, m.103. **thio-** Thiobenzoxazole.

benzoxazolon(e). $C_7H_5O_2N$ = 135.05. The heterocyclic compound,



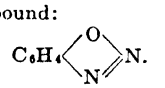
N-ethyl- $C_7H_4EtO_2N$ = 163.07. Colorless crystals, m.29.

benzoxazolyl. The monovalent radical, C_7H_4ON—, derived from benzoxazole.

benzoxdiazine. $C_7H_6ON_2$ = 134.07. A group of heterocyclic compounds, similar to benzodiazine, but which contain one oxygen and two nitrogen atoms in the ring, as:

1.2.3- Oxygen at position 1, nitrogen at 2 and 3.
2.3.4- Oxygen at position 2, nitrogen at 3 and 4.
3.1.2- Oxygen at position 3, nitrogen at 1 and 2.

benzoxdiazole. $C_6H_4ON_2$ = 120.05. The heterocyclic compound:

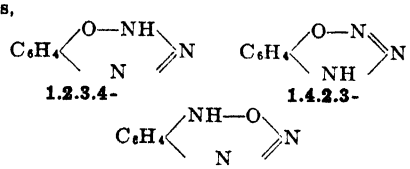


Cf. *naphthoxdiazole.*

benzoxtetrazine. $C_6H_4ON_4$ = 136.07. A group of heterocyclic compounds, similar to benzodiazine, but which contain one oxygen and four nitrogen atoms in the ring; as,

1.2.3.4.6- Oxygen at 1, NH at 2, N at 3.4. and 6.
1.4.3.2.6- Oxygen at 1, NH at 4, N at 3.2. and 6.
2.1.3.2.7- Oxygen at 2, NH at 1, N at 3.2. and 7.

benzoxtriazine. $C_6H_5ON_3$ = 135.07. A group of heterocyclic compounds containing one oxygen and three nitrogen atoms in the ring; as,

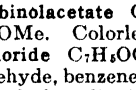


1.2.3.4- **1.4.2.3-**

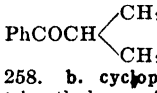
2.1.3.4-

benzoxy. The monovalent radical, C_6H_5COO— or PhCOO—, derived from benzoic acid.

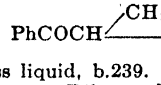
benzoyl. The monovalent aryl radical, C_6H_5CO— or PhCO— or Bz, derived from benzoic acid. Cf. *chlorobenzoyl, nitrobenzoyl.* **b. acetaldehyde** $C_9H_8O_2$ = 148.11, $PhCOCH_2.CHO$. Colorless crystals. **b. acetate** $C_9H_8O_3$ = 164.06. Acetylbenzoate, acetobenzoic acid anhydride, PhCO.O.OCMe. **b. acetic acid** $C_9H_8O_3$ = 164.11. Phenylketoacetic acid, $Ph.CO.CH_2.COOH$. Colorless needles m.61 decomp. 103; slightly soluble in water, soluble in alcohol or ether. Used in organic synthesis. **b. acetic ethyl ester.** $Ph.CO.CH_2.COOEt$ = 192.10. An oily liquid, b.148. **b. acetone** $C_{10}H_{10}O_2$ = 162.13. Acetylacetophenone. A homolog of benzoylacetaldehyde, $Ph.CO.CH_2.CO.Me$. Colorless liquid, d.1.570, m.80, b.260; very slightly soluble in water, soluble in alcohol or ether. Used in organic synthesis. **b. acetonitrile** C_9H_7ON = 145.1. Cyanacetophenone, $Ph.CO.CH_2.CN$. Colorless crystals, m.80; soluble in alcohol or ether. **b. acetyl** $C_9H_8O_2$ = 148.1. The diketone, Ph.CO.CO.Me. A colorless oily liquid, b.214. **b. amide.** Benzamide. **b. aniline.** Benzanilide. **b. anthraquinone** $C_{21}H_{12}O_3$ = 312.20, $C_6H_4(CO)_2:C_6H_3COPh$. White crystals, m.182; insoluble in water, soluble in alcohol or ether. **b. azide** $C_7H_5ON_3$ = 147.2. Azimide, benzazide, benzoylnitride.



Colorless crystals m.20, or a liquid. **b. benzoic acid.** $C_{14}H_{10}O_3$ = 226.08. Benzophenone carboxylic acid, $PhCOC_6H_4COOH$. Colorless crystals, *o-* m.127; *m-* m.162; *p-* m.194. **b. benzylamine** $C_{14}H_{13}ON$ = 211.11. $Ph.CO.NHCH_2.Ph$. Colorless crystals, m.105. **b. bromide** C_7H_5Br = 185.04. α-Bromobenzaldehyde, benzene carbonylbromide*, PhCOBr. A colorless liquid, d.1.57, m.0, b.218; decomp. in water, soluble in ether. **b. butylcarbinol** $C_{11}H_{14}O_2$ = 178.11. The compound $PhCO(CH_2)_4OH$. Colorless crystals, m.49. **b. carbinol** $C_8H_8O_2$ = 136.06. $PhCOCH_2OH$. Colorless crystals, m.83. **b. carbinolacetate** $C_{10}H_{10}O_3$ = 178.08. $PhCOCH_2O.COMe$. Colorless crystals, m.49, b.270. **b. chloride** C_7H_5OCl = 140.53. α-Chlorobenzaldehyde, benzenecarbonyl chloride*, PhCOCl. A colorless liquid, d.1.219, m. −1, b.198; decomp. with water or alcohol, but soluble in ether or chloroform; used as a reagent for alcohol and lysidine, in organic synthesis and in the manufacture of dyes. **b. cyanide** C_8H_5ON = 131.12. α-Cyanobenzaldehyde, PhCOCN. Colorless scales, m.32, b.207; insoluble in water. **b. cyclobutane** $C_{11}H_{12}O$ = 160.15.



A colorless liquid, b.258. **b. cyclopropane** $C_{10}H_{10}O$ = 146.13. B. trimethylene. The ring-compound

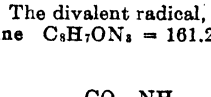


A colorless liquid, b.239. **b. disulfide** $C_{14}H_{10}O_4S_2$ = 274.21. Dibenzoyl-disulfide. The compound, PhCOSSCOPh. Colorless prisms, m.128, decomp. on further heating, insoluble in water, slightly soluble in alcohol. **b. ecgonine.** Cocaine. **b. fluoride** C_7H_5OF = 128.08. Benzene carbonyl fluoride*, PhCOF. A colorless liquid, b.161.5; insoluble in water. **b. formaldehyde** $C_8H_6O_2$ = 134.1. (1) *anhydrous.* $PhCO.CHO$, phenylglyoxal. A colorless liquid, $b._{125mm}142$. (2) *hydrated.* $PhCO.CH(OH)_2$. Colorless crystals, m.73. **b. formic acid** $C_8H_6O_3$ = 150.1. Phenyl-glyoxylic acid, PhCO.COOH. Colorless crystals, m.65; soluble in water, alcohol, or ether. **b. formoxine** $C_8H_7O_3N$ = 149.1. Isonitrosoacetophenone. $Ph.CO.CH:NOH$. Colorless crystals, m.127, used

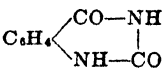
as a reagent for ferrous salts. **b. glycine.** Hippuric acid. **b. glycocoll.** Hippuric acid. **b. glycolic acid** $C_9H_8O_4$ = 180.1. PhCO.OCH$_2$.COOH. Colorless large prisms, slightly soluble in water, soluble in alcohol or ether. **b. hydrazine** $C_7H_8ON_2$ = 136.1. PhCONHNH$_2$, α-hydrazinobenzaldehyde. Colorless crystals, m.112, b.267, soluble in water, alcohol or ether. (2) *di-* Dibenzoyl hydrazine, $(PhCONH)_2$ = 270.3. Colorless crystals, m.233. **b. hydride.** Benzaldehyde. **b. hydrogen peroxide** $C_7H_6O_3$ = 138.05. PhCO.O$_2$H. Colorless crystals, m.41, b.97; insoluble in water, soluble in alcohol or ether. **b. hydroxide.** Benzoic acid. **b. iodide** C_7H_5OI = 231.95. Benzenecarbonyliodide*, α-iodobenzaldehyde. PhCOI. Colorless leaflets, m.3 (decomp.), decomp. in water, soluble in alcohol or ether. **b. methane.** Acetophenone. **b. naphthol.** Naphthol benzoate. **b. oxide.** Benzoic anhydride. **b. peroxide** $C_{14}H_{10}O_4$ = 242.15. Benzoperoxide, luzidol, $(PhCO)_2O_2$. Colorless rhombic crystals, m.103; insoluble in water, soluble in alcohol, ether, or benzene. Used as a flour "improver," and as a bleaching agent. **b. phenylhydrazine** $C_{13}H_{12}ON_2$ = 212.17. PhCONHNHPh. Colorless crystals, m.145; soluble in hot water, alcohol, ether, or chloroform. Used as an antiseptic. **b. propionaldehyde** $C_{10}H_{10}O_2$ = 162.1. $PhCO(CH_2)_2CHO$. A colorless liquid, b.245. **b. propionic acid** $C_{10}H_{10}O_3$ = 178.1. $PhCO.(CH_2)_2COOH$. Colorless needles, m.116; soluble in hot water or alcohol. **b. pseudotropeine.** Tropacocaine. **b. pyrocatechol.** *Dihydroxy*-benzophenone. **b. salicin.** Populin. **b. sulfide** $C_{14}H_{10}O_2S$ = 242.1. PhCO.S.COPh. Colorless crystals, m.48. **b. sulfonic imide.** Saccharin. **b. thiourea** $C_8H_9ON_2S$ = 180.14. $PhCONH.CS.NH_2$. Small colorless prisms, m.170; soluble in water or alcohol, insoluble in ether. **b. trimethylene.** B. cyclopropane. **b. urea** $C_8H_8O_2N_2$ = 164.12. $PhCONH.CO.NH_2$. A crystalline solid, m.215.

benzoylation. The introduction of the PhCO— radical into a molecule.

benzoylene. The divalent radical, —C_6H_4.CO—. **b. guanidine** $C_8H_7ON_3$ = 161.2. Benzglycocyanidine.



b. urea. $C_8H_6O_2N_2$ = 162.2. Diketotetrahydroquinazoline.



benzoyles. A group of organic aromatic compounds containing the benzoylene radical, *e.g.*, benzoylene guanidine.

benzpinacone. Benzopinacol.

benzpyrazole. Isoindazole.

benzpyrene. Benzopyrene.

benz-seleno. See *benzo-seleno-*.

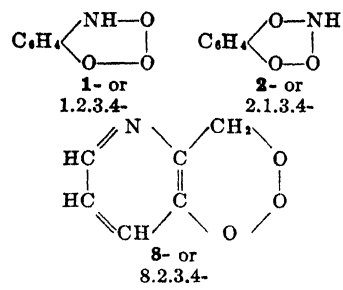
benzsulfhydroxamic acid. Benzene sulfonic hydroxamide.

benz-sulfo-. See *benzosulfo-*.

benz-syn-aldoxime. Benzaldoxime.

benzthiophen. Thionaphthene.

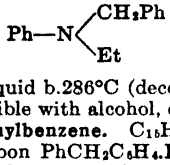
benztrioxazine. $C_6H_5O_3N$ = 139.1. A group of heterocyclic compounds which contain three oxygen atoms and one nitrogen atom in the ring; as,



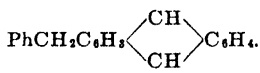
1- or 1.2.3.4- **2-** or 2.1.3.4- **8-** or 8.2.3.4-

benzyl. The monovalent aryl radical, C_7H_7—, $PhCH_2$— or $C_6H_5CH_2$—, derived from toluene. **b. acetamide** $C_9H_{11}ON$ = 149.01. **N-** $PhCH_2NHCOMe$. Colorless crystals, m.60, b.300; soluble in ether. **α-** Hydrocinnamamide. **b. acetate** $C_9H_{10}O_2$ or $MeCOOCH_2Ph$ = 150.13. A colorless liquid, d_{16}°1.057, b.206, very slightly soluble in water, soluble in hot alcohol or ether. Cf. *methylbenzoate*. **b., acetoacetic ether** $C_{13}H_{16}O_3$ or $C_2H_3O.CHCH_2Ph.COOEt$ = 220.20. A colorless liquid, d_{25}°1.061, b.287; insoluble in water, miscible with alcohol or ether. **b. acetophenone.** Propiophenone. **b. acrylic acid.** $C_{10}H_{10}O_2$ = 162.08. Methylene hydrocinnamic acid, $CH_2:C(PhCH_2)_2COOH$. Colorless crystals, m.69. **b. alcohol** C_7H_8O or $PhCH_2OH$ = 108.10. Phenyl carbinol, benzalcohol, phenmethylol, α-hydroxytoluene, $PhCH_2OH$. A colorless liquid with an aromatic odor and a sharp burning taste, d.1.045, b.204.7, slightly soluble in water, soluble in alcohol or ether. Used as a local anesthetic and in perfumery. **(hydroxy-)** $C_6H_4(OH)CH_2OH$ = 124.10. **o-** Saligenin. **m-** m-oxybenzyl-alcohol. Colorless needles, m.67, decomp. 300; soluble in hot water, alcohol or ether. **p-** Colorless needles, m.110; soluble in water, alcohol or ether. **(hydroxy methoxy-)** Vanillic alcohol. **(isopropyl-)** Cuminol. **(methoxy-)** Anisyl alcohol. **(methyl-)** Homosaligenin. **(methylaminoethyl-)** Ephedrine. **(methylenedioxy-)** Piperonyl alcohol. **(methyl-isopropyl-)** Thymotic alcohol. **(nitro-)** $NO_2C_6H_4CH_2OH$ = 153.10. **o-** Colorless needles, m.74; soluble in alcohol, water or ether. **m-** White rhombic crystals, m.27. **p-** Colorless needles, m.93, b.179; soluble in water, alcohol or ether. **(oxy-)** See *hydroxy-b. alcohol*. **b. amine** C_7H_9N or $PhCH_2NH_2$ = 107.15. Phenylmethylamine. Colorless liquid d_{20}°0.980, b.184; miscible with water, alcohol or ether. Used in organic synthesis. **(di-)** $(PhCH_2)_2NH$ = 197.13. Diphenylmethylimine. A colorless liquid, b.300; soluble in alcohol. **(imino-)** Benzamidine. **(tri-)** $(PhCH_2)_3N$ = 287.17. Colorless crystals, m.91. **b. aniline** $C_{13}H_{13}N$ = 183.2. The aromatic diamine, $PhCH_2NHPh$. Colorless prisms, m.32, b.310; insoluble in water, soluble in alcohol or ether, used in organic synthesis. **(di-)** $C_{21}H_{19}N$ = 285.3. The aromatic triamine, $(PhCH_2)_2NPh$. Colorless crystals, m.67. **b. azide** $C_7H_7N_3$ or $PhCH_2N_3$ = 133.12. A liquid, $b._{25mm}$108, insoluble in water. **b. benzene.** Diphenylmethane, $PhCH_2Ph$. **b. benzoate** $C_{14}H_{12}O_2$ or $PhCOOCH_2Ph$ = 212.17. A colorless oily liquid with faint aromatic odor and sharp burning taste, d_{19}°1.114, m.18.5, b.321; insoluble

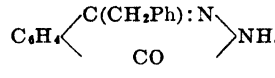
in water or glycerin, soluble in alcohol, ether or chloroform. Used medicinally as an antispasmodic. **b. benzoic acid.** Diphenylmethane carboxylic acid. **b. bichloride.** Benzalchloride. **b. bromide** C_7H_7Br = 171.06. α-bromotoluene, $PhCH_2Br$. A colorless liquid, d_{22}°1.438, m.-3.9, b.198.5; insoluble in water, miscible with alcohol or ether. Used as a poison gas in chemical warfare. **b. carbamate.** $C_8H_9O_2N$ = 151.12. $PhCH_2O.CO.NH_2$. A colorless liquid, b.197, insoluble in water, miscible with alcohol or ether. **b. carbamide.** B. urea. **b. carbinol.** $C_8H_{10}O$ = 122.10. Phenylethyl alcohol, phenylethanol, α-hydroxy-β-phenyl ether, $PhCH_2CH_2OH$. A colorless liquid, d.1.024, b.212; slightly soluble in water, soluble in alcohol or ether. It is a constituent of oil of rose, geranium, etc.; used in artificial flower oils. (iso-) Phenylmethylcarbinol, $PhCHMeOH$. A colorless liquid, b.203. **b. carbonimide.** $PhCH_2NC$, isomeric with b. cyanide. **b. chloride** C_7H_7Cl = 126.55. α-Chlorotoluene, $PhCH_2Cl$. A colorless liquid, d.1.103, m.-41, b.178; insoluble in water, miscible with alcohol or ether. Used in the synthesis of bitter almond oil and aniline dyes. **b. cinnamate** $C_{16}H_{14}O_2$ = 238.11. Cinnamein. The ester $C_8H_7COOCH_2Ph$. Colorless prisms, m.39; used in perfumery. **b. cyanamide.** $C_8H_8N_2$ = 132.12. The compound $PhCH_2NHCN$. A crystalline solid, m.33; insoluble in water, soluble in alcohol or ether. **b. cyanide.** C_8H_7N = 117.15. Phenylacetonitrile, α-tolunitrile, α-cyano-toluene, $PhCH_2CN$. A colorless liquid, d.1.0146, m.-24.6, b.233.5; insoluble in water, soluble in alcohol or ether. Used in organic synthesis. (iso-) B. carbonimide. (nitro-) $NO_2.C_6H_4.CH_2CN$ = 162.11. o- Colorless needles, m.83, soluble in hot water. p- Colorless prisms, m.115, insoluble in water, soluble in alcohol or ether. **b. fumarate.** $C_{18}H_{16}O_4$ = 326.14. Dibenzyl fumarate, $(PhCH_2OOC.CH=)_2$. A white odorless solid, insoluble in water; used as antispasmodic. Cf. *b. succinate.* **b. dichloride.** Benzalchloride. **b. diphenyl.** $C_{19}H_{16}$ = 244.15. The hydrocarbon $PhCH_2.C_6H_4Ph$. o- Monoclinic needles, m.54, $b._{650mm}$283; soluble in alcohol or ether. p- Colorless leaflets, m.85, b.285, soluble in alcohol or ether. **b. diphenylamine.** $C_{19}H_{17}N$ = 259.15. $PhCH_2.NPh_2$. Colorless crystals, m.87. **b. disulfide.** $C_{14}H_{14}S_2$ = 246.30. $PhCH_2S.SCH_2Ph$. Colorless leaflets, m.71; soluble in alcohol, ether or benzene. **b. ether** $C_{14}H_{14}O$ = 198.19. Benzyloxide, $(PhCH_2)_2O$. A colorless oily liquid, d.1.036, b.297; miscible with alcohol or ether. **b. ethylaniline.** $C_{15}H_{14}N$ = 208.2. The tertiary amine



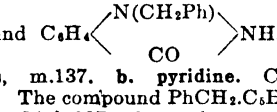
A yellowish liquid b.286°C (decomp.); insoluble in water, miscible with alcohol, ether, or chloroform. **b. ethylbenzene.** $C_{15}H_{16}$ = 196.20. The hydrocarbon $PhCH_2C_6H_4.Et$. A colorless liquid, d.0.985, b.194; soluble in ether, alcohol or chloroform. **b. formamide.** C_8H_9ON = 135.1. $PhCH_2.NH.CHO$. (o-nitro-) $NO_2.C_6H_4.CH_2.NHCHO$ = 181.10. Colorless crystals, m.89. **b. hydrazine.** $C_7H_{10}N_2$ = 122.2. $PhCH_2NHNH_2$. A colorless liquid, $b._{33mm}$135. (di-) $C_{14}H_{14}N_2$ = 212.3. The compound $PhCH_2NHNHCH_2Ph$. Colorless crystals, m.65; used in organic synthesis. **b. hydroxylamine.** C_7H_9ON = 123.09. α- $PhCH_2ONH_2$. A colorless liquid, b.123. β- The compound $PhCH_2NHOH$. Colorless crystals, m.57. (di-) The compound $PhCH_2NHOCH_2Ph$ = 213.14. (tri-) The compound $(PhCH_2)_2NOCH_2Ph$ = 303.19. **b. idene.** Benzylidene. **b. iodide** C_7H_7I = 218.08. α-Iodotoluene, or $PhCH_2I$. A colorless liquid, d.1.734, m.24, decomp. on further heating; soluble in alcohol, ether, or carbon disulfide. Used in organic synthesis and in the manufacture of drugs and dyes. **b. isocyanide.** B. carbimide. **b. isosulfocyanide.** B. sulfocyanide. **b. isothiocyanate.** B. mustard oil. **b. ketone.** $C_{15}H_{14}O$ = 210.19. The ketone $(PhCH_2)_2CO$. White crystals, m.34, b.330; insoluble in water, soluble in alcohol or ether. **b. mercaptan** C_7H_8S = 124.16. B. sulfhydrate, b. thiol, $PhCH_2SH$. A colorless liquid, d.1.058, b.196. **b. morphine.** Peronine. **b. mustard oil** C_8H_7SN = 149.19. Benzylisothiocyanate, $PhCH_2NCS$. A colorless liquid, b.243, insoluble in water, miscible with alcohol or ether. **b. naphthalene.** $C_{17}H_{14}$ = 218.20. The hydrocarbon $C_{10}H_7CH_2Ph$. α- Monoclinic prisms, m.58.6, b.350. β- Monoclinic prisms m.35, b.345. **b. naphthylketone.** $C_{18}H_{14}O$ = 246.11. $PhCH_2COC_{10}H_7$. Colorless scales, m.57; soluble in alcohol or ether. **b. nitrile.** B. cyanide. **b. oxethylamine.** $C_9H_{13}ON$ = 151.2. Picrate. Colorless crystals, m.136. **b. phenanthracene.** $C_{21}H_{16}$ = 268.13. The hydrocarbon



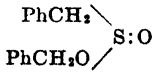
Colorless needles, m.155; insoluble in water, soluble in alcohol or ether. **b. phenol.** $C_{13}H_{12}O$ = 184.1. $PhCH_2C_6H_4OH$. p- Colorless crystals, m.84, b.325; soluble in water or alcohol. **b. phenylamine.** B. aniline. **b. phthalazone** $C_{15}H_{12}ON_2$ = 236.2. The compound



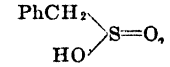
b. phthalimidine. $C_{14}H_{12}ON_2$ = 224.1. The compound



Colorless crystals, m.137. **b. pyridine.** $C_{13}H_{11}N$ = 169.11. The compound $PhCH_2.C_5H_4N$. α- b.276, β- m.34, b.287. **b. succinate.** $C_{18}H_{18}O_4$ = 328.14. Dibenzylsuccinate, $(PhCH_2OOC.CH_2—)_2$. White odorless powder, insoluble in water, soluble in alcohol, used as antispasmodic. Cf. *b. fumarate.* **b. sulfhydrate.** B. mercaptan: **b. sulfide.** $C_{14}H_{14}S$ = 214.22. B. thioether, $(PhCH_2)_2S$. Colorless scales, d.1.071, m.49, $b._{13mm}$180; insoluble in water, soluble in alcohol or ether. Used in organic synthesis. **b. sulfine.** $C_{14}H_{14}O_2S$ = 246.24.

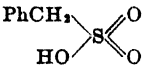


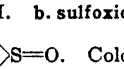
an isomer of b. sulfone. **b. sulfinic acid.** $C_7H_8O_2$ = 124.12.

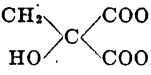


, or $PhCH_2.SO.OH$. **b. sulfocyanide.** C_8H_7NS = 149.19. B. rhodanide, b. thicyanate, $PhCH_2CNS$. Colorless prisms, m.41, b.230; insoluble in

water, soluble in alcohol or ether. (iso-) B. isorhodanide, b. isothiocyanate. $PhCH_2NCS$. Colorless liquid, b.240. **b. sulfone.** $C_{14}H_{14}O_2S = 246.24$. Colorless, flat, needles, m.150; soluble in alcohol, ether, acetone or benzene. **b. sulfonic acid.** $C_7H_8O_3S = 172.1$.



or $PhCH_2.SO_2.OH$. **b. sulfoxide.** $C_{14}H_{14}OS = 230.21$.  Colorless leaflets, m.132; soluble in hot water, alcohol, or ether. **b. tartronic acid.** $C_{10}H_{10}O_5 = 210.1$.

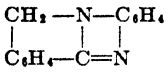


Colorless crystals, m.143, decomp. on further heating; soluble in water, alcohol or ether. **b. thiourea.** $C_8H_{10}N_2S = 166.2$. B. sulfocarbamide. $PhCH_2NH.CS.NH_2$. Colorless crystals, m.162; soluble in water. **b. thiocyanate.** B. sulfocyanide. **b. urea.** $C_8H_{10}ON_2 = 150.20$. B. carbamide, $PhCH_2NH.CO.NH_2$. Colorless needles, m.147 (decomp.); slightly soluble in water, soluble in alcohol or ether.

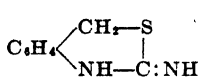
benzylation. The introduction of the benzyl radical into an organic molecule; or conversion into benzyl derivatives.

benzylcarbamide. See *benzyl.*

benzylene. The divalent radical, $-C_6H_4CH_2-$, which usually occurs in bicyclic compounds. **b. benzimidazole.** The tetraheterocyclic system:



b. chloride. Benzalchloride. **b. glycol.** Hydrobenzoin. **b. pseudothioures.** Coumothiazone, imido-. **b. pseudo-thiurea.** The heterocyclic system.



b. ψ-thiourea. Coumothiazone, imido-. **b. thiurea.** B. pseudo-thiurea.

benzylidene. The divalent $PhCH=$ or $C_7H_6=$ radical, in which the two valencies are usually attached to one atom of another radical, thus forming a double bond. Cf. *benzal.*

b. acetone. $C_{10}H_{10}O = 146.1$. Benzalacetone, methylcinnamyl ketone, acetocinnamone, methyl styryl ketone, $PhCH:CHCOMe$. Colorless crystals with odor like coumarin, m.42; soluble in alcohol or ether. Used in organic synthesis. *di-* Styryl ketone. **b. bromide.** $C_7H_6Br_2$ or $PhCHBr_2 = 249.94$. A liquid, $b._{20mm}130$. **b. chloride.** Benzalchloride.

benzylmorphine. Peronine.

benzylphenylamine. Benzyl aniline.

beraunite. A native iron phosphate.

Berberidaceae. The barberry family. A group of herbs, shrubs or trees with a watery juice. Several of them yield drugs:

Caulophyllum thalictroides	blue cohosh
Podophyllum peltatum	may apple, podophyllin
Berberis vulgaris	barberry
Jeffersonia diphylla	twin leaf
Nandina domestica	nandinine, domesticine

berberine. $C_{20}H_{17}O_4N.6H_2O = 443.34$. An alkaloid from the roots of *Hydrastis canadensis* (golden seal), *Berberis vulgaris*, and other Ranunculaceae. Orange or yellowish crystals, m.145; soluble in water or alcohol, slightly soluble in ether. Used as hydrochloride or sulfate. Cf. *bebeerine.* **b. bisulfate.** Is b. sulfate. **b. carbonate.** $C_{20}H_{17}N.H_2CO_3.2H_2O = 395.15$. Yellow crystals; soluble in hot water or alcohol. **b. hydrochloride.** $C_{20}H_{17}O_4N.HCl.2H_2O = 407.61$. Yellow crystals or amorphous powder, d.1.397; soluble in water or alcohol. It is a general tonic, stomachic and gentle laxative. **b. sulfate.** $C_{20}H_{17}O_4N.H_2SO_4 = 433.32$. Orange-yellow needles; soluble in water or alcohol. It is an antiperiodic, stomachic, and tonic.

berberis. The dried stems of *Berberis aristata* or *vulgaris*, used as a fluid-extract as a tonic and purgative. See *barberry.*

berberonic acid. $C_8H_8O_6N.2H_2O = 250.1$. 2.-4.5-pyridine tricarboxylic acid*, $C_5H_5N(CO-OH)_3$. Colorless, triclinic crystals, decomp. 235; slightly soluble in water or alcohol, soluble in ether.

berengelite. A Peruvian, pitchlike mineral, used for caulking.

beresovite. A native mixed chromate and carbonate of lead.

bergamot oil. A yellowish green, volatile essential oil from the rind of *Citrus bergamia*, a Rutaceae, d.0.880–0.885; insoluble in water, soluble in alcohol, ether, chloroform, or benzene. It contains linalyl acetate, limonene and linalol; used in perfumery, and as a histological clearing agent.

bergblau. A native copper carbonate.

bergenine. $C_6H_3O_3.H_2O = 141.1$. A bitter principle from *Saxifraga crassifolia;* m.140; soluble in water or alcohol.

bergenose. An ilmenite-norite from Norway.

berginization. See Bergius process (1).

Bergius, Friedrich. A German chemist noted for his industrial processes. **B. process.** (1) Berginization. The production of motor fuels by the hydrogenation and liquefaction of coal, which is pulverized and subjected at 400–450°C to an atmosphere of hydrogen under a pressure of 120–200 atmospheres, which transforms it into a black tarry liquid. This yields 50 % crude oil and other products (bergin products). (2) A method of manufacturing sugar from wood by treating sawdust with 40 % HCl and removing the acid by vapors from hot mineral oil.

Bergman, Torbern Olof. 1735–1784. A Swedish chemist and pioneer in devising symbols for chemical elements. In his *Opuscula physica et chemica* (1783) he adapted the alchemical symbols consisting of circles and arcs, and represented compounds by joining them together. He also devised analytical methods, and developed chemical industry.

beriberi. A disease due to a deficiency of vitamin B.

Berkefeld filter. A porous porcelain cylinder for the filtration of toxins and sera or the preparation of sterile solutions.

berkevilite. Barkevite.

Berkshire sand. A purified sea-sand used for filtration, and in the Sedgwick rafter funnel, which is used in water analysis.

Berlin blue. Ferric-ferrocyanide.

bernstein. Amber. **b. säure.** Succinic acid.

Berthelot, Marcellin Pierre Eugène. 1827–1907. A French statesman, chemist and pioneer in physical chemistry: "All chemical reactions are dependent upon physical forces." He also worked on the history of chemistry. Cf. *Berthollet.*

berthierine. An iron ore from Alsace, consisting of magnetite and chamosite.

berthierite. $FeSb_2S_4$. A native iron sulfantimonide, which occurs in dark-gray metallic prisms.

Berthollet, Count Claude Louis. 1748–1822. A French chemist and contemporary of Lavoisier. He discovered the compositions of ammonia and hydrogen sulfide and developed industrial chemistry; *e.g.*, dyeing. Cf. *Berthelot.*

berthollide. Proposed name for an alloy. Cf. *daltonide.*

bertrandite. $H_2Be_4Si_2O_9$. A native beryllium silicate which occurs in colorless, transparent, orthorhombic crystals.

beryl. $Al_2Be_2Si_6O_{18}$. A native beryllium, aluminum silicate, found as hexagonal, colorless, green, blue or brownish crystals. MW.539.9, d.2.7, MV.200, hardness, 7.5–8. The transparent varieties are used as gems; *e.g., aquamarine, smaragd, rosterite, emerald.*

beryllia. Beryllium oxide.

beryllium. Be = 9.02, or glucinum Gl. An element of the magnesium group, atomic number **4**. A hard, non-corrodible, grayish-black metal in hexagonal crystals, $d_{20°}$.1.85, m.1285; soluble in acids or alkalis. Beryllium ores are generally found in granite rocks; *e.g.*, beryl, chrysoberyl, euclase, helvite, and phenacite. Beryllium is divalent and forms only one series of compounds. It was discovered in 1797 by Vauquelin in beryl, and isolated in 1828 by Bussy and Woehler. The metal and its compounds are at present of little industrial importance, but it may become valuable for aircraft as it imparts strength and hardness to aluminum alloys; with silver it forms untarnishable alloys. It is also used for windows in x-ray tubes. **b. acetate.** $(CH_3COO)_2Be$ = 127.07. Colorless plates, decomp. 285. *basic-* $BeO.3Be(C_2H_3O_2)_2$ = 406.22. White octahedric crystals, d.1.364, m.284, b.331, decomp. in water. **b. acetylacetonate** $Be(C_5H_7O_2)_2$ = 207.13. Monoclinic crystals, d.1.168, m.108, b.270, slightly soluble in water. **b. alkyls.** The organic compounds of beryllium, containing aliphatic radicals; *e.g. b. ethide.* **b. bromide** $BeBr_2$ = 168.94. White, hygroscopic needles, m.601; soluble in water. **b. carbide** Be_2C = 30.21. Yellow, hexagonal crystals, $d_{15°}$.1.9, decomp. by water. **b. carbonate** $BeCO_3.4H_2O$ = 141.2. Glucinum carbonate. A white powder; insoluble in water, decomp. by acids. It occurs also in basic salts of variable composition. (basic-) $(BeO)_4CO_2.5H_2O$ = 259.59. A white powder; insoluble in water, decomp. by acids, soluble in alkalis. **b. chloride** $BeCl_2$ = 80 9. Glucinum chloride. White deliquescent needles, m.400, b.500; soluble in water, alkalis or acids. (liquid) $BeCl_2.4H_2O$. A slightly yellowish, sirupy liquid, miscible with water or alcohol. **b. ethide, b. ethyl** $BeEt_2$ = 67.20. Glucinum ethide. A colorless liquid, b.185–188. **b. fluoride** BeF_2 = 47.1. A white powder, $d_{15°}$. 2.1, m.800; soluble in water, alcohol or acids. **b. hydroxide** $Be(OH)_2$ = 43.1. Glucinum hydroxide. A white powder, decomp. on heating, insoluble in water, soluble in alkalis, carbonates or alcohol. **b. iodide** BeI_2 = 262.92. White needles, $d_{15°}$.4.20, m.510, b.590, decomp. by water, soluble in alcohol, ether or chloroform. **b. nitrate** $Be(NO_3)_2.3H_2O$ = 187.2. Glucinum nitrate. Colorless or slightly yellow deliquescent crystals, soluble in water or alcohol; used as a reagent, also as a hardener in gas mantles. **b. oxalate** $Be(C_2O_4).3H_2O$ = 151.07. Rhombic crystals, d.1.478, m.$(-2H_2O)$100, $(-H_2O)$220. **b. oxide** BeO = 25.1. Beryllia, glucinum oxide. An amorphous white powder, $d_{0°}$.3.016; infusible, insoluble in water, soluble in alkalis or acids. Used in the manufacture of beryllium salts, and as a refractory. **b. oxychloride** Be_2OCl_2 = 105.12. Glucinum oxychloride. White hexagonal crystals, $d_{0°}$.3.016; infusible, insoluble in water, soluble in acids or alkalis. **b. phosphate.** Beryllonite. **b. potassium fluoride** $BeF_2.2KF$ = 163.30. Glucinum potassium fluoride. White crystals, slightly soluble in water. **b. silicate** Be_2SiO_4. A white powder used as refractory, for sparking plug porcelain and in making Be compounds. Cf. *beryl.* **b. sodium fluoride** $BeF_2.2NaF$ = 131.10. Glucinum sodium fluoride. A white or grayish crystalline powder; soluble in water, used in preparing metallic beryllium. **b. sulfate** (1) $BeSO_4.4H_2O$ = 177.2. Glucinum sulfate. White tetragonal crystals, $d_{10°}$.1.712. It loses two molecules of water on heating to 100; decomp. on further heating. Soluble in water, insoluble in alcohol. (2) $BeSO_4.7H_2O$ = 231.28. White monoclinic crystals.

beryllonite. A native phosphate of beryllium, $NaBePO_4$. Yellowish transparent crystals, d.-2.845, hardness, 5.5-6.

berzelianite. Cu_2Se. A native copper selenide, which occurs in thin white crusts. Cf. *crookesite, umangite.*

berzeliite. $(Mg, Ca, Mn)_3As_2O_8$. A native arsenate of magnesium, calcium and manganese, which occurs in red waxy masses.

berzelium. A supposed element of atomic weight 212, found by Baskerville in thorium salts.

Berzelius, Jöns Jakob, Baron. 1779–1848. A Swedish chemist, the investigator of atomic weights, using oxygen as standard, and a prolific author. He also worked on electrochemical analysis, isomerism, and the gas laws. He discovered selenium and thorium, and isolated silicon.

Bessemer, Sir Henry. 1813–1898. An English metallurgist who patented the process of making steel in 1856. **b. converter.** A large egg-shaped retort used in steel and iron manufacture. **b. iron.** An iron manufactured by the Bessemer process. **b. process.** A method of making steel by pouring the molten cast iron in a specially designed container (converter), and passing a stream of air through

the molten mass to oxidize metals such as manganese, silicon and carbon.

Bestuscheff's tincture. An ethereal tincture of iron chloride.

beta. The second letter of the Greek alphabet, β. Compare *alpha*. **b. acid.** Same as 2.6-naphthylamine sulfonic acid. **b. chlora process.** A method of bleaching flour with nitrosyl chloride and chlorine. **b. eucaine.** Betaeucaine. **b. hydrogen.** See *hydrogen molecule*. **b. position.** The substitution of the 2nd., 3rd., 6th., or 7th. hydrogen atom of a dicyclic compound, or of the hydrogen atom attached to the carbon atom next but one to the principal group of a straight chain compound; *e.g.*, β-hydroxy propionic acid, $CH_2OH.CH_2.COOH$. Cf. *alpha* position. **b. particles.** A stream of negatively charged particles (electrons) emitted from radioactive substances with the velocity of light (87,000 miles per second). **b. ray.** See *b. particles*.

Jöns Jakob Berzelius.

Beta. A genus of plants, Chenopodiaceae, the beets. The juice of *B. vulgaris* yields sugar (q.v.); also betaine and an indicator.

betacaine. Betaeucaine.

betaeucaine. $C_{15}H_{21}NO_2$ = 247.2. Trimethyl-benzoyl-oxypiperidine. Benzoylvinyl-diacetonalkylamine. A synthetic drug used as its hydrochloride as a local anesthetic. **b. hydrochloride.** $C_{15}H_{21}O_2N.HCl$ = 283.65. A white odorless powder; soluble in water, alcohol, or chloroform. Used as a local anesthetic.

betaimidazolethylamine. Histamine.

betaimine-azolyl-ethylamine. Ergamine.

betaine. $C_5H_{11}O_2N(+H_2O)$ = 117.11. The compound $MeN\langle_{CH_2}^{CO}\rangle O$. Lycine, oxyneurine, dimethylsarcosine, trimethylglycocoll. An alkaloid, prepared from beets or synthetically. Colorless monoclinic crystals, m.293 (decomp.); soluble in water or alcohol. **nicotine methyl-** Trigonelline. **pyridine-** The heterocyclic compound, $HC\langle_{CH-CH}^{CH=CH}\rangle N\langle_{CH_2}^{CO}\rangle O$. **thio-** Thetine. **trimethyloxybutyn-** Carnitine. **trimethylphosphor-** The heterocyclic compound,

$$Me_3P\langle_{CH_2}^{CO}\rangle O.$$

b. hydrochloride $C_{15}H_{11}O_2N.HCl$ = 153.57. Acidol. Colorless crystals, m.235; soluble in water. Used for administration of HCl, and the neutralization of tetanus toxin.

betaines. A group of organic bases characterized by the $=NMe_3$ group.

glycine betaine.... $Me_3N.CH_2.CO$ (—O—)

γ-butyro betaine.. $Me_3N.(CH_2)_3.CO$ (—O—)

carnitine..... $Me_3N.CH_2.CHOH.CH_2.CO$ (—O—)

croton betaine.... $Me_3N.CH_2.CH:CH.CO$ (—O—)

Cf. *stachydrine, trigonelline*.

betaisoamylene. Amylene.

betamethyl-ethylpyridine. Collidine.

betamethyl-indole. Skatole.

betanaphthol. See *naphthol*. **b. benzoate.** See *β-naphthol benzoate*. **b. orange.** Tropaeolin. **b. salicylate.** Betol.

betanaphthyl. Naphthyl. **b. amine.** β-Naphthylamine. **b. benzoate.** β-Naphtholbenzoate. **b. salicylate.** Betol.

beta-oxybutyric acid. β-Oxybutyric acid.

betaquinine. Quinidine.

betaterpineol. β-Terpineol.

betatopic. Pertaining to a radio-active substance which differs from one of its isotopes by one orbital electron and one integer in atomic number (cf. *alphatopic*). **b. change.** The transformation of a radioactive substance, in which it loses an orbital electron, and thereby becomes an isotope of an element with an atomic number higher by 1.

betaxin. Vitamin B_1.

betel. (1) Originally the betel vine. Cf. *betel leaf*. (2) An East Indian chewing substance, which consists of a fragment of betel-nut rolled up in a betel leaf, with some lime, gambir or other substance. It is a tonic and stimulant. (3) Pinang. The Areca or catechu palm of the East Indies. **b.-leaf.** The dried leaves of *Piper Betle*, a Piperaceae. **b.-nut.** Areca nut, buyo, semen arecae. The dried seed of *Areca catechu*, an East Indian palm. It contains many alkaloids; *e.g.*, arecoline, arecaine, guvacine. Used as an astringent, anthelminthic, tonic, and stimulant. See also *areca* nut. **b. phenol.** Chavibetol.

beth root. Trillium.

betol. $C_{17}H_{12}O_3$ = 264.2. Salinaphthol, naphthalol, betanaphthyl-salicylate. Salicylic-β-naphthyl ether. $C_{10}H_7COO.C_6H_4OH$. A white amorphous powder; insoluble in water, soluble in alcohol, m.95. It is an intestinal antiseptic, antirheumatic, and antizymotic. Cf. *alphol*.

Bettendorf test. The official U.S.P. test for arsenic in the presence of bismuth and antimony compounds. A freshly prepared $SnCl_2$ solution is added to the sample: A brownish tint indicates arsenic.

Betts' process. A method of refining lead by using the fluosilicate with a little gelatin as an electrolyte.

betula. A genus of trees of the oak family, Cupuliferae. See *birch*. **b. camphor.** Betulinol. **b. oil.** See *birch oil*.

betulin. Betulinol. **b. amaric acid.** $C_{36}H_{52}O_{16}$ = 740.5. An oxidation product of betulinol.

betulinic acid. $C_{30}H_{54}O_6$ = 582.6. A dibasic acid, m.195, formed by oxidation of betulin.

betulinol. $C_{24}H_{40}O_2$ = 360.4. Betula camphor, betulin. A diatomic alcohol from the bark of betula species (*e.g.*, white birch). Colorless crystals, m.258, insoluble in water.

beudantite. Biereite, corkite. A native sulfate and phosphate of iron and lead which occurs in dark green or black rhombohedrons.

Beutel buret float. A hydrometer-like closed glass tube, used in burets to facilitate the readings.

beyrichite. Ni_3S_4. A native nickel sulfide, which occurs in metallic, grayish hexagonal crystals.

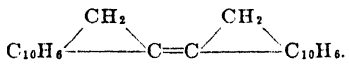
bhang. An intoxicating preparation made from the flowering tops of hemp. Cf. *hashish*.

Bi The symbol for bismuth. **BiO-** Bismuthyl.

bi- (1) Prefix indicating two or double. Cf. *di-* and *bis-*. (2) Misnomer for acid salt; as, bisulfate.

biacenaphthylidene. Biacene.

biacene. $C_{24}H_{16}$ = 304.2. $\Delta^{1,1'}$ biacenaphthylidene. The hydrocarbon



Reddish-yellow crystals, m.271, which show distinct dichroism when dissolved in conc. H_2SO_4; indigo-blue in transmitted light, red in incident light.

biacetyl. $C_4H_6O_2$ = 86.05. *2.3*-butane-dione*, diacetyl. The simplest diketone: MeCO.COMe. A colorless liquid of pungent, sweet odor, d.0.9793, b.88, slightly soluble in water, soluble in alcohol or ether. **b. dioxime.** Dimethylglyoxime. **b. monoxime.** MeCO.C(NOH)Me.

biacetylene. C_4H_2 = 50.0 Butadiine, butadiyne*, HC≡C—C≡CH.

Bial's reagent. A solution of 1 gm. orcin in 500 cc. 30 % HCl and 25 drops of $FeCl_3$ solution; used for the detection of pentoses in urine, in absence of dextrose.

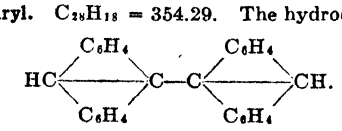
biallyl. Diallyl.

bianiline. N- Hydrazobenzene. **p-** Benzidine.

bianisaldehyde. Anisil.

bianisidine. Dianisidine.

bianthryl. $C_{28}H_{18}$ = 354.29. The hydrocarbon



Colorless leaflets, m.300.

biarsine. As_2H_4 = 153.94. Diarsine, diarsyl. The compound $H_2As—AsH_2$. Cf. *arsines*. **tetraethyl-** As_2Et_4 = 266.03. Ethylcacodyl. A colorless liquid, igniting in air, d.1.1388, b.187, insoluble in water. **tetramethyl-** Cacodyl.

biaxial. Having two axes. **b. crystals.** A crystal with two optical axes.

bibasic. Dibasic; having two hydrogen atoms which can be replaced by metals.

bibenzal. Stilbene.

bibenzenone. Diphenoquinone.

bibenzenyl. Tolane.

bibenzil. (1) Dibenzil, (2) Dibenzyl.

bibenzohydrol. Benzopinacol.

bibenzoic acid. Diphenic acid.

bibenzoyl. (1) Benzil. (2) Dibenzoyl; a prefix indicating the presence of two benzoyl radicals.

bibenzyl. $C_{14}H_{14}$ = 182.19. Dibenzyl. **asymmetric-** $Me.CHPh_2$. A colorless liquid, b.209. **symmetric-.** Diphenylethane, $PhCH_2.CH_2Ph$. Colorless, monoclinic needles, m.52, b.284, slightly soluble in alcohol, soluble in ether or chloroform. **b. alcohol.** Hydrobenzoin.

biberine. Bebeerine.

biborate. An acid borate; as, $NaHBO_2$. Cf. *diborate*.

bibulous. Absorbing moisture. **b. paper.** Blotting or filter paper.

bicarbonate. Dicarbonate, acid carbonate. A salt containing the monovalent —HCO_3 radical. **b. of potash.** Potassium b. **b. of soda.** Sodium b.

bicarburetted hydrogen. An obsolete name for ethylene.

bichloride. A salt containing two atoms of chlorine; *e.g.*, mercury bichloride.

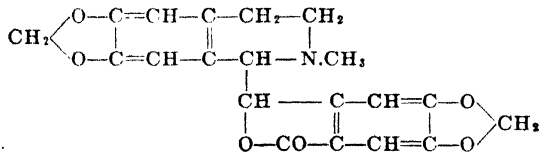
bichromate. Dichromate, acid chromate. A salt containing the divalent =Cr_2O_7 radical; as, sodium b., $Na_2Cr_2O_7$. **b. cell.** See *cell*.

bichrome. Potassium dichromate.

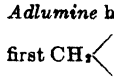
biconcave. See concave *lens*.

biconvex. See convex *lens*.

bicuculline. $C_{22}H_{17}O_6N$ = 367.15. An alkaloid from *Dicentra cucullaria*, *Corydalis sempervirens* and *Adlumia fungosa*, (Fumaraceae). Dimorphic crystals, m.177 and 196.



Adlumine has two CH_3O—groups instead of the



bicyclic. Containing two rings; as, naphthalene.

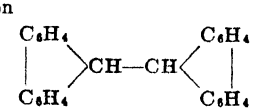
bicyclodecane. Dekalin.

bicycloheptane. 1.1.3- Norpinane. **1.2.2-** Norcamphane. **0.1.4-** Carane. **2:4-** Pinane.

bicycloheptene. 0.1.4- Carene. **1.1.4-** Norcarene. **1.1.3-** Pinene.

bidesyl. $C_{28}H_{22}O_2$ = 390.2. Dibenzoyldibenzyl. PhCO.CHPh.CHPh.COPh. Colorless crystals, m.255.

bidiphenyleneethane. $C_{26}H_{18}$ = 330.2. The hydrocarbon



Colorless crystals, m.246. Cf. *tetraphenylene*. **b. ethylene.** Bifluorene.

bieberite. $CoSO_4.7H_2O$. A native cobaltous sulfate; red monoclinic crystals.

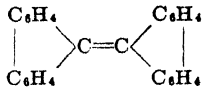
Biebrich red. Scarlet R.

biethylene. *1.3*-Butadiene*.

Biffi-Brooks coagulometer. A device for determining the temperature of coagulation of proteins.

biguanide. Guanylguanidine.

bifluorene. $C_{26}H_{16}$ = 328.2. Bidiphenylene ethylene. The hydrocarbon



Red needles, m.188.

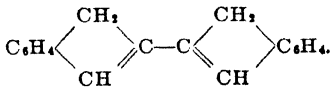
biformyl. Glyoxal.

bihexyl. Dodecane*.

bihydrazine. N_4H_6 = 62.2. Buzane, dihydrobuzylene, tetrazane, $NH_2.NH.NH.NH_2$. Cf. *tetrazanes*.

biindoxyl. Indigo white.

biindyl. $C_{18}H_{14}$ = 230.1. The hydrocarbon

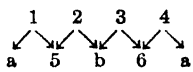


Cf. *diindyl*.

bikhaconitine. $C_{36}H_{51}O_{11}N$ = 673.40. An alkaloid from the root of *Aconitum ferox*, m.113. It is the bikh poison of Nepal.

bilateral. Pertaining to two or both sides.

bile. Gall, chola. The yellow, brown, or greenish secretion of the liver, containing 14 % solids and 86 % water, d.1.026–1.032. **b. acids.** A group of acids found in bile, and related to hematin and cholane. See *porphin, cholane*. Their sodium salts aid digestion. The principal acids are related as follows



where:

1. glycocholic acid	$C_{26}H_{43}O_6N$
2. taurocholic acid	$C_{26}H_{45}O_7NS$
3. taurocholeic acid	$C_{27}H_{47}O_6NS$
4. glycocholeic acid	$C_{27}H_{45}O_5N$

and the split products are:

5. cholic acid	$C_{24}H_{40}O_5$
6. choleic acid	$C_{24}H_{42}O_4$

a. glycine (NH_2CH_2COOH)
b. taurine ($NH_2(CH_2)_2SO_3H$).

b. pigments. The coloring matter of b.; as,

red	bilirubin, XO_6
green	biliverdin, XO_8
blue	bilicyanin, XO_9
purple	bilipurpurin, XO_{10}
brown	bilixanthin, XO_{12}

where X is $C_{32}H_{36}N_4$.

b. salts. The sodium salts of taurocholic and glycocholic acids, which occur normally in the bile.

bilein. A mixture of the alkali salts of the bile acids, obtained from oxgall.

bilicyanin. $C_{32}H_{36}O_9N_4$ = 620.3. A blue pigment obtained by oxidation of biliverdin.

biliflavin. A yellow pigment derived from biliverdin.

bilifulvin. Bilirubin.

bilifuscin. $C_{16}H_{20}O_4N_2$ = 304.6. A dark-brown powder obtained from bile pigments; insoluble in water, soluble in alcohol, acetic acid or alkalis; used as a reagent.

bilin. A mixture of sodium taurocholate and sodium glycocholate; the main constituent of bile.

bilineurine. Choline.

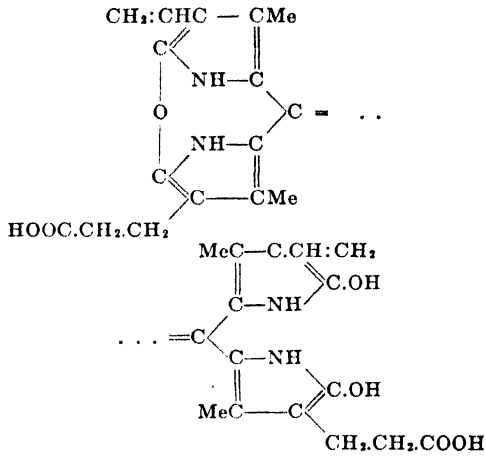
bilinigrin. A black oxidation product of bilirubin.

biliphain. Bilirubin.

biliprasin. A green pigment derived from biliverdin.

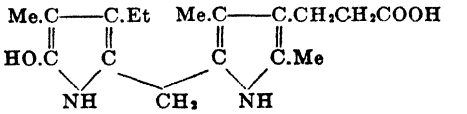
bilipurpurin. Cholohematin. A purple bile pigment.

bilirubin. $C_{32}H_{36}O_6N_4$ = 572.5. Bilifulvin, biliphain, cholepyrrhin, hematoidin. The red coloring matter of bile which is structurally related to hematoporphyrin and hematin; it is derived from hemoglobin and causes coloring of the eyes in jaundice. Reddish yellow needles, or an orange powder, m.192; insoluble in water, soluble in alkalis, acids or chloroform.



Cf. *porphin ring, cholothallin*. hydro- Urobilin.

bilirubinic acid. $C_{17}H_{24}O_3N_2$ = 304.16. A monobasic acid containing two attached pyrrole rings. It is formed from bilirubin and from hemin by reduction with hydriodic acid in glacial acetic acid. Fischer's formula is:



bilisoidanic acid. $C_{24}H_{32}O_9$ = 464.6. An acid obtained from bile by treatment with nitric acid.

biliverdic acid. $C_8H_9O_4N$ = 183.08. A crystalline solid, m.114.

biliverdin. $C_{32}H_{36}O_8N_4$ = 604.5. An oxidation product of bilirubin. A green amorphous powder; soluble in alcohol or glacial acetic acid. It yields choletelin and the pigments biliflavin and biliprasin.

bilixanthin. $C_{32}H_{36}O_{12}N_4$ = 668.3. A yellowish brown oxidation product of bile pigments, q.v.

billion. (1) A million millions; 10^{12} (British and German usage). (2) A thousand millions; 10^9 (Continental Europe and U.S.A. usage).

Billroth's mixture. An anesthetic consisting of 3 p ts. chloroform, 1 pt. alcohol and 1 pt. ether

biloidanic acid. $C_{23}H_{32}O_{12}$ = 488.25. Norsolanellic acid. An acid obtained by the oxidation of bile.

bimetal. A metal sheet made up of two layers and having special properties; as, corrosion resistance.

bimolecular. Pertaining to two molecules. **b. reaction.** See *reactions, 2nd. order.*

binaphthalene. $C_{20}H_{14}$ = 254.22. Naphthyl naphthalene, $C_{10}H_7—C_{10}H_7$. A group of hydrocarbons; as,

$\alpha.\alpha'$- or alpha-	m.160, b.365
$\beta.\beta'$- or beta-	m.187, b.452
$\alpha.\beta'$- or gamma-	m.70

They form colorless crystals, insoluble in water, soluble in alcohol or ether.

binaphthyl. (1) The monovalent radical,—$C_{20}H_{13}$, derived from binaphthalene. (2) Dinaphthyl.

binarite. Marcasite.

binary compound. A compound containing only two elements. It may have two or more atoms; *e.g.*, NaCl, $FeCl_2$, $FeCl_3$, $SiCl_4$. **b. mixture.** A mixture of any two substances. **b. salt.** A salt containing two bases, as $NaKSO_4$. **b. system.** Any combination possible with two metals; cf. *phase rule, alloy.*

binder. A material used to hold solid substances together in a plastic mass; as, bitumen.

bindheimite. Native hydrous lead antimonate.

binding. Held together. **b. energy.** The force which holds together the negatively and positively charged portions of an atom or molecule; cf. ionization *energy*, lattice *energy*, solution *energy*. **b. screw.** A screw in a perforated panel for connecting electric wires.

bing. Spoilbank. Colliery refuse consisting of pyritic fine coal and shale.

biniodide. (1) Diiodide. (2) A pharmaceutical name for (a) mercuric iodide, (b) mercuric potassium iodide.

binitro. See *dinitro-*.

binnite. The native copper-arsenic sulfide $2As_2S_3$, $3Cu_2S$.

binocular microscope. A microscope with two eyepieces giving a stereoscopic effect.

binoxalate. Bioxalate.

binoxide. Dioxide.

bio. A prefix meaning life, derived from the Greek "bios."

bioanalysis. The determination of minute quantities of elements or compounds by means of bacteria, protozoa or protophyta.

bioassay. The determination of the activity of drugs by studying their effects on animals.

biocatalysator. A substance of the protoplasm that promotes growth.

biocatalyst. (1) Enzyme. (2) Ergine.

biochemical. Pertaining to the matter-changes within an organism. **b. oxygen demand.** B.O.D. A chemical measure of the deoxygenating power of an effluent in terms of the difference between the Winkler oxygen value in contact with oxygen-saturated water before and after five days at 17.8°C.

biochemistry. A branch of chemistry dealing with the changes occurring in living organisms, *e.g.*, metabolism, respiration, etc.

biocolloid. Any glue-like substance of an organic nature; as, the glutin of bone glue.

bioctyl. Hexadecane*.

biodyne. A natural cellular respiratory factor.

bioelement. An element essential to life. Principally those most abundant in organisms, but traces of rarer elements are in many cases also essential. Cf. *abundance, periodic chain.*

DISTRIBUTION OF BIOELEMENTS

Order (1)	Mammals (2) per cent		Gymnosperms (3) per cent	
1	O	62.43	C	53.96
2	C	21.15	O	38.65
3	H	9.86	H	6.18
4	N	3.10	Al	0.065
5	Ca	1.90	Si	0.057
6	P	0.95	S	0.052
7	K	0.23	Fe	0.030
8	S	0.16	N	0.030
9	Cl	0.08	Ca	0.007
10	Na	0.080	K	0.006
11	Mg	0.027	P	0.005
12	I	0.014	Mg	0.003
13	F	0.009	Cl	0.002
14	Fe	0.005	No	0.001
15	Br	0.002	F	0.001
16	Al	0.001	Mn	0.001
17	Si	0.001		
18	Mn	0.001		
		100.00		100.00

biogen. The inactive parent compound of bios.

biogenesis. The theory that all life comes from life, *e.g.*, that life can not be artificially created. Antonym: abiogenesis.

biognosis. The study of life.

biological assay. The determination of the active principles of a drug by determining the smallest quantity which will produce certain symptoms in animals. It can supplement or replace chemical methods of analysis. **b. oxygen demand.** Biochemical oxygen demand.

biologics. A group of preparations derived from living organisms which are used in therapy:

1. *Antiserums*, producing passive or relatively temporary immunity.
   - A. *antitoxic*, produced by immunization of horses and used to neutralize specific toxins, as, diphtheria, tetanus, scarlet fever, etc. *antitoxin.*
   - B. *antibacterial*, produced by injecting horses with bacteria; as, antidysenteric, antipneumococcic, antiinfluenca *serum.*
2. *Vaccines*, producing active or relatively permanent immunity and consisting of bacterial suspension; as, rabies *vaccine.*
3. *Bacterial Antigens*, derived from bacteria and having immunizing power.
   - A. *bacterial vaccines*, consisting of killed bacteria in suspension; as, catarrhal, furunculosis, pertussis *bacterin* (or vaccine).
   - B. *ectoantigens*, or washings from live pathogenic bacteria; as, gonococcus, pneumococcus, streptococcus *immunogen.*
   - C. *toxoids* and *filtrates*, such as, diphtheria, staphylococcus toxoids, tuberculins, gonococcus filtrate.

4. *Pollen and Protein Extracts*, used for diagnosing and treating hay fever, asthma, urticaria, dermatitis, etc.

biology. The science of living matter, its forms, functions, occurrence, behavior and evolution. Branches of biology:

1. Botanical branches (plants)
2. Zoological branches (animals)
3. Anthropological branches (man)

BIOLOGY The science of living things:	*energy* transformation:		Biophysics
	matter changes:		Biochemistry
	structure of living things: MORPHOLOGY	cells	Cytology
		tissues	Histology
		organs	Anatomy
		organisms	Taxonomy
	functions of living things: PHYSIOLOGY	generative	Embryology
		sustentative	Metabolism
		correlative	Circulation and Nerves
	abnormal structure and function: PATHOLOGY	of plants	Phytopathology
		of animals	Zoopathology
		of man	Pathology
	development of live: ETIOLOGY	of the race	Phylogeny
		of individual	Ontogeny
	dwelling place: CHOROLOGY	of plants	Flora
		of animals	Fauna
		of both	Ecology
	prehistoric life: PALEONTOLOGY	of plants	Paleobotany
		of animals	Paleozoology
		of man	Ethnology

bioluminescence. The phosphorescence of living vegetable or animal organisms.

biometry. The application of statistics to biological science.

biomolecule. A molecule of protoplasm or a unit of living substance. Cf. *biomone, biophore, idioblast, gene, protoplasm, micelle.*

biomone. A particle of living matter made up of biomolecules.

bion. (1) An individual living organism. (2) The hypothetical life-element (Osburn), analogous to the electron the element of electricity.

bionergy. The "vital" force generated in living cells.

bionomy. The measurement of life phenomena.

bio-osmotic. The osmotic pressure of living cells.

biophage. A cell or organism feeding on living cells or living organisms.

biophore. Biomone. The smallest particle of living matter (Weismann).

bioplasm. Protoplasm.

bioplast. Micelle.

biorization. Pasteurization under a pressure of 1–3 atmospheres.

bios. $C_6H_{11}O_2N$ = 133.2. A crystalline substance similar in character to a vitamin, which is found to be essential for the growth of certain types of yeast, m.223. Now known to consist principally of i-inositol, vitamin B_1 and pantothenic acid (q.v.). Cf. *biogen.*

biose. (1) carbohydrate containing two hydroxy groups; as, $C_3H_4O_3$. Cf. *tetrose, pentose, hexose.* (2) Disaccharide.

biosterin. (1) A vitamin. (2) Biosterol.

biosterol. $C_{22}H_{44}O_2$ = 340.7. An alcohol resembling cholesterol. It appears to have the growth-stimulating property of vitamin A, q.v.

biota. The flora and fauna of a region.

biotic. Pertaining to life or living organisms.

biotin. (1) $C_{10}H_{16}O_3NS$(?). Vitamin H, 2-keto-3,4-imidazolido-2-tetrahydrothiophene-n-valeric acid. A cyclic urea derivative from (*e.g.*,) agar. It has growth-promoting properties. (2) $C_{11}H_{18}O_3N_2S$(?). A very active constituent of bios (q.v.) occurring in wild yeasts and egg yolk, and isolated as the crystalline methyl ether; 1 part in 3×10^{11} effects yeast growth.

biotite. A brownish-black ferrous mica.

biotoxin. The toxins formed in the tissues of the living body.

bioxalate. Binoxalate, acid oxalate. A salt containing the monovalent $—HC_2O_4$ radical.

bioxindol. Isoindigotin. **dihydroxy-** Isatide. **hydroxy-** Isatan.

bioxyl. Bismuthyl chloride.

biozeolite. A biological slime from sewage filters, which has zeolitic properties.

biphenyl. (1) $C_{12}H_{10}$ = 154.14. Phenylbenzene, Ph.Ph. Colorless scales d.1.041, m.71, b.254, insoluble in water, soluble in alcohol or ether. (2) Diphenyl. *o*-**amino-** Biphenylamine. *p*-**amino-** Xenylamine. **diamino-** $NH_2C_6H_4.C_6H_4NH_2$. *o.o'*- or **2.2'-** Colorless crystals, m.81. *o.p'*- or **2.4'-** Diphenyline. *p.p'*- or **4.4'-** Benzidine. **difluoro-** Antitussin. **dimethyl-** Ditolyl. **methyl-** $Ph.C_6H_4.Me$ = 168.10. Phenyltolyl. *m*- or **3-** Colorless liquid, b.275. *p*- or **4-** Colorless liquid, b.265.

b. amine. $Ph.C_6H_4.NH_2$ = 169.10. *ar*-Phenylaniline, aminobiphenyl. Differs from diphenylamine, q.v. *o*- **2-** Colorless crystals, m.45. *p*- or **4-** Xenylamine. **b. diamine.** *o.o'*- Diamino b. *p.p'*- Benzidine. **b. mercury.** $(PhC_6H_4)_2Hg$ = 506.75. White scales, m.216, insoluble in water.

biphenylene. (1) Th hypothetical compound $C_6H_4{:}C_6H_4$. (2) The bivalent radical, $—C_6H_4—$

C_6H_4—. **b. disazo.** The bivalent radical, —N:NC_6H_4.C_6H_4N:N—. **b. oxide.** Dibenzofurane. **b. sulfide.** Dibenzothiophen.

BIPP. A mixture of bismuth iodoform and paraffin, used as an antiseptic; it is harmless to tissues.

bipropargyl. C_6H_6 = 78.05. Dipropargyl, *1.5*-hexadiyne*, 1.5-hexadine, CH≡C.CH_2.CH_2.-C≡CH. A colorless liquid, d.0.805, m.—6, b.85.4.

bipropenyl. *2.4*-Hexadiene*.

bipseudoindoxyl. Indigotin.

birch. A tree of the genus Betula. **b. camphor.** Betulinol. **b. oil.** Sweet b. oil, betula oil. The essential oil from the bark of *Betula lenta*, black birch. A colorless oil, d.1.1272–1.182, b.218–222; its chief constituent is methylsalicylate (oil of wintergreen). Used for flavoring, as an antirheumatic and antipyretic. **b. tar oil.** A tarry oil from the wood of *Betula alba*, white birch. A dark-brown oil with empyreumatic odor, d.0.886–0.950; soluble in alcohol, ether, or chloroform. The chief constituents are phenols and cresols; used as a disinfectant, antiparasitic and in leather dressing. **b. wood-carbon.** Norit.

bird-lime. A viscid substance from the bark of the Ilex species and mistletoe. It contains viscin, viscum and ilicic alcohol.

birectification. A precise method of analysing fermented liquors by fractional distillation.

birefractive. Doubly refracting.

birefringence. Double *refraction*. el rical-*Kerr* effect.

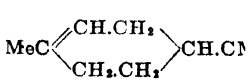
birotation. Mutarotation. The exc ly high or low optical activity of a pared aqueous solution of a sug standing or after boiling or th ammonia, is reduced to normal.

birthwort. Serpentaria.

bis- A prefix indicating *twice*, to molecules made up of two compounds.

bisabolene. $C_{15}H_{24}$ = 204.21. quiterpene from bisabol m oil. A colorless liquid, d.0.

bisabolol. $C_{15}H_{26}O$ = 221.



Me₂.

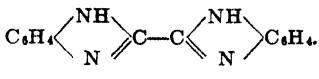
bisacenaphthylidene = 332.2. The homocyclic ke

bisazimethylene. K

bisazo- Tetrazo-.

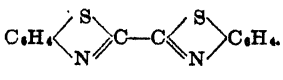
bisazobenzil. $C_{14}H_8N_4$ = 232.2. The homocyclic azide Ph.CN_2—CN_2.Ph.

bisbenzimidazole. $C_{14}H_{10}N_4$ = 234.2. The heterocyclic system related to indigo.



Colorless crystals, m.305.

bisbenzothiazole. $C_{14}H_8N_2S_2$. The heterocyclic system.



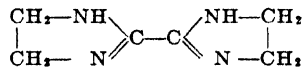
bischofite. A native, hydrous magnesium chloride, $MgCl_2.6H_2O$.

biscuit ware. An unglazed, porous porcelain, which has been fired twice.

bisdiazo- Tetrazo-. **b. amine.** N_6H_2 = 73.06. The hypothetical compound NH:N.NH.N:NH, known as its derivatives. Cf. *hydronitrogen*. **b. hydrazine.** N_8H_4 = 88.08. The hypothetical compound HN:N.NH.NH.N:NH known as its derivatives.

bisethylxanthate. Ethylxanthogenate.

bisglyoxalidine. $C_6H_{10}N_4$ = 138.3. The heterocyclic system,

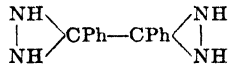


Colorless crystals, m.295.

bisglyoxaline. Glycosine.

bishydrazi carbonyl. Diurea.

bishydrazibenzil. $C_{14}H_{14}N_4$ = 238.3. The compound,

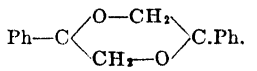


bismal. $4C_{15}H_{12}O_{10}.3Bi(OH)_3$ = 2188.46. Bismuth methylenedigallate. A grayish-brown powder, soluble in alkalis; used medicinally as an astringent in diarrhea.

bismarck brown. Triaminoazobenzene.

bismarsen. $C_{21}H_{21}O_{12}As_3Na_6S_3N_3Bi$. Bismuth sulfarsphenamine. Brown amorphous powder, soluble in water; used in the treatment of syphilis.

bismethylbenzoylcarbinol. $C_{16}H_{16}O_2$ = 240.2. The heterocyclic compound,



crystals, m.92.

$_3.3H_2O$. Bismuth ocher. A na- uth oxide.

Colloidal bismuth metahydroxide. t-brown granules which produce an opal- scent suspension with water.

smuth. Bi = 209.00. An element of the arsenic group, atomic number 83. Bismutum, wismuth. A pinkish, silver-white, brittle metal resembling antimony, $d_{20°}$.9.78, m.269.2, b.-1435.5; insoluble in water, soluble in acids. It occurs native, as sulfide (bismuthinite), and in a few rare minerals; as, sulfobismuthide, telluride and vanadate. The isotopes of bismuth are radium E = 210.4, thorium C = 212.4, actinium C = 212(?), and radium C = 214.4. Bismuth is tri- and penta-valent, and forms two series of compounds:

Derived from trivalent bismuth:

bismuthides	M_3Bi
bismuthous compounds	Bi^{+++}
bismuthyl compounds	BiO^-
bismuthines	BiR_3

Derived from pentavalent bismuth:

bismuthic compounds	Bi^{+++++}

Bismuth was discovered by an unknown alchemist. It is mentioned by Basil Valentine in 1450, and described as a "bastard of tin." Its name is of obscure origin and comes probably from the Arabic, "wiss majat," a metal which easily melts, or German, "wismuth,"

wiesen matte, a meadow. B. is used commercially in many alloys of low melting point (*e.g.*, lipowitz metal, wood metal, etc.), as a constituent of type metal, and also in the manufacture of bismuth compounds and drugs; its insoluble salts cast x-ray shadows (b. meal), the soluble salts are very toxic. B. is very diamagnetic. Cf. *Lipowitz alloy, rose metal, D'arcet metal.* **tribromphenol-** Xeroform. **triiodophenol-** Neoform. **trimethyl-** Bismuthine.

b. acetate. $Bi(OOCMe)_3$ = 381.1. Bismuthous acetate. White powder: soluble in acetic acid. **b. albuminate.** An additive compound of albumin with bismuth; a gray powder, containing 9 % Bi, used to treat cholera and colics. **b. ammonium citrate.** Transparent, shining, white scales soluble in water or alcohol. **b. benzoate.** $Bi(OOCPh)_3$ = 572.15. Bismuthous benzoate. A gray powder soluble in acids and used internally in stomach disorders and externally instead of iodoform. **b. beta-naphtholate.** Orphol. **b. borate.** $BiBO_3$ = 267.9. Bismuthous borate. A grayish powder soluble in acids. It is an intestinal antiseptic. **b. borosalicylate.** A grayish amorphous powder, decomp. in water. **b. bromide.** $BiBr_3$ = 448.8. Bismuthous bromide, bismuth tribromide. White or yellowish crystals, d.5.604, m.210, b.453, decomp. in water, soluble in ether or hydrobromic acid. **b. camphorate.** $Bi_2(C_{10}N_{14}O_4)_3$ = 1014. A white powder, insoluble in water. **b. carbolate.** Bismuthyl phenylate. **b. carbonate.** Bismuthyl carbonate. **b. chloride.** $BiCl_3$ = 315.5. Bismuthous chloride, bismuth trichloride. White crystals, $d_{11°}$4.56, m.232, b.447; insoluble in water, soluble in alcohol, acetone or acids. **b. chromate.** $Bi_2O_3.2CrO_3$ = 666.0. A yellow amorphous powder, insoluble in water, soluble in acids; used as a pigment. **b. cinnamate.** Hetoform. The bismuth salt of acid. **b. citrate.** $BiC_6H_5O_7$ = 398.0 crystals, d.3.458, insoluble in water, in ammonia water; used as a sto. astringent. **b. chrysophanate.** Bi $2Bi_2O_3$ = 1394.07. Dermol. A yellow phous powder; insoluble in water and used skin diseases. **b. dichloride.** $BiCl_2$ = 278.4 Black needles, d.4.86, m.163, decomp. by water. **b. dithiosalicylate** (basic). Thioform. **b. gallate.** $Bi(OH)_2C_7H_5O_5$ = 412.06. Dermatol, b. subgallate. A yellow powder (55 % Bi), insoluble in water, alcohol or ether, but soluble in alkalis. It is an internal and external antiseptic and astringent. **b. glance.** Bismuthinite. **b. gold.** Au_2Bi; occurs naturally. **b. hydroxide.** $Bi(OH)_3$ = 260.0. Bismuthous hydroxide. A white amorphous powder; insoluble in water and alcohol, soluble in acids; used for manufacturing bismuth salts. **b. iodate.** $Bi(IO_3)_3$ = 733.76. Bismuthous iodate. A heavy white amorphous powder; insoluble in water, decomp. by strong acids. **b. iodide.** BiI_3 = 589.76. Gray glistening crystals, $d_{20°}$5.65, m.408, insoluble in water, soluble in KI solution. **b. iodosubgallate.** B. oxyiodogallate. **b. lactate** $Bi(C_3H_5O_3)C_3H_4O_3$ = 386.07. White crystals, slightly soluble in water; used as an antiseptic. **b. loretinate.** A surgical dusting powder, used as an iodoform substitute. **b. meal.** A meal containing an insoluble bismuth salt given before an x-ray examination, so as to render the digestive organs visible. **b. methylene digallate.** Bismal. **b. minerals.** Bismuth ores occur in nature closely associated with arsenic and antimony. Some are:

native bismuth	Bi
guanajuatite	Bi_2S_3
bismuthinite (bismuth glance)	Bi_2S_3
tetradymite	Bi_2Te_3
joscite	Bi_2Te
wehrlite	Bi_2Te_3
gruenlingite	Bi_4TeS_2
bismite	$Bi(OH)_3$
bismuth ocher (bismuthite)	Bi_2O_3
bismutite	$Bi_2H_2CO_6$
bismuthosphaerite	$(BiO)_2CO_3$
bismuthosmaltite	$CoBi_3.CoAs_3$
bismuth telluride	$Bi_2(S, Te)_2$

b. molybdate, $Bi_2(MoO_4)_3$ = 898.1. A yellow powder, insoluble in water, soluble in acids. **b. naphtholate.** Orphol. **b. nickel.** A native mixture of bismuth and nickel sulfides. **b. nitrate.** $Bi(NO_3)_3.5H_2O$ = 485.1. B. ternitrate, b. trinitrate. White triclinic, deliquescent crystals, d.2.78, m.74; decomp. on further heating; soluble in acids, decomp. in water. It is an astringent or antiseptic, used in diarrhea. Cf. bismuth subnitrate. **b. ocher.** See b. minerals. **b. oleate.** $Bi(C_{17}H_{33}COO)_3$ = 1053.2. A yellow granular mass, soluble in ether; used in the treatment of skin diseases. **b. organic compound.** A compound in which aliphatic or aromatic hydrocarbon radicals are attached to bismuth (*e.g.*, bismuth trimethyl, bismuth tripl vl). **b. oxalate.** $Bi_2(COO)_6$ = 682.03. A granular powder, soluble in acids. **b.** (1) Commonly, bismuthous oxide. (2) of the three oxides: Bi_2O_3 = bisxide or bismuthous oxide. Bi_2O_4 = roxide. Bi_2O_5 = bismuth pentoxide oxide. **b. oxybromide.** Bisde. **b. oxychloride.** Bismuthyl xyfluoride. Bismuthyl fluoride. Bismuthyl iodide. **b. oxyio-**H)$(C_7H_4O_4)$ = 504.98. B. io- ismuthyl iodogallate, airol, uminous light grayish-green and tasteless, insoluble in lute alkalis or acids; used iodoform. **b. pentoxide. permanganate.** Bi(Mnhous permanganate. A ble in water, soluble in ptic; used as a dusting po peroxide. Bi_2O_4 = 482.0. A liberating oxygen at 150°C. **b.** e. Bismuth sulfocarbolate, bis enate. A slightly pinkish powder, n water, used as an antiseptic. **b.** e. $Bi(OH)_2OPh$ = 336.6. B. phenol, -p e, -phenolate, -carbolate. A gray powde 80 % Bi); insoluble in water, used as an intestinal antiseptic. **b. phosphate.** $BiPO_4$ = 304.0. Bismuthous phosphate. A white powder; decomp. by heat, insoluble in water, soluble in acids. **b. phospholactate.** A white, crystalline powder, slightly soluble in water, decomp. by heat; used as an intestinal antiseptic. **b. potassium iodide.** $BiI_3.4KI$ = 1253.9. Yellowish crystals, soluble in water, used as (Dragendorff's) reagent for alkaloids. **b. potassium tartrate** $BiK(C_4H_4O_6)_2$ = 545.1. Colorless crystals, soluble in water; used as a reagent for glucose in urine. **b. propionate.** $Bi(C_3H_5O_2)_3$ = 428.19. A white powder, insoluble in water, soluble

in acids. **b. pyrogallate.** $Bi(OH)C_6H_3(OH)O_2$ = 350.04. Bismuth gallate, helcosol. A yellow powder (60 % Bi), insoluble in water or alcohol; used as an intestinal antiseptic and dusting powder for wounds. **b. salicylate** $Bi(C_7H_5O_3)_3.Bi_2O_3$ = 1744.04. Bismuth subsalicylate. A white microcrystalline powder, insoluble in water, soluble in acids. Used as an intestinal antiseptic, and dusting powder. **b. selenide.** Bi_2Se_3 = 655.6. Black crystals, d.6.86, decomp. on heating; insoluble in water or alkalis. **b. silver.** A native form of silver, containing 16 % bismuth. **b. sodium iodide.** $BiI_3.4NaI$ = 1190.1. Red crystals, decomp. in water, soluble in acids; an antiseptic and alterant. **b. subcarbonate.** Bismuthyl carbonate. **b. subgallate.** B. gallate. **b. subnitrate.** B. basic nitrate. A mixture of $Bi(OH)_2NO_3$ and $BiOH(NO_3)_2$ or of $(BiO)NO_3$ and (BiO)OH. A white powder (79–82 % Bi), insoluble in water, $d_{15°}$.4.928; decomp. 260, soluble in acids. An antiseptic or astringent, used in stomach and intestinal disorders; also as a b. meal (q.v.); and as a dusting powder. Cf. *pearl white*(3). **b. subsalicylate.** B. salicylate. **b. sulfate.** $Bi_2(SO_4)_3$ = 706.2. Bismuthous sulfate. A white crystalline powder, decomp. in water or if heated, soluble in acids. **b. sulfide.** Bi_2S_3 = 514.2. Bismuthous sulfide, bismuth trisulfide. Dark-brown rhombic crystals or powder, d.7.39, decomp. on heating, insoluble in water, soluble in acids. **b. sulfite.** $Bi_2(SO_3)_3$. A white powder of variable composition, soluble in acids. **b. sulfocarbolate.** B. phenolsulfonate. **b. tannate.** A yellow powder resulting from action of tannic acid on bismuth hydroxide; insoluble in water, soluble in acids, and used as an antiseptic and astringent. **b. tartrate.** $Bi_2(C_4H_4O_6)_3.6H_2O$ = 970.0. A white powder, d.2.595, insoluble in water, soluble in alkalis, acids and glycerol. It is used in the treatment of Vincent's Angina. **b. telluride.** See *b. minerals*. **b. tetraiodophenolphthalein.** Eudoxine. **b. tetroxide.** B. peroxide. **b. thiosalicylate.** Thioform. **b. tribromide.** B. bromide. **b. tribromphenylate.** Xeroform. **b. trichloride.** B. chloride. **b. triethyl*.** $BiEt_3$ = 296.15. A colorless, oily liquid, d.1.82, b.107; insoluble in water, miscible with alcohol or ether. **b. trimethyl*.** C_3H_9Bi = 254.07. Trimethyl bismuthine, $BiMe_3$. A colorless liquid, d.2.300, b.110. **b. triphenyl*.** $BiPh_3$ = 440.16. Triphenyl bismuthine. Colorless crystals, d.1.585, m.78. **b. trisulfide.** B. sulfide. **b. tungstate.** $BiWO_3$ = 441.5. B. wolframate. A white powder, decomp. in water, soluble in acids. **b. valerate.** $Bi(C_5H_9O_2)_3$ = 512.22. A white powder, insoluble in water, soluble in acids; used as a sedative and antispasmodic. **b. violet.** A triphenyl methane dye in combination with Bi; used as non-toxic antiseptic.

bismuthi. The official Latin for bismuth.

bismuthic. A compound of pentavalent bismuth. **b. oxide.** Bi_2O_5 = 498.0. Bismuth pentoxide. A brown powder which liberates oxygen on heating to 150°C; insoluble in water, soluble in concentrated alkalis or acids.

bismuthide. (1) A compound of the type M_3Bi, analogous to arsenide, stibnide. (2) Bismuthosmaltide. **sulfo-** Beegerite.

bismuthine. (1) An organic bismuth compound, BiR_3, analogous to arsine and stibine. (2) Bismuthinite. **ethyl-** $C_6H_{15}Bi$ = 296.12. Triethylbismuth, $BiEt_3$. A colorless liquid, d.1.82, b_{30mm}107. **methyl-** C_3H_9Bi = 254.07. Trimethyl bismuth, $BiMe_3$. A liquid, d.2.300, b.110. **phenyl-** $C_{18}H_{15}Bi$ = 440.16. Triphenyl bismuth, $BiPh_3$. A solid, d.1.585, m.78.

bismuthinite. Bi_2S_3. Bismuthine. Bismuth glance. Native bismuth sulfide.

bismuthiol. Mercaptosulfo thiobiazole. A reagent for bismuth salts with which it gives a red precipitate, owing to the presence of the $(NH)_2NH(CS)_2$ group. Cf. *mercaptophenyl dithiodiazolone*.

bismuthite. $Bi_2H_2CO_6$. A native hydrous bismuth carbonate, $(BiO)_2CO_3.H_2O$, occurring as white or greenish earthy masses.

bismuthosmaltite. $Co(As,Bi)_3$. A native cobalt arsenide and cobalt bismuthide; or smaltite containing bismuth.

bismuthosphaerite. $(BiO)_2CO_3$. A native bismuth carbonate which occurs in yellow fibrous masses.

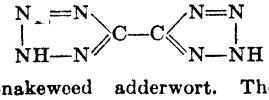
bismuthous. A compound of trivalent bismuth. The common bismuth compounds belong to this series. **b. oxide.** Bi_2O_3 = 466.0. Bismuth oxide, bismuth trioxide. Yellow tetragonal crystals, d.8.868, m. 850; insoluble in water, soluble in acids. Used in medicine similarly to bismuth subnitrate.

bismuthyl. The monovalent radical, BiO—, derived from trivalent bismuth. **b. bromide.** BiOBr = 305.92. Bismuth oxybromide. A yellowish-brown powder, $d_{15°}$.8.082; insoluble in water, soluble in acids; used to treat dyspepsia and hysterics. **b. carbonate.** $(BiO)_2CO_3$ = 527.02. Bismuth subcarbonate. A white powder, d.6.86; insoluble in water, soluble in acids. Used in ointments and face powders, and internally for stomach disorders. **b. chloride.** BiOCl = 260.50. Bismuth oxychloride. A white powder, $d_{15°}$.7.717; insoluble in water, soluble in acids; used as an astringent and antiseptic. It is decomp. at red-heat. **b. dichromate.** $(BiO)_2.Cr_2O_7$ = 666.01. Orange-red crystals; insoluble in water or alkalis, soluble in acids. **b. fluoride** BiOF = 244.04. Bismuthoxyfluoride. White crystals, $d_{20°}$.7.55; insoluble in water, soluble in acids. **b. hydroxide.** (BiO)OH is basic bismuth hydroxide. **b. iodide** BiOI = 352.4. Bismuth oxyiodide. A white powder, insoluble in water, soluble in acids. **b. nitrate.** $(BiO)NO_3.H_2O$ = 305.03. Basic bismuth nitrate. The main constituent of bismuth subnitrate, *q.v.*

bismutite. Bismuthite.

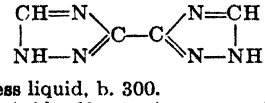
bismutosmaltite. Bismuthosmaltite.

bistetrazole. $C_2H_2N_8$ =138.3. Ditetrazyl. The heterocyclic system:



bistort. Snakeweed adderwort. The root of *Polygonum bistorte*, used as an astringent.

bistriazole. $C_4H_4N_6$ = 136.3. Ditriazolyl. The heterocyclic system:

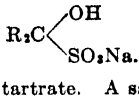


A colorless liquid, b. 300.

bisulfate. Acid sulfate. A compound containing the monovalent HSO_4— radical, derived from sulfuric acid.

bisulfide. Disulfide. A binary compound containing two atoms of sulfur.

bisulfite. Acid sulfite. An oxysalt containing the monovalent HSO_3— radical, derived from sulfurous acid. **b. compounds.** Addition compounds of sodium bisulfite and an aldehyde or ketone of the general formula



bitartrate. Acid tartrate. A salt containing the monovalent $C_4H_5O_6$—radical, derived from tartaric acid.

bithiophene. Thiophthene.

bitter. (1) See *bitters*. (2) An astringent taste, as that of quinine or magnesium sulfate. **b. almond oil.** An essential oil from the seeds of *Prunus amygdala amara*, bitter almond. A pale yellow or colorless liquid, d.1.038–1.060, $[\alpha]_D$ + 0°10′. Its chief constituents are benzaldehyde, hydrocyanic acid, phenoxyacetonitrile; used for flavoring. **b. almond oil camphor.** Benzoin. **b. apple.** Colocynth. **b. ash.** Quassia. **b. bark.** Cinchona. **b. cucumber.** Colocynth. **b. cups.** Colocynth. **b. damson.** Simaruba. **b. herb.** Erythraea. **b. principle.** A generic name indicating the bitter-tasting principle of a drug *e.g.*, due to alkaloids, resinoids, or glucosides. **b. root.** Gentian. **b. salt.** Magnesium sulfate. **b. spar.** A ferruginous dolomite. **b. stick.** Chirata. **b. wintergreen.** Chimaphila. **b. wood.** Quassia.

bittern. A waste liquid from the solar salt industry, which contains the magnesium salts and bromides from the sea water.

bitters. (1) A group of drugs which includes gentian, quassia etc. (2) Mineral waters characterised by a bitter or saline taste, (*e.g.* due to magnesium sulfate). (3) A medical preparation which contains the bitter principles of plants; as, Angostura b.

bittersweet. Dulcamara. **American-, false-** Waxwort. The root and bark of *Celastrus scandens*, a Celastraceae; used as diaphoretic. It contains celastrine.

bitumen. A group of native, solid or semisolid, hydrocarbons, such as naphtha or asphalt, soluble in carbon disulfide. They are rich in C and H, and burn with a sooty flame. Cf. *asphaltenes, carbenes, kerotenes, protobitumen.* **albino-** A petroleum resin. **asphaltic-** Asphalt. **b. elastic.** A variety of bitumen.

bituminous. Having the qualities of bitumen. **b. coal.** A coal which is rich in hydrocarbons and contains 50–80 %C. **b. materials.** The compounds and mixtures used for pavings and roofings; as, asphalt, shales, tars. **b. resins.** Dark red, transparent, fossil resins from brown coals, which contain 80 % of wax. Cf. *retinite resins.*

biurate. Acid urate. A salt of uric acid.

biurea. $C_2H_6N_4O_2$ = 118.08. The compound, $(NH_2.CO.NH—)_2$. Cf. *diurea.*

biuret. $C_2H_5O_2N_3.H_2O$ = 121.19. Allophanamide, allophanic acidamide, dicarbamylamine, carbamylurea, $NH_2.CO.NH.CO.NH_2$. Colorless needles, decomp. 190; soluble in hot water or alcohol. It is a condensation product of urea; used as a reagent. **acetyl-** $C_4H_7O_3N_3$ = 145.11. $MeCO.NH.CO.NH.CONH_2$. Colorless needles, m.193; soluble in water or alcohol.

b. reaction. Pitrowsky reaction. A test for the presence of peptides, proteins and amino-acids which contain the —CO.NH— group. To the solution add a drop of copper sulfate solution and potassium hydroxide; a violet color indicates the presence of b.

bivalence. The property of an element to combine with two univalent (or one divalent) atoms or radicals; as, ferrous, calcium, oxygen, etc.

bivalent. Any atom capable of combining with two univalent atoms or radicals. Cf. *divalent.*

bivinyl. C_4H_6 = 54.1. Erythrene, 1.3-butadiene*, vinyl ethylene, budiene, divinyl, pyrrolylene, $CH_2:CH.CH:CH_2$. A colorless gas, b. −3; used as an anesthetic. **2- methyl-** Isoprene.

Bixaceae, Bixineae. A group of trees and shrubs, some of which yield important drugs.

Gynocardia odorata.....	chaulmoogra seeds
	chaulmoogra oil
Bixa orellana.....	annatto.

bixin. $C_{25}H_{30}O_4$ = 394.2. $MeOOC(CH:CH.CMe:CH)_4CH:CH.COOH$. A dark red crystalline coloring matter from annatto, m.176; soluble in hot alcohol; used as a stain and dye.

bixol. $C_{18}H_{30}O$ = 262.3. $Me_2C{=}C.CH_2.(CMe{=}CHCH_2)_2.CH_2OH$. A dark green, oily alcohol from the seeds of *Bixa orellana*, d.0.8845, n.1.5078, with parsley taste.

Black, Joseph. 1728–1799. A Scotch chemist and physicist, noted as a pioneer in experimental research. He introduced the term "fixed air" for the gas (CO_2) given off from carbonates; opposed the phlogiston theory (q.v.); and developed the concept of latent heat.

black. A substance which reflects no colored rays of light; hence the absence of color. **b. alum.** A mixture of aluminum sulfate and activated carbon used in water treatment. **b. antimony.** Antimonic sulfide. **b. ash.** An impure sodium carbonate with some unburnt carbon and uncombustible mineral matter produced in the soda wood pulp recovery process. **b. balsam.** Peru balsam. **b. berry.** See *rubus.* **b. body.** A substance reflecting no light; that is a material which absorbs all radiant energy and transforms it into heat. Cf. *Stefan-Boltzmann equation.* **b. boy.** Grass tree gum. A resin from *Xanthorrhoea hastilis*, a Liliaceae, of Australia. Used as a varnish and sealing wax. **b. cobalt.** An earthy variety of native cobalt. **b. cohosh.** Cimicifuga. **b. copper.** Copper oxide. **b. damp.** Choke damp. **b. dogwood.** Frangula. **b. drops.** Opium vinegar. **b. dyes.** See *aniline black, chrome black, sedan black*, etc. **b. flux.** A reducing agent used in assaying; made by burning together 1 part of potassium carbonate and 3 parts of argol. **b. fish oil.** Malon oil. **b. haw.** *Viburnum prunifolium.* **b. hellebore** The rhizomes of *Helleborus niger;* which are used, as a fluid extract, as a cathartic or diuretic. **b. henbane.** Hyoscyamus. **b. indian hemp.** Apocynum. **b. jack.** Sphalerite. **b. lead.** (1) Plumbago. (2) Alquifou. **b. leg.** Anthrax. **b. lotion.** See *lotion.* **b. manganese.** Pyrolusite. **b. metal.** An electrolytic deposit in a black form of certain metals, *e.g.* platinum, palladium, etc. **b. mustard.** Sinapis nigra. **b. pigments.** See *bone black, graphite, ivory black, lamp black*, etc. **b. potassium.** Suint ash. **b. powder.** An explosive consisting of 62–75 % KNO_3, 10–19 % S, and 12–5 % charcoal. **b. precipitate.** Mercurous nitrate. **b. silver.** Stephanite. **b. stain.** Table top impregnation. **b. tellurium.** A native telluride, of gold and lead, (Pb, Au)-(Te.S). **b. tin.** Cassiterite. **b. willow bark.** The bark of *Salix nigra*, used in the form of fluid

extract as bitter tonic, anaphrodisiac and antiperiodic.

Blackmar oil thief. A device for taking oil samples from tank cars.

blackstrap. An inedible grade of molasses. A by-product of sugar refining used as a source of alcohol.

Blagden's law. The lowering of the freezing point of a solution is in proportion to the amount of dissolved substance present. Cf. *Raoult's law, Coppet's law.*

Blair oven. A drying oven used in iron analysis.

blairmorite. A rock containing 71 % analcite, found in Alberta (Canada).

Blaise reaction. A Grignard reaction (q.v.).

blanc fix(e). Synthetic barium sulfate produced by the action of barium chloride on aluminum sulfate; used as a pigment for coating paper.

blanch. A lead ore imbedded in rocks.

blanching liquor. A solution of calcium hypochlorite.

blangel. Silica gel used as a dehydrating agent, and impregnated with a cobalt salt to indicate by a color change whether it is in the hydrated or dehydrated state.

blast. (1) To smash to pieces by an explosive. (2) To subject a material to a hot firing. (3) A current of hot gases. (4) A nucleated red blood corpuscle. **b. burner.** A large blow-pipe or bunsen burner in which compressed air is blown into the flame. **b. furnace.** A smelting oven, with an air current, used for the manufacture of pig iron. **b. lamp.** B. burner.

blasting. The process of loosening natural deposits of rocks and other materials by explosives. **b. gelatin.** A high-explosive consisting of a 5–10 % solution of collodion cotton in nitroglycerin, (cf. *gelignite*). **b. oil.** Nitroglycerin. **b. powders.** Non-detonating explosives, deflagrating powder. The black granular powders used for mining and road building; as black powder.

blastokolin. The natural inhibitor to ripening occurring in apples. It is probably associated with maleic acid.

Blau gas. A fuel gas for airships produced by cracking gas-oil at 550–600°C. It consists of saturated paraffin hydrocarbons with some hydrogen and ethylene; its density equals that of air.

bleaching. (1) The whitening and removal of natural impurities from materials by chemical or physical agents; *e.g.*, chlorine or exposure to sunlight. (2) Decolorizing textile fibers or paper pulp with calcium hypochlorite or other bleaching materials. **b. materials.** A group of oxidizing or reducing agents; such as, sulfur dioxide, sodium acid sulfite, hydrogen peroxide, calcium hypochlorite, chlorine water or oxides of nitrogen. **b. powder.** Chloride of lime. A compound formed by passing chlorine gas over dry slaked lime. When fresh it is principally calcium oxychloride, but when it absorbs moisture it is converted into a mixture of calcium chloride and hypochlorite.

Bleeker method. A process for the reduction of vanadium compounds by electrolysis.

blende. (1) Sphalerite, or zinc blende. Cf. *Sidot's b.* (2) A sulfide ore; as, antimony b., manganese b. Cf. *glance.*

blennostasin. $C_{19}H_{22}ON_2 2HBr$ = 456.05. Cinchonidine dihydrobromide. Yellow crystals, used as a vasoconstrictor.

blick. The brightening of a noble metal during cupellation owing to adsorption of the outer layer of lead oxide.

blister steel. A steel of finely granulated texture. Cf. *cementation.*

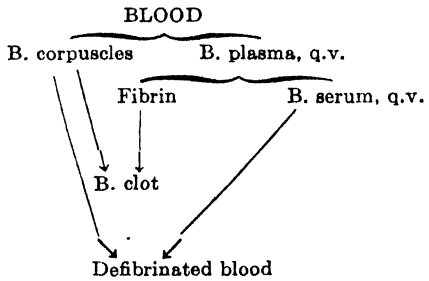
blistering beetle. Cantharides.

block tin. An alloy of tin with iron, cobalt, lead, antimony and arsenic.

blodite, bloedite, blödit. Astrakanite.

Blondlot rays. n-*Rays.*

blood. A fluid that circulates in vertebrates through the heart, arteries and veins, and supplies nutritive materials to all parts of the organism. A red, homogeneous liquid, d. 1.045–1.075, Δ of freezing point −0.56°C, pH = 7.35, constituting $\frac{1}{13}$ of the body weight and containing 2.2 % solids and 98 % water in an extremely delicately adjusted equilibrium of salts, proteins, enzymes and organised particles (b. corpuscles):



The functions of blood are:

1. It carries nutritive materials from the intestines to all cells and tissues of the organism, and oxygen from the lungs to the tissues.

2. It removes the waste products from the tissues, and carries them to the kidneys, lungs, intestines or skin.

3. It provides for metabolic co-ordination of the body by the distribution of internal secretions from one organ to another.

4. It plays an important rôle in the defense of an organism against infection, (by equalizing temperature changes), and in maintaining the isotonic condition of the organism.

TRANSPORT OF MATTER AND HEAT BY MEANS OF THE BLOOD

Gain	*Organ*	*Loss*
oxygen	lungs	carbon dioxide, water, heat
	kidneys	urea, salts, water
	skin	salts, water, heat
carbohydrates	liver	carbohydrates
heat, waste-matter	tissues	glucose, proteins, fat and oxygen
heat, glucose, amino-acids, fat, etc	intestines	
lymph, salts	lymphatics	

Cf. *porphin, fibrin, hemoglobin, respiration, immunity.* **arterial-** Bright-red b. rich in oxygen or oxy-hemoglobin. **beaten-** Defibrinated b. **clotted-** A thick, semi-solid mass consisting of blood corpuscles imbedded in a network of precipitated fibrin. **defibrinated-** A red homogeneous liquid, consisting of blood corpuscles and serum. **dried-** The collected b. of slaughtered animals dried and ground for use as a fertilizer. It should contain not less than 12 % N in organic form. **venous-** Dark-

red b., rich in carbon dioxide or reduced hemoglobin. Cf. *b. gases.*

b. alkalinity. The buffer quality of blood. Blood is nearly neutral (pH = 7), but it can neutralize large quantities of acids because of its dissolved sodium carbonate, sodium bicarbonate, and sodium biphosphate (see *buffer solution*). **b. amylase.** An enzyme of the blood converting glycogen or starch to a reducing sugar. **b. analysis.** The microscopical or chemical examination of blood. **b. apparatus.** A device for determining the O_2 and CO_2 content of the blood. **b. capsules.** Wright's capsules. A glass tube drawn out to capillaries, one which it bent backward and used for taking blood samples for microscopical examination. **b. cast.** The blood fibres observed in urine by microscopic examination. **b. clot.** A clump of coagulated blood, which contains the fibrin and blood corpuscles. **b. collector.** Keidel's blood collector. An evacuated ampule with which blood is withdrawn for blood tests. **b. count.** The determination of the number of blood cells in a definite volume of blood. **b. composition.** Blood consists of a liquid (plasma, q.v.) and cellular elements. The plasma contains the serum (q.v.) and fibrinogen; the cellular elements are the red and white blood corpuscles and the blood plates. The main constituents of the serum are albumin, globulin, glucose and salts. The red blood corpuscles contain the oxyhemoglobin, lecithin and some salts, while the fibrin ferment is in the white blood corpuscles. **b. crystals.** Hemin. **b. elder,** Ebul. **b. enzymes.** The enzymes or ferments of the blood; as, amylase, invertin, glycolytic enzymes, proteolytic enzymes, cholesterases and lipases. **b. gases.** The gases of the blood are: carbon dioxide, oxygen and nitrogen. *E.g.*, an analysis of the blood of cats shows:

10 cc. of.....	CO_2	O_2	N_2
arterial blood..	25.07 cc.	13.60 cc.	1.00 cc.
venous blood..	40.83 cc.	9.93 cc.	0.77 cc.

b. glycolysis. The power of the blood plasma to break down glucose into decomposition products, the nature of which is uncertain. **b. hemoglobin.** The coloring matter or chromoprotein of blood (see *hemoglobin*) which breaks down to hematin and hemin (q.v.) and these, in turn, to hematoporphyrin (q.v.) which is isomeric with bilirubin. **b. hydrogen ion concentration.** The mean value at 18°C is 6×10^{-8}–2×10^{-8}, corresponding with pH = 7.2–7.7; hence, b. is weakly alkaline. **b. osmotic pressure.** 7.3 atmos. (freezing point method). **b. pigment.** Hemoglobin. Cf. *cytochrome.* **b. plasma.** The liquid portion of the blood. 1000 grams of blood plasma contain:

water	901.51 gm.
solids	98.49 gm.
These solids are:	
albumin	81.92 gm.
salt	8.51 gm.
fibrin	8.06 gm.
The salts are:	
sodium chloride	5.546 gm.
sodium carbonate	1.532 gm.
calcium phosphate	0.298 gm.
potassium chloride	0.359 gm.
potassium sulfate	0.281 gm.
sodium phosphate	0.271 gm.
magnesium phosphate	0.218 gm.

b. platelets. Thrombocytes. A structural element of the blood containing cytozyme which is essential in stopping bleeding by coagulating the blood. It is a commercial product (*e.g.*, Coagulen Ciba). **b. root.** Sanguinaria. **b. serum.** The liquid portion of the blood, from which the fibrin is removed, d.1.0292, osmotic pressure 6.6 atmos.

1000 grams of serum contain:

water	908.84 gm.
solids	91.16 gm.
The solids are:	
albumin etc	82.59 gm
salts	8.57 gm.
The salts are:	
sodium chloride	5.591 gm.
sodium carbonate	1.545 gm.
potassium chloride	0.362 gm.
calcium phosphate	0.300 gm.
potassium sulfate	0.283 gm.
sodium phosphate	0.273 gm.
magnesium phosphate	0.220 gm.

b. serum, artificial. Loeffler's mixture. A culture medium which consists of 250 cc. glucose bouillon, 750 cc. horse or beef serum. **b. sugar.** The carbohydrates of the b.; as, glucose. **b. stone.** (1) Hematite. (2) Jasper.

bloom. (1) The fluorescence of lubricating oils. (2) The delicate coating which covers fresh fruit or leaves. (3) The cloudy appearance produced by aging on the surface of varnish on pictures; as mastic varnish. (4) The appearance of a gray or white, fluffy film on a material. (5) The crystallization of a component on the surface of a material; as, on chocolate, where fat or sugar may form a b.

blowpipe. (1) A metal tube tapering to a fine point, straight or bent at a right angle. It is used to blow air into a flame and to direct it as a fine conical tongue on the particles to be heated in qualitative, mineralogical or preliminary analysis, soldering or melting in dentistry, or jewelry manufacture. (2) A blast burner. **b. analysis.** The methods of detecting qualitatively the composition of minerals, alloys, or inorganic materials by observing their behavior in the bunsen flame, and performing flame test, bead test, and reactions on charcoal or plaster of Paris with the aid of the blowpipe.

SYSTEMATIC BLOWPIPE ANALYSIS

Group I. Substance is tested upon charcoal in the oxidizing flame:

A. White, glowing, non-fusing mass.
  1. Dissolve in a few drops HCl and make flame test
     orange ..... calcium
     red ..... strontium
     green ..... barium
  2. Moisten the hot mass with a drop of cobalt nitrate solution and expose again to oxidizing flame.
     rose colored mass ..... magnesium
     blue colored mass ..... aluminum
     green colored mass ..... zinc

B. Dark metallic mass or dark metallic granules. Scrape off charcoal and powder.
  1. Particles are attracted by magnet. Perform bead test
     brown ..... iron or nickel
     blue ..... cobalt

a. Dissolve a particle in HCl and moisten filterpaper impregnated with $K_4Fe(CN)_6$:
blue..... iron

2. Particles are not magnetic. Perform bead test:
green..... copper or chromium
purple..... manganese

b. Part of the material is mixed with KNO_3 and Na_2CO_3 and melted on platinum foil:
yellow flux..... chromium
green flux..manganese (and chromium)
If green, moisten with water, dry with filterpaper and add a drop of $AgNO_3$:
red spot..... chromium

c. Dissolve in conc. HCl, filter, and add NH_4OH:
blue color..... copper

C. Fused mass which runs into the charcoal. Perform flame test:
yellow..... sodium
lilac..... potassium

Group II. Substance is mixed with sodium carbonate and tested on charcoal.

A. Formation of a white smoke with a white coat or sublimate, or only a white sublimate:
odorless smoke..... antimony
smoke of garlic-like odor..... arsenic
white sublimate..... tin

B. Formation of colored coats or sublimates with or without metallic buttons or globuli:
orange-yellow sublimate..... cadmium
brown sublimate with white edge. bismuth
white sublimate, becoming green if moistened with cobalt nitrate solution and heated..... zinc
yellow sublimate with metallic globulus..... lead

C. No sublimate, only metallic globules:
white..... silver
yellow..... gold

Group III. Substance is heated in the bottom of a dry glass tube:

A. White sublimate: ammonium salts, mercury

1. Mixed with sodium carbonate and heated
ammonia odor..... ammonium salts
gray sublimate..... mercury

B. Yellow sublimate..... sulfur or sulfides

Group IV. Substance is mixed with potassium bisulfate and heated at the bottom of a glass tube:

A. Colorless vapors: sulfites, chlorides, fluorides

1. White fumes with glass rod moistened with ammonia..... hydrochloric acid
2. attacking the glass.... hydrofluoric acid

B. Green vapors..... chlorine, chlorates
C. Brown vapors..... bromine, bromides
D. Purple vapor..... iodine, iodides

Group V.

A. Heated with copper powder in glass tube:
brown vapor..... nitrates, nitrites

B. Heated in glass tube, alcohol added:
acetic ether odor..... acetates

C. Powdered substance moistened and burned on magnesium-ribbon:
PH_3-odor on moistening..... phosphorus

blown oils. Polymerized oils, oxidized oils. Any oil, as, linseed, grapeseed or fish oil, which has been oxidized by passing through it a stream of air, thereby converting it into a fast drying oil; used for paints and varnishes.

Bloxam, Charles. 1831–1887. An English analytical chemist noted for his writings.

blubber oil. Whale oil.

blue. A color of the spectrum of shorter wavelength than green, but longer than violet (wave-length, 0.000047 cm.). Egyptian- native copper aluminate.

b. cohosh. Caulophyllum. **b. copper.** A native amorphous form of copper sulfide, CuS. **b. copperas.** Copper sulfate. **b. cross.** Ph_2AsCl. Diphenyl chlorarsine, D.A. A nose irritant, m.39, used as a poison gas in warfare. **b. dyes.** See *alizarin b., alkali b., anthracene b., basic b., cyanin b., methyl b., methylene b.*, etc. **b. gum.** Eucalyptus. **b. iron ore.** Vivianite. **b. john.** A native, crystalline copper sulfate with fluorspar. **b. mass.** Mercury ointment. **b. pigments.** See *Chinese b., cobalt b., copper b. indigo, prussian b., smalt, Turnbull's b., ultramarine.* **b. print.** A photographic copy made on ferri-ferrocyanide paper and fixed by washing with water. **b. powder.** Zinc dust. **b. salt.** Crystallised *nickel sulfate.* **b. stone.** A native, crystalline copper sulfate. Cf. *b. john.* **b. unit.** A method of expressing the vitamin A potency of a substance in terms of the intensity of the blue color produced with antimony trichloride. Cf. *Carr-Price value.* **b. verdigris.** Copper acetate. **b. verditer.** Basic *copper carbonate.* **b. vitriol.** (1) Chalcanthite, a native copper sulfate. (2) Crystallized copper sulfate.

blushing. The turbidity of lacquers and varnishes due to the precipitation of the resins in the solution, caused either by moisture or evaporation of the solvent. Cf. *bloom* (3).

board foot. A measure of the volume of boards sawn from logs. It is the volume of a board 1 in. thick and 1 sq. ft. in area, *i.e.*, one twelfth of a cu. ft. Cf., *cunit, cord, fastmeter.*

Board of Trade unit. B.T.U. The British unit of electrical energy. 1 B.T.U. = 1 kilowatt hour = 3.6×10^6 watt-secs. (Cf. *British Thermal Unit* = B.Th.U.)

boart. Bort.

Boas reagent. A solution of 5 gm. resorcinol and 3 gm. sugar in 100 gm. dilute alcohol. **B. test.** A test for hydrochloric acid in gastric juice. A rose-red color develops on boiling with B. reagent.

boat. A small elongated vessel of porcelain, quartz, or platinum which can be inserted in a combustion tube. It is used in organic analysis.

bobierite. A native, hydrous magnesium phosphate, $Mg_2P_2O_7.8H_2O$, which occurs in guano as light colored crystals.

B.O.D. Biochemical oxygen demand.

bodies. (1) A group of biochemical substances which have a similar structure. (2) A group of cellular structures or definitely shaped substances found in the protoplasm. **acetone-** Substances such as acetone, aceto-acetic acid, or β-oxybutyric acid, when found in urine. **alloxur-** A compound of uric acid and alloxan, secreted in the urine; as, the purine bodies. **Buchner-** Any defensive protein of the organism. **purine-** Any derivative of uric acid; as xanthine, guanine, adenine, etc.

body. (1) The trunk of an animal or plant. (2) The largest part of an organ. (3) The consistency or viscosity of a liquid. (4) A limited portion of matter. (5) The strength of a liquid; as, wine. **black-** See *Stefan-Boltzmann equation, black body.* **b. fluids.** See blood, lymph and

internal secretions. **b. tube.** The portion of the microscope which carries the objective, and inside which slides the draw-tube.

boehmite. A form of bauxite, Al_2O_3,H_2O.

Boerhaave, Herman. 1668–1738. A Dutch scientist and pioneer of modern chemistry, noted for his famous textbook.

bog. A marsh or morass. **b. berry.** The fruit of *Vaccinium oxyoccus*, or cranberry. **b. butter.** Butyrelite. A soft mineral occurring in marshes. **b. iron ore.** Bogore. **b. manganese.** Wad. **b. ore.** Bogore.

Bogert, Marston Taylor. 1868– . An American chemist, noted for his research in synthetic organic chemistry.

boghead. A carbonaceous rock, or cannel with a high ash content; consisting chiefly of iron carbonate. **b. naphtha.** Photogen.

bogiron ore. Bogore.

bog-manganese. Wad.

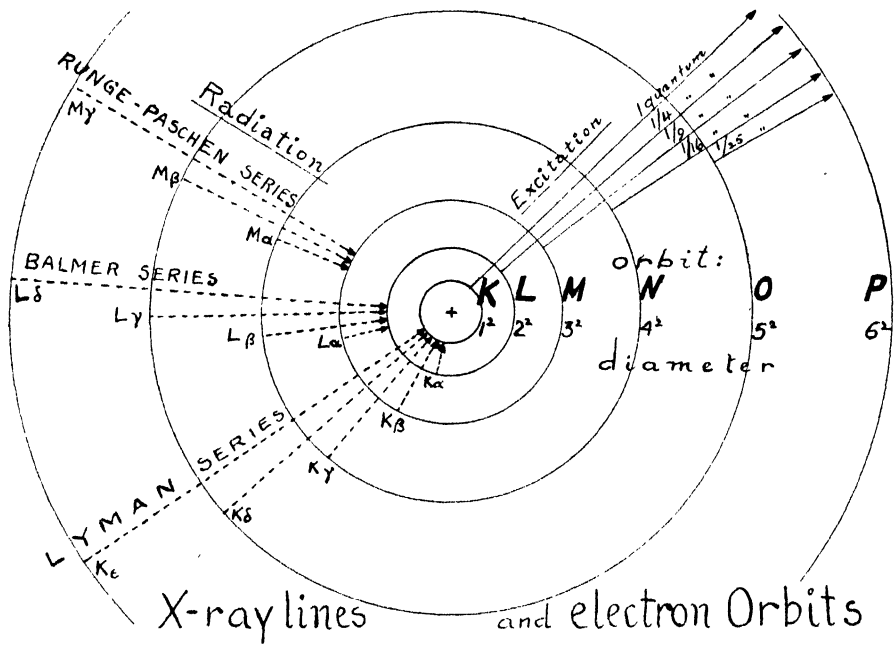
bogore. Bogiron ore, marsh ore, brown iron ore, brown hematite, brown ocher, limonite. A hydrous ferric oxide, $2Fe_2O_3.3H_2O$, with some ferrous carbonate, from marshy places, a source of iron.

bohemium. Bo. The element, atomic number 75, claimed to be discovered by the Bohemian scientists J. Heyrowsky and Doleysek (1925), as an impurity in magnesium. It appears to be identical with the rhenium previously discovered by Naddack, Tacke and Berg.

Bohr, Niels. 1885– . A Danish physicist, and Nobel prize winner (1922), noted for his theory of atomic structure. **B. atom.** A hypothesis of atomic structure (q.v.) which assumes that the electrons move in circular or elliptical orbits around a positive nucleus, resembling an infinitesimally small solar system. **B. and Coster notation.** See *quantum numbers*. **B. formula.** An expression which connects the quantum theory with that of spectrum lines. For the hydrogen series, $N = [2\pi^2me^4(M + m)]/Mh^3$, where e = charge and m = mass of an electron, M = atomic weight of hydrogen and h = Planck's constant. The value of N is 109,678.7. **B. formula for Rydberg's constant.** An equation relating the constants e/m, e, h and c as derived from B. theory:

$$R_\infty = [2\pi^2e^5]/[h^3c^2e/m]$$

Cf. *Lewis-Adams formula, constants*. **B's. theory.** Spectrum lines are produced (1) by emission of radiation (energy) when electrons drop from an orbit of greater to lower energy (energy levels); or (2) by absorption of radiation (energy) when the electrons move from an orbit of lower to higher energy. Cf. *quantum, spectrum series, Stoner quanta, correspondence principle*. See figure.



Bohr theory.

boiled. Describing a liquid which has been made to boil. **b. oil.** A linseed oil which has been heated to 210–260°C, and thereby hardens more readily; used in varnishes and lacquers.

boiler. An open or closed vessel for evaporating liquids, cooking food, or generating steam. **vacuum-** A closed vessel in which evaporation of a liquid is caused by low pressure, with or without the application of heat.

b. compound. A substance used to prevent the formation of b. scale. Cf. *water softening*. **b. fluid.** A solution which prevents the formation of a compact b. incrustation. **b. incrustation.** The insoluble mass deposited on the bottom and sides of a vessel in which hard water

has been evaporated. It consists of calcium and magnesium carbonates and sulfates. **b. mud.** A loose deposit of b. incrustations. **b. scale.** A compact and thick layer of successive deposits. **b. stone.** B. scale.

boilers. A group name for nitrocellulose and lacquer solvents (q.v.), arranged in order of their boiling points: **low-** b. below 100°C. **medium-** b. near 125°C. **high-** b. from 150–200°C.

boiling. The state of ebullition or the brisk change from the liquid to the vapor state. **b. point.** B.p., b. The temperature at which, under atmospheric or any other specified pressure, a liquid is transformed into a vapor; *i.e.*, the temperature at which the vapor pressure of the liquid equals the pressure of the surrounding gas or vapor. The temperature of the reverse phenomenon is the condensation point. Cf. *Clapeyron equation.* **absolute b. point.** The b. on the absolute scale; *e.g.*, x°C + 273 = (x + 273)°A. **b.p. apparatus.** A device for determining the boiling point of a liquid under a definite pressure. **lowering of b.p.** A decrease in pressure lowers the boiling point; *e.g.*, by lowering the pressure 10 mm. water will boil 0.37°C lower. **b.p. elevation.** The presence of a dissolved substance raises the boiling point of a liquid, and the rise is a function of its molecular weight. Hence a method of determination of the latter. Cf. *Raoult's Law, Beckmann's apparatus.*

Boisbaudran, Paul Émile Lecoq de. 1838–1912. A French scientist, noted as discoverer of gallium, samarium and dysprosium.

boldine. $C_{19}H_{21}NO_4$ = 327.17. An alkaloid from the leaves of *Peumus boldus* (Monimiaceae). A grayish-white powder, insoluble in water, soluble in alcohol, ether, or chloroform. Used as a hypnotic and in hepatic and biliary disorders. Cf. *laurotetanine.* **b. hydrobromide.** $C_{19}H_{21}NO_4.HBr$ = 621.34. White crystals, soluble in water; used as a hypnotic and local anesthetic.

boldo. The dried leaves of *Peumus boldus*, a Chilean tree (Monimiaceae). It is a tonic, antirheumatic and antipyretic.

boldoglucin. $C_{30}H_{50}O_8$ = 541.5. A glucoside from the leaves of *Peumus boldus.* A thick syrupy liquid, used as a narcotic and hypnotic.

bole. (1) A fine clay, coloured by the presence of iron. (2) The trunk or stem of a tree. (3) A measure of corn; equals 6 bushels. **red-** Ocher. **white-** Kaolin.

boleite. A native hydrous oxychloride of lead, silver, and copper, which occurs in blue crystalline masses at Boleo, Lower California.

Boletus. A genus of Fungi or mushrooms belonging to the Basidiomycetes.

Bologna phosphorus. Luminescent barium sulfide.

bolometer. A device for measuring minute quantities of radiant heat by registering the change in the conductivity of a black body; used in spectroscopy.

bolting cloth. A fabric of unsized silk, used for making sieves.

boltonite. Mg_2SiO_4. A native magnesium silicate. A variety of fosterite.

Boltzmann's constant. $k = 1.372 \times 10^{-16}$ erg/°C. The gas constant, R, expressed per molecule. If m is the number of molecules, R = PV/Tm. **B. equation.** See *molecular free path.* **B's law.** The law of the equipartition of energy: The total kinetic energy of a system, due to translation, rotation, vibration, etc., is equally divided between all the degrees of freedom. The energy per degree of freedom is $\frac{1}{2}RT$ per gram molecule.

bolus. (1) Masticated food ready to be swallowed. (2) Kaolin.

bomb. (1) A projectile of iron or steel filled with explosive, poisonous, or incendiary substances, and used in chemical warfare. (2) A heavy iron tube filled with a substance which is to be oxidized for the determination of its heating value. (3) Radium in concentrated form (1–5 gm. units) used for intensive local treatment, e.g. of cancer. **b. calorimeter.** See *calorimeter.*

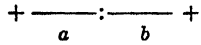
bombard. To expose to the rays of radioactive substances, or to converging cathode rays.

bombardment. Exposure to the rays of radioactive substances; *e.g.*, the exposure to cathode rays focused on a point as in the X-ray tube; or the hitting of the atomic nuclei by high speed α-particles and the disruption of the hydrogen sub-atoms composing it (Rutherford).

bombiosterol. $C_{27}H_{46}O$ = 386.32. A sterol, m.-148, $[\alpha]_D$ −34.9°, in chrysalis oil.

bonanza. A rich vein of ore.

bond. The linkage between atoms thought to consist of an electron-pair rotating between two kernels and forming an electro-magnetic vector along axis *ab*:

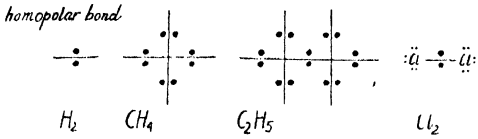


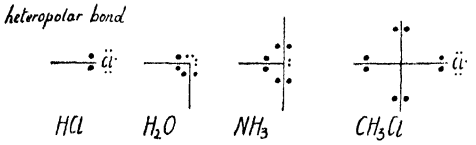
The nature of the atoms will give the following types:

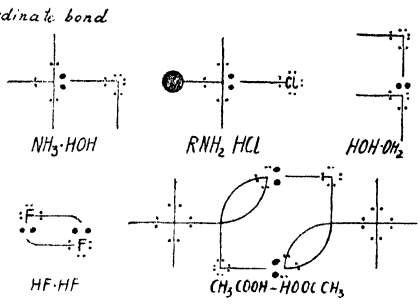
I. *Atomic b.* Each atom contributes one electron,
   1. *homopolar b.* **(nonpolar).** The electron-pair is held equally by both kernels, neither of which becomes negative with respect to the other, a = b; as in H_2, Cl_2, CH_4 etc.
   2. *heteropolar b.* **(polar).** The electron-pair is held unequally, hence one kernel becomes negative and the other positive, a > b; as in HCl, H_2O etc.

II. *Molecular b.* One atom contributes both electrons,
   3. *coordinate* b. **(semipolar).** An unshared electron-pair of an octet on a kernel (like N, O, F etc) is shared by a kernel having an incomplete octet (generally H, also Li, Be, B etc.).

These three types of b. are illustrated by *electronic* structure symbols in which the heavy type dots represent the electrons of the particular b.; their distances on the lines are a measure of the force shared by each kernel, thus:







Cf. *valence, linkage, associated* and *normal liquids, combination, compounds, atomic radius, molecular diagram, chelate.*

bondu. A corrosion-resisting aluminum alloy containing 2–4 % Cu, 0.3–0.6 % Mn and 0.5–0.9 % Mg. Cf. *acieral, aerometal.*

bonducin. $C_{14}H_{15}O_5$ = 263.1. A bitter principle of bonduc seeds, *Caesalpinia crista*, a Leguminosae. A white bitter powder, insoluble in water; used as a febrifuge.

bone. The skeletal material of the vertebrates. **b. ash.** An impure calcium phosphate. The remains of burnt animal bones, used as fertilizers, contain 35–38 % P_2O_5. **b. black.** A charcoal made from bones and blood which is usually impure; used to refine sugar, oil, etc. **b. earth.** B. ash. **b. meal.** Finely ground animal bones used as fertilizer; it contains 3.3–4.1 % N, 20–25 % P_2O_5. *steamed-* Finely-ground bones, which have been previously steamed under pressure to remove the glue. They contain 1.6–2.5 % N, 25 % P_2O_5. **b. oil.** Animal oil, Dippel's oil. A tarry oil obtained by dry distillation of bones, d.0.900–0.980; soluble in water. The chief constituent is pyridine. Used as an insecticide and in organic synthesis; a popular panacea for many disorders. **b. phosphate.** Calcium phosphate. **b. tallow.** Soft grease obtained by boiling fresh bones; used to make cheap soaps. **b. turquoise.** Fossil bones, or teeth colored with $Fe_2P_2O_8$. **b. wax.** See *wax.*

bongkrekik acid. The compound $C_{12}H_{18}O_3$, produced by the action of certain bacteria on coconuts.

boost. To overload or place an excessive strain on an engine, or when charging an accumulator.

Boot density bottle. A specific gravity bottle containing about 5 cc. and having double walls with a vacuum between. Used for determining specific gravities at constant temperatures.

boracic acid. Boric acid.

boracite. $Mg_7Cl_2B_{16}O_{30}$. A native magnesium chloro-borate which occurs in white transparent isometric crystals at Stassfurt; hardness 7, d.2.9–3.

boracium. The original name of boron (Davy).

Boraginaceae. Borage family, a group of herbs, some of which yield drugs.

Alkanna tinctoria	alkanet, alkannin
Symphytum officinale	comfrey
Borago officinalis	borage
Pulmonaria officinalis	lungwort

boral. Aluminum borotartrate; used as an antiseptic and astringent.

borane. Boron hydride.

borate. A salt of boric acid. **bi-** Acid borate. **A** salt of the type MH_2BO_3. **di-** Pyro-b. **hypo-** A salt of the type MH_3BO. **meta-** A salt containing the monovalent $—BO_2$ radical. **ortho-** Borate. **per-** A salt containing the monovalent $—BO_3$ radical. **pyro-** A salt containing the divalent $>B_4O_7$ radical. **tetra-** Pyro-.

boratto. A silk and wool fabric.

borax. $Na_2B_4O_7.10H_2O$. Zala, tinkal. A native sodium tetraborate, found in California, Nevada, Oregon and Asia Minor; used as cleaning agent, antiseptic, flux, etc. **b. bead.** A crystal of borax melted in the loop of a platinum wire until it is transparent. It is colored by metallic oxides; see *blowpipe analysis.* **b. carmine.** See *Grenacher stain, Nikiforoff stain.* **b. glass.** (1) Fused borax, used as a flux. (2) See *glass.* **b. methylene-blue.** Sahli stain.

Bordeaux B. Acid Bordeaux, α-naphthalene-azo-β-naphthol-3.6-disulfonic acid. An indicator for pH range 10.5 (pink) to 12.5 (orange). **B. colors.** A group of artificial coloring matters for foodstuffs. **B. mixture.** (1) A mixture of equal weights of copper sulfate and lime in water; (2) a solution of copper arsenate and phenols. Used as insecticides.

Bordet test. An agglutination test for the differentiation of human and animal bloods.

borethyl. Triethyl borine.

boric acid. H_3BO_3 = 62.9. Boracic acid, fumarole acid, $B(OH)_3$. Triclinic white crystals, $d_{15°}$1.4347, m.185, soluble in water, alcohol or glycerin. Used as a reagent, and in the manufacture of borates. It is found in the volcanic lagoons of Toscana. **meta-** HBO_2. **ortho-** B. acid. **per-** HBO_3. **pyro-** $H_2B_4O_7$. **benzyl-** $C_7H_7B(OH)_2$ = 135.89. Benzylboron dihydroxide. White crystals, m.161. **ethyl-** $C_2H_4B(OH)_2$ = 73.87. Ethylboron dihydroxide. Colorless crystals, subliming 40.

borickite. Anhydrous phosphate of iron.

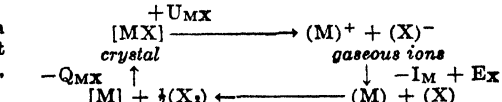
boride. A binary compound of negative boron with a more positive element or radical of the type, M_3B or BR_3.

borine. A compound of boron with an acyl or aryl radical, BR_3. **triethyl-** Borethyl. BEt_3. A colorless liquid, b.95. **trimethyl-** Bormethyl. BMe_3. Cf. *methyl borate, ethyl borate.* **triphenyl-** Borphenyl, BPh_3.

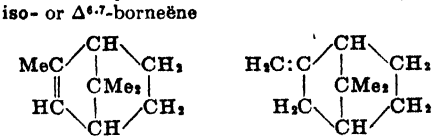
borium. Boron.

bormethyl. Trimethyl *borine.*

Born-Haber cycle. The relationship of U = lattice energy of crystals, I = ionization potential, E = electron affinity, S = heat of sublimation, D = heat of dissociation and Q = chemical heat of formation, can be expressed by the diagram:

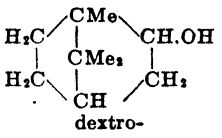


borneene. $C_{10}H_{16}$ = 136.18. **n-** or $\Delta^{5,6}$-borneëne. A hydrocarbon isomeric with bornylene. **iso-** or $\Delta^{6,7}$-borneëne

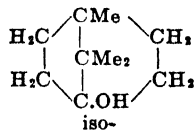


borneo-camphor. d-Borneol. **b. tallow.** See *tallow.*

borneol. $C_{10}H_{18}O$ = 154.20. d- Camphyl alcohol, borneo-camphor, baras camphor, sumatras camphor, bornyl alcohol, 2-hydroxy-camphane, 2-camphanol,



dextro-



iso-

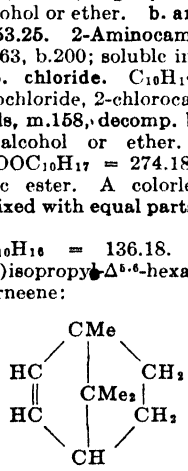
A terpene from *Dryobalanops camphora*, or prepared synthetically. Transparent hexagonal leaflets, m.203, b.212, d.1.011; very slightly soluble in water, soluble in alcohol or ether. **epi-** Epiborneol. **iso-** 4-Hydroxycamphane. Transparent crystals, d.1.011, m.210. Used in perfumery, celluloid manufacture, and medicinally, as an antiseptic and stimulant. **b. acetate.** Bornyl acetate. **b. salicylate.** Bornyl salicylate. **b. valerate.** Gynoval.

bornesitol. Quebrachitol.

bornite. $FeS.2Cu_2S.CuS$. Peacock copper, **purple copper.** A native copper iron sulfide, which occurs in reddish-brown brittle, isometric crystals, d.5.0.

bornyl. The monovalent $—C_{10}H_{17}$ radical derived from borneol by removing the hydroxyl-group. **b. acetate.** $MeCOOC_{10}H_{17}$ = 196.22. d-Borneol acetic ester. Colorless crystals, d.0.985, m.29, b.223; slightly soluble in water, soluble in alcohol or ether. **b. amine.** $C_{10}H_{17}.NH_2$ = 153.25. 2-Aminocamphane. White crystals, m.163, b.200; soluble in water, alcohol or ether. **b. chloride.** $C_{10}H_{17}Cl$ = 172.65. Pinene hydrochloride, 2-chlorocamphane. Colorless crystals, m.158, decomp. by water at 49; soluble in alcohol or ether. **b. salicylate.** $C_6H_4(OH)COOC_{10}H_{17}$ = 274.18. Salit, d-borneol salicylic ester. A colorless solid, used externally mixed with equal parts of olive oil, for rheumatism.

bornylene. $C_{10}H_{16}$ = 136.18. $\Delta^{5,6}$-camphane, 1-methyl-1(4)isopropyl-$\Delta^{5,6}$-hexamethylene, an isomer of borneene:



Colorless crystals, m.113, b.149; insoluble in water, soluble in alcohol or ether.

bornyval. Gynoval.

borobutane. See *boron hydrides.*

borocaine. $C_{13}H_{20}O_2N_2.5HBO_2$. Ethocaine borate. White crystalline powder, used as antiseptic.

borocalcite. $CaB_4O_7.4H_2O$. Bechilite. A native calcium borate.

borofluohydric acid. Borofluoric acid.

borofluoric acid. HBF_4 = 88.01. Hydroborofluoric acid, fluoboric, borofluohydric acid. Colorless liquid, b.130, miscible with water.

borofluoride. Fluoboride. A salt of borofluoric acid containing the monovalent $BF_4—$ radical.

borofluorin. A mixture of boric acid, benzoic acid, sodium fluoride and formaldehyde, used as an antiseptic and germicide.

boroglyceride. Glyceryl borate. An antiseptic paste of boric acid and glycerin.

borol. Sodium and potassium borosulfate. Colorless transparent masses; soluble in water. Used as a disinfectant and antiseptic.

borolon. An artificial aluminum oxide forming white or brownish-red, crystalline masses, d.3.9–4.0, obtained by fusing bauxite and used as abrasive, refractory or filtering material.

boron. B = 10.82. A metal of the aluminum group, atomic number 5, and analogous to carbon. It occurs in three modifications:

(a) *Crystalline* b. Colorless tetragonal crystals of great hardness; d.2.51, sometimes variously colored by impurities; insoluble in acids, and alkalis, and slowly soluble in molten alkali carbonates and oxides.

(b) *Amorphous* b. Grayish powder, d.2.45, m. above 2000, b. about 3500; when heated in air it burns at about 700; insoluble in water and alkalis, soluble in acids (decomp.).

(c) *Adamantine* b. Clear and colorless, or brown crystals having the crystal shape of diamond; a variety of crystalline boron. Boron occurs widely distributed in small quantities in several silicates (tourmaline) and as borates (borax, colemanite, sassolite, ulexite), and is also found in many alkaline lakes (California, Thibet). Boron is trivalent and forms only one series of compounds.

boron x-ides	BX_3
borates	$B(OM)_3$
borines	BR_3
boranes	B_xH_y

B. was discovered in 1807 independently by Davy and Gay-Lussac and Thenard. Crystalline b. was first prepared by Woehler in 1856. Metallic b. is used as a catalyst in various industrial processes.

b. alkyls. See *borines.* **b. bromide.** BBr_3 = 250.8. B. tribromide. A colorless, fuming liquid, d.2.69, m. −45, b.90, decomp. by water or alcohol. **b. carbide** B_4C = 76.92. Black crystals, d.2.51; m.2350, insoluble in water or alcohol. **b. chloride** BCl_3 = 117.2. B. trichloride. A colorless liquid, d.1.434, m. −107, b.18, decomp. by water or alcohol. **b. fluoride** BF_3 = 67.82. B. trifluoride. A colorless gas, $d_{(air=1)}$2.3, m. −127, b. −101. **b. hydrides** BH_3 = 13.84 or B_2H_4 = 27.7. Borane, boroethane. A colorless gas, m. −169, b. −87, decomp. by alcohol. B_2H_6 only is known; BH_3 is analogous to CH_3. Boron forms numerous other hydrides (hydroborons); as, B_4H_{10} (borobutane), $B_{10}H_{14}$ (borodecane), analogous to the hydrocarbons and silanes. **b. hydroxide.** Boric acid. **b. iodide** BI_3 = 391.8. B. triiodide. Colorless crystalline scales, d.3.3, m.43°C, b.210, decomp. by water, soluble in chloroform or carbon disulfide. **b. minerals.** Boron is a main constituent of several silicates; as, tourmaline and datolite. It occurs in saline deposits and is obtained from

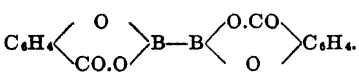
borax	$Na_2B_4O_7.10H_2O$
rasorite	$Na_2B_4O_7.4H_2O$
ulexite	$NaCaB_5O_9$ or $Na_2B_4O_7$, $Ca_2B_6O_{11}$, $16H_2O$
borocalcite	CaB_4O_7, $4H_2O$
colemanite	$Ca_2B_6O_{11}$, $5H_2O$
sassolite	H_3BO_3
pinnoite	MgB_2O_4
boracite	$2Mg_3B_8O_{15}$, $MgCl_2$

b. nitride. BN = 24.8. A colorless, infusible, crystalline powder, insoluble in acids or alkalis (decomp. by hydrofluoric acid). **b. oxide** B_2O_3 = 69.64. A colorless powder, d.1.83, m.577, slightly soluble in water or alcohol, readily soluble in acids. **b. phosphide.** BP = 42.0. A red powder, which burns at 200; it is insoluble in water, alcohol, or ether. **b. sulfide** B_2S_3 = 117.83. B. trisulfide. Colorless crystals, d.1.55, m.310, decomp. in water. **(penta-)** B_2S_5 = 182.3. Colorless crystals, d.1.85, m.390. **b. tribromide.** B. bromide. **b. trichloride.** B. chloride. **b. triethoxy-** Ethyl borate. **b. triethyl-** Borine. **b. trimethoxy-** Methyl borate. **b. trimethyl-** Borine. **b. trisulfide.** B. sulfide.

boronatrocalcite. Ulexite.

borophenylic acid. Phenylboric acid. A mixture of phenylborate, $PhBO_2$, and phenyltriborate, PhB_3O_5. White or pinkish crystals, m.204; soluble in water, alcohol or ether. Used as an antiseptic.

borosalicylates. A group of heterocyclic compounds of the type



borosilicate. Silicoborate. A salt of boric and silicic acids. A silicate in which B replaces Si.

borotungstic acid. $(WO_3)_9B_2O_3.24H_2O$. A yellow liquid, d.3.0; soluble in water. Used in mineralogy for determining the density of minerals.

borowolframic acid. Borotungstic acid.

borphenyl. Triphenyl borine.

Borrel grinder. A device for grinding organic tissues and bacteria by means of flexible steel leaves which rotate at a high speed in a steel cylinder.

borsal, borsyl. Sodium borosilicate.

bort. Anthracite diamond, carbonado. A dark, lustrous diamond from Brazil; used for cutting stones and as drill-point in boring machines. It is a conglomerate of minute crystals.

boryl. (1) The monovalent radical —BO. (2) Ethyl-borosalicylate. A white powder, used as an antiseptic and antirheumatic.

Bosch, Karl. 1874– . A German industrial chemist noted as an inventor.

boss. Clamp-holder.

boswellic acid. $C_{32}H_{52}O_4$ = 500.5. An acid constituent of African olibanum, the resinous exudate of *Boswellia papyrifera*, a Burseraceae.

botany. (1) The science of the structure, function, occurrence, and classification of plants and vegetable organisms. See also *biology*. (2) Waste jute cuttings used for paper manufacture, cf. *hessian*.

Botany Bay gum. Acaroid resin.

botryolite. Datolite.

Böttcher chamber. A counting apparatus for blood corpuscles and bacteria which consists of a microscope slide with ruled squares and a mounted cover glass.

Böttger test. A test for glucose in urine, in which a black precipitate is given with sodium carbonate and bismuth subnitrate.

bottle. A vessel with a narrow neck used for holding liquids. **aspirator-** See *aspirator*. **balsam-** A small wide-necked b. with a loosely-fitting glass cover. **density-** See specific gravity *b*. **dropping-** A b. containing a pipette fitted into its cork or rubber stopper. **gas-** A b. used for generating or washing gases, which usually has a two-hole stopper through which the inlet and outlet tubing pass. **graduated-** A graduated b. used for mixing liquids. **hard rubber-** One made of rubber and used for certain acids. **immersion oil-** B.'s of various shapes, with a glass rod attached to the stopper. **milk testing-** Babcock b. **oil sample-** A long narrow b. **paraffin-** A b. made of paraffin and used for holding hydrofluoric acid. **percolator-** A wide-mouth b., graduated in cc., pints or ounces. **reagent-** A glass b. with the name and symbol of a reagent burnt or etched on. **specific gravity-** A small, light, accurately-counterpoised and graduated b. used to determine the specific gravity of liquids. **specimen-** A wide-mouth b. used with a closure for holding specimens of various kinds. **washing-** A glass b. fitted with an inlet and outlet tube. The latter only reaches to the bottom and is connected at the other end with a small jet. Used for washing precipitates with distilled water, alcohol or other fluids, or as a bubbler for purifying or washing gases. **weighing-** A small, light, glass-stoppered container, used for weighing liquids or solids on the analytical balance. **Woulff-** A glass b. with two or three necks, used as a washing or gas-generating bottle.

b. brush. A length of stiff, woven, galvanised wire, to the end portion and tip of which bristles are attached.

bottlenose oil. An inferior sperm oil from the blubber of the bottlenose whale, used in soap making.

botulin. A ptomaine produced by bacteria (*Bacillus botulinus*) and sometimes found in tinned and preserved meats.

Bouchardat, Alexander. 1806–1886. A French pharmacist noted methods of urine analysis. **B. reagent.** A solution of 1 pt. iodine and 2 pts. potassium iodide in 20 pts. water. It gives a brown precipitate with alkaloids.

bougie. (1) A filter cylinder made of porous porcelain. *E.g.*, Berkefeld, Pukal, Pasteur-Chamberland. (2) A taper-shaped pharmaceutical preparation for introduction into the rectum or urethra, etc. (3) A narrow tube for introduction into the urethra or other body orifice. **b. unit.** The French photometric standard; $\frac{1}{3}$th. part of the light emitted by 1 sq. cm. of platinum at its solidifying point.

bouillon. A meat broth, used as food or culture medium. **glycerin-** Koch's culture medium, made from 10 gm. Liebig meat extract, 10 gm. peptone, 20 cc. glycerin, 1000 cc. water and sufficient sodium carbonate solution to make it alkaline to litmus. Cf. *glucose b.* **plain-.** A culture medium consisting of 10 gm. peptone, 5 gm. sodium chloride and 1000 cc. bouillon stock solution, neutralized with sodium hydroxide.

b. stock. A solution of 500 gm. lean beef or 3 gm. beef extract in 1000 cc. water, used for making culture media.

Bouin's fluid. A preservative for embryological and histological material, consisting of 75 cc. saturated picric acid, 25 cc. 40 % formaldehyde and 5 cc. glacial acetic acid.

boulangerite. $Pb_3Sb_2S_6$. A native lead sulfantimonate, $3PbS.2Sb_2S_3$, found as steel-gray or bluish-gray needles or feathery masses, d.6.18. Cf. *epiboulangerite*.

bourbonal. $C_9H_{10}O_3$ = 166.07. Ethyl vanillin, 3-ethoxy-4-hydroxybenzaldehyde, $CHO.C_6H_3$-

(OH)OEt. A synthetic substitute for vanillin, claimed to be four times as strong in flavor.

bournonite. $CuPbSbS_3$. A native copper lead sulfantimonite, found as a bluish-gray, brittle metallic mineral.

boussingaultite. $(NH_4)_2Mg(SO_4)_2.6H_2O$. A native ammonium magnesium sulfate, found in the lagoons of Tuscany.

Bouveault-Blanc reaction. The reduction of esters to alcohols by means of metallic sodium.

B.O.V. Brown oil of vitriol. Commercial sulphuric acid containing 77–78 % H_2SO_4 by weight.

Bowen tube. Bowen potash bulb. A tube with bulbs for the absorption of gases.

bowenite. Serpentine.

Boyce burner. An adjustable burner for gas, which regulates the gas and air flows.

Robert Boyle.

Boyle, The Hon. Robert. 1627–1691. An English physicist and chemist, and pioneer in the investigation of gas laws. **B.'s law.** If the temperature is constant, the pressure of a given quantity of a gas is inversely proportional to the volume it occupies. $PV = k$, or $pv = p'v'$.

B.P. Abbreviation for (1) the beri-beri-preventing factor of vitamin B; (2) boiling point; (3) British Pharmacopoeia, B.Ph.

b.p. Abbreviation for boiling point.

B.Ph. Abbreviation for British Pharmacopoeia.

Br. The symbol for bromine. Br_2 = bromine molecule, Br^- = bromide ion. Br^* = excited bromine atom.

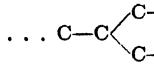
brachydome. See *dome.*

Bragg, Sir William Henry. 1862–1942. A British chemist, noted for his research on crystal structure. **B. crystallogram.** The photographic record obtained by B's. method. **B. crystal model.** The crystalline structure as determined by the diffraction of monochromatic x-rays. **B. method.** If a crystal is placed in the path of a narrow x-ray beam, the layers of atoms in the crystal act as reflection planes for the incident ray and on the photographic plate a series of lines, corresponding with the several orders of spectrum, will be produced. The following relation exists: $\lambda = 2d \sin \theta$, where θ is the glancing angle, d the spacings between atomic planes, and λ the wavelength. Compare also *x-ray spectrograph, crystal structure, Laue pattern.* See figure.

brain. The nerve tissues within the skull which consist, chemically, of: (1) white brain substance (kephalins, lecithins, paramyelins, myelins, cholesterol, phrenosterol, cerebrin and cerebrosides). (2) Buttery substance (kephaloidin, lecithin, myelin, paramyelin, aminomyelin, sphingomyelin, phrenosin and amino-lipins). (3) Aqueous brain extract, containing alkaloids (hypoxanthine, etc.), aminoacids, inosite, organic and inorganic acids and salts. **b. sugar.** Cerebrose.

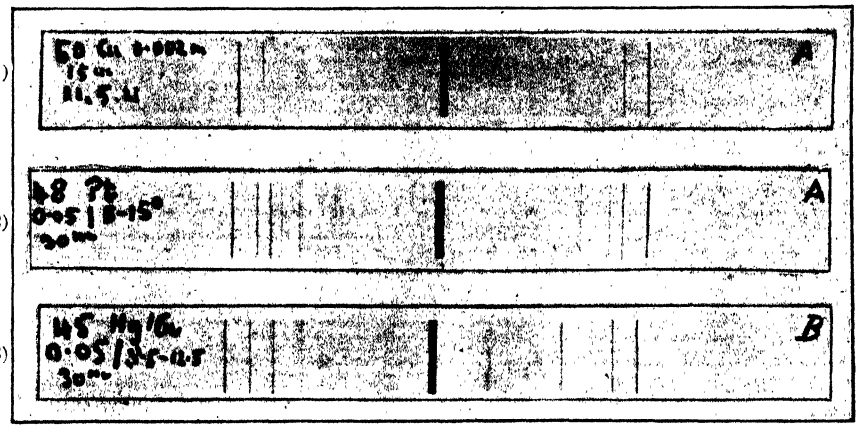
bran. The husk or outer covering of the grain of wheat. **b. oil.** Furfural.

branched chain. A forked atomic chain; as,



See also *chain.*

brand. A term, design or trade mark.



Bragg crystallogram using a rock salt crystal and apparatus manufactured by Adam Hilger, Ltd., London.
(1) Kα and Kβ of copper, 15 min. exposure.
(2) L series of platinum, 30 min. exposure.
(3) Kα and Kβ of copper and Lα, Lβ of mercury, 30 min. exposure.

Brand, Hennig. A merchant and alchemist of Hamburg, who discovered the first non-metallic element (phosphorus) in 1669.

Brandt, Georg. 1694–1768. A Swedish mineralogist, who discovered the first metallic element, cobalt, in 1735.

brandy. An alcoholic beverage distilled from wine. Cf. *cognac.*

brasan. Brazan.

brassilic acid. $C_{22}H_{46}O_6$ = 386.4. i-Dihydroxy behenic acid, $Me(CH_2)_7(CHOH)_2(CH_2)_{12}COOH$. Yellow crystals, m.99, soluble in hot alcohol. Cf. *brasilic, brassylic,* and *brazilic acids.*

brasileïn. Brazileïn.

brasilic acid. $C_{12}H_{12}O_6$ = 252.09. Colorless crystals, m.129. Cf. *brasileic, brassylic,* and *brassidic acids.*

brasilin. Brazilin.

brass. A copper-base alloy containing an appreciable amount of zinc. In the classics, an alloy of copper and tin. **alpha-** One containing less than 40 % Cu. **beta-** One containing more than 40 % Cu.

90 % Cu, 10 % Zn, red brass	m. 1040
80 % Cu, 20 % Zn, Dutch metal	m. 995
70 % Cu, 30 % Zn	m. 930
67 % Cu, 33 % Zn, yellow, ordinary b.	m. 940
60 % Cu, 40 % Zn, Muntz metal	m. 900

aluminum- An alloy of 55–70 pts. Cu, 25–45 pts. Zn and 1–4 pts. Al. **calamine-** Marcasite. **coal-** Roman b. **iron-** B. containing 1–9 % iron. **naval-** An alloy of 61 pts. Cu, 38 pts. Zn and 1 pt. Sn. **red-** B. containing 90 % Cu. **Roman-** B. made by heating charcoal, copper and calamine at a temperature below 1000°C. **yellow-** Muntz metal.

brassic. See *brassidic.*

brassicasterol. $C_{28}H_{46}O$ = 398.35. A sterol, m.148, from rape oil.

brassidic acid. $C_{22}H_{42}O_2$ = 338.45. *12*-Docosenoic acid*, iso-erucic acid. The unsaturated open-chain acid: $Me(CH_2)_7CH{:}CH(CH_2)_{11}COOH$. Colorless leaflets, d.0.859, m.65 b.$_{30mm}$ 282; slightly soluble in water, or alcohol, soluble in ether. It is an isomer of erucic acid and cetoleic acid. Cf. *brasilic* and *brasileic* acids.

brassil. Pyrite.

brassylic acid. $C_{13}H_{24}O_4$ = 244.19. 1.11-Hendecanedicarboxylic acid, $HOOC(CH_2)_{11}COOH$. Colorless crystals, m.114 slightly soluble in water. Compare *brasileic, brasilic* and *brazilic acids.*

brattice. A heavily-tarred canvas used in mines for partitions and ventilation.

Braun tube. A potash bulb.

Brauner, Bohuslav. 1855–1935. A Czechoslovakian chemist, noted for inorganic research and atomic weight determinations.

braunite. A native manganese silicate, $MnSiO_3.3Mn_2O_3$, which occurs in brownish-black or gray lustrous, tetragonal crystals.

bravaisite. Glauconite.

Bray, William Crowell. 1879– . An American chemist, noted for research in catalysis, qualitative analysis and chemical kinetics.

Brayera. A genus of Rosaceae. See *brayerin, kousso.*

brayerin. $C_{31}H_{38}O_{10}$ = 570.3. A bitter, resinous principle from *Brayera* species.

brazan. $C_{16}H_{10}O$ = 218.2. Brasan, phenylenaphthylene oxide. The heterocyclic compound C_6H_4  $C_{10}H_6$.

braze. To solder with an alloy of Cu and Zn. Cf. *solder.*

Brazil. B. gum. Angico gum. **B. nut.** The edible seeds of *Bertholletia excelsa,* a Myrtaceae. **b. nut oil.** Castanhao oil. **b. wax.** Carnauba wax. **b. wood.** See *brazilwood.*

brazileïn. $C_{16}H_{12}O_5$ = 284.1. Dark-red crystals obtained by oxidation of brazilin; it resembles hematoxylin.

brazilic acid. Brasilic acid.

brazilin. $C_{16}H_{14}O_5.1\frac{1}{2}H_2O$ = 313.21. **Brasilin.** The coloring matter of brazilwood. Colorless or yellow needles, m.250; soluble in water, alcohol, or ether. Used as a dye and indicator (acids—yellow, alkalis—purple to red) especially for the titration of alkaloids.

brazilite. Baddeleyite.

brazilwood. (1) The heart wood of *Peltophorum dubium,* a Leguminosae of South America. Used for the preparation of brazilin and as an indicator. (2) A red wood of *Caesalpinia* species of South America. **yellow-** Morus tinctoria.

brazing. Brazeing.

bread. The staple food-product produced from the baking of flour.

bregenin. $C_{40}H_{87}O_5N$ = 661.71. A phosphatide from brain substance.

breithauptite. NiSb. A native nickel antimonide.

Bremen blue. Blue *copper carbonate.* **B. green.** Green *copper carbonate.*

brenzcain. $C_6H_4(OMe)OCH_2Ph$ = 214.11 Brenzcatechin methyl benzyl ether, guaiacol benzylic ether. Colorless crystals, m.62; insoluble in water, soluble in alcohol or ether. Used as a local anesthetic.

brenzcatechin. Catechol. **b. dimethylether.** Veratrol. **b. methyl benzyl ether.** Brenzcain.

Breuer hemacytometer. Device for counting red blood corpuscles.

breunnerite. $MgFe(CO_3)$. A native mixture of siderite and magnesite.

brevium. Bv = 234. The radioactive element uranium X_2, atomic number 91. It is an isotope of ekatantalum (q.v.) and has a half-period of 1.65 minutes; hence the name, proposed by Fajans.

brewing. The process by which malted grain is treated with hot water to produce an extract (wort). This is boiled with hops, filtered, and fermented with yeast.

Brewster's law. The polarizing angle, p, can be determined by the relation: *tan* p = n (sin p)/(*cos* p), where n is the refractive index.

brewsterite. A rock-forming mineral of the zeolite group.

brick. A baked clay molded in various, generally rectangular, shapes. **fire-** A b. used for furnace linings. **silica-** A b. used as lining for high-temperature appliances. **sil-o-cel-** A b. used for insulation.

bridge. (1) Any connecting atom or atoms within a ring of atoms. Cf. *ring structure.* (2) A connecting device; as, *Carey-Foster b., Kelvin b., Wheatstone b.*

brightening. A term used in the dye industry. The dyed material is subjected to 5 pounds steam pressure, which brightens the color.

brightness. The intensity of light or color (q.v.); hence, the amount of light emitted or reflected by an object. Surface brightness is measured in *lamberts.* **absolute-, apparent-,** and **photographic-** See *spectral* classification.

brilliance. Brightness.

brilliant. Intensely bright. **b. cresyl blue.** A dye used as a stain for blood. **b. crocein.** An aniline dye: the sodium salt of aminoazobenzene-azo-β-naphtholdisulfonic acid. A light-brown powder; soluble in water with deep-red color. **b. green.** A dye used as indicator, changing at pH 2.0 from yellow (acid) to green (alkaline). **b. yellow.** A dye used as indicator, changing at pH 0.5 from blue (acid) to yellow, and at pH 8.0 from yellow to scarlet (alkaline).

brimstone. Sulfur.

Brin process. The preparation of oxygen gas by heating barium oxide which, at 500°, forms barium peroxide. The latter then gives off oxygen at about 1000°C.

brine. Water which is nearly saturated with salts; *e.g.*, sodium chloride.

Brinell Johan August. 1849–1925. A Swedish engineer. **B. hardness.** The hardness of a substance as determined by the Brinell method, which compares the area of indentation produced by a hardened steel ball (10 mm. diameter) under a pressure of 3000 Kg or 500 Kg. B.h. = $P/\pi tD$, where P is the pressure (in kg), t the depth of indentation (in mm.), and D is the diameter of ball (in mm.). **B. tester.** A device for determining the B. hardness.

Brinton Reishauer bottle. A specific gravity bottle which holds 100 cc. of liquid.

briquet. pl. *briquettes*. A brick of compressed solid fuel; as, coal, coke, lignite, sawdust or waste materials.

brisance. The violence or shattering effect of an explosive, measured in terms of its detonation velocity.

bristles. The stiff hairs of various mammals (as, hog), used for brushes.

britannia metal. A hard silver-white alloy of 80–90 pts. tin, 10–20 pts. antimony, and small quantities of copper, and sometimes lead, bismuth or zinc. It can be spun, and is used in household utensils as it takes a high polish.

britholite. $(Na_2Ca_7Ce_{11})(F.OH)_4[(SiO_4)_9(PO_4)_5]$. A cerium silicate apatite.

British Chemical Societies. (1) Chemical Society. Organized 1841. Publishers of *Journal and Proceedings*. Secretary: Burlington House, London W. 1. (2) Society of Chemical Industry. Organized in 1881. Publishers of a weekly *Journal* and monthly *Transactions*. Secretary: 56, Victoria St., London, S. W. 1. These two societies also publish Annual Reports on the Progress in Pure and Applied Chemistry, respectively; and jointly, The Bureau of Chemical and Physiological Abstracts.

British gum. Dextrin.

British Thermal Unit. B.t.u. (American usage). B.Th.U. (English usage) (Cf. Board of Trade Unit, B.T.U.). A measure of energy in the English system, which corresponds with the calories of the metric system. The heat required to raise one pound of water from 39°F to 40°F; hence, the heat required to raise the temperature of one pound water at its temperature of maximum density by one degree Fahrenheit. This amount of heat varies with the temperatures. **mean-** The $\frac{1}{180}$ part of the heat required to raise the temperature of one pound water from 32° to 212°F.

1 B.Th.U. (mean) = 252 calories = 1054.8 joule.
1.8 B.Th.U. per lb. = 1 cal. per gm.

brittle. (1) Easily broken or pulverized. (2) In bacteriology the dry growth of bacteria, which is friable under a platinum needle. **b. silver ore.** Stephanite.

Brix hydrometer. A hydrometer graduated with the Brix scale. **B. degree.** An arbitrary scale for the direct conversion of the saccharometer reading of a sugar solution into its specific gravity; (1) x° Brix indicates that the solution to which it refers contains x gm. of sugar in 100 c.c. (2) At 15.6°C, specific gravity = 400/(400 ± x° Brix), where x is + or − according as the liquid is heavier or lighter than water, respectively. See *hydrometers*.

brochantite. Warringtonite. A native, basic copper sulfate, $Cu_2(OH)_2SO_4$, occurring in emerald-green vitreous masses.

Brodie coagulometer. A device for measuring the coagulation of the blood under the microscope. **B. kymograph-.** An apparatus for recording the undulations of living organisms, *e.g.*, blood pressure and arterial action. **B. solution.** A solution of salt of such a specific gravity that a column 10,000 mm. high is equivalent to a pressure of 1 atmosphere. It is used in manometers.

Brönner acid. 2, 6-Naphthylamine sulfonic acid.

bröggerite. A variety of pitchblende.

Broglie, Prince Louis Victor de. A French physicist noted for work in wave mechanics; Nobel-prize winner. **B. formula.** An expression connecting wave-length, λ, with momentum, *mv*, accelerated by volts, V.

$$\lambda = \frac{h}{mv} = \sqrt{\frac{150}{V}}\ \text{Å}.$$

brom- Bromo-. **b. acetone.** Bromoacetone.

bromacetanilide. See *acetanilide*.

bromacetate. A salt of bromacetic acid containing the monovalent $CH_2Br.COO$—radical.

bromacetic acid. $C_2H_3O_2Br$ = 138.95. Bromoacetic acid, $CH_2Br.COOH$. Colorless hexagonal crystals, m.49, b.208; soluble in water, alcohol, or ether.

bromacetol. *2,2*-Dibromopropane*.

bromal. C_2HOBr_3 = 280.9. Tribromoacetaldehyde, *2,2,2*-tribromo-ethanal*, CBr_3CHO. A colorless or yellowish liquid, d.2.65, b.174, decomp. in water, soluble in alcohol or ether. It is used as a hypnotic and anodyne, and in organic synthesis. **b. hydrate.** $C_2H_3O_2Br_3$ = 298.9. Tribromaldehydehydrate, *2,2,2,*-tribromo-*1,1*-ethanediol*, $CBr_3.CH(OH)_2$. Colorless crystals, m.53; soluble in water, alcohol, or ether, and used as a hypnotic, antispasmodic and sedative.

bromalin. $C_8H_{17}N_4Br$ = 249.2. Bromethylformin, hexamethylenctetramine bromethylene, $C_6H_{12}N_4.C_2H_5Br$. Colorless crystals, m.200; soluble in water, alcohol or ether, and used medicinally as an antiepileptic and sedative.

bromalonic acid. See *malonic acid*.

bromamide. Aniline tribromide.

bromaniline. See *aniline*.

bromargyrite. Bromyrite.

bromate. A salt of bromic acid containing the monovalent —BrO_3 radical; as sodium bromate, $NaBrO_3$.

bromated. Brominated. (1) Combined with or containing bromine. (2) The introduction of bromine into a molecule. **di-** A molecule containing two atoms of bromine. **mono-** A molecule containing one atom of bromine.
b. camphor. See *camphor*.

bromation. Bromination.

bromatology. The science of food and diet.

bromaurate. A salt, $MAuBr_4$, derived from auric bromide and a metallic bromide, MBr.

brombenzamide. See *benzamide.*

brombenzene. See *benzene.*

bromcamphor. See *camphor, monobromated.*

bromchlorphenol blue. $C_{19}H_{10}Br_2Cl_2O_5S$ = 580.6. Dibromo dichloro sulfon phthalein. A yellow powder, soluble in water or alcohol. It is an indicator, changing from yellow (pH 4.5) to blue (pH 5.5).

bromcresol green. $C_{21}H_{14}Br_4O_5S$ = 700.0. *3.3.-6.7*-Tetrabromo-*m*-cresol sulfone phthalein. A gray powder, soluble in water and alcohol. Used as pH-indicator between 4.5 (yellow) and 5.5 (blue). **b.c. purple.** $C_{21}H_{16}Br_2C_5S$ = 540.41. Dibromo-*o*-cresol sulfon phthalein. A light yellow powder, used as pH-indicator between pH 5.2 (yellow) and 6.8 (purple).

bromelia. $C_{13}H_{12}O$ = 172.1. Ethoxynaphthalene, β-naphthyl-ethyl ether, $C_{10}H_7OEt$. Colorless crystals, d.1.064, m.37.5, b.282; insoluble in water, soluble in alcohol or ether. Used in perfumery.

Bromeliaceae. The pineapple family, an order of tropical plants with rigid, spiny leaves.

bromelin. A proteolytic enzyme occurring in pineapples, which changes proteins to proteoses and peptones.

bromeosin. See *eosin.*

bromethane. Misnomer for: (1) bromomethane; (2) bromoethane.

bromethyl. (1) Ethyl bromide. (2) Bromomethyl. (3) Bromoethyl.

bromethylene. Ethylene bromide.

bromethylformin. Bromalin.

brometone. $C_4H_7OBr_3$ = 310.9. Acetone bromoform, 1.1.1.tribrom-2-methylpropan-2-ol, tribromo-tertiary-butanol, *2.2.2*-tribromo-*1*-methyl-*1*-propanol*, $CBr_3.CMe_2OH$. Fine, white prismatic crystals with camphor-like odor and taste, m.167; slightly soluble in water, soluble in alcohol, ether, or benzene; used medicinally as a sedative.

bromhydrin. An organic compound of the type Br—R—OH. Cf. *halohydrin, chlorhydrin.* **tri-** Allyl tribromide.

bromic acid. $HBrO_3$ = 128.97. Colorless crystals, decomp. about 100; slightly soluble in water. Its salts are the bromates. **hydro-** See *hydrobromic acid.* **b. ether.** Ethyl bromide.

bromide. A binary salt containing negative monovalent bromine; *e.g.*, sodium bromide, NaBr. The bromides are usually soluble in water. **hydro-** An addition compound of HBr and an organic base, as an alkaloid.

brominated. Bromated.

bromination. (1) To treat with bromine. (2) To introduce Br into an organic molecule. Cf. *bromation, bromization.*

bromine. Br = 79.916. An element of the chlorine group, atomic number 35. A dark-brown, liquid, fuming halogen, d_0°.3.19, m. −7.5, b.58.78; soluble in water, alcohol, chloroform or ether. Gaseous bromine has a density of 5.524 (air = 1) and molecular weight (Br_2) 159.84. Elementary bromine never occurs native, and is found mainly as the bromides of alkali metals, in natural waters, brines and sea water. Solid ores are carnallite and silver bromide. Bromine is mainly monovalent, but in some compounds it is tri-, penta- and heptavalent and forms several series of compounds:

−1 bromides	Br^-
+1 hypobromites	BrO^-
+3 bromites	BrO_2^-
+5 bromates	BrO_3^-
+7 perbromates	BrO_4^-

Bromine was discovered in 1826 by Balard in the mother liquors of sea water, and named from the Greek "bromos" meaning stench. Liquid bromine is used as a reagent, and oxidizing agent, in organic synthesis, and as poison gas. **b. chloride** $BrCl.10H_2O$ = 295.6. B. monochloride. Yellow crystals or liquid, m.7, decomp. readily, very soluble in water, carbon disulfide or ether. **b. cyanide.** Cyanogen bromide. BrCN = 106.01. Colorless needles, m.52, b.-61.5; soluble in water or alcohol. **b. fluoride** BrF = 98.92. Colorless prisms, m.50, b.132; decomp. by water. **b. hydrate** $Br.10H_2O$ = 260.01. Red octahedric crystals, decomp. 15; soluble in water. **b. hydride.** Hydrobromic acid. **b. iodide** BrI = 206.84. B. monoiodide. Colorless crystals, m.36; soluble in carbon disulfide or chloroform. **b. monochloride.** B. chloride. **b. monoiodide.** B. iodide. **b. pentachloride** $BrCl_5$ = 257.21. A colorless liquid, used in organic synthesis. **b. sulfide.** Br_2S_2 = 223.96. A red liquid, d.2.629, b.195, decomp. by water. **b. water.** A saturated aqueous solution of bromine containing about 3 % Br; used as reagent instead of bromine.

brominol. A brominized (33 % Br) olive oil, used as an x-ray contrast medium.

bromipin. 10 % brominated sesame oil. A yellow oily liquid used medicinally as a sedative, nervine and antiepileptic. 33 % b. is used as an x-ray contrast medium.

bromite. Bromyrite.

bromization. Bromation. To saturate with bromine. Cf. *bromination.*

bromlite. Alstonite.

brommalonic acid. $C_3H_3O_4Br$ = 183.01. The bibasic acid $CHBr(COOH)_2$. Colorless needles; soluble in water, alcohol or ether.

bromnaphthalene. See *naphthalene.*

bromo- Brom-. A prefix which indicates the presence of a bromine atom in an organic compound. **di-** A compound containing two bromine atoms. **tri-** A compound containing three Br atoms.

bromoacetic acid. See *bromacetic acid.*

bromoacetone. $BrCH_2COMe$ = 136.95. Monobromomethyl ketone. A colorless liquid, d.-1.603, m. −54, b.127; used in chemical warfare as a poison gas.

bromobenzamide. See *benzamide.*

bromobenzene. See *benzene.*

bromobenzylcyanide. $BrC_6H_4CH_2CN$ = 195.97. o-bromo-phenyl-aceto-nitrile, 2-bromo-7-cyano-toluene. A colorless liquid, d.1.519, m.25.5, b.242 (decomp.), used in chemical warfare as a lacrimatory poison gas (B.B.C.).

bromocaffeine. $C_8H_9O_2N_4Br$ = 272.1. A white powder, m.206; slightly soluble in water, soluble in alcohol, ether, or chloroform.

bromocamphor. Camphor, monobromated.

bromocyanogen. Cyanogen bromide.

bromoethyl. (1) Ethyl bromide. (2) The radical BrC_2H_4—.

bromoform. $CHBr_3$ = 252.90. Tribromomethane*, formyl bromide, methenyl bromide. A colorless liquid, d.2.904, m.7.7, b.150.4; slightly soluble in water, miscible with alcohol or ether. Used for the separation of minerals, and as local

anesthetic, antispasmodic and sedative. nitro- CBr_3NO_2 = 297.78. Bromopicrin, tribromo-nitromethane*. Colorless liquid, $d_{12°}$.2.811, m.10, b_{118mm}.127; insoluble in water, soluble in alcohol or ether.

bromoformin. Bromalin.

bromoketone. $BrCH_2.COEt$ = 150.98. Bromomethyl ethyl-ketone; used in chemical warfare.

bromol. Tribromphenol.

bromomethane. Methyl bromide. **tri-** Bromoform.

bromomethyl. (1) Methyl bromide. (2) The radical $BrCH_2$—.

bromometry. The determination of the halogen-absorbing capacity of unsaturated compounds or of materials containing them, *e.g.*, fats. Results are usually expressed in terms of iodine.

bromonaphthalene. See *naphthalene.*

bromophenol. See *bromphenols.* **b. blue.** See *bromphenols.*

bromophosgene. Carbonyl bromide.

bromopicrin. Nitro-bromoform.

bromoprene. C_4H_5Br = 134.0. *2*-Bromobutadiene-1.4, CH_2:CBr.CH:CH_2. An intermediate in the polymerization of synthetic rubber. Cf. *isoprene, duprene.*

bromopyrine. $C_{11}H_{11}ON_2Br$ = 267.0. Monobromantipyrine. White crystals, m.114; soluble in hot water or alcohol; used medicinally as an antipyretic and antiseptic.

bromothymol blue. See *indicators.*

bromotoluene. See *toluene.*

bromphenols. $Br.C_6H_4.OH$ = 173.0. A series of compounds, formed by the action of bromine on phenol: **o-** A liquid, b.194, sparingly soluble in water. **m-** A solid, m.32, b.236. **p-** A solid, m.63, b.235. Sparingly soluble in water. **tri-** $C_6H_3OBr_3$ = 330.9. The solid, 1.2.4.6-C_6H_2.-OH.Br_3, m.96. Sparingly soluble in water. **b. blue.** $C_{19}H_{10}Br_4O_5S$ = 673.75. *2.3.6.7*-Tetrabromophenol sulfon-phthalein. A yellow powder, soluble in water or alcohol; used as pH-indicator from pH 3.0 (yellow) to 4.6 (blue). **b. red.** $C_{19}H_{12}Br_2O_5S$ = 511.9. Dibromophenol-sulfon-phthalein. A yellow powder, used as pH-indicator from 6.0 (yellow) to 7.0 (red).

bromphenyl acetylcystein. Phenylmercapturic acid.

bromthymol. b. blue. $C_{27}H_{28}Br_2O_5S$ = 624. Dibromo thymol sulfon phthalein. Dark brown crystals with green luster, used as pH-indicator from pH 6.0 (yellow) to 7.6 (blue).

bromum. The official Latin for bromine.

bromural. $MeCHMe(CHBrCO)NH.CONH_2$ = 223.03. 2-Monobromoisovaleryl urea. Small colorless needles, m.145; soluble in water, alcohol or ether. Used medicinally as a nerve sedative and hypnotic.

Bromwell apparatus. A graduated glass cylinder of special shape for fusel oil determination (U. S. Dept. Agric., Bureau of Chem., Bull. 107).

bromyrite. AgBr. Bromargyrite, bromite. An unctuous native, silver bromide found as yellow or greenish, transparent or opaque isometric crystals.

brongniardite. $Ag_2PbSb_2S_5$. A native silver-lead-sulfoantimonite, which occurs in isometric crystals.

Brönner acid. 2.6-Naphthyl-amine-sulfonic acid.

bronze. A copper-base alloy containing elements other than zinc in amounts sufficient to predominate over the zinc present, *e.g.*,

90 % Cu 10 % Sn, gun metal ..... m.1005°C
80 % Cu 20 % Sn, bell metal ..... m. 890°C
70 % Cu 30 % Sn, speculum ..... m. 755°C

acid- An alloy containing 82–88 % Cu, 2–8 % Pb, 8–10 % Sn and 0–2 % Zn. **aluminum-** An alloy of 90 % Cu and 10 % Al. **carbon-** An alloy used for bearings. **manganese-** An alloy of 88 % Cu, 10 % Sn and 2 % Mn. **phosphor-** See *phosphor.* **saffron-** Orange *tungsten.* **silicon-** A non-corrosive bronze containing Si. **Sillmann-** An alloy of 86 % Cu, 10 % Al and 4 % Fe. **Tobin-** An alloy of 55 % Cu, 43 % Zn and 2 % Sn. **tungsten-** Tungsten bronze.

b. blue. Prussian blue.

bronzite. Schillerspar. A rhombic native pyroxene consisting of $MgSiO_3$ with 10 % $FeSiO_3$; it has a sub-metallic bronze-like lustre.

brookite. Arkansite. An orthorhombic variety of rutile, d.4.0, hardness 6–6.5; reddish-brown to black color.

broom. Scoparius. **Spanish-** Spartium. **b. corn-** Sorghum.

brown. A pigment or color made by mixing red, yellow, and black. **b. coal.** Lignite. **b. dyes,** See *aniline* b., *bismarck* b., *resorcin* b., *spirit* b. **b. hematite.** See *hematite.* **b. iron ore.** See *limonite, bog iron ore, ocher, b. hematite.* A hydrous iron oxide with some iron carbonate. **b. ocher.** B. iron ore. **b. pigments.** See *cadmium b., Cassel b., chrome b.,* ocher, sepia, vandyke b., zinc b. **b. oil of vitriol.** B.O.V. **b. spar.** Pearl spar. A variety of dolomite (q.v.) with a brown tinge due to Fe_2O_3 or Mn_2O_3.

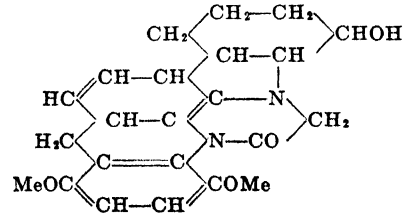
Brown, Alexander Crum. 1869–1908. A Scottish chemist noted for organic research. **Crum B. rule.** If the hydrogen of an aromatic compound can be converted by direct oxidation into a hydroxyl compound, substitution will take place in the meta-position. If not, the substituting radical enters the ortho or para position. **B., Robert,** 1773–1858. An English botanist noted as the discoverer of the Brownian movement.

Brownian movement. Pedesis. The rapid vibratory motion of extremely small particles suspended in a liquid, caused by the bombardment of the particle by the moving molecules of the liquid. The velocity varies inversely with the size of the particles, and depends also upon the viscosity of the medium. Cf. *Svedberg's equation.*

Brownite cupel. A shallow vessel used in silver analysis.

brownmillerite. $4CaO.Al_2O_3.Fe_2O_3$. A phase in the stabilisation of dolomite by calcination with silica.

brucine. $C_{23}H_{26}O_4N_2.4H_2O$ = 466.41. Dimethoxystrychnine.



An alkaloid from the seeds of *Strychnos* species (nux vomica, ignatia, etc.). Colorless crystals, m.178, slightly soluble in water, soluble in alcohol or ether. Used medicinally as a nerve tonic. **b. hydrobromide** $C_{23}H_{26}O_4N_2.HBr$ =

479.31. White crystals; soluble in water or alcohol; and used as brucine. **b. hydrochloride** $C_{23}H_{26}O_4N_2.HCl$ = 430.81. White crystals, soluble in water or alcohol; used as a tonic. **b. nitrate** $C_{23}H_{26}O_4N_2.HNO_3.2H_2O$ = 493.39. White crystals, decomp. 230; soluble in alcohol, water or ether. **b. phosphate** $(C_{23}H_{26}O_4N_2)_2.H_3PO_4$ = 886.78. A white crystalline powder, soluble in water or alcohol. **b. sulfate** $(C_{23}H_{26}O_4N_2)_2.H_2SO_4.7H_2O$ = 1012.86. Colorless needles, soluble in water or alcohol. **b. test.** A solution of 0.5 gm. in 200 cc. of concentrated sulfuric acid is used as a test for nitric acid.

brucite. $Mg(OH)_2$. Nemalite. A native magnesium hydroxide.

Bruehl receiver. Receivers for a condenser in an air-tight container, in which a number of distillates may be collected separately by turning the apparatus around so that the individual receivers come under the end of the condenser. The condenser passes in through an air-tight joint, so that vacuum distillation may be used.

Brunck, Heinrick von. 1847–1911. A German chemist, noted for the development of the organic chemical industry.

brunfelsia. Manaca.

Brünner acid. 2,6-Naphthylamine sulphonic acid.

brunswick green. Green *copper carbonate.*

brushite. $CaHPO_4.2H_2O$. A native acid calcium phosphate.

bryoidin. $C_{20}H_{32}O_3$ = 326.30. A bitter principle of elemi gum.

bryonane. $C_{20}H_{42}$ = 282.3. A saturated hydrocarbon, m.69, b.400, from the leaves of *Bryonia dioica*, a Cucurbitaceae. It is possibly identical with laurane.

bryonia. English mandrake, white bryony. The dried roots of *Brionia* species (Cucurbitaceae) containing bryonin, alkaloids, and resin; used as cathartic. **black-** Blackeye root. The root of *Tamus communis*, a Dioscoraceae, used as rubefacient and diuretic. **white-** Bryonia.

bryonin. $C_{48}H_{80}O_{19}$(?). A glucoside from the root of *Bryonia* species, Cucurbitaceae. An amorphous yellowish-brown powder; soluble in water or alcohol; used medicinally as a cathartic.

Bryophyta. A division of Cryptogamia, including liverworts (Hepatica) and mosses (Musci).

B.S. See *Bureau of Standards.*

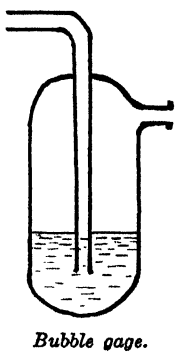
B.S.I. British Standards Institution. An organization which issues specifications and methods of testing materials. Cf. *A.S.T.M.*

B.t.u., B.Th.U. British thermal unit.

Bu. The symbol for butyl. **i-Bu.** The symbol for isobutyl. **BuOH.** Butyl alcohol.

bu. Abbreviation for bushel.

bubble. (1) A small air droplet. (2) To pass gas through a liquid. **b. counter.** A device to measure the volume of a gas evolved during a reaction. It consists of a capillary tube through which the gas bubbles escape, connected with a U-tube partly filled with Hg; each b. makes an electric contact. **b. gage.** A small glass instrument used as an indicator of gas flow (figure).

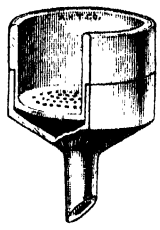


Bubble gage.

bubulin. A compound of cow's dung.

bucco. Buchu.

Buchner, Eduard. 1860–1917. A German chemist and Nobel prize winner (1907), who found that enzyme action is purely chemical. **B. funnel.** A shaped porcelain funnel containing a perforated porcelain plate, on which the filter-paper is placed. **B. number.** The number of cc. of normal alcoholic potash solution required to neutralize 2.5 grams of wax dissolved in 80 % alcohol.



Buchner funnel.

bucholzite. A variety of fibrolite.

buchu. Bucco, bucku. The dried leaves of *Barosma betulina*, a Rutaceae of South Africa. It is a diuretic, anticatarrhal; used as fluid extract. Cf. *rutin, barosmin.* **b. camphor.** See *diosphenol.*

Buck iron mortar. A specially shaped mortar for grinding gold ore with mercury.

buckbean. Menyanthes.

buckthorn. Rhamnus. **b. bark.** Frangula. **b. berries.** Rhamnus cathartica. The dried ripe fruit of *Rhamnus cathartica* (Rhamnaceae). It is a cathartic; used as fluid extract. Cf. *xanthorhamnin.*

buckwheat. The seeds of *Fagopyrum esculentum*, a Polygonaceae; used as food.

Bucky rays. Grenz rays.

Budde effect. The expansion in volume of chlorine or bromine vapor when exposed to light.

buddeized. Sterilized by adding hydrogen peroxide and followed by slight warming; as, milk.

budding. A form of cell-division in which the new cell is an outgrowth of the parent cell, from which it becomes detached after it has grown to a certain size; as, yeast.

buddling. The process of crushing an ore and washing it in a stream of water.

budiene. Bivinyl.

Bueb process. A method for making ferrous ferrocyanide from iron sulfate, ammonia and hydrocyanic acid.

bufagin. $C_{24}H_{32}O_5$ = 380.3. A neutral, digitalis-like principle in the skin-gland venom of the toad, *Bufo agua.* It is used by Brazilian natives as a constituent of arrow-poison. Cf. *sterols.*

buffer. Any substance which, when added to a solution, resists any change in hydrogen ion concentration on addition of acid or alkali. **oxidation-reduction-** A mixture of compounds which resists a change in oxidation-reduction potential and so enables selective oxidation and reduction to be carried out. Cf. *redox.* **b. action.** The capacity to neutralize, within limits, either acids or bases, without changing the original acidity or alkalinity; as, of blood, soil, plant juices. **b. capacity.** The millimoles of H^+ which a unit volume of the solution in question will neutralize when an excess of standard acid is added. **b. index.** B. value. **b. salt.** Salts which behave as buffers: generally those of acids with a low dissociation; *e.g.*, the carbonates and phosphates of the blood, which maintain a pH of 7.35, notwithstanding the absorption of CO_2 or the introduction of acids. **b. solution.** Any solution of a weak acid or base and its salts, such as acetates, borates, phosphates, phthalates, which behave as buffers. The following is a "universal" b. solution from pH 2.5 to pH 11.5 (Prideaux and

Ward, Trans. Chem. Soc., 125, 1924, p. 426). A 0.1 N solution is made containing phosphoric, phenylacetic, and boric acids, 0.02 N to the hydrogen ion in each case. If V is the number of cc. of 0.2 N HCl and 0.2 N NaOH which is added to 100 cc. of this solution with subsequent dilution to 200 cc., then pH = 3.1 + 0.1185V (NaOH is +, HCl is −). **b. value.** The amount of standard solution (acid or alkali) required to bring about a specified change in the hydrogen ion concentration of a solution.

bufonin. $C_{34}H_{54}O_2$ = 494.43. A poisonous principle in the secretion of toads and lizards; *e.g.*, *Bufo vulgaris*. Cf. *phrynin*. It is slightly soluble in water or alcohol, soluble in ether, benzene or chloroform.

bufotalin. $C_{24}H_{30}O_3$ = 266.23. A split-product of bufotoxin, which resembles digitaligenin.

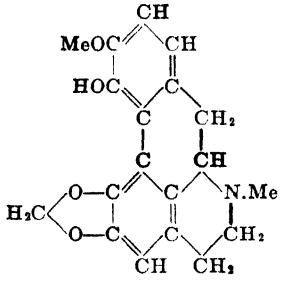
bufotanine. $C_{14}H_{18}O_2N_2$ = 246.16. An alkaloid from the secretion of the parotoid gland of *Bufo vulgaris*.

bufotoxin. $C_{34}H_{46}O_{10}$ = 614.37. A poisonous principle in the skin secretions of toads and lizards. It forms salts with alkalis, and is precipitated by barium chloride.

bugle weed. The herb of *Lycopus virginicus*, a Labiatae. It is a tonic, astringent and sedative; used as a fluid extract.

bulb. (1) A round under-ground leaf-bud or stem of a plant, consisting of a number of fleshy leaves crowded together and enclosing the base of the stem. (2) Any spherical or bulb-shaped apparatus. **connecting-** A glass tube with a round enlargement, for connecting flasks with condensers; *e.g.*, a splash-head in Kjeldahl's apparatus. **levelling-** A round glass container with two outlets, used in gas analysis. **nitrogen-** A conical flask connected with one or more spherical glass tubes; *e.g.*, Fresenius, Volhard, etc. **resistance-** Electrical contacts used with potentiometers. **rubber-** Rubber nipples for pipettes or round hollow rubber balls with valves for blowpipes, gas burettes, etc.

bulbocapnine. $C_{19}H_{19}O_4N$ = 325.16. An alkaloid from the bulbs of *Corydalis cava* (*Bulbocapnus cavus*) a Papaveraceae. A white crystalline powder, m.199; soluble in alcohol.



b. hydrochloride. $C_{19}H_{19}O_4N.HCl$ = 361.6. White crystals, soluble in hot water.

bulgara. The *Bacillus lactis bulgaricus* found in intestinal flora; used in tablet form for increasing the production of lactic acid and preventing abnormal intestinal putrefaction. Used in intestinal toxemia, chronic constipation etc.

bulk. (1) The increase in the volume of a solvent which is due to the dissolved substance. Cf. *cut*. (2) The ratio of the thickness to the weight per unit area of a paper. It is therefore a measure of the air-space present.

bullate. A bacterial growth rising in convex prominences like a blistered surface.

bullet-proof glass. A glass made from two or more plates of glass cemented together, under pressure, by a transparent plastic material.

bullion. (1) Uncoined gold or silver in bars or other masses. (2) Metal money as distinct from paper money. (3) Any metal in bar form.

bullseye condenser. A concave lens mounted on a stand, and used for the illumination of opaque objects under the microscope; also for ultramicroscopic illumination with an artificial source of light.

bully tree. See (1) *chicle*, (2) *balata*, (3) *sapota*.

bumping. Uneven boiling of a liquid, owing to super-heating because of the absence of dirt or other particles which act as nuclei for the formation of steam bubbles. It is avoided by adding glass beads, pumice, straight or U-shaped glass tubes, or any other inert solid to the liquid.

Bumstead electroscope. A sensitive gold leaf electroscope.

buna. A German rubber substitute prepared by the polymerisation of butadiene.

Bunsen, Robert Wilhelm Eberhard von. 1811–1899. A German chemist noted for gasometric

Robert Wilhelm von Bunsen.

and photometric researches, work on the electrolytic cell, devising the bunsen burner and as a pioneer in spectrum analysis. **b. burner.** A gas burner with adjustable air supply. **B. cell.** An electrolytic element which furnishes a large current of a constant potential of 1.9 volt. It consists of an anode of amalgamated zinc in 10 % sulfuric acid and a cathode of carbon in conc. nitric acid. It is a modification of Grove's cell (q.v.). **B. clamp.** A clamp with cylindrical, rubber-covered jaws, for holding tubes, condensers, etc. **B. eudiometer.** A graduated glass tube with platinum electrodes near the closed end. On passing an electric discharge through a combustible gas mixture, the volume changes, and thence the composition may be determined. **B. flame** See *flame*. **B. funnel.** A glass funnel with long stem at an

angle of 60°. **B. gas-bottle.** A cylindrical glass bottle with a tubular outlet near the neck and an inlet tube passing close to the bottom. It is used for washing gases. **B. reactions.** Flame reactions. The qualitative preliminary examination of substances by observing their behavior in the Bunsen flame: evaporation, melting, or imparting characteristic color to the flame, and producing a metallic spot on a cold porcelain surface. Cf. *analysis*. **B. Roscoe law.** Reciprocity law. If in a series of exposures the products of light intensity and exposure time are equal, the amounts of darkening of a sensitive silver chloride paper will also be equal; hence, the amount of substance decomposed by radiant energy is proportional to the amount of energy absorbed. **B. valve.** See *valve*.

bunsenite, bunsenine. NiO. Krennerite. A native nickel oxide, which occurs in greenish isometric crystals.

Bunte, Hans. 1848–1925. A German chemist who developed gas analysis. **B. gas-burette.** A burette with or without a water-jacket, which has at one end a two-way stopcock.

buoyancy. The capacity to float in a liquid or gas. **correction for-** In accurate weighing the true weight g_0 is obtained by $g_0 = g\left(1 + \frac{g_a}{d} - K\right)$ where g is the observed weight, $g_a = 0.0012$, the weight of 1 cc. air, d the density of the body being weighed, and $K = 0.00014$, the ratio of the densities of air and brass weights.

buphane. Candelabra flower, Cape poison bulb, gifbol. The plant, *Buphane distidia* and *B. toxicaria*, an Amaryllidaceae of South Africa, used as antiseptic. It contains buphanine, haemanthine, narcissine, etc.

buphanine. An alkaloid from the bulb of buphane; it is hydrolyzed to buphanitine.

buphanitine. $C_{23}H_{24}N_2O_6 = 424.20$. An alkaloid from buphanine, m.240.

burbonal. Bourbonal.

Burchard-Liebermann reaction. Acetic anhydride produces a blue-green color with cholesterol in chloroform on the addition of a few drops of concentrated sulfuric acid.

burdock. Lappa.

Bureau of Standards. The U. S. Official Institution for setting up and testing standards of quality for apparatus and chemicals.

buret, burette. A graduated glass tube used in volumetric analysis for measuring of definite amounts of liquids. **automatic-** A buret with a device for rapidly re-filling to the zero-point, which usually is provided with an overflow cup. **certified-** A buret which has been tested as to the accuracy of its calibrations. **chamber-** A b. in which drainage errors are minimized by means of a wide ungraduated upper chamber containing the bulk of the liquid, and terminating at the bottom in a small narrow graduated tube, with a tap, for measurement purposes. **gas-** A buret used in gas-analysis; *e.g.*, *Bunsen b.* **precision-** Certified b. **Schellbach-** A b. with a milk-glass scale, having a central blue line which gives the meniscus the appearance of a cusp and is supposed to minimize errors from this source.

b. cap. A small glass cup that fits loosely over the top of a buret. **b. clamp.** A pinch-cock attached to the rubber tubing of a buret. **b. float.** A small floating swimmer or closed glass tube placed inside the burette, facilitating readings. **b. holder.** A clamp for holding a buret in position. **b. reader.** A device which is clamped on the buret, facilitating the reading of the meniscus.

Burgundy mixture. A substitute for Bordeaux mixture. A mixture of 4 lbs. of copper sulfate in 35 gallons of water, and 5 lbs. of sodium carbonate in 5 gallons of water.

burkeite. $Na_2CO_3.2Na_2SO_4$. **·sesqui-** $2Na_2CO_3.3Na_2SO_4$. By-products from the co-crystallisation of sodium sulphate and carbonate in the isolation of potassium from the Trona deposits (q.v.).

Bürker chamber. A counting chamber for hemocytometers, consisting of an accurately ruled microscope slide.

burlap. A coarse jute fabric, similar to sacking; used in linoleum manufacture and as a wrapping.

burner. A device or apparatus for obtaining a flame by the combustion of solids, liquids or gases. **acetylene-** A b. designed for acetylene gas. **acme-** A b. for gas or gasoline vapor, with adjustable air and gas control. **alcohol-** A b., usually of the wick-type, for alcohol. **argand-** A b. for oil or gas with an inner tube to supply air to the flame.

b. attachments. See *crown top, gauze top, wing top, chimney, star, tripod*. **Barthel-** A b. designed to burn alcohol or benzene. **blast-** A b. in which compressed air is blown into the flame. **blue flame-** A b. for gas, giving a high temperature with or without blast attachment. **Boyce-** Acme b. **bunsen-** See *Bunsen*. **Chaddock-** A non-corrodable b. resembling a small blast furnace, made from refractory material. **combustion tube-** A set of bunsen b. with wing tops. **Dangler-** A gasoline b. **eureka-** A self-lighting gas b. **evaporating-** A round cast-iron disk with holes, for obtaining a number of small flames. **Fisher-** A modified Mekker burner which gives a hot flame. **Fletcher-** Round hollow cast-iron rings with holes or slits, for rapidly heating large vessels. **gauze top-** A bent iron tube with gauze top. **Jansen-** A blast-b. for glass-blowing with air and gas regulation through two different tubes. **Mekker-** A bunsen b. having a grid at its top, which mixes the gases and prevents "striking back," and produces a hot, uniform flame. **micro-** A very small gas b., for microanalytical operation. **multiple tube-** A gas b. with three or more tubes, arranged circularly or in a straight line. **pilot light-** A bunsen b. with a small inside tube producing a small flame which is kept burning continuously. **porcelain-** Chaddock. **rose-** A burner with a rose-shaped circular metal attachment, perforated round its circumference, which fits on the top and enables very small flames to be obtained. **Sargent-** A b. for gas with adjustable air and gas supply. **Scimatco-** A gas b. for obtaining high temperatures. **spectrum-** A b. with platinum holders, for producing colored flames from solids such as salt for spectrum analysis, polariscopes or other instruments where monochromatic light is required. **Teclu-** See *Teclu b.*

burnettizing. A process for the preservation of wood by treatment with creosote under pressure.

burning. See *calcination, firing*.

burnt. Calcined, or strongly heated. **b. alum.** Anhydrous *potassium aluminum sulfate*. **b. lime.** Calcium oxide.

burra gokero. Barra gokhru. The seeds of *Pedalium murex*, a Pedaliaceae of tropical

Africa and Asia; an antispasmodic and diuretic.

Burrel apparatus. An apparatus for gas analysis (U. S. Bureau of Mines, Bulletin 42).

Burseraceae. A group of tropical trees and shrubs that secrete resinous and oily substances.

Commiphora myrrha	myrrh
Bursera gummifera	chibou
Boswellia papyrifera	boswellic acid
Boswellia carterii	olibanum
Commiphora (Balsamodendron) mucul	bdellium
Canarium commune	elemi, nauli gum

bursine. An alkaloid from *Capsella bursapastoris* (shepherd's purse), a Cruciferae.

burtonization. The addition of gypsum or other calcium salts to a water supply. Used in brewing, where a water similar to that of Burton-on-Trent (England) is required.

bus-bar. The conducting metal rod which carries the objects to be plated or otherwise treated in electrolytic deposition plants.

bushel. 1 bu. (British) = 0.35239 hectoliters or 35.2 liters = 8 gallons or 2219.36 ± 17 cu. in. imp.- British b. **U. S. A.-** = 2150.42 cu. in. Winchester- U. S. A. b.

Busz rhombohedron. A crystal model for demonstrating the double refraction of calcspar.

butacaine sulfate. Butyn (q.v.).

butadiene*- Bivinyl. **bromo-*** Bromoprene. **chloro-*** Chloroprene. **methyl-*** Isoprene. **b. dicarboxylic acid.** Muconic acid.

butadiine, butadiyne*. Biacetylene.

butagas. Compressed butane, used for domestic lighting and heating.

butalanin. *α*-Amino-i-*valeric acid.*

butaldehyde. Butyraldehyde.

butamin. Tutocaine.

butanal*. Butyraldehyde.

butanamide*. Butyramide.

butane. C_4H_{10} = 58.1. Tetrane, methyl ethyl methane. $MeCH_2.CH_2Me$. The fourth member of the aliphatic hydrocarbon series. A colorless gas, d_{air}. 2.046, m. −35, b.1; insoluble in water, slightly soluble in alcohol. It is a constituent of natural and illuminating gas. **iso-** Trimethylmethane, $CHMe_3$. A colorless gas, m. −145, b. −11, insoluble in water, soluble in alcohol or ether. **bromo-*** Butyl bromide. **chloro-*** Butyl chloride. **dibromo-*** Butylene bromide. **dihydroxy-** Butanediol*. **hydroxy-** Butyl alcohol. **diphenyl-** Dibenzyl ethane. **iodo-*** Butyl iodide. **nitro-*** $C_4H_9NO_2$ = 103.08. Butyl nitrite. A colorless liquid, b.151, slightly soluble in water. **phenyl-** Butyl benzene.

b. diamine. Putrescine. **b. dicarboxylic acid*.** Adipic acid.

butanedial*. Succinaldehyde.

butanediamide*. Succinamide.

butanediamine*. Putrescine.

butanediol*. $C_4H_{10}O_2$ = 90.1. Butylene glycol, dihydroxybutane. *α*- or **1.2-** $EtCHOH.CH_2.OH$. A colorless liquid, d.1.019, b.191. *β*- or **1.3-** $MeCHOH.CH_2CH_2OH$. A colorless liquid, d.1.0239, b.204. *γ*- or **1.4-** Tetramethylene glycol. $HO(CH_2)_4OH$. A colorless liquid, d.1.020, m.16, b.230. *ψ*- or **2.3-** $Me(CHOH)_2Me$. A colorless liquid, d.1.048, b.184. **dimethyl-** Pinacol.

butanedione*. $C_4H_6O_2$ = 86.1. A group of diketones; **1.3-** $HCO.CH_2.COMe$. **2.3-** Biacetyl.

butane-ol. Butyl alcohol.

butanoic acid. Butyric acid.

butanol*. Butyl alcohol.

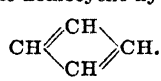
butanone*. Methylethylketone. **dimethyl-** Pinacoline. **hydroxy-** $Me.CO.CHOH.Me$. Acetoin. An ethereal liquid formed during fermentation by yeast.

butanoyl*. Is Butyryl.

butea gum. Bengal kino. The dried, red astringent juice of the dhak or pallas tree, *Butea frondosa*, a Leguminosae of India; used as an astringent. It contains 20–60 % kinotannic acid.

butenal*. Crotonaldehyde.

butene*. (1) C_4H_4 = 52.04. Dimethylene, cyclo butylene. The homocyclic hydrocarbon



(2) Butylene (butene*).

butenic acid. $C_4H_6O_2$ = 86.046. Butenoic acid*. *α*- See *crotonic* and *isocrotonic acid.* *β*- Vinylacetic acid, $CH_2{:}CH.CH_2.COOH$. A colorless liquid, d.1.007, m. −39, b.163, soluble in water, alcohol or ether. **iso-** methyl *acrylic acid.* **α-methyl-** See *angelic* and *tiglic acid.* *β*-**methyl-** Senecioic acid.

butenoic acid*. Butenic acid.

butenol*. C_4H_8O = 72.05. **1-** 1-buten-*1*-ol, $Me.CH_2.CH{:}CHOH$. **2-** *2-buten-1-*ol. $CH_3{-}CH{:}CH.CH_2.OH$. Crotonyl alcohol. **3-** *3-*buten-*1*-ol, $CH_2{:}CH.CH_2.CH_2OH$.

butenyl. The monovalent radical C_4H_7—, derived from butylene. There are Δ^1- $MeCH_2{-}CH{:}CH$—; Δ^2- $MeCH{:}CHCH_2$— and Δ^3- $CH_2{:}CH(CH_2)_2$—.

butesin. $C_{11}H_{15}O_2N$ = 193.12. *n*-butyl-*p*-aminobenzoate, $NH_2C_6H_4COOC_4H_9$. White crystals, m.57, b_{2mm}.147, insoluble in water, soluble in alcohol; used as a local anesthetic. **iso-** m.65. **b. picrate.** A yellow powder used as an analgesic and protective. It is a combination of trinitrophenol and b.

butine. C_4H_6 = 54.05. Butyne*. An unsaturated hydrocarbon containing a triple bond; as **T1-** Ethylacetylene, $CH{:}C.CH_2Me$. A colorless liquid or crystals, m.18. **T2-** Crotonylene.

Butler set. A wooden case containing a set of apparatus and reagents for blowpipe analysis.

butoxy. The monovalent radical, $Me(CH_2)_3O$—, derived from butanol.

butter. (1) A food prepared by churning cheese. It contains not less than 80 % of milk fat, some water, vitamins, small quantities of proteins, lactose and mineral salts. (2) A soft substance; as certain inorganic chlorides:

b. of antimony	antimonic chloride
b. of arsenic	arsenous chloride
b. of tin	stannic chloride
b. of zinc	zinc chloride

(3) A low-melting vegetable fat, **vegetable b., as**

bambuk b	from *Bassia Purkii*
cacao b	from *Theobroma cacao*
illipé b	from *Bassia* species
nutmeg b	from *Myristica fragrans*
otoba b	from *Myristica otaba*

b. fat. The oily portions of the milk of mammals composed of 88 % of the glycerides of oleic, stearic, and palmitic acids, and 6 % of the glycerides of butyric, caproic, caprylic, and capric acids; d.0.910–0.914, m.30–34. **b. rock.** A soft greasy compound of iron and aluminium

exuded from aluminiferous rocks. **b. yellow.** (1) A yellow dye often used for tinting butter, *e.g.*, tartrazine. (2) *p*-diaminoazo benzene. (3) *4*-dimethylamino benzene-*1*-azo naphthalene. (4) N, N'-dimethyl-*p*-amino-azo-benzene.

butternut. Tuglans. **b. tree.** A tree of the genus Bassia of the Sapotaccae. The seeds yield an oily fat which is used for soap or lamp oil.

button. A small round globe or sphere of metal found in the crucible after fusion, or on charcoal after reduction of an ore.

butvar. Trade name for a butyral polyvinyl plastic (q.v.).

butyl. Bu. **normal-** The monovalent hydrocarbon radical C_4H_9— or $CH_3.CH_2.CH_2.CH_2$—. **iso-** *i*-Bu. The monovalent hydrocarbon radical iso- C_4H_9—, or $(CH_3)_2CH.CH_2$—. **secondary-** The monovalent radical $CH_3.CH_2.CH.Me$.—. **tertiary-** The monovalent hydrocarbon radical $(CH_3)_3C$—.

b. acetate $C_6H_{12}O_2$ or MeCOOBu = 116.13. Colorless liquid, d_{20}°.0.872, b.125; slightly soluble in water, miscible with alcohol or ether; used as a solvent for lacquers. **b. alcohol.** Butyl alcohol (below). **b. aldehyde.** Butyraldehyde. **b. amine** $C_4H_{11}N$ or $BuNH_2$ = 73.15. Aminobutane (normal-). Colorless liquid, d_{20}°.0.740, b.78; soluble in alcohol, water or ether. (iso-) i-$BuNH_2$. Colorless liquid, d.0.736, b.66; miscible with water, alcohol or ether. **b. benzene** $C_{10}H_{14}$ or PhBu = 134.14. (iso-) A colorless liquid, d_{15}°.0.85, b.167. (sec.-) A colorless liquid, d_{15}°.0.873, b.171. **b. benzoate** $C_{11}H_{14}O_2$, PhCOOBu = 178.18. A colorless oily liquid d_{20}°.1.000, b.248.5; insoluble in water, miscible with alcohol or ether. (iso-) PhCOO *i*-Bu. A colorless liquid, d.1002, b.237, insoluble in water, miscible with alcohol or ether. **b. bromide** C_4H_9Br = 137.05. l-bromobutane*, BuBr. (normal-) A colorless oily liquid, d_{20}°. 1.279, b.101; insoluble in water, miscible with alcohol or ether. (iso-) l-bromo-isobutane i-BuBr. A colorless oily liquid. d.1.260, b.90; insoluble in water, miscible with alcohol or ether. **b. butyrate** $C_8H_{16}O_2$ or PrCOOBu = 144.17. (normal-) A colorless liquid, d_0°.0.888, b.165; slightly soluble in water, miscible with alcohol or ether. (iso-) PrCOO(i)-Bu. A colorless liquid, d.0.866, b.157; very slightly soluble in water, miscible with alcohol or ether. (iso-iso-) iso-butyl-isobutyric-ester. $Me_2CH.COO.CH_2CHMe_2$. A colorless liquid, d_0°.0.875, b.146; insoluble in water, miscible with alcohol. **b. carbamate** $C_5H_{11}O_2N$ or NH_2COOBu = 117.12. Colorless crystals. (iso-) $NH_2COOCH_2.CHMe_2$. Colorless crystals, m.55, b.207; insoluble in water, soluble in alcohol, or ether. **b. carbinol** $C_5H_{12}O$ or $Me_3C.CH_2OH$ = 88.13. Trimethylmethanecarbinol, trimethylethylalcohol, trimethylethanol. Colorless crystals, d_{20}°.0.812, m.52, b.113, slightly soluble in water, soluble in alcohol or ether. **b. carbitol.** See *carbitol*. **b. cellosolve.** See *cellosolve*. b. **chloral** $C_4H_5OCl_3$ = 175.43. Crotonchloral, trichlorbutyl aldehyde, $MeCHCl.CCl_2.COH$. A colorless liquid, d_{20}°.1.395, b.165; soluble in water, alcohol or ether. **b. chloralhydrate** $C_4H_7O_2Cl_3$ = 193.46. Crotonchloralhydrate, 2.2.3-trichlorbutan-1.1-diol, trichlorbutylidene glycol, $MeCHCl.CCl_2.CH(OH)_2$. Colorless crystals, m.-78; soluble in water. Used as an analgesic, hypnotic and teniafuge. **b. chloride** C_4H_9Cl = 92.54. (normal-) l-chlorobutane*, BuCl. A colorless liquid, d_{20}°.0.887, b.78; insoluble in water, miscible with alcohol or ether. (iso-) l-chloroisobutane. Me_2CHCH_2Cl. A colorless liquid, d.0.880, b.69; insoluble in water, miscible with alcohol or ether. (tert-) $Me_3C.Cl$. A colorless liquid, d_{15}°.0.847, b.51. **b. cyanide** C_5H_9N or BuCN = 83.06. Valeronitrile. A colorless liquid, d_{20}°.1.0, b.141; insoluble in water, soluble in alcohol or ether. (iso-) Me_2CHCH_2CN, isovaleronitrile. A colorless liquid d_{20}°.0.807, b.127; slightly soluble in water, miscible with alcohol or ether. (tert-) Me_3CCN. A crystalline solid, m.15, b.105. **b. ether** $C_8H_{18}O$ or Bu_2O = 130.19. B.-oxide, *1*-butoxy-butane*. A colorless liquid, d_{40}°.-0.769, b.141, soluble in water. (iso-) i-butyloxide *2*-(α-methyl propoxy) butane*. A colorless liquid, b.122°C, slightly soluble in water, miscible with alcohol or ether. **b. formate** $C_5H_{10}O_2$ or HCOOBu = 102.11. (normal-). Tetrylformate. A colorless liquid, d_0°.0.911, b.107, slightly soluble in water, miscible with alcohol or ether. (iso-) A colorless liquid, d_{20}°.0885, b.98.5, miscible with alcohol or ether. **b. hydrate.** B. alcohol. **b. hydride.** Butane. **b. iodide** C_4H_9I or BuI = 184.06. *1*-iodobutane*. (normal-). A colorless liquid, d_{20}°.1.617, b.130; insoluble in water, miscible with alcohol or ether. (iso-). *1*-iodo-*2*-methyl propane*. A colorless liquid, d_0°.1.640, m. −90, b.120; insoluble in water, miscible with alcohol or ether. (sec-) $Me.CH_2.CHIMe$. *2*-iodobutane*. A colorless liquid, d_0°.1.626, b.118. (tert-) Me_3CI. *2*-iodo-*2*-methyl propane*. A colorless liquid, d_0°.1.571, b.99. **b. isobutyrate.** See *b. butyrate*. **b. isocyanide** C_5H_9N or BuNC = 83.10. Isobutylisocyanide, butylcarbylamine*. A colorless liquid, d_4°.0.787, m.115; slightly soluble in water, miscible with alcohol or ether. **b. isovalerate.** See *b. valerate*. **b. ketone** $C_8H_{16}O$ or Bu.CO.Bu = 142.20. Isobutylketone. A colorless liquid, d_{20}°.0.833, b.181; slightly soluble in water, miscible with alcohol or ether. **b. mercaptan.** C_4H_9SH = 90.16. *1*-Butanethiol*. A colorless liquid, d_0°.0.858, b.92. It occurs in the odorous secretion of the skunk. **b. mustard oil** C_5H_9NS or BuNCS = 115.19. B. sulfocyanide. A colorless liquid, b.167; insoluble in water, miscible with alcohol or ether. (iso-) i-butyl mustard oil, i-butylsulfocyanide. i-butylrhodanate. A colorless liquid, d_{20}°.0.943, b.162; insoluble in water, miscible with alcohol or ether. (sec.-) $Me.CH_2.CH(NCS)Me$. A colorless liquid, d_{12}°.-0.944, b.160. (tert.-) $Me_3C.NCS$. An oily liquid, d_{10}°.0.919, b.140, m.10.5. **b. nitrate*** $C_4H_9O_3N$ or $BuNO_3$ = 119.13. Iso-butyl nitrate. A colorless liquid d.1.021, b.123; insoluble in water, miscible with alcohol or ether. **b. nitrite*** $C_4H_9O_2N$ or $BuNO_2$ = 103.10. Isobutyl nitrite. A colorless liquid, d_0°.0.908, b.67; soluble in alcohol. It also occurs in the tautomeric nitroso form, BuONO. **b. oxide.** B. ether. **b. oxide linkage.** A bond between the first and fourth C atom of a chain through an O atom. Cf. *sugar, furanose*. **b. phenylate.** B. phenyl ether. **b. phenyl ether** $C_{10}H_{14}O$ = 150.14. Phenylbutyl oxide. Butyl phenylate, BuOPh. A colorless liquid, d.0.935, b.198; insoluble in water, miscible with alcohol or ether. It is an antiseptic. **b. phenyl ketone** $C_{11}H_{14}O$ = 162.17. Phenylpentanone, Bu.CO.-

Ph. (normal-). A colorless liquid, b.239.5, miscible with alcohol or ether, insoluble in water. (iso-). A colorless liquid, d.0.993, b.225; insoluble in water, soluble in alcohol or ether. **b. phthalate.** $C_6H_4(COOBu)_2$. A colorless liquid, b_{20mm}.204, used instead of mercury in diffusion pumps. **b. propionate** $C_7H_{14}O_2$ = 130.14. iso-butylpropionate, EtCOOBu. A colorless liquid with a pleasant aromatic odor, d.0.893, b.136; soluble in alcohol. Used in fruit essences. **b. rhodanate.** B. mustard oil. **b. sulfide.** $C_8H_{18}S$ = 146.24. (normal-) Bu_2S. A colorless liquid, d.0.852, m. −79.7, b.182; insoluble in water. (iso-) $(Me_2CH.CH_2)_2S$. (sec-) $(MeCH_2CHMe)_2S$. A colorless liquid, d.0.832, b.165. **b. sulfocyanide.** B. mustard oil. **b. valerate** $C_9H_{18}O_2$ = 158.18. (normal-) n-butyl-n-valerate, BuCOOBu. A colorless liquid, b.184; soluble in alcohol; used as a flavoring agent in fruit essences. (iso-) $Me_2CHCH_2COOCH_2CHMe_2$, i-butyl-i-valerate. A colorless liquid, d.0.848, b.169; insoluble in water, miscible with alcohol or ether.

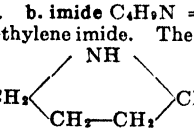
butyl alcohol. $C_4H_{10}O$ or BuOH = 74.10. Butanol*, butylhydroxide, hydroxybutane. (iso-) $Me_2CH.CH_2OH$. Colorless liquid, $d_{25°}$.0.7980, m. −108, b.107.87; slightly soluble in water, miscible with alcohol or ether. (**normal-**) See *primary*. (**primary-**) $Me.CH_2.CH_2.CH_2OH$. 1-butanol*, propylcarbinol. (normal-) A colorless liquid, $d_{25°}$.0.8057, b.117.7; miscible with alcohol or ether; used as a solvent, defrother, dehydrator and penetrant. (**secondary-**) $MeCH_2CHMeOH$. *2*-butanol*, ethylmethylcarbinol. A colorless liquid, $d_{25°}$.0.8027, b.99.52; soluble in water, alcohol or ether. (**tertiary-**) Me_3COH. *2*-methyl-*2*-propanol. A colorless liquid or rhombic crystals, $d_{22°}$.0.781, m.25, b.83; miscible with water, alcohol or ether. **tribromo-** Brometone. **trichloro-** Chloretone.

butyl aminobenzoate. Butesin (q.v.).

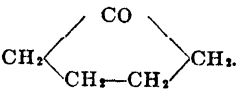
butyl rubber. A generic name applied to vulcanizable elastic copolymers of isobutylene and small amounts of diolefins.

butylene. (1) C_4H_8 = 56.06. A gaseous hydrocarbon occurring in three isomeric forms: α-, Δ^1-, or 1-butene, ethylethylene, $CH_2{:}CH{-}CH_2Me$, m. −130, b. −18. β-, Δ^2- or 2-butene, Ψ-butylene, dimethylethylene, $MeCH{:}CHMe$, b.1; it is used as an anesthesizing gas to substitute nitrous oxide. γ-, **iso-** or 2-methylpropene, $Me_2C{:}CH_2$. A volatile liquid or a gas, b. −6. ψ- or **pseudo-** β- Butylene. (2) The divalent $C_4H_8{=}$ radical derived from butane. **di iso-** C_8H_{16} = 112.12. The hydrocarbon $CMe_3.CH_2.CH{:}CH_2$. *2.2.4*-trimethyl-1-pentene. **tri iso-** $C_{12}H_{24}$ = 168.18. The hydrocarbon $CMe_3.CH_2.CMe{:}CHCMe_3$. *2.2.4.6.6*-pentamethyl-3-heptene. **methyl-** Pental.

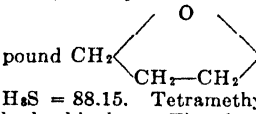
b. bromide $C_4H_8Br_2$ = 215.90. 1.2-Dibromo-i-butane, i-butylenebromide, $Me_2CBr.CH_2Br$. A yellow liquid, d.1.798, b.158; miscible with alcohol. (*pseudo-*) β-butylenebromide. 2.3-dibromobutane $MeCHBr.CHBrMe$. A yellow liquid, d.1.821, b.158; soluble in alcohol. **b. glycol.** Butanediol. **b. imide** C_4H_9N = 71.10. Pyrrolidine, tetramethylene imide. The heterocyclic compound,



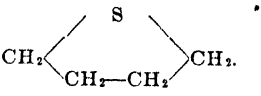
b. ketone C_5H_8O = 84.08. Ketopentamethylene. The homocyclic compound,



b. oxide C_4H_8O = 72.08. Tetramethylene oxide, tetrahydrofuran. The heterocyclic compound



b. sulfide C_4H_8S = 88.15. Tetramethylene sulfide, tetrahydrothiophen. The heterocyclic compound



butylidene. The divalent radical, $Me(CH_2)_2CH{=}$.

butyn. $(C_{18}H_{30}N_2)_2.H_2SO_4$ = 646.5. Butacaine sulfate. The hydrosulfate of γ-dibutylaminopropyl-p-aminobenzoate. $(NH_2.C_6H_4.COO.CH_2.CH_2.CH_2.NBu_2)_2H_2SO_4$. A colorless crystalline substance, m.-99, soluble in water; used as a cocaine substitute in local anesthesia.

butyne*. Butine.

butyraldehyde. C_4H_8O = 72.08. Butanal*, butylaldehyde, butal, butyric aldehyde, butyral, PrCHO. A colorless liquid, b.77. **iso-** $Me_2CH.CHO$. A colorless liquid, d.0.794, b.63; miscible with water, alcohol, or ether. **hydroxy-** Aldol. **trichloro-** Butyl chloral.

butyramide. C_4H_9ON = 87.13. Butyric amide, butanamide*, $PrCONH_2$. Colorless scales, m.-115, b.216; soluble in water, alcohol, or ether. **iso-** $Me_2CH.CONH_2$. A crystalline solid, m.118, b.217; soluble in water or alcohol, slightly soluble in ether.

butyrase. An esterase. See *enzymes*.

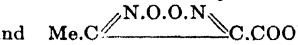
butyrate. A salt or ester of butyric acid containing the monovalent $C_4H_7O_2$— or PrCOO— radical.

butyrelite. Bog butter. A fatty substance found in peat.

butyric acid. $C_4H_8O_2$ = 88.80. Butanoic acid*, ethylacetic acid. The fourth member of the fatty-acid series, $Me.CH_2.CH_2.COOH$ or PrCOOH. (normal-). A colorless liquid of unpleasant and penetrating odor, d.0.960, m. −8, b.162.5; miscible with water, alcohol or ether. It is produced in fermentation, during the decay of cheese, (see fermentation *b.*); is used as a reagent in bacteriological and physiological work; as a flavor in food products; and in the preparation of esters for fruit essences. (iso-) $Me_2CHCOOH$. A colorless liquid, d.-0.947, m.80, b.155.5; slightly soluble in water, miscible with alcohol or ether. **amino-** $C_4H_9O_2N$ = 103.77. Aminobutanoic acid*. **α- or 1-** $NH_2.CHEt.COOH$. Crystals, m.285. **β- or 2-** $NH_2CHMe.CH_2COOH$. Crystals, m.-184. **γ- or 3-** $NH_2(CH_2)_3COOH$. Crystals, m.193. **iso-** $NH_2.CMe_2.COOH$. Liquid, b.-280. **α-amino-β-hydroxy-** $NH_2.CH(CHOH.Me)COOH$. A constituent of proteins. Cf. *amino acids*. **aminomethyl-** Isovaline. **chloro-** $C_4H_7O_2Cl$ = 122.51. **α- or 1-** $EtCHCl.COOH$. b_{15mm}.101. **β- or 2-** $MeCHCl.CH_2.COOH$. m.44 b_{12mm}.100. **β(*dl*)- or 2(*dl*)-** m.16, b_{22mm}.116. **γ- or 3-** $Cl(CH_2)_3COOH$. m.16, b_{22mm}.196. **hydroxy-** $C_4H_8O_3$ = 104.08. $EtCHOHCOOH$. Colorless crystals m.43, b.255 (decomp.); soluble in water, alcohol or ether. It is one of the "acetone bodies" of the blood. **hydroxyethyl-**

Diethoxalic acid. **keto-** Acetoacetic acid. **methyl-** β- Isovaleric acid. α- Hydroangelic acid. **oxy-** See *hydroxy-b*. **trihydroxy-** Erythric acid.

b. aldehyde. Butyraldehyde. **b. amide** C_4H_9ON = 87.13. i-butyric amide, $Me_2CH.CONH_2$. Colorless leaflets, m.129, b.216; soluble in water, alcohol or ether. **b. anhydride** $C_8H_{14}O_3$ = 158.16. (normal-) PrCO.O.OCPr. A colorless liquid, d.0.978, b.192; decomp. by water or alcohol to form the acid; soluble in ether. (iso-) $Me_2CHCO.O.COCHMe_2$. A colorless liquid, d.0.957, b.182.5; decomp. in water or alcohol. **b. fermentation.** The production of b. acid by fermentation of sugar or starch by fission ferments, such as *B. butylicus*, in presence of calcium carbonate as neutralizing agent. **b. di-i-nitroso peroxide** $C_4H_4O_4N_2$ = 144.06. Peroxide di-iso-nitrosobutyric acid.

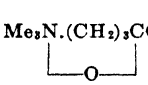


The compound Me.C(N.O.O.N)C.COOH. Colorless crystals, m.92.

butyrin. $C_{15}H_{26}O_6$ = 302.28. Tributyrin, triglycerol butyrate, glycerin tributyric ester. $(PrCOO)_3C_3H_5$. A yellowish liquid, d.1.052, b.285; insoluble in water, miscible with alcohol or ether. It is a constituent of butter fat. Cf. *glycerides*.

butyrinase. An enzyme of blood serum which hydrolyzes butyrin to glycerol and butyric acid.

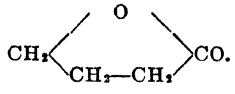
butyrobetaine. The base,



m.130, b.220, occurring in mussels (*Arca noae*), snakes (*Python moluris*) and anthozoans (*Actinia equina*).

butyroin. $C_8H_{16}O_2$ = 144.3. 5-hydroxy-4-octanone, Pr.CO.CHOH.Pr.

butyrolactone. $C_4H_6O_2$ = 86.6. 4-Hydroxybutanoic acid lactone*, butanolide. The inner anhydride of butyric acid,



A colorless liquid, b.204.

butyrometer. A device, to determine the amount of butter-fat in milk.

butyrone. $C_7H_{14}O$ = 114.11. Dipropylketone, 4-heptanone*, Pr.CO.Pr. A colorless liquid distilled from calcium butyrate, $d_{15°}$.0.821, m. −32.6, b.143.5; used as a solvent.

butyronitrile. Propylcyanide.

butyrophenone. $C_{10}H_{12}O$ = 148.09. Phenyl-*n*-propyl ketone, $PhCOCH_2CH_2Me$. A colorless liquid, d.0.988, m.11, b.232.3; used in organic synthesis. **iso-** Phenyl-*i*-propyl ketone, $Ph.COCHMe_2$. A liquid, d.0.984, b.217.

butyrous. Butter-like in consistency; *e.g.*, a bacterial culture.

butyrum. Latin for butter. **b. antimonii.** Antimonous chloride.

butyryl. (normal-). The monovalent —C_4H_7O or PrCO— radical derived from n-butyric acid. (iso-) The monovalent Me_2CHCO— radical derived from i.butyric acid.

b. chloride. C_4H_7OCl = 106.53. (normal-) Butanoyl chloride*. PrCOCl. A colorless liquid, d.1.026, b.101. (iso-) $Me_2CH.COCl$. A colorless liquid, d.1.0174.

buxidine. An alkaloid from the leaves of *Buxus sempervirens*. It crystallizes as colorless prisms.

buxine. $C_{19}H_{21}O_3N$ = 311.22. An alkaloid from the leaves of *Buxus sempervirens*, a Buxaceae probably identical with bebeerine. **pseudo-** $C_{24}H_{48}ON_2$ = 380.50. Ψ-buxine. An alkaloid from the leaves of *Buxus sempervirens*.

Buxton's fluid. A mixture of 50 cc. H_2O, 20 cc. glycerin, 40 gm. gum arabic, 50 gm. chloral hydrate and 0.5 gm. cocaine hydrochloride, used to mount microscopic specimens (arthropods) directly on the slide.

buyo. Betel-nut.

buzane. Bihydrazine.

buzylene. (1) Isotetrazene, diazohydrazine. An unisolated azohydroxylamine compound, $HN:N.NH.NH_2$ which occurs in certain compounds; as, hippuryl-phenyl-buzylene. Cf. *tetrazone*. (2) The bivalent —N:N.NH.NH— radical. **dihydro-** Bihydrazine.

byerite. A bituminous coal resembling albertite.

byerlite. A substance resembling asphalt, made by heating petroleum residues with sulfur in presence of air.

bynin. Hordenin. A gliadin from malt. Cf. *proteins*.

by-product. A material obtained in addition to the principal or primary material in a manufacturing process.

byssinosis. A form of asthma sometimes affecting workers in textile factories.

byssochlamic acid. $C_{18}H_{30}O_6$ = 332.1. The dianhydride of a tetrabasic acid, produced by the action on it of the mold *Byssochlamis fulva*.

byssus. (1) Flax. (2) Lint. (3) The protein threads which attach the edible sea mussel (*Mytilus*) to rocks.

bythium. Eka-tellurium. A supposed element of the sulfur group.

bytownite. A triclinic feldspar of the anorthite type. Cf. *silica minerals*.

Bz. (1) The benzoyl radical, PhCO—. (2) The benzene ring, similar to Py (= pyridine ring). See *quinoline*.

BzH Benzaldehyde.

BzOH Benzoic acid.

C

C (1) The symbol for carbon. (2) Abbreviation for constant. °C. The symbol for degree centigrade or Celsius. **C acid.** 2-Naphthylamine-4, 8-disulfonic acid.

C. Abbreviation for concentration. C_v, C_p. The symbols for molecular heat at constant volume or pressure. C_H. Hydrogen ion concentration.

c. Symbol for (1) the velocity of light in a vacuum: $c = (2.99796 \pm 0.00004) \times 10^{10}$ cm. sec^{-1}; (2) specific heat.

C. N. Coordination number.

C. P. Chemically pure.

Ca. (1) The symbol for calcium. (2) Abbreviation for centare. (3) Abbreviation for cathode.

ca. Abbreviation for candle, centare, and circa.

cabasite. Chabazite.

cabbage. The vegetable *Brassica oleracea*, a Cruciferae. **c. seed oil.** The edible fatty oil from the seeds of *Brassica oleraceae*, a Cruciferae; used in soaps, ointments, liniments and as a substitute for olive oil. **c. sugar.** A triose isolated from c. leaves. **c. tree bark.** Yaba bark.

cabrerite. A native arsenate of nickel and cobalt, $(Ni,Co)_3As_2O_8.8H_2O$, which occurs in green fibrous masses.

cacaine. Theobromine.

cacao. Cocoa. **c. butter.** Oil of theobroma. The yellow oil expressed after beating and crushing the seeds of *Theobroma cacao*. It has a low m. and is used for receptacles for drugs. **c. red** $(C_{17}H_{16}O_7)x$. The red pigment of c.; soluble in ether or alcohol.

cacaorin. $C_{60}H_{84}N_4O_{15}$. A bitter glucoside from raw cacao beans; oxidized to glucose, theobromine and cacao red.

cacodiliacol. Guaiacol cacodylate.

cacodyl. (1) *Dicacodyl.* (2) The monovalent radical C_2H_6As— or $AsMe_2$—, derived from arsine. **di-** $C_4H_{12}As_2$ = 210.1. Dicacodyl, tetramethyl arsine. $Me_2As.AsMe_2$. A colorless poisonous liquid, m.−6, b.170. **ethyl-** $C_8H_{20}As_2$ = 275.9. Tetraethylarsine. $Et_2As.AsEt_2$, a colorless liquid, b.185. (2) Diethylarsine.

c. chloride $AsClMe_2$ = 140.56. Dimethylarsenic chloride. A colorless liquid b.100. **c. cyanide** $AsMe_2CN$ = 131.06. Dimethylarsenic cyanide. Colorless crystals, m.33, b.140. **c. hydride** $AsMe_2H$ = 106.07. Dimethylarsine. A colorless volatile liquid, d.-1.213, b.36, miscible with alcohol, ether or chloroform. **c. oxide** $C_4H_{12}OAs_2$ = 226.1. Dimethylarsine oxide, dimethyl arsenious oxide, alkarsine, $AsMe_2.O.AsMe_2$. A colorless liquid, d.1.642, m.−25, b.120.

cacodylates. The salts of the monobasic cacodylic acid, containing the $AsO.Me_2.O$— radical. They are usually soluble in water, and are the least toxic and irritating arsenic preparations, especially for hypodermic injections. **thio-** The salts of the monobasic thiocacodylic acid containing the $Me_2AsO.S$— radical; insoluble in water, and prepared by the action of H_2S upon cacodylates.

cacodylic acid. $C_2H_7O_2As$ = 138.1. Dimethylarsinic acid, alkargen. The monobasic acid $Me_2AsO.OH$. Colorless crystals, m.200, soluble in water or alcohol; used in organic synthesis and in the manufacture of cacodylates. **ethyl-** Diethylarsinic acid.

cacotheline. $C_{20}H_{22}N_2O_4(NO_2)_2$ = 462.2. A red compound formed from brucine by the action of nitric acid; it forms green and violet salts with SO_2 and $SnCl_2$, and is a reagent for tin.

cacoxenite. A yellow phosphate of iron which occurs with limonite.

cactine. An alkaloid from *Cereus grandiflorus* (night blooming cactus).

cactoid. The combined principles from the freshly tinctured leaves and stems of *Cereus grandiflorus;* used as a heart stimulant.

cactus. A family of plants, Cactaceae, with succulent stems and thorny leaves, including the genera: *Anhalonium*, *Cereus* and *Opuntia*. Cf. *prickly pear*, *mescal buttons*, *cochineal*. **c. alkaloids.** See *anhalonium alkaloids*, *cactine*, *pilocerine*, *pectenine*.

cadalene. $C_{15}H_{18}$ = 198.14. *3.8*-Dimethyl-*5*-isopropylnaphthalene. A reduction product of cadinene and zingiberene.

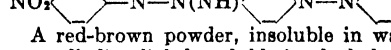
cadaverine. $C_5H_{14}N_2$ = 102.1. Pentamethylene diamine, 1.5-pentanediamine*, *1.5*-diaminopentane, amylene diamine. $NH_2(CH_2)_5NH_2$. A ptomaine formed by the hydrolysis of proteins and putrefying animal tissues. It is an isomer of sapin. Colorless liquid, d.0.885, m.9; b.178.

cadaverines. Ptomaines.

cade oil. Juniper tar oil. The yellow essential oil obtained in the dry distillation of *Juniperus oxycedrus* and other species; d.0.980–1.055. Soluble in alcohol, ether, or carbon disulfide; the chief constituent is cadinene. Used in soaps, ointments, and pharmaceutical products.

cadinene. $C_{15}H_{24}$ = 204.2. A sesquiterpene, d.0.918, b.275, and constituent of essential oils from juniper species and cedars. It is probably *3.8*-dimethyl-*1.4.7*-trihydro-*5*-isopropyl naphthalene.

cadion. p-Nitrobenzene diazoamino azo-benzene.



=346.3.

A red-brown powder, insoluble in water, acids or alkalis, slightly soluble in alcohol or acetone. It is a reagent for cadmium (pink colour) and magnesium (blue colour). **c.-2D.** 4-nitro naphthalene diazo amino azo benzene. It is also used as a reagent for cadmium.

cadmia. An ancient name for zinc or zinc carbonate.

cadmium. Cd = 112.41. An element of the zinc family, atomic number 48. A white, ductile metal, d.8.625, m.321.6, b.778; insoluble in water, dissolved by acids. It is found in zinc ores, and obtained as a by-product in the distillation of zinc. Cadmium is generally divalent

and closely associated with zinc, but compounds with monovalent cadmium (cadmous) have been prepared. Its compounds are poisonous and its salts are little ionized. It was discovered in 1817 simultaneously by Strohmeyer and Herman, and is used mainly for electrodes in standard cells, and as a constituent of alloys of low melting point, (*e.g.* Wood's alloy). **c. acetate.** $Cd(OOCMe)_2.3H_2O$ = 284.5. White monoclinic crystals, d.2.01, soluble in water. It is a reagent for determining sulfur, selenium or tellurium in iron and steel, and is also used in dentistry. **c. alloys.** A mixture of cadmium with other metals. The m. of some alloys, in °C, are:

Cd.....	90 %	80 %	70 %	60 %	50 %
with	10 %	20 %	30 %	40 %	50 %
Ag.....	420°	520°	610°	700°	760°
Na.....	390°	360°	340°	330°	352°
Tl.....	300°	285°	270°	262°	258°
Zn.....	280°	270°	295°	313°	327°

c. amalgam. An amalgam of cadmium and mercury, used in dentistry and for the cadmium cell (q.v.). **c. boro-tungstate.** $Cd_2B_2W_9O_{32}.18H_2O$ = 2739.1. Yellow crystals or a yellow liquid, d.3.28; soluble in water, and used in mineralogy for separating minerals and metals mechanically (see *Klein's liquid*). **c. bromate.** $Cd(BrO_3)_2$ = 368.2. A colorless crystalline powder which is soluble in water. **c. bromide.** $CdBr_2$ = 272.2. Colorless crystals, $d_{25°}$.5.192, m.568, b.810; soluble in water, alcohol, or ether. (**cryst.**) $CdBr_2.4H_2O$ = 344.3. White crystals, soluble in water, alcohol or ether; used in photography. **c. carbonate.** $CdCO_3$ = 172.4. Otavite. White rhombic crystals or an amorphous powder, $d_4°$.4.258, decomp. on heating; insoluble in water, soluble in acids or ammonium salt solutions. **c. cell.** C. normal element. **c. chlorate.** $Cd(ClO_3)_2$ = 279.2. White crystals, soluble in water. **c. chloride.** $CdCl_2$ = 183.3. White crystals, d.8.32; soluble in water, alcohol or ether. (**cryst**) $CdCl_2.2H_2O$ = 219.3. White monoclinic crystals; soluble in water, alcohol or ether. It is a reagent for pyridine bases, and is used in photography, the dye industry, and in textile printing. **c. chloroacetate.** (1) *mono-* $(CH_2Cl.COO)_2Cd.6H_2O$ = 407.45. Colorless crystals, d.1.942. (2) *di-* $(CHCl_2.COO)_2Cd.H_2O$ = 386.27. Colorless crystals, d.2.132. (3) *tri-* $(CCl_3.COO)_2Cd.1\frac{1}{2}H_2O$ = 464.18. Rhombic crystals, d.2.093. **c. cinnamate.** $(C_6H_5.CH{:}CHCOO)_2Cd$ = 406.52. White powder, insoluble in water. **c. cyanide.** $Cd(CN)_2$ = 164.1. A colorless powder, soluble in water or alcohol. **c. diethyl*** $Cd(C_2H_5)_2$ = 170.49. Ethylcadmium. A colorless liquid, d.1.653, m. −21, b_{20mm}.64. **c. dimethyl*.** $Cd(CH_3)_2$ = 142.16. Methylcadmium. A colorless liquid, d.1.9846, m. −4.5, b.106. **c. ferricyanide.** $Cd_3[Fe(CN)_6]_2$ = 972.7. A brownish-red crystalline powder, soluble in water. **c. ferrocyanide.** $Cd_2Fe(CN)_6$ = 436.2. A yellow crystalline powder, soluble in water. **c. fluoride.** CdF_2 = 150.4. White crystals, d.6.64, m.520, b.1000; soluble in water or alcohol. **c. fluosilicate.** $CdSiF_6$ = 254.47. C. silicofluoride. Hexagonal, white crystals, soluble in water or alcohol. **c. formate.** $Cd(OOCH)_2$ = 202.1. A colorless powder, d.2.44, which is soluble in water. **c. fumarate.** $Cd_2C_4H_2O_4$ = 338.84. A white powder, insoluble in water. **c. hydroxide.** $Cd(OH)_2$ = 146.4. White hexagonal crystals, $d_{15°}$.4.79; slightly soluble in water, soluble in acids or ammonium salt solutions. **c. iodate.** $Cd(IO_3)_2$ = 462.27. A white crystalline powder, d.6.48, decomp. on heating, slightly soluble in water, soluble in acids or ammonium salt solutions. It forms the hydrate $Cd(IO_3)_2.H_2O$ = 480.20; and the ammonate $Cd(IO_3)_2.4NH_3$ = 530.4, which explodes on heating. **c. iodide.** CdI_2 = 366.27. Colorless scales which occur in two allotropic modifications: α- d.5.67, m.388, b.712; and β- d.5.30, m.404. Soluble in water, alcohol, ether, or ammonium hydroxide. Used as a reagent for alkaloids and nitrous acid; in photography; and medicinally, as an antiseptic, in ointments. **c. lactate.** $Cd(C_3H_5O_3)_2$ = 290.2. A colorless powder, slightly soluble in water. **c. line.** The red radiation from c. vapor which serves as the fundamental standard of length; 1,533,164.14 waves equal one meter. **c. lithopone.** See *lithopone*. **c. malate.** $Cd_2C_4H_2O_4.2H_2O$ = 374.87. A white powder, slightly soluble in water. **c. methide.** $Cd(CH_3)_2$ = 142.4. Dimethylcadmium, $CdMe_2$; sometimes used in Grignard's reaction. **c. minerals.** Cd always occurs in association with zinc, though in small quantities, and is a relatively rare element. Its chief ores are greenockite CdS, and the carbonate and oxide. Zn is 200 times more abundant than cadmium. **c. nitrate.** (1) $Cd(NO_3)_2$ = 236.42. Colorless powder, m.350. (2) hydrate: $Cd(NO_3)_2.4H_2O$ = 308.49. Colorless prismatic needles, d.2.455, m.59.4°, b.132; soluble in water or alcohol. It is a reagent for zinc and ferrocyanides; used in the manufacture of cadmium yellow, and in the glass industry and ceramics for obtaining yellow glazes or orange colors. **c. normal element.** C. cell, Weston element. An H-shaped glass vessel with platinum contacts used as a standard cell for potentiometric measurements. The cathode is Cd-amalgam, the anode mercury, and the electrolyte saturated Cd sulfate solution. A reproducible potential of 1.0186 volts, at 18°C, is obtained. **c. oxalate.** CdC_2O_4 = 200.41. A white powder, d.3.32, m.340. (2) hydrate $CdC_2O_4.3H_2O$ = 254.46. A white powder, insoluble in water, soluble in acids or dilute ammonium hydroxide. **c. oxide.** (1) CdO = 128.41. An amorphous brown or yellow powder, or cubical crystals, d.6.95 to 8.15; insoluble in water soluble in acids or ammonium salt solutions. (2) Cd_2O = 240.82. Cadmous oxide. A yellowish powder, d.8.192; decomp. when heated. (3) Cd_4O = 465.64. Cadmium suboxide. A brown amorphous powder, decomp. by water, acids, or ammonium hydroxide. (4) Cd. peroxide. An insoluble compound, CdO_2, Cd_3O_5 or Cd_5O_8. **c. oxybromide.** $CdO.CdBr_2.H_2O$ = 418.67. A yellow powder, d.4.87, decomp. by water. **c. oxychloride.** $CdO.CdCl_2.H_2O$ = 329.75. A colorless powder, d.4.56, decomp. 280; slightly soluble in hot water, and slowly decomp. by it. **c. permanganate.** $Cd(MnO_4)_2$ = 350.0. A purple crystalline powder, soluble in water. **c. peroxide.** C. oxide (4). **c. phosphate.** $Cd_3(PO_4)_2$ = 526.0. A white powder, insoluble in

water. **c. plating.** A coating of c. on iron wire, springs, tools and other steel articles, to make them rust-proof. **c. potassium cyanide.** $Cd(CN)_2.2KCN$ = 294.5. A white crystalline powder, soluble in water. **c. potassium iodide.** $CdI_2.2KI.H_2O$ = 716.31. A white powder which yellows on aging; soluble in water or alcohol. It is a reagent for alkaloids. **c. red.** (1) A mixture of C. selenide, sulfide and $BaSO_4$. (2) A mineral pigment containing 60 % Cd, 25 % S and 15 % Se. **c. salicylate.** $Cd(C_7H_5O_3)_2.H_2O$ = 404.1. White needles, soluble in water or alcohol; used as an astringent in ophthalmology. **c. selenate.** $CdSeO_4$ = 255.1. A colorless crystalline powder, soluble in water. **c. selenide.** CdSe = 191.6. A red powder, insoluble in water; used in rubber manufacture to increase resistance to abrasion. **c. silicofluoride.** C. fluosilicate. **c. suboxide.** Cd_4O = 465.64. C. oxide (3). **c. succinate.** $CdC_4H_4O_4$ = 228.0. A white powder, slightly soluble in water, soluble in alcohol. **c. sulfate.** $CdSO_4$ = 208.0. White rhombic crystals, d.3.05, m.1000; soluble in water, insoluble in alcohol. (cryst.) (1) $CdSO_4.4H_2O$ = 280.5. White crystals, d.3.05; soluble in water. (2) $3CdSO_4.8H_2O$ = 769.5. White monoclinic crystals, $d_{25°}$.3.087; soluble in water or alcohol. Used in electrotechnics for filling cadmium normal cells; and medicinally as an antiseptic and astringent in eye-washes. **c. sulfide.** CdS = 144.5. Greenockite. Two modifications: (1) *orange.* A reddish-yellow powder, insoluble in water; used as a pigment and in pyrotechnics. (2) *light yellow.* Cadmium yellow, jaune brillant. Yellow hexagonal crystals or powder, d.4.8; insoluble in water, used as a pigment for yellow and greenish tints and for coloring soaps, in ceramics, rubber and pyrotechnics. **c. sulfite.** $CdSO_3$ = 192.0. A white powder, slightly soluble in water. **c. tartrate.** $Cd(C_4H_4O_6)(H_2O)$. A white crystalline powder, slightly soluble in water, soluble in acids. **c. tungstate.** $CdWO_4$ = 360.0. A colorless powder insoluble in water. **c. valerate.** $Cd(C_5H_9O_2)_2$ = 314.2. Colorless scales, soluble in water or alcohol; used as an antispasmodic. **c. wolframate.** C. tungstate. **c. yellow.** C. sulfide.

cadmous. A compound of monovalent Cd; as, cadmous oxide, Cd_2O.

cæ. See *ce.*

Cæsalpinia, Caesalpinia. A genus of trees, Leguminosae, of tropical and subtropical countries:

C. coriaria.....	dividivi, ellagitannic acid
C. sappan.....	brazilwood, sappan wood
C. bonducella.....	bonducin

cæsium, caesium. See *cesium.*

caferana. Tachia. The dried roots of *Tachia guianensis,* a Gentianaceae of Brazil; used as a tonic and antiperiodic.

caferanine. A crystalline principle in caferana.

caffalic acid. $C_{34}H_{54}O_{15}$ = 702.4. An acid in coffee.

caffeic acid. $C_9H_8O_4.\frac{1}{2}H_2O$ = 189.12. 3.4-dihydroxycinnamic acid, 3.4-dioxyphenyl acrylic acid. Yellow prisms in black fir resin, m.195, decomp. on further heating; soluble in water or alcohol. **dimethylhydro-** $C_{11}H_{14}O_4$ = 210.11. Colorless crystals, m.96. **hydro-** $C_9H_{10}O_4$ = 182.08. 3.4-dioxyphenyl propionic acid. Colorless crystals, m.213.

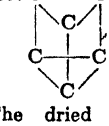
caffeine. $C_8H_{10}O_2N_4.H_2O$ = 212.30. Theine, methyltheobromine, 1.3.7-trimethyl-xanthine, guaranine, caffëine, psoraline. A diureide found in coffee, tea, and cola nuts, as long white needles of bitter tasts, $d_{19°}$.1.23, m.230, b.235; soluble in water, alcohol, ether or chloroform. Used medicinally as a diuretic or heart stimulant. **bromo-** See *bromo c.* **chloral-** See *chloral c.* **ethoxy-** See *ethoxy c.* **hydroxy-** $C_8H_{10}O_3N_4$ = 210.2. 1.3.7-trimethyl-uric acid. Fine white needles, m.345, soluble in hot water, acids or alkalis; used as a diuretic. **phenoxy-** See *phenoxy c.*

c. arsenate. $C_8H_{10}N_4O_2.H_3AsO_4$ = 336.1. A white powder, soluble in hot water; used for neuralgia. **c. benzoate.** $C_8H_{10}N_4O_2.C_7H_6O_2$ = 316.23. A white, crystalline powder, soluble in water or alcohol. **c. citrate.** $C_8H_{10}O_2N_4.C_6H_8O_7$ = 386.25. A white, crystalline powder, soluble in water, alcohol or chloroform; used similarly to caffeine. **c. hydrobromide** $C_8H_{10}O_2N_4.HBr$ = 275.03. A white, crystalline powder, soluble in water. **c. hydrochloride.** $C_8H_{10}O_2N_4.HCl + 2H_2O$ = 266.56. A white powder, which is soluble in water. **c. nitrate.** $C_8H_{10}O_2N_4.HNO_3$ = 257.30. A white, crystalline powder, soluble in water. **c. phenylate.** $C_8H_{10}O_2N_4.C_6H_6O.H_2O$ = 306.35. A white, crystalline powder, soluble in water. **c. salicylate.** $C_8H_{10}O_2N_4.C_7H_6O_3$ = 332.33. A white, crystalline powder, soluble in water or alcohol. **c. sodium benzoate.** A mixture of caffeine and sodium benzoate, very soluble in water; used in hypodermic medication. **c. sodium bromide.** A mixture of 60 % caffeine and 40 % sodium bromide. A white powder, very soluble in water. **c. sodium citrate.** A mixture of 50 % caffeine and 50 % sodium citrate. A white powder, very soluble in water. **c. sodium salicylate.** A mixture of 45 % caffeine and 55 % sodium salicylate. A white powder, very soluble in water. **c. sulfate** $(C_8H_{10}O_2N_4)_2.H_2SO_4$ = 486.65. A white, crystalline powder, decomp. in water. **c. sulfonate.** Symphorol. **c. triiodide** $C_8H_{10}O_2N_4I_2.2HI$ = 703.98. Dark green prisms, m.171, decomp. in water or alcohol; used medicinally as an alterant and diuretic. **c. valerate** $C_8H_{10}O_2N_4.C_5H_{10}O_2$ = 296.34. A white, crystalline powder, decomp. by alcohol; used medicinally for nervous headaches and hysteria.

caffelite. A plastic material derived from coffee.

caffetannic acid. $C_{15}H_{18}O_9$ = 342.14. Chlorogenic acid. A tannin which occurs in coffee berries, cainia root, nux vomica, St. Ignatius beans, etc., as its calcium or magnesium salt. An amorphous powder, soluble in water or alcohol.

cage type. Ladenburg's formula for benzene or a ring-system of the type:



cahinca. David's root. The dried roots of *Chiococca racemosa,* a Rubiaceae. See *chiococceine.*

cahincic acid. $C_{40}H_{64}O_{18}$ = 832.6. Caincic acid. A glucoside, the active principle of cahinca root. White, odorless, bitter crystals, soluble in water; used as a tonic, purgative, and diuretic. Cf. *chiococcic acid, caincetin.*

Cailletet, Louis. A French iron-master noted for liquefying gases.

caincetin. $C_{22}H_{34}O_3$ = 346.3. White crystals, obtained by decomp. of cahincic acid.

caincic acid. Cahincic acid.

caincin. Cahincic acid.

cairngorm. A variety of quartz.

cajeput. Cajuput, tree tea, swamp tea. The leaves of *Melaleuca leukadendron*, a Myrtaceae of East India. **c. oil.** The colorless or greenish essential oil of cajeput. Its chief constituents are cineol and terpineol. $[\alpha]_D = -10°$ to $-4°$; soluble in alcohol or ether.

cajeputene. Terpene.

cajuput. Cajeput.

cajuputol. Eucalyptol.

cake. Any solid crystalline mass. **niter-** Sodium sulfate containing about 33 % H_2SO_4. A by product of nitric acid manufacture. **salt-** Sodium sulfate.

caking. The transformation of a powdered substance into a solid mass either by moisture, heat or pressure.

Cal. An abbreviation for large calorie, Kg.-cal. or Calorie.

cal. An abbreviation for small calorie, gm.-cal. or calorie.

calabar bean. Physostigma. **false-** Pseudophysostigma.

calabarine. An alkaloid from calabar bean.

Calais sand. A very fine sand found near Calais, France, which is used as an abrasive; e.g. for cleaning platinum ware.

calamene. $C_{15}H_{24}$ = 204.19. A sesquiterpene from calamus oil.

calamine. (1) $Zn(OH)_2.Zn_3Si_2O_7.H_2O$. A native zinc silicate. (2) The obsolete name for zinc carbonate, now called smithsonite. **c. brass.** Brass.

calaminth. Basil thyme, mountain minth. The plant, *Calamintha officinalis*, a Labiatae, used as diaphoretic and expectorant. It contains calaminthone.

calaminthone. $C_{10}H_{16}O$ = 152.2. A ketone found in French oil of majoram, distilled from the leaves of *Calamintha nepeta*, a Labiatae.

calamus. Sweet flag, sweet grass, sweet cane. The dried rhizomes of *Acorus calamus*, an Araceae, used as fluid extract, tincture, stimulant and carminative tonic. Cf. *acorin, acoretin.* **c. oil.** The brownish, heavy, essential oil from calamus. Its chief constituents are asarone and eugenol. Used medicinally, in perfumes, and as a flavoring.

calaverite. $(Au, Ag)Te_2$. A native gold telluride containing 40 % Au, found at Cripple Creek, Colorado and in Calaveras County, California.

calaya. An extract from the fruit of *Anneslea febrifuga*, a Theaceae; used medicinally as an antiperiodic.

calc spar. Calcite.

calcareous, calcarious. Containing calcium. **c. algae.** The algae of the genus *Lithothamnium*, which have skeletons containing 95 % calcium carbonate and 5 % magnesium carbonate. Their deposits form limestone. Cf. *coccolith.* **c. sinter.** Travertine, onyx. A tufa, or the deposits of calcium carbonate formed by the evaporation of hard waters or mineral waters containing calcium bicarbonate.

calcariuria. The abnormal elimination of calcium salts in the urine.

calcemic dose. A dose of vitamin D equivalent to 50,000–1,000,000 I.U. per day which promotes mobilisation of calcium from the skeleton and its subsequent secretion; as distinct from the antirachitic dose of 700–1000 I.U. per day.

calcic. Pertaining to calcium.

calcification. Hardening due to formation of calcium salts, *e.g.*, as of tissues.

calciferol. See *vitamin.*

calcii. The official Latin genitive of calcium.

calcimeter. An apparatus for the determination of carbonates by liberating CO_2 with acid and absorbing it in alkali.

calcination. Roasting. The formation of oxides by heating oxy salts; *e.g.*, CaO from $CaCO_3$, FeO from $FeSO_4$, or any process of expelling the volatile portions of a substance by heat, usually without access of air. Cf. *roasting.*

calcined. Heated to a high temperature. **c. phosphate.** A fertilizer obtained by roasting finely-ground phosphate rock with potassium salts.

calcinol. Calcium iodate.

calcioferrite. A phosphate of iron found in sedimentary beds of limonite.

calciovolborthite. A native copper and calcium vanadate.

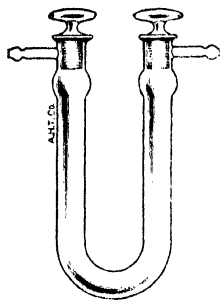
calcite. $CaCO_3$. Calcspar. A hexagonal, normally colorless, rock-forming mineral, d.2.72, hardness 3. The crystalline species are iceland spar (birefringent), corn spar, and satin spar, while the amorphous varieties include chalk, marble, limestone, stalactite, baryte; spongy as mountain milk; flake like as schiefer spar. **baryto-** Alstonite. **chloro-** Hydrophilite.

calcitization. The conversion of marble to calcite; *e.g.*, at Marble Delta (Natal).

calcium. Ca = 40.08. An element of the magnesium family, atomic number 20. A white, crystalline metal, d.1.415, m.810, soluble in water forming the hydroxide and readily dissolved in acids forming salts. It is widely distributed in nature, and next to aluminum and iron, the most abundant metal. It is found in large quantities as carbonate (limestone, marble, chalk, aragonite, calcite, iceland spar, etc.), sulfate (gypsum), fluoride (fluorspar), phosphate (apatite), and as complex silicates (feldspar, amphiboles, pyroxenes, etc.). Its compounds are not poisonous, and many of its salts are strongly ionized. It is essential to life and man's daily requirement of 0.7 gm. should be supplied by milk (1.5 lbs.) or cheese (0.25 lb.), as no other foods contain it in sufficient quantities. It was isolated by Davy in 1808 by electrolysis. Metallic calcium is made by electrolysing a fused mixture of fluorspar and calcium chloride. Calcium is divalent, and forms only one series of compounds. Metallic calcium is used in organic synthesis, as a deoxidizer in alloys, in the preparation of metals, as reducing agent, as a purifier for argon in rectifiers and, with lead, as antifriction alloys. Many of its compounds are of great economic importance.

c. acetate. $Ca(OOCMe)_2.H_2O$ = 176.1. White crystalline needles, or amorphous white powder decomp. on heating, soluble in water or alcohol. Used in the manufacture of acetic acid and acetone, and in the dye-industry. **c. albuminate.** A compound of calcium and albumin. A light-brown, granulated mass, slightly soluble in water; used as an alterant and nutrient. **c. arsenate.** $Ca_3(AsO_4)_2$ = 398.0. Tricalcium-orthoarsenate. Normal c. arsenate. A white powder; slightly soluble in water, soluble in acids. Used as an insecticide spray

for trees and shrubs. c. **arsenite.** $Ca_3(AsO_3)_2$ = 366.0. A white granular powder, slightly soluble in water. c. **behenate.** $Ca(C_{22}H_{43}O_2)_2$ = 718.6. A colorless crystalline power. (**dibrom-**) Sabromin. (**monoiodo-**) Sajodin. c. **benzoate** $Ca(C_7H_5O_2)_2.3H_2O$ = 336.3. A colorless crystalline powder; d.1.436, soluble in water; used as an alterant and antiseptic. c. **biarsenate.** $CaH_4(AsO_4)_2$ = 322.1. A white powder, slightly soluble in water; used as an insecticide and spray; *e.g.* to exterminate cotton-boll weevil. c. **bichromate.** $CaCr_2O_7$ = 256.1. Reddish-brown hygroscopic crystals, soluble in water. c. **bimalate.** $CaH_2(C_4H_4O_5)_2.6H_2O$ = 408.2. A white powder, sparingly soluble in water. c. **biphosphate.** See *c. phosphate.* c. **bisulfite.** $Ca(HSO_3)_2$ = 202.8. An aqueous solution of this salt is used as an antiseptic and disinfectant, and medicinally, as a gargle or spray; also in breweries, to prevent fermentation. c. **bitartrate.** $CaH_2(C_4H_4O_6)_2$ = 338.1. White crystals, soluble in hot water. c. **borate.** $Ca(BO_2)_2.2H_2O$ = 161.7. White crystals, soluble in hot water or in dilute acids. It is an antiseptic and astringent. c. **borocitrate.** A white powder, slightly soluble in water, soluble in dilute acids. c. **bromide.** $CaBr_2$ = 199.9. White granular powder or needles, $d_{20°}$3.354, m.760, b.809; soluble in water or alcohol. It is a sedative, nervine, and substitute for potassium bromide, and is used in photography. (cryst.) $CaBr_2.6H_2O$ = 308.1. White needles, d.3.32, m.38, b.150, very soluble in water or alcohol. c. **bromiodide.** $CaBr_2.CaI_2$ = 493.6. A yellow powder, soluble in water; used as a sedative and alterant. c. **butyrate.** $Ca(C_4H_7O_2)_2.H_2O$ = 232.2. Colorless crystals, soluble in water. c. **cacodylate.** $Ca(Me_2AsO_2)_2.H_2O$ = 332.1. A white powder, soluble in water; used in hypodermic medication. c. **carbide.** CaC_2 = 64.0. A gray, crystalline, granular mass, $d_{18°}$2.22, decomp. in water, soluble in alcohol. Used in preparing acetylene gas for illumination or blast flames, and for bicycle and miner's lamps. Cf. *acetylith.* c. **carbonate.** $CaCO_3$ = 100.0. A rock-forming substance (calcite, q.v.), widely distributed; occurs in rhombohedric or rhombic white crystals, or as an amorphous fine white powder, d.2.7–2.949, decomp. at 825; insoluble in water, soluble in acids. Used medicinally as an antiacid, and as a constituent of tooth-paste, white paint, calsomine, cleaning powder, paper filler, and for the preparation of carbon dioxide. (γ-) Vaterite. c. **chinate.** C. quinate. c. **chinovate.** A compound of calcium and chinovose. A white or yellowish powder, soluble in alcohol; used as a tonic in malaria. c. **chlorate.** $Ca(ClO_3)_2.2H_2O$ = 242.9. White monoclinic crystals, decomp. by heat, soluble in water or alcohol. Used in photography, pyrotechnics, in manufacturing soda water, and as a dusting powder to kill poison ivy and poison oak. c. **chlorhydrophosphate.** C. chlorphosphate. c. **chlorhydrosulfate.** C. chlorsulfate. c. **chloride.** $CaCl_2$ = 111.1. A white, granular, deliquescent powder, $d_{20°}$2.152, m.774°C, soluble in water or alcohol. It is used as a drying agent in desiccators, for raising the boiling point of solutions, in preserving meat, in freezing mixtures, in preserving stones, for impregnating textiles to make them less inflammable, as a dust preventor on roads (halophilite), and in the manufacture of hydrochloric acid, alizarin, and sugars. (**ammonia-**) The unstable compound $CaCl_2.8NH_3$. (**cryst.**) $CaCl_2.6H_2O$ = 219.1. $CaCl_2.2H_2O$ also exists. Colorless, hexagonal crystals, d.1.654, m.29.5, b.130; very soluble in water or alcohol. Used medicinally in pruritus, and prurigo, and to stop external or internal bleeding; also in breweries and soda-water manufacture. (**fused-**) Calcium chloride. (**c. tube**) A glass tube or glass vessel filled with calcium chloride and used for drying gases or for the qualitative or quantitative absorption of water. c. **chlorophosphate.** C. chlorhydrophosphate. A yellow powder, soluble in water. An aqueous solution containing 25% of the salt, d.1.225, is used as a tonic and alterant. c. **chlorosulfate.** Calcium chlorhydrosulfate. A white powder, almost insoluble in water. c. **chromate.** $CaCrO_4.2H_2O$ = 192.2. A yellow crystalline powder, slightly soluble in water, soluble in alcohol or acids. c. **cinnamate,** or c. **cinnamylate.** $Ca(C_9H_7O_2)_2.3H_2O$ = 388.25. White crystals, soluble in hot water. c. **citrate.** $Ca_3(C_6H_5O_7)_2.4H_2O$ = 570.31. White crystals, slightly soluble in water. c. **cyanamide.** $CaCN_2$ = 80.1. A white or grayish powder, decomp. by water; an intermediate in the fixation of atmospheric nitrogen. Used as catalyst in the manufacture of NH_3. See *cyanamid, nitrolim.* c. **cyanide.** $Ca(CN)_2$ = 92.1. Calcyanide, "powdered cyanic acid." Colorless, regular crystals, or a fine white powder, decomp. in moist air or water, and forms cyanic acid. Used in fumigation. c. **dibrombehenate.** Sabromin. c. **ethylsulfate.** $Ca(EtSO_4)_2.H_2O$ = 308.33. C. sulfovinate. White crystals, soluble in water, slightly soluble in alcohol. c. **ferricyanide.** $Ca_3[Fe(CN)_6]_2.H_2O$ = 562.4. Red deliquescent needles, soluble in water. c. **ferrocyanide.** $Ca_2Fe(CN)_6$ = 292.2. Yellow crystals, soluble in water. c. **ferrophospho-lactate.** A white powder, soluble in hot water; used medicinally in making syrups. c. **fluoride.** (1) CaF_2 = 154.07. Colorless regular crystals, d.3.18, m.1378; sparingly soluble in water, soluble in water containing carbon dioxide, decomp. by acids. Used for etching glass, in the preparation of enamels, and in the manufacture of hydrofluoric acid. (2) Fluorite. c. **fluosilicate.** $CaSiF_6.2H_2O$ = 218.17. C. silicofluoride. Hexagonal crystals, d.2.254, slightly soluble in water. c. **formate.** $Ca(OOCH)_2$ = 130.0. A white crystalline powder, d.2.015, soluble in water. c. **fumarate.** $CaC_4H_2O_4.3H_2O$ = 208.14. Rhombic, white crystals, soluble in water. c. **gluconate.** $(C_5H_{11}O_5COO)_2Ca.H_2O$ = 448.3. The calcium salt of gluconic acid. A white, odorless powder, soluble in water, insoluble in alcohol; used in calcium therapy. c. **glycerinate.** $Ca(C_3H_5O_4)_2.2H_2O$ = 286.20. A white powder, is soluble in water. c. **glyceroborate.** A colorless crystalline crust, used as an antiseptic, and preservative. c. **glycerophosphate.** $CaPO_4C_3$-



Calcium chloride tube.

$H_8(OH)_2.2H_2O$ = 246.18. Neurosin. A white crystalline powder, soluble in water; used as a nervine tonic. **c. glycollate.** $Ca(C_2H_3O_3)_2.H_2O$ = 208.1. White crystals, slightly soluble in water. **c. hippurate.** $Ca(C_9H_8O_3N)_2$ = 396.1. A white crystalline powder, slightly soluble in water; used as an antarthritic and alterant. **c. hydride.** CaH_2 = 42.0. Hydrolith. A colorless amorphous powder; insoluble in water. Used in organic synthesis. **c. hydroxide.** $Ca(OH)_2$ = 74.1. Hydrated lime, slaked lime, white hexagonal crystals or powder, d.2.078, decomp. on heating; slightly soluble in water, soluble in ammonium chloride solution or alkalis. Used in making lime water and mortar. **c. hypochlorite.** $Ca(OCl)_2.4H_2O$ = 215, or $CaOCl_2.xH_2O$. A white powder of variable composition, used as an antiseptic and disinfectant, or as a bleaching and deodorizing agent, as an oxidizing agent, and for the preparation of chlorine. Cf. *bleaching powder.* **c. hypophosphate.** $Ca(H_2PO_2)_2$ = 170.2. Monoclinic white or grayish crystals, decomp. at red heat and soluble in water. Used medicinally in phthisis and nutritive disturbances. **c. hyposulfite.** See (1) *c. bisulfite* or (2) *c. thiosulfate.* **c. iodate.** $Ca(IO_3)_2.6H_2O$ = 498.8. Calcinol. White rhombic prisms, decomp. on heating; slightly soluble in water, insoluble in alcohol; used as an external and internal antiseptic, and as a substitute for iodoform. **c. iodide.** CaI_2 = 293.9. A yellowish-white powder, $d_{25°}$.3.956; m.631, b.712, soluble in water or alcohol; used medicinally in syphilis, and as a substitute for potassium iodide. (cryst.) $CaI_2.6H_2O$ = 402.0. Colorless plates or scales, m.42, b.160; very soluble in water. Used in photography. **c. isobutyrate.** $Ca(C_4H_7O_2)_2.5H_2O$ = 304.1. Colorless, monoclinic needles, soluble in water. **c. lactate.** $Ca(C_3H_5O_3)_2.5H_2O$ = 308.3. White crystalline masses soluble in water; used medicinally for rachitis and scrofula. **c. lime.** Quicklime containing 75 % or less of CaO. **c. linoleate.** $Ca(C_{18}H_{31}O_2)_2$ = 598.56. White amorphous powder, insoluble in water, soluble in alcohol or ether. **c. loretinate.** A white powder, used in manufacturing antiseptic gauze. **c. magnesium phosphate.** A mixture of calcium and magnesium phosphates. A white powder, insoluble in water. **c. malate.** $CaC_4H_4O_5$. (1) *active-* $2H_2O$ = 208.14. (2) *racemic-* $3H_2O$ = 226.16. Rhombic, colorless crystals, slightly soluble in water. **c. maleate.** $CaC_4H_2O_4$ = 172.11. Rhombic, colorless crystals, soluble in water. **c. malonate.** $CaC_3H_2O_4.4H_2O$ = 214.16. White powder, insoluble in water. **c. manganite.** CaO,MnO_2 = 143.02. Formed in solution in the Weldon process (q.v.). **c. meconate.** $CaC_7H_2O_7.H_2O$ = 256.12. A yellowish-white powder, sparingly soluble in water. **c. metabisulfite.** C. bisulfite. **c. metaphosphate.** C. phosphate (2). **c. methylsulfate** $Ca(MeSO_4)_2$ = 262.0. White crystals, soluble in water. **c. minerals.** Calcium is one of the most abundant metals and an essential constituent of many rocks, *e.g.*,

limestone, calcite, q.v.	$CaCO_3$
gypsum	$CaSO_4$
fluorspar	CaF_2
apatite	$3\,Ca_3(PO_4)_2, CaF_2$

c. monoiodo behenate. Sajodin. **c. monophosphate.** See *c. phosphate* (3). **c. nitrate.** $Ca(NO_3)_2$ = 164.1, or $Ca(NO_3)_2.4H_2O$ = 236.1. Colorless monoclinic crystals, $d_{15°}$.1.9, m.43, b.132; very soluble in water, slightly soluble in alcohol; used as a fertilizer (Norge niter, Norway saltpeter), and in explosives. Cf. Baldwin's *phosphorus.* **c. nitride.** Ca_3N_2 = 148.0. A brown mass, d.2.63, m.900, decomp. in water. **c. nitrite.** $Ca(NO_2)_2$ = 132.1. Colorless hexagonal prisms, very soluble in water, slightly soluble in alcohol. **c. oleate.** $Ca(C_{18}H_{33}O_2)_2$ = 602.6. A yellowish granular powder, soluble in alcohol or ether. **c. oxalate.** $CaC_2O_4.H_2O$ = 146.0, or $Ca(OOC)_2$ = 128.0. A white amorphous powder or micro-crystalline mass, d.2.2, insoluble in water, and soluble in acids. See *raphides.* **c. oxide** CaO = 56.0. Lime, burnt lime, quick lime, caustic lime, calx. White masses, $d_{5°}$.3.306, m.1995; sparingly soluble in water (lime water), soluble in acids. Used as a reagent, and medicinally as an antiacid and mild caustic. Commercial grades are used in mortar, and for causticising soda ash. **c. oxychloride.** $CaOCl_2$ Bleaching powder. **c. oxysulfide.** CaO.CaS = 128.0. A yellow powder, used in aqueous solution for skin diseases. **c. palmitate.** $Ca(C_{16}H_{31}O_2)_2$ = 550.6. Yellow white crystals, insoluble in water, soluble in alcohol. **c. permanganate.** $Ca(MnO_4)_2.4H_2O$ = 330.0. Acerdol. Purple hygroscopic prisms decomp. on heating; soluble in water. It is an antiseptic and disinfectant; used in dentistry and in disinfecting drinking water. **c. peroxide.** CaO_2 = 72.0. A light cream-colored, odorless, tasteless powder, decomp. in water. Used as an antiacid, detergent, antiferment, bactericide and antiseptic. **c. phenate.** $Ca(OPh)_2$ = 226.1. C. carbolate, c. phenylate, c. phenolate. A pinkish powder, slightly soluble in water or alcohol; used as an antiseptic. **c. phenolsulfonate.** $Ca(SO_2C_6H_4OH)_2$ = 354.4. C. sulfophenate, c. sulfocarbolate. A white or faintly pink powder; soluble in water or alcohol; used as an intestinal antiseptic. **c. phosphate.** There are:

$CaHPO_4$	= dicalcium phosphate.
$Ca(PO_3)_2$	= calcium metaphosphate.
$CaH_4(PO_4)_2$	= monocalcium phosphate as salts of phosphoric acid.
$Ca_2P_2O_7$	= calcium pyrophosphate.
$Ca_3(PO_4)_2$	= tricalcium phosphate.

The two last differ from calcium phosphite, being the salts of $H_4P_2O_7$ and HPO_3, respectively. The naturally occurring phosphates and their mean indices of refraction, are:

Monetite....$2CaO.P_2O_5.H_2O$	1.518
Brushite....$2CaO.P_2O_5.5H_2O$	1.545
Martinite...$5CaO.2P_2O_5.1\frac{1}{2}H_2O$	1.606
Isoclasite....$4CaO.P_2O_5.5H_2O$	1.568
Fluorapatite.$CaF_2.9CaO.3P_2O_5$	1.633
Chlorapatite.$CaCl_2.9CaO.3P_2O_5$	1.667
Podolite....$CaCO_3.9CaO.3P_2O_5$	1.635
Dahllite.....$CaCO_3.6CaO.2P_2O_5$	1.633
Trancolite...$CaCO_3.CaF_2.9CaO.3P_2O_5.H_2O$	1.625

(1) $CaHPO_4.2H_2O$ = 172.1 (**di-**), secondary-dibasic-, diacid-. Colorless monoclinic plates, $d_{15°}$.2.3; slightly soluble in water, soluble in ammonium citrate solution or acids; used medicinally in rachitis and in dentistry. (2) $Ca(PO_3)_2$ = 198.0. (**meta-**) A white powder, insoluble in water, or acids. (3) $CaH_4(PO_4)_2.H_2O$ = 252.1. (**mono-**), primary-, acid-. Colorless rhombic crystals, $d_{4°}$.2.0, becoming an-

hydrous on heating; very soluble in water, soluble in acids. Used in baking powders. (4) $Ca_2P_2O_7.4H_2O$ = 328.3. (pyro-) Colorless crystals; slightly soluble in water, soluble in acids. (5) $Ca_3(PO_4)_2.H_2O$ = 328.3. (tri-), normal-, tertiary-, neutral-, tribasic-. A white powder, d.3.48; insoluble in water or alcohol, soluble in acids. Used medicinally as a food for bone tissues, and in the manufacture of enamels, opaque glass, cleansing agents, and phosphorus. **c. phosphide.** (1) Ca_2P_2 = 142.0. A gray granular mass, decomp. in water to form inflammable phosphine. Used in torpedoes and in chemical warfare. (2) Ca_3P_2 = 182.27. Tricalcium diphosphide. Yields non-inflammable phosphine in water. **c. phosphite.** $2CaHPO_3.3H_2O$. White crystals, slightly soluble in water, decomp. on heating forming PH_3. **c. phthalate.** $CaC_8H_4O_4.H_2O$ = 222.1. Colorless prisms, soluble in water. **c. plumbate.** $Ca(PbO_3)_2$ or Ca_2PbO_4 = 350.9. A brown or orange crystalline powder, insoluble in cold water, decomp. by CO_2 or hot water, and soluble in acids. Used in the chemical industry as an oxidizing agent, in accumulators, in pyrotechnics as a substitute for potassium chlorate, and in the manufacture of glass and matches. **c. plumbite.** $CaPbO_2$ = 278.9. Colorless crystals, slightly soluble in water. **c. propionate.** $Ca(C_3H_5O_2)_2$ = 186.1. A white powder, soluble in water. **c. pyrophosphate.** See *c. phosphate* (4). **c. quinate** $CaC_{14}H_{22}O_{12}$ = 426.24. C. chinate, $[C_6H_7(OH)_4COO]_2Ca$. **c. rhodanide.** C. thiocyanate. **c. saccharate.** Antacedin. Colorless scales, soluble in water; used medicinally as an antiacid. **c. salicylate.** $Ca(OOC.C_6H_4.OH)_2.2H_2O$ = 350.20. Colorless crystals, slightly soluble in water, soluble in carbonated water or acids. **c. santoninate.** $Ca(C_{15}H_{19}O_4)_2$ = 566.39. A white crystalline powder, sparingly soluble in water; used as an anthelminthic. **c. selenate.** $CaSeO_4$ = 183.1. White crystals, sparingly soluble in water. **c. selenite.** $CaSeO_3.2H_2O$ = 219.30. A white powder, soluble in water. **c. silicate** $CaSiO_3$ = 116.17. Okonite. A white amorphous mass, insoluble in water or acids. **c. silicofluoride.** Lapis albus. **c. silicotitanite.** Sphene. **c. stearate** $Ca(C_{18}H_{35}O_2)_2$ = 606.6. A white granular powder, insoluble in water, soluble in alcohol. **c. suberate.** $[(CH_2)_6COO]_2Ca$. The c. salt of suberic acid; it yields suberone on heating. **c. succinate.** $CaC_4H_4O_4.H_2O$ = 174.1. White crystals, soluble in water. **c. sulfate.** (1) *anhydrite.* $CaSO_4$ = 136.1. White rhombic crystals, d.2.96, m.1360; insoluble in water, soluble in ammonium salts, sodium thiosulfate and sodium chloride solutions, and acids. Used as desiccant and absorbent, for drying gases and in air conditioning. (2) *sesquihydrate-* $CaSO_4.\frac{1}{2}H_2O$ = 145.1. (**Plaster of paris.**) A white powder containing 5 % water made by heating gypsum to 120–130°C. It quickly solidifies when mixed with water, and is used for castings and taking moulds of objects, for architectural and art molding, ceramics and metal casting. (3) *dihydrate.* $CaSO_4.2H_2O$ = 172.1. (**Gypsum.**) White monoclinic crystals, d.2.32. Used as a filler in paper (pearl hardening, mineral white), in making artificial ivory, as pigment, in fertilisers, as a retarder in Portland cement and as a cleaning agent. **c. sulfide** CaS = 72.1. Hepar calcis, sulfurated lime. A white, grayish, or yellowish powder, d_{15}°.2.8, used for luminous paints. **c. sulfite.** $CaSO_3.2H_2O$ = 156.16. A white powder soluble in dilute H_2SO_3. Used as a disinfectant in breweries, as an antichlor in bleaching, and in manufacturing cellulose from wood. **c. sulfocarbolate.** C. phenolsulfonate. **c. sulfocyanide.** C. thiocyanate. **c. superoxide.** C. peroxide. **c. tannate.** A yellowish-gray powder, insoluble in water, soluble in dilute acids. **c. tartrate.** $CaC_4H_4O_6.4H_2O$ = 260.2. A white powder, sparingly soluble in water. **c. thiocyanate.** $Ca(CNS)_2$ = 156.0. C. rhodanide. A white crystalline powder, soluble in water; used in analysis to dissolve silk from mixed textiles, and in medicine as vasodilator. **c. thiosulfate** $CaS_2O_3.6H_2O$ = 260.1. White rhombic crystals, d.1.87, decomp. in water and when heated. **c. tungstate** $CaWO_4$ = 288.0. C. wolframate, artificial scheelite. Shining tetragonal scales or white powder, insoluble in water; used in luminous pigments and in X-ray screens. **c. urate.** $Ca(C_5H_3O_3N_4)_2$ = 374.22. A white powder, sparingly soluble in water. **c. valerate.** $Ca(C_5H_9O_2)_2.3H_2O$ = 296.28. A white crystalline powder, soluble in water and used as a sedative. **c. wolframate.** C. tungstate.

calcothar. Colcothar.

calcspar. Calcite.

calculator. A device for rapid mathematical calculation. See *nomogram.*

calculus. (1) The abnormal deposition of mineral salts; as, a stone-like concretion in an animal organism.

biliary- Gallstones. Solid deposits occurring either as (a) **cholesterol-**, consisting of cholesterol; (b) **pigment-**, consisting of bile pigments, bilirubin, and calcium salts; (c) **inorganic-**, consisting of carbonates and phosphates of calcium.

urinary- Urine concretions or concremets. Solid masses of urinary sediment formed in the urinary tract. (a) **uric acid-**, consist of uric acid and urates from pale yellow to brownish-red in color; (b) **phosphate-** consist of the triple phosphates, which are white, gray or yellowish; (c) **oxalate-** consist of calcium oxalate crystals.

(2) The mathematical laws of continuously varying quantities, which can be graphically expressed in curves. Cf. *diagram.*

calcyanide. Calcium cyanide.

Caldwell crucible. An opaque, fused, silica crucible having an open bottom with a flange to hold a platinum or porcelain disc.

caledon. A trade name for anthraquinone vat dyestuffs.

caledonite. A native basic lead and copper sulfate.

calefacient. A drug which is externally applied to induce a sense of warmth.

calender. A machine which presses moist cloth, paper, etc., between heavy rollers, and thus glazes its surface.

calendula. Marigold. The flowering tops of *Calendula officinalis,* Compositae; used as a tincture, as a stimulant.

calendulin. An amorphous substance from calendula.

caleometer. An electrical instrument which measures the heat loss of a coil of wire at constant temperature.

calglucon. Calcium gluconate.

calgon. Trade-mark for a sodium phosphate glass containing approximately 67 % P_2O_5.

caliber, calibre. The inside diameter or bore of a tube.

calibration. (1) The graduation of a measuring instrument; (2) the determination of its error.

caliche. Chile saltpeter. A crude sodium nitrate found in the deserts of Atacama and Tarapaca (Northern Chile). It contains 20 to 50 per cent of sodium nitrate with sodium iodate.

californite. A massive variety of vesuvianite, resembling jade.

calipers. A device for measuring the diameter of a tube. **micrometer-** An instrument for measuring with an accuracy up to $\frac{1}{100}$ mm. **vernier-** A steel instrument for determining the inside or outside diameter of a tube.

calisaya. Cinchona.

callainite. Turquoise.

callaite. Turquoise.

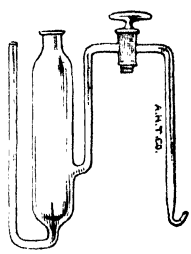
calliandrein. A glucoside from *Calliandra grandiflora*, a Leguminosae. A white, odorless, powder resembling saponin; used as an antipyretic.

callicrein. A circulatory hormone from the pancreas, not yet isolated.

callitrol. The alkali-soluble fraction, b_{6mm}.118, from the wood oil of *Callitris glauca*, an Australian cypress yielding sandarac. It contains chiefly *d*-citronellic acid.

callitrolic acid. $C_{64}H_{82}O_5(OH)COOH$. A resinous acid in sandarac.

callophane. A portable instrument for fluorescence analysis, q.v., which utilizes daylight as the source of ultraviolet light.



Calomel electrode (Hildebrand).

calmine. Barbital sodium.

calnitro. A fertilizer made from NH_4NO_3 and $CaCO_3$ containing 16–20 % N.

calomel. (1) A native mercurous chloride of secondary origin. (2) Mercurous chloride (pharmaceutical). **c. electrode.** A standard half-cell or electrode for measuring an e.m.f. The potential is that of mercury and calomel in contact with a solution of potassium chloride.

POTENTIALS OF STANDARD CALOMEL ELECTRODES (20°C)

Saturated potassium chloride.....	0.2492 volt
M/1 potassium chloride.....	0.2860
M/10 potassium chloride.....	0.3379

calorgas. A mixture of hydrocarbons, e.g. C_4H_{10}, compressed in cylinders for heating and lighting purposes (heating value is 21,000 B.Th.U. per pound). It is a by-product of coal hydrogenation.

caloric. The alchemical term for fire, which was supposed to possess weight.

calorie. A unit of quantity of heat. The heat required to raise the temperature of 1 gram of water from t° to (t + 1)°C. Hence the 15° cal., the 20° cal. etc., where t = 15, 20 etc. **gram-** Small c. **great-** Large c. **kilo-** Large c. **large-** *Cal.* or kilogram-calorie. The heat required to raise the temperature of 1 kg. water from 14.5° to 15.5°C.

1 Cal. = 1000 cal. = 1000 gram-cal.

mean- The $\frac{1}{100}$ part of the heat required to raise one gram water from 0°C to 100°C at atmospheric pressure. **micro-** Small c. **small-** *cal.* or gram-calorie, therm. The quantity of heat required to heat one gram water from 14.5°C to 15.5°C.

At 18°C, 1 cal. = 1 therm. = 0.001 Cal. = 4.183 Joules = 4.181×10^7 ergs = 3.086 foot pounds = 0.426 kg. meters = 1.162×10^{-6} kilowatt-hours = 0.003968 B.Th.U.

calorifacient. A substance which produces warmth in the animal organism.

calorific. Carrying or holding warmth. **c. value.** (1) Technical: the number of large calories obtained by the combustion of fuels or gases. (2) Physiological: The number of small calories derived from foods or the daily diet.

calorimeter. An instrument for measuring the amount of heat liberated or absorbed. **adiabatic-** A c. kept at constant temperature. **bomb-** A c. in the form of an enclosed steel bomb; used for determination of the calorific power of fuels. **Emerson-** A c. for determining the heat value of fuels. **Féry-** A c. for determining the heat value of foods. Cf. *colorimeter.*

calorimetric. Pertaining to measuring heat quantities. Cf. *colorimetric.*

calorimetry. The measurement of heat. Cf. *colorimetry.*

caloriscope. A device for demonstrating the release of heat in the respiration of an organism.

caloritropic. Thermotropic.

calorizing. A process similar to sherardizing (q.v.), used for the production of aluminum coatings.

calotropin. A glucoside from *Calotropis procera*, an Asclepiadaceae which has a digitalis like action; used by natives in arrow poisons. Cf. *akundarol.*

calumba. Columba. The root of *Jateorhiza calumba* (*J. palmata*), a Menispermaceae of East Africa. It is a bitter stomachic tonic. **American c.** Fraserin.

calumbic acid. Colombic acid. An acid principle from calumba. Cf. *columbic acid.*

calumbin. $C_{28}H_{30}O_2$ = 398.23. Columbin. A glucoside from calumba. Yellow crystals, m.182, slightly soluble in water, soluble in alcohol; used as bitter tonic.

calx. (1) Latin for lime or calcium oxide. (2) The alchemical name for an oxide or dross.

calycanthine. $C_{11}H_{14}N_2.\frac{1}{2}H_2O$ = 183.2. An alkaloid from *Calycanthus fertilis* or Carolina allspice.

calyxanthine. Calycanthine.

cambium. A layer of growing tissue between the wood and bast of a tree.

cambogia. Gamboge.

cambopinic acid. $C_{11}H_{18}O_2$ = 182.14. A crystalline acid from the resin of *Pinus cambodgiana.*

camel's hair brush. A small brush used in quantitative analysis for transferring precipitates; in microscopy for smoothing out tissues on slides.

camelina. The plant *C. satina*, a Cruciferae of the Mediterranean area which yields an oil, oil cake and fiber.

camellin. $C_{53}H_{84}O_{19}$ = 1024.81. A glucoside from the seeds of *Camellia japonica*, a Theaceae. A reddish, bitter powder, soluble in water; used as a cardiac stimulant.

camenthol. A mixture of camphor and menthol, used for inhalation.

camera. (1) A light-proof box, compartment, or chamber. (2) An optical device for taking photographs. **ciné-** A c. to take many individual exposures per second: as,

ordinary.....	16 pictures p. sec.
ultrarapid.....	128 pictures p. sec.
chronoteine, q.v.....	3200 pictures p. sec.

stereoscopic- A photographic camera for taking two pictures at a slightly different angle simultaneously, thus bringing out the depths or perspective of a scene. Cf. *binocular.*

camera-lucida. A prism-attachment fastened to the eye-piece of a microscope, which throws the image of the object in the field of the microscope on to drawing paper affixed to the table beside the artist, who then traces it.

camomile. See *anthemis, calendula, chamomile, matricaria.*

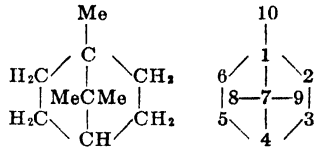
camouflet. A space formed by an underground explosion, and usually containing carbon monoxide.

Camp colorimeter. A pair of graduated glass tubes for comparing the colors of a standard and unknown solution, used in the determination of manganese in steel. Cf. *colorimeter.* **C. tube.** A glass cylinder for the absorption of gases.

Campden tablets. A domestic preservative, containing sodium or potassium metabisulfite. One tablet dissolved in 275 c.c. of water produces an approximately 0.1 % solution of SO_2.

campeachy wood. Logwood.

camphane. $C_{10}H_{18}$ = 138.2 1,7,7-trimethyl-norcamphane. The terpene hydrocarbon:



White crystals, m.154, sublime at 160; soluble in alcohol. **2-amino-** Bornyl amine. **2-chloro-** Bornyl chloride. **2.3-dihydroxy-** Camphene glycol. **2-hydroxy-** Borneol. **3-hydroxy-** Epiborneol. **4-hydroxy-** Isoborneol. **2-keto-** Camphor. **3-keto-** Epicamphor.

c. carboxylic acid. Camphocarboxylic acid.

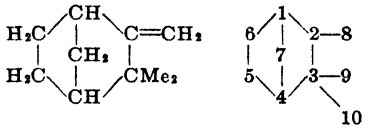
camphanic acid. $C_{10}H_{14}O_4$ = 198.11. The lactone of α-hydroxy camphoric acid. Colorless crystals, m.201.

camphanol. 2- Borneol. **3-** Epiborneol. **4-** Isoborneol.

camphanone. 2- Camphor. **3-** Epicamphor.

camphanyl. The monovalent group $C_{10}H_{17}$—, derived from camphane.

camphene. $C_{10}H_{16}$ = 136.17. 3,3-dimethyl-2-methylene-norcamphane. The terpene hydrocarbon:



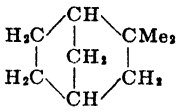
It occurs in three isomeric forms: (a) **l-*Inactive-c.*** Colorless, fine needles, m.47, b.157; insoluble in water, soluble in alcohol or ether. (b) **d-*Dextro-c.*** Colorless needles, m.51, b.159; soluble in alcohol or ether. (c) **l-*Levo-c.*** Colorless needles, m.52, b.159; soluble in alcohol or ether. **chloro-** See *chlorocamphene.* **sesqui-** See *sesquicamphene.* **8-Δ1-pentenyl-** Sesquicamphene.

c. camphonic acid. Camphoric acid.

c. glycol. $C_{10}H_{18}O_2$ = 170.15, 2.3-dihydroxy-camphane.

camphenic acid. $C_{10}H_{16}O_4$ = 199.1. 3-carboxy-α-α-dimethylcyclopentane-acetic acid.

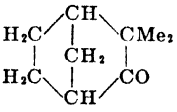
camphenilane. C_9H_{16} = 124.2. 2.2-dimethyl-norcamphane. The hydrocarbon:



camphenilene. The monovalent radical, C_9H_{15}—, derived from camphenilane.

camphenilidene. The bivalent radical, C_9H_{14}=, derived from camphenilane.

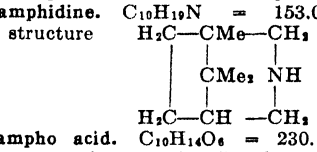
camphenilone. $C_9H_{14}O$ = 138.17. 3-keto-camphanilane. The heterocyclic compound:



l-methyl- Camphenone.

camphenone. $C_{10}H_{16}O$ = 150.11. 1-methyl-camphenilone. Colorless crystals, m.168.

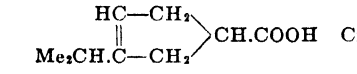
camphidine. $C_{10}H_{19}N$ = 153.08. The ring structure



campho acid. $C_{10}H_{14}O_4$ = 230.11. Carboxyl-apocamphoric acid. Colorless crystals, m.196.

camphocarboxylic acid. $C_{11}H_{16}O_3$ = 196.2. 2-keto-3-carboxy-camphane. Colorless crystals, soluble in water.

camphoceenic acid. $C_9H_{14}O_2$ = 154.1. 3-isopropyl-Δ^3-cyclopentene carboxylic acid.



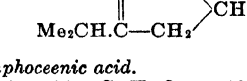
Cf. *campholene.*

camphogen. Cymene.

camphol. Borneol.

campholactone. $C_9H_{14}O_2$ = 154.1. Colorless crystals, m.50.

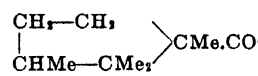
campholene. C_9H_{14} = 110.1. *3*-Isopropyl-Δ^3-cyclopentene. The pentacyclic hydrocarbon:



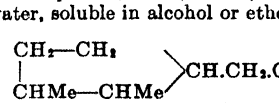
Cf. *camphoceenic acid.*

campholenic acid. $C_{10}H_{16}O_2$ = 168.2. A colorless liquid, d.0.992, b.256.

campholic acid. $C_{10}H_{18}O_2$ = 170.2. 1.2.2.3-tetramethyl cyclopentane carboxylic acid.



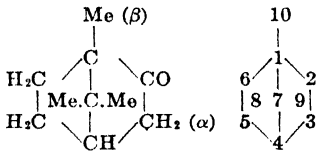
Colorless prisms, m.95, b.250; slightly soluble in water, soluble in alcohol or ether. **iso-**



campholide. $C_{10}H_{16}O_2$ = 168.2. White crystals, m.211.

camphonanic acid. $C_9H_{16}O_2$ = 156.2. 1.2.2-trimethyl cyclopentane carboxylic acid. Colorless crystals, soluble in alcohol.

camphor. (1) $C_{10}H_{16}O$ = 152.2. 2-ketocamphane, *d-2-keto-1.7.7*-trimethylnorcamphane, 2-camphanone, Japan camphor, laurel camphor. A stearoptene from the leaves of Laurus or *Cinnamomum camphora*, a small tree of Formosa, China, Japan and Malay Archipelago.



Synthetic and natural camphor occurs in large crystalline plates, easily broken when moistened with ether, d.0.879, m.175, b.204, $[\alpha]_D$ + 44°; soluble in alcohol or ether, insoluble in water. Used medicinally as an antispasmodic, stimulant, sedative, carminative, diaphoretic, antiseptic, and in large quantities in the cellulose industry, and as plasticizer for synthetic resins. Cf. *menthol, thymol.* (2) A group name for odorous principles of plants; see *camphors.* **alant-** Helenin. **amido-** $C_{10}H_{17}ON$ = 167.2. A colorless oily liquid. b.244. **anemone-** Anemonin. **anise-** Anethole. **artificial-.** Terpene monochlorhydrate. **asarum-** Asarone. **azo-** $C_{10}H_{16}N_2O$ = 180.2. Monoketazocamphor quinone. **beta-** Epicamphor. **betula-** Betulinol. **bitter almond-** Benzoin. **Borneo-** Borneol. **cantharides:** Cantharidin. **champaca-** Champacol. **cyan-** $C_{11}H_{15}ON$ = 177.2. White crystals, m.127. **cyanmethylene-** $C_{12}H_{15}ON$ = 189.2. Colorless crystals, m.46, b.280. **dextro-** Camphor. **diketo-** C. quinone. **elecampane-** Helenin. **epi-** Epicamphor. **iso-nitroso-** $C_{10}H_{15}O_2N$ = 181.12. Colorless crystals, m.153. **Japanese-** Camphor. **keto-** Camphorquinone. **laurel-** Camphor. **ledum-** Ledum camphor. **Malayan-** Borneol. **oxymethylene-** $C_{11}H_{16}O_2$ = 180.2. White crystals, m.77. **parsley-** Apiol. **peppermint-** Menthol. **pernitroso-** $C_{10}H_{16}O_2N_2$ = 197.2. White crystals, m.43. **pine-** Pinol. **pulsatilla-** Anemonin. **Sumatra-** Borneol. **tar-** Naphthalene. **Tonka-** Coumarin. **thyme-** Thymol.

c. chlorated. $C_{10}H_{15}OCl$ = 186.6. Monochlorated camphor. A yellow crystalline powder, m.106; soluble in alcohol or ether. Used as an antiseptic. **c. dibromated.** $C_{10}H_{14}OBr_2$ = 310.2. A yellowish-white crystalline powder, m.115; soluble in alcohol or ether. Used as an antiseptic. **c. imide.** See *camphorimide.* **c. monobromated.** $C_{10}H_{15}BrO$ = 231.2. Colorless crystals, m.76, b.274; soluble in alcohol or ether; used extensively in medicine as an antispasmodic, antineuralgic, and soporific in tablets, pills, or as solutions in oil. **c. oil.** The essential oil distilled from the leaves of *Cinnamomum camphora.* A colorless mobile liquid, d.0.87–1.04 of strong odor, used as an antiseptic and rubefacient. **c. wood oil.** The oil distilled from the branches. A yellow oil of strong odor, d.1.155, containing camphor, safrol, pinene, phellandrene, cadinene. Used as liniment for rheumatism, bruises and sprains. See *antimalum, camphorated oil.*

camphoramic acid. $C_{10}H_{16}NO_3$ = 198.13. Camphoramidic acid, camphoric acid-3-amide, $C_8H_{14}Me_2.(CONH_2).COOH$. White crystals, α- m.177, β- m.182.5, soluble in water.

camphoranic acid. $C_9H_{12}O_6$ = 216.1. Colorless crystals, m.209.

camphorated oil. Camphor liniment. A mixture of 1 pt. camphor and 4 parts cottonseed or olive oil. Used as rubefacient. Cf. *camphor wood oil.*

camphoric acid. $C_{10}H_{16}O_4$ = 200.2. cis-1.2.2-trimethyl-1.-3cyclopentane-dicarboxylic acid, $C_8H_{14}(COOH)_2$. A dibasic acid obtained by the oxidation of camphor. Colorless, odorless prisms, d.1.193; m.187, decomp. on further heating; soluble in 125 pts. cold or 10 pts. boiling water; slightly soluble in ether. **c. a. amide.** Camphoramic acid. **c. a. diamide.** $C_{10}H_{18}O_2N_2$ = 198.6. White crystals, m.197.

camphorimide. $C_{10}H_{15}O_2N$ = 181.2. Camphoric imide. Colorless crystals, m.248, b.300.

camphormethylene carboxylic acid. $C_{12}H_{16}O_3$ = 208.2. White crystals, m.101.

camphormethylimide. $C_{11}H_{17}O_2N$ = 195.2. White crystals, m.40.

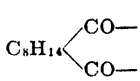
camphormethyl isoimide. $C_{11}H_{17}O_2N$ = 195.2. White crystals, m.134.

camphornitrilo acid. $C_{10}H_{15}O_2N$ = 181.2. Cyanlauronic acid. Colorless crystals, m.152.

camphoronic acid. $C_9H_{14}O_6$ = 218.1. α,α,β-trimethyl-carballylic acid, *2.3*-dimethyl-*1.2.3*-butanetricarboxylic acid*, $CH_2COOH.CMeCOOH.CMe_2COOH$. A tribasic acid formed by oxidation of camphoric acid; microcrystalline needles, m.135.

camphoroxime. $C_{10}H_{17}ON$ = 167.2. Colorless needles, m.118, b.249; insoluble in water, soluble in alcohol or ether.

camphoroyl. The bivalent radical, derived from



camphoric acid.

camphorquinone. $C_{10}H_{14}O_2$ = 166.2. 3-ketocamphor or 2,3-di-ketocamphane.

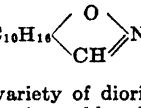
camphors. A group of solid and volatile substances (stearoptenes), derived from certain plants, and composed of the keto- or alcohol-derivatives of terpenes; generally the odoriferous principle of the plant. Cf. *terpenes.* Camphor, menthol, and thymol are official.

camphoryl. The monovalent radical, $C_{10}H_{15}O$—, derived from camphor. **c. hydroxylamine.** $C_{10}H_{15}O_2N$ = 197.1. Colorless crystals, m.225.

camphorylidene. The bivalent radical, $C_{10}H_{14}O$ =, derived from camphor.

camphyl. The bivalent radical, $C_{10}H_{16}$ =, derived from camphor. **c. alcohol.** Borneol. **c. amine.** $C_{10}H_{17}NH_2$ = 153.2. A solid, $d_{37°}$ 0.93, b.198.

camphylisoxazolone. $C_{11}H_{17}NO$ = 179.14. The compound,



camptonide. A variety of diorite.

camptonose. A variety of basalt.

camwood. A red dye wood from *Baphia nitida,* a Leguminosae of West Africa. Cf. *sandalwood, santalin.*

canada asbestos. Chrysotile. **c. balsam.** A turpentine-like balsam exuded from incisions in the bark of *Abies balsamea,* a conifer of Canada and Maine. It is a yellow liquid, with a pleasant odor and bitter taste, and dries in air to a

transparent resin. Hence its use to cement lenses together, to mount microscopic specimens, as a varnish, and in medicine. Its refractive index equals that of glass. **c. snakeroot.** Asarum. **c. turpentine.** The essential oil of *Pinus maritima*, a Conifer.

canadase. Anorthosite from Maine.

canadine. $C_{20}H_{21}O_4N$ = 339.17. *l*-Tetrahydroberberine. An alkaloid from the leaves of *Hydrastis canadensis*. Silky needles, m.133, insoluble in water.

canadium. A supposed new element of the platinum group.

canadol. Impure hexane, C_6H_{14}, obtained by the fractional distillation of petroleum, and used medicinally as a local anesthetic in minor surgery.

canaigre. The roots of *Rumex hymenosepalis*, a Polygonaceae, of Texas and Mexico; used for tanning (25–30 % tannin).

canal rays. Positive rays. The rays emerging behind the perforated cathode of a high vacuum tube, which consist of positively charged molecules of gas. They move from the anode with a velocity of about 3.2×10^9 cm./sec. in the opposite direction to the cathode rays. They carry a positive charge and cause strong ionization, photographic action, fluorescence, and disintegration of certain substances. They are used in positive-ray analysis (q.v.). Cf. *rays* (figure), *mass spectra*.

cananga. Ylang ylang.

canavalia bean. The seeds of *Canavalia* species, which are rich in urease.

canavalin. A globulin of the jack beans, the seeds of *Canavalia* species, Leguminosae, of tropical countries.

cancerine. $C_8H_5O_3N$ = 163.1. A ptomaine found in pathological urine as colorless crystals.

cancrinite. $Na_4Al_3HCSi_3O_{15}$. A yellow, hexagonal, rock-forming mineral, M.W. 511.5, d.2.4, M.V. 213, hardness 5–6.

candelilla wax. Gama wax. A yellowish brown solid wax, d.0.983, m.67–68, from the surface of the candelilla plant of Mexico; used in candles, cements, polishes, varnishes, leather dressings and dentistry.

candle. A basic photometric unit, *ca*, of luminous intensity which is determined by international agreement and known as the international candle. Cf. *photometric units*. **c. balance.** A balance for determining the rate per hour at which a candle burns. **c. nut oil.** Lumbang oil. **c. power.** The luminous intensity in terms of the candle; the brightness of a standard candle. 1 candle = 1.11 Hefner units = 0.104 carcel units. 1 candle per cm^2 = 3.1416 lamberts = 3141.6 millilamberts. 1 candle per $in.^2$ = 0.4968 lamberts = 496.8 millilamberts. **c. standard.** Candles made of sperm wax, six to the pound, which burn 120 grains of wax per hour. See *standard candle, foot candle, meter candle*.

canella. Whitewood, cinnamon bark. The bark of *Winterana canella*, a Canellaceae of the West Indies. It is aromatic, and used as a condiment. **c. oil.** The essential oil of c. Colorless liquid, d.0.920–0.935, $[a]$ + 1°8′, and containing eugenol, cineol and caryophyllin.

cane sugar. A sugar made from sugar cane and identical with sucrose (q.v.).

canfieldite. Ag_8SnS. A rare, native, silver and tin sulfide.

cannabane. $C_{15}H_{22}$ = 238.2. Cannabene hydride. A volatile hydrocarbon in the essential oil of hemp. Cf. *cannibene*.

cannabene. $C_{15}H_{20}$ = 236.2. A hydrocarbon in oil of hemp.

cannabin. (1) A glucoside or (2) a resin from *Cannabis indica*.

cannabine. An alkaloid from cannabis, used as a hypnotic.

cannabinol. $C_{21}H_{30}O_2$ = 314.3. A phenol aldehyde, the active principle of *Cannabis sativa*. A yellowish oil, d.1.042, b_{100mm}.315; insoluble in water, soluble in glacial acetic acid forming a fluorescent green and red coloured solution; soluble in alcohol, ether, or chloroform. **acetyl-** See *acetyl c.*

cannabinone. $C_8H_{12}O$ = 124.0. A ketone derived from cannabis.

cannabis. Indian hemp, Indian c., the flowering tops of the female plant of *C. indica* or *C. sativa* (hemp), an Urticaceae. It is a narcotic. See *bhang, ganja, hashish*.

cannaboid. The combined principles of *Cannabis indica* which are antispasmodic and sedative.

cannel coal. A compact and hard variety of bituminous coal which burns with a luminous flame. Used for gas production. Cf. *boghead, torbanite*.

cannibene. $C_{15}H_{24}$ = 204.19. A sesquiterpene, d.0.897, b.259, from the essential oil of hemp. Cf. *cannabane*.

cannizarization. The treatment of aldehydes with alcoholic potash; as, Cannizzaro's reaction. **C. number.** Cannizzaro number.

Cannizzaro, Stanislao. 1826–1910. An Italian chemist noted for his work on organic chemistry and the amplification and application of Avogadro's hypothesis to the atomic theory. **C. number.** The number of milligrams KOH which react with 1 gm. aldehyde according to C. reaction. **C. reaction.** The decomposition of aromatic aldehydes by alcoholic potash, with the formation of corresponding acids and alcohols. Thus benzaldehyde gives benzoic acid and benzyl alcohol:

$$2RCHO + KOH \rightarrow R.CH_2OH + R.COOK$$

cannonite. A high-explosive, consisting of nitrocellulose and nitroglycerin.

cannula. A straight or U-shaped tube of glass or metal. It is used in physiological experimentation for insertion into or connecting arteries.

cantharene. C_8H_{12} = 108.1. Dihydro-o-xylene. A colorless liquid, b.135.

cantharides. Blistering beetle, cantharis, Russian flies. The Spanish fly, *Lytta* or *Cantharis vesicatoria*, used medicinally as a blistering agent. **c. camphor.** *Sodium cantharidate*.

cantharidic acid. Cantharidin.

cantharidin(e). $C_{10}H_{12}O_4$ = 196.1. 2.3-Dimethyl-7-oxabicyclo [2,2,1] heptane-2.3-di-dicarboxylic anhydride. The lactone of cantharidic acid obtained from various species of cantharis. Colorless, odorless, glistening crystals, slightly soluble in water, m.210°, used externally in blistering ointments, and internally as a diuretic and stimulant.

Cantharis. A genus of beetles, now *Lytta*. Cf. *cantharides*.

Canton phosphorus. A mixture of 2 parts oyster shells and 1 part sulfur, said to be luminescent.

canula. Cannula.

canvas. A strong and closely-woven fabric of hemp or flax used in filterpresses and sacking.

caoutchouc. [From *caa o-chu*, Malayan "weeping tree," or from the sound of elastic.] Rubber. **Gaboon-** Dambonite. **mineral-** q.v. **oil of-** Terpene.

C.A.P. Abbreviation for *chloracetophenone.*

capacitance. Electrostatic *capacity.*

capacity. (1) The ability to hold or contain a force or energy. (2) Same as volume. (3) The amount of matter; as compared with intensity. Thus, the c. factor of acidity is *normality;* cf. *intensity.* **electrostatic-** The amount of electricity required to raise a body to a given potential. An isolated condenser has unit capacity when unit electrical quantity will charge it to unit potential. The common units of capacity are: (1) International farad—the c. of a condenser charged to 1 volt by 1 coulomb. (2) microfarad—the one millionth part of a farad. **electromagnetic-** 10^9 Farads. **heat-** Thermal c. **specific inductive-** Dielectric constant. **thermal-** Heat c. The number of calories required to raise the temperature of an isolated body one degree centigrade.

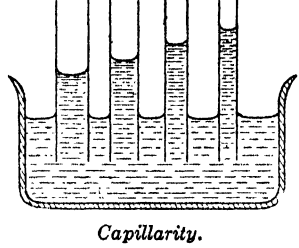
caparrosa. The leaves of *Nea theifera,* a Nyctaginaceae of South America; used as a tea.

capers. The green flowerbuds of *Capparis spinosa,* a Capparidaceae of the Mediterranean; used pickled as a condiment.

capillaries. The network of delicate blood-vessels or other small connecting tubes of tissues.

capillarity. The attractive force between two unlike molecules as shown by the wetting of a solid surface by a liquid, or by meniscus formation.

capillary. Any tube with a very small inside diameter, or bore. **c. analysis.** (1) The separation or identification of liquids or substances (e.g. drugs or dyes) in solution by observing the zones or colors produced when it is absorbed on a strip of filter paper which may be impregnated with a reagent or observed in ultra-violet light. Cf. *chromatographic analysis.* (2) A filterpaper dipped into a *negative* colloid absorbs both, the dispersed and external phase; but in a *positive* colloid only the external phase is absorbed. Cf. *adsorption.* **c. correction.** A correction for the capillarity of mercury applied to mercury thermometers of diameters more than 25 mm. **c. electrode.** See *Lippmann e.* **c. electrometer.** See *electrometer.* **c. pipette.** A pipette for measuring the fractional parts of a cc.; as, a blood pipette. **c. tubing.** Glass tubing with an inside diameter of less than 1 mm.



Capillarity.

capillator. An apparatus for the colorimetric determination of pH values in which the solutions are compared in capillary tubes. The effect of any color or turbidity in the original solution is thereby much reduced.

capnometry. The measurement of the density of smoke. Cf. *nephelometry.*

caporit. A disinfectant mixture of $CaOCl_2$ and NaCl containing about 50 % active chlorine.

capraldehyde. $C_{10}H_{20}O$ = 156.15. Capric aldehyde, decanal*, caprinaldehyde, n-decyl aldehyde. Colorless liquid, d.0.828, b.209.2, from essential oils. **iso-** A liquid, d.0.830, b.169.6. Cf. *capryl aldehyde.*

capramide. (1) Caproyl amide. (2) $C_{10}H_{21}NO$ = 171.17. Decanamide*, capric amide, n-decylic amide, $Me(CH_2)_8CONH_2$. White crystals, d.-0.999, m.108.

caprate. A salt of capric acid, containing the monovalent radical, $C_9H_{19}COO$—.

capric acid. $C_{10}H_{20}O_2$ = 172.21. Octylacetic acid, n-decoic acid, *n*-decanoic acid*, decylic acid, decatoic acid, $Me(CH_2)_8COOH$. A fatty acid in butter and other animal fats. Colorless needles, $d_{37°}$.0.930, m.31, b.268; very slightly soluble in water, soluble in alcohol or ether. Cf. *rutic acid.* **c. aldehyde.** Capraldehyde. **c. amide.** Capramide. **c. anhydride.** $C_{20}H_{38}O_3$ = 326.30. Decanoic anhydride*, *n*-decylic anhydride, $[Me(CH_2)_8CO]_2O$. White crystals, m.239, insoluble in water. **c. nitrile-** Caprinitrile.

Caprifoliaceae. Honeysuckle family. A group of shrubs or twining plants, some of which yield drugs, as follows:

flowers:	
Sambucus canadensis	elder
bark:	
Viburnum opulus	cramp bark
Viburnum prunifolium	black haw
roots:	
Triosteum perfoliatum	fever root
fruits:	
Lonicera xylosteum	xylostein

caprilic acid. Caprylic acid.

caprin. A compound of capric acid and glycerin; *e.g.,* tricaprin or glyceryl tricaprate, dicaprin or glyceryl dicaprate.

caprine. Norleucine.

caprinitrile. $C_{10}H_{19}N$ = 153.16. Decane nitrile*, capric nitrile, *n*-nonyl cyanide, $Me(CH_2)_8CN$. A colorless liquid, d.0.8295, m. −17.9, b.243.7, insoluble in water.

caproaldehyde. $C_6H_{12}O$ = 100.09. Hexanal*, *n*-caproic aldehyde, *n*-hexoic aldehyde, $Me(CH_2)_4CHO$. Colorless liquid, d.0.8335, b.131.

caproate. A salt of caproic acid, containing the monovalent radical, $C_5H_{11}COO$— derived from caproic acid.

caproic acid. $C_6H_{12}O_2$ = 116.13. Butyl-acetic acid, *n*-hexoic acid, hexanoic acid*, *n*-hexylic acid, pentylformic acid, capronic acid, $Me(CH_2)_4COOH$. A fatty acid in animal fats. A colorless liquid, $d_{20°}$.0.929, m. −5.2, b.205.7, slightly soluble in water; soluble in alcohol or ether. Used in the manufacture of esters. **α-amino-** Norleucine. **α,ε-diamino-** Lysine. **α-hydroxy-** Leucinic acid. **iso-** $Me_2CH(CH_2)_2COOH$. *i*-butylacetic acid; dimethyl butyric acid. A liquid, d.0.925, m. −35, b.207.7. **γ-keto-** Homolevulinic acid. **pseudo-**$MeCMe_2.CH_2COOH$. ***tert-*** Butylacetic acid. A liquid, m. −11, b.190. **secondary-** $Et_2CHCOOH$. Diethylacetic acid. A liquid, d.0.933, m. −15°C, b.197. **secondary active-** $Me(CH_2)_2.CHMeCOOH$. Methyl propyl acetic acid. A liquid, d.0.928, b.193.5. **tertiary-** $Me_2CEtCOOH$. Dimethylacetic acid. A liquid, m. −14°C, b.187.

caproin. A compound of glycerin and caproic acid; *e.g.,* tricaproin or glyceryl tricaproate, dicaproin or glyceryl dicaproate.

caprokol. $C_{12}H_{18}O_2$ = 194.2. *4*-Hexylresorcinol. $C_6H_3(OH)_2C_6H_{13}$. Colorless crystals, used as a urinary antiseptic and said to have 45 times the germicidal power of phenol.

caprone. $C_{11}H_{22}O$ = 170.2. 6-Hen-decanone*. A volatile ketone from butter.

capronic acid. Caproic acid.

capronitrile. Amyl cyanide.

capronium. Ytterbium.

capronyl. The monovalent acid radical, C_5H_{11}-CO—, derived from caproic acid. **c. chloride.** $C_6H_{11}OCl$ = 134.6. Caproic acid chloride. A colorless liquid, b.138.

caprophyl. Dung bacteria.

caproyl. The monovalent, acid radical, C_7H_{15}-CO—, derived from caprylic acid. **c. alcohol.** Octyl alcohol. **c. aldehyde.** Capraldehyde. **c. amide.** $C_8H_{15}ONH_2$ = 143.2. Capramide, octylamide, octanamide*. The compound $C_7H_{15}.CO.NH_2$. **c. chloride.** $C_8H_{15}OCl$ = 162.57 The compound $C_7H_{15}COCl$. A colorless liquid, d.0.975, b.196.

c. acetate. Octyl acetate.

capryl. Hexyl. The monovalent hydrocarbon radical, C_6H_{13}—, derived from hexane. **c. alcohol.** Hexyl alcohol. **c. amine.** $C_6H_{13}NH_2$ = 101.1. Hexylamine. A poisonous ptomaine from decomposed yeast or rancid animal oils. **c. hydride.** Hexane.

caprylate. A salt of caprylic acid; it contains the monovalent radical, $C_7H_{15}COO$—.

caprylene. Octene.

caprylic acid. $C_8H_{16}O_2$ = 144.17. Hexylacetic acid, *n*-octoic acid, octylic acid, octanoic acid*, $Me(CH_2)_6COOH$. A fatty acid in butter. Colorless leaflets, d.0.910, m.16, b.237.5; slightly soluble in water, soluble in alcohol or ether. **iso-**CEt_3COOH. Triethylacetic acid. A solid, m.39.5, b.202. **c. alcohol.** Octyl alcohol. **c. aldehyde.** $C_8H_{16}O$ = 128.12. Octanal*, capryl aldehyde, $Me(CH_2)_6CHO$. A colorless liquid, d.0.821, b_{32mm}.81, in citron.

caprylidene. C_8H_{14} = 110.11. Octine, *1*-octyne*, *n*-hexylacetylene, $Me(CH_2)_5C{:}CH$. A liquid, d.0.770, b.125.

caprylin. Any compound of glycerin and caprylic acid; *e.g.*, tricaprylin or glyceryl tricaprylate, dicaprylin or glyceryl dicaprylate.

capryryl. Octanoyl*. The radical $Me(CH_2)_6$-CO—, derived from caprylic acid. **c. chloride.** $C_7H_{15}COCl$ = 162.57. Octanoyl chloride*. A colorless liquid, d.0.9704, b.163.

capsaicin. $C_{18}H_{27}O_3N$ = 305.3. A bitter principle, m.65, from capsicum. Cf. *zingerone*.

capsanthin. $C_{40}H_{58}O_3$ = 586.4. The red carotinoid (q.v.) pigment of paprika, *Capsicum annuum*, m.175.

capsanthol. $C_{40}H_{57}(OH)_3$ = 588.46. A reduction product, m.175, of capsanthin.

capsic acid. An active principle of pimenta.

capsicin. An oleoresin from capsicum. Thick, reddish-brown masses, soluble in alcohol or ether; used as a stimulant, anodyne, and rubefacient.

capsicine. An alkaloid from capsicum.

capsicol. The essential oil of capsicum.

capsicum. Cayenne pepper, chile, chilli, pepper red. The dried, unripe fruits of *Capsicum fastigiatum*, *C. annuum* and other Solanaceae; used medicinally as a local stimulant, and as condiment for tomato sauce, etc. Cf. *paprika*. **c. resin.** An oleoresin from *Capsicum*, used as circulatory stimulant and heart tonic.

capsularin. $C_{22}H_{36}O_8$ = 428.3. A glucoside found in jute leaf, *Corchorus capsularis*, a Tiliaceae; colorless needles m.175.

capsule. (1) A small membranous sac inclosing a structural part of an organism. (2) A small sealed container for volatile compounds.

capsuloesic acid. Aescinic acid.

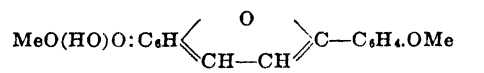
caput. Pl. *capita*. A head. **c. mortuum.** (1) The name given by early chemists to an earthy residue obtained after distillation or incineration. (2) Calcothar.

caracolite. $PbOHCl.Na_2SO_4$. A native double salt of lead oxychloride and sodium sulfate; orthorhombic crystals.

caraguata. The fibre from *Eryngium pandanifolium*, an Umbelliferae of South America, used for ropes, matting and bags.

carajura. A red pigment from *Begonia chica*. It contains wax, colored resin, silica and salts of Ca, Mg, and K, and is a source of carajurin.

carajurin. $C_{17}H_{14}O_6$ = 298.11.



The principal colored constituent of carajura.

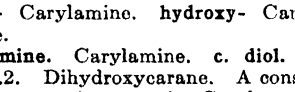
carajutin. $C_{15}H_{10}O_5$ = 270.08. A derivative of carajurin, scarlet needles.

caramel. $(C_{12}H_{18}O_9)x$. A compound obtained by heating sugar to about 200, often in presence of ammonium salts. A black or brown soluble mass, used as coloring matter for food, beverages and beer.

caramelan. A brown amorphous constituent of caramel. It forms soluble salts with lead and alkalis, is hydrolyzed by dilute acids to dextrose, furfural and levulic acid, and reduces Fehling's solution.

carana. Mararo, caranna, gum carana. A dark gray, brittle, resinous substance from *Urotium carana*, a Rutaceae of South America and Mexico.

carane. $C_{10}H_{18}$ = 138.2. 3.7.7-trimethyl-bicyclo(0.1.4)heptane. The hydrocarbon



A constituent of essential oils. Δ^3- Carene. **amino-** Carylamine. **hydroxy-** Carol. **keto-** Carone.

c. amine. Carylamine. **c. diol.** $C_{10}H_{18}O_2$ = 170.2. Dihydroxycarane. A constituent of Indian turpentine. **c. ol.** Carol.

caraneol. Carol.

caranna. Carana.

carase. Papain.

carat. A unit of weight of diamonds, precious stones, and the fineness of gold. Standard of pure gold is 24 carats; *e.g.*, 15 c. gold contains 9 parts of a base metal *i.e.*, 37.5 % of gold. 1 carat = 205 mg. or 3.163 troy grains. **English-** 3.1683 grams = 205.31 mg. Defined by the British Board of Trade in 1888. **metric-** 200.000 mg. = 3.086 grains. It became compulsory in the United Kingdom in 1914. Cf. *carob bean*.

caraway. The fruits of *Carum carvi*, an Umbelliferae, used as an aromatic, stimulant and flavoring agent. **c. oil.** The essential oil of c. seeds, d.0.907–0.915, b.180–230, containing carvone and *d*-limonene; used for flavoring. **c. water.** Aqua carum. Water flavored with c. oil.

carbachol. Chloryl, moryl. Carbyl choline chloride.

carbacidometer. Air tester.

carbagel. Calcium chloride on porous carbon; used for dehydration.

carbamamidine. Guanidine.

carbamase. An enzyme, splitting proteins to amines.

carbamate. A salt of carbamic acid; it contains the monovalent NH_2COO— radical. **ethyl-** Urethane.

carbamic. The divalent radical, —NH.COO—, derived from carbamic acid; as Ph.NHCOO.Ph, phenylcarbamic-phenyl ester.

carbamic acid. NH_2COOH. Amidocarbonic acid, aminoformic acid. The theoretical, first and simplest aminoacid, known as a number of salts, carbamates. Cf. *thionamic acid.* **amino-** Carbazic acid. **carbamyl-** Allophanic acid. **cyano-** See *cyano c.* **dithio-** See *dithio c.* **nitro-** See *nitro c.* **phenyl-** Carbanilic acid.

carbamide. An isomer of urea, q.v. **c. chloride.** Carbamyl chloride.

carbamidine. Guanidine.

carbamido. Uramido, uramino. The monovalent radical, NH_2CONH—, derived from urea. **phenyl-** The radical PhNH.CO.NH—.

carbaminate. Carbamate.

carbamonitrile. Cyanamide.

carbamyl. The monovalent radical, NH_2CO—, derived from carbamic acid. **c. carbamic acid.** Allophanic acid. **c. chloride.** NH_2COCl = 79.48. Carbamide chloride. Colorless needles, m.50, b.60; insoluble in water or alcohol. Used in organic synthesis. Cf. *Friedel-Craft reaction.* **c. cyanide.** Oxamonitrile.

carbamylic ester. Phenyl urethane.

carbanil. Phenyl cyanate. **c. aldehyde.** Formanilide.

carbanilic acid. $C_7H_7O_2N$ = 137.06. Phenylcarbamic acid, Ph.NH.COOH.

carbanilide. $C_{13}H_{12}ON_2$ = 212.25. Diphenylurea, PhNH.CO.NHPh. Colorless needles, m.236, slightly soluble in water, soluble in alcohol or ether.

carbanilino- Phenylcarbamyl. A prefix indicating the radical PhNHCO—.

carbanilo- A prefix indicating the radical, Ph-NH—. **c. nitrile.** Cyanoanilide.

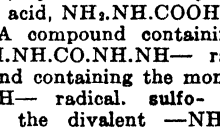
carbanion. Carbonate ion, $CO_3^{=}$.

carbarsone. $C_7H_9N_2O_4As$ = 260.05. *N*-Carbamyl arsanilic acid, *p*-carbaminophenyl-arsonic acid. A white powder, insoluble in water, soluble in carbonate solutions; used as an amebicide. Cf. *tryparsamide, acetarsone.*

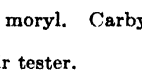
carbazic acid. $CH_4O_2N_2$ = 76.03. Aminocarbamic acid, hydrazine carboxylic acid, hydrazinoformic acid, $NH_2.NH.COOH$.

carbazide. A compound containing the divalent —NH.NH.CO.NH.NH— radical. **semi-** A compound containing the monovalent NH_2-CO.NH.NH— radical. **sulfo-** A compound containing the divalent —NH.NH.CS.NH.-NH— radical. **sulfosemi-** A compound containing the monovalent $NH_2CS.NH.NH$— radical. Cf. *carbohydrazide.*

carbazolacetic acid. $C_{14}H_{11}O_2N$ = 224.1.



carbazole. $C_{12}H_9N$ = 167.1. Dibenzopyrrole, diphenylenimide. The heterocyclic system,



Colorless crystals, m.245, b.351; used as a stabilizer for explosives. **acetyl-** See *acetyl c.* **N-ethyl-** $C_{14}H_{14}N$ = 196.2. Colorless crystals, m.68. **hexahydro-** $C_{12}H_{15}N$ = 173.2. Colorless crystals, m.99, b.267. **N-methyl-** $C_{13}H_{12}N$ = 182.1. Colorless crystals, m.87. **naphthopheno-** See *naphthophenocarbazole.* **tetrahydro-** $C_{12}H_{13}N$ = 171.12. Colorless crystals, m.119.

carbazone. A compound containing the divalent —N:N.CO.NH.NH— radical. (See *carbodiazone.*) **sulfo-** A compound containing the divalent —N:N.CS.NH.NH— radical.

carbazotate. Picrate.

carbazyl. The monovalent radical, $C_{12}H_8N$—, derived from carbazole; it forms 5 isomers.

carbazylic acid. An organic acid of the type $R—C(:NH)NH_2$. Cf. *carbylic acid.*

carbene. Cuprene.

carbenes. Constituents of bitumen which are insoluble in carbon tetrachloride or chloroform, but soluble in carbon disulfide. Cf. *asphalthenes.*

carbenzol. A distillate from shale tar containing phenols; used medicinally in skin diseases.

carbethoxy. The monovalent radical, —COOEt. Cf. *carbomethoxy.*

carbethylic acid. Ethyl carbonate.

carbide. Carbonide, carburet (cf. *acetylide*). A binary carbon compound of a metal. Some carbides decompose readily in water and give acetylene (Li_4C, K_4C, CaC_2, SrC_2, BaC_2); others form methane (Al_2C, B_2C), or hydrogen and methane (MgC_2, Mn_3C, Cr_3C); or a mixture of hydrogen, methane, and acetylene (rare earth carbides); while those of the rare metals (ThC_2, U_2C_3) form solid, liquid or gaseous hydrocarbons, and some carbides (as SiC, Ti_xC_y) are extremely stable. Cf. *crystolon, carboly.*

carbimide. Isocyanic acid.

carbinol. (1) The monovalent radical, —CH_2OH, characteristic of primary alcohols. Cf. *carbinols.* (2) Methanol. (3) Acetyl methyl carbinol, occurring in butter and responsible for its flavor and aroma. **acetyl-** Acetol. **allyl-** Δ^3-1-Butenol. **anthryl-** Anthracene carbinol. **benzyl-** Phenethyl alcohol. **butyl-** primary- Amyl alcohol; secondary- 2-Methyl-1-butanol; tertiary- 2-Dimethylpropanol. **diethyl-** 3-Pentanol. **dimethyl-** Secondary- *propanol.* **diphenyl-** Benzohydrol. **ethyl-** Propanol. **hexamethyl-** 2-Octanol. **methyl-** Ethanol. **phenyl-** Benzylalcohol. **propyl-** n-Butyl alcohol, n-butanol. **triethyl-** 3-Ethyl-3-pentanol. **trimethyl-** Tert-*Butyl alcohol* (tert. butanol).

carbinols. Primary alcohols. An aliphatic or aromatic compound of the general formula $R.CH_2.OH$; as

methylcarbinol	$Me.CH_2OH$
ethylcarbinol	$Et.CH_2OH$
propylcarbinol	$Pr.CH_2OH$
phenylcarbinol	$Ph.CH_2OH$

carbitol. $C_6H_{14}O_3$ = 134.11. Diethyleneglycol ethylether, $EtO(CH_2)_2.O.(CH_2)_2OH$. A colorless, volatile liquid, d.1.132, b.195; soluble in water, alcohol or ether. Used as a solvent for resins and nitrocellulose, in lacquer manufacture, in cosmetics and shaving cream. **butyl-** $C_8H_{18}O_3$ = 162.2. Diethyleneglycol-butylether, $BuOCH_2OCH_2CH_2OH$. A colorless, volatile liquid, b.222; used as a solvent in the manufacture of lacquers.

carbo. Charcoal. **c. animalis.** A charcoal prepared from bones and other animal matter, used as a decolorizing agent. **c. lignius.** A charcoal prepared from wood (wood charcoal). Used for decolorizing solutions, and in blowpipe analysis. **c. sanguinarius.** Blood coal. Charcoal prepared from animal blood.

carbobenzoyl. A compound containing the monovalent radical, —CO.C_6H_4.COOH. **c. formic acid.** Phthalonic acid. **c. acetic acid.** Colorless, m.90. **c. propionic acid.** Colorless, m.137.

carbocinchomeronic acid. Cinchomeronic acid.

carbocyanine. A group of dyes used as photographic sensitizers; *e.g.*, pinacyanol, sensitol-red. Cf. *cyanine, isocyanine, pseudocyanine.*

carbocyclic. A homocyclic compound of carbon, or an organic ring-compound in which all the ring atoms are carbon (*e.g.*, benzene) as opposed to heterocyclic compounds.

carbodiazone. A compound containing the divalent —N:N.CO.N:N— radical. **sulfo-** A compound containing the divalent —N:N.CS.N:N— radical.

carbofrax. The registered trade-mark for certain refractory products consisting of silicon carbide, bonded together by varying amounts of refractory clays or other ceramics.

carbohydrase. A member of a class of hydrolytic enzymes (q.v.) which split carbohydrates.

carbohydrates. Organic compounds which are synthesized by plants and contain C, H, and O; the latter two in the proportion of water. Their general formula is $C_x(H_2O)_y$.

Monosaccharides, x and y are 2, 3, 4, 5, 6, or 7.
Disaccharides, x is 12, y is 11.
Trisaccharides, x is 18, y is 16.
Polysaccharides, x and y are integers greater than 18.
Natural c. are generally dextorotatory, except fructose and inosite.

CARBOHYDRATES

I. *Monosaccharides*
  1. Bioses ..... $C_2H_4O_2$
    a. aldoses—glycoaldehyde
    b. ketoses—none
  2. Trioses ..... $C_3H_6O_3$
    a. aldoses—glycerose
    b. ketoses—dioxyacetone
  3. Tetroses ..... $C_4H_8O_4$
    a. aldoses—erythrose
    b. ketoses—erythrulose
  4. Pentoses ..... $C_5H_{10}O_5$
    a. aldoses—arabinose
      xylose
      ribose
    b. ketoses—arabinulose
  5. Hexoses ..... $C_6H_{12}O_6$
    a. aldoses—dextrose
      galactose
      mannose
    b. ketoses—levulose
      sorbose
  6. Heptoses ..... $C_7H_{14}O_7$
    a. aldoses—mannoheptose
II. *Disaccharides* ..... $C_{12}H_{22}O_{11}$
  1. Lactose (milk sugar)
  2. Maltose (malt sugar)
  3. Sucrose (cane sugar)
  4. Melibiose
  5. Trehalose
III. *Trisaccharides* ..... $C_{18}H_{32}O_{16}$
  1. Raffinose
  2. Melezitose
IV. *Tetrasaccharides* ..... $C_{24}H_{42}O_{21}$
  1. Lupeose
  2. Stachyose
V. *Polysaccharides* ..... $C_x(H_2O)_{x-1}$
  1. Dextrins
    a. achroodextrins
    b. erythrodextrins
  2. Starch group
    a. starches
    b. inulins
    c. glycogens
    d. lichenins
  3. Cellulose group
    a. Celluloses
    b. hemicelluloses
      1. pentosans—gum arabic
      2. hexosans—galactans
        agar-agar.
VI. *Conjugated Saccharides*
  1. Gums and mucilage group
    Consisting of saccharides and acids
  2. Glucosides, q.v.
    Consisting of saccharides and some other compound
  3. Tannins, q.v.
    Consisting of saccharides and tannins

carbohydrazide. CH_6ON_4 = 90.08. Carbazide (q.v.), *s*-diaminourea, $NH_2.NH.CO.NH.NH_2$.

carbohydrazidine. See *oxidiimide dihydrazide.*

carbohydrazones. Carbazides.

carbohydride. Hydrocarbon.

carboids. Kerotenes.

carbolate. Phenate. An ester of "carbolic" acid (phenol), hence a compound containing the monovalent PhO—radical.

carbolfuchsin. Ziehl's stain. A staining solution containing 5 pts. fuchsin, 25 pts. phenol, 50 pts. alcohol, and 500 pts. water.

carbolic acid. Phenol. **c. liquid.** Cresylic acid. **c. oil.** The fraction of coal tar, b.180–230; it is rich in phenols.

carbolmethyl violet. A microscope staining solution made by mixing 10 pts. of an alcoholic solution of methyl violet 6B with 90 pts. of a 5 % aqueous phenol solution.

carbolon. A trade name for *silicon carbide.*

carboloy. A trade mark for cemented *tungsten carbide*, which is used for high-speed machine tools and is second in hardness to diamond.

carbolxylene. A microscope clearing solution, made by mixing 3 pts. xylene and 1 pt. phenol.

carbometer. A device for measuring the amount of carbon dioxide in air.

carbomethene. Ketene.

carbomethoxy. The monovalent radical, —COOMe. Cf. *carbethoxy.*

carbon. C = 12.010. Atomic number, 6. A non-metallic bio-element which exists in three allotropic forms: amorphous (coal), graphite, and crystalline (diamond). It occurs native as coal, graphite and diamond; in combination with hydrogen as petroleum, with oxygen as carbon dioxide. It is an essential element for all vegetable and animal life. Its principal valency is four, but a few compounds of mono-, di-, and tri-valent carbon have been prepared. The main characteristic of carbon is that its atoms have a greater affinity for one another than for other atoms; thus the carbon atoms link with one another in endless variety and give rise to thousands of different (organic) compounds. This behavior of the carbon atom is due to its valency of four, and as eight electrons are neces-

sary for a stable system, the carbon atoms may be weakly positive or weakly negative and form non-polar compounds. The binary compounds of carbon are:

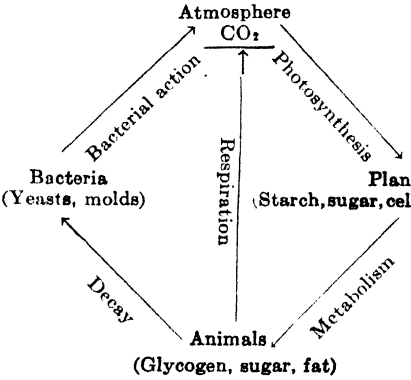
carbides..... M_xC_y
hydrocarbons..... C_xH_y
carbon-x-ides..... C_xX_y
carbonyls..... CO^-

Cf. *active c., gas c., charcoal, graphite, diamond, lampblack, electrode.*

c. apparatus. An instrument for determining the total carbon in coal, coke, and other fuels. **c. atom.** Tetrahedronal c. *asymmetric-* C. linked to four different types of atoms or radicals. *primary-* C. having one bond satisfied by carbon, *e.g.*, at the end of a chain. *quaternary-* C. surrounded by four carbon atoms. *secondary-* C. linked to two c. atoms. *tertiary-* C. linked to three c. atoms. **c. bisulfide.** C. disulfide. **c. black.** Lamp black. **c. bond.** The non-polar linkage between two carbon atoms, A and B, which consists of a pair of electrons at equal or unequal distances from each carbon atom. It may be electrically neutral, as in (1); or negative (B in 2), or positive (B in 3),

(1) A : B or A−−B or A—o—B
(2) A :B or A+−B or A—−o−B
(3) A: B or A−+B or A-o—−B

c. bronze. An alloy for bearings. **c. chains.** The successive arrangement of linked carbon atoms in a compound. (**closed-**) Aromatic compounds, (**open-**) Aliphatic compounds. **c. compounds.** See *organic compounds.* The characteristics of carbon compounds are (1) non-polarity; they do not ionize, and since their reactions are molecular and not ionic, they have a low velocity and can be controlled by temperature; (2) polymerism, the combination of similar molecules to larger and complex molecules; (3) isomerism and asymmetry, (q.v.); (4) combustibility, on heating, all carbon atoms oxidized to carbon dioxide and other reaction products. **c. cycle.** The circulation of carbon between a living organism and the surrounding environment as illustrated by the diagram:



c. dichloride. C_2Cl_4 = 165.84. Ethylene perchloride. A colorless liquid, $d_{20°}$.1.619, b.122. **c. dioxide.** CO_2 = 44.01. Carbonic acid gas, carbonic anhydride. A heavy, colorless incombustible gas, d_{air}.1.53, m.−65, $b._{5\,atm.}$−56, soluble in water, slightly soluble in alcohol. It is shipped as compressed liquid in steel tanks, and is used extensively in many industries; viz. for carbonating beverages, in refrigerators and fire extinguishers, for destruction of vermin and as a fertilizer. **c. disulfide.** CS_2 = 76.13. A colorless refractive liquid with a characteristic odor, $d_{22°}$.1.256, m.−112, b.46.2, nearly insoluble in water, soluble in alcohol or ether. Used medicinally as a local anesthetic and counter-irritant; in organic synthesis as a reagent; and as a solvent for S, I, rubber, etc. **c. group.** The fourth group of the periodic system (q.v.). **c. hexachloride.** C_2Cl_6 = 236.77. Carbon trichloride, ethyl perchloride, hexachloroethane. Colorless crystals, $d_{20°}$.1.99, m.182, b.187, insoluble in water, soluble in alcohol or ether. **c. light.** An electric arc light with C electrodes. **c. monosulfide.** CS = 44.04. A colorless gas, b.−130; very unstable and polymerizes to a red solid. **c. monoxide.** CO = 28.01. A colorless poisonous gas, $d_{air.}$-0.967, m.−205.7, b.−190, slightly soluble in water. It is formed during incomplete combustion of C. **c. oxysulfide.** COS = 60.07. Carbonyl sulfide. A colorless gas, $d_{air.}$2.104, m.−138.2, b.50.2, slightly soluble in water; mixed with air, it is explosive. **c. paper.** A tissue paper coated with a mixture of grease lampblack, and used to make copies of writings, typings, or drawings. **c. print.** A photographic process of making artistic reproductions of negatives. **c. residue.** Conradson carbon. The %C produced from a lubricating oil heated in a closed crucible under definite conditions. **c. subnitride.** Acetylene dinitrile. **c. suboxide.** C_3O_2 = 68.02. A colorless gas, $d_{air.}$1.11, m.−107, b.7, decomp. by water, soluble in ether. It is considered to be:

C=C=C—O or O:C:C:C:O
└—O—┘
(*Michael's formula*) (*Diehl's formula*)

It has a pungent odor, and is lacrimatory and suffocating. With water it forms malonic acid. **c. subsulfide.** C_3S_2 = 100.0. A deep red liquid, m.−0.5, pungent odor; it polymerises on heating. **c. tetrabromide.** CBr_4 = 331.85. Tetrabromomethane*. Colorless scales, d.3.42, m.92, b.189, insoluble in water, soluble in alcohol or ether. **c. tetrachloride.** CCl_4 = 153.84. Tetrachloromethane*, phenoxin, pyrex, A colorless liquid, $d_{25°}$.1.584, m.−19.5, b.76, slightly soluble in water, miscible with alcohol or ether. Used as a local anesthetic, and fire extinguisher; as a non-flammable solvent for resins, rubber, oils, etc.; as cleaning agent, to replace benzene; and in organic synthesis as a reagent. **c. tetrafluoride.** CF_4 = 88.0 Tetrafluoromethane*, fluoromethane. A colorless gas, b.−126, formed as by-product in the manufacture of aluminum from cryolite. **c tetraiodide.** CI_4 = 519.84. Tetraiodomethane*. Red crystals, $d_{20°}$.4.32, decomp. on heating, insoluble in water, soluble in alcohol or ether. **c. trichloride.** Hexachloroethane.

carbonaceous. Containing carbon.

carbonado. Bort. A hard, black diamond, used for cutting purposes.

carbonatation. The formation of carbonates by the action of carbon dioxide; wrongly known as *carbonation.*

carbonate. A salt of the theoretical carbonic acid, containing the divalent CO_3=radical;

All carbonates are readily decomposed by acids. The carbonates of the alkali metals are soluble; all others are insoluble. **bi-** A salt containing the monovalent HCO_3— radical, they are also termed acid carbonates. **chloro-** See *chlorocarbonate.*

c. minerals. A group of rock-forming minerals, as

calcite	$CaCO_3$
aragonite	$CaCO_3$
dolomite	$CaMg(CO_3)_2$
magnesite	$MgCO_3$
siderite	$FeCO_3$

carbonation. (1) Carbonization. (2) The precipitation of lime by carbon dioxide, *e.g.*, in sugar refineries. (3) The saturation of water with carbon dioxide, *e.g.*, in soda water manufacture; this is more properly known as *carbonatation* (q.v.).

carbonic. A compound containing tetravalent carbon. Cf. *carbonium.*

carbonic acid. (1) H_2CO_3. Meta-carbonic acid, hydroxyformic acid. $CO(OH)_2$ or HO.COOH. The hypothetical acid of carbon dioxide and water; known only in the form of its salts (carbonates) and acid salts (bicarbonates), as amides (carbamic acid, urea), and acid chlorides (carbonyl chloride). (2) An old term for carboxylic acid. **c. acid hydrate.** The compound $CO_2.6H_2O$. **ortho-** The compound $C(OH)_4$. It does not exist in the free state, though its esters are known.

carbonic acid esters. An organic compound in which the H of carbonic acid is substituted by a radical. **meta-** Compounds of the general formula, RO.CO.OR. **ortho-** Compounds of the general formula, $C(OR)_4$.

carbonic anhydride. Carbonic acid.

carbonic ester. Carbonic acid ester. **ethyl-** $CO(OEt)_2$ = 118.1. A colorless liquid, b.126. **ethylene-** $CO(OC_2H_3)_2$ = 114.1. Colorless crystals, m.39, b.236. **methyl-** $CO(OMe)_2$ = 90.1. A colorless liquid, b.91. **methylethyl-** EtO.CO.OMe = 104.1. A colorless liquid, b.-109. **methylpropyl-** PrO.CO.OMe = 118.1. A colorless liquid, b.131.

carbonic ether. Ethyl carbonate.

carbonide. Carbide.

carboniferous. (1) Containing carbon. (2) Belonging to the coal-age; see *geologic era.*

carbonite. (1) Small charcoal briquettes. See *briquet.* (2) A high-explosive consisting of 17–30 % nitroglycerin, 24–30 % $NaNO_3$, and 37–44 % flour.

carbonitrile. Cyanide, nitrile. The radical —CN, indicated by the *prefix* cyano-, or the *suffix* nitrile or carbonitrile.

carbonium. A compound with divalent or trivalent carbon; hence the condition in which a carbon atom has temporarily a quartet or sextet of electrons. This exceptional structure has been held responsible for the presence of color and reactivity.

carbonization. (1) The transformation of organic matter into charcoal. (2) The distillation of coal, as in gas and coke manufacture. **high temperature-** Heating coal out of contact with air in a gas oven or coke oven to 1000–1300°C, with the formation of gas, tar, oil, ammonia and coke. **low temperature-** Heating of coal to 450–700°C, with the formation of gas, petroleum (hydrocarbons from pentane to octane, and amylene to octene) and coke.

carbonize. To convert to carbon; to char or to burn incompletely.

carbonizer. A concentrated aluminum chloride solution used in the textile industry to remove cellulose from wool.

carbonoid. A tetragonal form suggested for the structure of carbon, which has four equal faces, each of which corresponds with one valency. Cf. *benzenoid.*

carbonometer. A device for determining the carbonic acid content of blood. Cf. *carbometer.*

carbonoxysulfide. Carbon oxysulfide.

carbon rheostat. An electric resistance consisting of a number of carbon plates mounted between castings on a base of asbestos and wood in such a way that pressure can be placed on the plates by means of a screw and their total resistance thus altered.

carbonyl. The divalent =CO radical. Cf. *carbonyles, thionyl.* **c. amido phenol.** Oxybenzoazole. **c. bromide.** $COBr_2$ = 187.83. Bromophosgene. A poisonous liquid, d.2.44, b.64.5, **c. chloride.** $COCl_2$ = 98.92. Phosgene. A poisonous gas, m.—75, b.8.2, decomp. in water or alcohol; used in organic synthesis, and gas warfare. **c. dioxy.** The bivalent radical —O.-CO.O—. **c. hemoglobin.** A combination of CO and hemoglobin, which is highly poisonous. **c. pyrrole.** $CO(C_4H_4N)_2$ = 160.1. Colorless crystals, m.0.63, b.238. **c. sulfide.** Carbon oxysulfide. **c. thiocarbonanilide.** $C_2ON_2SPh_2$ = 254.1. Colorless crystals, m.87. **thio-c. thiocarboanilide** $C_2N_2S_2Ph_2$ = 270.1. Colorless crystals, m.79.

carbonyles. Carboxides. A group of compounds of carbon monoxide and metals, some of them volatile; as, nickel carbonyl, $Ni(CO)_4$.

carboraffin. An activated charcoal, used chiefly for decolorizing sugar solutions.

carborundum. The registered trade-mark for certain silicon carbide and other abrasive products, including garnet, flint, emery and diamond.

carbosant. $C_{31}H_{46}O_3$ = 466.37. Santalyl carbonate, $(C_{15}H_{23}).O.COO(C_{15}H_{23})$. Carbonic acid ester of sandalwood oil. An oily yellow liquid, nearly tasteless and odorless; insoluble in water, soluble in alcohol, ether or chloroform.

carbostyril. C_9H_7ON = 145.15. 2-hydroxyquinoline, 2-quinolinol, α-oxyquinoline, 2(1)-quinol-one. Colorless prisms, m.199; slightly soluble in water, soluble in alcohol or ether. **ethyl-** See *ethyl c.* **hydro-** C_9H_9ON = 147.15. Colorless crystals, m.163. **hydroiso-** C_9H_9ON = 147.15. Crystals, m.71. **iso-** C_9H_7ON = 145.15. Crystals, m.208. **methyl-** Lepidone. **nitro-** $C_9H_6O_3N_2$ = 190.2. Colorless crystals, m.168. **octohydro-** $C_9H_{15}ON$ = 153.19. Crystals, m.151. **oxy-** $C_9H_7O_2N$ = 161.16. Colorless crystals, m.300. **pseudo-** C_9H_7ON = 145.15.

carbostyrilic acid. Kynuric acid.

carbox metal. An alloy of 84 % Pb, 14 % Sb, 1 % Fe and 1 % Zn.

carboxide. (1) Same as carbonyl. (2) The keto group. (3) A mixture of 1 pt. ethylene oxide and 9 pts. CO_2, used as fumigant for destruction of insects in grain, foodstuffs, tobacco, etc.

carboxy. Carboxyl.

carboxyhemoglobin. A compound of carbon monoxide and hemoglobin formed in the blood after carbon monoxide poisoning.

carboxyl. Oxatyl, carboxy. The monovalent acidic —COOH group. The basic capacity of an organic acid is dependent on the number of carboxyl groups present. *E.g.*, acetic acid is

mono-basic, oxalic acid is dibasic, citric acid is tribasic, as they contain respectively one, two, or three c. radicals. **c. nitrogen.** See *nitrogen.*

carboxylase. An enzyme in yeast, which splits the carboxyl group into CO_2. **co-** Vitamin B_1 pyrophosphate.

carboxylic acid. A compound of the type R—COOH. See *acids.* Its nitrogen analog is *carbazylic* acid. Cf. *carbylic acid.*

carboy. Demijohn. A large glass flask protected by wicker work or a wooden box, holding 10–13 gallons and used for the transport of acids, etc. **c. inclinator.** A support for a c., enabling it to be inclined and emptied easily.

carbro process. A method of making color-prints from color-photographs, similar to the ozobrom process.

carbromal. Adalin.

carbrosolide. A trade name for silicon carbide.

carburation. (1) Carbonization as applied to internal combustion engines. (2) *Carburization.*

carburet. Carbide.

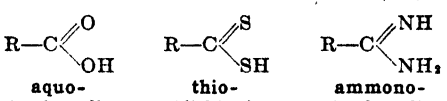
carburettor. (1) A device for making illuminating gas from water gas by spraying oil on hot surfaces over which the water gas passes. (2) That part of the internal combustion engine in which vaporisation of the fuel occurs.

carburite. A mixture of equal parts carbon and iron, used for recarburizing steel in the electric furnace.

carburization. The dissolution of carbon in molten metals; as, iron, steel, etc., produced by heating the metal in a stream of carbon monoxide or of a hydrocarbon. **case-** Carburization on the surface.

carbylamine*. (1) Isocyanide. (2) Ethylisocyanide.

carbylic acid. A group-name for organic acids which have carbon in their acid radical; as,



aquo- (carboxylic acids) **thio-** (dithionic acids) **ammono-** (carbazylic acids)

Cf. *siliconic acid, stannonic acid.*

carcel unit. The brightness of the carcel lamp, burning 42 grams of colza oil per hour. 1 carcel unit = 9.6 candles = 7.5 German standard candles (q.v.).

carcinogen. A substance which produces cancer in living tissues; as, benzopyrene.

carcinomic acid. An unsaturated fatty acid isolated from cancerous serum and tissue.

cardaissin. A substance extracted from suprarenal glands of cows; used as a heart stimulant during operations.

cardamom. The seeds of *Elettaria cardamomum,* a Zingiberaceae of tropical Asia. Used as an aromatic or carminative in the form of an infusion, tincture or fluid extract; and as a spice. **c. oil.** The essential oil of c., d.0.895–0.905; it contains terpinene, dipentene and limonene. **Malabar-** d.0.933–0.943; contains cineol. **Siam-** d.0.905; contains borneol.

cardiac. Pertaining to the heart (*καρδία* = heart). **c. sedative.** A drug which lessens the frequency of heart action, as, aconite, nitrites, veratrum. **c. stimulant.** A drug which increases the force and frequency of the heart-beat; as, digitalis, strophanthine, caffeine, or camphor.

cardiogram. The tracing produced by the cardiograph either on smoked paper, or with ink on white paper. **electro-** A photographic record of the electric heart-currents, which deflect a galvanometer mirror that reflects light from a small bulb on to photographic paper.

cardiograph. A device to record the movement of the heart, especially its force and character. It consists of a small diaphragm placed over the heart or artery which transmits the heart-beat by airpressure to a recording diaphragm. **electro-** A sensitive galvanometer with which the electric pulsations of the heart are measured.

cardioid. Heart-shaped. **c. condenser.** A device for concentrating light used in the ultramicroscope.

cardol. $C_{21}H_{30}O_2$ = 314.3. An irritant and oily liquid from the seeds of *Anacardium occidentale* (cashow nuts).

carene. $C_{10}H_{16}$ = 136.2. 4.7.7-trimethyl-Δ^3-norcarene, 3.7.7-trimethyl-Δ^3-bicyclo (0.1.4) heptane. A hydrocarbon of the terpene group, occurring in essential oils. **d-,** Colorless, sweet-smelling oil, d.0.8586, b.170, $[\alpha]_D$ = 7.69°; a constituent of Indian turpentine.

Carex. Red couch grass. A genus of perennial grass-like herbs of the Cyperaceae.

Carey-Foster Bridge. An electrical-resistance set which consists of three bridge wires, two shunts, and four sets of radio coils.

cargentos. Colloidal silver oxide containing a small amount of casein; used as a germicide.

Carica. The papaw or melon tree. *Carica papaya,* a Caricaceae of South America. Cf. *papaya.* **c. xanthin.** Kryptoxanthin.

caricin. (1) A glucoside from the seeds of carica. Cf. *papain.* (2) A protease, papain.

Carissa. A genus of spiny shrubs of Apocynaceae from Asia and Australia.

carissin. A glucoside from the bark of *Carissa ovata;* used as a cardiac stimulant.

caritinoid. Carotenoid.

Carius, Georg Ludwig. 1829–1875. A German chemist, noted for research in many branches of chemistry. **C. furnace.** A combustion furnace with five iron tubes.

carlic acid. $C_{10}H_{10}O_6$ = 226.1. An acid from the mold fungus, *Penicillium Charlesii.* Cf. *carolic acid.*

Carliczek gauze. A brass wire gauze: the individual wires are covered with asbestos.

carlosic acid. $C_{10}H_{12}O_6$ = 228.1. An acid from the mold fungus *Penicillium Charlesii.* See *carolinic acid.*

Carl's solution. A preservative for insect specimens consisting of 170 cc. 95 % alcohol, 60 cc. 40 % formaldehyde, 20 cc. glacial acetic acid and 280 cc. water. Cf. *fixative.*

Carlsbad salt. (1) Natural. Sal carolinum genuinum, sal thermarum carolinarum. The salts obtained by evaporation of the water of the springs at Carlsbad (Karlovy Vary, Czechoslovakia). (2) Artificial. Sal carolinum factitium. Sal carlsbadense. A mixture of 44 % Na_2SO_4, 2 % K_2SO_4, 18 % NaCl, and 36 % $NaHCO_3$.

carminative. A drug relieving colic, and promoting the expulsion of gas from the gastro-intestinal tract.

carmine. Coccinellin. A red coloring matter obtained by precipitating a decoction of cochineal with alum. It is of a mixture of carminic acids, carmine red, and other substances. Bright red, friable pieces, soluble in ammonia water, insoluble in water or dilute acids; is used as a microscopical stain. (*E.g.,*

Beale, Grenacher, Hoyer, Mayer, Nikiroff stains.) **ammonia-** A solution of carmine in ammonia water. **blue-** See *indigo c.* **borax-** An alkaline c. stain containing borax, and used to stain the nuclei of cells. **indigo-** See *indigo c.* **lithium-** See *Orth's stain.* **c. lake.** A compound of carmine and alumina. **c. red.** $C_{11}H_{12}O_7$ = 256.1. Purple lustrous crystals, obtained as a split-product of carminic acid; used as microscope stain.

carminic acid. $C_{22}H_{20}O_{13}$ = 492.15. Cochinilin. A glucosidae hydroxyanthrapurpurin derivative from cochineal. Purple-brown crystals, m.136, soluble in water or alcohol; used as reagent for albumin and aluminum, as a microscope stain, and pH indicator changing at pH 5.5 red (acid) to magenta (alkaline).

carminite. A lead ore containing phosphates, arsenates, and vanadates.

carmoisine. A carmine-red dye used in foodstuffs.

carnallite. $KCl,MgCl_2,6H_2O$ = 277.85. A native, potassium, magnesium chloride found in the Stassfurt mines of Germany. Cf. *sylvine.*

carnauba. (1) The Brazilian wax palm, *Copernicia cerifera;* or (2) its root, used as an alterative. **c. wax.** Brazil wax. A wax obtained from the fresh young leaves of carnauba. Yellowish or greenish masses, m.83–88, acid no. 4–8, sap. val. 80–95, iod. no. 1–13. It consists mainly of myricyl cerotate; used as a polish and for phonograph records.

carnaubic acid. $C_{24}H_{48}O_2$ = 368.37. The monobasic acid $C_{23}H_{47}COOH$; m.72, in carnauba wax and beef kidney.

carnaubyl alcohol. $C_{24}H_{49}OH$ = 354.39. A constituent of carnauba wax and wool fat, m.69, insoluble in water.

carnegieite. $Na_2Al_2Si_2O_8$. A sodium feldspar.

carnegine. $C_{13}H_{19}O_2$ = 221.15. An alkaloid from Cactaceae. It is a dimethyl derivative of salsoline, q.v. Cf. *dioscorine.*

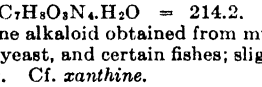
carnelian. Cornelian.

Carnelley, Thomas. 1852–1890. An English chemist noted for his *Physico-Chemical Constants* (1885–87).

carneol. Obsolete for cornelian.

carnine. $C_7H_8O_3N_4.H_2O$ = 214.2. A colorless crystalline alkaloid obtained from muscles, meat extract, yeast, and certain fishes; slightly soluble in water. Cf. *xanthine.*

carnitine. $C_7H_{15}O_3N$ = 161.2. Novain, γ-trimethyl-β-oxybutyro-betaine. A base found in the muscle tissue of animals, chiefly cephalopods.



Soluble in water or alcohol. Cf. *croton-betaine.*

carnomuscarine. A nitrogeneous extractive of muscles.

carnosine. $C_9H_{14}O_3N_4$ = 226.3. Ignotine, β-alanyl histidine. Colorless crystals, from meat extracts, m.219 (decomp.). Cf. *anserine.*

Carnot, Sadi. 1796–1832. A French engineer. **C. function.** The ratio between the lost and utilized heat of a living body. **C. theorem.** The work obtainable from a given quantity of heat absorbed in a machine that is working in a reversible cycle, depends only on the temperatures of the source of heat and refrigerator.

carnotite. A radioactive mineral consisting of the vanadate of uranium and potassium, (23 per cent V).

Carnoy's fluid. A mixture of absolute alcohol and glacial acetic acid used to fix animal tissues before staining.

Caro, Heinrich. 1834–1910. A German industrial chemist. **C.'s acid.** Persulfuric acid, H_2SO_5 or $HO.SO_2.O.OH$.

carob beans. St. John's bread. The pods of *Ceratonia siligua,* a Leguminosae, rich in sugar and gum; used as fodder. Its seeds were the "carats" (q.v). of jewellers. Cf. *tragon.* **c. gum.** The gum of c. beans, used as an emulsifier in ice-cream, lozenge and toilet cream manufacture, and as substitute for tragacanth.

caroba. The Brazilian caraiba tree, *Jacaranda procera,* a Bignoniaceae.

carobic acid. A colorless crystalline acid from the leaves of caroba.

carobine. An alkaloid of caroba.

carobone. A balsamic resin from the leaves of caroba.

carol. $C_{10}H_{18}O$ = 154.2. Carane-ol, 5-hydroxycarane. A monobasic alcohol, derived from carane, and a constituent of many essential oils.

carolic acid. $C_9H_{10}O_4$ = 182.1. An acid from the mould fungi, *Penicillium Charlesii.* Cf. *carlic acid.*

carolinic acid. $C_9H_{10}O_6$ = 214.1.

from the mould fungi, *Penicillium Charlesii.* Cf. *carlosic acid.*

carolinium. A supposed element obtained from thorium minerals.

carolite. Carrollite.

carone. $C_{10}H_{16}O$ = 152.2. 5-Ketocarane. A ketone of essential oils, derived from carane. A colorless, oily, odorous liquid, b.210.

carony bark. Angostura bark.

carotenase. An enzyme of the liver which splits carotene in half, thus producing vitamin A.

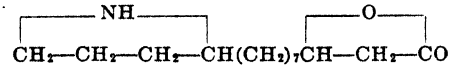
carotene. $C_{40}H_{56}$ = 536.6. Carotin; caritol, primary vitamin A. A lipochrome, m.174, b.287; occurring in leaves, carrots and other foodstuffs, where it is associated with chlorophyll; also in animal tissues, blood serum, milk fat, etc. It is the precursor of vitamin A and exists in several isomeric forms: α- (the smaller portion) is optically active, m.172, max. absorption bands at 521 and 485 mμ. β- (the larger portion) is optically inactive, m.182, max. absorption bands at 511 and 478 mμ. Cf. *xanthophyll, carotenoids.* **red-** Lycopin.

carotenoids. Carotinoids, polyenes. A group name for lipochromes or carotene-like plant pigments which are deposited in animal tissues. They may be hydrocarbons, alcohols, ketones or acids, characterized by a series of alternate double bonds. Cf. *cholane ring, cerebrosides.* See Table.

carotin. Carotene.

carotinoids. Carotenoids.

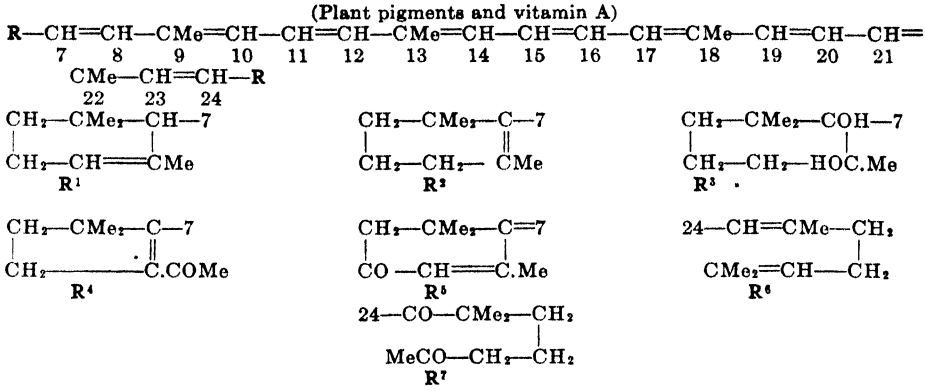
carpaine. $C_{14}H_{25}O_2N$ = 239.3. An alkaloid from the leaves of *Carica papaya,* a Caricaceae. Colorless crystals, soluble in alcohol, ether or chloroform, m.119; used as a diuretic and heart



stimulant, and resembles digitalis in action. **c. hydrochloride.** $C_{14}H_{25}O_2N.HCl$ = 275.67.

CAROTENOIDS

(Plant pigments and vitamin A)



Polyene Hydrocarbons:

$C_{40}H_{56}$	alpha-carotene	R^{1}-7 ..... 24-R^{2}	
	beta-carotene	R^{2}-7 ..... 24-R^{2}	
	gamma-carotene	R^{2}-7 ..... 24-R^{6}	
	delta-carotene	R^{1}-7 ..... 24-R^{6}	
Polyene Alcohols:			
$C_{20}H_{29}OH$	vitamin A	R^{2}-7 ..... 15-OH	
$C_{40}H_{55}OH$	kryptoxanthin	R^{2}-7 ..... 24-R^{2}	-OH at 3
	rubixanthin	R^{2}-7 ..... 24-R^{6}	-OH at 3
$C_{40}H_{58}O_{2}$	β-oxycarotene	R^{2}-7 ..... 24-R^{2}	
$C_{40}H_{52}O_{2}$	xanthophyll	*from green plants*	
$C_{40}H_{56}O_{2}$	zeaxanthin	*from seeds, seed pods*	
$C_{40}H_{56}O_{4}$	violaxanthin	*from pansies, orange rinds*	
$C_{40}H_{56}O_{4}$	taraxanthin	*from dandelion*	
$C_{40}H_{56}O_{6}$	fucoxanthin	*from brown algae*	
$C_{35}H_{50}O_{3}$	capsanthin	*from paprika*	
Polyene Ketones:			
$C_{40}H_{50}O_{2}$	rhodoxanthin	R^{5}-7 ..... 24-R^{5}	
$C_{40}H_{56}O_{2}$	semicarotenone	R^{2}-7 ..... 24-R^{7}	
$C_{40}H_{54}O$	dehydrosemicarotenone	R^{4}-7 ..... 24-R^{2}	
Polyene Acids:			
$C_{20}H_{24}O_{4}$	crocetin	HOOC-9 ..... 22-COOH	
$C_{27}H_{38}O_{4}$	azafrin	R^{3}-7 ..... 20-COOH	
$C_{25}H_{30}O_{4}$	bixin	MeOOC-8 ..... 23-COOH	

The structures of these compounds are shown by connecting the indicated radicals at the carbon atoms of the chain.

White crystals m.225, soluble in water, and used in hypodermic medication.

carpamic acid. $C_{14}H_{27}O_{3}N$ = 257.2. An acid formed on hydrating carpaine.

Carpenter, Sir Harold. 1875–1940. A British metallurgical chemist.

carposide. A glucoside obtained from carica, and identical with *caricin.*

Carr oven. A single-walled vacuum oven.

carragheen. Irish moss.

Carrel-Dakin solution. An isotonic NaOCl solution, used for bathing and irrigating wounds. Cf. *Dakin solution.*

carrene. Methylene chloride.

carrollite. $Co_{2}CuS_{4}$. A rare, native, cobalt-copper sulfide.

carron oil. An emulsion of linseed oil in lime-water, used for burns. First used at the Carron iron works, Scotland.

carrotin. Carotene.

carroting. The preparation of hair for felting.

carstone. A ferruginous sandstone of Norfolk (England).

carthamein. An oxidation product of carthamin.

carthamic acid. Carthamin.

carthamin. $C_{14}H_{16}O_{7}$ = 296.2. The red coloring matter of the safflower, *Carthamus tinctorius.* Dark red scales, insoluble in water, soluble in alkali carbonate solutions; used as a dye and coloring matter.

carthamus. African saffron. A genus of composite plants, as *C. tinctorius,* false or American saffron or safflower, cultivated in Asia; used as a dye, condiment and for making rouge.

cartilagin. Chondrigen. The protein of cartilage, or the white, elastic substance of the bone surface; changed, by boiling, to chondrin.

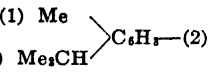
carubinose. *d*-Mannose.

carum. Caraway. Cf. *ajava.*

carvacrol. $C_{10}H_{14}O$ = 150.16. 2-hydroxy-p-cymene, isopropyl-o-cresol, isopropylhydroxy-toluene, 2-cymophenol, 2-methyl-5-isopropyl-phenol, oxycymol, 1-methyl-2-hydroxy-3-isopropylbenzene, $Me.C_{6}H_{3}(OH)C_{3}H_{7}$. An aromatic constituent of essential oils, camphor, origanum, caraway, savory and other Labiatae. A thick, colorless, oily liquid, d.0978, m.0, b.236; insoluble in water, soluble in alcohol, ether or alkalis. Used in perfumery, and as a vermifuge and fungicide. **c. iodide.** $C_{10}H_{13}OI$ = 276.06. Iodocrol. An almost odorless compound, used as an iodoform substitute.

carvacrotic acid. A colorless crystalline acid derived from carvacrol.

carvacryl. The monovalent radical, derived from

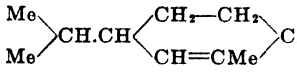


carvacrol. **c. amine.** Cymidine.

carvene. d-Limonene.

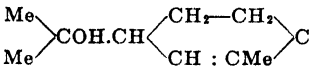
carveol. $C_{10}H_{16}O$ = 152.16. 2-hydro-xylimonene, $\Delta^{1,8}(9)$-terpadiene-ol-2, 1-methyl-2-hydroxy-4-isopropylene-tetrahydro-benzene, $Me.C_6H_7(OH)C_3H_5$. A constituent of several essential oils of the Labiatae family, b.232.

carvestrene. $C_{10}H_{18}$ = 138.11. 1-m-terpene, 1-methyl-3-isopropyl-tetrahydro-benzene,



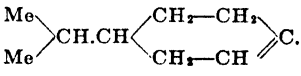
A hydrocarbon in essential oils.

carvestrol. $C_{10}H_{18}O$ = 154.2. 1-m-menthenol, 1-meta-terpenol-8. The alcohol derivative of carvestrene:



carvol. Carvone.

carvomenthane. $C_{10}H_{18}$ = 138.14. Δ^1-terpene, 1-methyl-4-isopropyl-tetrahydro-benzene.

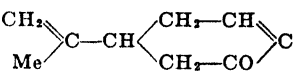


A hydrocarbon from carvone. A colorless liquid, d.0.806, b.175.

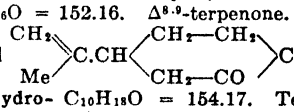
carvomenthol. $C_{10}H_{20}O$ = 156.2. 2-*p*-menthanol. An isomer of menthol in essential oils, d.0.904, b.222, soluble in alcohol.

carvomenthyl. The monovalent radical, $—C_{10}H_{17}$, derived from carvomenthane. **c. amine.** $C_{10}H_{17}.NH_2$ = 153.2. Tetrahydro-carvyl-amine. A colorless liquid, b.212.

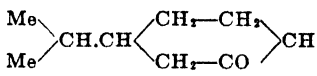
carvone. $C_{10}H_{14}O$ = 150.16. $\Delta^{6,8(9)}$-terpadienone-2, $\Delta^{6,8(9)}$-2-p-menthadienone, 1-methyl-2-oxy-4-isopropylene-Δ^6-tetrahydro-benzene.



A constituent of the oils of caraway, cumin and dill. A colorless liquid, b.225. **dihydro-** $C_{10}H_{16}O$ = 152.16. $\Delta^{8,9}$-terpenone. The compound



tetrahydro- $C_{10}H_{18}O$ = 154.17. Terpanone-2. The saturated ketone



A constituent of essential oils.

c. anil. $C_{10}H_{18}O.NHPh$ = 241.2. A light-yellowish oil, b.180, which darkens with age.

carvylamine. tetrahydro- Carvomenthylamine.

Carya. The hickory tree, *Carya tomentosa* (Juglandaceae) of North America, cultivated for its wood and fruits (pecans).

caryin. A crystalline compound from the bark of carya.

caryinite. A native phosphate and arsenate of lead.

caryl- The monovalent radical, $C_{10}H_{17}$— derived from carane. **c. amine.** 5-carylamine. $C_{10}H_{17}NH_2$.

caryocinesis. Karyokinesis.

caryophyllin. $C_{30}H_{48}O_3$ = 456.4. Oleanolic acid. A ketone from oil of cloves, soluble in alcohol or ether.

caryophyllinic acid. $C_{30}H_{32}O_8$ = 400.3. An acid derived from caryophyllin.

caryophyllum. Cloves. The flower-heads of *Eugenia caryophyllata*, a Myrtaceae. They are brown in color, have a strong fragrant and spicy odor, and contain an oil used as a flavoring and aromatic stimulant.

casca. The Spanish and Portuguese word for "bark." **c. bark.** Erythrophloeum.

cascara amarga. Honduras bark. The bark of *Picramnia antidesma* a Simarubaceae of tropical America, used as a tonic and alterative. **c. sagrada.** Sacred bark. Chittem bark, bearwood. The bark of *Rhamnus purshiana*, a shrub of the Western United States. It is a cathartic, stimulant and laxative, and is used as a fluid extract, or tincture. See *peristaltin, cascarin, anthraglucosagradin.*

cascarilla. The bark of various *Croton* and *Cinchona* species, especially *Croton eluteria.* The fluid extract or tincture is used as a stomachic tonic.

cascarillic acid. $C_{11}H_{20}O_2$ = 184.14. An acid from the oil of cascarilla. Colorless liquid, d.9324, m. −15, b.270.

cascarilline. $C_{12}H_{18}O_4$ = 226.2. Colorless bitter crystals from the bark of *Croton eluteria.*

cascarin. A colorless crystalline glucoside from Cascara sagrada; used as a hypodermic purgative.

case harden. To harden wrought iron by heating it in contact with carbon or potassium ferrocyanide. A surface layer of steel is produced. See *carburization, cementation.*

caseanic acid. $C_9H_{16}O_7N_2$ = 264.15. An acid from casein.

casease. A bacterial ferment that dissolves casein. Cf. *caseinase.*

caseate. Caseinate.

caseation. The curdling of milk and the transformation of it into a cheesy mass.

casein. The protein of milk, and principal constituent of cheese. A white substance, soluble in acids and alkalis. Used as food; technically, in combination with formaldehyde, as a plastic and for synthetic resins; in the leather industry; as a substitute for linseed oil in making pigments, for making albumin, rubber, and gelatin for films, and as a glue when mixed with lime. The composition of a typical casein is:

carbon	53 %
hydrogen	7 %
oxygen	22.65 %
nitrogen	15.7 %
sulfur	0.8 %
phosphorus	0.85 %

Its isoelectric point is pH 4.7; hence it occurs as:

neutral casein at	pH 4.7
metal caseinate	above pH 4.7
casein salt	below pH 4.7

animal- Casein. **blood-** Obsolete name for albuminose. **fibrous-** See *aralac, lanital.* **gluten-** Vegetable casein. **milk-** Casein. **saliva-** Ptyalin. **vegetable-** A protein from

the seeds of various cereal plants, forming 10–20 % of the gluten of flour.

caseinase. Rennase.

caseinate. Caseate. A compound of casein with a metal; as, sodium c.

caseinic acid. $C_{12}H_{24}O_8N_2$ = 276.21. An acid from casein.

caseinogen. A compound protein of milk which yields casein by the action of digestive ferments.

Casella acid. 2.7-Naphthol sulfonic acid.

cashew. The nut of *Anacardium occidentale*, a tree of tropical America. Cf. *anacardium*. **c. oil.** A yellow oil, used in lacquers and paints, cf. *harvel coating*.

casimirin. A glucoside from the seeds of white sapota or *Casimiroa edulis*, a Rutaceae of Mexico; used as a hypnotic and analgesic.

casoid. A synthetic plastic made from a casein basis.

cassareep. The evaporated juice of the bitter cassava, used in the West Indies as a preservative for meat.

cassava. Manioc, mandioc, manihoi, etc. A group of Euphorbiaceae cultivated in South and Central America; as, **bitter-** *Manihot utilissima* and **sweet-** *Manihot aipi*. Their large tuberous roots contain starch, and are used in preparing tapioca and Brazilian arrowroot.

cassel brown. A brown pigment found near Cassel (Germany). It is a fossilized humus of the tertiary period. **c. yellow.** A form of lead oxychloride.

Casseler green. Barium manganate.

casseliase. A mica peridotite from Kentucky.

casselose. A nephelite-melilite basalt from Texas.

casserole. A laboratory porcelain dish with a handle.

Cassia. (1) An obsolete term for sweet smelling trees. (2) A genus of leguminous herbs and trees. (3) An inferior cinnamon from *Cinnamomum cassia*, used as spice and as a source of oil. **purging-** The pulp of the pods of *Cassia fistula*. **c. bark.** Chinese cinnamon. **c. buds.** The unripe fruit of various cinnamon species. **c. leaves.** Senna. **c. oil.** Chinese oil of cinnamon. An essential oil from the bark of *Cassia chinensis*. It is darker and heavier than cinnamon oil, and less agreeable to the taste. **c. seeds.** The fruits of *Cassia fistula*, a tree of East India, used as a laxative and for poultices.

cassina. Holly from the sea coast of Southern U. S.; its leaves are used in a beverage.

cassiopeium. Cp = 175.0. The name given to lutecium, *q.v.*, by Auer von Welsbach, who separated it from ytterbium in 1905.

cassiterite. SnO_2. Tinstone, block tin, tin spar, stream tin. Native stannic oxide; a tetragonal brown, black, red or yellow mineral, d.6.9, hardness 6–7, generally found as rounded pebbles in the streams of Malaya.

cast. (1) To form a molten substance into a definite shape or state by allowing it to cool in a mold. (2) Cf. *casts*.

castanea. The leaves of *Castanea vulgaris*, the chestnut tree of the United States; used as fluid extract for whooping cough.

castanhao oil. Brazil nut oil. A liquid fat expressed from the seeds of *Bertholletia* species.

castelamarin. $C_9H_{14}O_3$ = 170.11. A bitter principle, m.269, from *Castela nicholsoni*, a Simarubaceae. Cf. *amargosa bark*.

castine. An alkaloid from *Vitex Agnus castus*, a Verbenaceae.

castonin. A globulin from European chestnut.

castor. (1) The beaver, *Castor fiber*, an amphibious rodent. (2) Castoreum. A brown, strong-smelling, solid substance from the preputial follicles of the beaver, used as an antispasmodic and stimulant. **c. beans.** The seeds of *Ricinus communis*. **c. oil.** Ricinus oil. The fixed oil expressed from the castor bean. A transparent, pale-yellow liquid, $d_{25°}$.0.945–0.965; used as a mild purgative. Cf. *dericin*, *ricinolein*. **c. pomace.** The solid residue from the extraction of c. oil from the c. bean. Used as fertilizer, and contains 4.1–6.6 % N, 1–1.5 % P_2O_5 and 1–1.5 % K_2O. **c. seeds.** C. beans.

castoreum. Castor. **c. oil.** Essential castor oil. A pale-yellow liquid obtained by distillation of castoreum.

castoric acid. An acid in castoreum.

castorin. A white fatty substance in castoreum.

casts. Cylindrical structures formed in uriniferous tubules, and found in urine sediment. **blood-** C. consisting of erythrocytes, and indicating a renal hemorrhage. **epithelial-** C. consisting of epithelial cells and indicating acute nephritis. **fatty-** C. consisting of fat globules or fatty acids, and indicating a degeneration of the kidney. **granular-** C. consisting of granular material, and indicating an inflammatory kidney. **hyaline-** C. consisting of the basic material of casts, commonly found in all kidney disorders. **pus-** C. consisting of pus cells or leucocytes, indicating renal suppuration. **waxy-** C. consisting of the light-yellow basic material commonly found in amyloid disease.

cata- A prefix derived from the Greek κατα, meaning down, against, back, or of a lower order. Cf. *ana-*

catabiotic. Capable of using up or dissipating. **c. force.** The energy derived by an organism from the metabolism of its food.

catabolism. Disintegration or the breaking down of tissues, the destructive metabolism by which living matter is transformed into waste materials and eliminated from the body. Cf. *anabolism*.

catadyn. An oligodynamic catalyst (q.v.) used for sterilization; as, silver.

catalase. (1) An oxidizing enzyme of blood and the tissues which splits peroxides to oxygen and water. (2) The oxidizing enzyme of fresh tobacco leaves. Cf. *peroxidase*.

catalasometer. An instrument which measures the activity of the catalase in a liquid (*e.g.*, milk) from the change in the level of a liquid in the graduated tube passing through the stopper of the closed vertical cylinder in which the reaction occurs.

catalinite. Beach pebbles of Santa Catalina Island; a green, red or brown variety of quartz.

catalysant. The substance on which a catalyst acts. Cf. *substrate*.

catalysate. The product of catalysis.

catalysis. Contact action or cyclic action. The effect produced by a small quantity of a substance on a chemical reaction, after which the substance (catalyst) appears to remain unchanged. Theories:

(1) Chemical. Formation of an intermediate compound; *chemical* catalyst, q.v.
(2) Adsorption. Contact action, *mechanical* catalyst, q.v.
(3) Radiation. Excitation by light, *photochemical* catalyst, q.v.

heterogenous- The acceleration of a chemical reaction in a heterogeneous system; *e.g.*, a

solid catalyst in a gas mixture. **homogenous-** The acceleration of a chemical reaction in a homogeneous mixture, *e.g.*, catalyst and reacting substances are either gases, or liquids. **iso-** The phenomenon of two catalytic influences in the same system and at the same time. **isomeric-** The transformation of a substance to an isomeric form by a catalyst. **negative-** (1) The retardation of a reaction by a catalyst, *e.g.*, mannitol reduces the oxidation of P. (2) The stopping of a reaction by a substance added to the system; *e.g.*, O_2 stops the reaction of H_2 and Cl_2. **photo-** The acceleration of a reaction by light. **photochemical-** The action of light as a catalyst. **pseudo-** Acceleration of a chemical reaction by a chemical catalyst.

catalyst. Catalyzator, catalyzer, catalytic agent. A substance which effects catalysis. **chemical-** A substance which changes the speed of a chemical reaction, probably by taking part in its chemical reaction, but which is formed again as a reaction product; hence is again present in its original concentration at the end of the reaction. An example is the rôle of nitric acid in the lead chamber process of making sulfuric acid. **inducing-** Promoter. A substance which stimulates or aids in catalysis. **mechanical-** A substance which influences the speed of a chemical reaction without itself undergoing a change, *e.g.*, the reaction of $2H_2O_2 = 2H_2O + O_2$ is accelerated by colloidal Pt, or Au. **negative-** Retarder. A substance which retards a chemical reaction. **positive-** Accelerator. A substance which accelerates a chemical reaction. Cf. *enzyme, ferment, vitamin, sensitizer.*

catalytic. Pertaining to catalysis. **c. action.** Catalysis. **c. agent.** Catalyst. **c. force.** The mechanical expression of the change in the speed of a chemical reaction produced by a catalyst. **c. poison.** Anticatalyzers, paralyzers. A substance which counteracts the effect of a catalyst, *e.g.*, HCN will prevent the catalysis of H_2O_2 by colloidal Pt. **c. process.** Contact process. The manufacture of industrially important substances by catalysis, *e.g.*, fixation of atmospheric nitrogen, manufacture of sulfuric acid (*contact process*).

catalyzer. Catalyst.

catamorphism. The chemical and physical changes produced on rock by the action of wind and water. Cf. *anamorphism.*

cataphoresis. Kataphoresis. The downward motion of electrically charged particles suspended in a medium under the influence of an electric field. Cf. *endosmosis.* Its antonym *anaphoresis* implies upward motion.

catapleiite. A complex zirconium silicate.

catechin. $C_{15}H_{14}O_6$ = 290.01. An acid substance from catechu, mahogany wood, and kino. An amorphous yellow powder, soluble in water, alcohol or alkalis; used for tanning and in calico printing. **c.a.** $+3H_2O$. *dl*-catechol, acacatechin. The principal constituent of acacia catechu. Thin needles, sintering at 100, and m.214. **c.b.** $+4H_2O$. *d*-catechol, gambir catechin. Thin needles, m.93–95, soluble in alcohol or ether. **c.c.** $+4H_2O$. *d*-epicatechol. Thin needles; anhydrous at 274.

catechol. (1) Pyrocatechol. (2) Catechin. **benzoylpyro-** Dihydroxybensophenone. **dimethoxy-** Veratrol. **methyl-** Guaiacol.

catechu. Cutch, cashoo, black catechu. An extract of the dark heart-wood of *Acacia catechu*, used as tincture, fluid extract, or powder, as an astringent in diarrhea, leucorrhea, and hemorrhages. Cf. *japonic acid.* **pale-** Gambir. **c. palm.** Areca.

catechuic acid. Catechin.

catechuretin. $C_{33}H_{23}O_{12}$ = 676.22. A substance produced from catechu by the action of sulfuric acid.

catechutannic acid. A reddish, amorphous substance obtained from catechu; believed to be the anhydride of catechuic acid.

catelectrode. Cathode.

catenary. The curve assumed by a chain suspended at each end.

catgut. An aseptic cord prepared from animal intestines (*e.g.*, sheep), and used for ligatures.

cathartic. A drug which causes the evacuation of the bowels, *e.g.*, castor oil, croton oil, magnesium sulfate. Cf. *purgative, laxative, aperient, hydragogue.*

cathartic acid. $C_{180}H_{96}O_{82}N_2S$. A glucoside and active principle of senna.

cathartin. (1) A bitter principle of senna (Lassaigne and Feneulle). (2) A compound from the ripe fruits of *Rhamnus cathartica* (Winkler). (3) A compound from jalap.

cathartogenin. A split product of cathartic acid.

cathartomannite. $C_{21}H_{44}O_{19}$. A non-fermentable carbohydrate-like substance from senna.

cathetometer. A precision instrument for the measurement of small vertical displacements. It consists usually of a microscope mounted on a rigid vertical rod, with cross wires and a scale.

cathidine, cathine, cathinine. Three alkaloids from African tea, the leaves of *Catha edulis*, a Celastraceae of Northern Africa. Cf. *katine.*

cathine. $C_9H_{13}ON$ = 151.11. *d*-nor-*i*-ephedrine. A crystalline alkaloid, m.77, soluble in water, from bushman's tee (boesmanstee), the leaves of *Catha edulis*, a Celastraceae, from N. and S. Africa. Cf. *celastrine, katine.*

cathode. Kathode, negode, katode. The negative pole or electrode of a galvanic battery, cell, electric current, or electric device. **c. deposit.** (1) A precipitate of a metal produced by electrolysis. (2) A metallic mirror formed on the glass near the cathode of vacuum tubes. See *cathodic sputtering.*

cathode rays. Negative rays. A stream of negatively charged electrons issuing from the cathode of a vacuum tube perpendicular to the surface, with velocities (10^9 to 10^{10} cm./sec.) depending upon the existing potential difference. When they are stopped by a solid substance they produce heat, phosphorescence, x-rays, pressure, or photographic action. The charge on a single electron is 4.77×10^{-10} e.s.u.; its mass 9×10^{-28} grams, or $\frac{1}{1800}$ of an H atom; its diameter 4×10^{-13} cm. They are analogous to the β-rays of radioactive matter.

cathodic sputtering. The disintegration of the cathode metal in an electric discharge tube, as a result of which the surrounding glass is covered with a mirror of finely-divided cathode metal.

catholyte. The liquid in the immediate neighborhood of the cathode during electrolysis. Cf. *anolyte.*

cation. Kathion, cathion, negion. (1) A positively charged atom, radical or group of atoms, which passes to the cathode or negative pole during electrolysis. (2) A positively charged gas molecule.

cationotropy. A case of ionotropy (q.v.) in which a H^+ or M^+ breaks off a molecule and leaves

negative ion in dynamic equilibrium. Cf. *prototropy*.

catlinite. Pipestone. A red clay from the Upper Missouri Region; used by the Indians for pipes.

catoptric. An optical system with metallic reflectors instead of glass mirrors.

catoptrics. A branch of physics that deals with mirrors and reflected light.

catoptron. A mirror.

catoptroscope. A device for examining objects by reflected light.

Cauchy's formula. An equation by which the wavelength, λ, and frequency, n, measured in air are converted to vacuum conditions. $(n-1)10^7 = a + b/\lambda^2 \times 10^{-5} + c/\lambda^4 \times 10^{-16}$. At 15°C and 760 mm. the values are for a = 2726.43; b = 12.288; c = 0.3555. At 0°C and 760 mm., a = 2875.66; b = 13.412; and c = 0.3777.

caulophyllin. A resinous precipitate obtained by pouring concentrated tincture of caulophyllum into water.

caulophylline. An alkaloid from blue cohosh, the root of *Caulophyllum thalictroides*. Colorless, odorless crystals.

caulophylloid. The combined principles from caulophyllum, used for the relief of congestive and spasmodic conditions of generative organs.

caulophyllosapogenin. $C_{56}H_{88}O_9$ = 904.68. A glucoside, m.315, from caulophyllum.

caulophyllum. Squaw root, blue cohosh. The rhizome and roots of *C. thalictroides*, a Berberidaceae of North America. It is a sedative, diuretic, and antispasmodic; used as fluid extract and tincture.

caulosaponin. $C_{54}H_{88}O_{17}$ = 1008.7. Leontin. A glucoside, m.255, from caulophyllum.

caustic. (1) Corrosive or burning. (2) The hydroxide of a light metal, *e.g.*, caustic soda. (3) A curve or surface of maximum brightness produced by the concentration of rays of light after reflection or refraction. (4) A drug which destroys the soft tissues of the body; used to destroy pathological tissues; an escharotic. **lunar-** Silver nitrate. **Vienna-** KOH fused with lime. Cf. *soda-lime*. **volatile-** Ammonium hydroxide.

c. curve. The line produced by the intersection of a number of reflected or refracted rays of light. **c. lime.** Calcium oxide. **c. potash.** Potassium hydroxide. **c. soda.** (1) Sodium hydroxide. (2) An impure, solid, or ground sodium hydroxide containing 76–78 % of sodium oxide, used in the manufacture of soap, paper, paints, leather, chemicals, and drugs; also for softening water, mercerizing cotton, refining oils, and in the preparation of cleansers.

causticity. The extent to which a substance is caustic. It is given (as a percentage) by the expression $100(2x - y)/y$, where x and y are the cc. of hydrochloric acid necessary to make the solution neutral to phenolphthalein and methyl orange, respectively. Hence it expresses the relative proportions of carbonate and hydroxide.

causticized ash. A mixture of soda-ash (Na_2CO_3) and caustic soda (NaOH), containing from 15–45 % NaOH. Used as water softener, for cleansers, and in the manufacture of leather.

Cavendish, Henry. 1731–1810. An English philosopher and chemist noted as a pioneer in specific heat and eudiometry and as the discoverer of hydrogen. He determined the compositions of water, air and nitric acid.

Caventou, Joseph Bienaimé. 1795–1877. A French pharmacist and discoverer of brucine, strychnine and quinine (with Pelletier).

cavitation. The production of emulsions by disruption of a liquid into a two-phase system of liquid and gas, when the hydrodynamic pressure in the liquid is reduced to the vapor pressure.

cawk. Barytes.

cayaponine. A purgative alkaloid from *Cayaponia globosa*, a Cucurbitaceae of Brazil.

cayenne pepper. Capsicum.

Cb. The symbol for *columbium*.

cc. Abbreviation for cubic centimeter.

Cd. The symbol for cadmium.

Ce. The symbol for cerium.

ceanothine. An alkaloid from New Jersey tea, the root of *Ceanothus americanus*, a Rhamnacea of the Eastern United States. Used as a purgative in dysentery, syphilis, etc.

ceara rubber. The coagulated latex of *Manihot glaziovii*, an Euphorbiaceae of Brazil and Argentine.

cebil gum. The reddish-yellow tears from *Piptadenia cebil*, a Leguminosae of Brazil. Cf. *angico*.

cebur balsam. Tagulaway.

cecilose. A pyroxenite or websterite from Maryland.

cedar. A group of trees of the pine family. **red-** Juniperus. **white-** Thuja.

c. gum. Pale-yellow tears from *Cedrela toona* (Indian mahogany), a Meliaceae of Queensland. **c. leaves oil.** C. oil. **c. oil.** The essential oil, d.0.870–0.890, from *Juniperus virginiana*, used in microscopy as clarifying agent and for oil-immersion lenses. It contains limonene, cadinene, borneol and esters. **c. wood oil.** Essential oil from the wood of *Cedrela odorata*, a large tree of the West Indies and South America. An odorous liquid, d.-0.945–0.960, soluble in alcohol; containing cedrene and cedrol.

cedarite. Chemavinite.

cedrarine. Orexin.

cedrene. $C_{15}H_{24}$ = 204.2. A hydrocarbon, the liquid part of oil of red cedar, $d_{15°}$0.984, b.237. **c. camphor.** Cedrol.

cedrin. An active principle of cedron. Colorless bitter crystals, soluble in water; used as an antiperiodic.

cedrol. $C_{15}H_{26}O$ = 222.2. Cedrene camphor. The crystalline portion, m.87, b.294, of oil of red cedar.

cedron. The seeds of *Simaba cedron*, a Simarubaceae of Central America; used as a febrifuge.

cedronella. Lemongrass.

cedronine. An alkaloid from cedron.

cel. A unit of velocity; the velocity imparted by 1 dyne in 1 second to 1 gram.

celadonite. A species of glauconite.

celandin. Chelidonium.

celandine. Pilewort. **greater-** Chelidonium. **lesser-** Pilewort.

celastin. Menyanthin.

celastrine. An alkaloid from the seeds of *Celastrus scandens* and other Celastraceae. A white crystalline powder; a stimulant causing an increase in body temperature. Cf. *cathine*.

celery. The vegetable *Apium graveolens*, an Umbelliferae. Cf. *apiol*, *apigenin*. **c. seeds.** Used as a spice and for making **c. seed oil**, which contains selinene and apiol. A colorless liquid, d.0.870–0.895.

celestine. $SrSO_4$. A native strontium sulfate, deposited in sedimentary rocks.

celite. A registered trade-mark for certain diatomaceous earth products, particularly filter aids, fillers, abrasives, heat insulating materials, insulating plasters and cements, and the like.

cell. (1) **Biological.** The anatomical unit of life of which all living matter is constituted, and from which it develops. It consists essentially of a small protoplasmic mass which is an ever-changing and ever-circulating colloidal chemical system of proteins, and is differentiated into a nucleus and cell body. According to its structural character this protoplasm is divided as follows:

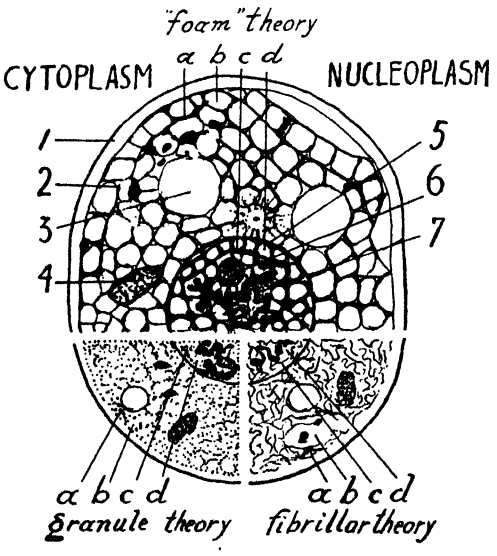
protoplasm

cytoplasm (cell body) *normally pH* 6.6		nucleoplasm (cell nucleus) *normally pH* 7.5	
a	b	c	d
spongioplasm (the solid portion or fibers)	hyaloplasm (the liquid portion or fluid)	linin (the solid portion)	nucleoplasm (the liquid portion)

Each one of these structural elements of protoplasm may form or contain further specialized units of matter, as:

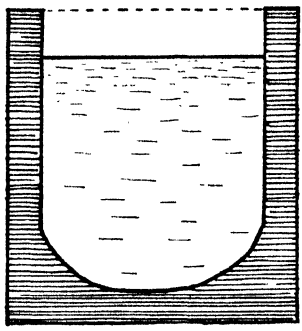
in the cell body.	*in the nucleus*
1. cellular membrane	5. nuclear membrane
2. granules	6. nucleolus
3. vacuoles	7. chromatin and chromosomes
4. plastids	

(2) **Galvanic.** An electrical element; or device for transforming chemical into electrical energy, the action of which is due to the passage of ions through an electrolyte. It usually consists of a metal or other substance immersed



Cell (schematic).

in an electrolyte containing ions of that substance, and connected by a liquid bridge (*e.g.*, a tube containing an electrolyte), to a second electrode which is similar in type to but not identical with the first. Cf. *galvanic battery*, *concentration c.* A cell consists of the containing vessel, two electrodes (anode and cathode), one or more electrolytes providing anions and cations and the respective metals. (3) **General.** Any container *e.g.*, filled with an absorbing liquid, as a light filter. **air-** The air-containing chambers of the lungs or of vegetable tissues. **alkali-** Photoelectric c. **amoeboid-** A cell resembling an amoeba, *e.g.*, a leucocyte. **animal-** The cells of animal tissues. **asexual-** A cell which reproduces itself without external



Cell (definition 3).

stimulus. **bichromate-** An electric amalgamated zinc-carbon cell. Voltage = 2.0 volts. The electrolyte is a 12 % solution of potassium dichromate containing (approximately) 9 % of sulphuric acid. **blood-** See *blood*. **Bunsen-** See *Bunsen*. **cadium-** See *cadmium*. **carrier-** Leucocyte. **chromatophore-** A biological unit containing coloring matter. **Clark's-** See *Clark*. **columnar-** An elongated cell, a number of which form part of the epithelial tissue. **concentration-** A galvanic c. produced by a combination of 2 electrodes consisting of the same substance (usually a metal), immersed in solutions containing ions of the substance which differ only in the concentrations of the ions concerned; *e.g.*, the system $Ag/0.1N\ AgNO_3/0.01N\ AgNO_3/Ag$. **Daniell-** An electrical zinc-copper cell, (about 4 volts). **daughter-** A cell produced by the division of another (mother) cell. **dead-** A c. which has ceased to perform vital functions; it may serve for mechanical protection, *e.g.*, horn, hair, or cork cells. **diffusion-** A percolator for the extraction of sugar from beets. **dry-** See *dry*. **electrical-** (1) An accumulator. (2) A voltaic c. (3) An electrolytic c. **electrolytic-** (1) A c. used for electroplating. (2) Galvanic c. **electroresponsive-** See *electroresponse*. **embryonic-** A c. from which the various tissues develop. **epithelial-** A cell of the skin. **galvanic-** See *cell* (2) and *galvanic*. **giant-** An abnormally large cell. **Leclanché-** An electrical zinc-carbon cell, (about 1.5 volts). **locomotive-** A cell capable of independent movement. **optical-** See *selenium*. **oxidation-reduction-** An electrolytic cell utilizing an oxidation-reduction reaction. **photo-conductive-** p.-electric; p.-emissive; p.-voltaic. See *photo*. **reversible-** An electrolytic cell in which the energy spent in reversing the chemical changes in the cell is approximately equal to that given out by the direct operation of the cell. **secondary-** (*biol.*). A cell formed by the coalescence of other cells. (*electr.*) An accumulator. **sele-**

nium- See *selenium*. **standard-** A device for obtaining a definite voltage, *e.g.*, cadmium cell. **transition-** (*biol.*). A cell whose characteristics, are between two well defined types of cells, and which is supposed to change from one type to the other. (*electr.*) A voltaic cell which contains an electrolyte undergoing a definite change at some temperature, *e.g.*, $ZnSO_4.7H_2O$ changes at 39°C to $ZNSO_4.6H_2O$, with corresponding change in the e.m.f.; hence a Clark cell (q.v.) must be kept below 39°C. **voltaic-** See *cell* (2). **Weston-** Cadmium cell.

c. constant. Resistance capacity. **c. division.** See *karyokinesis*.

cellase. Cellulosase. A ferment which digests cellulose.

cellit. Technical acetyl cellulose.

cellobiose. $C_{12}H_{22}O_{11}$ = 342.17. Cellose. A disaccharide, glucose-β-glucoside, m.225, obtained as intermediate product in the hydrolysis of cellulose; used as bacteriological reagent.

celloidin. Collodion wool. A concentrated solution of pyroxylin. Used in microscopy for embedding specimens or section-cutting.

cellon. Tetrachlorethane.

cellophane. The registered trade name for the elastic, transparent, heat-resistant, water- and oil-insoluble, gas-tight cellulose film obtained by the precipitation of a viscose solution with ammonium salts. Used as a substitute for celluloid, guttapercha and parchment paper.

cellose. Cellobiose.

cellosolve. $C_4H_{10}O_2$ = 90.08. Glycol ethyl ether, hydroxyether, *2*-ethoxyethanol*, ethyleneglycol ethylether, glycolmonoethylether, $EtOCH_2CH_2OH$. A colorless liquid, d.0.935, b.135.3, soluble in water, alcohol or ether; used as a solvent. **butyl-** $C_6H_{14}O_2$ = 118.11. Glycol butyl ether, *2*-butoxyethanol*, ethyleneglycol monobutylether, $BuO.CH_2.CH_2OH$. A colorless liquid, d.0.931, b.170.6; used as a solvent, especially for brushing lacquers. **ethyl-** Cellosolve. **methyl-** $C_3H_8O_2$ = 76.0. Ethyleneglycol monomethylether, methoxyhydroxy ethane, methoxyethanol*, $MeO(CH_2)_2$-OH. A volatile liquid, d.0.930, b.134; miscible with toluene or turpentine. Used as solvent for nitrocellulose in the manufacture of lacquers.

c. acetate. $C_4H_8O_3$ = 104.0. Hydroxyethylacetate, glycol monoacetate, $MeCOO(CH_2)_2OH$. A colorless volatile liquid, d.0.976, b.153, soluble in toluene; used for lacquers. **c. butylate.** $C_6H_{14}O_2$ = 118.1. A colorless liquid, d.0.902, b.170; used as solvent for nitrocellulose.

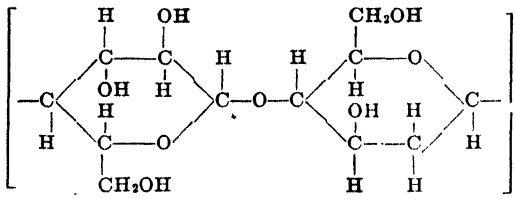
cellotropin. $C_6H_4O.Ph.COO.C_6H_{11}O_5$ = 376.16. Monobenzoyl-arbutin. A white, odorless and tasteless powder, insoluble in water or ether, soluble in alcohol; used for pulmonary tuberculosis and scrofula.

celluloid. Zylonite, xylonite. A malleable substance prepared from nitrocellulose (pyroxylin or nitrated cotton) and camphor, pressed into various shapes and rendered less inflammable by the addition of ammonium phosphate and other ingredients. Used in the manufacture of many articles, and sometimes in dentistry and surgery.

cellulosans. Pentosans associated with cellulose in wood.

cellulosase. Cellase.

cellulose. $(C_6H_{10}O_5)x$ = (162)x. A carbohydrate constituent of the walls and skeletons of vegetable cells. A polymer of the glucose-residue units:



. . . to O of next glucose-residue. A *c. micelle* is considered to contain from 1500–2000 such units arranged in 40–60 *cellobiose* chains, each containing from 15 to 20 pairs of glucose-residues. It is almost pure in pith, absorbent cotton, and filterpaper, and is a colorless, transparent mass, insoluble in water, alcohol, ether, or other solvents, but soluble in copper ammonium hydroxide and also dissolved by sulfuric acid with the formation of amyloid (parchment paper). (See *collodion, celluloid, pyroxylin, gun cotton, nitrocellulose, rayon, acetylcellulose, viscose.*) The sources of c. are

1. Seed fibers (87–91 %); as, cotton kapok and other flosses.
2. Woody fibers (58–62 %); as, pine.
3. Bast fibers (32–37 %); as, straw, flax, hemp, ramie.
4. Leaf fibers; as, sisal and manila hemp.

C. is divided into the following fractions, by digestion with 17.5 % NaOH: α-insoluble; β-soluble, but reprecipitated by acids; γ-soluble and *not* reprecipitated by acids. **Cross and Bevan-** The c. isolated from vegetable material by successive chlorination and alkali treatment, according to original method of Cross and Bevan. **hemi-** See *hemicellulose*. **holo-** See *holo*. **pseudo-** Hemicellulose. **c. acetate.** The esters of cellulose and acetic acid, used extensively in industry (cellit, cellon, sicoid, sericose, boroid, cellolite) as imitation leather, fabrics, yarns, hairs, bristles, gold leafs, filaments, sponges, films, wind shields, phonograph records, aeroplane dopes, solid alcohol or cigar tips. (**mono-**) $C_6H_9O_4.COOMe$ = 205.00. C. monoacetate. (**di-**) $C_6H_8O_3(COOMe)_2$ = 246.11. C. diacetate. (**tri-**) $C_6H_7O_2(COOMe)_3$ = 288.19. C. triacetate. A colorless, amorphous, white mass, insoluble in water, alcohol or ether. (**tetra-**) $C_6H_6O(COOMe)_4$ = 330.17. C. tetraacetate. White, amorphous mass, softening 150, insoluble in ordinary solvents. (**penta-**) $C_6H_5(COOMe)_5$ = 372.24. C. pentacetate. White amorphous mass, insoluble in water, soluble in alcohol. **c. nitrate.** The esters of cellulose and nitric acid, used extensively in explosives and in the lacquer industry under the misnomer: *nitrocellulose*. There exist, according to the degree of nitration: (**tri-**) $C_{12}H_{17}O_7(NO_3)_3$ = 459.23. C. trinitrate. (**tetra-**) $C_{12}H_{16}O_6(NO_3)_4$ = 504.23. C. tetranitrate. Both are white amorphous masses, d.1.66, insoluble in ordinary solvents, soluble in absolute alcohol or glacial acetic acid. They are the principal constituents of collodion. (**penta-**) $C_{12}H_{15}O_5(NO_3)_5$ = 549.23. C. pentanitrate. White amorphous substance, d. about 1.66, insoluble in alcohol, benzene, ether, soluble in a mixture of alcohol and ether. (**hexa-**) $C_{12}H_{14}O_4(NO_3)_6$ = 594.23. C. hexanitrate. The principal constituent of gun-

cotton. White amorphous substance, d.1.66, ignites about 160, insoluble in ordinary solvents.

celotex. A structural insoluting material or wall board produced by pressing bagasse or other fibers; d.0.19–0.24, tensile strength 26.2Kg./cm.^{2}

celsian. A barium feldspar, $BaAl_2Si_2O_8$.

Celsius, Anders. 1701–1744. A Swedish astronomer who originated the celsius thermometer scale. **C. scale.** A thermometer scale from which developed the centigrade scale (q.v.).

celtium. Ct. A supposed element (at. no. 72) of the rare earth group, discovered by Urbain and Dauvillier in zirconium minerals. Cf. *hafnium.*

cement. (1) A plastic material which hardens and forms a firm connecting medium between two or more solids. (2) Portland cement. A fine gray powder, probably containing $3CaO.SiO_2$, $3CaO.Al_2O_3$, and $2CaO.SiO_2$. It is made by mixing and grinding a calcareous material (limestone, marl or chalk) with an argillaceous one (clay or shale, $Al_2O_3.SiO_2$), and heating it in ovens to 1350–1800°C until it begins to vitrify. The clinker thus produced is pulverized, mixed with 2 % gypsum, and ground to 200-mesh. The composition is: CaO 62–67, SiO_2 18–20, Al_2O_3 4–8, Fe 2–3, Mg 1–4, K, Na 0.5 %, Ti, Mn traces. Used for concrete, which is made by mixing 1 part cement, 2 parts sand and 4 parts of gravel, and for each 100 pounds of cement 6 gallons of water. The resulting concrete, properly handled will have a crushing strength of 3000 lbs. after one month and 4000 lbs. or more after a year. **adamantine-** A mixture of powdered pumice stone with silver amalgam, used in dentistry to fill cavities of teeth. **bituminous-** Cement prepared from natural pitch. **chalcedony-** A mortar and cement made from chalcedony. **clinker-** Uncrushed portland cement. **copper-** Dental c. See *dental c.* **glass-** A mending material for broken glass, as a mixture of resins. **glycerin-** A glue containing glycerin. **hydraulic-** A cement that sets under water, as Portland cement. **porcelain-** A substance used to mend porcelain. **portland-** A hydraulic cement made by calcining limestone and clay or rivermud. **quick-setting-** A mixture of 11–20 % alkyd resin, 35 % of nitrocellulose solution, 11–21 % solvent and 4–8 % plasticizer. **refractory-** See *refractory c.* **roman-** A quick-setting cement obtained by mixing burnt clay with lime and sand. **rubber-** A mixture of un-vulcanized rubber and sulfur dissolved in oil; used for coating objects. **silicate-** See *dental c.* **zinc oxide-** See *dental c.*

cementation. (1) The setting or hardening of a plastic material. (2) Heating wrought iron in a bed of charcoal or hematite, and its conversion into steel, (blister steel). (3) Heating one metal in contact with another, and production of a coating of the latter.

cementing. To bind together. **c. electron.** Electrons of the atomic nucleus which hold protons together.

cementite. The iron carbide, Fe_3C, which occurs in steel.

cenospheres. An opaque spherical structure in coal.

cent. A contraction of the Latin centum (a hundred), or centesimus (a hundredth).

Centaurea. A genus of composite herbs, containing 470 species, *e.g.*, *C. behen*, behenic acid; *C. jacea*, centaurin; *C. cyanus*, cyanin.

centaureidin. $C_{18}H_{18}O_8$ = 362.2. A flavone decomposition product of centaurin.

centaurin. A glucoside from the roots of *Centaurea jacea.*

centaurine. An alkaloid from *Erythrea centaurium.*

centaury. The various species of *Erythraea*, used for general tonic preparations. **American-** Sabbatia.

centi- A prefix denoting $\frac{1}{100}$.

centigrade. A thermometer scale based upon the freezing point (0°) and boiling point (100°) of water. It was originated by Celsius, hence 1°C = 1° centigrade = 1° Celsius.

centigram. The one-hundredth part of a gram: 1 cg. = .01 gm. = 10 mg. (= 0.154 grains troy).

centiliter, centilitre. The one-hundredth part of a liter: 1 cl. = .01l. = 10 mils. or 10 cc. (0.61 in.^{3}).

centimeter, centimetre. The one-hundredth part of a meter: 1 cm. = .01 m. = 10 mm. (0.3937 inches). **cubic-** A cube whose edge is 1 cm. long. It differs from the milliliter which is $\frac{1}{1000}$ part of a liter; thus $\frac{1}{1000}$ liter = 1 ml. = 1.00027 cc. Cf. *cubic centimeter.*

centimeter-cube. Cubic centimeter.

centinormal. N/100. See one hundredth *normal* solution.

centipoise. 0.01 poise (q.v.). A unit of viscosity or fluidity. The viscosity of water at 20°C is taken as 1.00. Cf. *rhe, dissipation.*

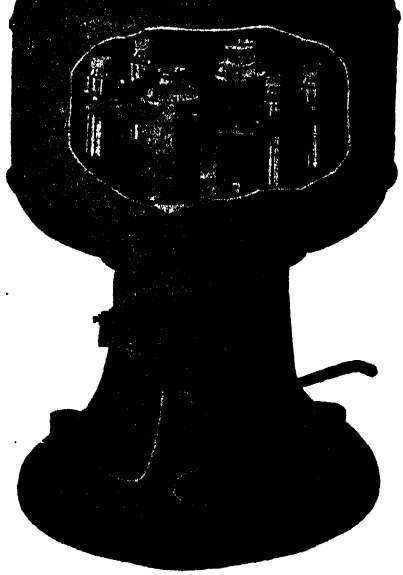
centner. (1) A German standard weight. It equals 50 kg. or 110.2 lbs. (Eng.). (2) A drachm weight divided into 100 equal portions.

centrifugal. Tending to move outwards, away from a center. **c. force.** That tendency of a body moving round another body in a curve to leave its axis of motion.

centrifugalization. Centrifugation.

centrifugation. A process of separating solids from liquids, or liquids of different specific gravity by subjecting them to fast rotation.

centrifuge. A machine for the separation of substances by centrifugal force and consisting of a



Centrifuge.

rapidly rotating container, in which are placed test-tubes, bottles, or large quantities of material. **c. tube.** A heavy walled glass container, which may be graduated, suitable for use in a centrifuge.

centrifuging. Subjecting to centrifugation.

centripetal. Antonym of centrifugal. Tending to move towards the center.

centron. The positive nucleus of an atom; Cf. *proton.*

centrosome. A small, round, highly refractive body of protoplasm between nucleus and cell-body, taking an active part in cell division. See *karyokinesis.*

cephæ. See words beginning with *cephae-* and *cepha-.*

cephaëline. $C_{14}H_{19}O_2N$ = 233.2. An alkaloid from the root of *Cephaelis ipecacuanha* (Rio ipecac) and *Cephaelis acuminata* (Carthagena ipecac). Colorless, white crystals sparingly soluble in water; used as an emetic. **c. hydrochloride.** $C_{14}H_{19}O_2N.HCl$ = 269.67. Colorless, white crystals, soluble in water; used as an emetic.

Cephaëlis. A genus of Rubiaceae of Central and South America, which yields ipecacuanha.

cephalanthin. A glucoside from *Cephalanthus occidentalis* or button-bush, a Rubiaceae of North America.

cephaletin. An amorphous, bitter principle from swamp dogwood, *Cephalanthus occidentalis*, a Rubiaceae of North America.

cephalin. (1) Kephalin. (2) A white crystalline acid principle from *Cephalanthus occidentalis.*

ceptor. A characteristic of an organism which is responsible for its transformation, *e.g.*, amboceptor, chemoceptor, receptor (q.v.).

cera. Wax. **c. alba.** Bleached or white beeswax. **c. flava.** Unbleached or yellow beeswax.

ceramic ink. A ground mixture of 1 pt. K_2CO_3, 1 pt. borax, 2 pts. litharge and 2 pts. cobalt salt. Mix with oil to a paste, write on glass or porcelain, and burn in with the bunsen burner to produce a permanent marking.

ceramics. The art of making objects such as vases, reliefs, and pottery, from clay, and burning into them the various metallic colors. The chemical composition of c. ware is shown by the diagram.

cerane. $C_{26}H_{54}$ = 366.42. Isohexacosane. Colorless crystals, m.61, b.$_{0.7mm}$207, insoluble in water.

cerargyrite. AgCl. Hornsilver, argentum cornu. A native isomer of silver chloride.

cerasein. Cerasin. A resin from the bark of *Prunus* (*Cerasus*) *sarotina* (wild cherry); used as diuretic, sedative, and antipyretic.

cerasin. (1) Kerasin. (2) Cerasein. (3) Cerasinose.

cerasinose. A carbohydrate derived from cherry-gum by boiling with dilute sulfuric acid.

cerasite. A Japanese variety of iolite.

cerate. (1) A compound of oil or lard with wax, resin, or spermaceti. The official preparations are *camphor-, cantharides-, lead subacetate-, rosin-,* etc. (2) A soap or metallic salt made from lard. (3) A cerotate.

ceratin. Keratin.

ceratinase. A hydrolytic enzyme from carob beans.

ceratum. A mixture of 3 parts white wax and 7 parts of lard.

cerberetin. $C_{19}H_{26}O_4$ = 318.3. A decomposition product of cerberin. A citron-yellow powder, m.85.

cerberidin. A glucoside from *Thevetia cerbera.* A yellow, amorphous powder, soluble in water and used as a substitute for digitalis.

cerberin. $C_{27}H_{40}O_8$ = 492.4. A glucoside from the seeds of *Cerbera odallam* and *Thevetia neriifolia*, an Apocynaceae of the East Indies; used as a substitute for senna. Cf. *odallin, thevetin.*

cereal. (1) An edible seed of Gramineae, *e.g.*, wheat, rye, oats, rice, maize, barley. (2) A preparation of (1).

cerealin. An enzyme or protein contained in bran, and similar to diastase; it converts starch into glucose.

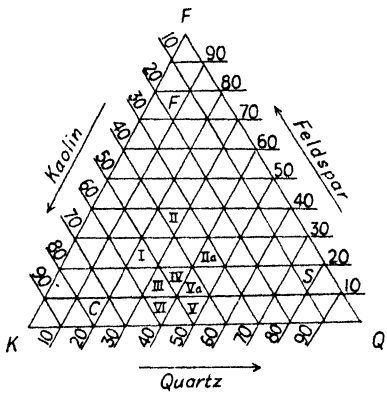
cerebral. Pertaining to the brain. **c. excitants.** Drugs which stimulate the brain to activity. **c. depressants.** Drugs which temporarily suspend or depress the functions of the brain.

cerebric acid. A fatty acid from the white substance of brain tissue.

cerebrin. $C_{17}H_{33}O_3N$ = 299.4. A colorless, fatty principle, obtained from brain tissue by boiling with barium hydroxide.

cerebrine. Cerebrum siccum. Dried brain substance, used in the treatment of neurasthenia.

cerebron. $C_{40}H_{81}O_6N$ = 671.8. An amino lipotide from the white brain tissue.



Ceramic ware.

I = hard porcelain.
II = soft porcelain.
III = Japanese porcelain.
IV = stoneware.
V = whiteware.
Va = German whiteware.
VI = calcareous whiteware.
C = clay.
S = sand.
F = feldspar.

cerebronic acid. $C_{25}H_{50}O_3$ = 478.5 and $C_{24}H_{48}O_3$ = 466.5. A mixture of α-hydroxy-pentacosanic acid and α-hydroxytetracosanic acid, m.80.5, obtained by hydrolysis of the white brain substance.

cerebrose. $C_6H_{12}O_6$. Brain sugar. A carbohydrate of brain tissue, identical with galactose.

cerebroside. Galactoside. A group of nitrogeneous, fatty substances found in the white

matter of the brain; free from phosphorus, and containing galactose and a complex fatty acid. Cf., *phrenosin, sphingosine, kerasin, cholane ring, carotenoids.*

Mosander in 1839. Cerium forms two series of compounds with valencies:

+3 cerous-.....Ce^{+++}
+4 ceric-.....Ce^{++++}

CEREBROSIDES

$Me(CH_2)_7CH_2.CH_2(CH_2)_{12}CH_2CONH.CH_2.CH.CHOH.CH:CH(CH_2)_{12}Me$

a *b* *R*

kerasin (as shown): *R* is —O—CH(O—CH(CH$_2$OH)—CHOH—CHOH)—CHOH

phrenosin: *b* is CHOH (instead of CH_2).
nervon: *a* is CH:CH (instead of $CH_2.CH_2$).

cerebrospinal. Pertaining to the brain and spinal cord.

cerebrospinase. An oxidizing ferment in the cerebro spinal fluid.

ceresin. Earth wax, ozocerite. A purified mineral wax (ozokerite), m.58, d.0.753. Used as a substitute for beeswax; sometimes hard paraffin wax is added to it.

cerevisin. A dried brewer's yeast derived from the yeast *Saccharamyces cerevisiae.*

cerevisterol. A sterol from yeast, m.265.3. Cf. *ergosterol, cholane ring.*

ceria. Cerium dioxide.

ceric. (1) A compound containing tetravalent cerium Ce^{++++}. (2) Pertaining to wax. **c. acid.** Cerotic acid. **c. ammonium nitrate.** $Ce(NO_3)_4.2NH_4NO_3$ = 548.3. Small, orange crystals, very soluble in water or alcohol, and readily reduced to cerous compounds; used in the preparation of pure cerous salts. **c. fluoride.** $CeF_4.H_2O$ = 224.13. An amorphous white powder, insoluble in water, used in ceramics. **c. hydroxide.** $Ce(OH)_4$ = 208.0. A yellow powder, insoluble in water, slightly soluble in acids or alkalis. **c. nitrate.** $Ce(NO_3)_4$ = 388.3. Orange, hygroscopic crystals, soluble in water or alcohol. **c. oxide.** CeO_2 = 172.3. Cerium dioxide, ceria. A light yellow powder, d.7.65, m.1950, insoluble in water, soluble in concentrated sulfuric acid; used in ceramics and Welsbach mantles. **c. sulfate.** $Ce(SO_4)_2.4H_2O$ = 404.5. White or yellow needles, soluble in water, decomp. in excess with the formation of a basic salt. Used as reducer in photography, and in analytical chemistry as an oxidizing agent for vanadyl ions and in the volumetric determination of hydroquinone.

ceride. A tertiary lipid formed by the union of higher monovalent alcohols and fatty acids.

ceridin. Cerolin.

cerin. (1) $C_{30}H_{50}O_2$ = 442.3. A sterol and constituent of cork; colorless, small, acicular crystals. (2) Cerotic acid.

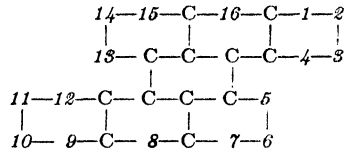
cerinic acid. Cerotic acid.

ceriometry. Volumetric analysis with ceric sulfate solution.

cerite. A native hydrous silicate of the rare earths, found in the gneiss at Bastnaes, Sweden, which also contains cerium, lanthanum, and didymium. **fluo- Fluocerite.**

cerium. Ce = 140.13. A rare earth element, atomic number 58. An iron-gray, ductile, malleable metal, d.7.042, m.623, b.1400; it burns in air like magnesium, decomp. in water, and is readily soluble in acids. It occurs as silicate (cerite and allanite) and phosphate (monazite), together with other rare earth metals. It was discovered in 1803 by Klaproth, independently by Berzelius and Hisinger, and first isolated by The metal is prepared by electrolysis of the fused chloride, and is used in alloys for gas-lighters (mischmetall) and other pyrophoric or spark-producing metals; for machine gun tracer bullets; as "getter" of noble gases in radio tubes, as scavenger in steel making, and for flash light powders. The compounds are poisonous, and are used in large quantities for incandescent gas mantles. **c. compounds.** See under *ceric* and *cerous.* **c. dioxide.** Ceric oxide.

cerodi- A prefix indicating the heptacyclic ring structure:



as in:

cerodiamidine, *8* and *16* are N
cerodioxene, *8* and *16* are O
cerodithiene, *8* and *16* are S

cerolein. A constituent of bees-wax, soluble in cold alcohol.

cerolin. Ceridin. A fatty constituent of yeast, used in the treatment of acne.

ceromel. Honey in the comb, or a mixture of wax and honey.

ceromelissic acid. $C_{33}H_{66}O_2$ = 494.6. An acid, m.94, from lardacein.

ceropic acid. $C_{36}H_{68}O_{30}$ = 980.7. A white microcrystalline acid from the needles of *Pinus sylvestris* a Coniferae.

ceroplastic acid. $C_{33}H_{70}O_2$ = 498.6. An acid, m.97, from lardacein.

cerosate. A compound containing the monovalent radical, $C_{23}H_{47}COO$—, derived from cerosic acid.

cerosic acid. $C_{23}H_{47}COOH$ = 368.5. Tetracosanic acid. A fatty acid, m.85, from cerosin.

cerosin. Cerosinyl cerosate. A wax found as coating on sugar cane.

cerosinyl. The radical, $C_{24}H_{49}$—, derived from cerosic acid.

cerotate. A compound containing the monovalent $C_{26}H_{53}COO$— radical, derived from cerotic acid. Cf. *carnauba wax.*

cerotene. $C_{27}H_{54}$ = 378.5. An unsaturated hydrocarbon from wax. Cf. *cerylene, carotene.*

cerotic acid. (1) $C_{25}H_{53}COOH$ = 410.5. Cerotinic acid, heptacosanoic acid*, cerotin, cerinic acid. The monobasic, fatty acid of wax. A white, amorphous powder, or small granules, m.82.5, insoluble in water, soluble in alcohol. Cf. *neocerotic acid.* (2) $C_{25}H_{51}COOH$ = 396.41.

Hexacosanoic acid*. White needles, d.0.836, m.88, insoluble in water.

cerotin. Ceryl cerotate.

cerotinate. Cerotate.

cerotinic acid. Cerotic acid.

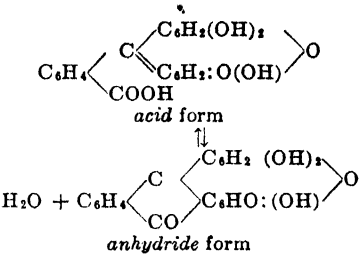
cerotol. Ceryl alcohol.

cerous. Containing trivalent cerium, Ce^{+++}. **c. acetate.** $Ce(C_2H_3O_2)_3.H_2O$ = 335.2. White crystals, m.115, soluble in water. **c. ammonium nitrate.** $Ce(NO_3)_3.3NH_4NO_3 10H_2O$ = 681.56. Large transparent crystals, soluble in water or alcohol; used in the manufacture of Welsbach mantles. **c. benzoate.** $Ce(C_7H_5O_2)_3$ = 503.3. A white powder, soluble in hot water or alcohol. **c. bromate.** $Ce_2(BrO_3)_6.9H_2O$ = 1070.4. White crystals, very soluble in water. **c. bromide.** $CeBr_3.7H_2O$ = 506.1. White, hygroscopic crystals, very soluble in water or alcohol. **c. carbonate.** $Ce_2(CO_3)_3.5H_2O$ = 550.4. A white powder, insoluble in water but soluble in ammonium carbonate solution or dilute acids. **c. chloride.** $CeCl_3$ = 246.6. White crystals, $d_{15°}$.3.88, m.848, soluble in water or alcohol. (cryst.) $CeCl_3.7H_2O$ = 372.7. Large, slightly pink, transparent crystals, very soluble in water or alcohol; used in the manufacture of Welsbach mantles. **c. citrate.** $CeC_6H_5O_7$ = 329.4. A white powder, insoluble in water, soluble in dilute acids. **c. fluoride.** CeF_3 = 197.13. Colorless crystals, d.5.8, m.1324, slightly soluble in water. **c. hydroxide.** $Ce(OH)_3$ = 191.2. A yellowish powder, insoluble in water, soluble in acids. **c. hypophosphite.** $Ce(H_2PO_2)_3.H_2O$ = 353.3. A white powder, insoluble in water, soluble in dilute acids; used medicinally for phthisis. **c. iodide.** $CeI_3.9H_2O$ = 682.7. White or pink crystals, very soluble in water or alcohol. **c. lactate.** $Ce(C_3H_5O_3)_3$ = 407.5. A white powder, sparingly soluble in water. **c. malate.** $Ce_2(C_4H_4O_5)_3$ = 676.5. A white powder, soluble in water. **c. nitrate.** $Ce(NO_3)_3.6H_2O$ = 434.5. White, transparent crystals, very soluble in water or alcohol; used in making Welsbach mantles. **c. oxalate.** $Ce_2(C_2O_4)_3.9H_2O$ = 706.8. A pinkish, crystalline powder, usually containing La and Pr salts, insoluble in water. Used as a raw material in the preparation of rare earths, and medicinally as a sedative and tonic. **c. oxide.** Ce_2O_3 = 328.5. A gray powder, d.6.9, insoluble in water, soluble in acids. **c. phosphate.** $CePO_4$ = 235.3. Yellowish, rhombic crystals $d_{14°}$.5.92, insoluble in water or acids. **c. salicylate.** $Ce(C_7H_5O_3)_3$ = 551.5. A white powder, insoluble in water. **c. sulfate.** $Ce_2(SO_4)_3$ = 568.7. Monoclinic or rhombic crystals, d.3.912, soluble in water. (cryst.) $Ce_2(SO_4)_3.8H_2O$ = 713.1. Pinkish, small crystals, soluble in water; used to prepare aniline black. **c. valerate.** $Ce(C_5H_9O_2)_3$ = 443.5. A white powder, sparingly soluble in water.

ceroxylin. $C_{20}H_{32}O$ = 288.26. A crystalline substance found in the waxy exudation of *Ceroxylon andicola*, the wax palm of South America.

certified. Describing an instrument, especially a measuring device such as a buret or pipet, which has been tested in an official laboratory and its correctness recorded on a certificate. Cf. *standardized*.

cerulein. Coerulein. $C_{20}H_{12}O_7$, or $C_{20}H_{10}O_6.H_2O$ = 364.14. A coloring matter from gallein, which exists as a normal acid and as an internal anhydride:



ceruleum. A blue pigment consisting of cobaltous stannate and calcium sulfate.

cerulic acid. An oxidation product of coffee.

cerulignone. $C_{16}H_{16}O_6$ = 304.0. Cœrulignone, *3.3'.5.5'*-tetramethoxydiphenoquinone, cedriret. Dark, steel-blue needle-shaped crystals, obtained by treating crude pyroligneous acid with potassium dichromate. **hydro-** Hydrocerulignone.

cerumen. Wax from the human ear.

cerusa, ceruse, cerussa. White lead.

cerussite. $PbCO_3$. A white native lead carbonate and common mineral, produced by the action of CO_2 and water on lead ores.

cervantite. Sb_2O_4. A native antimony tetroxide; secondary mineral formed by the oxidation of antimony sulfide.

ceryl. The monovalent radical, $C_{26}H_{53}$—derived from ceryl alcohol. **c. alcohol.** $C_{26}H_{54}O$ = 382.43. *1*-Hexacosanol*, cerotin, *n*-hexacosyl alcohol. A monatomic alcohol derived from Chinese wax and wool fat. Colorless crystals, m.79, insoluble in water, soluble in alcohol or ether. (iso-) An isomeric alcohol from Java wax. White crystals, m.62, insoluble in water, soluble in alcohol or ether. **c. cerotate.** $C_{52}H_{106}O_2$ = 774.80. An ester of ceryl alcohol and cerotic acid, $C_{26}H_{53}OOC.C_{26}H_{53}$. Colorless crystals, m.84, forming the main portion of Chinese wax. **c. palmitate.** $C_{42}H_{84}O_2$ = 620.8. An ester of ceryl alcohol and palmitic acid, $C_{15}H_{31}COO.C_{26}H_{53}$, and a constituent of opium wax.

cerylate. A compound containing the monovalent $C_{27}H_{55}O$— radical, derived from ceryl alcohol.

cerylene. $C_{27}H_{54}$ = 378.54. A hydrocarbon distilled from Chinese wax, which resembles paraffin. Cf. *cerotene*.

cerylic. Ceryl.

cesiated. Coated with cesium; as, the cathode of a thermionic discharge device.

cesium, cæsium. Cs = 132.91. A rare element of the alkali family, atomic number 55. A silver-white, soft, metal which resembles sodium, d.187, m.26.4, b.670, and reacts violently with water. It is the most electro-positive element, and has a valency of one. Cesium occurs in small quantities in a few mineral waters and minerals and in the ashes of a few plants, and is prepared by the distillation of cesium hydroxide with magnesium powder in a stream of hydrogen gas. It was discovered by Kirchhoff and Bunsen in 1860 by means of the spectroscope, and isolated in 1881 by Setterberg. Cesium metal is a substitute for rubidium, *q.v.*, and its salts are used as reagents in microchemistry, as a getter or gas absorbent in radio tubes, as a source of metallic vapor in power tubes, as a sensitive coating in photoelectric cells, and medicinally as an anti-shock compound in administering arsphenamine.

c. acetate. $CsC_2H_3O_2$ = 191.93. Deliquescent white crystals, m.194, soluble in water, alcohol or ether. **c. alum.** C. aluminum sulfate. **c. aluminum sulfate.** $Cs_2Al_2(SO_4)_4.24H_2O$ = 1136.50. C. alum. Colorless crystals, soluble in water. **c. ammonium bromide.** $CsBr.NH_4Br$ = 309.68. A white, crystalline powder, soluble in water; used as a nerve-sedative in epilepsy. **c. ammonium chloride.** $CsCl.3NH_4Cl$ = 328.75. A white, crystalline powder, soluble in water. **c. antimonous chloride.** $6CsCl.SbCl_3$ = 1131.5. Antimony c. chloride. Cesium chlorostibate, (Cs_6SbCl_9). A yellowish, crystalline powder, slightly soluble in water. **c. benzoate.** $CsC_7H_5O_2$ = 253.85. A white powder, very soluble in water. **c. bicarbonate.** $CsHCO_3$ = 193.8. White crystals soluble in water. **c. bisulfate.** $CsHSO_4$ = 229.8. C. acid sulfate. White crystals, soluble in water. **c. bitartrate.** $CsHC_4H_4O_6$ = 281.85. C. acid tartrate. White rhombic crystals, soluble in water. **c. bromate.** $CsBrO_3$ = 260.8. White crystals soluble in water. **c. bromide.** CsBr = 212.7. A colorless, crystalline powder, $d_{21°}$.4.455, soluble in water; used medicinally for heart disturbances due to nervousness. **c. carbonate.** Cs_2CO_3 = 325.6. White hygroscopic crystals, soluble in water or alcohol; used in breweries and in soda-water manufacture. **c. carbonate, acid.** C. bicarbonate. **c. chlorantimonate.** C. antimonous chloride. **c. chloride.** CsCl = 168.3. Colorless, regular crystals, $d_{20°}$.3.972, m.646; it sublimes on further heating, soluble in water, alcohol, or ether. Used in breweries and in soda-water manufacture. **c. chloroplatinate.** Cs_2PtCl_6 = 674.0. Pale yellow octahedra, soluble in water. **c. chromate.** Cs_2CrO_4 = 381.7. Yellow crystals, soluble in water. **c. cyanide.** CsCN = 158.8. White crystals, soluble in water. **c. dichromate.** $Cs_2Cr_2O_7$ = 481.8. Yellowish-red crystals, soluble in water. **c. fluosilicate.** Cs_2SiF_6 = 407.4. C. silicofluoride. White, regular crystals, $d_{17°}$.3.375, soluble in water. **c. formate.** $CsCHO_2$ = 177.82. Deliquescent white powder, m.265, very soluble in water. The *monohydrate* loses H_2O at 41°C. **c. hydroxide.** CsOH = 149.8. A white, grayish or yellowish, molten mass, d.4.018, m.275; it is deliquescent, and very soluble in water. **c. iodate.** $CsIO_3$ = 307.6. White crystals, soluble in water. **c. iodide** CsI = 259.7. White crystals, $d_{25°}$.4.51, m.621, soluble in water or alcohol, used medicinally as a substitute for potassium iodide. **c. ion.** The electrically-charged cesium atom, Cs^+, obtained in solutions of soluble cesium salts in water. **c. manganese chloride.** $2CsCl.MnCl_2.3H_2O$ = 512.51. C. chloromanganite (Cs_2MnCl_4). Pink crystals, soluble in water. **c. nitrate.** $CsNO_3$ = 194.8. Colorless, tetragonal, shining prisms, $d_{28°}$.3.687, m.414, decomp. on further heating, soluble in water, slightly soluble in alcohol; sometimes used in pyrotechnics. **c. nitrite.** $CsNO_2$ = 178.8. White crystals, soluble in water. **c. oxalate.** $Cs_2C_2O_4$ = 353.62. A white powder, soluble in water. **c. oxide.** (1) Cs_2O = 281.6. Normal c. oxide, c. monoxide. An orange crystalline powder, $d_{0°}$.4.78, soluble in water or alcohol. (2) Cs_2O_2 = 297.6. C. dioxide. (3) Cs_2O_3 = 313.6. C. trioxide. (4) Cs_2O_4 = 329.6. C. tetroxide, c. peroxide. **c. perchlorate.** $CsClO_4$ = 232.2. White crystals, soluble in water. **c. periodate.** $CsIO_4$ = 323.6. White crystals, soluble in water. **c. permanganate.** $CsMnO_4$ = 251.8. Violet prisms, soluble in water. **c. peroxide.** Cs_2O_4 = 329.6. C. tetroxide. A yellow granular powder decomp. violently in water. **c. platinic chloride.** C. chloroplatinate. **c. rubidium alum.** C. rubidium aluminum sulfate. **c. rubidium aluminum sulfate.** $CsRb-Al_2(SO_4)_4.24H_2O$ = 1064.93. C. rubidium alum. Colorless crystals, soluble in water. **c. rubidium ammonium bromide,** $CsBr.RbBr.6NH_4Br$. A white, crystalline powder, soluble in water; used as a nerve sedative. **c. rubidium bromide.** CsBr.RbBr = 378.10. A white, crystalline powder, soluble in water; used medicinally as a substitute for potassium bromide. **c. rubidium chloride.** CsCl.RbCl = 289.18. A yellowish, crystalline powder, slightly soluble in water. **c. salicylate.** $CsC_7H_5O_3$ = 269.85. A white powder, very soluble in warm water. **c. silicofluoride.** C. fluosilicate. **c. sulfate.** Cs_2SO_4 = 361.7 Colorless needles, d.4.24, soluble in water, insoluble in alcohol. Used in breweries and in soda-water manufacture. **c. sulfide.** There are several sulfides, but none is used industrially. (1) Cs_2S = 297.6. C. monosulfide. (2) Cs_2S_2 = 329.6. C. disulfide. (3) Cs_2S_3 = 361.6. C. trisulfide. (4) Cs_2S_5 = 425.6. C. pentasulfide. **c. sulfite** Cs_2SO_3 = 345.6. White crystals, soluble in water. **c. tartrate, acid.** C. bitartrate. **c. tetroxide.** C. peroxide. **c. trinitride.** CsN_3 = 175.0. Used as getter in radio tubes. **c. trisulfide.** See *c. sulfide.*

cespitine. $C_5H_{13}N$ = 87.1. A base obtained from coal tar, and isomeric with amylamine.

cetaceum. Spermaceti.

cetane. $C_{16}H_{34}$ = 226.25. Hexadecane.* A hydrocarbon of the paraffin series; colorless solid, d.0.775, m.20, b.287.5.

cetavlon. CTAB. Cetyl-trimethylammonium bromide, a cationic detergent and bactericide.

cetene. $C_{16}H_{32}$ = 224.33. Cetylene *2*-hexadecyne*, Δ^1-hexadecene, hexadecylene, $CH_2{:}CH(CH_2)_{13}CH_3$. An unsaturated hydrocarbon d.0.789, m.4, b.274, obtained from cetyl alcohol.

cetenylene. $C_{16}H_{30}$ = 222.23. An unsaturated hydrocarbon and homolog of heptine. Cf. *hexadecine.*

cetic. A compound containing the monovalent $C_{16}H_{33}$— radical.

cetic acid. $C_{15}H_{30}O_2$ = 242.23. A fatty acid from spermaceti.

cetin. $C_{15}H_{31}COOC_{16}H_{33}$. Cetylcetylate. The cetic acid ester, and principal constituent of spermaceti. A colorless, crystalline mass, m.50, b.360, insoluble in water, soluble in alcohol or ether.

cetol. Cetyl alcohol.

cetoleic acid. $C_{22}H_{42}O_2$ = 338.4. An unsaturated, monobasic acid, $Me(CH_2)_9CH{:}CH(CH_2)_9COOH$, an isomer of erucic acid; it is a constituent of marine animal (whale, codliver, shark, herring) oils.

Cetraria. (1) A genus of lichens. (2) Iceland moss.

C. vulpina	vulpic acid
C. islandica	Island moss, cetrarin

cetraric acid. $C_{18}H_{16}O_8$ = 360.2. A crystalline dibasic acid from Iceland moss.

cetrarin. $C_{30}H_{30}O_{12}$ = 582.3. Cetrarinic acid. A white, crystalline, bitter principle of Iceland moss; insoluble in water, but soluble in hot

alcohol, carbonate or hydroxide solutions. Used in anemia, chlorosis, and phthisis as a blood-forming agent; it is also a stomachic and expectorant. **c. base.** A brown, amorphous mixture of cetrarin, cetraric acid, stearic acid, and other substances from Iceland moss; used similarly to cetrarin.

cetrarinic acid. Cetrarin.

cetyl. Hexadecyl. The monovalent radical, $C_{16}H_{33}$—, isomeric with the cetic radical. **c. alcohol.** $C_{16}H_{33}OH$ = 242.35. Ethal, cetylic alcohol, *1*-hexadecanol*, cetol, primary hexadecyl alcohol, pentadecylcarbinol. A colorless, tasteless, waxy powder, m.39.5, b.344, $d_{50°}$.0.808, insoluble in water, soluble in alcohol or ether, and used for eczema. **c. amine.** $C_{16}H_{33}NH_2$ = 241.26. Hexadecylamine. Colorless substance insoluble in water. **c. cyanide.** Margaronitrile. **c. ether.** $C_{32}H_{66}O$ = 466.51. *1*-Hexadecyl oxyhexadecane*, hexadecyl ether $(C_{16}H_{33})_2O$. White leaflets, m.55; slightly soluble in water. **c. iodide.** $C_{16}H_{33}I$ = 352.3. *1*-Iodohexadecane*. Colorless scales, m.22; insoluble in water, soluble in alcohol or ether.

cetylate. (1) A salt of palmitic acid containing the monovalent $C_{15}H_{31}COO$— radical. (2) A compound derived from cetyl alcohol containing the monovalent $C_{16}H_{33}O$— radical.

cetylene. Cetene.

cetylic acid. Palmitic acid.

cetylide. $(C_{15}H_{31}O_2)_3C_{16}H_{18}(OH)_3$ = 1026.01. A compound formed by the hydrolysis of cerebrin.

cevadic acid. $C_5H_8O_2$ = 100.01. Methyl crotonic acid, tiglic acid. A constituent of cevadin.

cevadilla. Sabadilla.

cevadilline. Sabadilline.

cevadine. $C_{32}H_{49}O_9N$ = 591.5. The veratrine of Merck. An alkaloid from the seeds of sabadilla. Colorless needles, m.205; insoluble in water, soluble in alcohol or ether. Decomp. by hot KOH to cevine and cevadic acid.

cevilline. $C_{29}H_{47}O_7N$ = 521.5. An alkaloid produced by the saponification of cevadilline.

cevine. $C_{27}H_{43}O_8N$ = 509.5. An alkaloid produced by the hydrolysis of cevadine.

cevitamic acid. Vitamin C.

cevollite. A fibrous zeolite alteration-product of melilite.

ceyssatite. A white earth consisting of almost pure silica from Ceyssat, France; used as an absorbent powder in eczema.

Cf. Abbreviation for, confer or compare.

Cg. Abbreviation for centigram.

C.G.S. or **c.g.s.** An abbreviation for centimeter-gram-second units, (1874).

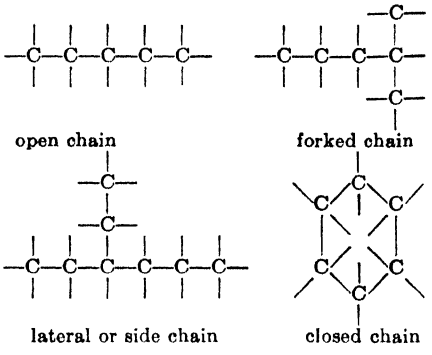
Ch. Abbreviation for chain.

chabazite. $CaAl_2Si_4O_{12}.6H_2O$. Phacolite, cabazite. A zeolite, sometimes produced artificially by the action of water on cement. Cf. *acadialite, gmelinite.*

Chaddock burner. A small furnace made of pottery and used as a non-corrosive gas burner. **C. clamp.** A wooden test tube holder. **C. support.** A burette stand with wire springs for holding two burettes.

chaetomin. An antibiotic substance produced in cultures of *Chaetomium cochliodes.*

chain. (1) A series of connected successive events or substances; as in chain reaction, or periodic chain. (2) A number of similar atoms linked together by homopolar bonds, as in a carbon chain. (3) A measure of length: 1 chain = 4 rods = 100 links = 20.11684 m. **branched-** See (1) lateral- (2) forked-. **carbon-** A series of connected C-atoms. **closed-** A ring formed by a chain of atoms, *e.g.*, the benzene ring.



forked- A branch of two smaller chains from the end atom of a longer chain. **lateral-** A branch chain in the middle of a longer chain. **open-** A number of atoms joined together in a line. **periodic-** See *periodic system.* **side-** (1) Lateral c. (2) Usually applied to a chain attached to a ring. (3) An atomic group of the protoplasm which reacts with a non-protoplasmic group. See *Ehrlich theory.* **straight-** An open c. with no forks or branches.

c. reaction. A series of successive reactions, each of which depends upon the preceding one, generally of the type 1, a, b, a, b, . . . where 1 is the initial reaction and a and b the c. reactions which take place so long as reagents are present. Two types:

A. Matter chain:

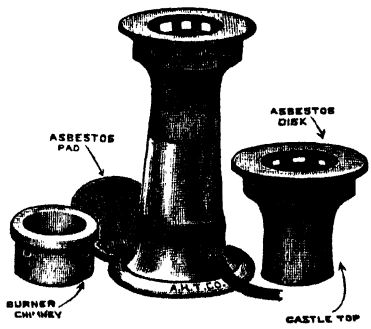
(1) $Cl_2 + E = 2Cl$
(a) $Cl + H_2 = HCl + H$
(b) $H + Cl_2 = HCl + Cl$ . . .

B. Energy chain:

(1) $Cl_2 + E = Cl_2^*$
(a) $Cl_2^* + H_2 = HCl^* + HCl$
(b) $HCl^* + Cl_2 = Cl_2^* + HCl$ . . .

In both cases the result is

$$xCl_2 + xH_2 \rightarrow 2xHCl.$$



Chaddock burner.

chainomatic. An analytical balance on which no separate weights for less than 0.1 gm. are used. The weight of a substance is determined by adjusting the length of the fine chain that hangs from one of the arms of the beam, and measuring this length on a perpendicular scale.

chains. Describing a growth of bacteria in the form of a chain. **long-** A c. consisting of more than eight bacteria. **short-** A c. composed of two to eight bacteria.

chalcacene. $C_{30}.H_{20}$ = 380.15. A pyrolytic product from acenaphthene. Red needles with bronze lustre, m.359, isomeric with rhodacene.

chalcanthite. $CuSO_4.5H_2O$. A native, blue, crystalline copper sulfate formed by the evaporation of cupriferous mine waters.

chalcedony. A cryptocrystalline and amorphous form of silica, SiO_2 or quartz, which occurs in a variety of colors and shapes and is sometimes used as a semi-precious stone:

agate—banded forms
cornelian—opaque variety
chrysoprase—green opaque variety
bloodstone—dark opaque variety with blood red spots
jasper—red, green, or black varieties
silicified wood—jasper-like variety
moss agate—milky variety, with dendritic markings of manganese oxide which resemble plants
onyx—a variety of agate, with straight alternating light and dark bands
plasma—green mottled variety
prase—gray-green variety
sardonyx—golden or blood-red variety.

chalcedonyx. A variety of white and gray layered agate.

chalcocite. Cu_2S. A native copper sulfide, d.5.5–5.8.

chalcomorphite. A native, hydrous, calcium aluminum silicate.

chalcone. (1) $C_{15}H_{12}O$ = 208.10. Betaphenylacrylophenone, benzalacetophenone. The compound Ph.CH:CH.CO.Ph. (2) Aralkylic ketones. A group of natural yellow and orange substituted benzalacetophenone derivatives of the type Ar.CO.CH:CHAr'; as, curcumin, eriodictyol, hesperitin and maringinin. Cf. *flavones*.

chalcophanite. $ZnO.2MnO_2.2H_2O$. A metallic, bluish-black zinc manganite.

chalcophyllite. $Cu_7As_2O_{12}.14H_2O$. A native copper arsenate produced by the oxidation of enargite; occurs in hexagonal, green, transparent crystals, d.2.4–2.6.

chalcopyrite. $CuFeS_2$. A metallic, yellow, copper iron sulfide, d.4.1–4.3.

chalcopyrrhotite. $CuFe_4S_5$. A brownish-yellow, copper iron sulfide.

chalcosiderite. $CuFe_6(PO_4)_4.8H_2O$. A bright-green native copper *iron* phosphate.

chalcostibite. $CuSbS_2$. Wolfsbergite. A native, metallic, gray, copper sulfantimonide, d.4.8–5.0.

chalcuite. A bluish-green turquoise from New Mexico.

chalk. $CaCO_3$. Creta, calcite. A native, amorphous, calcium carbonate, deposited from ocean oozes and largely composed of the residues of shells. See *calcium carbonate*. **French-** A grade of talc.

chalking. (1) To treat with chalk, *e.g.*, in the dye industry by passing cotton through a suspension of 6 pts. chalk in 1000 parts water. (2) To form a powder which is easily rubbed off, *e.g.*, from paints.

chalkogenide. A compound containing a chalkogen.

chalkogens. The elements oxygen, sulfur, selenium and tellurium.

chalmersite. $CuFe_2S_3$. A native copper iron sulfide.

chalybeate. A drug or natural water that contains iron salts; used as a blood tonic.

chalybite. Spathic iron ore. A native form of ferrous carbonate. Cf. *siderite*.

chamaeliretin. A resin-like substance from chamaelirin.

chamaelirin. The bitter principle of false unicorn root, *Chamaelirium luteum*, a Liliaceae; a bitter and poisonous saponin-like glucoside. Cf. *helonoid*.

chamazulene. $C_{15}H_{18}$ = 198.14. A blue hydrocarbon from chamomile oil.

chamber. (1) A boxlike receptacle; as: **cloud-** A c. making traveling particles visible. **fog-** Cloud c. **ionization-** A partly evacuated box, with galvanometer for detecting rays. (2) The leaded room used in sulfuric acid manufacture, q.v. **c. acid.** Impure 60–70 % sulfuric acid from the lead chambers of the c. process. **c. crystals.** Nitrosyl sulfate. **c. process.** A process for the manufacture of sulphuric acid in lead chambers from the interaction of sulfur dioxide, air, steam, and oxides of nitrogen.

Chamberland, Charles, Edouard. 1851–1908. A French bacteriologist. **C. filter.** A porous clay cylinder for filtering bacteria from solutions. **C. flask.** A glass flask with a tubulated side-tube, for growing bacteria.

chamelirin. Chamaelirin.

chamomile. A genus of composite plants; especially *Anthemis* species. **common- English or Roman-** The flowers of *Anthemis nobilis;* used as a tonic and febrifuge. **German-** See Matricaria. **wild-** Stinking mayweed. The plant *Anthemis cotula*. See *anthemidine*.

c. oil. Essential oil from the *Anthemis nobilis* flowers. A bluish liquid, d.0.905–0.915, soluble in 6 pts. 70 % alcohol. It contains esters of butyric, angelic and tiglic acids. **German-** The essential oil of *Matricaria*, d.0.930–0.940; it contains esters of caproic acid, azulene and chamazulene.

chamomillin. A bitter principle of chamomile.

chamosite. A constituent of berthierine.

Chamot microscope. A microscope designed especially for microchemical work by E. M. Chamot.

champacol. $C_{17}H_{30}O$ = 250.24. A camphor from the wood of *Michelia champaca*, a Magnoliaceae of Java. Colorless, crystalline needles, or yellowish masses, m.87, insoluble in water, soluble in alcohol or ether.

Chandler, Charles Frederick. 1836–1925. An American chemist, noted as a teacher and pioneer in the application of chemistry.

chandoo. Chundoo. The best quality of raw opium, prepared for smoking by roasting, extraction, evaporation and fermentation. Cf. *mudat yenshee*. **c. dross.** Yenshee.

change of state. Passing from the solid to the liquid or from the latter to the gaseous state; or the reverse. The change from the solid to the liquid state is **fusion** or **melting**, the reverse change, **freezing** or **solidification**. The change from the liquid to the gaseous state is **vaporization** or **boiling**, the reverse change, **condensation** or **liquefaction**. The change from the gaseous to the solid state is **sublimation**.

Chaperon cell. A voltaic cell consisting of amalgamated zinc and copper in a solution of potassium hydroxide; 0.98 volt.

Chapman pump. A brass filter pump for attachment to a water faucet.

char. (1) To carbonize or burn incompletely. (2) Charcoal.

Charles Frederick Chandler.

charas. A drug from hemp resin.

charcoal. A form of amorphous carbon derived from the incomplete combustion of animal or vegetable matter (*e.g.*, bones or wood). Used for adsorption of gases or coloring matters etc., in blowpipe analysis and as a pigment (c. black). **activated-** See *activated.* **animal-** C. prepared from bone or blood. **vegetable-** or **wood-** C. prepared by the incomplete combustion of wood. Used medicinally for hyperacidity and some forms of indigestion; commercially, as clarifying and decolorizing agent, and in gas masks. Its source (*e.g.*, wood, nut shells or fruit stones) determines its quality. Cf. *carbonization, norit.*

Chardin filter paper. A filter paper specially prepared for the filtration of agar-agar for culture media.

Chardonnet silk. A rayon (q.v.) made by a viscose process.

charge. (1) A load or burden, *e.g.*, the charge of ore in a furnace, the charge of electricity in a condenser or the charge of carbon dioxide in a soda-water fountain. (2) In physics a definite quantity of electricity. **atomic-** The electricity carried by an atom or ion, which depends on the valency or the number of valence electrons. 1 electron corresponds with 1.1×10^{-19} coulombs. 1 gram-equiv. atom of a univalent element carries 9,6489 coulombs (1 Faraday). **elementary-** The c. of an electron, $e = 4.770 \times 10^{-10}$, q.v. **fictitious-** The quantity of electricity contained in the material of a condenser as distinguished from the true charge of the plates. **ionic-** See *ionic c.* **nuclear-** See *atomic structure.* **residual-** The quantity of electricity remaining in a condenser after discharge. **specific-** The ratio e/m_0. Cf. *electron.*

charging rod. (1) A piece of sealing wax, hard rubber, or glass used for charging electroscopes. (2) A device in which a celluloid tube is rubbed over flannel to charge electroscopes positively or negatively.

chargometer. A hydrometer in a glass syringe with rubber bulb, used for testing the density of the acid in electrical batteries.

Charles, Jacques Alex Caesar. 1746–1822. A French chemist who cooperated in the formulation of the gas laws. **C. law.** Dalton's law, Gay-Lussac law. The volume of a gas at 0°C. increases with each degree centigrade by $\frac{1}{273}$, provided the pressure is constant. The pressure of a gas increases with each degree centigrade by $\frac{1}{273}$, provided the volume is constant. Hence the ratio between the increase in pressure per degree and the value of the pressure at 0°C. (pressure coefficient) is the same for all gases.

Charleston phosphate. A soft phosphate mineral containing 27 per cent of P_2O_5.

charlock. The seeds of *Sinapis* (*Brassica*) *arvensis*, field mustard, used as condiment.

Charlton white. Lithopone.

charpie. Lint.

charring. To carbonize.

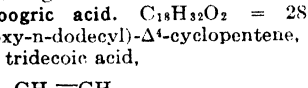
Chatterton's compound. A cement for glass.

chaulmestrol. A brand of ethyl chaulmoograte used in leprosy.

chaulmoogra oil. A yellow oil expressed from the seeds of *Taraktogenos Kurzii* a Bixineae of India, d.0.946–0.951, m.5–20, iodine number 103.5; it contains chaulmoogric, gynocardic and hydnocarpic acids. Used medicinally for leprosy and skin diseases. Cf. *gorli oil, gynocardia oil, maroti oil.*

chaulmoogrene. $C_{18}H_{34}$ = 250.3. n-dococyl-Δ^4-cyclopentane. A hydrocarbon derived from chaulmoogric acid.

chaulmoogric acid. $C_{18}H_{32}O_2$ = 280.3. 1-(α-carboxy-n-dodecyl)-Δ^4-cyclopentene, cyclopentenyl tridecoic acid,



A colorless crystalline acid obtained from chaulmoogra oil, m.68, soluble in alcohol.

chaulmoogryl alcohol. $C_{18}H_{33}OH$ = 266.3. An alcohol obtained from chaulmoogric acid.

chaulmugra. Chaulmoogra.

chavibetol. $C_{10}H_{12}O_2$ = 165.9, allyl-3.4-guajacol, 1-hydroxy-2-methoxy-5-allyl-benzene. A colorless liquid, b.254. **iso-** Betelphenol, 1-hydroxy-2-methoxy-5-propenyl-benzene, a constituent of essential oils. Cf. *eugenol.*

chavicic acid. An amorphous acid obtained from chavicine.

chavicine. An alkaloid from black pepper.

chavicol. $C_9H_{10}O$ = 134.1. p-allyl phenol $C_6H_4(OH)C_3H_5$. A constituent of betel oil; a colorless oil, d.1.035, b.237. **methyl-** Estragole.

chavosot. A p-allylphenol, used in dentistry as a bactericide.

chebulinic acid. (1) $C_{23}H_{20}O_{19}$. A principle from the seeds of *Terminalia chebula*, an East Indian tree. Used as an intestinal antiseptic. (2) $C_{41}H_{34}O_{27}$ = 958.0. An acid derived from tannin. (3) $C_{34}H_{30}O_{23}$ = 806.2. Eutannin. An acid from myrobalans. Rhombic prisms, decomp.234, soluble in hot water, alcohol or acetone.

checkerberry. Gaultheria.

cheese. A food prepared from the casein of skimmed or unskimmed milk, and flavored by the activity of certain bacteria.

cheddite. A high explosive consisting of 70–90 % $KClO_3$, 0–20 % aromatic nitro compounds and 0–15 % paraffin.

cheiramidine. $C_{22}H_{26}O_4N_2.H_2O$ = 400.24. An alkaloid from the bark of *Remijia purdieana*, a Rubiaceae.

cheiramine. A secondary alkaloid from the bark of *Remijia purdieana.*

Cheiranthus. Wall-flower. The herb *C. cheiri*, a Cruciferae which yields alkaloids, glucosides and acids.

cheirantic acid. An oleic-type acid from the oil of the wallflower, *Cheiranthus cheiri.*

cheirantin. A glucoside from *Cheiranthus cheiri*, a Cruciferae.

cheirin. A glucoside of digitalis-like action from *Cheiranthus cheiri.*

cheirinine. $C_{18}H_{35}O_{17}N_3$ = 567.4. An alkaloid from the leaves of *Cheiranthus cheiri*, a Cruciferae. Colorless crystals, sparingly soluble in water.

chekan, cheken. The shrub *Myrtus cheken*, a Myrtaceae of Chile; its bark is used as an astringent.

chekenetin. $C_{11}H_7O_6.H_2O$ = 253.1. Olive colored crystals from the leaves of *Myrtus* (or *Eugenia*) *cheken*, a Myrtaceae of Chile.

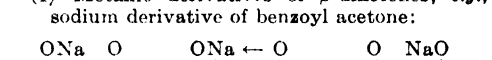
chekenine. $C_{13}H_{11}O_3$ = 215.1. A volatile alkaloid from the leaves of *Myrtus cheken;* rhombic yellow scales.

chekenone. $C_{40}H_{44}O_8$ = 652.4. A crystalline principle from the leaves of *Myrtus cheken*, a Myrtaceae of Chile.

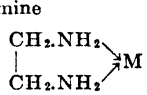
chelafrin. Adrenalin.

chelate. [Greek *chele*—a crab's claw.] Pertaining to a molecular structure in which a ring can be formed by the residual valencies (unshared electrons) of neighbouring atoms. **c. compound.** An organic compound in which atoms of the same molecule are co-ordinated. In the following examples the arrow indicates co-ordination.

(1) Metallic derivatives of β-diketones; *e.g.*, sodium derivative of benzoyl acetone:



(2) Coordinate compounds of metals with ethylene diamine



c. groups. Atomic groups capable of forming rings by one or two co-ordinate bonds, q.v.

chelen. Ethyl chloride.

chelerythrine. $C_{21}H_{17}O_4N$ = 347.2. A narcotic alkaloid related to sanguinarine from the seeds of *Chelidonium majus*, a Papaveraceae. Red crystals, m.203, slightly soluble in alcohol or ether.

chelidamic acid. $C_7H_5O_5N$ or $C_5H_3ON(COOH)_2$ = 183.1. 3-oxypyridine-1.5-dicarboxylic acid, ammonchelidonic acid.

chelidonamic acid. $C_7H_7O_6N$ = 201.1. An acid derived from chelidonic acid by boiling with ammonia.

chelidonate. A salt of chelidonic acid containing the divalent $C_7H_2O_6$— radical.

chelidonic acid. $C_7H_4O_6$ = 184.0. Pyrone dicarboxylic acid. An acid from *Chelidonium majus* resembling meconic acid. Cf. *komanic acid, comenic acid, chelidamic acid.*

chelidonine. $C_{20}H_{19}O_5N$ = 353.2. An alkaloid from *Chelidonium majus* and opium. Colorless shining tablets, m.130, insoluble in water, soluble in alcohol or ether; used as a narcotic. **homo-** See *homochelidonine.*

c. hydrochloride. $C_{20}H_{19}O_5N.HCl$ = 388.67. White crystals, slightly soluble in water or alcohol, and a mild narcotic. **c. phosphate.** A white crystalline powder used as a mild narcotic for stomachic and intestinal pains. **c. sulfate.** $(C_{20}H_{19}O_5N)_2.H_2SO_4$ = 804.49. A white crystalline powder, soluble in water and used as a sedative (small doses) and stimulant (larger doses).

Chelidonium. (1) A genus of papaveraceous plants, *e.g.*, *C. majus*, greater celandine. (2) Celandin. The leaves and stems of *C. majus*, used as a cathartic and for skin diseases. Cf. *chelerythrine, glaucopicrine.*

chelidonoid. The combined principles of *Chelidonium majus.* It contains chelidonine, chelerythrine, protopine, and other alkaloids.

chelidoxanthine. A yellow crystalline bitter principle from *Chelidonium majus.*

chelonin. A brown, bitter, amorphous powder from *Chelone glabra* (snake head), a Scrophulariaceae: used as a tonic.

chelonoid. The combined principles of *Chelone glabra:* used as irritant, cathartic, and anthelmintic.

chemavinite. Cedarite, Canadian amber. A mineral resin from Hudson Bay, containing C, H, O and N.

chemical. (1) Pertaining to chemistry. (2) A substance of definite and known composition; see *chemicals.* **c. action.** A change in the molecular composition of a substance produced either by heat, light, electricity, or by chemical means. See *reaction.* **c. activity.** Reactivity. **c. affinity.** See *affinity.* **c. antidote.** A substance that is used to counteract the effect of a poison, *e.g.*, oils, soaps, milk, acids, alkalis, albumin, charcoal, carbonates, hydrates, sulfates, starch, or tannin. **c. burns.** The corrosive effect of chemicals on the skin; for

CHEMICAL BURNS

(*Emergency treatment to be applied as soon as possible*)

acids, alkalis...	wash with a large amount of water.
chromic acid...	wash with sodium polysulfide, and follow with tannic acid.
cyanides.....	potassium permanganate or ammonium sulfide.
phenol.....	ethyl alcohol or sodium sulfate solution.
phosphorus....	solution of copper sulfate, followed by milk of magnesia.
sodium.....	remove the sodium, wash with water and tannic acid solution.

emergency treatment see table. **c. change.** Reaction. **c. compound.** See *compounds.* **c. constitution.** See *structure.* **c. denudation.** The process by which the solid salts of the soil are dissolved by water and carried to the sea. **c. energy.** The energy relations of chemical reactions. Intensity is expressed by chemical affinity or chemical potential, whilst the capacity is expressed by the equivalent weight or the active mass of substance. **c. entities.** The fundamental concepts of chemistry; as, atoms, ions, molecules and free radicals. **c. equation.** The expression of a chemical reaction in terms of chemical formulas, *e.g.*,

A + B = C + D
reacting substances reaction products

(ionic-) The general statement of a chemical reaction which shows only those substances actually undergoing a change, thus:

$$Ba^{++} + SO_4^{--} = BaSO_4$$

(molecular-) The specific statement of a chemical reaction showing the relative proportions of substances used, thus:

$$BaCl_2 + H_2SO_4 = BaSO_4 + 2HCl.$$

c. microscopy. The utilization of the microscope in chemistry, *e.g.*, for identification of substances, qualitative and quantitative analysis, determination of melting and subliming points, and refractive indexes and the behavior of substances in polarized light. **c. pulp.** Wood treated by the soda, sulfite, or sulfate process for paper making. **c. reaction.** See *reaction*. **c. shorthand.** See *symbols*. **c. slide rule.** An adaptation of the slide-rule for chemical calculations, and including chemical symbols and the atomic and molecular weights of the common substances. See *slide rule*. **c. societies.** The largest are in order of foundation:

Chemical Society of London..... founded 1841
Société Chimique de Paris..... founded 1858
Chemische Gesellschaft, Berlin..... founded 1867
American Chemical Society,
Washington..... founded 1876

c. solvents. See *solvents*. **c. system.** An equilibrium established by the interaction of substances. It is characterized by the presence of definite proportions of the reacting substances and of their reaction products. Cf. *phase rule, system*.

chemicals. A compound or a substance of a definite molecular composition. Generally the term *chemical* is restricted to a substance consisting of a single molecular species, while the term *drug* refers to a substance derived from the vegetable or animal sources and often a mixture of substances. Classification:
General chemicals:
Inorganic, as acids, alkalis and salts.
Organic, as alkaloids, dyes, sugars.
Metals and alloys.
Coal tar products:
Intermediates.
Dyes and stains.
Medicinals and bacteriological stains.
Photographical chemicals, developers, dyes.
Reagents:
Tested, analysed or standardized chemicals.
Volumetric solutions.
Indicators.

Chemicals may be marketed as cones (as silver nitrate), cubes (as litmus), crystals, flakes (as naphthalene), fused, granulated, lumps, pearls (as iron salts), powdered, scales, or sticks.

The *grade* or the purity of chemicals on the market are:

C.P..... chemically pure, the highest grade.
U.S.P. or B.P.. tested to conform with the requirements of the U.S. or British Pharmacopoeia, respectively.
A.R..... analytical reagent.
pure..... of sufficient purity for general work.
tech..... a purity sufficient for technical work.
crude..... an impure grade.

kinetic-. Refrigerants. Those c. used for refrigeration.

chemiluminescence. The production of visible light during chemical reactions without an apparent increase in temperature. See *luminescence*.

chemistry. The fundamental science of the structure of matter and the composition of substances, their transformation, analysis, synthesis, and manufacture. **agricultural-** C. applied to agriculture, soils, fertilizers, manures, and the growing of plants. **analytical-** C. which deals with the detection (qualitative) and determination (quantitative) of substances. **animal-** C. dealing with the composition of animal tissues and fluids; cf. *bio-*. **applied-** C. applied to some useful end, either directly (through industry) or indirectly for the welfare of man. **astro-** The investigation of the composition of celestial objects, as stars, and nebulae; it is a branch of astrophysics. **bio-** The chemistry of life, or c. that deals with the composition of animal and vegetable matter, the changes occurring in the living organism, the transformation of food into living material, and the elimination of waste-products. **biological-** Bio.- **commercial-** (1) The compounding and mixing of substances for some directly utilitarian purpose; usually for some patented or secret recipe. **electro-** A branch of physical c. dealing with the relation between electrical and chemical energy and their transformation: cf. *electrolysis, galvanic cells*. **empirical-** The knowledge of chemical phenomena obtained by uncorrelated and unsystematized experimentation; chemistry based upon experience which is fragmentary and not embodied in a philosophy or system of science. **engineering-** C. applied to engineering; the composition of building materials, testing, and improvement. **experimental-** The performance of experiments to illustrate or discover chemical facts. **fermentation-** A branch of biochemistry dealing with the catalytic changes produced by enzymes and ferments. **food-** C. dealing with the composition and examination of foods, detection of adulterants, and the control of foods for human consumption. **forensic-** The application of chemical knowledge for legal purposes; for the detection of crime. **galvano-** Electro-. **geo-** The investigation of the chemical resources of the earth's surface and the changes occurring in the atmosphere, hydrosphere, and lithosphere. **geological-** Geo-. **histo-** The composition of or chemical changes occurring in the tissues of plants and animals. **histological-** Histo-. **historical-** The study of the development and evolution of chemical thought through the ages. **industrial-** C. applied to the industries. **inorganic-** The c. of polar compounds, usually of compounds which do not contain carbon. **judicial-** Forensic- **legal-** Forensic-. **manufacturing-** C. applied to the large-scale preparation of substances. **medical-** C. applied to medicine, for the diagnosis and combating of disease. **mechano-** A branch of physical c. dealing with the mechanical properties of substances, *e.g.*, surface tension, density, strength, compressibility. **meta-**

A branch of chemistry which deals with the subatomic properties of matter, (*e.g.*, radioactive substances) or with its characteristically atomic properties; as, adsorption, association, excitation. **micro-** See *micro* and *chemical microscopy*. **microscopical-** Micro-. **mineral-** Mineralogical- or inorganic-. **mineralogical-** C. that deals with the composition and formation of minerals. **organic-** The c. of carbon compounds; generally those which are non-polar. **pathological-** The c. of the composition of abnormal tissues and body fluids, and the changes caused by disease. **pharmaceutical-** Chemistry applied to the preparation, testing, and composition of drugs. **philosophical-** The appreciation of chemical knowledge and its position in a system of science. **photo-** The study of the relations of radiant and chemical energy and their transformation; the effect of light on the composition of substances. **photographic-** C. applied to photography and photographic processes. **physical-** A branch of theoretical c. which deals with the relation of energy and chemical force, and their transformation. **physiological-** The c. of the composition of and chemical changes in the healthy animal or vegetable organism. **phyto-** The c. of plants and plant functions. **practical-** Experimental c. as performed in the laboratory. **pure-** A branch of theoretical c. that deals with chemical forces alone. **radio-** A branch of theoretical c. which studies the composition and structure of the atom as revealed by the radioactive elements. **sanitary-** The application of c. to sanitation; water supply, disposal of domestic wastes, etc. **stereo-** A branch of theoretical c. which deals with the structure of molecules. **stoichiometric-** A branch of theoretical c. which deals with chemical force as expressed by atomic weight and valency, the proportions in which substances react and the distribution in space of the atoms of a molecule. **structural-** A branch of stereochemistry dealing with the internal molecular arrangement of carbon compounds. **synthetic-** Building up of compounds from simpler substances; especially of organic compounds (dyes, synthetic drugs, etc.). **technical-** C. applied to technology and to processes of manufacturing. **theoretical-** The deduction of laws which govern the experimentally-established facts of chemistry and their mathematical relations. **therapeutical-** A branch of medical chemistry dealing with the effect of drugs on the living organism. **thermo-** The branch of physical c. dealing with the relation of heat and heat radiations during chemical changes. **topo-** See under *topochemistry*. **toxicological-** A branch of forensic c. dealing with the composition of poisons and their detection. **vegetable-** The branch of biochemistry dealing with the composition of plants and the changes occurring during the performance of their normal functions. **zoö-** The c. of animals and animal functions, exclusive of man.

chemoceptor. The anchoring group in the protoplasm of a cell which unites the haptaphore of drugs and renders them capable of action.

chemo-immunology. The study of the chemical changes occurring during the immunization of an organism.

chemokinesis. Increasing the activity of an organism by the presence of a chemical substance.

chemology. A proposed alternative term for chemistry.

chemolysis. The dissolution of organic matter which occurs during decay, and is due to chemical reactions and not bacteria.

chemoreceptor. Chemoceptor.

chemoresistance. The specific resistance of a cell due to the presence of a chemical substance.

chemosmosis. Chemical reactions taking place through an intervening semi-permeable membrane, as in colloidal growth.

chemosynthesis. A chemical reaction in which the energy is not derived from oxygen (as in

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The Branches of Chemistry.

photosynthesis, q.v.), but from oxidation by bacteria; as,

$$H_2S \rightarrow H_2SO_4$$
$$Fe^{++} \rightarrow Fe^{+++}$$
$$NH_3 \rightarrow N_2$$

chemotaxis. Chemotropism. The attraction or repulsion of cells by chemicals.

chemotherapy. The study of the action of molecules of definite structure on protoplasm on the assumption that certain radicals have a selective affinity with parts of the cells. Cf. *Ehrlich's side chain theory, chemoceptor.*

chemotropism. Chemotaxis. **negative-** The repulsion of microorganisms by chemicals. **positive-** The attraction of microorganisms by chemicals.

chemurgic. Chemistry applied to farming. **C. Council.** An organization of Dearborn, Mich., U.S.A., whose purpose is to advance the industrial use of American farm products through applied science. At its first conference it signed "under the shadow of a replica of Independence Hall," on May, 7th, 1935, a *Declaration of Dependence Upon the Soil and of the Right of Self-Maintenance.*

chenocholic acid. $C_{27}H_{44}O_4$ = 432.4. An acid derived from chenotaurolic acid by hydrolysis.

chenopodin. A bitter principle from *Chenopodium album.* Cf. *betaine.*

chenopodium. (1) The goosefoot family. (2) American wormseed, Mexican tea. The fruit of *C. anthelminticum,* used as a mild cardiac stimulant. **c. oil.** American wormseed oil. The essential oil from the seeds of *C. ambrosioides,* used as an anthelmintic. **c. seeds.** The fruits of *C. ambrosioides* or *C. anthelminticum.* American wormseed; an anthelmintic.

chenotaurocholic acid. $C_{29}H_{29}O_6NS$ = 519.3. An acid in goose's bile. Cf. *chenocholic acid.*

chernawinite. Canadian amber. A resinous mineral similar to amber, found in Canada.

cherry. A tree of the subgenenus *Cerasus* of *Prunus* (Rosaceae). Cf. *cerasinose.* **wild-** See *wild.*

cherrylaurel. The leaves of *Prunus laurocerasus,* a Rosaceae, used as sedative. **c. oil.** The essential oil of c., d.1.054–1.066, soluble in 2 pts. 70 % alcohol; contains, HCN and benzaldehyde. **c. water.** The distillate of the crushed c. leaves, used to kill beetles.

Cheshunt mixture. A substitute for Bordeaux mixture, in which the lime is replaced by ammonium carbonate.

chessylite. Azurite.

chestnut. Castanea.

chevkinite. A complex mixture of hydrated oxides of K, Na, Fe, Ca, Mn, La and Ce.

Chevreul, Michel Eugéne. 1786–1889. A French chemist noted for work on fats, soap and textile dyeing.

Chew ductility machine. An electrical device for determining the ductility of materials.

chi. The Greek letter χ. It indicates the *22nd* carbon atom.

chibou. The resin of *Bursera gummifera,* a tree of Florida and tropical America; used in plasters and ointments.

chicle. Gum chicle, balata, tuno gum. The dried milky juice of the bully-tree (*Mimusops balata*), a Sapotaceae of Northern South America. It consists of oxidized hydrocarbons and resembles caoutchouc and guttapercha. Occurs as soft, grayish-white masses, tasteless, m.49; used in the manufacture of chewing gum.

chicory. The ground root of *Cichorium intybus,* a composite plant of Europe and Asia, naturalized in the United States. Used as a coffee substitute or adulterant.

chile. Capsicum. **c. niter.** Sodium nitrate. **c. saltpeter.** Caliche. The sodium nitrate found in large deposits in Chile.

chilenite. A silver bismuthide, Ag_6Bi.

chilli, chilly. Capsicum.

Chimaphila. Pipsissewa. The dried leaves of *C. umbellata,* an Ericaceae. Used as a tonic, antiperiodic, diuretic, and astringent.

chimaphilin. $C_{24}H_{21}O_4$ = 373.1. Golden-yellow needles, odorless, tasteless, m.114, insoluble in water, soluble in alcohol or ether, obtained from the leaves of *Chimaphila umbellata;* used as a diuretic.

chimaphiloid. The combined principles from the leaves of *Chimaphilia umbellata.* Used as stimulant, alterative tonic, and diuretic.

chimosis. See *gastric digestion.*

chimyl alcohol. $C_{19}H_{40}O_3$ = 316.3. The glyceryl ether $C_{16}H_{33}OC_3H_5(OH)_2$. Cf. *butyl* and *selachyl alcohols.*

china. (1) Cinchona bark. (2) Porcelain. **c. clay.** The product obtained by leaching weathered deposits of granitic rocks, so that the quartz and mica portions are removed. Cf. *kaolin.* **c. grass.** Ramie. **c. jute.** The fibre from *Abutilon avicennae,* a Malvaceae cultivated in China. **c. root.** (1) Smilax. (2) Galangal. **c. tallow tree.** *Sapium sebiferum,* an Euphorbiaceae, whose seeds are rich in oil. **c. wood oil.** Tung oil.

chinaldine. Quinaldine.

chinaphenine. $Et.O.C_6H_4NH.CO.OC_{20}H_{23}ON_2$ = 485.29. Quinine carbophenetidine. The quinine carbonic acid ester of phenetidine. A white, tasteless powder, slightly soluble in water, soluble in alcohol, ether, benzene or chloroform; used as an antipyretic and antineuralgic.

chinaphthol. Quinanaphthol.

chinaroot. The dried rhizome of *Smilax china,* a plant of Southern China resembling sarsaparilla.

chinaseptol. Diaphtol.

chinazoline. Quinazoline.

chinchona. Cinchona bark.

chindoline. Quindoline.

Chinese. c. blue. Prussian blue. **c. cinnamon.** Cassia bark. **c. oil.** Tung oil. **c. wax.** A wax formed on *Fraxinus chinensis* from the secretions of *Coccus ceriferus;* it consists chiefly of ceryl cerotate.

chinic acid. Quinic acid.

chinidine. Cinchonidine.

chinindoline. Quinindoline.

chinine. Quinine.

chiniofon. $C_9H_6ONIS + Na_2CO_3$. Yatren, *7-iodo-8-ozyquinoline-5-sulfonic acid with sodium carbonate.* Yellow crystalline powder, which effervesces in water and forms sodium iodoxy quinoline sulfonate; used as an antidysenteric and amebicide

chinioidina. Quinoidine.

chinoform. Quinoform.

chinoidine. Quinoidine.

chinol. Hydroquinol.

chinoline. Quinoline.

chinopyrine. Quinopyrine.

chinoral. Quinoral. A compound of quinine and chloral, used as a hypnotic and antiseptic.

chinosol. $C_9H_6ON.SO_3K.H_2O$. Quinosol. Oxyquinolin potassium sulfonate. A white powder, used as an antiseptic, styptic, and antipyretic.

chinothein. A mixture of quinine, caffeine, and antipyrine.

chinotoxine. Quinotoxine. A synthetic drug resembling curare in its action.

chinotropine. Quinotropine.

chinovate. (1) A salt of quinovatic acid. (2) A compound of chinovase.

chinovin. Quinovin.

chinovose. A carbohydrate from cinchona bark.

chinwood. Taxus.

chiococcic acid. An acid compound from cahincic acid.

chiolite. Arksutite. The mineral, $2NaF.AlF_3$, d.2.84. It resembles cryolite.

chiococcine. An alkaloid from the roots of *Chiococca racemosa* or cahinca, which resembles emetine in its action.

chionanthin. $C_{22}H_{28}O_{10}$ = 452.22. A resin from the *Chionanthus virginica*, the poison ash or fringe-tree of North America; used as a tonic and sedative. Cf. *chionanthus*.

chionanthoid. The combined principles from the bark of *Chionanthus virginica;* used as a hepatic stimulant and cholagogue to increase appetite.

chionanthus. The bark of the fringe-tree, *C. virginica*, (poison ash, Virginia snow flower, mist tree), an Oleaceae of Southern United States; used as fluid extract, as an aperient, tonic and diuretic.

chipmunk crushers. A grinding machine for ores and rocks.

chiquito. A fat obtained from *Combretum butyrosum*, a Combretaceae of tropical Africa.

chirata. Chiretta. The dried herb of *Swertia (Ophelia) chirata*, a Gentianaceae of India; used as bitter tonic. Cf. *chiratin, ophelic acid.*

chiratin. $C_{26}H_{48}O_{15}$ = 600.5. A bitter crystalline glucoside from the *Ophelia chirata*, a Gentianaceae of Europe, India and South Africa. It is a yellow, hygroscopic powder which is hydrolyzed to ophelic acid and chiratogenin.

chiratogenin. $C_{13}H_{24}O_3$ = 228.0. A split-product of chiratin.

chironol. $C_{28}H_{48}O$ = 400.37. An alcohol from *Opopanax chironium*, an Umbelliferae.

chitenidine. $C_{19}H_{22}ON_2$ = 294.2. An oxidation product of quinine.

chitenine. $C_{19}H_{22}O_4N_2$ = 342.19. An oxidation product of quinine used in malaria.

chitin. $C_{15}H_{26}O_{10}N_2$ = 394.3. The horny substance which forms the framework of invertebrates (crabs, lobsters, beetles), and is the animal analog of the cellulose of plants. Decomp. to glucosamine and acetic acid when boiled with concentrated HCl.

chitosamin. Glucosamine.

chitosan. A split-product of chitin. Chitin and chitosan are related to mucin and chondrosin, and thereby support the theory that the arthropods are the ancestors of the vertebrates.

chitose. $C_6H_{12}O_6$ = 184.1. A sugar formed from chitonic acid.

chittim bark. Cascara sagrada.

chlamydobacteria. Bacteria of various shapes that possess a rigid sheath or capsula; as, streptothrix, cladothrix, crenothrix, phragmidothrix, and thiothrix.

chlamydozoa. A minute animal organism, which is surrounded by a rigid sheath or capsula.

chloanthite. A native nickel arsenide.

chlor- See *chloro-*.

chloracetamic acid. C_2HONCl_4 = 196.82. Tetrachloracetamide, $CCl_3.CO.NHCl$.

chloracetamide. See *acetamide*.

chloracetate. A salt of chloracetic acid which contains the monvalent CH_2ClCOO— radical.

chloracetic acid. $C_2H_3O_2Cl$ = 94.49. Carboxymethyl chloride, chloroacetic acid; $CH_2ClCOOH$. Colorless, rhombic crystals, $d_{54°}$.1.398, m.51, b.189; insoluble in water, soluble in alcohol or ether. **tri-** See *trichlor-*.

chloracetone. C_3H_5OCl = 92.51. Acetyl-methyl chloride, chloroacetone, monochloracetone, $CH_2Cl.CO.CH_3$. A colorless liquid, $d_{16°}$.1.162, b.119; insoluble in water, miscible with alcohol or ether. It is liable to spontaneous explosion and should be carefully stored.

chloracetonic acid. $C_4H_7O_3Cl$ = 138.5. Chloroacetonic acid, $CH_2Cl.C(OH)(Me)COOH$.

chloracetophenone. C_8H_7OCl = 154.5. C.A.P. Phenacyl chloride, chloroacetophenone, $PhCOCH_2Cl$. Rhombic crystals, d.1.32, m.59, b.245; used as a tear gas.

chloracetyl. Chloroacetyl. The monovalent radical, $CH_2Cl.CO$—, derived from chloracetic acid. **c. chloride.** $CH_2Cl.COCl$ = 112.93. A colorless liquid, $d_{0°}$.1.495, b.105, decomp. by water or alcohol.

chloracid. An organic acid containing chlorine.

chloracrylate. A salt of chloracrylic acid containing the monovalent $C_2H_2Cl.COO$— radical.

chloracrylic acid. $C_3H_3O_2Cl$ = 106.5. The compound $CHCl{=}CH{-}COOH$.

chloral. C_2HOCl_3 = 147.37. Trichloracetic aldehyde, trichloroacetaldehyde, trichlorocthanal*, $CCl_3.CHO$. A colorless, oily liquid, $d_{20°}$.1.512, m. −57.5, b.98, soluble in water, alcohol or ether; used as a hypnotic. Cf. *hydronal.* **amylene-** Dormiol. **anhydrogluco-** Chloralose. **butyl-** See *butyl.* **poly-** Hydronal. **urethan-** Uralin. **c. alcoholate.** $C_4H_7O_2Cl_3$ = 193.46. Trichlorethylate, $CCl_3.CHOH.OEt$. Colorless crystals, $d_{40°}$.1.43, m.46, b.115, slightly soluble in water, soluble in alcohol or ether; used as a hypnotic. **c. amide.** $CCl_3CHOH.NH_2$ = 164.4. C. ammonium, chloralformamide, chloramide. White crystals, m.71, soluble in alcohol or ether. It is a hypnotic and analgesic. **c. ammonia.** C. amide. **c. antipyrine.** Hypnal. **c. benzamide.** $CCl_3CHOH(C_6H_5CONH)$ = 268.4. Colorless crystals, used as a hypnotic. **c. caffeine.** A molecular mixture of caffeine and chloral, soluble in water. **c. cyanhydrin.** $CCl_3.CHOH.CN$ = 174.4. C. cyanhydride, c. hydrocyanide, trichloracetonitrile. Colorless crystals, m.60, b.218, soluble in water, alcohol or ether; used as a substitute for bitter almond water. **c. hydrate.** $CCl_3CH(OH)_2$ = 165.39. Hydrated c., crystalline c. Colorless deliquescent needles or plates, d.1.901, m.47.4, b.97 (decomp.), soluble in water, alcohol or ether. It is a hypnotic, antispasmodic, antiseptic; used extensively in medicine and as reagent for ergosterol. **c, hydrocyanide.** C. cyanhydrin. **c. hydrosulfide.** $(CCl_3CHOH)_2S$ = 328.46. Colorless crystals, soluble in water. **c. sulfhydrate.** $CCl_3CHOHSH$ = 181.77. Colorless prismatic crystals. **c. thiobenzamide.** $CCl_3.CHOH.C_6H_5CSNH$ = 284.82. Colorless crystals, slightly soluble in water. **c. uric acid.** Chloraluric acid.

chloralbine. $C_6H_6Cl_2$ = 148.9. Colorless crystals derived from trichlorphenol.

chloralide. A compound of chloral.

chloralimide. $CCl_3CH{:}NH$ = 146.4. Colorless crystals, m.155, soluble in alcohol or ether; used as a hypnotic and analgesic.

chlorallyl. The monovalent C_3H_4Cl— radical derived from allyl.

chlorallylene. Allyl chloride.

chloraloin. $C_{24}H_{30}O_{14}Cl_6$ = 874.92. A yellow, amorphous precipitate obtained by the action of chlorine on aloes.

chloralose. $C_8H_{11}O_6Cl_3$ = 309.4. Anhydroglucochloral. Colorless crystals, m.185, slightly soluble in water, soluble in alcohol. It is a hypnotic. **para-** An isomeric by-product obtained by the action of chloral on glucose; it is without therapeutic effect. It forms colorless crystals, m.227.

chloralurethane. Uralin.

chloraluric acid. $C_{14}H_{22}O_{11}N_{12}Cl_2$ = 651.5. Colorless crystals, obtained by the action of $HClO_2$ on uric acid.

chloramide. Chloral amide.

chloramidobenzene. Chloraniline.

chloramine. NH_2Cl = 51.53. Monochloramine. A colorless, unstable, pungent, liquid. An intermediate in the preparation of hydrazine from Cl_2 and NH_3. **chloramine-T.** Chlorazene.

chlorammine. A process of chlorinating water by injecting chlorine and ammonia.

chloranil. $C_6Cl_4O_2$ = 245.84. Tetrachlorquinone, tetrachloro-*p*-benzoquinone. Yellow scales, m.290 (sublime), slightly soluble in alcohol, soluble in ether; used as an oxidizing agent in the dye industry.

chloranilam. $C_6H_3O_3NCl_2$ = 207.9. Chloranilamidic acid. Colorless crystals, formed from chloranil by the action of HCl.

chloranilamide. $C_6H_2O_2N_2Cl_2$ = 220.9. The amide of chloranilamidic acid.

chloranilamidic acid. Chloranilam.

chloranilanilide. $C_6Cl_2(NHPh)_2O_2$ = 359.06. Colorless crystals formed by heating chloranil, alcohol, and aniline.

chloranilate. A salt of chloranilic acid containing the divalent $C_6Cl_2O_4$— radical.

chloranilic acid. $C_6Cl_2O_2(OH)_2$ = 209.0. *2.5*-Dichloro-*3.6*-dihydroxy quinone. A dibasic acid derived from chloranil. Red leaflets, m.283; insoluble in water.

chloraniline. See *aniline.*

chloranion. The chlorate ion.

chloranol. $C_6H_2O_2Cl_4$ = 247.85. Tetrachloroquinol. Pale yellow crystals, used as a reagent and in the dye industry.

chlorantimoniate. A double salt of a chloride with antimony trichloride.

chlorargentate. A double salt of a metal chloride with silver chloride.

chlorargyrite. Argentum cornu.

chlorarsine. Cacodyl chloride.

chlorastrolite. A variety of jade.

chlorate. A salt of chloric acid which contains the monovalent ClO_3— radical. **c. ion.** The monovalent ion ClO_3^-, derived from chloric acid.

chlorated. A substance containing chlorine; especially when the chlorine is readily available as in chloride of lime.

chloraurate. A double salt of auric chloride with some other chloride; or a salt containing the monovalent $AuCl_4$— radical.

chlorauric acid. $HAuCl_4$ = 340.0. Yellow crystals, formed on evaporation of a solution of gold in aqua regia.

chlorauride. Auric chloride.

chloraurite. A double chloride of the type AuCl.MCl or a compound containing the —$AuCl_2$ radical.

chlorazene. $MeC_6H_4SO_2Na{:}NCl.3H_2O$ = 281.5, Sodium p-toluene-sulfo-chloramine, mianine, activin, tochlorine, chloroamine, tolamine, chloramine-T. Dakin's antiseptic.

chlorazol. (1) $C_4H_3O_4NCl_2$ = 235.4. An acrid, pungent, oily liquid obtained from proteins (muscles, albumin, glutin) by the action of nitric and hydrochloric acid and distilling. (2) A trade name for direct dyestuffs.

chlorbenz-. Chlorobenz-.

chlorbenzamide. Benzamide.

chlorbenzene. See *chloro-benzene.*

chlorellin. An antibiotic substance produced by certain algae, notably species of *Chlorella.*

chlorethanal alcoholate. Somnol.

chlorethane. See *ethane.*

chlorethanol. C_2H_5OCl = 80.50. Chlorcarbinol, 2-chloroethyl alcohol. $ClCH_2.CH_2OH$. A colorless liquid, d.1.213, m. −69, b.128.8.

chlorethene. Ethylene.

chlorethyl. Ethyl chloride.

chlorethylene. See *ethylene.*

chlorethyl ether. $C_4H_8Cl_2O$ = 142.98. Dichloroethyl ether, chlorex, $(ClCH_2.CH_2)_2O$. A colorless liquid, d.1.213, b.178; used as solvent.

chlorethylidene. Ethylidene.

chloretone. $C_4H_7OCl_3$ = 177.4. Acetone chloroform, 2-trichloromethyl-2-propanol, *1.1.1*-trichloro-*2*-methyl propanol*, chlorobutanol, anesin, aneson, $CCl_3.CMe_2OH$. Colorless, odorous deliquescent crystals, m.80, sparingly soluble in water; soluble in alcohol, ether or oils; used as an anesthetic, antiseptic, hypnotic, and for seasickness.

chlorex. A trade name for dichloroethyl ether. **c. process.** A method of refining lubricating oils with c.

chlorhydrate. Hydrochloride.

chlorhydrin. A compound containing both, the Cl and OH radicals; as, ethylene c., propylene c. Cf. *halohydrin, dichlorhydrin.*

chloric acid. $HClO_3$. An acid of pentavalent chlorine, which can exist only in solutions and as compounds. Its salts are the chlorates. **per-** $HClO_4$. An acid of heptavalent chlorine, which exists only in dilute solution and in the form of compounds such as the perchlorates.

chloride. A salt containing the monovalent Cl—, usually a binary compound of chlorine in which chlorine is the negative constituent. **c. of lime.** Bleaching powder. **c. of soda.** Sodium chloride. **c. ion.** Chlorion. A negatively charged atom Cl^-, formed by dissolving a soluble chloride in water.

chloridion. Chloride ion.

chloridization. (1) Chlorination. (2) The treatment of ores with chlorine or hydrochloric acid, to produce the chloride of the principal meta present.

chloridometer. Chlorometer. A device for estimating chlorides in urine.

chlorimetry. The quantitative determination of the available or free chlorine in compounds, especially in bleaching powder.

chlorin. Crude dinitro resorcinol.

chlorinate. To introduce chlorine into a compound, or to combine it with a substance.

chlorinated. Treated with chlorine. **c. lime.** Bleaching powder containing not less than 30 %

available chlorine. **c. solvents.** A series of non-inflammable, stable, non-corrosive and non-explosive liquids formed by the action of chlorine on acetylene, *e.g.*:

dieline	$C_2H_2Cl_2$,	b.52
trieline	C_2HCl_3,	b.85
eteline	C_2Cl_4,	b.119
tetraline	$C_2H_2Cl_4$,	b.144
pentaline	C_2HCl_5,	b.159
perchloroethane	C_2Cl_6,	b.185

chlorination. The process of saturating with or introducing chlorine into a compound, especially the substitution of hydrogen atoms of an organic compound by chlorine atoms. **exhaustive-** The successive substitution of all H atoms by Cl.

chlorindin. $C_{16}H_8O_2N_2Cl_2$ = 330.9. A chlorine substitution product of indin.

chlorindoptene. $C_8H_4OCl_4$ = 257.8. Colorless crystals obtained by the action of chlorine on indigo-blue.

chlorine. Cl = 35.457. A halogen element, atomic number 17. A greenish-yellow, poisonous, gas with suffocating odor, m. −102.0, b. −33.60, d. (liquid Cl) 1.4, d. (gaseous Cl_2) 71.63 (H_2 = 2), or 2.49 (air = 1), soluble in water. After fluorine it is the most electronegative element. It is the most abundant halogen, and occurs as chlorides (sea-water, salt-deposits) in many minerals, and in all vegetable and animal tissues. It is obtained as a by-product in soda manufacture, or by electrolysis of chlorides. Discovered in 1774 by Scheele. It consists of two isotopes: Cl^{35} and Cl^{37}, and is mono-, tri-, or penta-valent; hence, it gives the following series of compounds:

− 1 chlorides	Cl^- *e.g.* NaCl
+ 1 hypochlorites	ClO^- *e.g.* NaOCl
+ 3 chlorites	ClO_2^- *e.g.* $NaClO_2$
+ 5 chlorates	ClO_3^- *e.g.* $NaClO_3$
+ 7 perchlorates	ClO_4^- *e.g.* $NaClO_4$

Used as a bleaching agent for textiles, straw and sponges, as a poison gas in chemical warfare, in the extraction of gold, as a disinfectant, germicide and insecticide, as an oxidizing and reducing agent in chemical synthesis. **available-** (1) The chlorine that can be liberated from a substance (*e.g.*, bleaching powder) by acids. (2) The chlorine equivalent of the active oxygen of an oxidizing agent (*e.g.*, a hypochlorite).

c. cyanide. Cyanogen chloride. **c. dioxide.** ClO_2 = 67.5. C. peroxide. A yellowish, strong irritating gas, $d_{(air=1)}$.2.315, m. −76, b.9.9; or reddish liquid, d.1.5. It is soluble in water, decomp. in alcohol, and is a strong oxidizing agent forming hypochlorites or peroxides; it explodes in contact with NH_3, CH_4, PH_3, or H_2S. **c. heptoxide.** Cl_2O_7 = 182.9. The anhydride of perchloric acid. A colorless, oily liquid, b.82, which readily decomposes and explodes. **c. hydrate.** $Cl.8H_2O$ = 179.6 or $Cl.5H_2O$ = 86.91. Octahedric, yellow crystals, d.1.23, stable below 9, m. −50. **c. hydride.** Hydrochloric acid. **c. monoxide.** Cl_2O = 86.9. Anhydride of hypochlorous acid. A yellowish-red liquid or yellowish gas, $d_{(air)}$.2.99, m. −20, b.5; soluble in water or concentrated sulfuric acid, but decomp. by alkalis. **c. oxides.** Cl_2O = c. monoxide, anhydride of hypochlorous acid. ClO_2 = c. dioxide. Cl_2O_7 = c. heptoxide, anhydride of perchloric acid. ClO_4 = c. tetroxide. The existence of Cl_2O_3 and Cl_2O_5 is doubtful. **c. water.** A pale greenish-yellow liquid of strong chlorine odor, obtained by passing a stream of chlorine through water. It contains 0.4 gram Cl per 100 cc., and if kept for any length of time, it decomposes to HCl and HOCl. Used as a reagent in determining I, Br, quinine, uric acid, or xanthine; also as an oxidising and bleaching agent and antiseptic.

chlorinity. The number of grams of halides (calculated as Cl) occurring in a kg. of sea water. It is related to salinity, S, thus: S = 0.03 + 1.805 Cl.

chloriodic acid. Iodine monochloride.

chloriodide. A double salt containing an iodide and chloride.

chloriodoform. $CHCl_2I$ = 210.8. Dichloriodoform, formyldichloroiodide, dichloroiodomethane. A yellow aromatic liquid.

chlorion. Chloride ion.

chlorisatic acid. $C_8H_6O_3NCl$ = 199.5. A chlorine substitution product of isatic acid.

chlorisatide. $C_{16}H_{10}O_4N_2Cl_2$ = 365.1. A chlorine substitution product derived from isatin; a white insoluble powder.

chlorisatimide. $C_{24}H_{15}O_4N_5Cl_2$ = 508.2. A chlorine substitution product of isatimide.

chlorite. (1) A salt containing the monovalent ClO_2^- radical derived from chlorous acid. (2) A group of rock-forming minerals; *e.g.*, clinochlore, penninite, prochlorite.

chlorition. The negatively charged ClO_2^- formed by ionization of chlorous acid and chlorites.

chloritoid. Phyllite. The mineral Al_2O_3,FeO, SiO_2,H_2O.

chlorknallgas. An explosive mixture of chlorine and hydrogen.

chloro- Describing an organic compound which contains chlorine atoms substituted for hydrogen atoms. The prefixes chlor- and chloro- are often interchangeable, but the former indicates a closer relationship of chlorine to the compound which it prefixes. *E.g.*, chloracetate is a salt containing the radical CH_2ClCOO—R, and derived from chloracetic acid; while chloroacetate is a salt of the type $CH_3.COO$—R—Cl, that is, derived from acetic acid and chlorine.

chloroacetophenone. Chloracetophenone.

chloroben. Dichlorobenzene.

chlorobenzaldehyde. C_7H_5ClO = 140.5. Chlorobenzene carbonal*, $Cl.C_6H_4.CHO$. o- or *2-*. m.11, b.208. m- or *3-*. m.17, b.213. p- or *4-*. m.47, b.214.

chlorobenzoate. A salt of chlorbenzoic acid containing the monovalent $C_6H_4Cl.COO$— radical.

chlorobenzoic acid. See *benzoic acid, chloro-*.

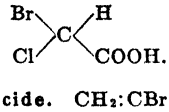
chlorobenzoyl. C_7H_5OCl = 140.5. A colorless liquid derived from benzaldehyde and chlorine. **c. chloride.** $C_7H_4OCl_2$ = 179.95. $ClCO.C_6H_4Cl$. o- m. −4, b.238. m- b.117. p- b.119.

chlorobenzyl. A compound containing the monovalent C_7H_6Cl— radical, of which 10 isomers are possible.

chloroboric acid. Boron trichloride.

chlorobromacetate. A salt of chlorbromacetic acid of the type CHClBr.COOM.

chlorobromacetic acid. $C_2H_2O_2ClBr$ = 173.5.



chlorobromglycide. CH_2:CBr.CH_2Cl = 155.5. A colorless liquid.

chlorobromopropane. Trimethylene chlorobromide.

chlorobutadiene. Chloroprene.
chlorobutanol. Chloretone.
chlorobutyric acid. Butyric acid.
chlorobutyryl. The radical $C_3H_2Cl.CO$—.
chlorocalcite. Hydrophilite.
chlorocamphene. $C_{10}H_{12}Cl_4$ = 273.8. A colorless liquid obtained by the action of chlorine upon terebenthene.
chlorocamphor. A number of chlorine substitution products of camphor; *e.g.*, monochlorated, dichlorated, etc.
chlorocarbinol. $CH_2Cl.CH_2OH$ = 80.5. Chlorethanol.
chlorocarbonate. Chloroformate. A compound containing the monovalent ClCO.O— radical; *e.g.*, methyl chlorocarbonate, ClCO.OMe.
chlorocarbonic acid. Chloroformic acid.
chlorocarvene. $C_{10}H_{15}Cl$ = 170.5. A colorless liquid obtained by the action of chlorine upon carvene.
chlorochromic acid. The compound $HCrO_3Cl$; see *chromyl chloride.*
chlorocinnamoyl. The radical $C_6H_4Cl.CH:CH.CO$—.
chlorocinnose. $C_9H_4OCl_4$ = 269.8. Colorless crystals, obtained by the distillation of a mixture of cinnamic acid and P_2O_5.
chlorocitraconyl. $C_5H_4O_2Cl_2$ = 166.9. An addition product of citraconyl and chlorine.
chlorocitric acid. See *citric acid.*
chlorocodeine. A chlorine substitution product of codeine.
chlorocosane. A liquid chlorinated paraffin which contains chlorine in stable combination.
chlorocresol green. $C_{21}H_{14}Cl_4O_5S$ = 521.9. *2.3.6.7*-Tetrachloro-*m*-cresol sulfon phthalein. A gray powder used as pH indicator between 4.0 (yellow) and 6.0 (blue).
chlorocruorin. A green pigment related to hemoglobin; found in certain molluscs.
chlorocyanamide. CN.NHCl = 76.48. A chlorine substitution product of cyanamide.
chlorocyanide. A double salt of a chloride and cyanide; MCl.MCN.
chlorocyanilide. $C_{15}H_{12}N_3Cl_5$ = 411.4. Colorless crystals.
chlorocyanogen. Cyanogen chloride.
chlorodifluoromethane. $CHClF_2$ = 86.5. A colorless gas, m. −146, b. −39.8; used as an anesthetic and refrigerant. Cf. *freon.*
chlorodracylic acid. p- Chlorobenzoic acid.
chlorofluoride. A double salt of a chloride and fluoride; MCl.MF.
chloroform. $CHCl_3$ = 119.37. Trichloromethane*. A colorless, volatile liquid- $d_{15°}$.1.499, m. −63.2, b.61.2, almost insoluble in water, miscible with alcohol or ether. Used as a solvent for oils, fats, iodine, bromine, rubber, and medicinally as an anesthetic, anodyne, and antispasmodic. **aceton-** Chloretone. **colloidal-** Desalgin. **crystal-** Chloroformate. **germanium-** See *germanium.* **methyl-** $MeCCl_3$ = 133.4. A colorless liquid, used as an anesthetic. **nitro-** Chloropicrin. **phenyl-** Benzotrichloride. **c.-*d*.** $CDCl_3$ = 120.37. Deuterochloroform, CH^bCl_3. A white solid, m.64.2–64.7, formed from CCl_3CHO and D_2O. **c. of crystallization.** Chloroformate.
chloroformate. (1) A crystal deposited from a solution containing chloroform as a constituent of its crystal structure; cf. *water of crystallization.* (2) Chlorocarbonate. An ester of chloroformic acid; as, palite.
chloroformic acid. CHO_2Cl = 80.5. Chlorocarbonic acid. The hypothetical acid, Cl.COOH, esters of which are known.
chlorofumaryl. Fumaryl chloride.
chlorogenic acid. $C_{16}H_{18}O_9.\frac{1}{2}H_2O$. An acid occuring in coffee and many other plants. It is a depside of caffeic and quinic acid, m.208, and a constituent of caffetannic acid.
chlorogenine. $C_{21}H_{20}O_4N_2.3\frac{1}{2}H_2O$ = 434.73. Alstonine. An alkaloid from the bark of *Alstonia constricta.* A brown powder, m.195, insoluble in water, soluble in alcohol or ether; used as an antipyretic and antiperiodic resembling quinine in its action.
chlorolactic acid. See *lactic acid.*
chloromaleic acid. $C_4H_3O_4Cl$ = 150.5. A substitution product of maleic acid, which forms colorless white crystals.
chloromalonic acid. See *malonic acid.*
chloromenthene. $C_{10}H_{17}Cl$ = 172.6. A substitution product of menthol; a yellow, oily liquid.
chloromercuriphenol. $C_6H_4(OH)ClHg$ = 329.11. Colorless crystals, m.152.5, soluble in sodium hydroxide.
chloromesityl. C_3H_5Cl = 76.5. Mesityl chloride. A substitution product obtained by heating acetone with P_2O_5.
chloromesitylene. $C_9H_{11}Cl$ = 154.5. A chlorinated mesitylene, $C_6H_2Me_3Cl$.
chloromesitylide. C_3H_3Cl = 74.5. A crystalline substance obtained by the action of chlorine upon mesitylene.
chlorometer. Chloridometer.
chloromethane. Methyl chloride.
chloromethyl. The monovalent CH_2Cl— radical derived from methyl chloride. **di-** The radical —$CHCl_2$. **tri-** The radical —CCl_3. **c. chloroformate.** Palite. **c. silicane.** CH_5ClSi = 80.56. Methylchlorosilane, $MeSiH_2Cl$. A colorless gas, $d_{-80°}$.0.935, m. −134.5, b.7.
chloromychmylic acid. $C_4H_8O_3Cl_2$ = 175.0. An acid from urine.
chloronaphthalene. See *naphthalene.*
chloronitric acid. (1) Nitroxylchloride. (2) Aqua regia.
chloronitrobenzene. See *nitrobenzene.*
chloronitrophenol. See *nitrophenol.*
chloronitrous acid. Nitrogen oxychloride.
chlorophenesic acid. Dichlor-*phenol.*
chlorophenic acid. Monochlor-*phenol.*
chlorophenisic acid. See trichlor-*phenol.*
chlorophenol. See *phenol.* **c. indophenol.** An oxidation-reduction indicator, q.v. **c. red.** $C_{19}H_{12}Cl_2O_5S$ = 423.0. Dichlorophenolsulfonphthalein. A yellow powder, used as pH-indicator between 5.5 (yellow) and 6.5 (red).
chlorophenusic acid. Pentachloro*phenol.*
chlorophoenicite. The mineral $(Zn,Mn)_3As_2O_8.7(Zn,Mn)(OH)_2$. It is pale green by reflected and purple red by transmitted light. **magnesium-.** C. containing Mg in place of Zn.
chlorophyll. The chromoprotein forming the green coloring matter of leaves and other parts of a plant. A soft, green mass, insoluble in water but soluble in alcohol, ether, chloroform, carbon disulfide, essential oils, or alkalis. The solutions are fluorescent and colloidal. It contains:

70 % chlorophyll *a*, or $C_{55}H_{72}MgN_4O_5$ = 892.9;
30 % chlorophyll *b*, or $C_{55}H_{70}MgN_4O_6$ = 908.9.

The alcoholic solution of *a* is bluish green, of *b*, yellowish green. Both are phytol esters of

porphin derivatives. Among its split products are phtopyrrole (related to hemopyrrole of blood), aetiophyllin $C_{31}H_{34}N_4Mg$, (the chromophore group containing Mg, as hematin contains Fe). It is used as a non-poisonous coloring matter, and as a dye for oils, cosmetics, etc. It is marketed in the form of copper and zinc compounds. α- The purified chlorophyll ($C_{31}H_{29}N_3Mg$)NH.CO(COOMe)$COOC_{22}H_{33}$. Cf. *phylloerythrin, phylloporphyrin.*

chlorophyllide. An ester of chlorophyllin; as, chlorophyll is the c. of phytol.

chlorophyllin a. $C_{34}H_{32}N_4O_5Mg$. A dicarboxylic acid from chlorophyll *a*. Cf. *porphin.*

chloropicrin. CCl_3NO_2 = 164.39. Nitrochloroform, aquinite, trichloronitromethan*, P.S. Colorless liquid, d_9°.1.692, m. −69, b.112, insoluble in water, miscible with alcohol or ether. It is an insecticide and emetic war gas.

chloroplast. A granule containing chlorophyll; the green protoplasmic part containing the chlorophyll of vegetable cells.

chloroplatinate. Platinichloride. A double salt of platinic chloride combined with another chloride; or a salt of chlorplatinic acid containing the divalent $PtCl_6^{=}$ radical.

chloroplatinic acid. H_2PtCl_6 = 410.0. A dibasic acid, the platinum chloride of commerce.

chloroplatinite. Platinochloride. A double salt of platinous chloride and another chloride; a salt of platinous acid containing the divalent $PtCl_4^{=}$ radical.

chloroplatinous acid. H_2PtCl_4 = 339.0. A dibasic acid containing divalent Pt.

chloroprene. C_4H_5Cl = 88.5. *2-Chloro-1,3-*butadiene*, $CH_2{:}CH.CCl{:}CH_2$. A colorless liquid, d.0.9583, b.59.4, synthesized from acetylene, it polymerizes under proper conditions, to form: α- a soft, plastic resembling unvulcanized rubber; β- a volatile, fragrant product, one fraction b_{27mm}.92–97, another b_{27mm}.114–118; μ- a transparent, resilient, nonplastic, elastic product resembling vulcanized rubber; ω- a granular, nonplastic, non-absorbent, balata-like, hard, amorphous product, becoming plastic at 60°C. It is used in the manufacture of duprene.

chloropyridine. See *pyridine.*

chloroquinoline. C_9H_6NCl = 163.5. (mono-) A chlorine substitution product of quinoline.

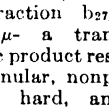
chlororaphin. An antibiotic substance obtained from *Chromobacterium.*

chlorosalol. $C_{13}H_9O_3Cl$ = 248.53. Chlorphenol salicylate, chlorsalol, $C_6H_4(OH)COOC_6H_4Cl$. A colorless, crystalline powder; used as external antiseptic.

chlorosamide. $C_{21}H_{15}O_3N_2Cl_3$ = 449.52. Yellow scales, derived from chlorsalicylic acid and ammonia.

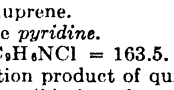
chlorosis. (1) Anemia, or an abnormal condition characterized by a deficiency of hemoglobin; or, in the case of plants, of magnesium. (2) The use of chlorine and chlorides in agriculture.

chlorosulfonic acid. HSO_3Cl = 132.5.



Used in chemical warfare for fog screens.

chlorosulfuric acid. Cl_2SO_2 = 134.9. Sulfuryl chloride. $(ClO)_2S$ or



chlorotoluene. Benzyl chloride.

chlorotrinitrobenzene. Picryl chloride.

chlorous. Describing a compound containing positive trivalent chlorine Cl≡; *e.g.*, chlorites. **c. acid.** $HClO_2$ = 68.5. An acid known only in solutions and as its salts (chlorites).

chlorovaleric acid. Monochlorovaleric acid.

chlorovalerisic acid. Trichlorovaleric acid.

chlorovalerosic acid. Tetrachlorovaleric acid.

chloroxalethylin. $C_6H_9N_2Cl$ = 144.6. A tertiary amine derived from diethyl oxamide.

chloroxalic acid. Chloroxalethyline.

chloroxalmethyline. $C_4H_5N_2Cl$ = 116.5. A tertiary amine derived from dimethyl oxamide.

chloroxalovinic acid. $C_4HO_4Cl_5$ = 290.3. Pentachlorethyl-oxalic acid. Colorless, hygroscopic crystals, soluble in water, alcohol or ether.

chloroxyl. A brand of cinchophen hydrochloride.

chloroxylene. Xylyl chloride.

chloroxylenol. Para-chloro-meta-xylenol, or 2-chloro-5-hydroxy-1,3-dimethylbenzene; used as a local antiseptic.

chloroxylonine. $C_{22}H_{23}O_7N$ = 413.3. An alkaloid from the wood of *Chloroxylon swietenia*, the East Indian satinwood, a Rutaceae.

chlorphenasic, chlorphenesic, chlorphenic, chlorphenisic, chlorphenosic. See *chlorophen-.*

chlorphenol. See *phenol.*

chloryl. (1) The monovalent ClO^- radical. (2) Carbachol.

chlorylene. C_2HCl_3 = 131.38. Trichloro ethylene, CHCl = CCl_2. Colorless liquid, d.1.477, m. −86.4, b.88, used as an antineuralgic.

chocolate. (1) A food preparation made from cocoa, milk, and sugar which is variously flavored, and consumed either in solid cakes or used as a powder for beverages, etc. (2) Theobroma paste. Ground cocoa used as a basis for certain drugs.

choke damp. Black damp. A mixture of CO_2 and other gases found in mines.

chola. Bile.

cholagogue. A drug that stimulates the flow of bile, *e.g.*, salicylates and bile salts.

cholaic acid. $C_{24}H_{40}O_2$ = 360.03. An acid derived from cholane.

cholalic acid. Cholic acid.

cholane. $C_{24}H_{42}$ = 328.39. A hydrocarbon parent-substance of sterols, hormones, bile-acids, and toad poisons. It is related to the carotenoids and cerebrosides by ring fracture. See table. **c. ring.** Androstane ring. A tetracyclic, saturated ring system. See figure.

cholanic acid. $C_{20}H_{28}O_6$ = 361.3. An oxidation product of cholic acid.

cholanthrene. $C_{20}H_{14}$ = 254.0. A pentacyclic hydrocarbon with a strong carcinogenic action.

cholate. (1) A salt or ester of cholic acid, indicated by the $C_{24}H_{41}COO$— radical. (2) Taurocholate. A salt of taurocholic acid, indicated by the $C_{23}H_{39}O_3.COO$— radical.

choleate. A salt or ester of choleic acid containing the monovalent $C_{25}H_{44}O_6NS.COO$— radical. Cf. *taurocholate.*

cholecyanin. Bilicyanin.

choleic acid. (1) Taurocholic acid. (2) $C_{25}H_{42}O_4$ = 392.31. A monobasic acid from bile, m.190. **glyco-, tauro-** See *bile acids.*

choleinic acid. $C_{25}H_{42}O_4$ = 406.4. An acid found in small quantities in ox bile.

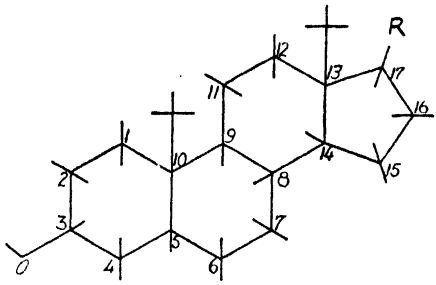
cholestane. $C_{27}H_{48}$ = 372.35. A hydrocarbon, and stereoisomer of ergostane.

cholestene. $C_{27}H_{46}$ = 370.35. The unsaturated hydrocarbon of cholesterol.

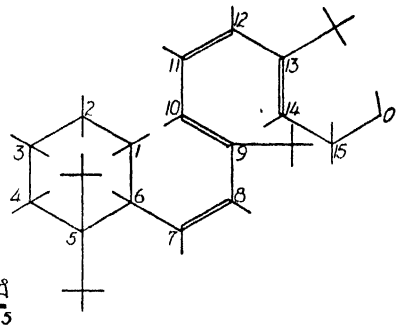
cholesterase. An enzyme that hydrolyzes cholesterol.

CHOLANE DERIVATIVES

(Compare also *carotenoids* and *cerebrosides*)



The Androstane or Cholane Ring



Vitamin A (Cf. carotenoids)

(The numbers represent carbon atoms, saturated unless otherwise specified, while R is a radical, as follows:)

A	—CH_2Me	I	—CMe.CH:CH.CO.O
B	—CHOH.Me		
C	—CO.Me		
D	—CHMe.COOH	J	—C:CH.O.CO.CH_2
E	—CHMe$(CH_2)_2$COOH	K	—CHMe$(CH_2)_2$Me
F	—CHMe.CH:CH.CHMe.$CHMe_2$	L	—$(CH_2)_4$CONH$(CH_2)_2SO_3H$
G	—CHMe$(CH_2)_3CHMe_2$	M	—$(CH_2)_4$CONH.CH_2.COOH
H	—CHMe.CH:CH.CHEt.$CHMe_2$	N	—$(CH_2)_4$COOH

	Name (double bond)	*Substituents*		*R*
Sterols:	(The numbers in parentheses indicate the position of the double bond.)			
$C_{29}H_{48}O$	stigmasterol (5:6)	3—OH	10.13—Me	H
	cholesterol (5:6)	3—OH	10.13—Me	G
	allocholesterol (4:5)	3—OH	10.13—Me	G
$C_{27}H_{42}O$	ergosterol (5:6 7:8)	3—OH	10.13—Me	F
	lumisterol (6:7 8:9)	3—OH	10.13—Me	F
	protochysterol (6:7 8:14)	3—OH	10.13—Me	F
	tachysterol (7:8 13:17)	3—OH	10.13—Me	F
	calciferol (13:17 15:16)	3—OH	10.13—Me	F
$C_{27}H_{46}O$	coprosterol	3—OH	10.13—Me	G
$C_{27}H_{48}$	coprostane	....	10.13—Me	G
Corpus Luteum Hormones:				
$C_{21}H_{32}O_2$	pregnenolone (5:6)	3—OH	10.13—Me	C
	pregnanedione	3=O	10.13—Me	C
$C_{21}H_{34}O_2$	pregnanolone	3—OH	10.13—Me	C
$C_{21}H_{30}O_2$	progesterone (5:6)	3=O	10.13—Me	C
$C_{21}H_{36}O_2$	pregnanediol	3—OH	10.13—Me	B
$C_{21}H_{32}O_2$	pregnenediol (5:6)	3—OH	10.13—Me	C
$C_{19}H_{26}O_2$	luteosterone (5:6)	3=O	10.13—Me	17=O
$C_{21}H_{36}$	pregnane	....	.....	A
Male Sex Hormones:				
$C_{19}H_{28}O_2$	androstanedione	3=O	10.13—Me	17=O
$C_{19}H_{28}O_2$	dehydroandrosterone (5:6)	3—OH	10.13—Me	17=O
$C_{19}H_{26}O_2$	androstenedione (4:5)	3=O	10.13—Me	17=O
$C_{19}H_{30}O_2$	androsterone	3—OH	10.13—Me	17=O
$C_{19}H_{28}O_2$	testosterone (4:5)	3=O	10.13—Me	17=O
$C_{19}H_{32}O_2$	androstanediol	3—OH	10.13—Me	17—OH
$C_{19}H_{30}O_2$	androstanolone	3=O	10.13—Me	17—OH
$C_{19}H_{30}O_2$	androstenediol (4:5)	3—OH	10 13—Me	17—OH
$C_{19}H_{32}$	androstane	....	10.13—Me	.....
$C_{19}H_{30}$	androstene (4:5)	....	10.13—Me	.....
Female Sex Hormones:				
$C_{18}H_{20}O_2$	equilin (1:2 3:4 5:10 7:8)	3—OH	13—Me	17=O
$C_{18}H_{24}O_3$	oestriol, theelol (1:2 3:4 5:10)	3—OH	13—Me	16.17—OH
$C_{18}H_{22}O_2$	oestrone, theelin (1:2 3:4 5:10)	3—OH	13—Me	17=O
$C_{18}H_{18}O_2$	equilenin (1:2 3:4 5:10)	3—OH	13—Me	17=O
$C_{18}H_{24}O_3$	dihydrooestrone (1:2 3:4 5:10 6:7 8:9)	3—OH	13—Me	17—OH
$C_{18}H_{30}$	estrane	....	13—Me	.....
$C_{18}H_{24}$	estratriene (1:2 3:4 5:10)	....	13—Me	.....
Digitalis Aglucones:				
$C_{23}H_{32}O$	strophantidin	3.5.14—OH	10—CHO 13—Me	J

$C_{23}H_{34}O_5$	periplogenin	3.5.14—OH	10.13—Me	J
$C_{23}H_{34}O_4$	digitoxigenin	3.14—OH	10.13—Me	J
$C_{42}H_{66}O_8$	gitoxigenin	16—OH	3.10.13—Me	J
Toad Poisons:				
$C_{26}H_{38}O_6$	bufotalin	3—OCOMe	7.12—OH 10.13—Me	I
Bile Acids:				
$C_{24}H_{42}$	cholane	....	10.13—Me	K
$C_{24}H_{40}O_2$	cholanic acid	....	10.13—Me	E
$C_{24}H_{38}O_2$	cholenic acid (5:6)	....	10.13—Me	E
$C_{24}H_{38}O_3$	hydroxycholenic acid (5:6)	3—OH	10.13—Me	E
$C_{24}H_{40}O_3$	lithocholic acid	3—OH	10.13—Me	E
$C_{24}H_{40}O_4$	desoxycholic acid	3.12—OH	10.13—Me	E
	hydroxycholic acid	3.6—OH	10.13—Me	E
	chenodeoxycholic acid	3.7—OH	10.13—Me	E
$C_{24}H_{40}O_5$	cholic acid	3.7.12—OH	10.13—Me	E
	phocaecholic acid	3.7.23—OH	10.13—Me	E
$C_{22}H_{34}O_3$	hydroxycholanic acid (5:6)	3—OH	10.13—Me	D
$C_{26}H_{39}O_7NS$	taurocholic acid	3.7.12—OH	10.13—Me	L
$C_{26}H_{37}O_6N$	glycohydeoxycholic acid	3.6—OH	10.13—Me	M
$C_{24}H_{34}O_5$	dehydrocholic acid	3.7.12—OH	10.13—Me	N
Fragments formed by ring fracture due to oxidation of C—atoms to COOH.				
$C_{24}H_{34}O_8$	bilianic acid (3 and 4 is COOH)	7.12=O	10.13—Me	E
$C_{25}H_{35}O_{10}$	choloidanic acid (3 and 4 is COOH)	12—COOH	10.13—Me	E
$C_{25}H_{34}O_{12}$	solannellic acid (3, 5, 6, 11 and 12 is COOH)	....	10.13—Me	E
$C_{19}H_{30}O_4$	etiobilianic acid (16 and 17 is COOH)	....	10.13—Me	E

cholesterate. A salt or ester of the dibasic cholesteric acid, containing the $C_8H_8O_8$— radical.

cholesteric acid. $C_8H_{10}O_8$ = 186.1. Cholesterinic acid. An oxidation product of choleic acid and cholesterol obtained by the action of HNO_3. Cf. *ambreic* acid.

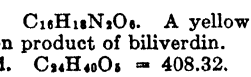
cholesterilene. $C_{26}H_{42}$ = 354.7. An unsaturated hydrocarbon derived from cholesterol; it forms white crystals.

cholesterin. Cholesterol.

cholesterinic acid. Cholesteric acid.

cholesterol. $C_{27}H_{45}OH$ = 386.35. Cholesterin. A monoatomic alcohol found in the blood, brain tissue, nerve substance, spleen, liver, bile; the principal constituent of gall-stones and certain cysts, prepared from the wool grease. Pearly scales, d.1.067, m.148, insoluble in water, soluble in alcohol, ether, chloroform or acetone. It is an antiseptic and antidote to the saponins and forms a number of esters which are important in metabolism. For its structure see *cholane*. **iso-** Lanosterol. **thio-** $C_{27}H_{46}SH$. A solid, m.191. Cf. *irradiation, sterols, lanisterol.*

cholestrophan. $C_8H_6N_2O_3$ = 142.06. Dimethyl parabanic acid,



Pearly leaflets, m.145, b.256, slightly soluble in water.

choletelin. $C_{16}H_{18}N_2O_6$. A yellow pigment and oxidation product of biliverdin.

cholic acid. $C_{24}H_{40}O_5$ = 408.32. Cholalic acid. A monobasic acid formed by the hydrolysis of bile acids. White crystals, m.198, insoluble in water, soluble in alcohol or ether. It is related to cholesterol and the terpenes. Cf. *cholane*. **desoxy-** See *desoxycholic acid*. **glyco-** See *glycocholic acid*. **litho-** See *lithocholic acid*. **rhizo-** An oxidation product of cholic acid. **tauro-** See *taurocholic acid*.

choline. $C_5H_{15}O_2N$ = 121.26. Bilineurine, sinkaline, trimethyl-ethanol-ammonium hydroxide, oxyethyltrimethyl-ammonium hydroxide. $Me_3N(OH)CH_2CH_2OH$. A ptomaine or quarternary amine occurring in many animal and vegetable tissues (placenta, fungi, seeds, etc.). It is a viscous liquid, soluble in water or alcohol. **acetyl-** See *acetyl*. **hydroxy-** Muscarine. **iso-** Amantine.

c. bases. A group of quarternary amines containing pentalent nitrogen, and derived from ammonium hydroxide by replacing the hydrogen atoms by radicals: choline, neurine, muscarine, betaine and sinapine. **c. borate.** Enzytol. A proprietary compound used in the treatment of cancer. **c. chloride.** $C_5H_{14}ClO_2N$ = 155.5. Colorless, hygroscopic crystals, soluble in water or alcohol. **c. hydrochloride.** C. chloride.

cholinic acid. $C_{50}H_{86}O_6.6H_2O$ = 840.38. An acid derived from bile.

cholodinic acid. $C_{24}H_{38}O_6$ = 422.30. An anhydrous product of cholic acid.

cholohematin. Bilipurpurin. A brown bile pigment.

choloidanic acid. $C_{16}H_{24}O_7$ = 328.19. An oxidation product of cholic acid.

chololic acid. Cholic acid.

cholonic acid. $C_{26}H_{41}O_5N$ = 447.34. An anhydrous product of glycocholic acid.

cholophaein. $C_{16}H_{18}O_4N_2$ = 302.16. A brown biliary pigment occurring in feces. Cf. *choletelin*.

cholothallin. $C_9H_{11}O_3N$ = 181.10. An oxidation product of bilirubin.

chondrigen. Cartilagin.

chondrin. A protein from cartilage, considered to be a mixture of mucin and gelatin. A transparent, gelatinous or yellow, horn-like mass, soluble in hot water.

chondrodite. Humite.

chondroine. $C_{18}H_{21}O_4N$ = 315.2. An alkaloid obtained from *Nectandra rodiaei*, a Lauraceae of tropical America. Cf. *bebeerine*.

chondroitic acid. $C_{18}H_{27}O_{17}NS$ = 561.30. An acid of cartilage, found in traces in urine; splits into chondroitin.

chondroitin. $C_{18}H_{27}O_{14}N$ = 481.22. A mucus-like substance and constituent of chondrin and chondroitic acid; it hydrolyses to chondrosin and acetic acid.

chondrometer. An instrument for determining the weight of a bushel of grain or seed.

chondromucoid. An albuminoid containing conjugated chondroitic acids; a constituent of cartilage.

chondroprotein. A group of mucoids containing chondroitic acid, found in the connective tissues.

chondrosin. $C_{12}H_{21}O_{11}N$ = 355.18. A split-product of chondroitin; it hydrolyzes to glycuronic acid and glucosamine. Cf. *chitosan.*

Chondrus. A family of sea weeds; *e.g.*, Irish moss.

chopping. Cutting. **c. mill.** A device for shredding and cutting fibrous materials; agar-agar, seeds, etc.

choritoid. $Al_2O_3.FeO_2.SiO_2.H_2O$. A silica mineral, (q.v.) of the mica group.

choroid. The layer below the retina of the eye.

chrithmene. Crithmene.

chroatol. $C_{10}H_{16}.2HI$ = 391.8. Terpene iodohydrate. A greenish oil, obtained by the action of iodine on turpentine.

chroma. The degree of saturation of a color.

chroman. $C_9H_8O_2$ = 148.1. Dihydrobenzopyran, $C_6H_4\langle^{O-\ CH_2}_{CH_2-CH_2}\rangle$. **hydrindo-** Hydrindochroman. **thio-** Thiochroman.

chromate. A salt of chromic acid which contains the divalent $CrO_4^{=}$ radical; as, Na_2CrO_4 sodium c. **bi-, Di-, di-** An acid salt derived from chromic acid containing the divalent $Cr_2O_7^{=}$ radical. The $Cr_2O_7^{--}$ ion, which makes aqueous solutions orange. **per-** See *perchromate.*

c. cell. See *cell.* **c. green.** A mixture of chrome yellow (q.v.) and prussian blue (cf. *chrome green).* **c. ion.** The negatively charged CrO_4^{--} ion, which imparts a yellow color to aqueous solutions.

chromatic. Pertaining to colors. **c. aberration.** The refraction of the different constituent rays of white light by a lens, to different extents; it produces differently colored foci, and an image fringed with color. **c. plate.** A photographic plate which is used in conjunction with color screens in order to produce a more contrasting image of colored objects. Cf. *photographic spectrum, photosensitizer.* There are four main groups of plates and films:

	Sensitive to	*Wavelength in Å.U.*	*Name*
(1)	violet and blue.	3500–5000	ordinary plates
(2)	violet, blue and green.....	3500–6000	*iso-* or *ortho-*chromatic plates
(3)	violet, blue and orange.....	3500–6500	*tri*chromatic plates
(4)	violet, blue and red.....	3500–7000	*pan*chromatic plates.

chromatin. A structural part of the nucleus of the cell that is most deeply colored by stains.

chromatographic. Recording colors. **c. analysis.** The analysis of mixtures of solutions (*e.g.*, of drugs, dyestuffs, etc.) by using absorbing materials such as gelatin, alumina, etc. to separate the substances in solution by selective adsorption.

chrome. (1) Chromium. (2) Chromium ore. (3) Chromium oxide. (4) Lead chromate. **c. alum.** Ammonium chromic sulfate. **c. green.** A mixture of chromic oxide and cobalt oxide. **c. ore.** Chromite. **c. red.** Lead chromate. **c. violet.** Aurine tricarboxylic acid. **c. yellow.** Lead chromate.

chromel. An alloy highly resistant to heat, oxidation and the action of acids; and used in thermocouples and in the laboratory (*e.g.*, for triangles). Grades:

A.....	80 % Ni	20 % Cr	
B.....	85 % Ni	15 % Cr	
C.....	65 % Ni	11 % Cr	24 % Fe
D.....	26 % Ni	8 % Cr	66 % Fe
P.....	90 % Ni	10 % Cr	

chromic. Describing a compound containing trivalent chromium $Cr^{\equiv}$. **c. acetate.** $Cr(C_2H_3O_2)_3H_2O$ = 247.09. A grayish-green powder, soluble in water. **c. acid.** (1) H_2CrO_4 = 118.1. The hypothetical hydrate of CrO_3, which exists only in solution or in the form of salts. (2) CrO_3. Chromium trioxide. **c. anhydride.** Chromium trioxide. **c. arsenide.** Chromium arsenide. **c. boride.** Chromium boride. **c. bromide.** (1) $CrBr_3$ = 291.76. Olive green, hexagonal crystals; slightly soluble in water, decomp. in alcohol. (2) $CrBr_3.6H_2O$ = 399.85; c.b. hexahydrate. Green scales, d.5.4, insoluble in water or alcohol. **c. carbide.** Cr_3C_2 = 180.06. A black powder, d.5.62, insoluble in water. **c. carbonate.** $Cr_2(CO_3)_3$. An amorphous, grayish-black powder of variable composition, containing some hydroxide; insoluble in water, soluble in acids. **c. chloride.** (1) $CrCl_3$ = 158.38. A purple crystalline powder, d.2.757; soluble in water, alcohol or ether. (2) $CrCl_3.6H_2O$ = 266.48. Green or purple, shining scales, d.5.5; soluble in water, alcohol or ether. **c. fluoride.** $CrF_3.4H_2O$ = 181.1. A green, crystalline powder, d.3.8, m.1000, b. about 1200, soluble in water, alcohol, or acids; used technically in dyeing and printing cotton, and coloring white marble. **c. hydroxide.** $Cr(OH)_3.2H_2O$ = 139.1. A bluish-green powder insoluble in water or alcohol, soluble in alkalis or acids; used as a pigment. **c. iodide.** $CrI_3.9H_2O$ = 437.9. A dark blue or black poyder, soluble in water. **c. nitrate.** $Cr(NO_3)_3.9H_2O$ = 400.2. Purple prisms, m.-36.5, b.125.5, soluble in water, alcohol, acids, or alkalis; used as a reagent. It crystallizes also as

heptahydrate.....	$Cr(NO_3)_3.7H_2O$
hexammonate.....	$Cr(NO_3)_3.6NH_3$

c. oxide. Cr_2O_3 = 152.0. Chrome green. A hexagonal, dark-green, crystalline powder, d.5.21, m.2059, insoluble in water, slightly soluble in alkalis or acids; used as pigment in calico printing, and paper money; also in ceramics and glass industry. **c. oxychloride.** Chromyl chloride. **c. phosphate.** $CrPO_4$ = 147.1. Plessy's green, Arnaudon's green. A bluish-green powder, insoluble in water; used as a pigment. It crystallizes also as

trihydrate.....	$CrPO_4.3H_2O$
hexahydrate.....	$CrPO_4.6H_2O$

c. potassium alum. Potassium c. sulfate. **c. potassium cyanide.** Potassium chromicyanide. **c. potassium oxalate.** $K_3Cr(C_2O_4)_3.3H_2O$ = 487.35. A purple crystalline mass, soluble in hot water. **c. potassium sulfate.** Potassium c. sulfate. **c. silicide.** Cr_3Si_2 = 212.1. A black crystalline powder, insoluble in water. **c. sulfate.** $Cr_2(SO_4)_3$ = 392.2. A green powder soluble in water; used in manufacturing chromic compounds. It crystallizes as:

hexahydrate..... $Cr_2(SO_4)_3.6H_2O$ (green)
pentadecahydrate.... $Cr_2(SO_4)_3.15H_2O$ (violet)

(cryst.) $Cr_2(SO_4)_3.18H_2O$ = 716.5. Regular, purple or violet crystals, $d_{22°}$1.7, anhydrous at 100 and soluble in water. **Used** in the manufacture of green inks and in the preparation of other chromium compounds. **c. sulfide.** Cr_2S_3 = 200.6. A dark-green powder, d.3.77, insoluble in water, soluble in acids. **c. tartrate.** $Cr_2(C_4H_4O_6)_3$ = 548.5. Dark-purple scales, soluble in water.

chromicyanide. The trivalent radical. $Cr(CN)_6\equiv$, occurring in compounds such as potassium chromicyanide $K_3Cr(CN)_6$. **c. ion.** The trivalent negative ion, $Cr(CN)_6^{---}$; it imparts a yellow color to solutions.

chromite. (1) An oxide of iron and chromium containing 68 % of chromic oxides. It occurs in brown or black streaked masses, principally in Asia Minor, and is a source of chromium salts; d.4.3–4.6, hardness 5.5. It is used for refractory bricks and cements, for making chromium compounds or ferrochrome, and for coloring glass and tiles green. (2) A salt of chromous acid containing the monovalent CrO_2— radical. **thio-** A compound of the type $M_2Cr_2S_4$.

c. ion. The negatively charged CrO_3^{--} ion, derived from chromous acid or the chromites

chromitite. The mineral Fe_2O_3,Cr_2O_3.

chromium. Cr = 52.01. An element, atomic number 24. A silver-white, hard, brittle metal, d.6.91, m.1520, insoluble in water, but dissolved rhythmically by acids (active and passive chromium). It was discovered in 1797 by Vauquelin and occurs principally in chromite. C is prepared from ores by reduction with metallic aluminum (thermite process), and is used in corrosion-resistant alloys and as a constituent of engineering steels for heavy duty machinery. C. compounds are poisonous and variously colored. They are di-, tri-, or hexavalent, and form the following series of compounds.

+2	chromous (blue).....	Cr^{++}
+3	chromic (purple).....	Cr^{+++}
	chromites (green).....	CrO_2^-
+6	chromyl (red).....	CrO_2^{++}
	chromates (yellow).....	CrO_4^{--}
	dichromates (orange).....	$Cr_2O_7^{--}$

The reactions of c. or the change from one to the other series of compounds, depend on the stability of its ions in acid or basic solution viz:

In acid solution		*In alkaline solution*	
Reduction	Cr^{+++} green or violet	CrO_2^- green	Oxidation
	↑	↓	
	$Cr_2O_7^{--}$ orange	CrO_4^{--} yellow	

c. acetate. See *chromous*. **c. arsenide.** CrAs = 127.1. Chromic arsenide. A black crystalline powder, d.6.35, insoluble in water. **c. boride.** CrB = 63.1. Chromic boride. A black powder, insoluble in water. **c. chloride.** See *chromic, chromous, chromyl*. **c. dioxide.** CrO_2 = 84.1. A black powder obtained by the reduction of potassium dichromate by sodium thiosulfate. It is regarded as chromic chromate, $Cr_2O_3.CrO_3 = 3CrO_2$. **c. minerals.** Chromium is common in magnesium rocks and occurs widely in nature. Its chief ores are: chromite, $FeCr_2O_4$; crocoite, $PbCrO_4$; knoxvillite, $CrSO_4$. **c. mordants.** A group of chromium compounds *e.g.*, used in tanning and dyeing, such as sodium dichromate, chrome alum, or chromic fluoride. **c. oxides.** See *chromous oxide, chromic oxide (green), chromium dioxide (black), chromium trioxide (red)*. **c. phosphide.** CrP = 83.2. A black powder, insoluble in water, decomp. in acids. **c. plating.** The electrolytic coating of metals with c. which produces a noncorrosive surface. **c. potassium oxalate.** $K_3Cr(C_2O_4)_3.H_2O$ = 487.36. Violet crystals, soluble in water. **c. trioxide.** CrO_3 = 100.01. Chromic acid anhydride. Fine, crimson-colored needles, m.190, very soluble in water, readily reduced to the green oxide. It is one of the most powerful of oxidizing agents.

chromo. A paper which has been coated with a mixture of a white pigment (*e.g.*, china clay, blanc fixe etc.) and an adhesive (*e.g.* casein); it is used to obtain fine color prints.

chromogen. (1) The parent-substance of a dyestuff, or of a compound which produces a colored substance or pigment. (2) The substances in biological liquids which, on oxidation, form colored compounds as, sepia, indigo, and fruits. Cf. *chromophore, auxochrome, dulcigen*.

chromogenic. Pertaining to a chromogen. **c. bacteria.** Bacteria which produce colored substances; as, a yellow or blue color in milk.

chromoisomerism. Chromotropy.

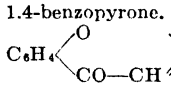
chromoisomers. Differently colored modifications of a substance. Cf. *chromotropy*.

chromolipoid. Lipochrome.

chromomere. A structural unit of a chromosome; each contains a gene, q.v.

chromometer. Colorimeter.

chromone. $C_9H_6O_2$ = 146.0. γ-benzopyrone, 1.4-benzopyrone. The heterocyclic compound



It is present in many vegetable pigments, and its derivatives are chromones, flavones, pyrones, etc. **2-phenyl-** Flavone. **3-phenyl-** Iso*flavone*.

chromophore. A structural arrangement of atoms which is common to many organic substances that possess color. It is thought that the cause of color is the vibrating electrons of a shifting double bond, the chromophoric group. Cf. *resonator, constellation, phore*.

chromophoric. Having properties of a chromophore. **c. group.** The nitro-, azo-, quinoid-, and —C:CH.CO— radicals, in which there is a possibility of a shifting double bond. See *chromophore, auxochrome*.

chromophotometer. Colorimeter.

chromoplast. The micelles of coloring matter in plant cells.

chromoproteins. A conjugated protein (or compound of a protein) and a chromophore; as, hemoglobin, chlorophyll, etc. Cf. *cytochrome*.

chromosaccharometer. A device for determining sugar in urine colorimetrically.

chromoscope. A device for measuring and comparing colors.

chromosome. A differentiated protoplasm formed from the chromatin of the nucleus during cell-division. The number of c. is constant in

every species of animals, but may differ for different species. Cf. *karyokinesis*.

chromosphere. A gaseous "atmosphere" surrounding the sun and composed mainly of hydrogen, helium and calcium vapors. Cf. *photosphere, corona*. The gases of the c. are responsible for the Fraunhöfer lines.

chromotropic acid. *1.8*-Dihydronaphthalene-*3.6*-disulfonic acid; used as an intermediate.

chromotropy. Chromoisomerism. The phenomenon, shown by certain substances, of occurring in differently colored forms (chromoisomers).

chromous. A compound of divalent chromium, Cr =. **c. acetate.** $Cr_2(C_2H_3O_2)_6.2H_2O$ = 494.24. A bluish-green soft mass, soluble in water; used in calico printing and as a stain. **c. acid.** $HCrO_2$ or HO.CrO. A blue-gray powder; a weak acid which yields chromites. **c. chloride.** $CrCl_2$ = 123.0. White crystals, $d_{14°}$2.76, soluble in water; it forms a blue solution which absorbs oxygen. **c. hydroxide.** $Cr(OH)_2$ = 86.0. A yellowish-brown powder, decomp. when heated; insoluble in water, sparingly soluble in acids. **c. iodide.** CrI_2 = 306.0. White crystals or powder, soluble in water. **c. oxalate.** $Cr(OOC)_2$ = 140.1. Dark-green scales, soluble in hot water. **c. oxide.** CrO = 68.04. Chromium monoxide. An unstable compound known in the hydrated state. **c. sulfate.** $CrSO_4.7H_2O$ = 274.2. Blue crystals, soluble in water, slightly soluble in alcohol.

chromyl. The divalent radical, CrO_2^{--}, containing hexavalent chromium. **c. amide.** $CrO_2(NH_2)_2$ = 116.1. **c. chloride.** CrO_2Cl_2 = 155.0 Chromic oxychloride, chlorochromic acid. A dark-red fuming liquid, d.1.96, b.116, decomp. in water or alcohol, and is a powerful oxidizing agent.

chronic. Long-continued or lingering; cf. *acute*.

chronograph. An instrument for recording small intervals of time.

chronometer. A watch or clock.

chronoscope. A device for measuring very brief intervals of time.

chronoteine. A high-speed moving picture camera consisting of 48 rotating lenses, used for the study of rapid moving machinery or phenomena (detonations). It takes normally 3200 pictures per second, but can be speeded up to take 10,000 exposures per second. Cf. *stroboscope*.

chrysalicic acid. $C_7H_5O_6N_3$ = 227.06. Dinitro-o-aminobenzoic acid. An isomer of chrysanisic acid.

chrysamine. $Na_2C_{18}H_{16}O_6N_4$ = 430.17. Flavophenine. A yellow azo-dye, obtained from benzidine and toluidine.

chrysammic acid. $C_{14}H_2(NO_2)_4(OH)_2O_2$ = 420.14. Chrysamminic acid, tetra nitrochrysazin. A dibasic acid constituent of aloes prepared by the action of HNO_3 on chrysophanic acid. It is a solid, insoluble in water, soluble in alcohol or ether.

chrysammidic acid. $NH_4C_7HO_2(NO_2)_2$. Ammonium chrysammate. A derivative of chrysammic acid.

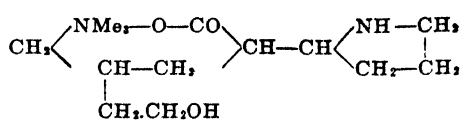
chrysamminic acid. Chrysammic acid.

chrysanilic acid. A decomposition product of indigo blue.

chrysaniline. $C_{19}H_{15}N_3$ = 285.2. ms-p-amidophenyl-2-amidoacridine. A derivative of acridine. Yellow crystals, m.268.

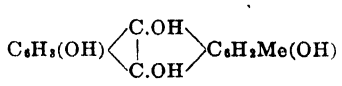
chrysanisic acid. $C_7H_5O_6N_3$ = 227.06. $NH_2.C_6H_2(NO_2)_2COOH$. 3.5-dinitro-4-aminobenzoic acid. Colorless crystals, m.259. An isomer of chrysalic acid.

chrysanthemine. $C_{14}H_{28}O_3N_2$ = 273.3. The alkaloid



found in some chrysanthemum species.

chrysarobin. $C_{15}H_{12}O_4$ = 256.1. A neutral principle from goa powder, the exudates of *Andira* (*Vouacapoua*) *araroba*, a Brazilian tree (Leguminosae).



A microcrystalline, yellow powder, insoluble in water, soluble in alcohol, ether, chloroform or alkalis. On oxidation it yields chrysophanic acid. Used as a gastro-intestinal antiseptic, antiparasitic and alterant, and externally in skin diseases. **c. tetraacetate.** Lenirobin. **c. triacetate.** Eurobin.

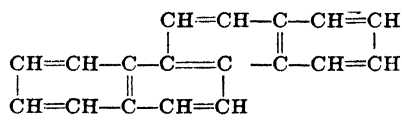
chrysatropic acid. Scopoletin.

chrysazin. $C_{14}H_8O_4$ = 240.13. 1.8-dihydroxy anthraquinone, $C_{14}H_6O_2(OH)_2$. A solid, slightly soluble in alcohol or ether, m.280. **tetranitro-**Chrysammic acid.

chrysazol. $C_{14}H_{10}O_2$ = 210.1. 1.9-dioxyanthracene, peri-dihydroxyanthracene, 1.8-anthradiol. A phenol derived from anthracene; used in the dye industry.

chryseam. $C_4H_5N_3S_2$ = 159.8. White crystals; a reagent for nitrites (red color).

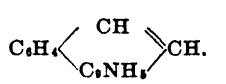
chrysene. $C_{18}H_{12}$ = 228.19. Benzophenanthrene. The hydrocarbon



Red fluorescent scales, m.250, b.448, slightly soluble in alcohol, ether or water. It is a constituent of coal tar.

chrysenic acid. $C_{16}H_{11}.COOH$ = 248.1. Beta-phenyl-naphtholcarboxylic acid. A monobasic acid derived from chrysene.

chrysidine. $C_{17}H_{11}N$ = 229.2. The compound



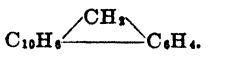
chrysin. $C_{15}H_{10}O_4$ = 254.1. 5.7-dihydroxy flavone, 2-phenyl-5.-7-dihydroxy-1.4-benzopyrone. A flavone in poplar buds; a derivative of benzopyrone, m.275.

chrysoberyl. $BeAl_2O_4$. A golden yellow beryllium aluminate, d.3.5–3.8, sometimes used as gem. Cf. *alexandrite*.

chrysocolla. $CuH_2SiO_4.H_2O$. Copper orthosilicate. A bluish-green mineral, d.2.0–2.2.

chrysofluorene. $C_{17}H_{12}$ = 216.1. Naphthylene-phenylene-methane, 1.2-benzofluorene, *α*-naph-

thofluorene. The hydrocarbon

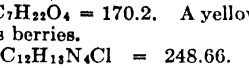


Colorless crystals, m.180.

chrysoidin. $C_7H_{22}O_4$ = 170.2. A yellow pigment in asparagus berries.

chrysoidine. $C_{12}H_{13}N_4Cl$ = 248.66. Diaminoazobenzene or 4-phenylazo-m-phenylene diamine hydrochloride. **c. orange.** A red-brown powder, very soluble in water or alcohol; used as a disinfectant, dye and indicator, changing at pH 7.0 from orange (acid) to yellow (basic).

chrysoketone. $C_{17}H_{10}O$ = 230.1. The ring system

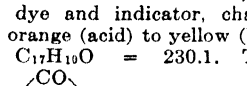


A crystalline substance, m.130.

chrysolepic acid. Picric acid.

chrysolite. Olivine.

chrysophanic acid. $C_{15}H_{10}O_4$ = 254.1. *4.5*-Dihydroxy-*2*-methylanthraquinone, parietic acid, chrysophanol,



A constituent of rhubarb root, senna leaves, goa powder and the wood of *Vouacapoua araroba*. Yellow crystals, used as a mild laxative. Cf. *rhein*.

chrysophanin. $C_{20}H_{20}O_9$ = 404.2. A glucoside in rhubarb and senna.

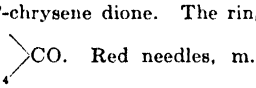
chrysophanol. Chrysophanic acid.

chrysophyscin. Physcion.

chrysopicrin. Vulpic acid.

chrysoprase. An apple-green opaque variety of chalcedony, used as a gem.

chrysoquinone. $C_{18}H_{10}O_2$ = 258.1. Chrysene quinone, *1.2*-chrysene dione. The ring system



Red needles, m.235, obtained by oxidation of chrysene.

chrysorrhetin. A yellow coloring matter of senna.

chrysotile. $3MgO,2SiO_2,2H_2O$. Canada asbestos. An impure hydrated magnesium silicate. It is a form of asbestos.

chrysotoxin. An active principle of ergot.

chuchuarine. $C_{20}H_{15}O_2N_{12}$ = 455.2. An alkaloid from the seeds and wood of *Semecarpus anacardium*, an Anacardiaceae of the East Indies. It resembles strychnine.

chum. The sediment in fatty oils.

chundoo. See *chandoo*.

churn. A device for agitating milk in making butter. **laboratory-** A c. used in experimental dairy work and household science, or for making intimate mixtures.

churning. The slow stirring or agitating of milk or cream with wooden paddles, shaking, etc. by which the fat globules aggregate to form butter.

chyazic acid. Hydrocyanic acid. The name is derived from C—Hy—Az, where Az is the French, azote.

chyle. An emulsion of lymph and fat formed in the small intestines during digestion, and passing through the thoracic duct into the veins as blood.

chymase. A coagulating enzyme (q.v.) that acts on casein.

chyme. A thick, brownish or grayish liquid consisting of partly digested food, passing from the stomach into the intestines.

chymia. An obsolete term for chemistry.

chymification. Gastric digestion.

chymogen. Rennase.

chymosin. Rennase.

chymotrypsin. An enzyme which coagulates milk.

cibazol. Sulphanilamido-thiazole.

ciceric acid. A mixture of oxalic and malic acid obtained from *Cicer arietinum*, *Vicia sativa* and other vetches.

Cicuta. A genus of poisonous umbelliferous plants; as *C. virosa* or water-hemlock.

cicutene. $C_{10}H_{16}$ = 136.2. A volatile terpene obtained from the root of *Cicuta virosa*.

cicutine. $C_8H_{17}N$ = 127.2. A liqiud alkaloid obtained from the root of *Cicuta virosa*, apparently identical with conine.

cicutoxine. $C_{12}H_{32}O_5$ = 256.3. An active principle of *Cicuta virosa*.

cider. Expressed apple juice, fermented or otherwise, which is used for drinking and vinegar manufacture. Cf. *pomace*, *perry*.

C.I.E. (Commission Internationale de l'Éclairage.) Units which define colors in terms of 3 hypothetical primary colors which, when mixed optically, match the color under standard lighting conditions. Cf. *color*.

cignolin. A brand of dioxyanthranol.

cilia. The hair-like protuberances on the surface of micro-organisms, used chiefly for locomotion.

ciment fondu. A form of hydraulic cement, formed by the complete fusion of bauxite and lime to form monocalcium aluminate and dicalcium silicate.

cimicic acid. $C_{15}H_{28}O_2$ = 240.3. A monobasic acid from bed bugs, *Cimex lectularius;* yellow crystals, m.44.2.

Cimicifuga. Macrotis, black cohosh, black snakeroot. The rhizome of *C. racemosa*, black snakeroot or cohosh; used, as tincture or fluid extract, as a tonic and antispasmodic. Cf. *rasmosin*, *macrotoid*.

cimicifugin. Macrotin. A resinoid from the rhizome of *Cimicifuga racemosa*. A yellowish-brown powder, insoluble in water, soluble in alcohol; used as an antispasmodic and nervine tonic.

cimifuga. Cimicifuga.

cimmol. Cinnamyl hydride.

cina. Santonica.

cinaebene. $C_{10}H_{16}$ = 136.2. A hydrocarbon from the essential oil of *Artemisia santonica*. **c. camphor.** $C_{10}H_{18}O$ = 154.2. A camphor, the chief constituent of the essential oil of *Artemisia santonica*. Cf. *santonica*.

cinchaine. $C_{22}H_{30}O_2N_2$ = 330.3. i-propyl-hydrocupreine. A cinchona alkaloid used as anesthetic.

cinchamidine. $C_{19}H_{24}ON_2$ = 296.3. Hydrocinchonidine. An alkaloid from cinchona bark. White leaflets, m.230, insoluble in water.

cinchene. $C_{19}H_{20}N_2$ = 276.3. An alkaloid obtained from cinchonine by boiling with alcoholic KOH.

cinchocerotin. $C_{27}H_{48}O_2$ = 404.38. A white crystalline substance derived from callisaya extract.

cinchofulvic acid. Cinchona red.

cinchol. $C_{20}H_{34}O$ = 290.3. An alcohol from cinchona resembling cholesterol.

cincholepidine. Lepidine.

cincholine. An alkaloid from cinchona bark.

cinchomeronic acid. $C_7H_5O_4N$ = 167.14. A dibasic acid derived from quinine: dicarboxy-

pyridine, *3.4-* or 2.3-pyridine dicarboxylic acid. Colorless crystals m.266. **iso-** 1.4-pyridine dicarboxylic acid. Colorless leaflets, m.236, slightly soluble in water, alcohol or ether. **carbo-** 1.2.3-pyridine tricarboxylic acid. Colorless crystals, m.250. **methyl-** Picoline dicarboxylic acid.

cinchona. (1) Quina, china, quina, Jesuit's bark, loxa bark, huanco bark, Peruvian bark, fever bark. The bark of *Cinchona* species containing at least 3 % of cinchona alkaloids; used as a tonic and febrifuge. (2) A genus of trees of the Rubiaceae found in the Andes and cultivated in Ceylon and Java. The following species yield barks:

C. callisaya	callisaya bark
C. ledgeriana	yellow bark
C. cordifolia	Cartagena bark
C. officinalis	crown or loxa bark
C. succirubra	red or cusco bark

c. alkaloids. The alkaloids in cinchona; the more important are: quinine, quinidine, cinchonine, cinchonidine. **c. tannin.** Quinotannic acid.

cinchonamine. $C_{19}H_{24}ON_2$ = 296.3. An alkaloid from the bark of *Remijia purdieana*, a Rubiaceae. Yellowish-white crystals, m.184, insoluble in water, soluble in alcohol or chloroform. **c. hydrochloride.** $C_{19}H_{24}ON_2.HCl.H_2O$ = 350.78. Yellow crystals, soluble in water or alcohol. **c. nitrate.** $C_{19}H_{24}ON_2.HNO_3$ = 359.32. Colorless or slightly yellow crystals, slightly soluble in water or alcohol. **c. sulfate.** $C_{19}H_{24}ON_2.H_2SO_4$ = 394.39. Colorless crystals, soluble in water; said to have six times the therapeutic effect of quinine sulfate.

cinchonane. $C_{19}H_{22}N_2$ = 278.19. Desoxycinchonine. Colorless crystals, m.92.

cinchonate. A salt of cinchonic acid, containing the trivalent $C_{11}H_{12}O_9\equiv$ radical.

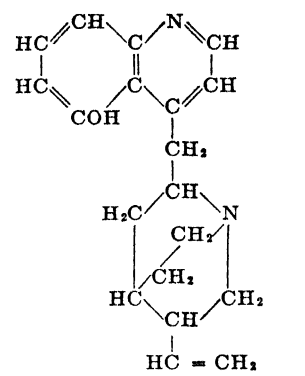
cinchonic acid. $C_6H_9(OH)_3(COOH)_3$ = 291.12. A tribasic acid formed by reduction of cinchomeronic acid. **methyl-** Aniluvitonic acid.

cinchonicine. Cinchotoxine.

cinchonidine. $C_{19}H_{22}ON_2$ = 294.3. Chinidine. The *levo-* isomer of cinchonine and an alkaloid obtained from cinchona bark. White crystals, m.205, insoluble in water, slightly soluble in ether, soluble in alcohol, chloroform or dilute acids. It is an antiperiodic, tonic and is used in heart diseases. **hydro-** Cinchamidine.

c. borate. $C_{19}H_{22}ON_2.H_2BO_3$ = 356.31. A white powder, soluble in alcohol. **c. dihydrobromide.** Blennostasin. **c. hydrobromide** $C_{19}H_{22}ON_2.2HBr$ = 456.15. Yellow prisms, soluble in water. **c. hydrochloride.** $C_{19}H_{22}ON_2.HCl + H_2O$ = 348.8. Colorless prisms, soluble in water, alcohol, or chloroform. **c. hydroiodide.** $C_{19}H_{22}ON_2.HI.2H_2O$ = 458.23. Yellow crystals, soluble in water or alcohol. **c. salicylate.** $C_{19}H_{22}ON_2.C_7H_6O_3$ = 432.34. A white microcrystalline powder, soluble in alcohol. **c. sulfate.** $(C_{19}H_{22}ON_2)_2.H_2SO_4.3H_2O$ = 740.7. Colorless crystals, soluble in water; used similarly to quinine sulfate. **c. tannate.** A pale-yellow, amorphous powder of variable composition, soluble in alcohol. **c. tartrate.** $(C_{19}H_{22}ON_2)_2.C_4H_6O_6.2H_2O$ = 774.66. White crystals, soluble in hot water or hot alcohol.

cinchonine. $C_{19}H_{22}ON_2$ = 294.29. An alkaloid from various species of cinchona bark; the *dextro-* isomer of cinchonidine.



Colorless crystals, m.240–250, b.448, slightly soluble in alcohol, water, or ether; soluble in chloroform or dilute acids. It is an antiperiodic and bitter tonic; used as a substitute for quinine, and as a spot reagent for bismuth (orange-red). **hydro-** Cinchotine. **hydroxy-** Cupreine. **pseudo-** Cinchotine.

c. benzoate. $C_{19}H_{22}ON_2.C_7H_6O_2$ = 416.34. Colorless or slightly yellow crystals, slightly soluble in water, soluble in alcohol or chloroform. **c. bisulfate.** $C_{19}H_{22}ON_2.H_2SO_4.4H_2O$ = 464.43. Colorless, cubic crystals, soluble in water or alcohol. **c. ferrocitrate.** Yellow scales, soluble in water. **c. hydrobromide.** $C_{19}H_{22}ON_2.HBr$ = 375.22. Colorless crystals, soluble in water or alcohol. **c. hydrochloride.** $C_{19}H_{22}ON_2.HCl.2H_2O$ = 366.79. Colorless monoclinic needles, slightly soluble in water, soluble in alcohol or ether. **c. iodosulfate.** Antiseptol, iodochinchonine sulfate. A brown powder, insoluble in water, soluble in alcohol; contains 50 % I. Used as a dusting powder and substitute for iodoform. **c. nitrate.** $C_{19}H_{22}ON_2.HNO_3.H_2O$ = 375.32. White crystals, soluble in water. **c. salicylate.** $C_{19}H_{22}ON_2.C_7H_6O_3$ = 432.34. White or pinkish crystals, soluble in hot water or alcohol; used for rheumatism. **c. sulfate.** $(C_{19}H_{22}ON_2)_2.H_2SO_4.2H_2O$ = 722.69. Colorless rhombic crystals, m.198, slightly soluble in water, soluble in alcohol. Used as an antiperiodic and tonic; as a reagent for bismuth, hydrochloric acid, or sulfite cellulose; in tanning extracts and in preparing leathers.

cinchoninic acid. $C_{10}H_7O_2N$ = 173.1. Alpha-quinoline-monocarboxylic acid, 4-quinoline carboxylic acid. A monobasic, colorless, crystalline, acid obtained by oxidation of cinchonine. **methyl-** Aniluvitonic acid. **2-phenyl-** Atophan.

cinchophen. Atophan.

cinchotannic acid. Quinotannic acid.

cinchotenicine. $C_{18}H_{20}O_3N_2$ = 312.4. An amorphous alkaloid from cinchona bark, which is isomeric with cinchotenine.

cinchotenidine. $C_{18}H_{20}O_3N_2.3H_2O$ = 366.4. A colorless crystalline alkaloid from cinchona bark, which is isomeric with cinchotenine.

cinchotenine. $C_{18}H_{20}O_3N_2.3H_2O$ = 366.4. A colorless crystalline alkaloid produced by the oxidation of cinchonine.

cinchotine. $C_{19}H_{24}ON_2$ = 296.4. Hydrocinchonine, *ψ*-cinchonine. An alkaloid, m.286, from various species of cinchona bark and cuprea bark; prepared artificially by the oxidation of quinine with $KMnO_4$.

cinchotoxine. $C_{19}H_{22}ON_2$ = 294.19. Cinchonicine. An alkaloid, m.59, obtained by heating cinchonine or cinchonidine.

cinene. Terpene.

cineole. Eucalyptole.

cineolic acid. $C_{10}H_{16}O_5$ = 216.12. The dibasic acid, HOOC.CMe<(CH2.CH2)(O.CMe2)>CH.COOH.

levo- Colorless crystals, d.0.92, m.196, decomp. in water. **1.4-** Ascaridolic acid. The dibasic acid.

HOOC.CMe<(CH2.CH2)(O)>C(CHMe2)COOH.

cinnabar. HgS. A native red mercuric sulfide.

cinnaldehyde. Cinnamaldehyde.

cinnamal. Cinnamilidene. The bivalent radical PhCH:CH.CH= or C_9H_8=.

cinnamaldehyde. C_9H_8O = 132.11. Cinnamic aldehyde, beta-phenylacrolein, benzal-acetaldehyde or cinnamyl aldehyde, *3*-phenyl-propenal*. PhCH:CHCHO. A yellow volatile liquid, d_4°.1.050, m. −7.5, b.245. Chief constituent of oil of cinnamon, cinnaldehyde, and cassia. Used as an itch remedy; and in artificial flavors. **hydroxy-** Coumaraldehyde. **hydroxymethoxy-** Ferulaldehyde.

cinnamamide. C_9H_9ON = 147.1. Benzalacetamide. PhCH:CHCONH2. Colorless crystals, m.141.5, soluble in alcohol. **hydro-** Hydrocinnamamide.

cinnamate. A salt of cinnamic acid containing the monovalent $C_9H_7O_2$— radical.

cinnamein. $C_9H_7O_2.C_7H_7$ = 238.11. Benzylcinnamate. An ester obtained from Peru and tolu balsams. A colorless liquid, also obtained by heating sodium cinnamate with benzyl chloride.

cinnamene. Styrene. **aceto-** Benzylidene acetone.

cinnamenyl Styryl. The monovalent radical, Ph.CH:CH—, or C_8H_7—, derived from cinnamene. **c. acetone.** $C_{12}H_{12}O$ = 172.1. C_8H_7CH:CHCOMe. Colorless crystals, m.68. **c. acrylic acid.** $C_{11}H_{10}O_2$ = 174.1. A monobasic acid C_8H_7CH:CHCOOH derived from cinnamaldehyde. Colorless crystals, m.165. **c. angelic acid.** A monobasic acid, C_9H_8:C_5H_4-COOH, derived from cinnamaldehyde. **c. crotonic acid.** A monobasic acid, C_9H_8:C_3H_3-COOH, derived from cinnamaldehyde.

cinnamic. Describing a compound containing the monovalent Ph.CH:CH— or C_8H_7— radical.

cinnamic acid $C_9H_8O_2$ = 148.11. Benzal-acetic acid, beta-phenylacrylic acid, styrylformic acid, *trans-* benzenepropenoic acid, PhCH:CHCOOH. An unsaturated monobasic acid and constituent of balsams and storax. Colorless monoclinic scales, d_4°.1.248, m.133, b.300, slightly soluble in water, soluble in alcohol or ether; it is used as a reagent for indole and in the synthesis of many organic compounds. It occurs in the trans- and cis- forms. **allo-** The cis- form of c. **amino-** $NH_2C_9H_7O_2$ = 163.26. **o-** Colorless needles decomp. 160, slightly soluble in water, soluble in alcohol or ether. **m-** Yellow needles, m.180, slightly soluble in water, soluble in alcohol or ether. **p-** Yellow needles, decomp. 175, sparingly soluble in water, soluble in alcohol or ether. **3.4-dihydroxy-** Caffeic acid. **3.4-dioxy-** Caffeic acid. **hydro-** $PhCH_2CH_2COOH$ = 150.13. Beta-phenylpropionic acid. Colorless needles, d_{40}°1.071, m.48.7, b.379, sparingly soluble in water, soluble in alcohol or ether. **hydroxy-** Coumaric and umbellic acids. **hydroxy-methoxy-** See *ferulic acid, isoferulinic acid, hesperitinic acid.* **methoxy-** $MeOC_9H_7O_2$ = 179.09. **o-**2-methoxy-. Colorless crystals, m.182, soluble in alcohol. **nitro-** $NO_2C_9H_7O_2$ = 193.11. **o-** White needles, m.249, insoluble in water, slightly soluble in alcohol. **m-** Yellow needles, m.196, slightly soluble in water, or alcohol. **p-** Colorless prisms, m.285, sparingly soluble in water, soluble in alcohol or ether. **oxy-** Coumaric acid.

cinnamic alcohol. $C_9H_{10}O$ = 134.13. Styryl alcohol, peruvin, styrene, styrolene alcohol, styrone styrilic acid, phenyl, glycol, phenylallyl alcohol, *3*-phenyl-*2*-propen-*1*-ol*. A monoatomic alcohol from balsam, storax, and cinnamon bark. PhCH:CHCH2OH. White needles, d_{35}°.1.040, m.33, b.250, slightly soluble in water, soluble in alcohol or ether. Used in artificial flavors, as a deodorant and antiseptic. **hydroxy-methoxy-** Coniferyl alcohol.

cinnamic aldehyde. Cinnamaldehyde. **c. anhydride.** $(PhCH:CHCO)_2O$ = 278.2. White crystals, m.127, slightly soluble in hot water.

cinnamide. Cinnamamide. **hydro-** Cinnhydramide.

cinnamilidene. (1) $C_{10}H_{10}$ = 130.1. The unsaturated hydrocarbon PhCH:CH.CH:CH2. (2) Cinnamal. **c. acetic acid.** The monobasic acid PhCH:CH.CH:CH.COOH = 174.08. **c. malonic acid.** The dibasic acid PhCH:CH.-CH:C(COOH)2 = 218.08.

Cinnamomum. A genus of trees, Lauraceae, which yield important drugs; as,

C. camphora	camphor, camphor oil
C. cassia	cassia bark, cassia oil
C. zeylanicum	cinnamon, cinnamon oil

cinnamon. The dried inner bark of various *Cinnamomum* species; as, *C. zeylanicum* of Ceylon and *C. cassia* (q.v.) of China. Used as an aromatic, carminative, astringent and condiment. **wild-** Canella. **c. oil.** The essential oil from the bark of various cinnamon species. *Cassia-*, from *C. cassia*, d.1.045–1.063, b.240–260, contains 70–85 % cinnamaldehyde. *Ceylon-*, from *C. zeylanicum*, d.1.024–1.040, contains cinnamaldehyde and eugenol. *leaf-*, d.1.044–1.065, contains, eugenol, sapol and cinnamaldehyde. **c. stone.** A mineral of the garnet group.

cinnamone. Styryl ketone.

cinnamonitrile. C_9H_7N = 129.1. A crystalline compound obtained from cinnamide by the action of P_2O_5.

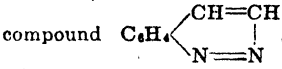
cinnamoyl. The monovalent PhCH:CHCO— or C_9H_7O— radical.

cinnamyl. (1) Cinnamoyl. (2) The radical Ph.-CH:CH.CH2— or C_9H_9—. **c. acetate.** The ester, $CH_3COOC_9H_9$, a constituent of many essential oils. **c. alcohol.** Cinnamic alcohol. **c. chloride.** C_9H_7OCl = 166.51. Chlorcinnamyl, PhCH:CHCOCl. Colorless crystals, m.36, b.-257. **c. cinnamate.** Styracin. **c. cocaine.** An alkaloid, m.121, from cocoa leaves. **c. eugenol.** $C_9H_7COOC_9H_{11}O$ = 282.14. Eugenol cinnamate. An ester of cinnamic acid and eugenol. Colorless needles, used as an antiseptic. **c. guaiacol.** Styracol. **c. hydride.** Allylbenzene. **c. methyl ketone.** Benzalacetone. **c. phenyl ketone.** Benzalacetophenone.

cinnhydramide. $C_{18}H_{16}N_2$ = 260.3. Hydrocinnamide. $(PhCH:CH.CH)_2N_2$. Colorless crys-

tals obtained from cinnamaldehyde and ammonia gas. Cf. *hydrocinnamamide.*

cinnitraniside. $C_{16}H_{14}O_4N_2$ = 298.13. Nitranisyl cinnamide.

cinnoline. $C_8H_6N_2$ = 130.2. α-phenoi-*1.2*-benzodiazine, α-benzo-o-diazine. The heterocyclic compound  . Colorless crystals, m.390; an isomer of phthalazine, quinazoline and quinoxaline. **dihydro-** $C_8H_8N_2$ = 132.2. Colorless crystals, m.88, soluble in alcohol.

cinnyl. Cinnamyl.

cinobufagin. $C_{26}H_{32}O_6$ = 428.2. A cardiac poison from Ch'an-Su, the dried venom of the Chinese toad; it hydrolyses to $C_{23}H_{30}O_5$ and acetic acid. Cf. *cholane derivatives.*

circle. A ring or a plane figure bounded, by a uniformly curved line. Let r be the radius, d the diameter and π a constant (3.14159) then:

diameter =	2r
circumference =	$2\pi r$ or πd
area =	πr^2 or $\frac{1}{4}\pi d^2$ or $0.7854d^2$

Cf. *pi, quadrant.*

circonium. Zirconium.

circuit. The continuous path of an electrical current.

circular. Round. **c. area.** d^2 = 1.2733a or a = $0.785398d^2$ where d is the diameter, and a the area. **c. inch.** The area of a circle one inch in diameter = 0.7854 sq. in. = 507 mm^2. = 5.07 cm^2.

circulation. A continuous movement in a regular course, as the motion of the blood through the blood vessels, the returning of the distillate to a still, or the movement of heated liquids or gases in a circuit.

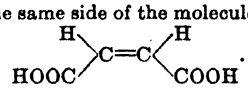
circulatory equalizers. A drug which restores the equilibrium of the circulatory system.

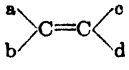
circumference. The outline of a more or less circular body. Cf. *circle.*

circumflux. Flowing or winding around.

circumfusion. Pouring or fusing around; as, a lower melting-point flux.

circumpolar. Around a pole.

cis. A form of isomerism of organic compounds, in which the H-atoms attached to two carbon atoms with double bonds are substituted adjacently on the same side of the molecule, *e.g.*, in maleic acid  . The relation of cis- and trans-isomerism is

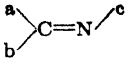


where

a:c is the *cis-* position

a:d is the *trans-* position;

or in the case of nitrogen compounds:



where

a:c is the *cis-* position

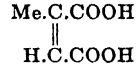
b:c is the *trans-* position

cissampeline. $C_{18}H_{21}O_3N$ = 299.3. An alkaloid from pareira root, *Cissampelos pareira*, a Menispermaceae of Brazil; a tonic and diuretic. Cf. *bebeerine, dyamettin, deyamettin.*

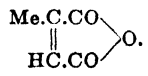
cistus. Labdanum.

citarin. $CH_2.O.O.CO.C(CH_2COONa)_2$ = 248.05. Sodium anhydro methylene citrate, citramin, goutine. A compound which dissolves in acid; used in the treatment of gout.

citraconic acid. $C_5H_6O_4$ = 130.0. Methyl maleic acid, 1.2-dicarboxypropylene, methyl butene dioic acid*. A dibasic acid isomeric with paraconic, itaconic, protaconic, isaconic and mesaconic acids, q.v.



c. anhydride. $C_5H_4O_3$ = 112.0. Methylmaleic anhydride. An intramolecular anhydride of citraconic acid; an oily, colorless liquid.



citraconyl. The divalent $C_5H_4O_4$— radical derived from citraconic acid.

citral. $C_9H_{15}CHO$ = 152.18. α-. Geranial. An aldehyde of several essential oils (citron oil). $Me_2C:CH.CH_2.CH_2.CH:CMeCHO$. It occurs as 4 isomers; as cis- and trans-terpinolene and cis- and trans-limonene. A yellowish volatile liquid, d.0.897, b.224.5, insoluble in water, miscible with alcohol or ether; used in perfumery and as a flavoring agent. β-. Neral. A colorless liquid, d.0.888, $b._{12mm}$104.

citramalic acid. $C_5H_8O_5$ = 148.1. *2*-Hydroxy-*2*-methyl butanedioic acid*, $HOOC.CMeOH.CH_2.COOH$. A dibasic acid derived from citraconic acid and isomeric with itamalic acid. *dl-* Monoclinic prisms, m.119.

citramide. $C_6H_{11}O_4N_3$ = 189.11. Colorless crystals, m.215 derived from ethyl citrate by the action of ammonia.

citramin. Citarin.

citranilide. $C_{24}H_{24}O_4N_2$ = 418.22. A compound obtained by heating aniline and citric acid.

citrate. A salt containing the trivalent $C_6H_5O_7\equiv$ radical, derived from citric acid. **c. soluble.** The phosphates in a fertilizer which are soluble in ammonium citrate solution.

citratus. A brand of di-calcium phosphate used as fertilizer.

citrene. $C_{10}H_{16}$ = 136.2. A terpene of lemon oil and identical with d-limonene, b.168. **c. terpin.** $C_{10}H_{20}O_2$ = 172.16. Citrene dihydrate. Colorless crystals, formed by the action of water on citrene.

citresia. Magnesium acid citrate.

citric acid. $C_6H_8O_7.H_2O$ = 210.11. 1,2,3-tricarboxy-2-hydroxypropane, *2*-hydroxy-*1,2,3*-propane tricarboxylic acid*, $C_3H_4(OH)(COOH)_3.H_2O$. A tribasic acid found in many fruit juices (lemon, orange, etc.). Colorless crystals, $d_{18°}$.1.542, m.153, decomp. on further heating, readily soluble in water or alcohol, slightly soluble in ether. Used as a reagent in quantitative and qualitative analysis, and as a constituent of soda-fountain mixtures. Cf. *citromyces, diconic acid.* **phenetidin-** Apolysin.

c. a. cycle. Krebs cycle. The main sequence of carbohydrate oxidation in the body tissues.

It corresponds with the complete oxidation of pyruvate to CO_2 and H_2O in the stages:

pyruvate → oxalacetate→
citrate → *iso*citrate→
oxalsuccinate → α-keto-
glutarate → succinate →
formate → malate → oxalacetate,

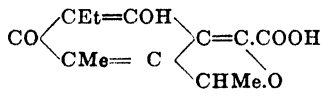
and so on.

citridic acid. Aconitic acid.

citrin. (1) Cucurbo citrin. A glucoside from watermelon seeds; used as a hypotensor. (2) Hesperidin.

citrine. (1) A yellow variety of quartz. (2) A yellow mercury ointment.

citrinin. $C_{13}H_{14}O_5$ = 250.05. A lemon yellow pigment from the fungus *Penicillium citrinum*, m.170–171 (decomp.)



It inhibits the growth of *Staphylococcus aureus*.

citrometer. A hydrometer graduated to indicate percentages of citric acid.

citromin. Citarin.

citromyces. A mold fungus, *C. pfefferianus*, which ferments glucose to citric acid.

citromycetin. $C_{14}H_{10}O_7.2H_2O$ = 308.07. A yellow flavone pigment from the fungus *Citromyces*.

citronella. Lemongrass. **c. oil.** The essential oil of many *Andropogon* or *Cymbopogon* species (lemongrass). Used for perfuming soap, and to keep off mosquitoes. *Batu-* d.0.900–0.920, *Singapore-* d.0.886–0.900. Both contain geraniol and citronellal.

citronellal. $C_{10}H_{18}O$ = 154.19. An aldehyde in many essential oils; it occurs in two isomers: the limonene form; $MeC:CH(CH_2)_3CHMeCH_2$-CHO; and terpinolene form, $CH_2:CMe(CH_2)_3$-$CHMeCH_2CHO$. A colorless liquid, d_{17}°.0.854, b.207, slightly soluble in water, miscible with alcohol or ether; used in perfumery and as a flavoring agent.

citronellaldehyde. Citronellal.

citronellic acid. $C_{10}H_{18}O_2$ = 170.14. Colorless liquid, d.0.931, b.257.

citronellol. $C_{10}H_{20}O$ = 156.21. 2.6-dimethyl-octene-1-ol-8. An isomer of rhodinol occurring in two stereoisomeric forms, $CH_2:CMe(CH_2)_3$-$CHMe.CH_2.CH_2OH$. An unsaturated alcohol and constituent of many essential oils; colorless liquid, d.0.856, b_{17mm}.118, slightly soluble in water, miscible with alcohol or ether.

citronin. Dinitrodiphenylamine. A yellow aniline dye.

citronyl. Citronella oil.

citrophen. A compound of citric acid and p-phenetidine, $(EtO.C_6H_4.NHCO)_3C_3H_4OH$. White crystals, m.181, soluble in water or alcohol. It is an antipyretic, sedative and antineuralgic.

citrulline. (1) A resinoid of colocynth. A yellow amorphous powder, insoluble in water, soluble in alcohol or ether; used medicinally as a laxative. (2) $C_6H_{13}N_3O_3$ = 175.11. An amino acid (q.v.) from casein and watermelon, *Citrullis vulgaris*, m.220, and an intermediate in the formation of urea.

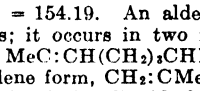
Citrus. Aurantiaceae. A genus of trees, Rutaceae, whose fruits are edible and yield juice, rinds, oils, and acids.

C. aurantium	sweet orange
C. aurant. var. *bigarardia*	bitter or Seville orange
C. medica	citron
C. med. var. *limonum*	lemon
C. med. var. *acida*	lime
C. med. var. *limetta*	sweet lime
C. bergamia	bergamot
C. decumana	grape fruit or shaddock
C. suntara	kumquat
C. nobilis	mandarin

citryl. Lemon oil.

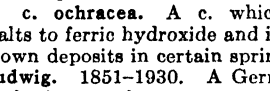
civet. A semi-liquid fat of strong musklike odor obtained from the civet cat, *Viverra civetta*, of the East Indies. It contains an essential oil and ammonia. Formerly used medicinally as an antispasmodic; now used as a perfume.

civetane. $C_{17}H_{32}$ = 236.2. Cycloheptadecene,



A colorless crystalline substance, m.47, b.120.

civetone. $C_{17}H_{30}O$ = 250.3. Δ^9-cycloheptadecenone, 9-cycloheptadecen-1-one*. The seventeen-membered ring ketone:



It is extracted from certain glands of the civet cat.

C.K. wax. See *wax*.

Cl. The symbol for chlorine, Cl^- chloride ion, Cl^* excited chlorine atom, Cl_2 chlorine molecule, Cl_2^+ ionized chlorine molecule, Cl_2^* excited chlorine molecule.

cl. An abbreviation for centiliter = $\frac{1}{100}$ liter = 10 cc.

cladding. A thin veneer of metal (usually nickel) used to protect steel plate from corrosion.

cladonic acid. An acid obtained from *Cladonia rangiferina*, a lichen (reindeer moss).

cladothrix. A quasi-branched form of schizomycetes. **c. ochracea.** A c. which oxidizes ferrous salts to ferric hydroxide and is the cause of the brown deposits in certain springs.

Claisen, Ludwig. 1851–1930. A German chemist, noted for work on tautomerism. **C. condensation.** Claisen reaction. **C. flask.** A distillation flask with a U-shaped and tubulated neck. **C. reaction.** A synthetic reaction of an aldehyde with an aldehyde or ketone in the presence of NaOH or NaOEt, according to the general equation $R.CHO + CH_3.CO.R' = R.CH:CH.CO.R' + H_2O$.

clamp. A device by which an instrument is held in position or by which the flow of a gas or liquid is interrupted.

Clapeyron Benoit-Paul Emile. 1799–1864. A French engineer. **C. equation.** An equation for calculating the change in the boiling point of a liquid at different pressures: $dp/dT = \lambda/T(v_2 - v_1)$ where p = pressure, T = absolute temperature, λ = heat of vaporizing 1 gm. of liquid, v_2 = specific volume of vapor, v_1 = specific volume of liquid. Cf. *Clausius equation*.

clarain. A constituent of coal (q.v.).

clarificant. A substance for clearing a solution.

clarification. A process by which a liquid is clarified, *e.g.*, filtration, sedimentation, precipitation with inert colloidal substances, etc. Cf. *defecation*.

Clark cell. A standard voltaic cell giving 1.433 volts at 15°C, but affected greatly by temperature changes. It consists of an anode of mercury and a cathode of amalgamated zinc in a saturated solution of zinc sulfate. **C. degree.** See *hardness* (water).

Clarke, Frank Wigglesworth. 1847–1931. An American chemist, noted for geochemical research.

Frank Wigglesworth Clarke.

Classen, Alexander. 1843– . A German chemist noted for analytical methods. **C. platinum dish.** A platinum dish for electrolytic separations. **C. switch board.** A switch board and work table for quantitative electrolysis.

classification of compounds. See *compounds, chemicals, organic compounds, Mulliken classification, ring systems, types.* **-of drugs.** See *drug.* **-of elements.** See *periodic system.* **-of reactions.** See *reactions.*

Claude, Georges. A French inventor, noted for liquefaction methods and neon lamps. **C.'s method.** A modification of the Linde process for liquefying air. The air is liquefied in stages by passage through an orifice under pressure, and the expanding gas cooled by doing work externally in a piston-engine. Cf. *nitrogen fixation.*

claudetite. A native arsenious oxide.

Claus, Adolf. 1840– . A German chemist noted for his benzene formula and system of organic chemistry.

Clausius, Rudolf Julius. 1822–1888. A German physicist, and founder of the mechanical theory of heat. **C. equation.** Clausius-Clapeyron equation. An equation for calculating the vapor pressure and the heat of vaporization: $\log P = -L/4.58T + C$ where P is the vapor pressure at the absolute temperature T, and L the molecular heat of vaporization, while C is a constant of integration. Its integrated form is

$$2.303 \log \frac{P}{760} = \frac{L}{R}\left(\frac{1}{T_{760}} - \frac{1}{T_p}\right)$$

where T_{760} and T_p are the boiling points at 760 and p mm. pressure respectively, R is 1.985 gm. cal. See also *Clapeyron equation.* **C. law.** The specific heat of a gas is independent of temperature, provided the gas is kept at constant volume. **C.-Mosotti equation.** The polarization of the dielectric per mole is related to the dielectric constant, D, by $\frac{D-1}{D+2} \cdot \frac{m}{d} = P$, where m is the molecular weight, d the density and P the molal polarization.

clausthalite. PbSe. A native lead selenide from Klausthal, Czechoslovakia.

clavacin. An antibiotic substance produced in cultures of several different fungi; it is identical with clavatin, claviformin, and patulin.

clavatin. Clavacin.

clavicepsin. $C_{18}H_{34}O_{16} = 506.26$. An inert glucoside, m.198, found in ergot.

claviformin. Clavacin.

clavine. $C_{11}H_{22}O_4N_2 = 246.18$. An alkaloid of ergot, m.263.

clay. A plastic, soft, variously colored earth, a hydrous silicate of alumina ($H_4Al_2Si_2O_9$) formed by the decomposition of feldspar and other aluminum minerals. In true clay 30 % of the total weight of solid particles consists of particles of diameter less than 0.002 mm. Used for pottery, filter candles, etc. Cf. *ceramics.* **China-** See *china clay.* **fire-** q.v. **pipe-** q.v. **potters'-** q.v. **c. ironstone.** Siderite.

cleaning solution. Mixed concentrated sulfuric acid and sodium dichromate, used to clean chemical glassware.

clearing. (1) The clarification of a solution. (2) In the dye industry, to free the cotton fiber from grease by boiling in a weak solution of sodium carbonate. (3) In photography, the removal of fog from a plate.

cleavage. (1) The separation of layers or parts from a mass, *e.g.*, the splitting of crystals in certain directions. (2) In biology: segmentation. Cf. *amitosis.*

clebrium. A non-corrosive alloy of iron with 13–19 % Cr, 2–4 % Ni, 3.2–0 % Mo, 0–2 % C, 0.8–2.8 % Mn.

clematidin. $C_9H_{10}O_6 = 214.08$. A compound derived from *Aristolochia clematitis*, birthwort, an Aristolochiaceae.

clematine. An alkaloid from *Clematis vitalba*, a Ranunculaceae.

Clematis. A genus of climbing, ranunculaceous plants.

Clerget inversion. The determination of sucrose polarimetrically after inversion of 100 cc. of solution with 5 cc. of strong HCl at 69° for 7½ mins. Sucrose $= \frac{100(a-b)}{142.66 - t/2}$ where a and b are the polarisations originally and after inversion at t°C.

Clerici solution. A molar mixture of thallium malonate and thallium formate, d.4.27; used in mineralogy to float specimens for determining their density.

Cleve, Per T. 1840–1905. A Swedish chemist noted as co-discoverer of helium and rare earth metals. **C.'s acid.** *1*-Naphthylamine-6-sulfonic acid.

Cleveland tester. An apparatus for determining the flash point of illuminating oil.

climacteric. A stage in the ripening of fruit.

clinical analysis. The examination of body fluids and waste products for diagnostic purposes. **c. tests.** The reactions employed in the

examination of urine, feces, stomach contents, blood, etc., for diagnostic purposes.

clinker. Hard, more or less vitrified fused residue remaining after combustion of coal in a furnace or kiln. It is also a product of volcanoes and is used in the manufacture of cement. Cf. *slag.*

clinochlore. Ripidolite. A green chlorite or aluminum magnesium silicate, d.2.65–2.78.

clinometer. A device for measuring slopes or inclines.

clinostat. A moving disk apparatus for determining the phototropism of a plant.

clorarsen. Dichlorophenarsine hydrochloride (q.v.).

closed chain. A ring compound: see *chain.*

clot. A solid concretion of a soft jelly-like mass.

cloth. Any fabric woven of wool, cotton, linen, silk or other fiber. **cheese-** A loosely woven thin cotton cloth used for straining. **filter-** A stout linen cloth or canvas used in filter presses.

clotting. The coagulation of blood, lymph, or milk.

cloud point. The temperature at which a solid substance starts to precipitate from solution in an oil when this is cooled under standard conditions. Cf. *aniline point.*

cloudy. (1) Containing a diffused and adhering precipitate. (2) Describing a bacterial culture which does not contain pseudozoogleae.

clove(s). Caryophyllus. The dried flower buds of *Caryophyllus aromaticus*, a Myrtaceae; used as spice. **c. oil.** Essential oil of cloves. A colorless or slightly yellow, volatile liquid, d.1.079, b.243, which consists of eugenol and several hydrocarbons.

clovene. $C_{15}H_{24}$ = 204.19. A terpene from clove oil. A colorless liquid, d.0.93, b.263.

cloves. Caryophyllum.

clupanodonic acid. $C_{22}H_{34}O_2$ = 330.27. Docosa-*4,7,11*-trien-*18*-ynoic acid. An unsaturated fatty acid in the fat of fish blubber. A yellow oil, d.0.9410, m. −78, b_{5mm}.236, soluble in ether; iodine number 367.7.

clupein. A protein from herring, *Clupea harengus*, and containing 47.93 % C, 7.59 % H, 12.78 % O, 31.68 % N.

clymocol. A brand of mono-chloromethyl-*i*-propyl phenol; used as a germicide.

cm. centimeter. **cm.²** square centimeter. **cm.³** cubic centimeter = cc.

cnicin. $C_{42}H_{56}O_{15}$ = 800.5. A glucoside from Canada thistle, *Cnicus arvenis*, or *Carduus benedicta*, a Compositae. White, odorless crystals, sparingly soluble in cold water, soluble in hot water.

Co The symbol for cobalt.

coacervation. The reversible collection of emulsoid particles into liquid droplets preceding flocculation.

coagel. The gel formed during coagulation; coarser in texture than the gels formed by swelling of solid colloids.

coagulability. The capacity to clot together or curdle.

coagulase. An enzyme (q.v.) that curdles and precipitates proteins.

coagulation. The precipitation of proteins or colloids in a jelly-like, soft mass; it may be caused either by heat, chemical agents or enzymes.

coagulator. An incubator for keeping test-tubes at blood temperature.

coagulen. A lipoid obtained by fractionally centrifuging blood, and said to consist mainly of blood platelets. A brownish red powder, soluble in water, and rich in thrombokinase. Used in surgery to stop bleeding by coagulating the blood.

coagulometer. A device for determining the speed of coagulation of blood.

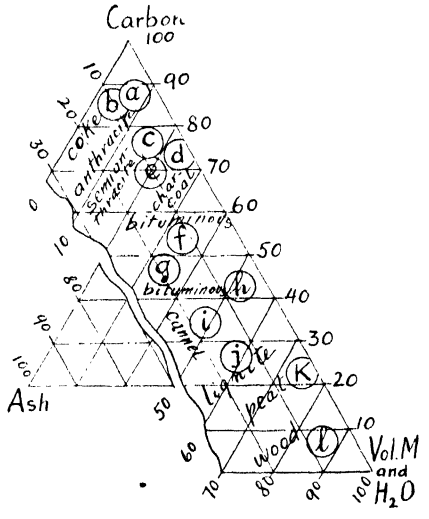
coal. A native, black or brownish, brittle or soft substance consisting chiefly of carbon, but also of hydrogen, nitrogen, oxygen and other elements (Si, P, As, Fe, etc.). It is the result of the degradation of ancient forests. Coals are classified according to their state of mineralization, and consequent percentage of carbon, as *lignites*, *bituminous coal*, and *anthracites*. According to Stopes, c. is classified microscopically as:

1. *clarain*, a mixture of leaves, wood, resinous bodies, etc. in a structureless matrix. It is lustrous in appearance.

2. *vitrain*. Lustrous thin bands which break with conchoidal fracture and are derived from wood in which the structure is completely destroyed.

3. *durain*, a dull variety of coal, which contains the exines, microspores and megaspheres, and has a high ash.

4. *fusain*, thin bands of soft dull coal derived from wood and containing no volatile matter, but having a marked structure



Coal.
Three component system (Carbon-volatile matter-ash)

Coals are classified by their carbon content, moisture and volatile matter, and mineral or ash content. Coals richest in carbon are the anthracites and cokes, typical compositions of which are shown in area a and b.

a. anthracite	13,350 B.t.u. per pound
b. coke	12,000 B.t.u. per pound
c. semianthracite	13,370 B.t.u. per pound
d. charcoal	13,000 B.t.u. per pound
e. bituminous A	14,260 B.t.u. per pound
f. bituminous B	13,900 B.t.u. per pound
g. bituminous C	11,700 B.t.u. per pound
h. bituminous D	9,700 B.t.u. per pound
i. cannel	13,700 B.t.u. per pound
j. lignite	6,000 B.t.u. per pound
k. peat	1,900 B.t.u. per pound
l. wood	7,600 B.t.u. per pound

The world output in 1940 was 1,420,000 tons, coming chiefly from Germany > U. S. > U. K. > U. S. S. R.

brown- Lignite. **cannel-** A compact, hard coal, suitable for gas production. **char-** See *charcoal*. **hard-** Anthracite. **mother of-** Fusain. **soft-** Bituminous c. **white-** Water power.

c. brass. Marcasite **c. gas.** The gaseous product of the distillation of coal. The average composition is:

hydrogen	43–55 %	Non-illuminating but heating
methane	25–45 %	
carbon monoxide	4–11 %	
olefines, acetylenes and benzene	2– 5 %	Illuminants
nitrogen	2–12 %	Impurities
carbon dioxide	0– 3 %	
oxygen	0.–1.5 %	

c. oil. (1) Kerosene. (2) Petroleum. **c. tar.** The condensed liquid from the distillation of coal. It varies according to the coal and process employed:

1. hydrocarbons—benzene, toluene, xylene, naphthalene, anthracene.
2. phenols—phenol, cresol.
3. basic substances—pyridine, quinoline.
4. finely-divided, free carbon.

coarse metal. An impure, fusible silicate of iron produced in the reverberatory furnace.

coating. A method for covering materials with protecting substances; as, electroplating, varnishing, painting, waterproofing, fireproofing, etc.

coazervate. The coagulated or precipitated liquid which separates from an emulsion.

coazervation. The separation of a lyophylic colloidal system into two liquid phases. Cf. *coagulation*.

cobalt. Co = 58.94. An element of the iron group, atomic number 27, discovered in 1733 by G. Brandt. A steel-gray, slightly pinkish, ductile metal, d.8.718, m.1465, insoluble in water, dissolved by acids. It occurs as metal in meteorites, as sulfide and arsenide in smaltite and cobaltite. It is prepared by reduction of its oxides in a current of hydrogen. Cobalt is bi- and tri-valent and forms two series of compounds:

2: cobaltous	Co^{++}
3: cobaltic	Co^{+++}

It forms many double salts, all colored. Some of its complex ions are:

cobaltous hexahydrate	$Co(H_2O)_6^{++}$
cobaltous hexammonate	$Co(NH_3)_6^{++}$
cobaltous hexacyanide (cobaltocyanide)	$Co(CN)_6^{----}$
cobaltic hexahydrate	$Co(H_2O)_6^{+++}$
cobaltic hexammonate	$Co(NH_3)_6^{+++}$
cobaltic tetracyanide	$Co(CN)_4^-$
cobaltic hexanitrite	$Co(NO_2)_6^{---}$
cobaltic hexacyanide (cobalticyanide)	$Co(CN)_6^{---}$

The cobaltous compounds are the more stable, and are pink when hydrated, and greenish when anhydrous. Metallic cobalt is used in alloys; (*e.g.*, carboloy, stellite) and in ceramics. **black-** An earthy variety of native c. **earthy-** Asbolite. **red-** Erythrite. **speiss-** An impure smaltite.

c. acetate. Cobaltous acetate. **c. acetylide.** The compound C_2Co. **c. aluminate.** Thenard's blue. **c. bloom.** The mineral $Co_3(AsO_4)_2$, $8H_2O$. **c. blue.** A dark blue mineral pigment containing 35 % CoO, 20 % ZnO and 25 % SiO_2. **c. carbonyl.** C. tetracarbonyl. **c. chlorides.** See *cobaltichloride*, *cobaltic* and *cobaltous chloride*. **c. cyanide.** Cobalticyanide. **c. green.** Cobalt zincate, Rinman's green. A solid solution of cobaltous oxide and zinc oxide used as green pigment. **c. minerals.** Cobalt is usually associated with nickel and found as sulfide, or arsenide.

native cobalt	Co
jaipurite	CoS
linnaeite	Co_3S_4
smaltite	$CoAs_2$
safflorite	$CoAs_2$
skutterudite	$CoAs_3$
erythrite	$Co_3As_2O_8$
cobaltite	CoAsS
carrollite	Co_2CuS_4
bieberite	$CoSO_4.7H_2O$
asbolite	$CoCl(OH)_2$
spherocobaltite	$CoCO_3$

c. nitride. Co_3N = 132.0. A black crystalline substance. **c. nitrites.** Cobaltinitrite. **c. oxides.** CoO = cobaltous oxide, Co_2O_3 = cobaltic oxide, Co_3O_4 = cobalto-cobaltic oxide. The cobalt oxide used in ceramics and the glass industry as a blue pigment for enamels, vases, porcelain, etc.; is variable in composition. **c. phosphide.** Co_2P = 149.0. A black, metallic substance. **c. sulfates.** See *cobaltic sulfate* and *cobaltous sulfate*. **c. tetracarbonyl.** $Co(CO)_4$ = 171.0. C. carbonyl. Black crystals, $d_{18°}$.1.827, m.43, b.135 (decomp.), insoluble in water, soluble in alcohol, ether or carbon disulfide. **c. yellow.** Cobaltic potassium nitrite. **c. zincate.** C. green.

cobaltammine compounds. Ammonate. A group of compounds of ammonia and cobalt containing the ammonia molecules in combination. Luteocobaltichloride $[Co(NH_3)_6]Cl_3$, purpureo-cobalt chloride $[Co(NH_3)_5Cl]Cl_2$, rosco-cobaltichloride $[Co(NH_3)_5H_2O]Cl_3$. See *cobaltichloride*.

cobaltic. Containing trivalent cobalt ≡ Co. **c. chloride.** $CoCl_3$ = 165.4. Blue crystals, d.-2.94, decomp. on heating, soluble in water. See *cobaltichloride*. **c. hydroxide.** $Co(OH)_3$ = 110.0. A black powder, insoluble in water, soluble in acids. **c. oxide.** Co_2O_3 = 166.0. Cobalt sesquioxide, a brownish-black powder, d.5.18, decomp. at red heat, is insoluble in water, soluble in acids. **c. potassium cyanide.** Potassium cobalticyanide. **c. potassium nitrite.** $K_3Co(NO_2)_6.xH_2O$. Potassium cobaltinitrite, cobalt yellow, or potassium cobaltic hexanitrite. A yellow crystalline precipitate obtained by adding potassium nitrite to cobaltic nitrate acidified with acetic acid. **c. sulfate.** $Co_2(SO_4)_3$ = 406.2. A blue crystalline powder, decomp. in water, soluble in dilute sulfuric acid. **c. sulfide.** Co_2S_3 = 214.0. A black powder, insoluble in water.

cobaltichloride.

luteo- $\begin{bmatrix} NH_3. & .NH_3 \\ NH_3. & Co & .NH_3 \\ NH_3. & .NH_3 \end{bmatrix} Cl_3$. **Hexammine** cobaltichloride. Orange-yellow crystals, soluble in water. Reagent for pyrophosphoric acid.

praseo- $\begin{bmatrix} NH_3. & .NH_3 \\ NH_3. & Co & .NH_3 \end{bmatrix} Cl_3$. **Tetrammine** cobaltichloride. Green crystals, soluble in water.

purpureo- $\begin{bmatrix} NH_3. & & .Cl \\ NH_3. & Co & .NH_3 \\ NH_3. & & .NH_3 \end{bmatrix} Cl_2$. Chloropentammine cobaltichloride. Purple crystals, soluble in water.

roseo- $\begin{bmatrix} NH_3. & & .H_2O \\ NH_3. & Co & .NH_3 \\ NH_3. & & .NH_3 \end{bmatrix} Cl_3$. Aquapentammine cobaltichloride. Small red crystals, readily decomp. by and soluble in water.

cobalticyanic acid. $H_3Co(CN)_6 = 216.1$. Colorless needles, decomp. above 100, very soluble in water or alcohol.

cobalticyanide. The salts of cobalticyanic acid which contain the trivalent ion $Co(CN)_6^{---}$. This imparts a yellow color to the aqueous solution. *E.g.*, potassium cobalticyanide.

cobaltinitrite. The salts containing the trivalent complex ion $Co(NO_2)_6^{---}$, imparting a yellow color to the aqueous solution. *E.g.*, potassium cobaltinitrite.

cobaltite. The mineral (CoFe)SAs.

cobalto cobaltic oxide. $Co_3O_4 = 240.9$. Black, regular crystals, d.5.8–6.3, insoluble in water, soluble in acids.

cobalto sulfate. A salt containing the divalent $Co(SO_4)_2^{--}$ ion which imparts a red color to the aqueous solution, *e.g.*, potassium cobalto sulfate, $K_2Co(SO_4)_2$.

cobaltous. Containing divalent cobalt, Co^{++}. **c. acetate.** $Co(C_2H_3O_2)_2.4H_2O = 249.1$. Purple crystals, $d_{18°}$.1.7043, soluble in water or alcohol; used in invisible inks. **c. ammonium sulfate.** $Co(SO_4)_2(NH_4)_2SO_4.6H_2O = 491.29$. Red crystals, soluble in water. **c. arsenate.** $Co_3(AsO_4)_2.8H_2O = 599.1$. Erythrite, cobalt bloom. Purple or reddish, monoclinic crystals. d.2.948, insoluble in water, soluble in acids. Used as a light blue pigment for porcelain and glass. **c. benzoate.** $Co(C_6H_5COO)_2.4H_2O = 373.08$. Grayish-red leaflets, dehydrated at 115, soluble in water. **c. bromate.** $Co(BrO_3)_2.6H_2O = 423.0$. A red crystalline substance, is soluble in water. **c. bromide.** $CoBr_2.6H_2O = 326.9$. Red hygroscopic crystals, soluble in water or alcohol; used for filling hygrometers. **c. butyrate.** $Co(C_4H_7O_2)_2 = 233.2$. A purplish-red, granular powder, soluble in water. **c. carbonate.** $CoCO_3 = 119.0$. A rhombohedric, rose-colored, light powder, d.4.13, decomp. on heating, insoluble in water, soluble in acids. Used for the preparation of cobalt, oxides and cobalt pigments. **c. chlorate.** $Co(ClO_3)_2.6H_2O = 334.0$. Purple, regular crystals, d.1.84, m.50, decomp. 100, very soluble in water or alcohol. **c. chloride.** $CoCl_2 = 129.9$. Blue crystals, d.2.94, sublime on heating; very soluble in water or alcohol. It crystallizes also as: hexahydrate, $CoCl_2.6H_2O$; tetrammonate, $CoCl_2.4NH_3$; pentammonate, $CoCl_2.5NH_3$. (cryst.) $CoCl_2.6H_2O = 238.0$. Ruby-red, monoclinic crystals, d.184, m.87, anhydrous at 110°C, very soluble in water or alcohol. Used in hygrometers, invisible inks, chemical barometers, and electroplating. **c. chromate.** $CoCrO_4 = 174.9$. A brown powder containing some cobaltous hydroxide, insoluble in water, soluble in dilute chromic acid. **c. citrate.** $Co_3(C_6H_5O_7)_2 = 555.2$. A pink amorphous powder, sparingly soluble in water. **c. cyanide.** $Co(CN)_2$, and $Co(CN)_2.3H_2O = 165.1$. A pinkish-gray or red powder, anhydrous at 250°C, decomp. 300, insoluble in water, soluble in potassium cyanide solution. **c. fluosilicate.** $CoSiF_6.6H_2O = 309.09$. Trigonal pink crystals, d.2.067, soluble in hot water. **c. formate.** $Co(OOCH)_2 = 149.0$. Red crystals, d.2.129, soluble in water. **c. hydroxide.** $Co(OH)_2 = 93.0$. Rose-red, rhombic or monoclinic crystals or powder, $d_{18°}$.3.597, insoluble in water, soluble in acids or ammonium salt solutions. **c. iodide.** $CoI_2.6H_2O = 420.83$. Brownish-red crystals, soluble in water or alcohol. Used similarly to c. bromide and chloride. **c. linoleate.** $Co(C_{18}H_{31}O_2)_2 = 617.42$. Brown amorphous powder, insoluble in water. **c. nickelous sulfate.** $NiSO_4.CoSO_4 = 309.72$. A double salt of cobaltous and nickelous sulfates. **c. nitrate.** $Co(NO_3)_2.6H_2O = 291.1$. Red monoclinic crystals, $d_{14°}$.1.83, m.56, decomp. at red heat, very soluble in water or alcohol. It is an antidote for cyanide poisoning; used for the preparation of cobalt pigments or secret ink, and as a reagent in blow-pipe analysis. **c. oleate.** $Co(C_{17}H_{33}COO)_2 = 621.4$. Brown, soft masses, insoluble in water, soluble in oils. **c. oxalate.** $Co(OOC)_2.H_2O = 165.0$. A pale-pinkish powder, d.2.325, insoluble in water. **c. oxide** $CoO = 75.0$. A brown powder, d.5.68, decomp. 2850, insoluble in water or alcohol, soluble in acids or ammonium hydroxide. **c. phosphate.** $Co_3(PO_4)_2.2H_2O = 403.3$. A red powder, insoluble in water, soluble in phosphoric acid; used for cobalt pigments, in the ceramics and glass industry for light-blue, metallic colors. **c. propionate.** $Co(C_3H_5O_2)_2.3H_2O = 259.06$. Dark red crystals, m.*ca.*250, soluble in water. **c. silicate.** $Co_2SiO_4 = 209.8$. Purple crystals, d.4.63, insoluble in water, decomp. by hydrochloric acid. **c. sulfate.** $CoSO_4.7H_2O = 281.2$. Rose vitriol. Cf. *bieberite*. Red, rhombic crystals, $d_{15°}$.1.918, m.96.8, anhydrous at 450, soluble in water, or alcohol. Used technically in the preparation of cobalt salts and cobalt oxides for ceramic pigments, and in galvanostegy for cobalting metals. **c. stannate.** $CoSnO_3$. A blue pigment. Cf. *ceruleum*. **c. sulfide.** $CoS = 91.0$. A brown powder, $d_{18°}$.5.45, m.1100, insoluble in water, soluble in acids. **c. tartrate.** $Co(C_4H_6O_6) = 212.0$. A pink powder, very sparingly soluble in water.

cobefrin. $C_9H_{13}NO_3 = 183.1$. *3.4*-Dihydroxyaminopropanol benzene, corbasil. $(OH)_2C_6H_3.CHOH.CHMe.NH_2$. White crystals, used as vasoconstrictor, q.v.

cobra. A poisonous snake of India, *Najatripudians*, whose venom contains ophiotoxin and copralysin. **c. lecithid.** A hemolytic compound of lecithin and cobra toxin formed in the blood.

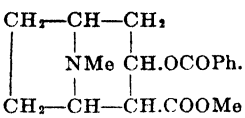
cobralysin. The hemolytic substance of cobra venom.

cobric acid. A white micro-crystalline powder obtained from cobra venom, and containing calcium sulfate.

coca. Erythroxylum. The dried leaves of the S. American shrub *Erythroxylum coca;* used to prepare a stimulant, and as a source of cocaine. **c. alkaloids.** A group of related alkaloids; as

cocaine	$C_{17}H_{21}NO_4$
cocainidine	$C_{18}H_{23}NO_4$
tropacocaine	$C_{15}H_{19}NO_2$
hygrine	$C_8H_{15}NO$
nirvanine	$C_{14}H_{20}N_2O_4$
cuscohygrine	$C_{18}H_{24}N_2O$
ecgonine	$C_9H_{15}NO_3$

cocaine. $C_{17}H_{21}O_4N$ = 303.26. Erythroxyline, methylbenzoylecgonine.



An alkaloid from the leaves of *Erythroxylum coca*. White monoclinic scales, m.98, slightly soluble in water, soluble in alcohol or ether. It is a local anesthetic and cerebrospinal stimulant; used chiefly as the hydrochloride. Cf. *cocethyline, novocaine, tutocaine, psicaine.* **isatropyl-** See *isatropylcocaine.* **methyl-** Cocainidine. **tropa-.** See *tropacocaine.*

c. benzoate. $C_{17}H_{21}O_4N.C_7H_6O_2$. White, soft, crystalline mass, soluble in water or alcohol. **c. bitartrate, d-ψ-** Psicaine. **c. borate.** A white, crystalline powder, soluble in alcohol; used for eye washes and hypodermically. **c. chloride.** C. hydrochloride. **c. citrate.** $(C_{17}H_{21}O_4N)_2.C_6H_8O_7$ = 798.58. White crystals, soluble in water; used in dentistry as an anesthetic. **c. hydrobromide.** $C_{17}H_{21}O_4N.HBr$ = 384.19. White crystals, soluble in water. **c. hydrochloride.** $C_{17}H_{21}O_4N.HCl$ = 339.73. Colorless prisms or scales, m.186, slightly soluble in water, soluble in alcohol, insoluble in ether or chloroform; used medicinally as local and general anesthetic, stimulant, anodyne, antipruritic, and sedative. **c. hydroiodide.** $C_{17}H_{21}O_4N.HI$ = 431.19. Yellow crystals, sparingly soluble in water or alcohol. **c. lactate.** $C_{17}H_{21}O_4N.C_3H_6O_3$ = 393.31. A soft, syrupy mass, soluble in water or alcohol; used as an anesthetic, sedative and antiseptic. **c. nitrate.** $C_{17}H_{21}O_4N.HNO_3$ = 366.28. White crystals, soluble in water. **c. oleate.** A solution of cocaine in oleic acid, used externally. **c. salicylate.** $C_{17}H_{21}O_4N.C_7H_6O_3$ = 441.31. Colorless crystals, soluble in water or alcohol. **c. sulfate.** $C_{17}H_{21}O_4N.H_2SO_4$ = 401.35. A granular, white, crystalline powder, soluble in water or alcohol. **c. tannate.** $C_{17}H_{21}O_4N.C_{14}H_{10}O_9$ = 625.4. A white, amorphous powder, soluble in alcohol. **c. tartrate.** $(C_{17}H_{21}O_4N)_2.C_4H_6O_6$ = 756.57. Colorless crystals, soluble in water or alcohol.

cocainidine. $C_{18}H_{23}O_4N$ = 317.3. Methylcocaine. An alkaloid from coca leaves, similar to cocaine.

cocatannic acid. $C_{17}H_{22}O_{10}.2H_2O$(?). A tannic acid from the leaves of *Erythroxylum coca;* yellow micro-crystals.

Coccaceae. A family of spherical schizomycetes (bacteria), which includes coccus, diplococcus, staphylococcus and streptococcus.

coccalinic acid. Menispermic acid.

cocceric acid. $C_{32}H_{64}O_3$ = 496.49. The monobasic, fatty acid, $C_{31}H_{63}(OH)COOH$, derived from cochineal wax. White crystalline mass, m.92.5.

coccerin. $C_{30}H_{60}(C_{31}H_{61}O_3)_2$ = 1382.11. A wax derived from cochineal; soluble in benzene.

cocceryl. The divalent $C_{30}H_{60}$= radical derived from c. alcohol. **c. alcohol.** $C_{30}H_{62}O_2$ = 454.6. A dibasic alcohol from cochineal wax; white crystals, m.101–104.

coccerylic acid. Cocceric acid.

cocci. The plural of coccus.

Coccidium. A genus of sporozoa.

coccinellin. Carmine.

coccinic acid. $C_9H_8O_5$ = 196.06. Hydroxymethylphthalic acid, $HO.C_6H_2Me(COOH)_2$. An acid derived from euxanthic acid. Cf. *cocinic acid.*

coccognic acid. Coccognidic acid. An acid substance from *Daphne gnidium*, a Thymelaeaceae.

coccognidic acid. Coccognic acid.

coccognin. A glucoside from the fruits of *Daphne gnidium*, a Thymelaceae.

coccolith. The minute calcareous skeleton of floating marine algae.

coccon. The seeds of the pomegranate.

cocculin. $C_{19}H_{26}O_{10}$ = 414.3. A crystalline constituent of *Cocculus indicus*, fishberry; it is a narcotic. Cf. *kukoline.*

cocculus. The fruit of menispermaceous plants. **c. indicus.** Fishberry, Indian berry, Oriental berry, Levant berry. The dried fruit of *Anamirta paniculata*, a Menispermaceae and climbing shrub of the East Indies; used as a destroyer of vermin and lice. See *cocculin, anamirtin, picrotoxin, kukoline.*

coccus. (1) A round or spherical bacterium. (2) A species of insects of the family Coccidae, scale insects, that yield cochineal, Chinese wax, kermes, lac, manna.

cocethyline. $C_{18}H_{23}O_4N$ = 317.5. Ethylbenzoylecgonine. A homolog of cocaine. Colorless crystals, m.109, soluble in alcohol or ether. Used as local anesthetic and cocaine substitute.

cochineal. The dried, female insect, *Coccus cacti*, which is reared on several species of cactus (*Opuntia*) and exported from tropical America. Its chief constituent is carmine, and it is used for coloring pharmaceutical preparations, and as an indicator. **c. solution.** A test solution and indicator prepared by macerating 3 gm. of unbroken cochineal for four days in 250 cc. of a mixture of 1 pt. alcohol and 3 pts. water. Used as an indicator in determining alkali carbonates, alkaloids, and inorganic acids, but is useless for organic acids (alkalis = violet; acids = yellowish-red). **c. wax.** Coccerin.

cochinilin. Carminic acid.

cochlear, cochleare. A spoon. It is used, sometimes, as a pharmaceutical measurement: cochlear magnum (tablespoon) = 15 cc. = ½ fluid ounce; cochlear medium (dessertspoon) = 8 cc. = 2 fluid drachms; cochlear parvum (teaspoon) = 4 cc. = 1 fluid drachm.

Cochlearia. (1) A genus of cruciferous plants. (2) Scurvy-grass. The dried herb of *C. officinalis;* used as a stimulant, diuretic and antiscorbutic in form of a fluid extract. (3) *C. armoracia*, horse radish (q.v.).

cochrome. An alloy of Co and Cr, analogous to nichrome (q.v.).

cocinic acid. $C_{11}H_{22}O_2$ = 186.17. A fatty acid from cocoanut oil, (cf. *coccinic acid, umbellulic acid, undecylic acid*).

cocinin. An ester of cocinic acid; the chief constituent of cocoanut oil.

cocinone. $C_{21}H_{42}O$ = 310.0. A derivative of cocinin.

coclaurine. An alkaloid from the leaves and bark of *Cocculus laurifolius*, a Menispermaceae.

cocoa. Cacao, (q.v.). Cf. *coca, coconut.* (1) C. tree. The shrub *Theobroma cacao*, a Sterculiaceae of the tropics. (2) C. seeds. (3) A brownish-red powder consisting of the finely ground residue of the seeds of *Theobroma cacao*, after expression of their fat. (4) The beverage made from (3). (5) Cf. *coca, coconut.* **c. butter.** Cacao butter, oleum theobromatis, theobroma

oil. A yellow or brownish fat obtained by compression of cacao seeds between hot or cold plates, d.0.976–0.995, sapon. val. 192–200, iodine val. 32–37.7, m.30–35°C, soluble in ether or chloroform. **c. nut.** (1) Cocoa. (2) Coconut. Cf. *coca*. **c. nut oil.** See *coconut oil*. **c. oil.** Cocoa butter. **c. red.** $C_{17}H_{12}(OH)_{10}$. The pigment of c., 2.5–5 % of which is formed during the drying of the white beans by enzyme action. **c. seeds.** Cacao. The dried and fermented seeds of the cocoa tree, *Theobroma cacao*, of tropical and South America; used to make a beverage. Chemical composition (approximate):

Fat (cocoa butter)	50.0 %
Albumin	18.0 %
Starch	10.0 %
Gum	8.0 %
Water	6.0 %
Salts (ash)	3.6 %
Coloring matter	2.6 %
Alkaloids (theobromine)	1.5 %

c. shell meal. The ground husks of c. seeds; used as fertilizer. They contain 2.5 % N, 1 % P_2O_5 and 2.5 % K_2O.

coconut. Cocoanut. The fruit of *Cocos nucifera*, a palm of the Pacific and Australian Islands and the East and West Indies. Cf. *copra, coir*. **c. butter.** Coconut oil. **c. cake.** The compressed material remaining after the expression of c. oil. **c. oil.** A fixed oil expressed from the fruit of *Cocos nucifera* or copra (dried cocoanut). Used in large quantities in the manufacture of margarine, food products and soap. A yellow oil, d.0.9259, m.14. Sapon. val. 246–268, iodine no. 8–9.5, acid val. 5–50.

cod. The cod fish, *Gadus morrhua*. **c. ichthulin.** A vitellin from cod eggs. **c. liver oil.** See *codliver oil*.

codamine. $C_{20}H_{25}O_4N$ = 343.20. An alkaloid of opium, isomeric with laudanine, m.121.

codeic acid. An acid derived from codeine.

codeine. $C_{18}H_{21}O_3N.H_2O$ = 317.28. Methylmorphine, morphine methyl-ether. A levorotatory alkaloid derived from opium, in which it occurs to the extent of 0.2–0.8 %. Colorless orthorhombic crystals, anhyd. 155, slightly soluble in water, soluble in alcohol or ether. Used as a mild narcotic instead of morphine. Cf. *codeinone, codethyline, dicodeine*. **c. citrate.** $(C_{18}H_{21}O_3N)_3C_6H_8O_7$ = 1089.84. Colorless crystals, soluble in water, or alcohol. **c. hydrobromide.** $C_{18}H_{21}O_3N.HBr.2H_2O$ = 434.24. Colorless crystals, soluble in water, used medicinally for whooping cough. **c. hydrochloride.** $C_{18}H_{21}O_3N.HCl.2H_2O$ = 371.77. White needles, anhydrous at 164, m.264; soluble in water. **c. methyl bromide.** Eucodeine. **c. phosphate.** $C_{18}H_{21}O_3N.H_3PO_4.2H_2O$ = 433.32. White crystals, anhydrous at 235, soluble in water, sparingly soluble in alcohol or ether; used hypodermically as a sedative. **c. salicylate.** $C_{18}H_{21}O_3N.C_7H_6O_3$ = 455.31. Colorless, crystalline powder, soluble in water or alcohol; used medicinally in rheumatic disorders. **c. sulfate.** $(C_{18}H_{21}O_3N)_2.H_2SO_4.5H_2O$ = 786.69. White rhombic crystals, decomp. 278, soluble in water, slightly soluble in alcohol or ether.

codeinone. $C_{18}H_{21}O_3N$. The quinone form of codeine. **dihydro- Dicodide. dihydrohydroxy-** Eucodal.

codethyline. $C_{19}H_{23}O_3N$ = 313.19. Morphine ethylate, ethyl-morphine. A derivative of morphine and homolog of codeine, m.93. **c. hydrochloride.** Dionine.

codliver oil. Oleum morrhuae, banks oil. A fixed oil from the liver of *Gadus morrhua*, a salt water fish. A colorless, pale-yellow, or brown oil, $d_{25°}$.0.915–0.925, soluble in alcohol. Its chief constituents are gaduin and olein, morrhuic acid, phosphorus, iodine, and sulfur compounds. It is an alterative, used as a nutritive in tuberculous diseases, convalesence, malnutrition, and malassimilation, as it contains several vitamins. See *gadose, jecolein, morrhuol, ptomaines*. **artificial-** An ergosterol or cholesterol that has been irradiated. Cf. *irradiation*. **c. o. emulsion.** An emulsion of codliver oil with various pharmaceutical ingredients which mask its unpleasant taste (peppermint oil and other essential oils), or make it more beneficial (phosphates, iron compounds, etc.).

codol. Retinol.

coefficient. A numerical factor by which the value of one quantity is multiplied to give the value of another; or to indicate its rate of range. **activitity-** q.v. **distribution-** q.v.

c. of absorption. See *absorption*. **c. of compressibility.** (A). The relative deviation of a gas from Boyle's Law (q.v.). Thus $p_1v_1/p_0v_0 = (1 - A)$ where p_1, p_0, v_1 and v_0 are two sets of measurements of p and v between 1 atmosphere and zero pressure. **c. of conductivity.** A number indicating the amount of heat or electricity that passes through a unit of thickness of substance in a unit of time, when the temperature- or potential-difference is 1°C or 1 volt, respectively. **c. of expansion.** A number indicating the expansion of a substance for a temperature increase of 1°C. Cf. *Charles' Law*.

coenzyme. A catalyst necessary for the activation of an enzyme. Cf. *coferment*.

cœr-. See *cer-*.

coferment. A substance which increases the activity of a ferment or enzyme, *e.g.*, calcium for thrombin. Cf. *coenzyme*.

coffee. The dried seeds of *Coffea arabica, C. liberica*, etc. (Rubiaceae) the coffee tree or shrub of Asia, Africa; Central or South America. Approximate chemical composition:

	Unroasted (green)	*Roasted* (brown)
Fat	13.27 %	14.48 %
Water	11.23 %	1.15 %
Albuminoids	12.07 %	13.98 %
Sugar	8.55 %	0.66 %
Fiber	3.92 %	4.75 %
Caffein	1.21 %	1.28 %

World production in 1940 was 2,320,000 tons, coming from Brazil > Colombia > Venezuela > Central America and East Indies.

coffeic acid. Caffeic acid.

coffeine. Caffeine.

cognac. A high grade of brandy. **c. essence.** (1) Ethyl nonylate or (2) ethyl chloride, used to imitate the c. flavor. **c. oil.** (1) A brandy adulterant which consists of cocoanut oil, alcohol and sulphuric acid. (2) The essential oil of cognac, containing the esters of caprinic and caprilic acids. (3) Ethyl oenanthate, used as flavoring agent.

Cohen, Ernst Julius. 1869– . A Dutch chemist noted for research in physical chemistry. **C., Julius B.** 1859–1935. A British chemist, noted for his work on optical activity and the laws of aromatic chemistry.

cohere. To hold together; as, molecules of the same type. Cf. *adhere, van der Waals forces.*

coherer. An electrical resistance tube filled with a granulated conductor by which electro-magnetic waves are detected (*e.g.*, in wireless telegraphy), owing to the change in resistance produced by varying coherence of the particles produced.

cohesion. The attractive force between the same kind of molecules, that is, the force which holds the molecules of a substance together. Cf. *adhesion.*

cohesive. Sticking together.

cohoba. A snuff used by the ancient natives of Haiti.

cohobation. Repeated distillations in which the distillate is returned each time to the residue in the distillation vessel. It was believed formerly to result in a higher degree of purity.

cohosh. An Indian (Algonkian) name for various medicinal plants; *e.g.* **black-** *Cimicifuga racemosa.* **blue-** *Caulophyllum thalictroides,* **red-** *Actaea spicata.* **white-** *Actaea alba.*

cohydrol. A colloidal solution of graphite. Cf. *aquadag.*

coil. A loop, or spiral made of wire, tubing, glass or other material. **induction-** A transformer for inducing an electric current, consisting of a coarse wire coil (primary coil) wound around an iron core and surrounded by a long insulated coil of fine wire in which the induced current is produced. **primary-** The inner wire coil of an induction apparatus to which the potential is initially applied. **resistance-** A series of wire coils of known electrical resistance, used to diminish the strength of a galvanic current or for testing the resistance of an object by comparison (bridge). **Ruhmkorff-** An induction apparatus, in which the secondary coil is of very fine and long wire, which is permanently mounted and connected with a condenser. **secondary-** The outer coil of an induction coil **Tesla-** An induction coil without the iron coil, used for Tesla discharges.

coinage gold. An alloy of 90 % gold and 10 % copper.

coinage silver. An alloy of 90 % silver and 10 % copper.

coir. The fibers of the coconut husk, made by retting the husks in sea water and crushing between rollers; used for cables and cordage.

coke. The carbonaceous residue (70–80 %) of coal after the volatile constituents have been distilled off. **native-** Carbonite. **c. oven.** A retort in which coal is heated and changed to coke. **c. oven gas.** The fuel and illuminating gas which distils from coal.

coking. Making coke by heating coal for about 12 hours. The reaction products from one ton of coal (Pittsburgh, U. S. A.) are:

coke	1500 pounds
gas	11,360 cubic feet
tar	12.4 gallons
benzene	4 gallons
ammonium sulfate	25 pounds

Cola. A genus of sterculiaceous plants; a source of caffeine. **c. nut.** Kola.

colamine. C_2H_7ON = 61.06. 2-aminoethanol, β-aminoethyl alcohol. $NH_2.CH_2.CH_2.OH$. A colorless liquid, d.1.022, b.171.

colatannin. $C_{16}H_{20}O_8$ = 340.15. Colatin. The tannin from cola nuts; crystals, m.148, soluble in alcohol or acetone.

colatein. A crystalline phenol derived from cola nuts.

colatin. Colatannin.

colatorium. A strainer or sieve.

colchiceine. $C_{21}H_{23}O_6N.H_2O$ = 403.19. A crystalline alkaloid derived from colchicum; said to be more active than colchicine. Yellow needles, m.172, sparingly soluble in water, soluble in alcohol, ether or chloroform.

colchicine. $C_{22}H_{25}O_6N$ = 399.3. An alkaloid from the seeds of *Colchicum autumnale,* meadow saffron. Yellow crystals or amorphous powder, m.135–150, soluble in water, alcohol, or chloroform. It is an antineuralgic, antirheumatic, and antiarthritic. **c. salicylate.** $C_{22}H_{25}O_6N.C_7H_6O_3$ = 537.26. Cholchisal. A yellow powder, soluble in water, alcohol or chloroform. **c. tannate.** $C_{22}H_{25}O_6N.C_{14}H_{10}O_9$ = 721.45. A yellow powder containing 38–40 % colchicine; soluble in alcohol.

Colchicum. (1) A genus of liliaceous plants. (2) The plant, *C. autumnale,* meadow saffron, autumn crocus, wild saffron, of Europe and North Africa; used as a specific for gout. **c. corm.** The root or bulb of *C. autumnale,* meadow saffron, which contains colchicine; used as a cathartic, emetic, and local stimulant. **c. flowers.** The dried blossoms of *C. autumnale.* **c. seeds.** The seeds of *C. autumnale.* It contains less colchicine than the corm.

colchinine. $C_{22}H_{15}O_6N$ = 389.12. An alkaloid, m.146.

colchisal. Colchicine salicylate.

colcothar. Prussian red, rouge. Caput mortuum, crocus martis. A red variety of ferric oxide obtained by heating ferrous sulfate in air; used as a styptic and tonic, as a polishing material for lenses, gems, etc., and as a pigment.

cold. Relatively low degree of heat; lacking warmth. **c. cream.** A white, scented ointment used as a cosmetic and consisting of wax, spermaceti, olive oil or other fat emulsified with rose-water or other liquid. **c. flow.** The behavior of an apparently solid substance (*e.g.*, pitch, rubber) as a viscous liquid, by virtue of which it has a very slow flowing motion. **c. storage.** See *refrigeration.*

Cole's test. A modification of the Benedict method for determining small quantities of sugar in urine.

colemanite. A native calcium borate, $Ca_2B_6O_{11}.5H_2O$.

Coleoptera. An order of insects which includes the bettles. Cf. *cantharis.*

colibacterin. A vaccine from Bacillus Coli.

colla. Glue. **c. animalis.** Gelatin. **c. glutinum.** Gluten. **c. piscium.** Ichthyol. **c. taurina.** Gelatin.

collagen. Ossein. A protein forming the chief constituent of connective tissue and the organic substance of bones. Contains 50.75 % C, 6.47 % H, 17.86 % N, and yields glue or gelatin on boiling with water.

collargol. (1) Colloidal silver and silver oxide formed by reduction and stabilized by egg albumen. (2) A water-soluble form of colloidal silver prepared by dialysis and evaporation of an alkaline solution of colloidal silver. It is

brownish-black in color, and contains 93 % Ag.

collateral. Side by side. Parallel. Supplementary.

collector. Flotation promoter. A substance used in flotation which increases the capacity of the air bubble to carry mineral particles; as, xanthates, dithiophosphates, creosotes.

colletin. A glucoside from *Colletia spinosa*, a Rhamnaceae of South America.

collidine. $C_8H_{11}N$ = 121.17. **alpha-** 4-ethyl-2-methylpyridine*. A colorless liquid, $d_{16°}$.0.927, b.179, soluble in water, alcohol, or ether; a constituent of coaltar. **beta-** 3-ethyl-4-methylpyridine*. A colorless liquid, $d_0°$.0.966, b.198, insoluble in water, soluble in alcohol. Obtained by the decomposition of cinchonine or from coaltar. **gamma-** 2.4.6-trimethylpyridine*. A colorless liquid d.0.947, b.172, sparingly soluble in water; obtained by destructive distillation of coaltar. **ethyl-** $C_{10}H_{15}N$. A derivative of collidine. **hydro-** A ptomaine from putrefying fish and animal tissues.

colligate. To connect or bind together.

colligative. Related or connected. **c. properties.** Properties which can be related to one another by a mathematical function. **c. p. of solutions.** Those properties which are affected proportionally by the introduction of a solute. If the solution is sufficiently dilute, the effect is independent of the chemical nature and depends solely upon the number of particles (molecules or ions) present. Colligative properties are:

	1 *Mol solute per liter solution causes*
Vapor pressure	lowering 0.5 mm.
Boiling point	raising 0.54°C.
Freezing point	lowering 1.85°C.
Osmotic pressure	22.4 atm.

collimator. A telescope lens or system of lenses with a slit at its focus for rendering parallel the rays entering an optical instrument.

collinsics. The relationship between molecular weight, M, density, D, and refractive index, μ, discovered by H. Collins: $M/\Sigma V_r = D$, and $(\mu - 1)(\Sigma V_r) = \Sigma R_0$ where ΣV_r is the sum of the relative volumes, and ΣR_0 the sum of the optical refractivities. Cf. *Lorentz-Lorenz equation.*

	V_r	R_0		V_r	R_0
Al	9.05	7.865	Mn	13.02	11.53
	12.05	4.863		11.53	13.02
As	19.58	17.75	N	3.8	3.8
B	3.865	3.865	Na	11.865	3.864
Be	4.62	3.733	O	2.51	1.346
C	8.0	3.333		4.45	1.747
Ca	14.54	10.52		7.53	1.654
	13.25	13.25	P	14.56	10.51
Cl	15.085	10.82	Pb	19.81	35.459
Cu	7.13	14.22		17.42	28.264
F	5.42	0.26	S	15.53	5.75
Fe	10.08	19.58	Si	13.02	11.53
	5.76	2.613		13.83	9.78
K	22.29	7.49		17.61	9.625
Mg	8.71	6.0015		18.91	10.461
	7.51	5.031	Zr	15.59	21.59

Thus, for KCl or sylvite, M = 39 + 35.5; D = 1.996 and μ = 1.49. Thus: 74.5 − (22.29 + 15.085) = 1.996; and (7.49 + 10.82) = 0.49(22.29 + 15.085).

collinsoniod. The combined principles from the root or rhizomes of *Collinsonia canadensis*, stone-root, a Labiatae; used as a diuretic, alterative and diaphoretic.

collision. A change in the energy of a molecule produced by interaction with another material system (molecule, atom or electron), or by electromagnetic induction. Cf. *induction, photon, quantum, chain reaction.* **atomic-** Contact with or between atoms; as, in bombardment with α-rays. Cf. *Wilson tracks.* **molecular-** The mechanical contact of two molecules, which is thought to be essential for a reaction to occur.

collochemistry. Colloidal chemistry.

collodion. A solution of pyroxylin (gun cotton, nitrated cellulose) in a mixture of alcohol and ether. It is a colorless or slightly yellowish, clear or opalescent, thick liquid containing not less than 5 % dissolved matter. Used as a reagent for differentiating phenol and creosote; medicinally for covering wounds, burns, or ulcers; and as an air-tight seal. **c. cotton.** Pyroxylin.

collodium. Collodion.

colloid. A state of subdivision of matter which comprises either single large molecules (*molecular c.*; as, proteins etc.) or aggregations of smaller molecules (*association c.*; as, gold etc.). These particles of ultramicroscopic size (*dispersed phase*) may be solid, liquid or gaseous, and are surrounded by different matter (*dispersion medium* or *external phase*) which may also be solid, liquid, or gaseous. Hence there are eight possible combinations (see table of *colloidal systems*). The size and electrical charge of the particles determine the phenomena observed with colloids, *e.g.*, Brownian movement, diffusion through semi-permeable membranes, etc. The sizes of colloids range from 1×10^{-7} cm. to 1×10^{-5} cm. (or $\frac{1}{10}$ to $\frac{1}{1000}\mu$). The smallest particle of colloidal gold observed by Zsigmondy was 1.7×10^{-7} cm. **association-** A compound whose molecules aggregate to form colloidal particles. Cf. *bond, co-ordination.* **dispersion-** A dispersoid or finely-divided substance. **emulsion-** An emulsoid, or a liquid dispersoid, *e.g.*, finely-divided droplets of a liquid suspended in another liquid. **eu-** A c. whose molecules are over 2500 Å.U. long. **hemi-** A c. whose molecules are 50–250 Å.U. long. **heteropolar-** A c. which consists of polar molecules; as, salts, albuminoids, sugars, etc. Cf. *heteropolar bond.* **homopolar-** A c. which consists of nonpolar molecules; as, hydrocarbons, rubber, etc. **hydrophilic-** See *hydrophile.* **hydrophobic-** See *hydrophobe.* **irreversible-** A finely-divided substance which, once coagulated or precipitated, cannot be readily reversed to the colloidal state. **lyophilic-** See *lyophile.* **lyophobic-** See *lyophobe.* **meso-** A c. whose molecules are 250–2500 Å.U. long. **molecular-** A compound whose molecule is of colloidal size; e.g. 100–500$\mu\mu$ long and 0.2-1$\mu\mu$ thick. **protective-** A substance which promotes the stability of a heterogeneous system, or of the colloidal state by enveloping the particles. **reversible-** A finely-divided substance which, when coagulated, precipitated, or obtained by evaporation of a solution, can readily be converted to the colloidal state. **suspension-** A suspensoid, or a solid dispersoid, *e.g.*, finely-

divided solid particles of ultramicroscopical size in a liquid.

c. equivalent. The number of atoms sharing a free electric charge. **c. mill.** A grinding mill for making emulsions and suspensions, or for the disintegration and dispersion of solids or liquids. **c. zone.** See *orientation, zone.*

colloidal. Pertaining to colloids. **c. metal.** A finely-divided metal consisting of particles of 1 to 100 millimicrons ($\mu\mu$). Since they expose a large surface they are very reactive; many of them act as catalysts in industrially important reactions and processes. **c. movement.** *Brownian movement.* **c. state.** The state of being finely subdivided, *e.g.*, a colloid. **c. system.** See *colloid.*

colophonic acid. Colopholic acid. An acid derived from turpentine; used in plasters, soaps, or cements. Cf. *abietene.*

colophonite. (1) An amber-colored andralite (iron *garnet*, q.v.) (2) A colophony found in the soil. Cf. *copal.*

colophonium. Rosin.

colophonone. $C_{22}H_{18}O_2$ = 314.2. A distillation product of pine rosin.

colophony. Rosin.

color, colour. (1) The visual sensation caused by light. (2) Light of a definite wavelength or group of wavelengths which is emitted, reflected, refracted or transmitted by an object. A color is defined by three properties: *hue-* The wave-length of the monochromatic light, *i.e.*, shade. *saturation-* The percentage of the light of the above wave-length present, *i.e.*, strength. *brightness-* the amount of light reflected as compared with a magnesium oxide standard under the same conditions, *i.e.*, luminosity. Cf. *C.I.E. units, c. diagram, c. theory, colors, dyes, pigments.* **artists'-** The finely-ground pigments used by artists. **basic-** The three colors: red, yellow and blue. **complementary-** Any two colors of the spectrum which produce white light when combined or blended with each other, not

COLLOIDAL SYSTEMS

Surrounding medium, dispersion medium, continuous or external phase

Enclosed medium, dispersed or discontinous phase, colloidal matter	in Solid	in Liquid (Hydrosols)	in Gas (Aerosols)
Solid	(1) **Solid sols** Alloys, colored glass, certain precious stones, paper.	(2) **Suspensions** Paints, milk of magnesia, collargol, etc.	(3) **Smokes** Iodine vapor, cement dust, HCl and NH_3, etc.
Liquid	(4) **Gels** Celluloid, jellies, green leaves, glue.	(5) **Emulsions** Milk, blood, liniments, crankcase oil, protoplasm.	(6) **Fogs** Sprays, mists, clouds, visible steam.
Gas	(7) **Solid foams** Rubber, pumice, plaster, fire foam, lungs, adsorbed gases, aerogels.	(8) **Foams** Lather, froths, mayonaise, whipped cream.	(9) No example.

collose. A substance produced in woody tissues as an intermediate stage in the process of liquefaction.

collosol. A colloidal solution of a drug (*e.g.*, alkaloids) or metals (Sb, Ag, Au, As, Bi, Cu, Fe, Hg, Mn, etc.), used in ampoule medication. Cf. *electrosol.*

collotype. Artotype. A method of printing from a gelatin surface on a glass plate sensitized with potassium dichromate and exposed under a negative.

colloxylin. Collodion.

colocynth. Bitter apple. Bitter cups. The fruit of *Citrullus colocynthis*, a Cucurbitaceae, of Asia Minor. It is a cathartic.

colocynthein. $C_{44}H_{64}O_{18}$ = 800.6. A resin from colocynthin.

colocynthin. $C_{56}H_{84}O_{23}$ = 1124.8. A glucoside from the fruit of *Citrullus colocynthis.* It is a strong purgative and is used in small doses only.

colog. Abbreviation for co-logarithm. Colog $x = -\log x = \log 1/x$.

colombic acid. Calumbic acid. Cf. *columbic acid.*

colonial spirit. Methanol.

colonies. Clusters of bacteria which are visible to the eye.

colophene. $C_{20}H_{32}$ = 272.3. A hydrocarbon of turpentine occurring as a colorless liquid.

colopholic acid. Colophonic acid.

PRIMARY COLORS

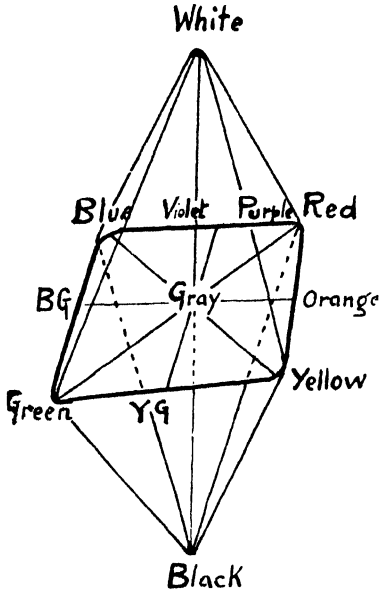
Wavelength λ in μ	*Name*	*Relative visibility*
0.410	violet	0.0012
0.470	blue	0.091
0.520	green	0.710
0.555	yellow-green	1.000
0.580	yellow	0.870
0.600	orange	0.631
0.650	red	0.107
0.700	dark red	0.0041

as pigments, but as rays of colored light. Complementary colors are those which stand opposite in the color diagram. The c. colors in *pigments* are: Red and green; blue and orange, etc. See under *complementary color*. **compound-** A color produced by mixing two or more primary colors as pigments; as,

green—from yellow and blue,
olive—from green and red,
brown—from red, green, and black,
orange—from yellow and red, etc.

contrast- Complementary-. **primary-** (1) The seven hues of the rainbow or solar spectrum: red, orange, yellow, green, blue, indigo and violet. (2) The basic colors: red-green-violet, or (pigments) red-yellow-blue. Cf. *Helmholtz's theory*. **secondary-** Compound-.

c. diagram. A chart or table in which the relationship of the principal colors is illustrated.

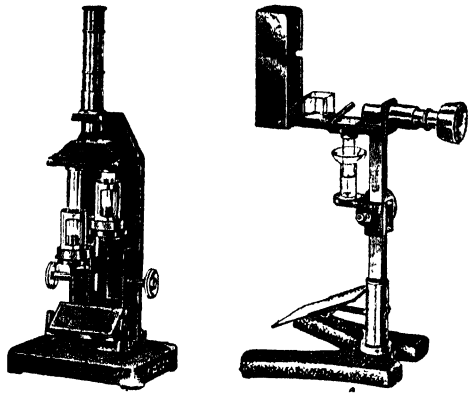


Color diagram.

In the figure the colors of the spectrum are in a plane around the center Those colors which stand opposite each other are complementary; if subtracted from each other (as with pigments) they produce darker shades and finally black; if combined with each other (as in colored lights) they produce lighter tints and finally white. **c. filter.** Light filter. A solid, liquid or gaseous layer of a substance which absorbs certain wavelengths. Cf. *c. screen, absorption cell, sodium flame*. **c. photography.** A mechanical process which records the form and color of an object photographically. The general principle is to take two or three exposures with two or three differently colored color screens, and then print the respective negatives upon two or three films which are stained in the complementary colors. On superimposing the prints a transparency in natural colors is obtained. In moving pictures green and red films are used, while in the various processes for plates either multi-colored screens consisting of lines or dots or specially prepared plates (*e.g.*, the Lumière plate) are used. **c. reaction.** A chemical change in which a change of color occurs. **c. scale.** (1) See *c. diagram, spectrum*. (2) Temperature. Approximate temperatures of heated metals are:

incipient red heat	500– 600°C
dark red heat	600– 800°C
bright red heat	800–1000°C
yellowish red heat	1000–1200°C
incipient white heat	1200–1400°C
white heat	1400–1600°C

c. screen. A color filter used in photography to render colored objects more contrasting in a black and white print. Cf. *complementary, photosensitizer*. **c. screen law.** To increase the photographic intensity of a color on the



Colorimeters.
(1) Duboscq. (2) Bock-Benedict.

film or plate, a screen of the complementary color is used. To decrease the effect a screen of the same color is used. **c. theory.** (1) The absorption of certain wavelengths of light by, or the color of solutions of certain compounds may be due to:

(a) Solvation—or the formation of hydrated ions, as $Cu(H_2O)_4^{++}$, in which case the dehydrated compound is colorless.

(b) Association—or the formation of stress compounds from free radicals; as Ph_3C . . . CPh_3, in which case the color changes on dilution.

(c) Ionization—or the formation of ions from the molecule; as in phenolphthalein, in which case the unionized molecule is differently colored.

(d) Tautomerism—or a change in the structure, as in the leuco- and erythro-salts or in quinone formation.

(2) The emission of a certain wavelength of light is due to electrons which oscillate from one atomic orbit to the other. This can be caused by high temperature, electricity or magnetism. See also *Helmholtz's theory, Beer's law, Lewis's theory, Witt's theory*.

coloradoite. HgTe. A mercury telluride from Colorado.

colorimeter. A device for determining the intensity and shade of colored solutions, or for comparing standard color solutions (comparator) It is used in quantitative analysis. Cf. *comparator, tintometer, chromophotometer, ionocolorimeter, calorimeter*. See figures.

colorimetric analysis. The quantitative determination of a substance by comparing the intensity of the color produced by a reagent, with that produced similarly in a standard of known strength. Cf. *Nessler solution, indicators.*

colorimetry. (1) Colorimetric analysis. (2) Color measurement. Cf. *calorimetry.*

coloring matter. A substance which produces the sensation of color. See *anthocyanins, colors, dyes, pigments.* **c. tablet.** A tablet which readily dissolves in water and contains a definite amount of a pure color. It is used as a convenient method to color small quantities of pharmaceutical preparations.

colors. Substances used as pigments or dyes, q.v. To indicate the shade of a color or dye, letters are sometimes used thus:

G = gelb (German) = yellow
J = jaune (French) = yellow
JJ = intense yellow
O = orange
OOO = very intense orange
R = reddish tint
RR = very red
S = black or sulfonation

colostrum. (1) The first secretion of the mammary glands, consisting of a thin milk. (2) A deep orange-colored fat, m.28–38, similar to lard, obtained from top milk by the action of 3–4 times its volume of HCl (d.1.12) at 92°C for 1½ hours.

columba. Calumba.

columbate. Niobate. A salt of the type $MCbO_3$ or $M_2O.Cb_2O_5$; as $NaCbO_3$, sodium c., and $Ag_2O.Cb_2O_5$, silver c. They often form complexes; thus $Na_8Cb_6O_{19}$ from sodium c.

columbian spirits. Methanol.

columbic. A compound containing pentavalent columbium=Cb≡(niobic=Nb≡). **c. acid.** (1) $HCbO_3$ = 142.1. An insoluble white powder derived from Cb_2O_5; soluble in alkalis forming complex columbates. (2) The compound $3Cb_2O_5.4H_2O$, which gives the acid $H_8Cb_6O_{19}$.

columbin. $C_{21}H_{22}O_7$ = 386.2. A glucoside from the root of *Jateorrhiza calumba.* Yellowish crystals, m.182, soluble in alcohol, chloroform or ether, sparingly soluble in water; it is a bitter tonic.

columbite. The mineral $(Fe,Mn)(Cb,Ta)_2O_4$. Cf. *tantalite.*

columbium. Cb = 92.91, or niobium (Nb). A metallic element, atomic no. 41, discovered in 1801 by C. Hatchett in columbite, a mineral named in honor of America. In 1802 A. G. Ekeberg isolated a new metal from yttrotantalite, a mineral of Sweden. The elemental nature was not clearly recognized until 1844 when H. Rose isolated from a columbite of Bavaria two metals, called niobium and peloponium. Niobium proved to be an element and peloponium a mixture of tantalum and columbium. It is a steel-gray shining metal, d.8.4, m.1950, which forms two series of compounds: columbous (valency of 3) and columbic (valency of 5), and belongs to the fifth sub-group of the periodic system. Columbium compounds are not technically important and are little known. **c. bromide.** $CbBr_5$ = 492.68. Purple-red crystals, decomp. by water. **c. chloride.** (1) $CbCl_3$ = 199.47. Columbous chloride, niobous chloride. Violet crystals, soluble in water. (2) $CbCl_5$ = 270.3. Columbic chloride, columbium pentachloride, niobic chloride, niobium pentachloride. Yellowish hygroscopic crystals, d.2.75, m.194, b.240, decomp. in air, water, or alcohol to form HCl. **c. fluoride.** CbF_5 = 188.1. Niobic fluoride. Colorless monoclinic prisms, d.3.293, m.72, b.220, hydrolysed in water. **c. hydride.** CbH = 94.1. A black powder, d.6.4, decomp. when heated. **c. minerals.** Columbium occurs with titanium and usually, the rare earth metals: columbite, $FeCb_2O_6$; tantalite, $(Fe,Mn)(Ta,Cb)_2O_6$; samarskite, $(Fe,Ca,UO_2)_3(Y,Ce)_2(Ta,Cb)_6O_{21}$. **c. oxalate.** $Cb(HC_2O_4)_5$ = 538.34 Monoclinic colorless crystals, decomp. by water. **c. oxide.**

(1) CbO = c. monoxide (or Cb_2O_2 = c. dioxide)
(2) Cb_2O_3 = c. trioxide
(3) CbO_2 = c. dioxide (or Cb_2O_4 = c. tetroxide)
(4) Cb_2O_5 = c. pentoxide

(1) CbO = 219.10, insoluble in water or acids, d.6.5. (2) Cb_2O_3 = 454.2, insoluble in all solvents except HF. (3) CbO_2 = 125.10. A black insoluble powder. (4) C. pentoxide. **c. oxybromide.** $CbOBr_3$ = 348.85. Columbyl bromide. Yellow crystals, hydrolysed in water. **c. oxychloride.** $CbOCl_3$ = 215.47. Columbyl or columboxy chloride. Colorless needles, subliming 400, and hydrolysing in water. **c. pentoxide.** Cb_2O_5 = 266.2 (Nb_2O_5). Columbic acid, niobic acid, niobium pentoxide, columbic oxide, niobic oxide. A white microcrystalline powder, d.4.61, m.1520, which becomes yellow on heating; insoluble in water or acids, soluble in HF. **c. potassium fluoride.** $CbOF_3.2KF.H_2O$ = 300.32. Columboxy potassium fluoride, niboxy potassium fluoride. White, shining scales, very soluble in water.

columbo. Calumba. **American-** Fraserin.

columbous. A compound of trivalent columbium Cb ≡, (niobous, Nb ≡).

columboxy. A compound of pentavalent columbium containing the trivalent radical CbO≡ (nioboxy, NbO≡).

columbyl. Columboxy.

column. A pillar. **c. still.** A still for fractional distillation.

colza. Rape seed oil.

comanic acid. $C_5H_4O_4$ = 140.1. Pyrone-α-carboxylic acid. An acid derived from chelidonic acid, slightly soluble in water, m.250.

combination. (1) The union or mixing of two or more substances; to form a new substance. (2) A chemical reaction in which two elements combine and form a binary compound, or two binary compounds combine and form a complex compound. This usually involves oxidation or reduction. **molecular-** The union or aggregation of molecules by chemical or coordinate bonds (q.v.); as,

1. *equilibrium* c. of two molecules of odd molecular number; *e.g.* free radicals, q.v.
2. *irreversible* c. or polymerization; *e.g.*, paraformaldehyde. Cf. *condensation.*
3. *reversible* c. or association; *e.g.* hydrone (q.v.). Cf. *liquids, bonds.*

c. principle. The frequency (q.v.) of a radiation may be represented by the difference between two terms.

combining. Uniting or joining together. **c. weight.** Equivalent weight.

combustible. Inflammable. **c. gases.** The fuel gases used in industry; as, hydrogen, hydrocarbons, carbon monoxide and their mixtures.

combustion. Burning, or a chemical change accompanied by the liberation of heat, sound or light, or all three. **fractional-** q.v. **heat of-** See under *heat.* **organic-** The decomposition of organic compounds, and the collection of the combustion products (see *elementary analysis*). **slow-** (1) The slow oxidation of a substance. (2) The combination of two gases by means of a heated wire. **spontaneous-** (1) Accelerated combustion effecting a sudden outburst of heat and light (explosion). (2) Self-ignition, q.v. **wet-** Oxidation by means of strong oxidizing agents; as, sulfuric acid-dichromate mixture.

c. boat. A small tray of refractory material (porcelain, alundum, platinum) used in quantitative elementary analysis for burning organic compounds in a combustion tube. **c. capsule.** A small crucible of porcelain used in coal analysis. **c. furnace.** A heating appliance used in the elementary analysis of organic compounds, consisting of a row of six, or more bunsen burners with a gutter in which the combustion tube is placed, and side tiles for regulating the temperature. **c. train.** The arrangement of apparatus in elementary organic analysis: usually hydrogen, oxygen, and air tanks, potash bulb, calcium chloride tube, combustion tube and furnace, potash bulb, and calcium chloride or sulfuric acid tube. **c. tube.** A wide glass, silica, or porcelain tube, resistant to high temperatures. **c. tube furnace.** (1) C. furnace. (2) An electrically-heated spool used for combustion work.

comenamic acid. $C_6H_5O_4N$ = 155.1. $C_5H_2(OH)O(NH)COOH$. Colorless crystals.

comenamide. $C_6H_5O_4N$ = 155.1. $C_5H_2(OH)O_2.CONH_2$. Colorless crystals.

comenic acid. $C_6H_4O_5$ = 156.03. Colorless crystals derived from meconic acid.

comminute. To bring to a fine state of division.

comminution. The process of grinding or breaking into small fragments, *e.g.*, cutting, rasping, grating, slicing, levigating, pulverizing, triturating, etc. Cf. *chopper, grinder, crusher, powderizer, mill.*

common salt. Sodium chloride.

commutator. A device for interrupting or reversing an electric current (*e.g.*, the mercury or Pohl commutator). **dynamo-** A transformer of alternating current into direct current, attached to a dynamo.

comolised. Highly aggregated.

comosic acid. An acid substance derived from the bulbs of *Muscari comosum*, a Liliaceae.

comparator. (1) An electrical device for the calibration of alternating current instruments. (2) See *colorimeter.*

comparison spectroscope. A spectroscope in which two different spectra can be produced simultaneously side by side.

comparison tubes. A set of test tubes of the same diameter, used in colorimeters for the comparison of colors.

comparoscope. A device attached to a microscope for comparing two different slides simultaneously.

compatibility. The non-impairment of the respective properties of two or more drugs when administered together. **in-** The impairing influence of two or more substances on each other when mixed; *e.g.*, acids and bases, or substances which form an insoluble precipitate. Cf. *incompatible.*

compatible. Applied to a pair of drugs which do not interfere or react chemically, physically or therapeutically with one another.

compensation apparatus. Potentiometer.

complement. (1) Supplying a missing part. (2) Alexin, cytase, end-body. A thermolabile substance having a haptaphore and zymophore group, the later acting destructively on the cell (see *Ehrlich's side chain theory*). (3) The difference between an acute angle and 90°. **c. fixation.** Complement deflection, complement deviation. The combining of the zymophore group of the complement to make it inert. The reaction product obtained by adding to a hemolytic serum a serum containing an antibody and corresponding antigen (*Ehrlich's side chain theory*). This principle is utilized in a number of diagnostical tests, *e.g.*, Wassermann reaction, Abderhalden test, etc.

complementary color. See *colour.* **c. c. screens.** (1) Copper ruby glass (red) and copper glass (blue); (2) uranium glass (yellow) or chromium glass (greenish yellow) and cobalt glass (blue). See *color.*

complex. Complicated, not simple. **c. acid.** A combination of two or more non-metallic compounds or acid radicals, *e.g.*, of 2HF and SiF_4 to give H_2SiF_6. **c. compound.** A combination of two or more compounds or ions, *e.g.*, 4KCN and $Fe(CN)_2$ to give $K_4Fe(CN)_6$. **c. ion.** A complex electrically charged radical or group of atoms, *e.g.*, $Cu(NH_3)_2^{++}$. **c. reaction.** A chemical change in which two or more reactions take place simultaneously.

component. (1) An ingredient or part of a mixture (as distinct from the *constituent* of a compound). (2) The smallest number of chemical substances capable of forming all the constituents (q.v.) of a system in whatever proportion they may be present See *phase rule.*

Compositae. Composite family. A group of herbaceous or woody plants, rarely shrubs, with many florets arranged in compact heads as a compound flower on a common receptacle; as the dandelion, sunflower, etc. Many members of this family yield important drugs:

roots:	
Taraxacum officinale.....	dandelion, taraxacum
Cichorium intybus.....	chicory
Anacyclus pyrethrum.....	pellitory, pyrethrum
Inula helenium.....	elecampane, inula
Arctium lappa.....	burdock root, lappa
Polymnia uvedalia.....	bearsfoot
Lactuca virosa.....	lactucarium
Echinacea angustifolia...	echinacea
Arnica montana.....	arnica root
Cnicus arvensis.....	Canada thistle, enicin
leaves:	
Erechthites hieracifolia...	firewood
Pterocaulon pycnostachyon	black root
Ambrosia artemisiaefolia.	ragweed
Xanthium strumarium...	cocklebur
Tanacetum balsamida....	tanacetum
herbs:	
Eupatorium perfoliatum..	eupatorium
Eupatorium purpureum..	queen of the meadow
Grindelia species.....	grindelia
Tanacetum vulgare.....	tansy
Artemisia absinthium....	wormwood
Artemisia tridentata.....	sage brush
Erigeron species.....	fleabane
Gnaphalium polycephalum	life everlasting
Helenium autumnale.....	sneezewort

Achillea millefolium	yarrow
Tussilago farfara	coltsfoot
Cnicus benedictus	blessed thistle
Silphium laciniatum	rosinweed
Rudbeckia laciniata	thimble weed
Bidens bipinnata	Spanish needles
Senecio aureus	ragwort
Solidago odora	golden rod
Lactuca species	lettuce
Matricaria parthenium	feverfew
Anthemis cotula	wild chamomile
Veronica nigritiana	vernonine
flowers:	
Matricaria chamomilla	German chamomile
Anthemis nobilis	English chamomile
Artemisia pauciflora	Levant wormseed
Calendula officinalis	marigold
Carthamus tinctorius	safflower
Pyrethrum species	insect powder
seeds:	
Helianthus annuus	sunflower seeds
fruits:	
Arctium lappa	burdock fruit
juice:	
Lactuca virosa	lactucarium

composition. The elements or compounds which enter into a material or which are produced from it by analysis. Cf. *constitution; e.g.* we know the *composition* of glass, but not its *constitution.*

compost. A mixed organic manure produced by the natural decomposition of waste organic matter.

compound. (1) A substance whose molecules consist of unlike atoms, and whose constituents cannot be separated by physical means. A compound differs from a physical mixture by reason of the definite proportions of the constituent elements (a proportion which depends upon their atomic weights), by the disappearance of the properties of the constituent elements and the appearance of entirely new properties characteristic of the compound. (2) To mix drugs, or make up a prescription. **acyclic-** An organic compound in which the carbon atoms are arranged in an open chain. **addition-** A compound formed by the union of two simpler or binary compounds: $NH_3 + HCl = NH_4Cl$; or $K_2O + SO_3 = K_2SO_4$. **additive-** A c. formed by the saturation of double or triple bonds; as, $CH_2Cl.CH_2Cl$ from $CH_2:CH_2$. **aliphatic-** An acyclic compound or paraffin; *e.g.*, the methane series. **amino-** An organic compound containing the NH_2— radical. **aromatic-** An organic c. in which the carbon atoms form a ring or closed chain, *e.g.*, benzene series. **asymmetric-** A c. containing one or more optically active carbon atoms. **azo-** An organic c. containing the —N:N— group. **binary-** A c. whose molecules consist of only two kinds of atoms, *e.g.*, NaCl, $FeCl_3$, CH_4, C_6H_6, etc. **carbon-** See *organic c.* **chain-** A cyclic compound. **closed chain-** Aromatic compound. **coal tar-** C. derived from coal tar, especially aromatic organic c. **condensation-** A c. formed by the union of two or more molecules, especially organic compounds, in which one or more molecules of water are usually liberated. **coupling-** A c. which serves as a substitute for some other atom, generally hydrogen. Cf. *anhydrosynthesis, derivative.* **cyclic-** Aromatic compound. **diazo-** A compound containing the divalent —N:N— group. **endothermic-** A c. formed with the absorption of heat; they are usually unstable (explosive) and liberate heat on decomposition. **exothermic-** A c. formed with the liberation of heat. Such compounds are usually stable, and their decomposition requires energy. **fatty-** Aliphatic c. **homocyclic-** An aromatic c. containing only carbon atoms in its ring, *e.g.*, benzene, naphthalene. **heterocyclic-** An aromatic c. containing other atoms besides carbon atoms (N, O, S, P, etc.,) in its ring, *e.g.*, pyridine, quinoline, etc. **index-** A c. from which another is derived by substitution; thus methane is the i. c. for chloromethane, nitromethane, formic acid, etc. **inorganic-** C. containing no carbon atoms. The majority of inorganic compounds (mineral acids, mineral bases, and metallic salts) are polar, *e.g.*, ionize in solution, and consist of electro-positive and electro-negative parts. **metameric-** Metamers. **molecular-** (1) Addition c. (2) See *combination, associaton, polymerization.* **nonpolar-** A more or less unstable compound consisting of elements having weak electrical forces, *e.g.*, carbon compounds. See *compounds.* **open-chain-** Aliphatic compounds. **organic-** Compounds containing carbon and hydrogen atoms, with or without other atoms in the molecule. The majority are nonpolar, *e.g.*, they have no distinctly positive or negative part, and do not ionize (except the metallic salts of organic acids). **organo-metallic-** Organic c. in which a hydrogen atom (or atoms) is replaced by a metal, *e.g.*, zinc diethyl $Zn(C_2H_5)_2$, cacodyl. **paraffin-** A saturated aliphatic hydrocarbon. **polar-** Fairly stable compounds consisting of elements of strong electro-motive force, *e.g.*, NaCl, $CuSO_4$, etc. See *compounds.* **quarternary-** (1) A compound whose molecule consists of four different kinds of atoms, *e.g.*, $NaHSO_4$, $NaAl(SO_4)_2$. (2) A combination of a fully substituted ammonium radical with a halogen, *e.g.*, tetra-ethyl ammonium iodide, $N(C_2H_5)_4.I$, (analogous to NH_4I). **ring-** See *aromatic c.* **series of-** Compounds containing the same positive or negative radical. Many metals have two or more series of compounds, *e.g.*, ferrous compounds, ferric compounds, and ferrates. Nearly all non-metals form two or more series of compounds, *e.g.*, sulfides, sulfites, sulfates, etc. **saturated-** A carbon c. in which all the bonds of carbon are satisfied, hence, compounds containing no double or triple bonds. **spiro-** An organic ring compound in which one carbon atom is common to two rings. **stable-** A compound which does not readily decompose, and which resists the influence of heat and other agents. **substitution-** A compound formed by the replacement of certain atoms by other atoms or group of atoms. Thus C_6H_5Cl is a substitution compound of C_6H_6; $C_6H_6Cl_2$ is an addition compound of C_6H_6. **sulfur-** A c. containing sulfur, especially organic compounds containing divalent sulfur. **ternary-** A c. whose molecules consist of three different kinds of atoms, *e.g.*, KCN, $Fe_2(SO_4)_3$, $C_6H_{12}O_6$. **tertiary-** Ternary c. **unsaturated-** A carbon compound which contains one or more double or triple bonds. **unstable-** A c. which readily decomposes.

c. ethers. Esters. **c. microscope.** See *microscope.* **c. molecule.** A molecule consisting of two or more kinds of atoms, (as H_2S), thus differing from an elementary molecule which consists of only one type of atoms (*e.g.*, H_2). **c. protein.** See *conjugate protein.*

compounds, classes of. Cf. *bonds*

A *Polar* Compounds which	B *Nonpolar* Compounds which
(a) ionize and conduct an electric current (electrophils)	(a) do not ionize and do not conduct an electric current.
(b) are very reactive	(b) are relatively inert
(c) associate, and form double molecules and complex ions.	(c) do not associate, but may polymerize to complex molecules.
(d) possess a condensed structure.	(d) possess a frame structure.
(e) exhibit tautomerism.	(e) exhibit isomerism.
(f) have a high dielectric constant.	(f) have a low dielectric constant.
(g) are generally known as inorganic substances.	(g) are generally known as organic substances.

compral. Cyrinal. A brand of pyramidon and trichloroethanol urethane; used as an analgesic.

compressed gases. A gas that is pumped at high pressure into a steel cylinder for shipment. The gases used in industry and their relative importance are shown by the following statistics (1922) of American manufacturers

INDUSTRIAL COMPRESSED GASES

Name	Number of cylinders in use	Shipping regulations	
		Spec.	Label
Acetylene	2,500,000	8	red
Ammonia	200,000	4	green
Air			green
Argon	1,000	3a	green
Blaugas	c	3.7	red
Carbon dioxide	500,000	3	green
Chlorine	20,000	25	green
Coal gas	c	3.7	red
Helium	80,000	3a	green
Hydrocarbon	c	3.7	red
Hydrogen	200,000	3a	red
Hydrocyanic acid	a	33	green
Methyl chloride	1,000	25	green
Neon	1,000	3a	green
Nitrogen	b	3a	green
Nitrous oxide	50,000	3	green
Oxygen	1,500,000	3a	green
Petroleum gas	c	26	red
Phosgene			red
Pintsch gas	c	3.7	red
Sulfur dioxide	10,000	25/27	green

a. Transported in tank trailers by automobile.
b. Not usually filled in cylinders.
c. Fuel gases are used in cylinders under various trade names: calorine, carbo-hydrogen, coal-gas, gasol, kutting-gas, pyrogen, thermoline, etc., Cf. *cylinders.*

compressibility. The resistance offered by substances to high pressure. **coefficient of-** See *coefficient.* Cf. *piezometer.*

Compton, Arthur Holly. 1892– . American physicist and Nobel prize winner (1927). **C. Karl Taylor.** 1887– . An American physicist noted for atomic research. **C. effect.** Scattered homogeneous x-rays give rise to a change of wavelength which depends on the direction of observation. It corresponds with fluorescence. Cf. *Raman effect.* **C. rule.** The atomic weight (A) multiplied by the heat of fusion (h) and divided by the absolute melting point (T) gives the number 2; hence, $Ah/T = 2$.

conalbumin. A noncrystalline albumin of egg white.

conamarin. A glucoside from the root of hemlock, *Conium maculatum*, an Umbelliferae. Cf. *conine.*

concanavalin. A globulin from jack beans.

concave. Presenting a depressed or hollow surface. **c. lens.** See *lens.* **c. mirror.** See *mirror.*

concentrate. (1) In chemistry: To increase the strength by reducing the amount of unwanted material. (2) In physics: To bring to one point or center.

concentration. (1) In chemistry: a. Increasing the amount of a dissolved substance either by evaporation or adding more of the substance. b. The strength of a solution, and the mass per unit volume, as in molal-. C. is commonly expressed as

percentage, %, or gm. per 100 cc.
molarity, M, or moles per liter.
molality, *M*, or moles per 1000 grams.
normality, N, or equivalents (in grams) per liter.

(2) In physics: Gathering together that which is diffused, *e.g.*, light, sound, or heat. **absolute-** The c. of the active ion of a substance; *e.g.*, the H^+ of an acid. **hydrogen-ion-** The number of hydrogen ions in grams per liter. This indicates the acid or alkaline reaction of a solution (see *hydrogen ion*). **ionic-** The number of gram-ions in a unit volume of solution. These indicate the degree of ionization. **molal-** The number of moles (gram molecules) in a unit volume (liter) which, in the case of gases, is expressed in terms of their pressures; in the case of solutions by concentration proper, and abbreviated as M-solution. (Cf. *molality.*) **normal-** The number of equivalent moles per liter. It is abbreviated as N-solution.

c. limit. The maximum dilution of a substance at which it may be detected by a particular chemical reaction.

concentrator. A mechanical device for increasing the percentage of a substance or diminishing the bulk of a material by the elimination of the inert matter. Cf. *separator.*

concentric. Describing a number of rings which have a common center.

concha. A shell.

conche. Four shell-like pots with granite bottoms and heavy rolls; used in chocolate manufacture.

conching. The rolling of chocolate mixtures from a few hours to seven days, to develop flavor and mildness.

conchinine. Quinidine.

conchiolin. $C_{30}H_{48}O_{11}N_8$ = 710.8. A protein from the shells of molluscs, resembling keratin.

concrete. A mixture of gravel, broken rock, and sand held together by cement (q.v.).

condensation. (1) Conversion to a more compact form. (2) Transformation from the gaseous to the liquid state. (3) A union and combination of similar molecules to form a more complex compound (polymerization, etc.). (4) A union of like or unlike molecules, usually with elimination of one or more molecules of water, HCl, or

alcohol, etc.; as, $6HCHO + 4NH_3 \rightarrow C_6H_{12}N_4 + 6H_2O$, and $2CO(NH_2)_2 \rightarrow C_3H_3N_3O_2 + NH_3$. (5) An accumulation of electrons, *e.g.*, in a condenser. (6) The formation of a pencil of parallel or convergent light rays from convergent rays, *e.g.*, by means of a concave mirror or a convex lens.

condensed. (1) Reduced in volume. (2) Liquefied from a gas or vapor. **c. nucleus.** See *nucleus*.

condenser. (1) A device which concentrates matter or energy. (2) An apparatus for cooling vapors to liquids, *e.g.*, Liebig-, Squibb-, etc. (3) A device for the polymerization of organic compounds. (4) A series of insulated conductors for the accumulation of electricity (see *electrical-*). (5) An optical instrument or arrangement of lenses or mirrors, *e.g.*, Abbé-. **Abbé-** See *Abbé*. **bull's eye-** A convex lens, which concentrates the light upon the mirror of a microscope. **electrical-** An electrical device for storing electrons; it consists of sheets of tin foil separated by paraffin, with the alternate tin foils connected to a common terminal. A microfarad condenser contains about 3600 sq. in. of tin foil. **high potential-** A series of alternating brass sheets and glass plates in an oil-filled box, used in high-frequency experiments, wireless telegraphy etc. **Kjeldahl-** A series of tubes arranged in a water cooled box for condensing. Used in nitrogen determinations. **Liebig-** A water-cooled tube attached to a flask or retort. Generally two straight glass tubes, one in the other. Cold water passes through the outer, and the vapor to be condensed passes through the inner tube. **paraboloid-** q.v. **reflux-** q.v. **substage-** Abbé-.

c. flask. A large spherical flash mounted and filled with liquid; used to absorb the heat from a source of light and to concentrate its intensity. **c. tube.** The inner tube of a condenser.

condiment. A spicy or stimulating vegetable product; used for its flavor and not its food value; as, spices, q.v.

condistillation. The separation of organic substances by distilling with another liquid (*e.g.*, hydrocarbons). Cf. *steam-distillation*.

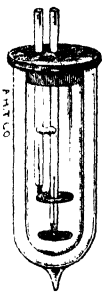
conductance. (1) The capacity to convey energy, as heat or electricity. (2) The ratio between an electric current flowing through a unit cube and the difference in potentials between its ends; hence, the reciprocal of resistance, q.v.

CONDUCTIVITY

Electrical	Metal	Thermal (relative)
681,200	silver	1.000
640,600	copper	.7198
468,000	gold	.7003
324,000	aluminum	.3435
186,000	zinc	.2653
146,000	cadmium	.2213
144,200	nickel	.1420
141,000	iron	.1665
91,200	platinum	.1664
76,600	tin	.1528
50,400	lead	.0877
27,100	antimony	.0542
10,630	mercury	.0148
9,260	bismuth	.0177

conduction. The property of transmitting or passing along matter or energy. **air-** C. by a current of air. **electrolytic-** The passage of electrons by means of ions. **sound-** The passage of sound waves in air. **thermal-** The transmission of heat by materials.

conductivity. (1) The degree of conduction; the capacity for transmitting electricity, heat, light, or sound. (2) The quantity of electricity transmitted per unit area per unit potential gradient per unit time, Λ. **coefficient of-** See *coefficient*. **electrical-** See *electrical*. **equivalent-** The ratio of the measured specific c. to the number of gram equivalents of salt in 1 cc. solution. Cf. degree of *ionization*. **heat-** Thermal-. **limiting-.** The c. of a solution at infinite dilution, *i.e.*, when ionization is complete. **molal-** or **molecular-** The c. in reciprocal ohms[1] of a solution containing 1 mol[1] of solute placed between electrodes 1 cm. apart, *i.e.*, the specific c. multiplied by the number of cc. containing 1 mol of solute. **specific-** The reciprocal, in mhos. of the specific resistance of an electrolyte. **super-** The abnormally high conductivity of metals at temperatures near absolute zero. **supra-** Super-c. **thermal-** The number of gram calories passing through a 1 cm. cube in 1 second for a temperature difference of 1°C. **unilateral-** See *valve effect*. **unit of-** Mho., the reciprocal ohm; ohm^{-1}.



Conductivity cell.

c. apparatus. A device for determining the conductivity of solutions, and consisting of conductivity cell, constant temperature bath, slide wire bridge, and telephone with resistance box, thermometer, and other accessories. **c. cell.** A glass vessel containing two electrodes at a definite distance apart, and filled with a solution whose conductivity is to be determined. *E.g.*, Arrhenius-, Hildebrand-, Kohlrausch-, Nernst-, Ostwald-, etc. See fig. **c. bridge.** A modified Kelvin bridge for measuring very low resistances, in which the conductivity is read as a percentage directly from the slide wire. **c. water.** The purest water obtainable; its specific conductivity is 0.4×10^{-6} $ohms^{-1}$ $cm.^{-1}$ in a vacuum, at 18°C. (Kohlrausch and Heydweiller.) Cf. *water*.

conductometric. Pertaining to conductivity measurements. **c. analysis.** Quantitative analysis or titration in which the progressive change in conductivity is used to determine the end-point of the reaction. Cf. *potentiometric titration*.

conductophore. The molecular structure associated with the property of connecting a toxophore (q.v.) with protoplasm.

conductor. A medium which has the property of conduction. **electrical-** Metals, solutions of salts, molten substances, or ionized gases which transmit electrons, or allow an electric current to pass (as opposed to insulators or non-conductors). **non-** See *insulator*.

condurangin. A glucoside from condurango bark. **alpha-** $C_{20}H_{32}O_6$ = 368.3. A white powder, insoluble in water, m.60. **beta-** $C_{18}H_{28}O_7$ = 356.3. An amorphous yellowish powder, soluble in alcohol, sparingly soluble in

ether, chloroform, or water; used as stomachic and astringent.

condurango. Candurangu, condorvine. The vine, *Gonolobus condurango*, an Asclepiadaceae of Columbia, from which a valuable bark is obtained. **c. bark.** The bark of condurango; used for cancer, as a bitter tonic and stomachic.

conduransterin. $C_{30}H_{50}O_2$ = 442.5. A principle from condurango bark.

Condy's fluid. A liquid disinfectant which, it is claimed, produces ozone during oxidation.

cone. A body having a circular base and tapering to a point. **filtering-** A hollow cone made of porous material, *e.g.*, alundum, which fits into a funnel or other support. Used for rapid filtration of solutions. **measuring-** A slightly-tapered ruler used for measuring the inside diameters of holes or tubing. **pyrometer-** Seger cone, q.v. A small pyramid of varying composition which has a definite melting point; used in ceramics, and pyrometry. **Seger-** Pyrometer cone.

conessine. $C_{24}H_{40}N_2$ = 356.5. Wrightine. An alkaloid from the bark of *Wrightia zeylanica*, an Apocynaceae of Ceylon. It occurs in colorless, deliquescent needles, m.121, slightly soluble in water, soluble in alcohol, ether or chloroform; used as astringent and anthelmintic.

configuration. The spatial relationship of the atoms in a molecule. Thus dextrose and levulose differ in *structure* but coincide in c. with respect to the three asymmetric carbon atoms. Dextrose, mannose, galactose, idose, talose, etc. (*d-* and *l-* form of each) coincide in *structure* but differ in *c.* Cf. *structure, atomic radius.* **electronic-** Constellation.

congealing. (1) Freezing. (2) The setting of cement or the solidification of a liquid. **c. point.** The temperature at which a liquid or solution freezes.

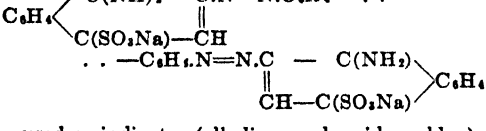
congelation. Freezing, solidification. The transformation from the liquid to the solid state, either by low temperature, by hydration, or by chemical reactions.

conglomerate. An aggregation or a mass of units, which are heaped together.

conglutin. A protein from the seeds of blue lupin, almond, or other leguminous plants. It contains 51.13 % C, 6.86 % H, 18.11 % N, 0.32 % S, 23.10 % O.

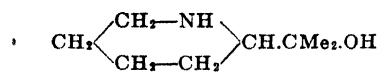
conglutinin. A protein of beef serum which causes the clumping of blood cells. (See *agglutinin.*)

congo-blue. Trypan blue. **c. paper.** A filter paper stained with congo red solution. **c. red.** $C_{32}H_{22}O_6N_6S_2Na_2$. Benzidine disazo-*m*-amino-benzene-sulfonic acid-*1*-naphthylamino-*4*-sulfonate of sodium. A red azo-dye,

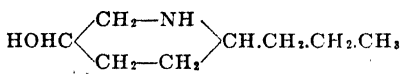


used as indicator (alkalis = red; acids = blue); and for the detection of free mineral acids in presence of organic acids. **c. solution.** A solution of 1 gm. congo red in 90 cc. water and 10 cc. alcohol. **c. yellow.** $C_{14}H_{12}O_4N_2SNa$. An orange-yellow dye.

conhydrine. $C_8H_{17}ON$ = 143.2. Conydrine, oxyconiine, hydroxyconiine, α-methyl-2-piperidineëthanol.



An alkaloid from the seeds of *Conium maculatum* (poison hemlock). Colorless crystals, m.98, b.230, soluble in water, alcohol, ether, or chloroform. It is a narcotic, antiseptic and anodyne. **pseudo-** *2*-α-hydroxypropylpiperidine. Colorless crystals, m.118, b.220, soluble in alcohol, water or ether.



conic acid. Coniic acid.

coniceine. $C_8H_{15}N$ = 125.13. α-. A colorless liquid, d.0.893, m.−16, b.158. β-. *2*-Allylpiperidine. White needles, d.0.852, m.40. b.168. γ-. *1.2.3.4*-tetrahydro-*6*-propyl pyridine. Colorless liquid, d.0.872, m.−50, b.172. δ-. Piperolidine. ε-. Methylconidine. Colorless liquid, d.0.8856, b.151.

conicic acid. Coniic acid.

conicine. Coniine.

Coniferae. Pinales; pine family. A group of trees or shrubs, usually with a resinous juice and awl or needle shaped leaves, which bear cones. It includes the old families Pinaceae and Taxaceae.

coniferaldehyde. Ferulaldehyde.

coniferin. $C_{16}H_{22}O_8.2H_2O$ = 378.2. A glucoside from the cambium of coniferous trees and asparagus. A grayish-white powder m.185, soluble in hot water, slightly soluble in alcohol. Used for the manufacture of vanillin. It hydrolyses to glucose and coniferol.

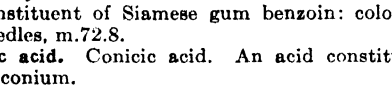
coniferol. $C_{10}H_{12}O_3$ = 180.1. Coniferyl alcohol, m-methoxy-p-oxystyrone. Colorless crystals, m.73, slightly soluble in water. It oxidizes to vanillin. Cf. *lignin.*

coniferyl. The radical $HO.(MeO)C_6H_3CH:CH—$. **c. alcohol.** Coniferol. **c. aldehyde.** Feruladehyde. **c. benzoate** $C_{17}H_{16}O_4$. The chief constituent of Siamese gum benzoin: colorless needles, m.72.8.

coniic acid. Conicic acid. An acid constituent of conium.

coniine. Conine.

conine. $C_8H_{17}N$ = 127.2. Cicutine, d-alpha-propylpiperidine, 2-propylpiperidine, coniine.



An alkaloid from the seeds of *Conium maculatum*, poison hemlock an Umbelliferæ. A yellow, oily narcotic liquid, d.0.862, m.−2.5, b.166, insoluble in water, miscible with alcohol or ether. Cf. *arthusine, conhydrine.* **hydroxy-** Conhydrine. **para-** Paraconine.

c. hydrobromide. $C_8H_{17}N.HBr$ = 208.01. White crystals, m.210, soluble in water, alcohol or chloroform; used as an antispasmodic and antineuralgic. **c. hydrochloride.** $C_8H_{17}N.HCl$ = 163.66. Colorless rhombic crystals, m.210–212, soluble in water or alcohol, insoluble in ether.

conium. The seeds of *Conium maculatum*, poison hemlock, an Umbelliferae. Used as a narcotic and sedative, as a fluid extract or tincture. Cf. *conine, conamarine.*

conjugate. Paired or coupled. **c. double bonds.** Two double bonds in the relative positions indi-

cated by the formula —CH=CH—CH=CH—.
4 3 2 1

They form additive compounds by saturation of the 1 and 4 carbons, so that a double bond is produced between the 2 and 3 carbons. **c. foci.** The anterior and posterior foci of a lens. **c. proteins.** Polypeptides or proteins which contain, in addition to amino acids, some other organic substance (prosthetic group); as,

conjugated protein:	*prosthetic group:*
hemoglobin	hematin
chlorophyll	ethiophyllin
nucleoproteins	nucleic acids
phosphoproteins	phosphoric acid
glycoprotein	chondroitin

conjugation. (1) The linking together of centers of unsaturation, as in conjugate double bonds. (2) The combination of large molecules (*e.g.*, proteins, polysaccharides) with some other compound.

consecutive. Following one another in an uninterrupted sequence or order. **c. position.** Adjacent position.

conservation. The preservation or protection from loss, decay, or deterioration. **c. of energy.** The principle that no energy is ever created or lost, but is always transformed into some other form of energy. Cf. *mass-energy cycle.* **c. of matter.** The principle that no matter is ever created or lost but is always transformed into some other form of matter, *e.g.*, the radioactive elements disintegrate, but form elements of lower atomic weight.

conservative. Preservative.

consistence. The viscosity or solidity of a fluid.

consistency. (1) The degree of solidity or fluidity. Cf. *dissipation, penetration.* (2) The percentage of solid matter in a mixture. (*E.g.*, of pulp.) **c. meter.** A device for determining the solidity of a semi-solid or syrupy substance, *e.g.*, gelatin, syrup, oils. It consists usually of a disk rotat-

PRIMARY CONSTANTS (by definition)

Quantity	*Symbol*	*Value*	*Error*
Atomic weight of oxygen	O	= 16.000	$\times 10^x$
Length of one meter	m	= 100 cm	
Mass of one cc. water at 4°C	gm	= 1.0000	
Density of water at 4°C	d_4°	= 1.0000	
Temperature of freezing water at 1 atm		0°C	
Temperature of boiling water at 1 atm		100°C	
Normal atmospheric pressure		760 mm Hg of d.13.5951	

BASIC CONSTANTS (by observation)

Velocity of light	c	= 2.99796×10^{10} cm $sec.^{-1}$	±.00004
Gravitational constant	G	= 6.664×10^{-8} $cm^3 g^{-1}$ $sec.^{-2}$	±.002
Electronic charge	e	= 4.770×10^{-10} e.s.u.	±.005
	e/c	= 1.5910×10^{-20} e.m.u.	±.0016
Electronic ratio	e/m	= 1.761×10^{7} e.m.u. g^{-1}	±.001
	(e/m)c	= 5.279×10^{17} e.s.u. g^{-1}	±.003
Faraday	F	= 9.6494×10^{4} coulombs	±.00005
Volume of 1 mole gas at 0°C and normal atmosphere	v_0	= 22.4141×10^{3} cm^3 $mole^{-1}$	±.0008
Absolute zero (ice-point)	T_0	= 273.18	±.03°K
Planck's constant	h	= 6.547×10^{-27} erg sec	±.008
Rydberg wave number	R_∞	= 109737.42 cm^{-1}	±.06

DERIVED CONSTANTS (by deduction)

Avogadro's number	N_0	= 6.064×10^{23} $mole^{-1}$	± 006
Loschmidt's number	n_0	= 2.705×10^{19} cm^{-3}	±.003
Gas constant	R_0	= 8.3136×10^{7} erg deg^{-1} $mole^{-1}$	±.001
	R_0'	= 1.9864 cal. deg^{-1} $mole^{-1}$	±.0004
	R_0''	= 8.246×10^{-2} liter. atm. deg^{-1} $mole^{-1}$	±.0009
	R_0'''	= 82.048 cm^3 atm. deg^{-1} $mole^{-1}$	±.009
Molecular gas constant	k_0	= 1.3708×10^{-16} erg	±.0014
Mass of hydrogen atom	m_H	= 1.6608×10^{-24} g	±.0017
Mass of electron	m_0	= 8.994×10^{-28} g	±.014
Mass of electron (*spectroscopic*)	m_0	= 9.035×10^{-28} g	±.010
Mass of alpha particle	m_α	= 6.597×10^{-24}	±.007
Distance nucleus to electron (*normal H*)	a_0	= 0.5284×10^{-8} cm	±.0004
Radius of Bohr (K) orbit (*normal H*)	a_0'	= 0.5281×10^{-8} cm	±.0004
Speed of electron (*normal H*)	v_0	= 2.1824×10^{8} cm sec^{-1}	±.0017

CONVENTIONAL CONSTANTS

Atmosphere, normal	A_n	= 1.013250×10^6 dyne cm^{-2}
Aberration constant		20.47″
Wavelength of red Cd line	λ_{Cd}	= 6438.4696 Å
Gravity constant, normal	g	= 980.665 cm sec^{-2}

EXPERIMENTAL CONSTANTS

Atomic weight of hydrogen	H	= 1.0078	
Grating space in calcite		3.028 Å.	
Liter	1	= 1000.027 cm^3	
Gram calorie (mean)	cal_m	= 4.186 joule	
British Thermal Unit (mean)	B.Th.u.	= 1054.8 joule	
International Ohm		1.00052 absolute ohm	±.00002
International Ampere		0.99995 absolute amp	±.00005

ing in the substance and driven by a constant force.

consistometer. An apparatus for determining the hardness or consistency of semi-liquids, and hard, brittle, bituminous materials. It consists essentially of a plunger dropping at a constant speed and force on to the material to be tested; the depth of penetration is measured.

consolute. (1) Any liquid or solution which is completely miscible with another liquid or solution. (2) Miscible in all proportions.

constant. (1) That which is unchangeable, permanent or invariable. (2) In physics: a property which remains numerically the same, and which may serve as a unit of measurement. (3) In mathematics: a quantity having a definite and fixed value. **basic-** The numerical value of a permanent property which can be directly determined. **cell-** Specific resistance. **conventional-** The numerical value of a physical property which is generally accepted as normal. **derived-** The numerical value of an unchanging physical property which is indirectly determined. **experimental-** The numerical value of a physical property determined by experiment and accepted as standard. See table.

c. proportion. A fundamental law of chemistry: Every chemical compound always contains the same percentage by weight of its constituent elements (Proust).

constantan. Constantin.

constantin. Constantan. An alloy of 60 % copper and 40 % nickel, d.8.4, m.1290; used in thermocouples.

constellation. The configuration or arrangement of electrons in a molecule which gives rise to certain properties; as in chromophore, fluorophore, pharmacophore, toxophore, osmophore and glucophore. Cf. *resonator*.

constituent. (1) Any one of the elements or parts of a compound (in contradistinction to the ingredients or *components* of a mixture). (2) Elements or compounds present in a system which are formed from the components (q.v.); thus, in the system

$$CaCO_3 = CaO + CO_2$$

there are three *constituents* ($CaCO_3$, CaO and CO_2), but only two *components*, as any two substances will determine the amount of the third.

constitution. The structure in which the elements are linked together or arranged in a material; *e.g.*, we do not know the *constitution* of glass, but we know its *composition*. Cf. *configuration*.

constitutional formula. See *formula*.

contact. (1) The touching of two or more bodies. (2) An electric switch. **c. action.** Catalysis. **c. difference.** Contact-potential. **c.-key.** An electrical switch. **c. potential.** The difference in potential of two metallic plates produced by their close contact. **c. process.** The catalytic manufacture of sulfuric acid from sulfur dioxide and oxygen. **c. series.** Electromotive series. **c. substance.** Catalyst.

container. See *shipping, storage*.

contamination. Infection occurring through contact, *e.g.* a bacterial culture is intentionally *infected* with bacteria when inoculated, but *contaminated* accidentally when another spore or mold develops in the culture.

contoured. An irregular, smooth, undulating surface like that of a relief map; used to describe bacterial cultures.

contractile. Capable of being drawn together.

contraction. (1) In chemistry: The drawing together of atoms in the molecule, depending partly upon their mutual electromotive forces. The contraction (C) is expressed by $[100 - (100M/A' - A'' \ldots)]$, where M is the molecular volume, A', A'', etc., the atomic volumes of the constituents. Thus C for the oxides of Na = 55.0, K = 61.0, Rb = 59.8, Cs = 58.4. (2) In physiology. The shortening of muscles in response to a stimulus.

contramin. $C_9H_{22}N_2S_2$ = 322.1. Diethylammonium diethylthiocarbamate, $NEt_2.CS.SNH_2Et_2$. A softener of fibrous tissue used in the treatment of chronic infections.

contrast. A comparison of two things by accentuating their points of difference. **c. stain.** A double stain, in which the special feature to be examined takes one color, all else another color.

contravalence. Covalence.

control. A blank test or standard; *e.g.*, an experiment performed simultaneously with another experiment in order to study the relative effects of different factors or conditions.

conus. Cone.

convallamaretin. $C_{20}H_{36}O_5$ = 404.4. A decomposition product of convallamarin.

convallamarin. $C_{23}H_{44}O_{12}$ = 512.4. A glucoside from *Convallaria majalis*, lily of the valley, a Liliaceae. A slightly yellow amorphous powder, soluble in water or alcohol; used as a cardiac stimulant and diuretic, as it increases arterial pressure similarly to digitalis.

CONVERSION FACTORS

LENGTH:	cm. × 0.3937 = inches	inch × 2.540 = cm.
	cm. × 0.0328 = feet	foot × 30.48 = cm.
	m. × 3.280 = feet	foot × 0.305 = m.
	m. × 1.093 = yards	yard × 0.914 = m.
	km. × 0.621 = miles	mile × 1.609 = km.
AREA:	sq. cm. × 0.155 = sq. inches	sq. in. × 6.452 = sq. cm.
	sq. m. × 10.764 = sq. feet	sq. feet × 0.093 = sq. m.
	sq. m. × 1.196 = sq. yards	sq. yard × 1.672 = sq. m.
	sq. km. × 0.386 = sq. miles	sq. miles × 2.59 = sq. km.
VOLUME:	cc. × 0.061 = cb. inches	cb. inch × 16.387 = cc.
	cc. × 0.0338 = Apoth. fluid ounces	Ap. fluid ounce × 29.574 = cc.
	1 × 1.0567 = quarts	quart × 0.946 = liters
	1 × 0.2642 = U. S. gallons	gallon × 3.785 = liters
WEIGHTS:	g. × 15.432 = grain	grain × 0.0648 = gm.
	gm. × 0.03527 = Av. ounces	Av. ounce × 28.349 = gm.
	gm. × 0.03215 = Ap. ounces	Ap. ounce × 31.103 = gm.
	kg. × 2.2046 = Av. pounds	Av. pound × 0.4536 = kg.
	kg. × 2.6792 = Ap. pounds	Ap. pound × 0.3732 = kg.

convallaretin. $C_{14}H_{26}O_3$ = 242.2. A resinoid from convallaria, used as an emetic.

Convallaria. Lily of the valley. The flowers and roots of *C. majalis;* used medicinally as an antispasmodic, sternutatory, and diuretic.

convallarin. $C_{34}H_{52}O_{11}$ = 646.6. A glucoside from the root of Convallaria. Colorless rectangular prisms, or amorphous yellowish powder, sparingly soluble in water, soluble in alcohol; used as a purgative.

convection. The transmission of heat by the rise of heated liquids or gases, and the fall of colder parts of liquid or gas which in turn become heated; hence, the currents or streams of liquids or gases set up in an unequally heated container.

convergent. Inclining towards each other or coming together at one point.

conversion. (1) The change from one isomer to another isomeric molecule. (2) The change from one unit or system of measurement to another unit or system of measurement. **c. factor.** A numeral by which a quantity must be multiplied in order to express that quantity in other units.

converter. A device used for changing (1) energy, or (2) matter into another form; as, (1) phase-c., or (2) a digester.

convex. A rounded or bulging exterior surface; opposed to concave. **c. lens.** See *lens.* **c. mirror.** See *mirror.*

convicin. $C_{20}H_{28}O_{16}N_6$ = 608.24. A hexose glucoside of pyrimidine, in *Vicia* species.

Convolvulaceae. A family of twining or trailing herbs, some of which have a milky juice:

Exogonium purga	jalap
Exogonium turpethum	turpeth
Ipomoea hederacea	kaladana
Ipomoea orizabensis	ipomoea
Ipomoea simulans	tamicin
Ipomoea pandurata	convolvulus
Convolvulus scammonia	scammony

convolvulin. $C_{31}H_{50}O_{16}$ = 678.5. Rhodeorhetin. A glucoside from jalap. A yellow amorphous mass, soluble in alcohol or chloroform; used as a drastic purgative.

convolvulinic acid. $C_{18}H_{30}O_3$ = 258.3. The acid $Me(CH_2)_5.CHOH(CH_2)_9COOH$, obtained from jalap resin. Colorless crystals, m.50.

convolvulinolic acid. Convolvulinic acid.

convolvulus. The root of *C. panduratus,* man root, a Convolvulaceae of North America; used as a diuretic and laxative.

convulsant. A drug which causes convulsions.

conydrine. Conhydrine.

conylene. C_8H_{14} = 110.10. 1.4-octadiene. A hydrocarbon derived from azoconhydrine.

conyrine. $C_8H_{11}N$ = 121.09. α-propyl pyridine. Colorless crystals, m.167, obtained by the reduction of conine with zinc dust.

Cook formula. The acetyl number (q.v.) A, is given by $A = \frac{S' - S}{1 - 0.00075S}$, where S and S' are the saponification values before and after acetylation.

Coolidge, William David. 1873– . An American physical chemist, noted for his development of x-ray devices. **C. tube.** (1) A modified x-ray tube in which the cathode is a tungsten spiral enclosed in a molybdenum tube. The quality of the x-rays depends on the electrically heated cathode. (2) Electron tube. A modified cathode tube with a thin nickel window and a cathode consisting of a wire made incandescent by a secondary electric current. On passing a high voltage across the highly evacuated tube, a stream of electrons will pass out of the window and produce effects similar to the β-rays of radium.

cooling. To deprive of heat; as, freezing, refrigeration. **air- C.** by means of air currents. **water- C.** by means of a stream of cold water.

Cooper Hewitt lamp. An incandescent mercury vapor lamp consisting of an exhausted glass tube, 3–4 feet long, which contains a small quantity of mercury and to which is applied an electric potential.

cooperite. A native platinum sulfarsenide containing 64 % Pt and 9 % Pd.

coordinate. Related to one another. **c. bond.** See *bond.* **c. paper.** A sheet of paper ruled with horizontal and vertical lines, used in drawing graphs and curves. **c. valence.** See *bond valence.*

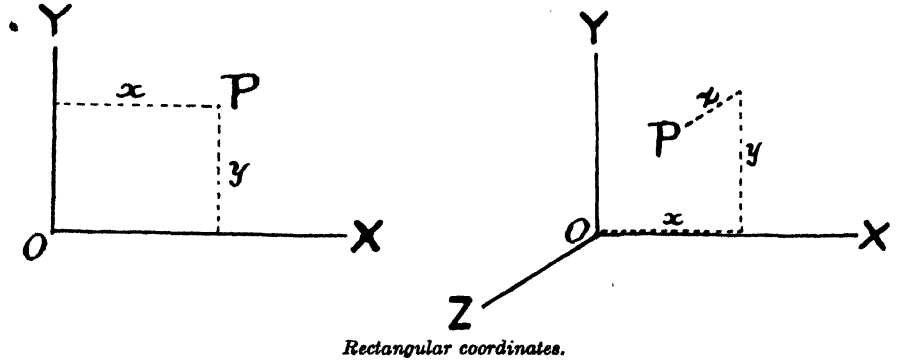
coordinates. Any system by which the position of a point, particle, object or star is defined by reference to base-lines or base-planes. Cf. *diagram, abscissa, ordinate.*

A. *Rectangular* c. (*Cartesian* c.) give the distances, x, y, of point P, from each of two or three perpendicular lines or planes, YOX, XOZ, ZOY.

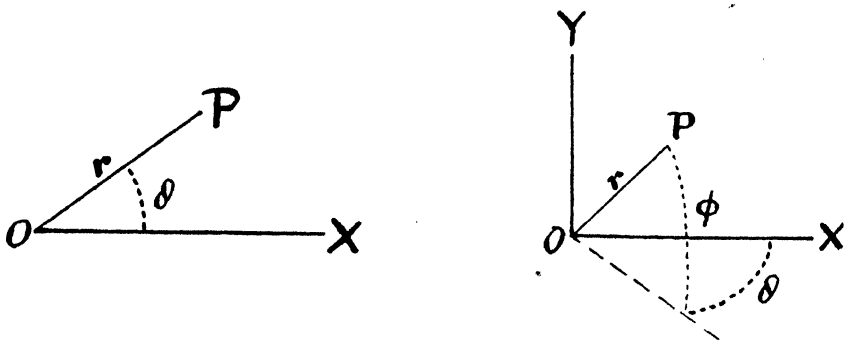
B. *Polar* c. give the distance, r, from the origin, O, with the angle, θ; or the latitude and longitude, θ and ϕ, on a sphere of radius r.

C. *Vector* c. A straight line in a definite direction, P, and of definite length, r.

coordination. The harmonious working together of parts of the same rank or order. **c. number.** The valence number of the central atom of addition compounds, indicating the number of molecules or atoms held by that atom. Carbon and related elements have a maximum of four, all other elements have generally a c. number

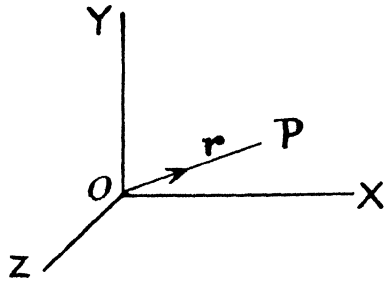


Rectangular coordinates.



Polar coördinates.

of six. Thus $[PtX_6]R_2$ or $[CrX_6]R_3$, where X may or may not be the same radical as R; the latter is usually a monovalent radical, while X is Br, Cl, CN, SCN, NO, NO_2, NH_3 or H_2O. Cf. *Werner's theory.*



Vector cooridnates.

copahene. $C_{20}H_{27}Cl$ = 302.7. Colorless crystals insoluble in water.

copahin. A resinoid from copaiba balsam.

copahuvic acid. Copaivic acid.

copaiba. Balsam of copaiba, copaiva. An oleoresin from various leguminous trees of tropical America, especially *Copaifera officinalis.* Grades: **Bahia-** refr. index 1.508, acid val. 110–150. **Maracaibo-** refr. ind. 1.517, acid value 120–160. **Maranham-** refr. ind. 1.515, acid value 140–170. **mixture-** q.v. **Para-** refr. ind. 1.510, acid value 100–160. Insoluble in water used as a stimulant, diuretic, and laxative.

c. oil. An essential oil distilled from c., d.-0.895–0.905, b.250–275; it contains sesquiterpenes. **c. resin.** The residue remaining after distillation. It consists mainly of copaivic acid.

copaiva. Copaiba.

copaivic acid. $C_{20}H_{30}O_2$ = 302.3. Copahuvic acid. A monobasic acid derived from the resin of copaiba.

copals. A group of hard resins from East Indies, South America and Africa, consisting of the exudations of various trees; they are used principally in varnish manufacture. **East African-** Animi resin. **fossil-** C. found in the ground at places where the trees yielding it have disappeared. This is the best and highest-priced c. **fresh-** Inferior c. gathered from living trees. **kauri-** Kauri gum. **Manila-** See *Manila.* **semifossil-** Copal collected from the ground near living trees.

c. balsam. Liquid ambar.

copalchi. The barks of *Strychnos pseudoquina, Croton niveus,* and other South American trees; used as a febrifuge.

copalin. Kopalin. The resin which exudes from the sweet-gum tree, *Liquidambar styraciflua.*

copel. An alloy of 55 % copper and 45 % nickel; used in thermocouples.

copellidine. $C_8H_{17}N$ = 127.15. aa_1-copellidine, 2-ethyl-6-methyl-piperidine. An artificial alkaloid, derived from piperidine.

copernik. An alloy of equal parts iron and nickel.

copiapite. Yellow copperas. The native compound $Fe_4S_5O_{18} + H_2O$.

copis. A white transparent shell from the Philippine Islands; used extensively in the manufacture of screens, windows, lamps, etc.

Coplin jar. A box-like glass vessel with inside perpendicular grooves for holding microscopical slides apart during staining.

copper. (1) Cu = 63.57. Cuprum. A metallic element, atomic number 29. An orange-colored, ductile, malleable metal, d.8.90, m.-1083, b.2840, insoluble in water, dissolved by nitric acid. It occurs in nature as metallic copper, oxide (cuprite), sulfide (copper-glance, chalcopyrite), or carbonate (malachite, etc.), and was known in prehistoric times (copper age). It is prepared or refined by electrolysis of crude copper in copper sulfate solution. Copper is mono- and di-valent, and forms two series of compounds:

+1: cuprous compounds, *e.g.*, CuCl
+2: cupric compounds, *e.g.*, $CuCl_2$.

The cupric compounds are more stable than the cuprous compounds; they are blue when hydrated, and white or grayish when anhydrous; they are poisonous and ionize in aqueous solution. Metallic copper is used extensively for wires, plates, coins, utensils, etc. and is a constituent of many alloys (brass, bronze, bell metal, gun metal, etc.). (2) A general term suggested for alloys containing 98 % or more of copper. **black-** Cupric oxide. **blue-** A native c. sulfide. **indigo-** Covellite. **peacock-, purple-** Dornite. **rose-** See *rosette.* **scale-** C. in thin flaskes. **silicon-** An alloy of 70–80 % Cu and 30–20 % Si. **wood-** Olivenite. **yellow-** Chalcopyrite.

c. aceto arsenite. Paris green. **c. alloys.** See table. **c. ammonium chloride.** See *cupric ammonium chloride.* **c. arsenite.** See *cupric arsenite.* **c. beaker.** A copper beaker or cup used in the laboratory. **c. blue.** Azurite. **c. bromide.** See *cuprous, cupric.* **c. carbonate.** Verditer. A native blue or green copper

COPPER ALLOYS

Cu.....	90 %	80 %	70 %	60 %	50 %
With	10 %	20 %	30 %	40 %	50 %
Ag.....	1035°	990°	945°	910°	870°
Al.....	1055°(a)	930°	755°	610°	580°
Au.....	1060°	1025°	1000°	975°	925°
Ni.....	1180°	1240°(d)	1290°	1320°(h)	1335°
Pb.....	1020°	1005°	985°	955°	950°
Sn.....	1005°(b)	890°(e)	755°(f)	725°	680°
Zn.....	1040°(c)	995°(j)	930°(g)	900°(i)	880°

a = aluminum bronze
b = bronze, gun metal
c = brass
d = nickeline
e = bell metal
f = speculum metal
g = yellow brass
h = constantan
i = Muntz metal
j = Dutch metal

carbonate. Cf. *Bremen. basic-* See *cupric c.* **c. chloride.** See *cupric, cuprous chloride.* **c. crucible.** A small crucible of copper. **c. flask.** A 1000-cc. flask used in Kjeldahl determinations. **c. froth.** Tyrolite. A native copper arsenate. **c. funnel.** A funnel made of copper, used in pharmaceutical laboratories. **c. green.** A native pigment of lead chromate and c. oxide. **c. lazur.** Azurite. **c. minerals.** The chief ores of copper are native copper, sulfides, oxides and carbonates.

native copper	Cu
chalcocite	Cu_2S
covellite	CuS
chalcopyrite	$CuFeS_2$
chalmersite	$CuFe_2S_3$
cubanite	$CuFe_2S_4$
bornite	Cu_3FeS_4
carrollite	$CuCo_2S_4$
berzelianite	Cu_2Se
umangite	Cu_3Se_2
rickardite	Cu_4Te_3
weissite	Cu_5Te_3
domeykite	Cu_3As
algodonite	Cu_6As
whitneyite	Cu_9As
horsfordite	Cu_5Sb
enargite	Cu_3AsS_4
famatinite	Cu_3SbS_4
tennantite	$Cu_3As_2S_7$
tetrahedrite	$Cu_3Sb_2S_7$
klaprotholite	$Cu_6Bi_4S_9$
emplectite	$CuBiS_2$
bournonite	$CuPbSbS_3$
cuprite	Cu_2O
tenorite	CuO
nantokite	CuCl
chalcanthite	$CuSO_4.5H_2O$
brochantite	$Cu_4SO_4(OH)_6$
malachite	$Cu_2(OH)_2CO_3$
azurite (chessylite)	$Cu_3(OH)_2(CO_3)_2$
chrysocolla	$CuSiO_3.2H_2O$
dioptase	CuH_2SiO_4

c. mordant. Cupric sulfate or cupric acetate. **c. number.** The number of milligrams of copper obtained by the reduction of Fehling's or Benedict's solution by one gram of a carbohydrate. **c. orthosilicate.** Dioptase. Chrysocolla. **c. peroxide.** Cu_2O_3 and $CuO_2.H_2O$. A yellow powder, decomp. in water. **c. phosphide.** See *cuprous p.* and *cupric p.* Cu_5P_2. H_2O also exists. **c. shavings.** Small shavings of metallic c., used as a catalyst and in preparing cuprammonium reagent. **c. silicide.** Cu_2Si. A gray powder. **c. sulfate.** Cupric sulfate. **c. vitriol.** Cupric sulfate. **c. wire.** A wire of metallic c., used extensively as an electric conductor.

copperas. A native, crystalline ferrous sulfate, $FeSO_4$. **blue-** Cupric sulfate. **green-** Ferrous sulfate. **yellow-** Copiapite. **white-** Zinc sulfate.

copperon. Cupferron.

Coppet, Louis Cas de. 1841–1911. A French physicist. **C's law.** The reduction in the freezing point of a solution is proportional to the amount of dissolved substance. Cf. *Raoult's law.*

copra. The dried kernels of the coconut, from which coconut oil is expressed.

cupraol. A fat obtained from coconut oil.

coprecipitation. See *precipitation.*

coprolite. The fossil dung of prehistoric animals and a source of phosphates and fertilizers (25–30 % P_2O_5). Rounded lumps, 2–8 ins. in diameter occurring in small deposits throughout the world.

coprophilia. A group of bacteria living in feces and dung.

coproporphyrin. The coloring matter of bottom-fermentation yeasts.

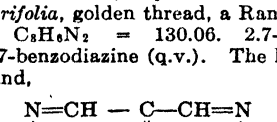
coprostanol. Coprosterol.

coprosterol. $C_{27}H_{48}O$ = 388.37. Dihydrocholesterol, stercorol; coprostanol. A saturated alcohol from feces; colorless crystals, m.98. Cf. *cholane derivatives.*

copro-yeast. See *yeast.*

coptine. A colorless, crystalline alkaloid from *Captis trifolia*, golden thread, a Ranunculaceae.

copyrine. $C_8H_6N_2$ = 130.06. 2.7-pyridopyridine, 2.7-benzodiazine (q.v.). The heterocyclic compound,



an isomer of phthalazine, quinazoline, and quinoxaline. **dibenzo-** See *dibenzocopyrine.*

corajo. Vegetable ivory. A hard, white substance from the tagud nut. Cf. *phytelephas.*

coral. The solid calcareous skeletons of the coral animal, *Polyps anthozoa;* it consists chiefly of calcium carbonate colored by ferric oxide. **c. bean.** Sophora. **c. root.** Crawley. The root of *Corallorhiza odontorhiza*, an Orchidaceae; a powerful diaphoretic.

corallin. (1) Peonin, aurine R. A coloring matter and dye derived from rosolic acid; insoluble in water, soluble in alcohol or ether. Used as a reagent and dye. (2) A pigment found in *Streptothrix* species. **c. solution.** A solution of 1 pt. c. in 10 pts. alcohol and 90 pts. water. It is an indicator for ammonia and weak bases, (alkalis—red; acids—yellow). **c. yellow.** Sodium rosolate.

corallinate. Rosolate.

coralline. (1) Corallin. (2) Rosolic acid.

corallite. Carrolite.

coramine. Nikethamide. A pyridine derivative used as cardiac stimulant.

corbefrin. Cobefrin.

corbyn. A glass bottle of 1200 cc. capacity, and shaped like a winchester (q.v.).

cord. A unit in the volumetric measurement of wood as logs. The volume occupied by an orderly pile of logs 8 feet long, 4 feet wide and 4 feet high, the logs being laid as near parallel to the ground and to one another as possible. It has therefore a maximum value of 128 cu. ft. (3.625 cu.m.), but is more usually 90 to 95 cu. ft. of solid wood because of the spaces between the logs. Cf. *cunit, board foot, fast meter.*

cordein. Methyl *cordol.*

cordial. (1) An elixir. (2) A liqueur.

cordierite. Iolite.

cordite. A smokeless, sporting powder consisting of 30–58 % nitroglycerin, 65–37 % nitrocellulose and 5–6 % mineral jelly.

cordol. $C_6H_4OH.COOC_6H_2Br_3$ = 450.82. Tribromsalol. A white, tasteless and odorless powder, insoluble in water, alcohol, or ether, soluble in chloroform or acetic acid; used as an intestinal antiseptic and hemostatic. **acetyl-** Cordyl, acetyltribromsalol. Fine, white needles. Analgesic, hypnotic, intestinal antiseptic and antispasmodic. **methyl-** Cordein methyltribromsalol. Colorless needles. Antiseptic and analgesic.

cordyl. Acetyl *cordol.*

core. The central part, *e.g.*, the iron rod of an induction coil.

coreductase. The co-enzyme of reductase, q.v.

coregonin. A protamine from *Coregonus albus*, white fish.

coriaceous. Describing a tough, leathery growth of bacteria.

coriamin. A 25 per cent aqueous solution of pyridine-β-carbonic acid diethylamide, $NC_5H_4.CON(C_2H_5)_2$.

coriamyrtin. $C_{30}H_{56}O_{10}$ = 556.3. A glucoside from the leaves, flowers, and seeds of *Coriaria myrtifolia*, or curriers sumach, a Coriariaceae. Colorless crystals, m.220, sparingly soluble in water, soluble in alcohol or ether; it is a tetanic poison resembling picrotoxin in action.

coriander. The seeds of *Coriandrum sativum*, an Umbelliferae; used as an aromatic, carminative, and spice. **c. oil.** The essential oil from coriander, d.0.863–0.875, containing linalol and pinene; used as a flavoring agent.

coriandrol. Linalool.

coriarine. An alkaloid from *Coriaria myrtifolia.* Cf. *coriamyrtin.*

coridine. $C_{10}H_{15}N$ = 149.1. An aniline derivative obtained by the distillation of animal matter, *e.g.*, bones. It is a homolog of pyridine. **hydro-** Hydrocoridine.

cork. Suber. (1) The exterior layers of the bark beneath the epidermis of certain oaks; obtained from *Quercus suber* and *Qu. occidentalis.* See *cerin, corticinic acid, phellonic acid, suberic acid, suberin.* (2) A stopper made from cork. **c. borer.** A set of metallic tubes for boring holes in cork stoppers. **c. press.** A device for pressing and softening cork stoppers. **c. tongs.** A pair of tweezers for making cork stoppers more elastic or soft.

corm. A thickened underground stem of a plant that has the character of a tuber and bulb. There is only one official corm (sometimes erroneously termed radix); namely, colchicum.

corn. (1) A general term for the grain-producing grasses, or cereals. (2) Maize. (3) A hard mass of tissue. **Indian-** Maize. **c. oil.** Oil of *maize.* **c. silk.** The stigmas of maize; used as a diuretic as a fluid extract. **c. sirup.** Glucose. **c. spar.** A crystalline variety of calcite. **c. starch.** See *starch.* **c. sugar.** *d*-Glucose.

cornelian. A bright red variety of chalcedony.

Cornet forceps. Nickel plated spring forceps to hold cover glasses.

cornflower. Blue bottle. The blossoms of *Centaurea cyanus*, a Compositae containing cyanidin, a blue pigment. Cf. *anthocyanin, flavones.*

cornic acid. Cornin.

cornification. Rendering hard and brittle by drying.

cornin. Cornic acid. A crystalline substance from the bark of *Cornus florida*, or dogwood, a Cornaceae. Cf. *cornuoid.*

cornine. An alkaloid from *Cornus florida;* used as an antiperiodic and tonic.

Corning filter. (1) In general: a glass filter plate made by the Corning Co. for isolating light of a particular wavelength. (2) In particular: a filter for isolating ultraviolet light.

cornstone. Impure clay containing limestone.

Cornu prism. A quartz prism composed of two 30° angle right and left quartz prisms in optical contact. It refracts light. Cf. *Littrow prism.*

cornuoid. The combined principles from the bark of *Cornus florida*, the Florida dogwood; used as a tonic, antimalarial, and febrifuge.

cornutine. An alkaloid of ergot. **c. citrate.** The citrate of cornutine; used medicinally for spermatorrhea.

cornutol. A liquid extract of ergot containing the water- and alcohol-insoluble constituents.

coromegine. Atropine.

corona. (1) A crown or crown-like structure. (2) The incandescent gases which surround the sun, and are seen during total eclipses. Its light is partly polarized and yields unknown bright lines, and continuous or Fraunhofer spectra. **c. discharge.** The corona produced at the electrodes during an electrical discharge at a high voltage (see *Cottrell precipitator*). **c. spectrum.** The spectrum of the corona of the sun, which is a reversed spectrum showing prominent and luminous Fraunhofer lines.

coronillin $C_7H_{12}O_5$ = 176.1. A glucoside from the seeds of *Coronilla scorpioides*, a Leguminosae. A yellowish powder, soluble in water, acetone or amyl alcohol, slightly soluble in alcohol, ether, or chloroform. It is a cardiac poison, used as a diuretic and heart stimulant.

coronium. Protofluorine. A hypothetical element discovered in the spectrum of the corona of the sun, but not yet found on the earth's surface. Its spectrum is thought to be due to forbidden lines of oxygen.

corporin. Progesterone.

corpse light. The blue flame inside the miners' safety lamp, which indicates the presence of fire-damp (methane).

corpus. (1) The body. (2) The main part of an organ. (3) A dried organ, used therapeutically. **c. ciliariae.** An extract of the ciliary or vitreous body. Used in ophthalmia. **c. luteum.** The dried substance from the corpora lutea removed from the ovaries of cows or hogs, dried and powdered without the addition of preservatives or diluents. It is a yellowish powder, slightly soluble in water and used in ampule medication. It contains several hormones, *e.g.*, progesterone, relaxin. Cf. *lutein, ovarian substance.*

corpuscle. (1) A small or minute particle. (2) A free electron. **blood-** See *blood.* **light-** See *photon.* **negative-** See *electron.* **positive-** See *proton.*

correlation. A reciprocal relationship; interdependence. **c. coefficient.** The quantity $\sqrt{(1 - p^2)/(n - 1)}$; where n is the number of values obtained for a given determination, and p is the true value.

correspondence principle. The relation existing between the different orbits of an electron in an atom and the characteristic radiation. Cf. *Bohr's theory, Pauli's principle.*

corresponding state. The assumption that if the pressure, volume and temperature is expressed for each substance (whether solid, liquid or gaseous) by the critical constants P_c, V_c, and T_c, then the (Van der Waal's equation) equation of state will hold for all substances, in the liquid or gaseous state, for they will then correspond. **c. temperatures.** Those temperatures of two or more substances which are equal fractions of the critical temperatures.

corrigent. A drug which favorably modifies or corrects the action of another drug.

corroborant. Tonic.

corrode. To disintegrate slowly by chemical action.

corronel. An alloy of 70 % nickel and 30 % copper.

corrosion. A process of gradual disintegration or decomposition of a chemical nature, *e.g.*, of iron in acidic water, rocks in natural waters. It is electrochemical in character. Cf. *surrosion, erosion.*

corrosive. (1) A drug which destroys organic tissues either by chemical means or by causing inflammation. (2) Any agent that causes corrosion. **c. poison.** See *poison.* **c. sublimate.** Mercuric chloride.

corrosives. The irritant poisons, which cause local destruction of organic tissues, *e.g.*, acids, bases, $KClO_4$, H_2O_2, etc.

corrugation. The wrinkling of a part or body, *e.g.*, corrugated fibre board.

corsite. Napoleonite. A variety of diorite found in Corsica. It may be banded or spotted; used as an ornamental stone.

cortepinitannic acid. $C_{32}H_{34}O_{17}$ = 690.2. A bright red powder from the bark of Scotch fir, *Pinus sylvestris.* Cf. *pinicortannic acid.*

cortex. The bark of a tree, root, or fruit.

corticin. A tannin from bark of trees.

corticole. A group of lichens.

corticosterone. 11,21-Dihydroxyprogesterone, a steroid hormone from adrenal cortex extracts.

corticotrophin. The active principle of the anterior lobe of the pituitary gland which acts on the adrenal cortex.

cortin. An extract of adrenal cortex.

corticinic acid. $C_{13}H_{10}O_6$ = 250.08. A colorless crystalline substance obtained from cork.

corundum. α-Alumina. Oriental topaz. A hard native or artificial aluminum oxide, used as an abrasive and refractory. *Emery* is impure c.; for native colored varieties see *adamantine, hyacinth, sapphire, oriental c.*

coruscation. The emission of sparks or flashes.

corybulbine. $C_{21}H_{25}O_4N$ = 355.20. An alkaloid from *Corydalis cava;* colorless crystals, insoluble in water.

corycavamine. $C_{21}H_{21}O_5N$ = 367.16. An alkaloid from *Corydalis cava.*

corycavine. $C_{23}H_{23}O_6N$ = 409.20. An alkaloid from *Corydalis cava,* m.218.

corydaline. $C_{22}H_{27}O_4N$ = 369.22. An alkaloid from *Corydalis cava* and *C. tuberosa,* holewort, a Fumariaceae. Colorless crystals, used medicinally as a tonic, alterative, and diuretic.

corydalis. Turkey corn, holewort. The root of *C. cava* (*Bulbocapnus cavus*), a Fumariaceae. Used for menstrual disorders, as a malarial tonic and vermifuge. It contains a number of isoquinoline alkaloids, as corydaline, bulbocapnine, corydine, and fumarine.

corydine. $C_{21}H_{23}O_4N$ = 353.18. An alkaloid from *Corydalis cava.*

corylin. A globulin from hazel nuts.

corynin. $C_{50}H_{100}O_4$ = 764.7. A hydroxy acid, m.70, from the fat of the diphtheria bacillus.

corynine. Yohimbine.

corytuberine. $C_{19}H_{23}O_4N$ = 329.17. An alkaloid from *Corydalis cava.*

cosanates. A group of salts or esters derived from fatty acids, with 20 to 29 carbon atoms, as:

eicosanate	$C_{19}H_{39}COO—$
heneicosanate	$C_{20}H_{41}COO—$
docosanate (behenate)	$C_{21}H_{43}COO—$
tricosanate	$C_{22}H_{45}COO—$
tetracosanate	$C_{23}H_{47}COO—$
pentacosanate	$C_{24}H_{49}COO—$

cosanic acids. A group of fatty acids with 20 to 29 carbon atoms, as:

eicosanic acid	$C_{20}H_{40}O_2$	m.76°C
heneicosanic acid	$C_{21}H_{42}O_2$	m.75°C
docosanic (behenic) acid	$C_{22}H_{44}O_2$	m.81°C
tricosanic acid	$C_{23}H_{46}O_2$	m.80°C
tetracosanic (cerosic) acid	$C_{24}H_{48}O_2$	m.85°C
pentacosanic acid	$C_{25}H_{50}O_2$	m.84°C
hexacosanic acid	$C_{26}H_{52}O_2$	m.89°C
heptacosanic (cerotic) acid	$C_{27}H_{54}O_2$	m.89°C

cosanols. A group of aliphatic alcohols of the methane series with 20 to 29 carbon atoms, as:

eicosanol	$C_{20}H_{42}O$	m.65°C
heneicosanol	$C_{21}H_{44}O$	m.68°C
docosanol	$C_{22}H_{46}O$	m.70°C
tricosanol	$C_{23}H_{48}O$	m.74°C
tetracosanol	$C_{24}H_{50}O$	m.76°C
pentacosanol	$C_{25}H_{52}O$	m.78°C

cosaprin. Sodium acetsulfanilate.

cosine. The ratio of the base to the hypotenuse of a right-angled triangle is the cosine of the angle subtended by these two sides.

cosmetic. A pharmaceutical preparation (powder, lotion, or cream) which tends to preserve, restore, or simulate beauty.

cosmic. Pertaining to the universe. **c. rays.** Ultra-γ-rays. A radiation of extremely short wavelength (around 0.0005 A.U.), frequency and penetration, which reaches the surface of the earth from all directions of space (cosmos).

First noted by Gockel (1910–11) up to 4500 m. height, confirmed by Hess (1912) and later by Kohlhörster (1912–14) up to 9200 m. Their cosmic origin was denied by Millikan (1922), but admitted in 1925.

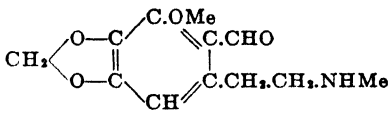
cosmin. Agathin.

cosyl. A group of monovalent radicals derived from the methane series of hydrocarbons with 20 to 29 carbon atoms:

eicosyl	$C_{20}H_{41}$—
heneicosyl	$C_{21}H_{43}$—
docosyl	$C_{22}H_{45}$—
tricosyl	$C_{23}H_{47}$—
tetracosyl	$C_{24}H_{49}$—
pentacosyl	$C_{25}H_{51}$—
hexacosyl	$C_{26}H_{53}$—
heptacosyl	$C_{27}H_{55}$—
octocosyl	$C_{28}H_{57}$—
nonocosyl	$C_{29}H_{57}$—

cotarnic acid. $C_{11}H_{12}O_6$ = 224.09. A dibasic acid derived by oxidation of cotarnine.

cotarnine. $C_{12}H_{15}O_4N$ = 237.13. An alkaloid formed by the oxidation of narcotine. It

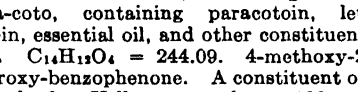


is a sedative and astringent. Cf. *cuprine, cupronine.* **c. hydrochloride.** Stypticine. **c. phthalate.** Styptol.

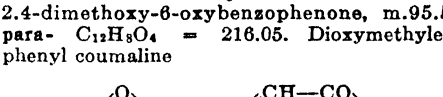
cotein. $C_{22}H_{18}O_6$ = 378.15. Cotoin. A crystalline principle from coto bark; an irritant to the skin.

coto. The bark from a Bolivian tree. Two varieties: Coto verum, containing cotein; and para-coto, containing paracotoin, leucotin, cotoin, essential oil, and other constituents.

cotoin. $C_{14}H_{12}O_4$ = 244.09. 4-methoxy-2.6.-dihydroxy-benzophenone. A constituent of para-coto bark. Yellow crystals, m.129; slightly soluble in cold, readily soluble in hot water. Used as an irritant. **hydro-** $C_{15}H_{14}O_4$ = 258.1. 2.4-dimethoxy-6-oxybenzophenone, m.95.5. **para-** $C_{12}H_8O_4$ = 216.05. Dioxymethylene phenyl coumaline



An active principle from para-coto bark. Yellow crystals, m.152, soluble in alcohol. **proto-** $C_{16}H_{14}O_6$ = 292.11.



cotonetin. $C_{20}H_{16}O_5$ = 336.1. Colorless scales, isolated from coto bark.

cotton. (1) The hairs of the seeds of *Gossypium* species, a Malvaceae, which consist of 91 % cellulose and 7 % moisture. (2) A textile material spun from c. fibers. (3) Pyroxylin or freshly nitrated c. **absorbent-** A purified and fat-free c. **gun-** Pyroxylin. **soluble-** Nitrocellulose. **styptic-** C. impregnated with ferric chloride and dried, and used to stop bleeding. **c. gum tree.** See *gum-tree.* **c. oil.** C. seed oil. **c. root bark.** The dried root bark of the c. plant, used as an emmenagogue. Cf. *gossypoid.* **c. seed meal.** The solid residue after extracting c. oil, finely ground and used as cattle feed and fertilizer; it contains 6.7–7.4 % N, 1.5–2 % K and 2–3 % P_2O_5. **c. seed oil.** Oleum gossypii seminis. The fixed oil expressed from the seeds of various Gossypium species. The raw oil is a brownish yellow, somewhat viscid liquid, d.0.922 to 0.936. The refined oil is colorless or slightly yellow, of a pleasant nutty odor, $d_{15°}$.0.9264. Used extensively in pharmaceutical preparations, and as a substitute for olive oil in the household. See *Halphen's test.*

cotyledon toxin. An amorphous, colorless substance from *Cotyledon orbiculata,* pigs ear or honde oor, a Crassulaceae of South Africa; used in epilepsy.

Cottrell, Frederick Gardner. 1877– . An American chemist, noted as designer of a precipitation apparatus. **C. precipitator.** A device for the deposition of the fine particles, which constitute a fog or smoke on a series of wires which are at a different electric potential from their surroundings. Used for the recovery of materials in ore-refineries, acid concentration plants, cement, coal and other industrial plants, where dust or smoke is a waste product.

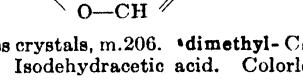
couepic acid. $C_{18}H_{30}O_2$ = 278.21. ϵ-Eleostearic acid. An unsaturated acid, $Me(CH_2)_3CH{:}CH(CH_2)_7COOH$, from the seed-oil of *Couepia grandiflora,* a Rosaceae of South America.

Coulomb, Charles Augustin de. 1736–1806. A French physicist noted as a pioneer in the formulation of electrical laws. **C. electromagnetic law.** The force between two similar magnetic poles varies inversely as the square of the distance between the poles. **C. electrostatic law.** The force between two electrical charges varies: (a) inversely as the squares of their distance apart; and (b) directly as the product of their electrical charges. Hence $F = (1/K)(qq'/r^2)$, where F is the force, k a constant depending on the units used, q and q' the two charges which are a distance apart. **C. unit.** See *coulomb.*

coulomb. Coul. Weber. A unit of electrical quantity. The amount of electricity or the number of electrons transferred by a current of one ampere in one second. 1 Coul. = 10^{-1} e.m.u. = $10^9 \times 3$ e.s.u. = (Volt. Sec.)/Ohm. = Amp./second = 1/96,489 Faraday. **international-** 1 Int. coul. = 0.9999 absolute coul.

coulometer. Voltameter.

coumalic acid. $C_6H_4O_4$ = 140.03. 2-keto-1.2-pyran-5-carboxylic acid, *2-oxo-1.2-pyran-5-carboxylic acid*.*



Colorless crystals, m.206. ***dimethyl-** $C_8H_8O_4$ = 168.07. Isodehydracetic acid. Colorless crystals, m.155.

coumalin. $C_5H_4O_2$ = 96.03. Cumalin, 1.2-pyrone, α-pyrone. Colorless liquid or crystals, m.5, b.120. **dimethyl-** $C_7H_8O_2$ = 124.05. Mesitene lactone. Colorless crystals, m.51.5, b.245. **phenyl-** $C_2H_3PhO_2$ = 172.07. 1-phenyl-a-pyrone. Colorless crystals, m.68. Cf. *paracotoin.*

coumaraldehyde. $C_9H_8O_2$ = 148.06. o-Oxycinnamaldehyde, coumaric aldehyde. Colorless crystals m.133, sparingly soluble in water, soluble in alcohol.

coumaran. $C_8H_8O_2$ = 152.07. Dihydrocoumarone, 1.2-dihydro benzofuran. A colorless liquid, b.189.

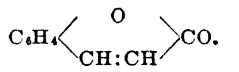
coumaranone. 2(1)-Benzofuranone.

coumaric acid. $C_9H_8O_3$ = 164.11. Coumarinic acid. An acid from the leaves of *Melilotus*. **ortho-** o-hydroxycinnamic acid, o-oxycinnamic acid. Colorless needles, m.208, slightly soluble in water, soluble in alcohol or ether. **meta-** m-hydroxycinnamic acid. Colorless prisms, m.191, sparingly soluble in hot water or ether. **para-** p-hydroxycinnamic acid. White needles, m.206 slighly soluble in water, soluble in alcohol or ether. **acetyl-** Tylmarin. **hydro-** $HO.C_6H_4.CH_2.CH_2.COOH$ = 166.13. p-hydrocoumaric acid, b-phenol-propionic acid. White monoclinic crystals, m.128, soluble in water, alcohol, or ether. Cf. *melilotic acid*. **hydroxy-** Umbellic acid.

c. aldehyde. Coumaraldehyde. **c. lactone.** Coumarin.

coumarilic acid. $C_8H_5O.COOH$ = 162.1. 1-benzofuran carboxylic acid. **alpha-** Colorless crystals, m.190. **beta-** Colorless crystals. **β-methyl-α-** $C_9H_7O.COOH$. Colorless crystals, m.189.

coumarin. $C_9H_6O_2$ = 146.05. 1.2-benzopyrone, o-hydroxy-cinnamic lactone

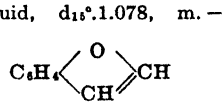


The anhydride of o-coumaric acid occurring in Tonka beans, sweet clover, and other plants; also prepared synthetically. Colorless rhombic crystals, d.0.937, m.67, b.301.7, sparingly soluble in cold water, soluble in hot water, alcohol, or ether; used as a flavoring agent. **6.7-dihydroxy-** Esculetin. **7.8-dihydroxy-** Daphnetin. **dimethyl-** $C_{11}H_{10}O_2$ = 174.1. 4.7-dimethyl-1.2-benzopyrone. para-beta-dimethyl-coumarin. Colorless crystals, m.148. **ethyl-** $C_{11}H_{10}O_2$ = 174.1. 3-ethyl-1.2-benzopyrone. Colorless crystals, m.71. **7-hydroxy-** Umbelliferone. **iso-** 2.1-benzopyrone. Colorless crystals, m.47°C. **iso-propyl-** $C_{12}H_{12}O_2$ = 188.1. 3-isopropyl-1.2-benzopyrone. Colorless crystals, m.54. **7-methoxy-** Herniarin. **α-methyl-** $C_{10}H_8O_2$ = 160.1. 3-methyl-1.2-benzopyrone. Colorless crystals, m.90. **β-methyl-** $C_{10}H_8O_2$ = 160.1. 4-methyl-1.2-benzopyrone. Colorless crystals, m.125. **3-oxy-** $C_9H_6O_3$ = 162.1. Colorless crystals, m.282. **4-oxy-** Umbelliferone. **4-oxy-β-methyl-** Resocyanin. **5-oxy-** $C_9H_6O_3$ = 162.1. Colorless crystals, m.249.

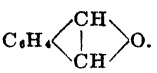
coumarinic acid. Coumaric acid.

coumarketone. A compound containing the monovalent $C_6H_4(OH)CH{:}CH.CO$-radical. **methyl-** $C_{10}H_{10}O_2$ = 162.1. o-oxy-benzalketone. Colorless crystals, m.139.

coumarone. C_8H_6O = 118.09. Benzofuran. A colorless liquid, $d_{15°}$.1.078, m. −18, b.169,

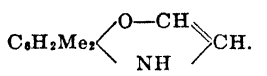


insoluble in water, soluble in alcohol or ether. **dihydro-** Coumaran. **dihydroketo-** Benzofuranone. **dimethyl-** $C_{10}H_{10}O$ = 146.15. 1.2-dimethyl-benzofuran. Colorless liquid, b.210. **hydro-** See *hydrocoumarone*. **iso-** C_8H_6O = 118.09. The heterocyclic system



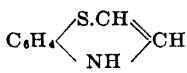
ketodihydro- See *ketocoumaran*. **methyl-** C_8H_8O = 133.12. 2-methyl-benzofuran, beta-methyl-coumarone. A colorless liquid, b.189.

coumazonic acid. $C_{10}H_{11}ON$ = 161.09. The heterocyclic system

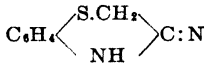


methyl- $C_{11}H_{13}ON$ = 175.1. Meta-methylcoumazonic acid, benzotrimethylmethoxazine. Colorless crystals, m.218.

coumothiazone. C_8H_7NS = 149.1. The heterocyclic system



imido- $C_8H_8N_2S$ = 164.1. Benzylene-ψ-thiourea. Colorless crystals, m.137.



counterirritant. A drug producing superficial irritation; used to mask the effects of other irritants or abnormal processes; *e.g.*, cantharides mustard, capsicum, chloroform, etc.

counterstain. A microscope stain used for making clearer, by contrast, structures already colored by another stain.

counting apparatus. A device for counting bacteria or blood corpuscles. **c. chamber.** A microscope slide with rectangular rulings, used for counting blood corpuscles and bacteria. **c. pipette.** A graduated capillary glass tube, used for making smears of milk or blood for counting bacteria or blood corpuscles.

coupeic acid. An active principle of oiticica oil.

Coupier's blue. $C_{24}H_{18}N_4$ = 334.16. Azodiphenyl, p,p'-diphenylazobenzene. The compound, $Ph.C_6H_4.N{:}N.C_6H_4.Ph$, m.250.

couple. (1) A pair of galvanic cells. Cf. *thermo-couple, zinc-copper c.* (2) To condense or unite two molecules.

coupling. Condensation between the nitrogen of a diazo group and a carbon of a ring compound.

courare. Curare.

Courtois, Bernard. 1777–1838. A French chemist; the discoverer of iodine.

cousso. See *kousso*.

C.O.V. Concentrated oil of vitriol; 95–96 % H_2SO_4, by weight.

co-valence. See *valence*. **dative-.** That type of c., analogous to electrovalence, in which one of the two atoms concerned contributes both electrons. **normal-** The usual form of c., in which each of the atoms concerned contributes one electron.

covelline; covellite. CuS. A native copper sulfide.

covolume. The quantity *b* in Van der Waal's equation (q.v.).

Coward unit. A vitamin unit, q.v.

Cowper stove. Tall iron cylinders lined with fire-brick and used for the production of a hot blast for the smelting of iron.

coxanthin. $C_{40}H_{56}O_6$ = 632.4. A carotenoid (q.v.) pigment of brown algae.

coyol palm. A tropical palm, *Acrocomia* species, yielding an oil.

CP. An abbreviation for chemically pure.

Cp. (1) The symbol for cassiopeium. (2) An abbreviation for molecular heat at constant pressure.

Cr. The symbol for chromium.

cracca. Tephrosia.

cracked. Broken, *e.g.* a molecule which is split into component parts. **c. kerosene.** A gasoline substitute obtained by super-heating kerosene under pressure, and distilling a volatile fraction at the boiling point of gasoline.

crackene. A proposed name for the hydrocarbon-mixture obtained by cracking low-temperature tars.

cracking. A process of making gasoline by superheating hydrocarbons in a gaseous atmosphere, as, hydrogen. The hydrocarbons of high molecular weight break down into those of lower molecular weight. Catalysts are also often included in the process. Cf. *hydrogenation, Bergius' process.*

cradin. A principle obtained from the leaves and twigs of the common fig. It is said to be a peptic ferment, resembling papain in its action.

Crafts, James Mason. 1839–1917. An American chemist, noted for organic syntheses. Cf. *Friedel-Crafts reaction.*

cramp bark. High cranberry. The bark of *Viburnum opulus*, a Caprifoliaceae; used as an antispasmodic.

Crane, Evan J. 1889– . An American chemist noted for work on nomenclature and abstracts of chemical literature.

crateriform. A round depressed cone in a solid culture medium, due to liquefaction of the medium by certain bacteria.

crawley. Coral root.

cream. The thick, yellowish-white layer formed on the surface of milk on standing. It consists of milk rich in fat, and is a highly nutritious article of food. **cold-** Cold cream. **ice-** A frozen food prepared from milk and flavorings.

cream of tartar. Potassium bitartrate.

creaming. The gradual rise or fall of the disperse phase of an emulsion, according as its specific gravity is less or greater than that of the continuous phase. Cf. *colloids, churner.*

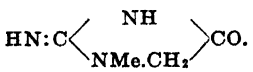
creamometer. A device for estimating the amount of fat in milk.

creasote. Creosote.

creatinase. An enzyme which transforms creatine to creatinine.

creatine. $C_4H_9O_2N_3 + H_2O = 131.12$. Methylglycocyamine, guanidine methylglycine, guanyl methylglycine, methylguanidoacetic acid. $NH_2.C:NH.NMe.CH_2.COOH$. An alkaloid or amino acid from the muscular tissue of all vertebrates. Colorless, monoclinic crystals, decomp. 300, sparingly soluble in water or alcohol, insoluble in ether; used as a tonic. Cf. *alacreatine.*

creatinine. $C_4H_7ON_3 = 113.20$. Methylglycocyamidine, 2.3- dihydro-2-imino-1-methyl-4(5)-imidazolone.



An anhydride of creatine, and a normal constituent of urine. White prisms, decomp. 270, slightly soluble in water or alcohol. Cf. *phosphagen.* **xantho-** See *xanthocreatinine.*

creatotoxin. A meat poison, or ptomaine.

creeping. Describing (1) any precipitate which rises on the walls of a wet glass container; (2) a solution which, during crystallization, deposits crystals on the sides and top of its container; (3) a liquid which permeates and passes through the packings of machinery (*e.g.*) pumps. (4) The elongation of a metal, especially at high temperatures, under a stress considerably less than that required to break it.

Crell, Lorenz Friedrich von. 1744–1816. A German chemist and mineralogist, noted as founder of chemical periodicals.

crenic acid. $C_{24}H_{12}O_{16} = 556.1$. Apocrenic acid. An acid produced by molds; found in the soil and in certain springs.

crenilabrin. A protamine from the sperm of the cunner fish, *Crenilabrus pavo.*

creolin. Analgin. A black syrupy liquid derived from coal tar, and consisting of saponifiable acids and resins; used as an antiseptic, deodorizer, and hemostatic, and forms a milky emulsion with water, d.1.04–1.08, soluble in alcohol, ether, or chloroform.

creosal. Tannosal.

creosol. $C_8H_{10}O_2 = 138.12$. 2-methoxy-1-hydroxy-4-methyl-benzene, 2-methoxy-4-methylphenol, methoxy-cresol, $MeO.C_6H_3(OH)Me$. A colorless oily liquid obtained from beech wood cresols, $d_{15}°$.1.096, b.220, slightly soluble in water, miscible with alcohol or ether; used as an antiseptic.

creosotal. Creosote carbonate.

creosote. An oily distillate from wood or other tars, consisting chiefly of cresol, oxycresol, methylcresol, and other phenols; d.1.035–1.085, b.200, soluble in water, alcohol, ether, or chloroform. Used medicinally as an antiseptic, local anesthetic, and caustic. **c. carbonate.** Creosotal. An antiseptic, oily derivative of creosote. **methylene-** Pneumin. **oleo-** C. oleate. **c. oleate.** Oleocreosote. A yellowish oily liquid, d.0.950, insoluble in water; used as an antiseptic.

cresalol. $C_6H_4(OH)COOC_6H_4Me = 228.10$. A mixture of the o-, m-, and p- compounds. A white powder used as an antiseptic dusting powder.

cresatin. $MeC_6H_4OOCMe = 150.08$. m-cresylacetate. A colorless, oily liquid, insoluble in water, soluble in alcohol; used as an antiseptic or analgesic.

cresegol. See *egol.*

cresidine. $C_7H_9ON = 123.08$. Aminohydroxytoluene, aminocresol, methylaminophenol, $NH_2.C_6H_3Me.OH$, Some of the isomers are:

4-amino-2-hydroxytoluene	m.161
5-amino-2-hydroxytoluene	m.175
6-amino-2-hydroxytoluene	m.128
4-amino-3-hydroxytoluene	m.174
5-amino-3-hydroxytoluene	m.79, b.345
2-amino-4-hydroxytoluene	m.144
3-amino-4-hydroxytoluene	m.135

cresol. $C_7H_8O = 108.10$. Cresylic acid, methylphenol, $Me.C_6H_4.OH$. **amino-** Cresidine. **iodo-** Traumatol. **isopropyl-o-** Carvacrol. **6-isopropyl-m-** Thymol. **ortho-** A colorless liquid, $d_{15}°$.1.051, m.30, b.190.8, sparingly soluble in water, miscible with alcohol or ether. **meta-** A colorless liquid, $d_{15}°$.1.039, m.4, b.205, slightly soluble in water, miscible with alcohol or ether. **2-methoxy-p-** Creosol. **methyl-** Xylenol. **para-** Colorless prisms,

d_{15}°.1.039, m.36, b.201.1, sparingly soluble in water, miscible with alcohol or ether. The cresol of commerce is a brownish-red syrupy liquid obtained from coal tar, and contains a mixture of the three cresols; used as a disinfectant. **triiodo-** Losophan. **trinitro-** See *trinitrocresol.*

cresolphthalein. $C_6H_4(CO)_2(C_6H_3OHMe)_2$ = 346.14. Methylphenolphthalein. Colorless crystals, m.216, slightly soluble in water, readily in alcohol or ether; used as an indicator from pH 8.2 (colorless) to 9.2 (red).

cresol purple. $C_{21}H_{18}O_5S$ = 382.27. *m*-Cresol sulfonphthalein. A brown powder, used as indicator, from pH 1.5 (red) to 2.5 (yellow). **brom-** See *bromocresol purple.*

cresol red. $C_{21}H_{18}O_5S$ = 382.27. *o*-Cresol sulfonphthalein. A brown powder, used as an indicator from pH 7.2 (yellow) to 8.8 (red).

cresolsulfonic acids. $C_7H_8O_4S$ = 188.13. A group of monobasic acids derived from the cresols, $C_6H_3Me(OH)(SO_2OH)$; used as antiseptics and in organic synthesis. a- or 1.2.4-. p-cresol-2-sulfonic acid, 4-hydroxytoluene-2-sulfonic acid. Colorless crystals, m.188, v- or 1.2.3-. o-cresol-6-sulfonic acid, 2-hydroxytoluene-6-sulfonic acid. Colorless crystals, m.-118.

cresorcin. $C_{22}H_{16}O_5$ = 360.14. *2.7*-Dimethyl fluorescein, *2.7*-dimethyl resorcinol phthalein. A yellow dye and pH indicator.

cresorcinol. *2.4*-Dihydroxy toluene.

cresorcyl. The radical —$C_6H_2(OH)_2Me$. **c. aldehyde.** $C_8H_8O_3$ = 152.06. *2.4*-Hydroxy-*5*-methyl benzaldehyde.

cresotic acid. $C_6H_3Me(OH)(COOH)$ = 152.06. Hydroxytoluic acid. Hydroxymethyl benzoic acid, methylsalicylic acid, cresotinic acid, cresol carboxylic acid. A group of monocarboxy acids which exist in a number of isomeric forms which are designated by the positions of the hydroxy group (first numeral) and the methyl group (second numeral) as follows:

2.3- or 2-hydroxy-m-toluic acid	m.160
2.4- or 2-hydroxy-p-toluic acid	m.178
2.5- or 6-hydroxy-m-toluic acid	m.152
2.6- or 6-hydroxy-o-toluic acid	m.167
3.2- or 3-hydroxy-o-toluic acid	m.183
3.4- or 3-hydroxy-p-toluic acid	m.207
3.5- or 5-hydroxy-m-toluic acid	m.208
3.6- or 5-hydroxy-o-toluic acid	m.172
4.2- or 4-hydroxy-o-toluic acid	m.177
4.3- or 4-hydroxy-m-toluic acid	m.172

cresotinic acid. Cresotic acid.

cresoxy. Toloxy.

cresyl. (1) The monovalent $HOC_6H_3(CH_3)$— or C_7H_7O— radical, derived from cresol. There are 10 isomers, derived from o-, m-, and p-cresols. (2) Tolyl, q.v. Cf. *cresotic acid.* **c. acetate.** Kresatin. **c. alcohol.** Cresol. **c. blue.** An oxidation-reduction indicator, q.v. **c. hydrate.** Cresol. **c. hydride.** Toluene. **c. phosphate.** Tricresyl phosphate. **c. violet.** A dye used as a vital stain for blood.

cresylate. A compound containing the monovalent $C_6H_4(CH_3)O$— or C_7H_7O— radical, derived from cresol. They are homologs of the phenates.

cresylene. Tolylene.

cresylic acid. A mixture of o-, m-, and p-, cresols.

cresylite. An explosive consisting of 60 pts. picric acid and 40 pts. trinitro-*m*-cresol.

creta (praeparata). Chalk.

cretaceous. A white, opaque, chalky growth of bacteria.

cretaform. Oxy-methyl cresol tannin. An internal astringent and antiseptic.

cristal. Crystal.

cristallisation. Crystallization.

cristobalite. A crystalline form of silica, d.2.32 formed on heating quartz to 1200, and stable below 1710. It exists in two forms: α- and β-; transition temperature 200–275°C. Cf. *silica.*

crith. Krith.

crithmene. $C_{10}H_{16}$ = 132.12. A terpene from samphire, *Crithmum maritimum*, an Umbelliferae.

critical. Pertaining to a turning point or abrupt change. **c. angle.** The angle of incidence, i, of a ray of light at which it is refracted through a prism so that its angle of emergence is 90°; hence, if the angle of incidence is larger, the light pencil will not be refracted but reflected. The critical angle depends on the refractive index between the two media, and is given by $\sin i = 1/n$, where i is the critical angle of incidence, and n the refractive index. **c. coefficient.** The expression RTd/p, in which R is the gas constant, T the critical absolute temperature, d the critical density and p the critical pressure. **c. conditions.** The c. temperature and c. pressure. **c. constant.** Any magnitude relating to the critical state. **c. density.** The density of the liquid and vapor at the c. temperature and c. pressure. **c. hygrometric state.** The quantity $100p/P$, where p and P are the vapor pressure of the system and of water, respectively. It determines whether a substance will be deliquescent or efflorescent. **c. point.** The conditions at which two phases (*e.g.*, liquid and vapor) are just about to become one phase; *i.e.*, the mixture becomes homogeneous. **c. pressure.** The pressure necessary to condense a gas at the c. temperature (q.v.), above which the gas cannot be liquefied, no matter what pressure is applied. (See table.) **c. solution temperature.** The temperature at which a mixture of two liquids, immiscible at ordinary temperatures, just ceases to separate into two phases. It is used to establish the purity of a liquid, as it is altered considerably by impurities. **c. temperature.** The temperature, T_c, at which a gas can be liquefied by a maximum pressure, the c. pressure; above this temperature the gas

CRITICAL TEMPERATURES AND PRESSURES OF SOME COMMON GASES

Substance	Critical temperature °C	Critical pressure atm.
Helium	−267.75	2.26
Hydrogen	−234.5	13.4
Oxygen	−118	49.3
Nitrogen	−145	33.65
Chlorine	141	79.6
Carbon monoxide	−113.7	34.6
Carbon dioxide	31	72.85
Nitrous oxide	36.5	71.65
Ammonia	133	112.3
Water	374	217.5

cannot be liquefied, no matter what pressure is applied. Approximately, $T_c = T_m + T_b$, where T_m is the melting point and T_b the boiling point of the substance (Prud'homme's rule); or $T_c/T_b = 1.5$ (Guldberg-Guye's rule). See Table. **c. volume.** The volume of one gram of substance at the c. temperature and c. pressure.

croceic acid. 2-Naphthol-8-sulfonic acid.

crocetin. $C_{20}H_{22}O_4$ = 328.15. *α-* The aglucone of the pigment of saffron, *Crocus sativa* and the seeds of *Gardenia grandiflora;* orange-red crystals, m.104, insoluble in water. Cf. *carotenoids, crocin, bixin, azafrin. β-* $C_{21}H_{23}O_4$ = 341.15. The monomethyl ester of *α*-c. *γ-* $C_{22}H_{26}O_4$ = 354.15. The dimethyl ester of *α*-c.

crocic acid. Croconic acid.

crocidolite. $NaFe(SiO_3)_2.FeSiO_3.H_2O$. A lavender-colored form of asbestos or hydrated ferrous-ferric silicate.

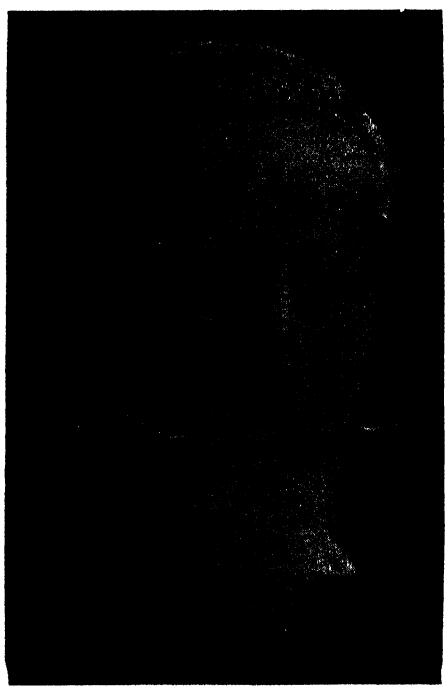
crocin. $C_{44}H_{70}O_{28}$ = 1046.56. The coloring matter of saffron, and the fruit of *Gardenia grandiflora,* a Rubiaceae of China and of *Crocus sativus* and *Fabiana imbricata.* Used for dyeing the yellow robes of mandarins. A bright-red powder, soluble in water or alcohol; hydrolysed to gentiobiose and crocetin. Cf. *carotinoids, crocose.*

crocoisite. $PbCrO_4$. Crocolite, crocoite. A red, native lead chromate.

crocoite, crocolite. Crocoisite.

croconic acid. $C_5H_2O_5$ = 142.04. Crocic acid. A dibasic ketonic acid. Yellow crystals, m.180, soluble in water or alcohol. **c. acid hydride.** $C_5H_3O_5$ = 145.03. A tribasic ketonic acid. Cf. *leuconic acid.*

crocose. $C_6H_{12}O_6$ = 180.05. A sugar and splitproduct of crocin. Colorless crystals, soluble in water. Probably identical with gentiobiose.



Sir William Crookes.

(From Thomson's Outline of Science. Courtesy of G. P. Putnam's Sons, N. Y.)

crocus. (1) Saffron. (2) A form of red ferric oxide which is used for polishing. **antimony-** See *antimony.* **meadow-** Colchicum. **c. martis.** Colcothar.

Crookes, Sir William. 1832–1919. An English physicist and chemist, noted as founder of Chemical News and work on electrical discharges through gases and vacuum tubes. See illustration. **C. glass.** An optical glass which eliminates many of the ultraviolet rays of the sun. **C. radiometer.** An evacuated glass bulb containing a shaft with four arms, pivoted in the center, which revolves horizontally under the influence of radiant heat. Affixed to the end of each arm, vertically, is a very light vane one side black, the other silvered. **C. space.** A dark space around the cathode of a low pressure x-ray tube, through which a high voltage current is passing. **C. tube.** A highly exhausted vacuum or x-ray tube.

crookesite. A mineral containing thallium (17 %) selenium, copper and silver.

crotaconic acid. $C_5H_6O_4$ = 130.05. A dibasic acid, isomeric with itaconic acid and derived from crotonic acid.

crotaline. A protein in the venom of the rattlesnake; used hypodermically in the treatment of epilepsy.

crotalotoxin. $C_{34}H_{54}O_{21}$ = 798.42. A crystalline principle from the venom of the rattlesnake, *Crotalus adamanteus.*

Croton. A genus of euphorbiaceous plants which yield various products; *e.g.,*

C. lacciferus	lac
C. cascarilla	cascarilla bark
C. niveus	copalchi
C. eluteria	cascarilline
C. tiglium	croton oil

c. oil. The fixed oil from the seeds of *C. tiglium* (see *tiglium*). A pale-yellow oil, d.- 0.940–0.955, insoluble in water, soluble in alcohol, ether, chloroform or carbon disulfide; contains chiefly tiglic acid. Used as a drastic purgative, or externally as a local irritant.

crotonal. The bivalent $C_4H_6=$ radical, derived from crotonaldehyde.

crotonaldehyde. $C_3H_5.CHO$ = 70.07. Propylene aldehyde, *2*-butenal*, crotonic aldehyde, an unsaturated aldehyde forming a colorless liquid, $d_{14°}$.0.859, b.104, soluble in water.

cis- H.C.Me
‖
H.C.CHO

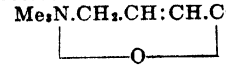
trans- Me.C.H
‖
H.C.CHO

Used as a solvent for fats, waxes and resins.

crotonallin. A toxic albumin from the seeds of *Croton tiglium.*

crotonarin. The solid part of croton oil.

crotonbetaine. $C_7H_{13}NO_2$ = 143.12. The base $Me_3N.CH_2.CH{:}CH.CO$, from beef muscle



extract. Cf. *carnitine.*

crotonic acid. $C_3H_5.COOH$ = 86.046. 1-carboxy-propylene, *α*-butenic acid. **alpha-** *trans-α*-butenic acid, *trans-2*-butenoic acid*, trans-

Me.C.H
‖
H.C.COOH.

crotonic acid. Colorless, monoclinic crystals, $d_{72°}$.0.973. m.72, b.189, soluble

in water. **beta-** *cis*-β-butenic acid, *trans*-2-butenoic acid*. cis-crotonic acid. H.C.Me ‖ H.C.COOH. Cf. *iso-crotonic acid*. **α-methyl-** Tiglic acid. **β-methyl-** Senecioic acid. **γ-methyl-** α-Pentenic acid.

c. aldehyde. Crotonaldehyde. **c. anhydride.** $C_8H_{10}O_3$ = 154.08. 2-Butenoic anhydride*, $(MeCH:CH.CO)_2O$. A colorless liquid, d.-1.0397, b.247.

crotonoid. An atomic arrangement in which an atom with free electrons (*e.g.*, O or N) is bound by a double bond to carbon adjacent to an ethylene linkage; as R.CH:CH.HC:O or R.CH:CH.HC:NH. It forms coordinate compounds. Cf. *conjugate bond*.

crotonol. Crotonolic acid.

crotonolic acid. $C_9H_{14}O_3$ = 154.11. A purgative monobasic acid from croton oil.

crotonyl. (1) The monovalent radical MeCH:-CHCO—; or (2) the monovalent $CH_3.CH:CH$— radical derived from crotonaldehyde. It is isomeric with propenyl and allyl and occurs in the cis- and trans-form. **c. alcohol.** $CH_2.-CH:CH.CH_2OH$ = 72.08. Crotonyl carbinol, 3-buten-1-ol, Δ^3-1-butenol. Colorless liquid, d.0.873, b.117, soluble in water.

crotonylene. C_4H_4 = 54.05. Dimethylacetylene, T^2-butine. An unsaturated hydrocarbon from coal gas, MeC:CMe. A colorless mass or liquid, m.27–28. Isomeric with T^1-butine (ethylacetylene) EtC:CH.

crotoxin. An active protein, containing sulphur, from the fresh venom secretion of the rattlesnake.

crottel. A vegetable dye resembling cudbear (q.v.), at one time made in the Scottish Highlands.

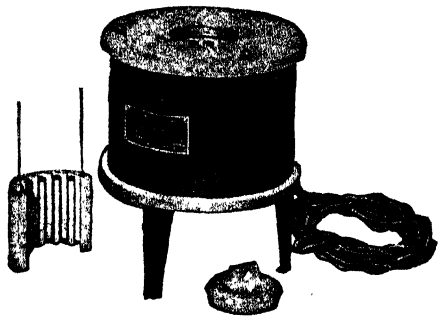
crotyl alcohol. Butenol*.

Crowell pump. A rotary pump for producing vacua and air pressure.

crown filler. Hydrated calcium sulfate, $CaSO_4.-2H_2O$, used as a paper filler. **c. glass.** Glass. **c. top.** Rose *burner*.

crucible. (1) A vessel of conical shape with a rounded base for fusing or incinerating. (2) The hearth of a blast furnace. **assay-** A small cup of porcelain used for the combustion of drugs or of filter papers containing precipitates, in quantitative analysis. **Gooch-** A c. with a perforated bottom for filtrations in analysis. **Hessian-** A large clay crucible for metallurgical work. **Munroe-** A filter c. similar to a Gooch c. with a layer of spongy platinum deposited on filterpaper as the filtering medium. **nickel-** A c. used for fusions. **platinum-** A small platinum cup used in quantitative analysis. **porcelain-** Assay c. **quartz-** A small cup made of transparent quartz, and used in quantitative analysis for combustion at high temperatures. **Rose-** A lid for a crucible fitted with an inlet tube for burning a substance in a current of coal gas. **sillimanite-** A c. made of sillimanite, used as a superior substitute for porcelain. **sintered glass-** A filter c. the base of which consists of sintered glass which acts as filtering medium. The size of the pores is graded according to the nature of the precipitate.

c. etching. Diamond *ink*. **c. furnace.** An electrically-heated resistance wire imbedded in a refractory material, which makes temperatures of 1000°C. possible within 30 minutes. **c. holder.** A rubber ring in a glass funnel for holding Gooch crucibles. **c. steel.** Pot steel. Steel made by the c. process. **c. tong.** A pair of scissor-like metal tongs for handling crucibles. **c. triangle.** A metallic wire or pipeclay triangle for supporting a crucible over the gas burner. **c. tubing.** Wide, soft, rubber



Crucible furnace.

tubing fitting over a crucible to connect it with an Erlenmeyer flask in vacuum filtration.

Cruciferae. The mustard family, a group of herbs with pungent, watery juice and flowers consisting of four petals and sepals, with cross-like arrangement.

Brassica (*Sinapis*) *alba*...	white mustard seeds
Brassica (*Sinapis*) *nigra*..	black mustard seeds
Brassica oleracea.....	cabbage seed oil
Brassica napus.....	rape seed oil
Capsella bursa pastoris....	bursine
Cheiranthus cheiri.....	cheirin
Cochlearia armoracia.....	horseradish
Cochlearia officinalis.....	cochlearia
Erysindum species.....	erysimin
Isatis tinctoria.....	indican, woad

crude. Unrefined or raw; *e.g.*, crude drugs (roots, leaves, etc.), crude chemicals (technical and unrefined substances, the hydrocarbons obtained from coal tar). Cf. *intermediates*.

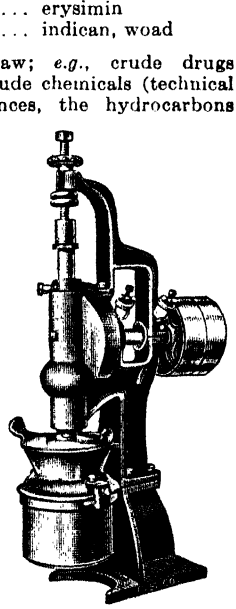
Crum Brown rule. See *Brown*.

crurin. $(C_9H_7N.HSCN)_3-Bi(SCN)_3$ = 947.60. Quinoline bismuth sulfocyanate, quinoline bismuth sulforhodanide. A brick-red micro-crystalline powder; used as an antiseptic and astringent.

crusher. A power-operated device for pulverizing materials by impact blows. Cf. *chopper*, *grinder*, *mill*.

crushing. To hammer to pieces; as, opposed to grinding, q.v.

crutcher. A mixing machine used in the soap industry.



Crusher.

cryochem process. A process of freezing and dehydrating aqueous preparations. Cf. *lyophilized biological*.

cryofine. Kryofine.

cryogenics. Experiments at low temperatures, generally below −100°C.

cryogenin. (1) A freezing mixture, or a substance by which low temperatures are produced. (2) Cryogenine.

cryogenine. Kryogenin, m-benzamino semicarbazide. White, odorless, bitter crystals, soluble in alcohol or ether, slightly soluble in water; used as an antiseptic and antipyretic.

cryohydrate. Cryosel. A salt that contains water of crystallization only at a low temperature; e.g., a eutectic mixture of salt and ice.

cryohydric point. The temperature at which a cryohydrate crystallizes from a freezing mixture.

cryolac number. The proportion of the freezing point depression of milk that is accounted for by the chloride and lactose present. It indicates the addition of water.

cryolite. Na_3AlF_6. A double fluoride of sodium and aluminum. A pale-gray mineral, d.3.0, hardness 2.5. It is a source of aluminum, alum, and caustic soda. Cf. *Thomsen process.*

c. glass. Milk *glass.*

cryometer. A thermometer for low temperatures.

cryoscope. A device for determining the freezing point of a liquid; it is used in physiological and chemical research work. Cf. *Friedenthal's* c., *Hortvet's* c.

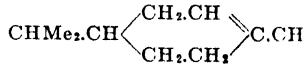
cryoscopic method. The determination of the molecular weight of an organic substance by observing the depression of the freezing point of a solution due to the solute. Cf. *Raoult's law.*

cryoscopy. The study of physical and chemical changes at low temperatures; especially the depression of the freezing point. Cf. *kryoscopy.*

cryosel. Cryohydrate.

cryostat. A thermo-regulator for maintaining low temperatures.

cryptal. $C_{10}H_{16}O$ = 152.12. *4*-Iso-propylcyclohexene aldehyde,



A constituent of the oil from *Eucalyptus hemiphloia* and *E. polybractea.*

cryptidine. $C_{11}H_{11}N$ = 157.09. An alkaloid formed by the dry distillation of quinine. Cf. *kryptidine.*

cryptocarine. An alkaloid from the bark of *Cryptocarya australis*, a Lauraceae of Queensland.

cryptocrystalline. Micro-crystalline.

cryptocyanine. Kryptocyanine.

cryptogams. A large division of plants characterized by having no true flowers, but propagating by spores. Cf. *Phanerogams.* The more important groups are:

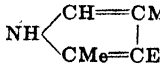
Thallophyta (Algae, Lichen, Fungi)
Bryophyta (Mosses, Liverworts)
Pteridophyta (Filices, Ferns)

cryptometer. An optical wedge to determine the covering or "hiding" power of paint.

cryptophanic acid. $C_5H_9O_5N$ = 163.07. A dibasic acid and constituent of urine.

cryptopine. $C_{21}H_{23}O_5N$ = 369.2. One of the alkaloids of opium, m.217; a hypnotic and anodyne.

cryptopyrrole. $C_8H_{13}N$ = 123.08. A base derived from hemin and chlorophyllin,



Colorless liquid, d.0.93, b_{19mm}.85.

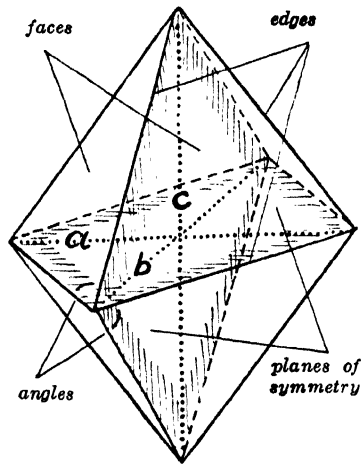
cryptoscope. Fluoroscope.

cryptovalency. An abnormal valency, *e.g.*, the tetravalent oxygen, or divalent carbon.

cryptoxanthin. A carotene from the berries of the *Physalis* species, which is similar in effects to vitamin A.

cryst. Abbreviation for *crystalline.*

crystal. A homogeneous and angular solid of definite form which is characterized by geometrically arranged plane surfaces (called



axes = a,b,c.
Crystal.

faces) and a symmetrical internal structure (see *crystal structure*). The crystals are usually classified into six or seven systems (see *crystal systems*) and are of three general types: homopolar-, ionic- and metallic-. (See figures.) **acicular-** A needle-shaped crystal. **arborescent-** A slender and branching crystal resembling a plant or tree. **blood-** Hemin. **complex-** A crystal having dissimilar faces. **double-** Twin crystals. **hemihedral-** Having half as many faces as the geometrical pattern demands. **holohedral-** Having all the faces that the geometrical pattern demands. **homopolar-** Nonpolar-. A c. consisting of a space lattice of atoms in which all valencies are satisfied, characteristic of organic compounds; hence, molecules held together by weak van der Waal's force into soft c. of low melting point. **ionic-** Polar-. A c. consisting of a space lattice of ions; as, Na^+ and Cl^-, in which the atoms have lost or gained electrons and no particular atom is united to another particular atom; hence the entire crystal is a giant molecule. This is characteristic of inorganic compounds. **lead chamber-** Nitrosyl sulfate. **liquid-** A liquid which has the optical properties of a crystal. **metallic-** Co-ordinate-. A c. consisting of a space lattice of positive ions and electrons in which the electrons may replace each other, and so conduct an electric current. **micro-** A crystal of microscopic size. **mixed-** A crystal which contains two or more isomorphous substances, as aluminum chromium sulfate. **nonpolar-** Monopolar c. **polar-** Ionic c. **racemic-** A crystal that is composed of two optically compensating isomers. **seed-** Crystallon. A crystal introduced into a saturated solution in order to act as a nucleus for the commencement of crystallization. **simple-** A crystal that belongs

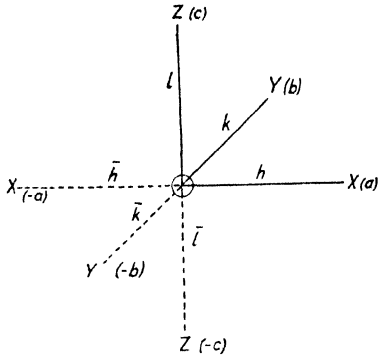
to one definite crystal system. **Teichmann's-** The hemin crystals of blood smears. **twin-** A crystal that consists of two crystals grown together along a common face.

c. alcohol. The alcohol of crystallization, or a crystal that contains alcohol molecules in its structure. **c. ammonia.** The ammonia of crystallization in the ammonates. *E.g.*, per molecule of substance, X, there are:—

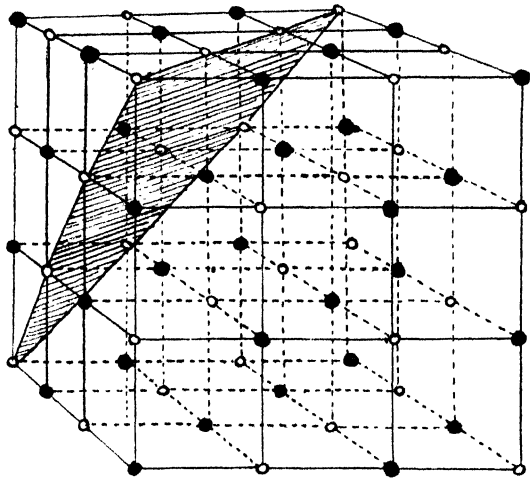
monammonate	$X.NH_3$
diammonate	$X.2NH_3$
triammonate	$X.3NH_3$
tetrammonate	$X.4NH_3$
pentammonate	$X.5NH_3$
hexammonate	$X.6NH_3$

c. axis. An imaginary line through the center of a plane of a crystal. See *c. system.* **c. carbonate.** The monohydrate of sodium carbonate, $Na_2CO_3.H_2O$. **c. chloroform.** The chloroform of crystallization, or a crystal that contains chloroform molecules in its structure. **c. coordinates.** The designation of the axes of a c. as derived from a crystallogram. See figure and *c. system.*

c. detector. A crystal which transmits electric current in one direction only; used to rectify alternating currents or detect radio waves; as, galena. **c. ether.** The ether of crystallization, or a crystal that contains ether molecules in its structure. **c. face.** Any plane surface of a crystal. **c. form.** The external geometrical shape of a crystal (see *c. system*). **c. model.** A model of wire, wood or glass, which illustrates the characteristic forms of crystals. **c. overgrowth.** The growth of one crystal around another. It is shown chiefly by isomorphous crystals. **c. pattern.** Space lattice, q.v. **c. structure.** The internal structure of a crystal as revealed by x-ray diffraction measurements. It is assumed that the individual atoms which compose the molecules of the crystal are arranged in a definite order (the space lattice), and the rows of atoms act as a diffraction grating for the very short wavelengths of x-rays (cf. *atomic planes*). From the pattern obtained on a photographic plate (the crystallogram, q.v.), the structure of the crystal is deduced. See figure. **c. system.** Any one of the seven fundamental systems of crystallography. The simplest means of classifying crystals is in terms of the axes, or the imaginary lines which pass from the faces or edges through the center of the crystal (see figures).



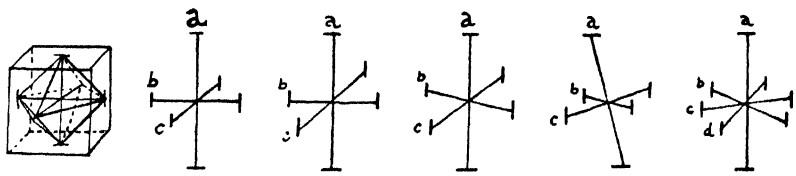
Crystal coordinates.
h, k, l, are the integers indicating the no. of atomic planes on that axis.



Crystal structure
(sodium chloride)

1. The ISOMETRIC system (Tesseral, cubic, regular or monometric)

The crystals have three axes; all of equal length and at right angles to one another and are, therefore, developed alike in the six directions of space (front, back, left, right, up and down). *Types:* cube, regular octahedron, rhombic do-



Crystal systems.

	System	*Interaxial Angles*	*Length of Axes*
1.	Isometric (cubic)	$\alpha = \beta = \gamma = 90°$	$a = b = c$
2.	Tetragonal	$\alpha = \beta = \gamma = 90°$	$a = b \lesssim c$
3.	Orthorhombic (rhombic)	$\alpha = \beta = \gamma = 90°$	$a \lesssim b \lesssim c$
4.	Monoclinic	$\alpha = \gamma = 90°$; $\beta \lesssim 90°$	$a \lesssim b \lesssim c$
5.	Triclinic	$\alpha \lesssim \beta \lesssim \gamma \lesssim 90°$	$a \lesssim b \lesssim c$
6.	Hexagonal	$\alpha = \beta = 90°$; $\gamma = 60°$ and $120°$	$a = b \lesssim c$
7.	Trigonal	$\alpha = \beta = \gamma \lesssim 90°$	$a = b \lesssim c$

decahedron, and their modifications. *Examples:* sodium chloride, alum, potassium iodide, garnet.

2. The TETRAGONAL system (dimetric or quadratic)

The crystals have three axes at right angles to one another. The two lateral axes are of equal length and the third (principal axis) is either shorter or longer; the crystals are, therefore, developed according to two patterns—one repeated four times in directions at equal intervals in a plane, the other twice in the direction at right angles to that plane. *Types:* prisms, pyramids, pinacoids. *Examples:* nickel sulfate, potassium ferrocyanide, zircon.

3. The ORTHORHOMBIC system (rhombic, trimetric or prismatic)

The crystals have three axes of unequal length, all intersecting at right angles and are, therefore, developed according to three patterns, each repeated twice in opposite directions. *Types:* Combinations of pinacoids, prisms, domes, and pyramids. *Examples:* zinc sulfate, potassium nitrate, sulfur, citric acid, potassium sulfate.

4. The MONOCLINIC system (oblique or prismatic)

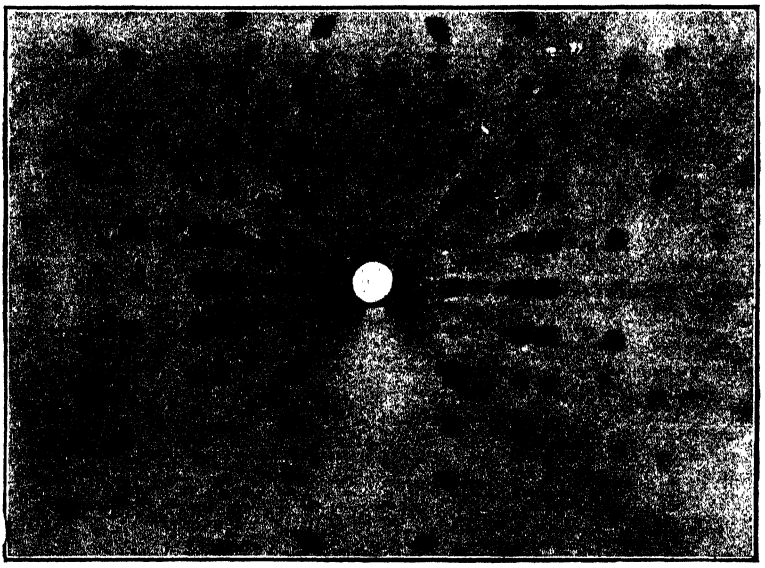
The crystals have three axes of unequal length, two of which intersect at an oblique angle and are perpendicular to the third axis. The crystals, therefore, are developed according to three patterns, each repeated in opposite directions, twice at angles less than 90° and twice at angles greater than 90°. *Types:* prisms, plates, needles. *Examples:* sodium sulfate, ferrous sulfate, oxalic acid, tartaric acid, potassium nickel sulfate.

5. The TRICLINIC system (assymetric)

The crystals have three axes of unequal length, all oblique to each other; and are, therefore, developed like the preceding two types, but with none of the patterns repeated exactly at right angles to one another. *Types:* Tetrahedron, prisms, scales. *Examples:* Calcium sulfate, potassium dichromate, copper sulfate.

6. The HEXAGONAL system

The crystal has four axes; three are of equal length, and at 60° to one another and intersect the principal axis at angles of 90°. The crystals therefore, are developed according to two patterns; one repeated six times at intervals, lying 60° apart in a plane, and the other pattern twice in the directions at right angles to that plane. *Types:* prisms, pyramids, and pinacoids. *Examples:* crystalline quartz, bismuth, antimony, thymol, beryl.



Crystallogram.

Rotating crystal or Siegbahn method (apparatus manufactured by Adam Hilger, Ltd., London), *showing the crystal structure of benzil. C axis of the crystal is set parallel to the axis of rotation* (*see also Bragg, Debye and Laue crystallograms*).

7. TRIGONAL or rhombohedral system.

The axes are as 6., and the crystal develops according to two patterns, one repeated three times at intervals lying 120° apart in a plane, and the other twice in the directions at right angles to that plane. *Examples:* benitoite, calcite.

c. violet. A methylated *p*-rosaniline, used as an indicator, pH 0.0 (green) to pH 2.0 (blue), (cf. *gentian violet*); as a Gram stain for bacteria; intravenously as antiseptic. **c. water.** The water of crystallization; the water molecules which take part in the crystalline structure of a substance, *e.g.*,

monohydrate	$X.H_2O$
dihydrate	$X.2H_2O$
trihydrate	$X.3H_2O$
tetrahydrate	$X.4H_2O$
pentahydrate	$X.5H_2O$
hexahydrate	$X.6H_2O$
heptahydrate	$X.7H_2O$
octohydrate	$X.8H_2O$ etc.

crystalbumin. An albuminous substance in the crystalline lens of the eye.

crystallin. (1) A solution of 1 part pyroxylin in 4 parts methanol and 15 parts amyl acetate;

used similarly to collodion. (2) A soluble protein from the lens of the eye; α- coagulating at 72, β-coagulating at 63.

crystalline. Peratining to crystals. **micro-** Pertaining to crystals of microscopic size.

crystallite. An imperfectly formed crystal.

crystallization. The change from the dissolved, molten, liquid, or gaseous state to a solid state of definite, ordered and characteristic shape. **fractional-** Repeated c. for the purpose of purification or separation of a substance. **heat of-** See heat. **liquid of-** The molecules of solvent which enter into the space lattice of crystals; as, acetone, acetic acid, alcohol, ammonia, chloroform, ether, and most commonly water.

crystallize. (1) To assume crystalline shape. (2) To cause crystallization.

crystallized. Formed into crystals.

crystallogram. The photographic record obtained when x-rays are diffracted by a crystal or crystal-powder. They vary according to the experimental arrangement:

(A) *x-rays* (polychromatic or monochromatic);

(B) *beam definition* (pinhole or slit);

(C) *sample* (single and stationary crystal, single and rotating crystal, or crystal powder);

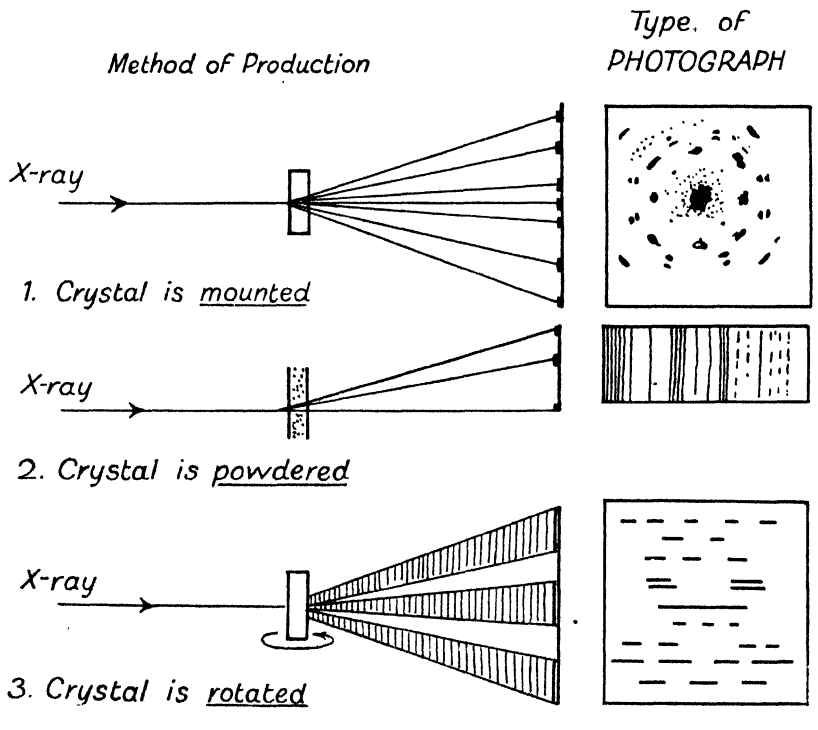
(D) *recording device* (plane surface photographic plate, cylindrical film, or ionization chamber). Cf. *x-ray spectrometer, halo, corona;* see figures.

Bragg-. DeBroglie-. Siegbahn-. A spectrum-like pattern produced when monochromatic x-rays pass through a slit and a rotating crystal. Cf. *Moseley spectrum.* **Clark-.** Duane-. A curve obtained by plotting the ionization current found at different angles when a beam of x-rays passes through a stationary crystal. **DeBroglie- Bragg-. Debye-Scherer-. Hull-.** A spectrum-like pattern consisting of curved and concentric lines, which are produced on a cylindrical and narrow film that surrounds a crystal powder or crystal which diffracts a beam of monochromatic x-rays. **Duane- Clark-. Hull- Debye-. Laue-** The original c., in which polychromatic x-rays pass through a pinhole and a single stationary crystal, behind which is a plane photographic plate or film on which the characteristic Laue pattern is produced. **modified Laue-** Monochromatic pinhole-. **monochromatic pinhole-** A modified Laue method using monochromatic x-rays. Used for: (1) single crystals (which produce a simpler Laue pattern); (2) powders (which produce concentric rings); (3) fibers (which produce a system of symmetrical and discontinuous arcs), and other materials. **Polyani- Siegbahn-. Scherer- Debye-. Schiebold- Siegbahn-. Seeman- Bragg-. Siegbahn-Polyani-. Schiebold-.** A Laue pattern produced by monochromatic x-rays and a slowly rotating single crystal.

crystallographic apparatus. A device for measuring the angles and optical properties of crystals; as, goniometer, dichroscope, petrographical microscope.

crystallography. The science of crystals. Originally the measurement and classification of the external shape of crystals (crystal systems); now, the study of the internal, molecular and atomic arrangement of crystals (crystal structure).

crystalloid. An obsolete term applied to non-colloidal substances, hence, those substances



Crystallograms (types).

which pass through a semi-permeable membrane. The broader meaning of "colloid" has eliminated this distinction.

crystalloluminescence. The emission of light during crystallization; *e.g.* by As_2O_3.

crystallon. Seed *crystal.*

crystalon. A trade name for silicon carbide.

crystallose. A soluble sodium salt of saccharin, used in diabetes as a sweetening agent.

crystule. A unit cell of a crystal, or a crystal unit.

CTAB. Cetavlon (q.v.).

CTS. Anhydrous sodium aluminum sulfate, a cream of tartar substitute.

cubanite. $CuFe_2S_4$. A copper ore.

cube. (1) A regular solid bound by six, equal, square plane faces, the opposite faces being parallel. Cf. *space lattice.* **hydrogen-** An alloy of 35 % sodium and 65 % lead pressed into cubes, and used for the rapid preparation of hydrogen (hydrone). **oxygen-** Cubes of sodium peroxide, with a trace of cupric oxide; used for the rapid preparation of oxygen (ozone). (2) An extract from cube root, the root of *Lonchocarpus nicou*, a Leguminosae of Peru, which is used as a fish poison and insecticide. It contains rotenone, toxicarol and tephrosine. Cf. *derris, deguelin.*

cubeb. The dried unripe fruit of *Piper cubeba*, a Piperacea of Java. The fluid extract is a stimulant and diuretic. **c. camphor.** $C_{15}H_{20}O$ = 222.22. The solid portion of oil of cubeb. **c. oil.** Essential oil of cubeb; it is an aromatic, colorless liquid d.0.905–0.925, b.175–280, whose constituents are cubebene and cubeb camphor.

cubebene. $C_{15}H_{26}$ = 206.22. A liquid hydrocarbon from cubeb oil.

cubebic acid. $C_{13}H_{14}O_7$ = 282.10. An amorphous resinous acid from cubeb.

cubebin. $C_{20}H_{20}O_6$ = 356.15. 3.4-dimethylenoxy-p-oxystyrone. Colorless needles, m.132, soluble in alcohol.

cubic. Pertaining to a cube. **c. centimeter.** A unit of volume in the metric system: the space occupied by a cube whose side is one centimeter long. 1 cc. = 1 $cm.^3$ = 0.99996 ml. = 0.06102336 cu. in. The volume occupied by 1 kg. water at 4°C. is the liter = 1000 ml. = 1000.028 cc. **c. decimeter** 1 cu. dm. = 1 dm^3 = 1000 $cm.^3$ = 61.023 $in.^3$. **c. foot.** 1 cu. ft. = 28317.016 $cm.^3$ **c. inch.** 1 cu. in. = 1 $in.^3$ = 16.387 $cm.^3$ **c. meter.** 1 $m.^3$ = 1,000,000 $cm.^3$ = 1.308 $yard^3$ = 25.314 cu. ft. **c. system.** See *crystal system.* **c. yard.** 1 cu. yd. = 1 $yd.^3$ = 0.765 $m.^3$

cubical. Relating to a cube or to three dimensions. **c. atom.** A theory of atomic structure developed by Gilbert N. Lewis. The valence electrons occupy positions at the corners of a cube. In a stable atom or compound there are eight electrons situated at the eight corners of a cube; hence a neon atom is inert and possesses zero-valency, while in a chlorine atom only seven corners are occupied and the atom is monovalent, as it can attract one more electron. Cf. *polar compound, Lewis-Langmuir theory, atomic structure, periodic chain.* **c. expansion.** Volume expansion. The enlargement of a solid in three planes. **c. system.** The isometric or regular crystal system, q.v.

cubit. An obsolete linear measure; 1 c. = 18 in.

cucaivite. AgCuSe. A native silver selenide.

cucoline. $C_{19}H_{23}O_4N$ = 329.2. An alkaloid from the root of *Cocculus* or *Sinomenium diversifolius*, a Menispermaceae. White needles, m.162, insoluble in water, soluble in alcohol, ether, or benzene. **hydro-** $C_{19}H_{25}O_4N$ = 331.2. A colorless crystalline substance, m.198.

cucumber. (1) The vine, *Cucumis sativus*, a Cucurbitaceae. (2) C. fruit used as food. **bitter-** Colocynth. **oil of-** Gourd oil.

Cucurbitaceae. The gourd family, a group of succulent herbs, generally creeping and climbing by tendrils; a source of drugs:

roots:	
Bryonia alba (dioica)	bryony
Cayaponia globosa	cayaponine
fruits:	
Megarrhiza californica	megarrhizin
Citrullus colocynthis	colocynth
Luffa aegyptiaca	vegetable sponge
Momordica balsamina	balsam apple
seeds:	
Cucurbita pepo	pumpkin seed, cucurbitine
Cucumis citrullus	watermelon seed, cucurbitol
Cucumis sativus	cucumber seed
Cucumis prophetarum	prophetin
resin:	
Ecballium elaterium	elaterium

cucurbitine. An alkaloid from the seeds of *Cucurbita pepo.*

cucurbitol. $C_{24}H_{40}O_4$ = 392.32. An alcohol from the seeds of the watermelon, *Cucumis citrullus*, a Curcurbitaceae. Colorless crystals, m.260.

cucus oil. Vetiveria oil.

cudbear. Persio, orchil. A purplish-red coloring matter from lichens, *Rocella, Lecanora,* and other species; used as a pure food color for pharmaceutical preparations.

cuinoline. Cinnoline.

cullet. Crushed or broken glass.

culture. (1) A growth of microorganisms, *e.g.,* pathogenic bacteria. (2) C. media, q.v. (3) To breed, incubate or grow microorganisms. **direct-** A growth obtained from a natural source (tissue, sputum, etc.), and directly transferred to a culture medium. **pure-** A growth obtained from a single species.

c. apparatus. A device for growing microorganisms (anaerobic bacteria) in gases, *e.g.,* nitrogen. **c. dish.** A Petri dish (q.v.) or other shallow glass dish. **c. flask.** A glass flask for growing micro-organisms in liquid culture media. **c. media.** The substances on which bacteria are grown. The more common are agar plain, agar glucose, agar glycerin, agar lactose, agar serum, bouillon plain, bouillon glucose, bouillon glycerin, bouillon lactose, gelatin plain, gelatin glucose, and blood serum. **c. medium.** The nutrient substance in a food for micro-organisms; used to cultivate or grow bacteria. (See *c. media.*) **c. slides.** A microscope slide with one or two cavities for holding a small quantity of liquid. **c. tube.** A test tube with plain rim used for culture media.

cumal. Cumylene. The divalent $C_{10}H_{12}$=, or $C_3H_7.C_6H_4.CH$= radical, derived from cumic aldehyde.

cumaldehyde. Cumic aldehyde.

cumalin. Coumalin.

cumanilide. Cumophenamide.

cumaric acid. Coumaric acid.

cumarin. Coumarin.

cumenamic acid. Cuminamic acid.

cumene. C_9H_{12} = 120.15. i-Propyl benzene, $PhCHMe_2$. A colorless liquid hydrocarbon, $d_{20°}$.0.862, b.153, insoluble in water, miscible with alcohol or ether; it is a constituent of cumin oil. **methyl-** Cymene. **pseudo-** See *pseudocumene.*

cumenol. Cuminol.

cumenuric acid. Cuminuric acid.

cumenyl. Cumyl. The monovalent $C_3H_7.C_6H_4$— or C_9H_{11}— radical, derived from cumene; it occurs as several isomers. **c. acrylic acid.** $C_{12}H_{14}O_2$ = 190.1. A monobasic acid, homologous to cinnamic acid. **c. amine.** Cumidine. **c. angelic acid.** $C_{14}H_{18}O_2$ = 218.15. A monobasic acid. **c. crotonic acid.** $C_{13}H_{16}O_2$ = 204.12. A monobasic acid. **c. cyanide.** Cumonitrile. **c. sulfurous acid.** $C_9H_{11}.HSO_3$ = 200.20. A monobasic acid, derived from cumene by the action of sulfuric acid.

cumic. Pertaining to the acid derived by oxidation from oil of cumin, q.v. **c. acid.** $C_{10}H_{12}O_2$ = 164.15. Cuminic acid, p-isopropyl-benzoic acid. Colorless triclinic crystals, $d_4°$.1.163, m.116.5, sparingly soluble in water, soluble in alcohol or ether. **c. alcohol.** Cuminol. **c. aldehyde.** $C_{10}H_{12}O$ = 148.15. Cumaldehyde, cuminic aldehyde, p-isopropyl benzaldehyde. $Me_2CH.C_6H_4.CHO$. A colorless liquid, $d_{22°}$.0.976, b.235, insoluble in water, miscible with alcohol or ether. **c. amide.** Cuminamide.

cumidic acid. $C_{10}H_{10}O_4$ = 194.08. Dimethylphthalic acid. An oxidation product of durene; dibasic acid, colorless crystals, m. exceeds 320.

cumidine. $C_9H_{13}N$ = 135.16. Aminocumene, cumenylamine, p-isopropyl-aniline, 1-amino-4-isopropyl-benzene. A colorless liquid, d.0.953, m. −64, b.225, insoluble in water, soluble in alcohol or acids. **pseudo-** See *pseudocumidine.*

cumidino. The monovalent radical $C_9H_{12}N$— or $Me_2CH.C_6H_4.NH$—, derived from cumidine.

cumin. The fruits of *Cuminum cyminum* an Umbelliferae of Europe, used as a stimulant, aromatic, and sedative. **c. oil.** Roman cumin oil. The essential oil from cumin seeds. A limpid liquid with a sharp taste, d.0.900–0.930, containing cymene and cumic aldehyde.

cuminal. (1) Cumal. (2) Cumic aldehyde. **di-** Cuminil.

cuminalcohol. Cuminol.

cuminaldehyde. Cumic aldehyde.

cuminamic acid. $C_{10}H_{12}O_2N$ = 178.10. A derivative of cumic acid.

cuminamide. $C_{10}H_{13}ON$ = 163.10. Cumic amide. The amide of cumic acid.

cuminic acid. Cumic acid. **c. alcohol.** Cuminol. **c. aldehyde.** Cumic aldehyde.

cuminil. $C_{20}H_{22}O_2$ or $C_9H_{11}CO.COC_9H_{11}$ = 294.18. Dicuminal, dicuminoketone. Colorless crystals, m.84.

cuminoin. $C_{20}H_{24}O_2$ = 296.19. Diisopropyl benzoin. $C_9H_{11}CO.CHOH.C_9H_{11}$. A derivative of cuminil.

cuminol. $C_{10}H_{14}O$ = 150.11. Cuminic alcohol, cumic alcohol, i-propylbenzyl alcohol, cumenol, cumin alcohol. $C_3H_7.C_6H_4CH_2OH$. A monobasic alcohol from cumin seeds. A colorless liquid, d.0.978, b.246.6.

cuminuric acid. $C_{12}H_{15}O_3N$ = 221.1. $C_3H_7.C_6H_4.CO.NH.CH_2COOH$, occurring in urine.

Cummings apparatus. A glass apparatus for the determination of ammonia in illuminating gas. **c. pump.** A mercury-vapor vacuum pump.

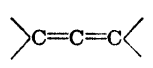
cumobenzyl alcohol. See *phenyl paraffin alcohols.*

cumol. (1) Pseudocumene. (2) A mixture of trimethyl benzenes, obtained as an oily hydrocarbon from coal tar, b.168–178.

cumonitrile. $C_{10}H_{11}N$ = 145.09. Cumenyl cyanide. A derivative of cumene.

cumophenamide. $C_{16}H_{17}ON$ = 239.14. Cumanilide. A compound of cumene and phenylamine.

cumulated double bonds. Two double bonds on the same carbon atom, thus:



Cf. *conjugated.*

cumulative. Storing up or increasing. **c. poison.** See *poison.*

cumyl. Cumenyl.

cumylene. Cumal.

cumylic acid. Durylic acid.

cunit. Cubic unit. A measure of volume, especially of wood, equal to 100 cu. ft. of solid unbarked wood. Cf. *cord, board foot.*

cuorin. $C_{71}H_{125}O_{21}NP_2$ = 1389.01. A phospholipin from the cow's heart, considered to be kephalin mixed with impurities.

cupel. A flat crucible or dish of bone ash, used in cupellation. **c. mould, mold.** A brass cup with pestle for making cupels. **c. rake.** An iron shovel or spatula for handling cupels. **c. tongue.** A steel tong for removing cupels from the oven.

cupellation. The separation of silver or gold from its alloys in the analysis of silver and gold ores. The unrefined metal is mixed with lead and placed in a cupel in the muffle furnace, where the impurities are either volatilized or absorbed by the cupel, and a button of noble metal is left.

cupferron. $C_6H_9O_2N_3$ = 155.09. Nitrosophenyl hydroxylamine, copperon, kupferron, ammonium nitroso-β-phenyl hydroxylamine, $NH_4O.NO.NPh$. Yellow crystals, m.164. Its acid solution is used as a quantitative precipitating reagent for aluminum, copper, iron, titanium, zirconium, etc.

cupola. A dome-shaped furnace for melting pig iron.

cupraloy. An alloy containing Cu 99.4 and (Cr + Ag) 0.6 %, having high strength and electrical conductivity.

cuprammonia. A solution of cupric hydroxide in ammonia water, used as a solvent for cellulose.

cuprammonium-ion. The divalent complex ion, $Cu(NH_3)_4^{++}$, which possesses the characteristic deep-blue color obtained by adding ammonia in excess to a cupric salt solution. **c. rayon, c. silk.** See *rayon.* **c. sulfate.** The solution $CuSO_4 + 4NH_3 + H_2O$. **c. viscosity.** The viscosity of a solution of cellulose in c. measured under standard conditions; it is a means of evaluating cellulosic materials.

cuprase. A non-toxic colloidal cupric hydroxide, used in the hypodermic treatment of cancer.

cuprate silk. Cuprammonium rayon, q.v.

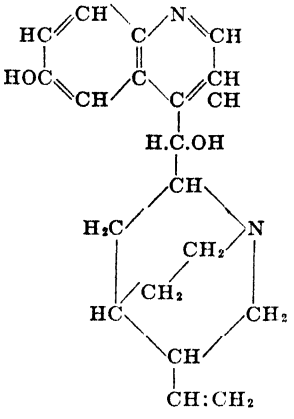
cuprea bark. The bark of *Remijia* species of tropical America, which yields quinine and other cinchona alkaloids.

cupreane. Desoxycupreine. An alkaloid from cuprea bark.

cupreidane. Desoxycupreidine. An alkaloid from cuprea bark.

cupreidine. $C_{19}H_{22}O_2N_2$ = 310.17. The *d*-isomer of cupreine; a cinchona alkaloid from cuprea bark. **desoxy-** Cupreidane.

cupreine. $C_{19}H_{22}O_2N_2$ = 310.17. *l*- Cupreidine. A cinchona alkaloid from cuprea bark.



Colorless crystals, m.198; slightly soluble in water, ether or chloroform, soluble in alkalis. **desoxy-** Cupreane. **ethylhydro-** Optochine. **methyl-** Quinine.

cuprene. $(C_{11-16}H_{10})_x$. Carbene. A yellow-brown, solid polymerisation product made by heating acetylene in presence of copper.

cupreol. $C_{20}H_{34}O$ = 290.35. A cholesterol-like substance from the bark of *Cinchona calisaya*, a Rubiaceae.

cupreous. Cuprous.

cupressin. An oil of *Cypress* species, used medicinally for whooping cough.

cupressus. Cypress.

cupric. Describing compounds containing divalent copper, > Cu, which yield the cupric ion Cu^{++} in aqueous solution. **c. abietinate.** $Cu(C_{19}H_{27}O_2)_2$ = 638.01. Green scales, insoluble in water, soluble in oils giving an emerald green colored solution; used as an anthelmintic and vermifuge, and for the impregnation and preservation of wood. **c. acetate.** $Cu(C_2H_3O_2)_2.H_2O$ = 199.6. Verdigris, cryst. aerugo, crystals of Venus. Bluish-green crystals, d.1.9, m.250 decomp., soluble in water, alcohol, or ether; used as an astringent or alterant, as a mordant and for porcelain painting and enamels. **(sub-)** Cupric subacetate. **c. aluminate.** Copper alum, lapis divinus. A compound of cupric sulfate, aluminum sulfate and potassium nitrate. A green powder or bluish-green sticks, soluble in water; used in ophthalmology and as a mild caustic. **c. ammonium chloride.** $CuCl_2.2NH_4Cl.2H_2O$ = 277.53. Ammonio-cupric chloride. Blue crystals, soluble in water, used as a reagent for carbon in steel. **c. ammonium sulfate.** $Cu(NH_3)_4SO_4.H_2O$ = 245.8. Dark blue, rhombic crystals, decomp. at 150, soluble in water, insoluble in alcohol. **c. arsenate.** $Cu_3(AsO_4)_2.4H_2O$ = 540.7. Bluish-green crystals, insoluble in water, soluble in ammonia or acids; used medicinally as an alterative. **c. arsenite.** $CuHAsO_3$ = 187.5 or $Cu(AsO_3)_2$ = 309.5. A mixture of the neutral and acid salt. Green or yellowish-green crystals, insoluble in water, soluble in ammonia or alkalis; used as an intestinal antiseptic and alterative. **c. benzoate.** $Cu(PhCOO)_2.2H_2O$ = 341.6. A light-blue crystalline powder insoluble in water or alcohol. **c. borate.** CuB_4O_7 = 219.6. A bluish-green crystalline powder, insoluble in water, soluble in dilute acid; used in ceramics and artists' paints. **c. bromide.** $CuBr_2$ = 223.4. A grayish-black crystalline powder, decomp. on heating, soluble in water or alcohol. **c. butyrate.** $Cu(C_4H_7O_2)_2.2H_2O$ = 273.6. Green monoclinic crystals, slightly soluble in water, soluble in alcohol; used as a reagent for essential oils. **c. carbonate.** Only basic carbonates are known, *e.g.*, $3CuO.2CO_2.H_2O$, copper lasur, mountain blue. A basic carbonate of copper; used in seed wheat treatment to control smut, as a pigment, and in ceramics. **c. cement.** See *dental cement*. **c. chlorate.** $Cu(ClO_3)_2.6H_2O$ = 338.6. Blue, hygroscopic crystals, soluble in water or alcohol; used as a mordant and in the dye industry. **c. chloride.** $CuCl_2$ = 134.5. Anhydrous copper chloride. Brownish-yellow crystals, d.3.054, m.498, which decomp. on further heating, soluble in water or alcohol; used as a mordant. **(cryst.)** $CuCl_2.2H_2O$ = 170.5. Blue, rhombic crystals, or green hygroscopic masses, d.2.47–2.53, which lose 2 mol. water at 100°C, and decomp. at red heat; soluble in water, alcohol, or ether. Used as a reagent and as mordant in the dye industry; for manufacturing sympathetic inks and melanin; as a disinfectant; and in the manufacture of aniline dyes. **c. chromate.** $CuCrO_4$ = 179.7. A yellowish liquid. **c. chromate, basic.** $CuCrO_4.2Cu(OH)_2$ = 374.9. Basic copper chromate. A light-brown powder, insoluble in water, soluble in chromic acid solution; used in the dye industry as a mordant. **c. citrate.** $Cu_2C_6H_4O_7.2\frac{1}{2}H_4O$ = 360.2. A green powder, slightly soluble in water; used medicinally, and as a reagent for glucose. **c. cyanide.** $Cu(CN)_2$ = 115.6. A green powder, soluble in water (cf. *cupro-cupric cyanide*). **c. dichromate.** $CuCr_2O_7.2H_2O$ = 315.8. Brown crystals, soluble in water. **c. ferrocyanide.** $Cu_2Fe(CN)_6.7H_2O$ = 465.2. A brownish-red powder, insoluble in water, soluble in ammonia or KCN solution. **c. fluoride.** $CuF_2.2H_2O$ = 137.6. Blue crystals, sparingly soluble in water. **c. fluosilicate.** C. silicofluoride. (a) *tetrahydrate* $CuSiF_6.4H_2O$ = 277.69. Blue monoclinic prisms, d.2.158, soluble in water. (b) *hexahydrate* $CuSiF_6.6H_2O$ = 313.72. Blue octahedral crystals, d.2.207, soluble in water. Used for coloring and hardening marble, as a disinfectant and a plant spray. **c. formate.** $Cu(HCOO)_2$ = 153.6. Blue monoclinic crystals, d.1.830, soluble in water. **c. hydroxide.** $Cu(OH)_2$ = 97.6. Blue crystals or blue powder, d.3.368, decomp. on heating, insoluble in water but soluble in alcohol or ammonia. **c. hyposulfite.** C. thiosulfate. **c. iodide.** CuI_2 = 317.3. A dark-brown powder, soluble in water or alcohol. **c. ion.** The divalent ion, Cu^{++}. **c. lactate.** $Cu(C_3H_5O_3)_2.2H_2O$ = 277.6. Bluish-green crystals, slightly soluble in water or alcohol. **c. nitrate.** (1) $Cu(NO_3)_2.3H_2O$ = 241.6. Blue, prismatic crystals, d.2.174, m.-114.5. Decomp. 170, soluble in water or alcohol; used as a reagent for detecting oxygen, as an astringent and alterative, and in the preparation of photosensitive papers. (2) $Cu(NO_3)_2.6H_2O$ = 295.7. Blue crystals, d.-2.047, m.26.4, decomp. on heating, very soluble in water or alcohol. Used as (1). **c. nitrite.** $Cu(NO_2)_2$ = 155.6. A green powder of variable

composition, readily decomp.; soluble in water or alcohol. **c. nitroprussiate.** $CuFe(CN)_5(NO)$ = 279.6. A grayish-green, granular photosensitive powder; insoluble in water. **c. nucleinate.** Cuprol. A green powder, soluble in water; used as an astringent. **c. oleate.** $Cu(C_{18}H_{33}O_2)_2$ = 626.2. A dark-green or bluish-green waxy solid, insoluble in water, soluble in ether. It is an antiseptic used in ointments and in the treatment of ring-worm. **c. oxalate.** $Cu(OOC)_2$ = 151.6. A bluish-green powder, insoluble in water, soluble in dilute acids. **c. oxide.** CuO = 79.6. A black monoclinic or regular crystalline powder, d.6.4, m.1064, insoluble in water, soluble in ammonia or potassium cyanide solution. Used as a reagent in elementary analysis (granulated); medicinally as a teniafuge and in ointments; technically in ceramics, glass industry, and porcelain industry for the production of blue and green colors. **c. oxychloride.** $CuO.CuCl_2$ = 214.1. A bluish-green powder, soluble in ammonia or acids; used as a green pigment. **c. palmitate.** $Cu(C_{16}H_{31}O_2)_2$ = 594.2. A greenish-blue powder, m.115, insoluble in water, soluble in alcohol. **c. phosphate.** $Cu_3(PO_4)_2.3H_2O$ = 434.8. Rhombic, blue crystals, slightly soluble in water, soluble in ammonia or acids. (**acid**) $CuHPO_4$ = 159.6. A bluish-green powder, insoluble in water, soluble in acids or ammonia. An anti-tuberculotic; also used as a reagent for CO_2 in water. **c. phosphide.** Cu_3P_2 = 252.8. A gray metallic powder, insoluble in water, soluble in nitric acid; used in the manufacture of phosphorus bronze. **c. potassium chlorate.** $Cu(ClO_3)_2.2KClO_3$ = 475.61. Green crystals, soluble in water. **c. potassium chloride.** $CuCl_2.2KCl.2H_2O$ = 319.910. Greenish-blue crystals, soluble in water. **c. potassium cyanide.** $Cu(CN)_2.2KCN.2H_2O$ = 281.74. Green crystals, soluble in water. **c. potassium ferrocyanide.** $K_2CuFe(CN)_6.H_2O$ = 371.60. A brownish-red powder, insoluble in water. **c. potassium tartrate.** $K_2Cu(C_4H_4O_6)_2$ = 437.83. Blue scales, soluble in water. **c. rhodanide.** C. thiocyanate. **c. salicylate.** $Cu(C_7H_5O_3)_2.4H_2O$ = 409.7. Greenish-blue micro-crystalline needles, soluble in water or alcohol. **c. selenate.** $CuSeO_4.5H_2O$ = 296.8. Blue crystals, slightly soluble in water. **c. silicate.** $CuSiO_3$ = 139.7. A bluish-green crystalline powder, insoluble in water. **c. silicofluoride.** C. fluosilicate. **c. sodium chloride.** $CuCl_2.2NaCl.2H_2O$ = 287.44. Greenish-blue crystals, soluble in water. **c. stearate.** $Cu(C_{18}H_{35}O_2)_2$ = 630.2. A light-blue, amorphous powder, insoluble in water or alcohol, soluble in chloroform, benzene, or turpentine; used as bronze for plaster. **c. subacetate.** Verdigris, aerugo. A greenish-blue powder, soluble in water, sparingly soluble in alcohol, and occurs in variable composition; the blue variety has the average composition $CuO.Cu(C_2H_3O_2)_2$, while the green variety $CuO.2Cu(C_2H_3O_2)_2$. Used in the manufacture of pigments (Schweinfurt green), as a mordant, and in cotton printing. **c. subcarbonate.** $CuCO_3.Cu(OH)_2$ = 221.2. C. carbonate. Blue monoclinic crystals or greenish, amorphous powder, d.3.88, decomp. on heating, insoluble in water, soluble in ammonia or acids. A reagent for detecting glucose; used medicinally as an astringent in ointments, internally as antidote for phosphorus; commercially as a pigment and in the paper industry. **c. sulfate (anhydrous).** $CuSO_4$ = 159.6. A white or grayish, amorphous powder, d.3.516, decomp. 621, soluble in water. Used to dehydrate liquids, *e.g.*, alcohol, and to detect traces of water, (*e.g.*, in ether), when it turns blue. (**basic**) $CuSO_4.3Cu(OH)_2$ = 452.40. A blue powder, slightly soluble in water. (**crystalline**) $CuSO_4.5H_2O$ = 249.71. Copper sulfate, Roman vitriol, blue vitriol, blue stone. Blue, triclinic, transparent crystals, $d_{16°}$.2.286, loses 4 mol. H_2O at 110, and 5 mol. at 250, soluble in 3.5 pts. cold and 1 pt. boiling water, insoluble in alcohol. Used as a reagent for preparing Fehling, Purdy, Benedict, Lowe, and other reagents for detecting glucose; for testing peptones, albumin, urea, picric acid, etc.; medicinally as a caustic, styptic, astringent, emetic, and alterative, and as an external caustic (sticks); technically, in the dye industry and the manufacture of green and blue pigments; in electrolysis and galvanoplating; commercially for manufacturing sprays and disinfectants for plants. **c. sulfide.** CuS = 95.6. A black powder or hexagonal microcrystals, d.3.98, insoluble in water, soluble in acids or ammonia; used as an antiparasitic paint for ship bottoms. **c. sulfite.** $CuSO_3.H_2O$ = 161.6. A greenish-blue crystalline powder, soluble in water. **c. sulfocarbolate.** C. sulfophenate. **c. sulfocyanide.** C. thiocyanate. **c. sulfophenate.** $Cu(PhSO_4)_2.6H_2O$ = 517.81. C. sulfocarbolate, copper carbosulfate, copper phenylsulfonate, copper sulfophenylate. Green crystals, soluble in water or alcohol; used as a bactericide and antiferment. **c. tannate.** A brown powder of variable composition, resulting from treating tannin with cupric salts. Insoluble in water, soluble in ammonia. **c. tartrate.** $CuC_4H_4O_6.3H_2O$ = 265.7. A green-blue powder, slightly soluble in water, soluble in alkalis; used as a reagent, for glucose. **c. thiocyanate.** $Cu(SCN)_2$ = 179.6. C. rhodanate. A blue powder which is insoluble in water but soluble in ammonia. **c. thiosulfate.** CuS_2O_3 = 175.6. A green-blue crystalline powder, sparingly soluble in water.

cupricyanide. A compound containing the divalent $Cu(CN)_4^{--}$ radical.

cuprine. $C_{11}H_7O_3N$ = 201.05. An alkaloid derived from cotarnine.

cuprite. Cu_2O. Ruberite, ruby copper, tile ore. A native cuprous oxide.

cuprocupric. A complex copper salt, which may be considered as a mixture of cuprous and cupric salts. **c. cyanide.** $Cu_3(CN)_4.5H_2O$ = 384.83. A green powder; insoluble in water, soluble in potassium cyanide solution.

cuprocyanide. A compound containing the trivalent $Cu(CN)_4^{---}$ radical.

cuprohemol. A compound of copper and hemol; used medicinally.

cuprol. A copper salt of nucleic acid.

cupron. α-Benzoin-oxime. A quantitative precipitant for copper.

cupronine. $C_{20}H_{18}O_2N_2$ = 334.13. An alkaloid derived from cotarnine.

cuprophane. The transparent cellulose films made by the cuprammonium process. Cf. *rayon.*

cuprosulfate. A double salt of copper sulfate and another sulfate.

cuprotungstite. $CuWO_4$. A tungsten ore.

cuprous. Describing a compound of monovalent copper Cu—; generally less common, and less

stable than the corresponding cupric compounds. **c. acetylide.** CuC_2H_2O = 169.16. An amorphous red powder formed when acetylene is passed into a cupric solution; it explodes when dry. **c. bromide.** Cu_2Br_2 = 287.0. A brown powder, d.4.72, m.484, b. about 900, insoluble in water, soluble in acids. **c. carbonate.** Cu_2CO_3 = 123.5. A yellow powder, decomp. on heating, insoluble in water, soluble in acids or ammonia. **c. chloride.** Cu_2Cl_2 = 198.2. Resin of copper, native as nantokite. Greenish-white tetrahedral crystals, d.3.53, m.422, b. about 1000, insoluble in water or alcohol, soluble in acids or ammonia. It is a reagent in gas analysis, and for the detection of AsH_3 and SbH_3. **c. cupric cyanide.** Cuprocupric cyanide. **c. cyanide.** $Cu_2(CN)_2$ = 179.4. A colorless monoclinic or amorphous powder, decomp. at red heat, insoluble in water, soluble in ammonia or KCN solution. **c. fluosilicate.** Cu_2SiF_6 = 269.20. C. silicofluoride. A red powder. **c. hydroxide.** $Cu_2(OH)_2$ = 161.2. A yellow powder, insoluble in water, soluble in acids or ammonia. **c. hyposulfite.** C. thiosulfite. **c. iodide.** Cu_2I_2 = 381.0. A brownish-yellow crystalline powder, $d_{15°}$.-5.65, m.606, b. about 765, insoluble in water, soluble in dilute acids, tincture of iodine, or KI solution. Used as a pigment mixed with equal parts HgI_2, for indicating the temperature of frictioning parts of machines. **c. ion.** The monovalent ion, Cu^+. **c. oxide.** Cu_2O = 143.1. A brown or red granular powder, or regular crystals, d.5.88, insoluble in water, soluble in acids, ammonia water or KCN solution; used in ceramics and the glass industry for making red pigments and red glass. **c. phosphide.** Cu_3P = 221.71. A grayish, metallic powder insoluble in water, soluble in acids, used in the manufacture of phosphorus bronze. **c. potassium cyanide.** $CuCN.3KCN$ = 285.1. A white, crystalline powder, soluble in water. **c. rhodanide.** C. thiocyanate. **c. sulfate.** Cu_2SO_4 = 223.20. A gray or white powder; readily decomp. by water. **c. sulfide.** Cu_2S = 159.2. A black powder or rhombic crystals, d.5.58, m.1100, insoluble in water, soluble in acids. It occurs native as chalcocite. **c. sulfite.** $Cu_2SO_3H_2O$ = 225.2. A brown crystalline powder, insoluble in water. **c. thiocyanide.** $Cu_2(CNS)_2$ = 243.4. C. sulfocyanate. C. sulfocyanide. C. rhodanide, c. rhodanate. A grayish-white powder, m.1080, insoluble in water, soluble in ammonia.

cuproxide. CuO. A native copper oxide.

cuprum. The Latin for copper. See *cupric.*

Cupuliferae. A family of trees comprising Betulaceae (birches) and Fagaceae (oaks, chestnuts, beeches), that yield a valuable wood and several drugs:

Quercus alba	white oak
Quercus species	nutgalls
Quercus robur	oak bark
Quercus suber	cork
Alnus serrulata	tag alder
Fagus ferruginea	American beech
Castanea vulgaris	chestnut
Betula lenta	sweet birch oil
Ostrya virginica	iron wood

Cf. *quercitron, fagin.*

curangin. $C_{43}H_{77}O_{20}$ = 973.63. Glucoside from *Curanga amara*, a Scrophulariaceae of Southern Asia. Febrifuge and vermifuge.

curare. Woorara, urari, curara, curari or South American arrow poison. A black, brittle, resinoid extract of various *Strychnos* species; it is a paralyzant of the motor nerves, and contains the active principles curarine and curine.

curarine. $C_{19}H_{26}O_2N$ = 300.15. A crystalline alkaloid from curare, and a strong paralyzant. **proto-** An alkaloid from curare. **pseudo-** Pseudocurarine. **tubo-** $C_{19}H_{26}ON_2$ = 314.21. An amorphous, brown alkaloid from curare.

curcas oil. An oil from the seeds of *Jatropha curcus*, Linn., or physic nut, from Siam and East Indies, d.0.919; used as a drying oil and an emetic and purgative.

curcin. A toxic albumin of Barbados nuts; the seeds of *Curcas purgans*, an Euphorbiaceae of the West Indies; it resembles ricin.

curcuma. Turmeric.

curcumene. A group of terpenes from the volatile oil of the rhizomes of *Curcuma aromatica.*

curcumin. (1) $C_{10}H_{10}O_3$ = 178.08. A brownish-yellow coloring matter of tumeric, the rhizome of *Curcuma longa.* Deep-yellow, highly lustrous crystals, sparingly soluble in water, soluble in alcohol or ether; used as an indicator from pH 7.4 (yellow) to 8.6 (brown), as reagent for beryllium, and as a dye. (2) $C_{21}H_{20}O_6$ = 368.16. *1.7*-bis-(*4*-hydroxy-*3*-methoxyphenyl)-*1.6*-heptadiene-*3.5*-dione*, $(MeO(HO)C_6H_3\text{-}CH{:}CHCO)_2CH_2$. Orange yellow needles, m.183, insoluble in water.

Marie Sklodowska Curie.

(Courtesy of Jour. of Chemical Education and Wide World Photos.)

curdling. The coagulation of milk.

curds. The precipitate obtained by coagulation of milk.

Curie, Irene. See *Joliot.* **C., Marie Sklodowska.** 1867–1934. A French chemist and physicist noted as co-discoverer of radium, polonium, and radioactivity. **C., Pierre** 1859–1906. A French physicist and husband of Madame C., noted as co-discoverer of radium. **C. electroscope.** A sensitive electroscope to determine minute amounts of radioactive substances. **C. point.** The temperature above which the molecular forces of magnetism of paramagnetic

bodies cease to exist. **C. therapy.** Radium therapy. **C. unit.** Curie.

curie. A unit of radioactivity; the amount of emanation from, or in equilibrium with one gram of pure radium. 1 curie = 2.5×10^9 mache units. It equals 0.663 mm^3 or 6.56×10^{-6} grams of emanation (radon) and maintains an air ionization of 2.75×10^4 e.s.u. (0.92 milliampere). **micro-** The millionth part of a c., 10^{-6} curie. **milli-** The one-thousandth part of a c., 10^{-3} curie. **millimicro-** Is 10^{-9} curie. Cf. *eman, mache.*

curiegraph. A photograph of a tissue injected with a radium emanation.

curiescopy. The visual examination in a dark chamber on a radioscopic screen of the emanations emitted by the radium preparation injected into a tissue.

curine. $C_{19}H_{19}O_3N$ = 297.2. A paralyzant alkaloid from curare. A colorless microcrystalline powder, m.161; soluble in water, alcohol, chloroform or dilute acids.

curite. $PbO_5.UO_3.4H_2O$. A radioactive mineral, from the Belgian Congo.

curled. Describing typical growths of bacteria in parallel chains or weavy strands; as, anthrax colonies.

current. (1) Any stream or flow; as, electric c.—a stream of electrons; blood c.—a flow of blood through the blood vessels. (2) Electric c. which moves along a conductor; its unit is the ampere, q.v.; its quantity the coulomb, q.v.; its potential difference the volt q.v. **alternating-** (A.C.) A periodically reversed electric c. **battery-** Same as galvanic c. **d'Arsonval-** The high voltage discharge of a condenser through a wire solenoid, producing high frequency alternations. Used therapeutically. **direct-** (D.C.). A current whose direction is always the same, *e.g.*, a galvanic current. **eddy-** The current set up around a conductor (see *eddy*). **Foucault-** Electrical currents induced in a mass of metal in a magnetic field of varying intensity. **galvanic-** A current from a galvanic battery. **high-frequency-** An alternating current changing its direction many times per second. **induced-** The current produced in an induction apparatus from the primary current. **primary-** The current that produces an induced current. **secondary-** Induced c.

c. breaker. A device to interrupt the electric current, *e.g.*, a commutator, switch, or rheotome. **c. changer.** A device to reverse an electric current, *e.g.*, a commutator. **c. condenser.** A device to store up electricity, *e.g.*, a condenser or accumulator. **c. density.** See *density*. **c. regulator.** A device to regulate electric current, *e.g.*, a rheostat.

curry. The powdered leaves of *Murraya koenigii*, a Rutaceae of India, sometimes flavored with other spices. Used as curry powder for seasoning food and preparing the Indian national dish, curry.

currying. The incorporation of oil and grease into leather.

Curtius, Theodor. 1857–1928. A German chemist, noted for organic syntheses. **C. reaction.** The preparation of amines and urethanes by the action of water and alcohol on acid azides.

curve. A continuous line which is not straight or is made up of straight parts. In the graphic diagram (coordinate system, q.v.) a line connecting points whose positions are defined by their abscissae and ordinates. Hence it expresses a relationship. **c. analyser.** A mechanical device consisting essentially of a table with two movable scales attached. Used to measure tracings and curves.

cuscamidine. An amorphous alkaloid from cusco bark.

cuscamine. A crystalline alkaloid, m.218, from cusco bark.

cuscus oil. Vetiver oil.

cuscohygrine. Hygrine.

cusco bark. Red bark. A variety of cinchona bark obtained from *Cinchona succirubra*, a Rubiaceae.

cusconidine. An amorphous alkaloid from cusco bark; pale-yellow masses.

cusconine. $C_{23}H_{26}O_4N_2$ = 394.3. An alkaloid, m.110, from cusco bark. Cf. *aricine.*

cusp. The point formed by the discontinuous join of two curves.

cusparia bark. Angostura bark.

cusparidine. $C_{19}H_{17}O_3N$ = 307.2. An alkaloid from angostura bark, the bark of *Cusparia officinalis*. A fine white crystalline powder, m.78, sparingly soluble in water, soluble in acids.

cusparine. $C_{19}H_{17}O_3N$ = 307.14. 2-Homopiperonyl-4-methoxyquinoline. An alkaloid from angostura bark. Colorless crystals, m.90; insoluble in water, soluble in alcohol, ether, chloroform, acetone or benzene.

cusso. Kousso.

cut. (1) The weight in pounds of resin added to each gallon of solvent. Owing to the bulking and swelling of the solvent, the following relation exists:

	4 *lb.* *cut*	6 *lb.* *cut*	6.7 *lb.* *cut*
lbs. resin in 1 gallon solution.....	2.86	3.75	4.00
gals. solvent in 1 gallon solution....	0.714	0.625	0.60

(2) A fraction of crude petroleum, q.v.

cutal. Aluminum borotannate.

cutch. Catechu.

cutic acid. $C_{25}H_{50}O_6$ = 458.40. A fatty acid from cutin.

cutin. The fatty or waxy protective coating of plants.

cutting. (1) Etching. (2) Lubricating. (3) Mixing. **c. fluid.** A liquid used to keep working parts cool; e.g. in drilling, milling, planing, sawing, tapping, threading. Examples are soap water, mineral oil, emulsions, etc. Cf. *cut.*

cuttle fish. A mollusk, genus *Sepia*, of the order Cephalopoda; it discharges a pigment from a gland near the liver which furnishes painter's sepia.

cwt. An abbreviation for hundredweight.

Cy. Abbreviation for cyanide radical, CN—.

cyamelide. $C_3H_3N_3O_3$ = 129.05. *s*-Trioxanetrimine, $(HNCO)_3$. White amorphous powder, insoluble in water.

cyamethine. Cyanmethine.

cyan. Cy. **Cyano-** The monovalent radical, —CN; see *cyanides*. **di-** Cyanogen. **hexa-** A cyclic polymer. **iso-** The monovalent radical, —NC, see *isocyanides*.

cyanacetic acid. $C_3H_3O_2N$ = 85.09. Cyano-acetic acid, nitrilmalonic acid, carboxy-cyanmethane, $CN.CH_2.COOH$. Colorless crystals, m.70, $b_{15mm.}$108, decomp. when further heated; soluble in water, alcohol or ether.

cyanalcohol. Cyanhydrin.

cyanaldehyde. C_3H_3ON = 69.02. Nitrilmalonaldehyde, $CN.CH_2.CHO$. Colorless crystals, soluble in water, alcohol, or ether.

cyanamid. Trade name for a mixture of 65–70 % calcium cyanamide and 15–20 % calcium hydroxide, with free carbon etc., used as fertilizer.

cyanamide. CN_2H_2 = 42.11. Cyanogen amide, amidocyanogen, carbamonitrile, carbamic acid nitril, urea anhydride, $NH_2.CN$ or NH:C:NH. Colorless needles, m.46, soluble in water, alcohol or ether. **allyl-** Sinamine. **benzyl-** See *benzyl*. **calcium-** CaNCN. An intermediate in synthesizing ammonia from air. **diethyl-** See *diethyl*. **dimethyl-** See *dimethyl*. **diphenyl-** Phenylcyananilide. **phenyl-** Cyananilide.

c. process. A method of nitrogen fixation: (1) Limestone and coke are heated in the electric furnace and form calcium carbide. (2) Over the heated carbide (1000°C.) a current of nitrogen passes and produces calcium cyanamide. (3) $CaCN_2$ is treated in autoclaves by high-pressure steam and yields ammonia.

cyanamil. Cinnamyl cinnamate.

cyananilide. $C_7H_6N_2$ or PhNHCN = 118.05. Phenylcyanamide, cyanilide, carbanilonitrile, *N*-cyanoaniline. Colorless crystals, m.47, soluble in alcohol. **phenyl-** $Ph_2N.CN$ = 194.09. Diphenylcyanamide. Colorless crystals, m.73.

cyanate. A salt of cyanic acid containing the monovalent —CNO radical. **iso-** Carbimide. A salt of isocyanic acid containing the monovalent —N:C:O radical. **pseudo-** The radical —O.N:C. **sulfo-** Thio-. **tauto-** The radical —O.C:N. **thio-** The radical —CNS.

cyanation. (1) The introduction of the —CN radical into a molecule. (2) The formation of a nitrile.

cyanaurite. A double salt of a metal cyanide and aurous cyanide, $MAu(CN)_2$.

cyanbenziline. $C_{24}H_{21}N_3$ = 351.20. *μα*-dibenzoyl-*β*-phenyl-*γ*-amino-pyrimidine. Colorless crystals, m.106.

cyanbenzyl. A compound containing the monovalent $CN.CH_2.C_6H_4$— radical, derived from alpha-benzyl cyanide. **c. cyanide.** $C_9H_6N_2$ or $CN.CH_2.C_6H_4.CN$ = 142.1. **ortho-** o-alpha-homophthalonitrile. Colorless crystals, m.81. **meta-** m-alpha-homophthalonitrile. Colorless crystals, m.88. **para-** p-alpha-homophthalonitrile. Colorless crystals, m.100.

cyancarbamic acid. $C_2H_2O_2N_2$ = 86.02. Cyanamidocarbonic acid, CN.NH.COOH.

cyancarbonic acid. Cyanformic acid. **c. ester.** $CN.COOC_2H_5$ = 99.07. A liquid, b.115, soluble in alcohol or ether, insoluble in water.

cyanconine. $C_9H_{14}N_2$ = 150.10. Alpha-meta-diethyl-beta-methyl-pyrimidine, 2.6-diethyl-5-methyl-1.3-pyrimidine. A colorless liquid, b.-205.

cyancoumarin. $C_9H_5O_2.CN$ = 161.05. 3-cyanocoumarin. Colorless crystals, m.182.

cyanethine. $C_9H_{15}N_3$ = 165.10. Alpha-meta-diethyl-beta-methyl-gamma-amido-pyrimidine, 2.6-diethyl-5-methyl-4-amido-1.3-pyrimidine. Colorless crystals, m.189.

cyanetholin. Ethyl cyanate.

cyanethylamide. Ethyl cyanamide.

cyanformate. A salt of cyanformic acid containing the monovalent CN.COO— radical.

cyanformic acid. CN.COOH = 71.03. A monobasic acid known only as its salts, the cyanformates.

cyanhematin. A compound of hematin and cyanogen.

cyanhydride. Cyanohydrin.

cyanhydrin. Cyanohydrin.

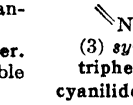
cyanic acid. HCNO = 43.06. Cyanhydroxide. A colorless poisonous liquid d.1.140, which polymerises to cyamelide and fulminuric acid and from which the cyanates are derived. **hydro-** HCN = 27.06. Prussic acid. A colorless poisonous liquid, $d_{18°}$.0.697, m. −11, b.25, miscible with alcohol, water, or ether. Its salts are the cyanides. **iso-** HNCO = 43.06. A monobasic acid from which the isocyanates are derived. **pseudo-** HONC = 43.06. A monobasic acid from which the pseudocyanates are derived. **pseudoiso-** Tauto-. **sulfo-** Thio-. **tauto-** HOCN = 43.06. Pseudoiso-, fulminic acid. A monobasic acid, from which the fulminates are derived. **thio-** See *thiocyanic acid*. **trihydro-** Cyanidine.

cyanide. A compound containing the monovalent radical, —CN, derived from hydrocyanic acid. **azo-** The radical —N:N.CN. **chloro-** q.v. **cupri-** q.v. **ferri-, ferro-** See *ferricyanide, ferrocyanide*. **hydro-** A compound containing a HCN molecule; as R.HCN. **iso-** The monovalent radical, —NC, derived from isocyanic acid, HNC. **sulfo-, thio-** Thiocyanate.

c. process. A method of extracting gold from ores by leaching with potassium cyanide solution.

cyanidin. $C_{15}H_{10}O_6.HCl$ = 322.53. An anthocyanidin, q.v., from the flowers of *Centaurea* species and *Rosa gallica*.

cyanidines. (1) A group of compounds derived from the hypothetical trihydrocyanic acid. They contain the trivalent radical, $C_3N_3\equiv$ or



(2) An anthocyanidin, q.v. (3) *sym*-triazine, q.v. **diamido-** Formoguanine. **triphenyl-** Cyanphenine. **trioxy-** Cyanuric acid.

cyanilide. Cyananilide.

cyanin. (1) $C_{27}H_{30}O_{16}$ = 610.23. A glucoside from cornflower, rose and other flowers, which hydrolyses to cyanidin. (2) Anthocyanin. A group of blue pigments found in certain flowers, as cornflower, iris, violet, etc. **carbo-** Carbocyanin. **iso-** Isocyanin. **di-** See *di-*

CYANIN DYES

Kryptocyanin	1.1′-diethyl-4.4′-carbocyanin iodide
pinacyanol	1.1′-diethyl-2.2′-carbocyanin iodide
ethyl red	1.1′-diethylisocyanin iodide
quinoline red	1.1′-benzilidene-2.2′-quinocyanin chloride
cyanin	1.1′-diisoamylcyanin iodide
pinaverdol	1.6.1′-trimethylisocyanin iodide
α-pseudocyanin	1.1′-diethyl-4.4′-dimethyl-2.2′-carbocyanin bromide
α-dicyanin	1.1′-diethyl-2.4-dimethyl-2′4′—carbocyanin iodide
pinachrome	1.1′-diethyl-6-ethoxy-6′-methoxyisocyanin iodide
dicyanin	1.1′-diethyl-4.2′-dimethyl-6.6′-diethoxy-2.4′-carbocyanin iodide
pseudodicyanin iodide	1.1′-diethyl-4.6.4′.6′-tetramethyl-2.2′-carbocyanin iodide
pseudodicyanin bromide	1.1′-diethyl-4.6.4′.6′-tetramethyl-2.4′-carbocyanin bromide.

cyanine. **phyco-** See *phycocyanin.* **syn-** See *syncyanin.*

c. dyes. A group of aniline dyes derived from cyanine; used in photography as sensitizers; *e.g.*,

cyanine. (1) $C_{29}H_{35}N_2I$ = 538.1. Chinolin blue, quinoline blue, iodcyanin, *1.1'*-diisoamylcyanin iodide. Green crystals with metallic luster, soluble in warm water or alcohol; used as an indicator and as a sensitizer in photography. (2) Cyanin.

c. hydroiodide. $C_{29}H_{35}N_2I.HI$ = 665.9. Yellow needles which are soluble in water.

cyanite. Kyanite, rhoetzite. Disthene. The natural, blue or white, silicate $(AlO)_2.SiO_3$, decomp. above 1100°C. to mullite and siliceous glass. Cf. *sillimanite, andalusite, mullite, fibrolite.*

cyanmethine. $C_6H_9N_3$ = 123.07. Cyamethine, α-meta-dimethyl-γ-amidopyridine, 2.6-dimethyl-4-amido-pyrimidine. Colorless crystals, m.180.

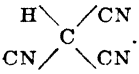
cyano. The monovalent radical —CN, sometimes abbreviated Cy. It acts like a halogen (forming cyanides) and forms, like ammonia, many complex salts. **iso-** The radical —N:C. **thio-** The radical —NCS. *isothio-* The radical —CNS. **c. salts.** A group of addition compounds in which the cyano radical forms part of the complex ion; as, $ZnCy_3^-$, $ZnCy_4^{--}$, $CuCy_2^-$, $CuCy_3^{--}$, $NiCy_4^{--}$, $FeCy_6^{---}$ and $FeCy_6^{----}$.

cyano aniline. Cyananilide.

cyanobenzene. See *benzene.*

cyanocarbonic acid. Cyanformic acid.

cyanoform. C_4HN_3 = 91.032. Tricyanomethane, m.93.



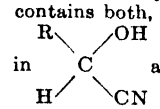
cyanogas. A powdered calcium cyanide, used in fumigation and as rodent killer, being sprinkled in the mouth of the hole where the moisture of the earth causes the slow evolution of HCN gas.

cyanogen. (1) NC.CN = 52.03. Cyan cyanide ethane dinitrile*, prussite, dicyanogen, oxalonitrile. A colorless poisonous gas with the odor of bitter almonds $d_{(air)}$.1.806, m. −34, b. −21, soluble in water, alcohol or ether. (2) Originally the radical —CN. **amido-** Cyanamide. **bromo-** C. bromide. **chloro-** C. chloride. **di-** Cyanogen.

c. bromide. NCBr = 106.01. Cyan bromide, bromine cyanide. Colorless transparent needles, m.52, b.61, soluble in water, alcohol, or ether. **c. chloride.** (1) NCCl = 61.50. Cyan chloride, chlorine cyanide. A colorless and extremely poisonous gas or liquid, m. −5, b.15, soluble in water, alcohol, or ether. (2) Solid, $C_3N_3Cl_3$ = 184.43. m.145, b.190. **c. disulfhydrate.** $NH_2.CS.CS.NH_2$ = 120.2. Rubeane. **c. halides.** A group of compounds of the general formula NCX, in which X is a halogen. They tend to polymerize to $N_3C_3X_3$. **c. iodide.** NCI = 152.9. Iodine cyanide. Colorless needles, soluble in water, alcohol, or ether. **c. monosulfhydrate.** Flavean hydride. **c. sulfide.** $(CN)_2S$ = 84.1. Cyan sulfide. Colorless rhombic scales, m.60, soluble in water, alcohol or carbon disulfide.

cyanogenetic. Yielding cyanogen; as, certain glucosides, amygdalin. Cf. *syncyanin.*

cyanohydrin. Cyan alcohol. A compound that contains both, the —CN and —OH radical, as



in and **c. synthesis.** The addition of a carbon atom by the reaction $R.HC{:}O + HCN \rightarrow R.CHOH.CN$. Cf. *Wohl's reaction.*

cyanol. Aniline.

cyanomaclurin. (1) $C_{15}H_{12}O_6$ = 288.08. A tannin from the wood of *Arctocarpus integrifolia.* Colorless crystals, m. exceeds 290. (2) A synthetic anthocyanidin.

cyanometer. An instrument for comparing the shades of the sky.

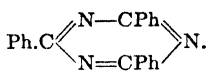
Cyanophyceae. A group of blue algae. See *phycocyanin.*

cyanotype. Blueprint.

cyanoximide. A compound containing the monovalent NC.C(NOH)— radical.

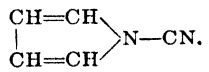
cyanoximido acetic acid. NC.C(:NOH).COOH = 114.03. Colorless crystals, m.129. **c. acetic ester.** NC.C(:NOH)COOEt = 142.08. Colorless crystals, m.127.

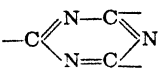
cyanphenine. $C_3N_3Ph_3$ = 309.12. Triphenyl cyanidine.



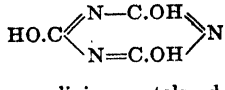
cyanphenyl. Pseudo-*carbostyril.*

cyanpyrrole. C_5H_4N = 78.03. N-cyanpyrrole. The heterocyclic compound

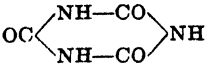


cyanur. A compound containing the trivalent cyanidine ring:  **c. amide.** C. tetramide. **c. diamide.** $C_3H_5ON_5$ = 127.3. Ammeline. Colorless crystals, decomp. on heating, insoluble in water, alcohol, or ether. **c. monoamide.** $C_3H_4O_2N_4$ = 128.2. Ammelide. Colorless crystals, insoluble in water, soluble in acids. **c. tetramide.** $C_3H_6N_6$ = 126.3. Melamine, cyanuramide. Colorless prisms, decomp. on heating, sparingly soluble in water, or alcohol, insoluble in ether.

cyanuric acid. $C_3H_3O_3N_3.2H_2O$ = 165.21. Pyrolithic acid, trioxycyanidine, *s*-triazine triol, trihydroxycyanidine, pyrouric acid, pyruric acid.



Colorless monoclinic crystals, d_0°.1.768, sparingly soluble in water, alcohol or ether. Cf. *cyanur, melem, melamide.* **iso-** Tricarbimide. The ketone form of cyanuric acid.



Cf. *mellimide.* **thio-** q.v. **c. chloride.** Tricyanogen chloride.

cyanuric ester. A derivative of cyanuric acid containing the trivalent cyanur radical, $C_3N_3O_3$≡. **ethyl-** $C_3N_3(OEt)_3$ = 213.14. Colorless crys-

tals, m.29, b.275. **ethyliso-** $C_3O_3N_3Et_3$ = 213.14. Ethyltricarbimide. Colorless crystals, m.96, b.276. **iso-** A derivative of isocyanuric acid, containing the trivalent isocyanur radical, $C_3H_3N_3\equiv$. **methyl-** $C_3N_3(OMe)_3$ = 171.10. Colorless crystals, m.135, b.263, soluble in alcohol. **methyliso-** $C_3O_3N_3Me_3$ = 171.10. Methyltricarbimide. Colorless crystals, m.175, b.296.

cyanurin. An indigo blue found occasionally in urine on the addition of an acid; it indicates indican.

cybotactates. Aggregates of molecules in liquids, generally oriented. Cf. *zones*.

cybotactic. Pertaining to end-to-end or side-to-side arrangements of molecules; as, in the case of octanol:

$Me(CH_2)_6CH_2OH$ $HOCH_2(CH_2)_6Me$
n- (end-to-end)
$Me(CH_2)_2CH_2OH(CH_2)_3Me$
$Me(CH_2)_2CH_2OH(CH_2)_3Me$
4- (side-to-side).

In both cases the OH groups are held together by coordinate bonds. Cf. coordinate *bond, association*.

cybotaxis. The cubical space-arrangement of the molecules of non-crystalline substances.

cyclamin. Arthranitin.

cyclamiretin. $C_{15}H_{22}O_2$ = 234.2. A decomposition product of cyclamin.

cycle. (1) Any periodic repetition of a phenomenon; as, carbon cycle, nitrogen cycle, sulfur cycle, phosphorus cycle, etc. (2) A ring or closed atomic chain; as, homocycle, heterocycle, carbocycle.

cycleine. $C_{27}H_{31}O_4N_2$ = 447.4. An alkaloid from *Cyclea peltata*, an East Indian Menispermaceae used for diarrhea and hemorrhoids.

cyclic. Arranged in a ring, *e.g.*, atoms. Cf. *acyclic, aromatic*. **carbo-** A ring of carbon atoms, *e.g.*, benzene. **di-** An atomic structure containing two rings, *e.g.*, as in naphthalene. **hepta-** (1) An atomic structure containing seven rings. (2) A ring of seven atoms, *e.g.*, tropine nucleus. **hetero-** A ring composed of two or more different kinds of atoms, *e.g.*, pyridine. **hexa-** (1) An atomic structure containing six rings. (2) A ring of six atoms, *e.g.*, benzene nucleus. **homo-** A ring composed of one kind of atom, *e.g.*, *carbo-*. **mono-** An atomic structure containing one ring only, *e.g.*, benzene derivatives. **penta-** (1) An atomic structure containing five rings, *e.g.* morphine. (2) A ring composed of five atoms, *e.g.*, cyclopentane. **poly-** An atomic structure containing two or more rings. **tetra-** (1) An atomic structure containing four rings. (2) A ring composed of four atoms, *e.g.*, cyclobutane. **tri-** (1) An atomic structure containing three rings. (2) A ring composed of three atoms, *e.g.*, cyclopropane.

c. action. See *catalysis*. **c. compound.** A compound that contains a ring of atoms, or a closed homocyclic or heterocyclic chain of atoms in its molecule. See *rings*. **c. hydrocarbons.** A compound of hydrogen and carbon, which contains a ring of carbon atoms; they may be unsaturated, cf. *benzene series, cycloolefines*, or saturated, cf. *cyclo-paraffins*.

cyclite. Benzyl bromide.

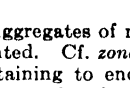
cyclization. Ring formation.

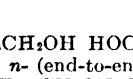
cyclo- A prefix indicating a ring compound.

cyclobarbital. Phanodorn; the 5-Δ^1-cyclohexenyl ethyl barbituric acid, used as a sedative.

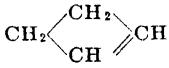
cyclobutane. C_4H_8 = 56.1. Tetramethylene, q.v., diethylene, tetrahydrobutene, cf. *picean nucleus*.  A colorless gas, d_4°.0.7083, b.11. **ethyl-** C_6H_{12} = 84.1. A colorless liquid, d.0.740, b.72. **methyl-** C_5H_{10} = 70.1. A colorless liquid, b.39.

c. carboxylic acid*. See *alicyclic acids*.

cyclobutanol*. C_4H_8OH = 72.1. Hydroxy-tetramethylene,  A colorless liquid, b.123.

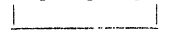
cyclobutanone*. C_4H_6O = 70.1. Ketotrimethylene,  A colorless liquid, d.0.930, b.99.

cyclobutene*. C_4H_6 = 54.1. Δ^1-tetramethylene, cyclobutylene,

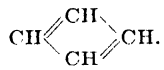


A colorless gas, b.3.

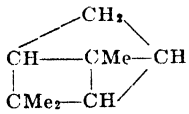
cyclobutyl. The monovalent radical



cyclobutylene. C_4H_4 = 52.1. Tetramethyl-diene, $\Delta^{1,3}$-tetramethylene, butene.

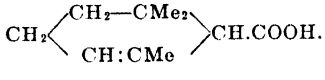


cyclofenchene. $C_{10}H_{16}$ = 136.12. A tricyclic terpene,



A colorless liquid, d.0.861, b.144.

cyclogeranic acid. $C_{10}H_{16}O_2$ = 168.2. 1.2.3.4-tetrahydro-2.2.6-trimethylbenzene carboxylic acid.



A colorless crystalline substance, m.106.

cycloheptadecene*. Civetane.

cycloheptadecenone*. Civetone.

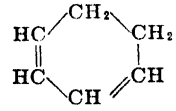
cycloheptane*. Suberane.

cycloheptanol*. Suberol.

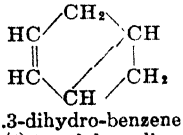
cycloheptanone*. Suberone.

cycloheptene*. C_7H_{12} = 96.09. Suberene, suberylene. A colorless oil, d.0.8228, b.115, insoluble in water.

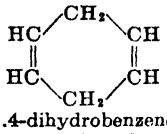
cyclohexadiene*. C_6H_8 = 80.06. Dihydrobenzene. A group of partly saturated benzenes:



1.2-dihydro-benzene
$\Delta^{3,5}$-cyclohexadiene
d_{20}°.0.848, b.78.5



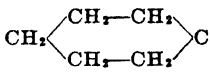
1.3-dihydro-benzene
$\Delta^{2(4),5}$-cyclohexadiene
d.0.842, m. −98, b.80.5



1.4-dihydrobenzene
$\Delta^{2.5}$-cyclohexadiene
$d_{22°}$.0.847, b.85.5

cyclohexan-diol. Cyclohexanediol.

cyclohexane*. C_6H_{12} = 84.13. Hexamethylene, hexanaphthene, hexahydrobenzene,



A colorless hydrocarbon occurring in Austrian and Caucasian petroleum, d.0.780, m.6.4, b.81; insoluble in water, soluble in alcohol or ether. **dimethyl-** C_8H_{16} = 112.1. **1.2-** Hexahydro-o-xylene. A colorless liquid, d.0.773, b.124. **1.3-** Hexahydro-m-xylene. A colorless liquid, d.0.771, b.120. **1.4-** Hexahydro-p-xylene. A colorless liquid, d.0.769, b.119. **ethyl-** C_8H_{16} = 112.1. Hexahydroethylbenzene. A colorless liquid, d.0.777, b.132. **hexahydroxy-** See *inosite, phenose.* **hydroxy-** Cyclohexanol. **isopropyl-4-methyl-** $C_{10}H_{20}$ = 140.2. p-menthane, $Me_2CH.C_6H_{10}.Me$. A colorless liquid, d.0.748, b.167. **methyl-** Hexahydrotoluene. **pentahydroxy-** See *quercitol, pinite.* **propyl-** C_9H_{18} = 126.1. Hexahydropropyl-benzene. A colorless liquid, d.0.767, b.140. **tetramethyl-** $C_{10}H_{20}$ = 140.2. Hexahydrodurene. A colorless liquid, d.0.785, b.161. **trihydroxy-** Phloroglucitol. **trimethyl-** C_9H_{18} = 126.2. **1.2.4-**Hexahydro-Ψ-cumene. A colorless liquid, d.0.778, b.142. **1.3.5-** Hexahydromesitylene. A colorless liquid, d.0.772, b.137.

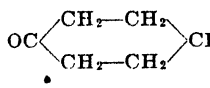
cyclohexanediol*. **1.2-** Hexahydrocatechol. **1.3-** See *quinitol.* **1.4-** See *quinitol.*

cyclohexanehexol. Inositol.

cyclohexanepentol*. Quercitol.

cyclohexanol*. $C_6H_{11}OH$ = 100.1. Hexahydrophenol, hexalin, PhH_6OH. Colorless crystals, or liquid, d.0.945, m.15, b.158. Used as a solvent for gums, waxes, rubber and nitrocellulose; also as an emulsifier in detergents. **trimethyl-** $C_9H_{18}O$ = 142.1. A liquid, b_{760mm}.198, soluble in most organic solvents or oils; used as a mutual solvent for water-immiscible liquids.

cyclohexanone*. $C_6H_{10}O$ = 98.1. Pimelinketone, ketohexamethylene.



A colorless liquid, b.155; used as a solvent, and in organic synthesis. **2-methyl-** $C_7H_{12}O$ = 112.1. A colorless liquid, b.166. **3-methyl-** A colorless liquid, b.164. **4-methyl-** A colorless liquid, b.163. **2.4.5-trimethyl-** $C_9H_{16}O$ = 140.1. A colorless liquid, b.191. **3.5.5-trimethyl-** Dihydroacetophenone. A colorless liquid, b.189.

cyclohexatriene. Benzene.

cyclohexene*. C_6H_{10} = 82.1. Tetrahydrobenzene, naphthylene, Δ^1-hexamethylene. A colorless liquid, d.0.8102, m.−103.7, b.83. Cf. *carveol, dambonite.* **c. trione*.** Urinoid.

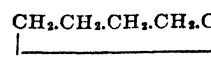
cyclohexenol*. $C_6H_{10}O$ = 98.1. Tetrahydrophenol, Δ^2-cyclohexenol, Δ^3-hydroxy-cyclohexene. A colorless liquid, b.163.

cyclohexenyl. The monovalent radical, C_6H_9—, derived from cyclohexene. There are 3 isomers.

cyclohexyl*. The monovalent radical, C_6H_{11}—, derived from cyclohexane. **bi-** $C_{12}H_{22}$ = 166.2. Dodecahydrodiphenyl, C_6H_{11}—C_6H_{11}. Colorless liquid, d.0.864, b.240.

c. diethanolamine. An emulsifying agent.

cyclohexylidene. The bivalent radical



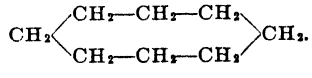
derived from cyclohexane.

cyclol. The hypothetical structure of globular proteins, viz. a space-enclosing arrangement of diazine and triazine rings.

cyclononane. C_9H_{18} = 126.2. A colorless liquid, d.0.769, b.170.

cyclo-octadiene. C_8H_{12} = 108.1. A hydrocarbon constituent of rubber. **1.5-dimethyl-** $C_{10}H_{16}$ = 136.1.

cyclo-octane. C_8H_{16} = 112.1. Octomethylene,



A liquid hydrocarbon, d.0.835, m.9.5, b.148.

cyclo-octotetraene. C_8H_8 = 104.1. Octomethyltetra-ene. A yellow liquid, $d_4°$.0.943, m.−27, b. about 40.

cyclo-olefine. A partly-saturated carbocyclic compound, or a ring-compound with double bonds and $=CH_2$ groups. General formula, C_nG_{2n-2}.

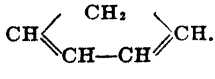
cyclopropene*	C_3H_4
cyclobutene*	C_4H_6
cyclopentene*	C_5H_8
cyclohexene*	C_6H_{10}
cycloheptadecene*	$C_{17}H_{32}$

cycloparaffin. Polymethylenes, naphthenes. A completely saturated carbocyclic compound, or a ring consisting of $=CH_2$ groups. Their general formula is C_nH_{2n}.

cyclopropane*	C_3H_6
cyclobutane*	C_4H_8
cyclopentane*	C_5H_{10}
cyclohexane*	C_6H_{12}
cycloheptane*	C_7H_{14}
cyclooctane*	C_8H_{16}
cyclononane*	C_9H_{18}

cyclopentadecanone*. $C_{15}H_{28}O$ = 224.2. Exaltone. A synthetic musk perfume. **3-methyl-** Muscone.

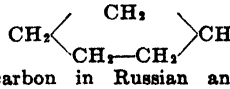
cyclopentadiene*. C_5H_6 = 66.0. Cyclopentylene, $\Delta^{1.3}$-pentamethylene, pentol,



A colorless liquid, b.41. **methylene-** Fulvene. **pantamino-** Pentaminopentol.

cyclopentamethylene. Cyclopentane.

cyclopentane*. C_5H_{10} = 70.1. Pentene, pentamethylene



A hydrocarbon in Russian and Caucasian petroleum. A colorless liquid, d.0.756, m.−95, b.50.5. **diethyl-** C_9H_{18} = 126.2. 1.3-diethyl-penta-methylene. A colorless liquid, b.93. **dimethyl-** C_7H_{14} = 98.1. There are three isomers: 1.1- (b.83); 1.2- (b.92); and 1.3- (b.91). **ethyl-** C_7H_{14} = 98.1. A colorless liquid, b.101. **methyl-** C_6H_{12} = 84.1. A colorless liquid, d.0.748, m.141, b.72.5. **pentaketo-** Leuconic

acid. **trimethyl-** C_8H_{16} = 112.1. A colorless liquid, d.0.771, b.114.

c. acetic acid. $C_5H_{10}.CH_2COOH$ = 129.1. A colorless liquid, b.140. **c. carboxylic acid*.** See *alicyclic acids*. **c. formic acid.** C_5H_{10}. COOH = 115.1. A colorless liquid, b.214.

cyclopentanol*. $C_5H_{10}O$ = 86.1. Hydroxypentamethylene, $CH_2<^{CHOH}_{CH_2—CH_2}>CH_2$. A colorless liquid, d.0.939, b.139.

cyclopentanone*. C_5H_8O = 84.1. Adipinketone, ketopentamethylene, $CH_2<^{CO}_{CH_2—CH_2}>CH_2$. A colorless liquid, b.130.

cyclopentene*. C_5H_8 = 68.1. Δ^1-pentamethylene, $CH_2<^{CH_2}_{CH:CH}>CH_2$. A colorless liquid, b.45. Cf. *camphoceenic acid*. **trimethyl-** Laurolene.

c. tridecoic acid. Chaulmoogric acid. **c. undecylic acid.** Hydnocarpic acid.

cyclopentenone*. C_5H_6O = 82.1. The homocyclic compound $OC<^{CH_2}_{CH:CH}>CH_2$.

cyclopentenyl. The monovalent radical, C_5H_7—, derived from cyclopentene.

cyclopentyl. The monovalent radical, C_5H_9—, derived from cyclopentane.

cyclopentylene. Cyclopentadiene.

cyclophenylenmethylene. $C_6H_4:CH_2$. **c. oxide.** C_7H_6O = 106.1. The heterocyclic compound $C_6H_4<^{O}_{——}>CH_2$.

cyclopia. A Leguminosae of South Africa. *C. vogelii* furnishes bush tea, used for lung disorders. **c. fluorescin.** $C_{14}H_{18}O_{12}$ = 378.4. A pigment from *C. genistoides*. **c. red.** $C_{25}H_{32}O_{10}$ = 492.25. A pigment from *C. genistoides*.

cyclopin. $C_{25}H_{28}O_{13}$ = 536.3. A glucoside from the leaves of *Cyclopia* species or bush tea from Cape Colony.

cyclopropane*. C_3H_6 = 42.1. Trimethylene, propene. $CH_2<^{CH_2}_{——}>CH_2$. A colorless gas, m. −126, b. −35, insoluble in water, soluble in alcohol or ether; used as a general anesthetic. **benzoyl-** See *benzoyl*. **dimethyl-** C_5H_{10} = 70.1. $CH_2<^{CMe_2}_{——}>CH_2$. A colorless liquid, d.-0.664, b.21, **ethyl-** C_5H_{10} = 70.1. A liquid, d.0.683, m.21, b.36. **methyl-** C_4H_8 = 56.1. A colorless gas, b.4. **trimethyl-** C_6H_{12} = 84.1. 1.1.2-trimethyl-trimethylene. A colorless liquid, d.0.679, b.57.

c. carboxylic acid*. See *acyclic acids*.

cyclopropene*. C_3H_4 = 40.1. Δ^1-trimethylene, cyclopropylene. $CH<^{CH_2}_{——}>CH$.

dihydro- Cyclopropane.

cyclopropyl. The monovalent radical, $CH_2.CH_2.CH$—, derived from cyclopropane.

cyclopropylene. Cyclopropene.

cyclopterin. A protein derived from the sperm of the lump-sucker, *Cyclopterus lumpus*.

cyclotrimethylene sulfone. $C_4H_8O_6S_3$ = 246.1. The heterocyclic compound $SO_2<^{CH_2—SO_2}_{CH_2—SO_2}>CH_2$.

cyclotron. A device to produce high speed gas atoms for nuclear bombardments, *q.v.* Cf. *rumbatron*.

cyclural. Hexobarbitone (q.v.).

cydonin. $C_{18}H_{26}O_{14}$ = 468.3. A gum or mucilaginous carbohydrate from quince seeds, *Cydonia vulgaris*.

cylinder. A glass tube, closed at one end and used to hold liquids for hydrometric determinations or the performance of lecture experiments. **filter-** A c. made of porous material used to filter solutions. **graduated-** A c. with a scale to measure liquids or gases. **steel-** A c. made of steel, used to ship compressed gases (see Table).

STEEL CYLINDER SIZES (U. S. A.)

	B	C	D	E	F	G	H
diameter, in.	3¼	4¼	4½	4½	5½	8½	9
height, in.	16	18	20	29	55	55	55
content, in.^{3}	90	142	177	288	930	2,380	2,660
content, cm.^{3}	1,474	2,326	2,900	4,723	15,252	39,032	43,624

cylindrite. $Pb_3FeSn_4Sb_2O_{14}$. A dark-gray tin ore.

cymarigenin. $C_{23}H_{30}O_5.H_2O$ = 404.03. A split product of cymarin, resembling digitoxigenin and bufotalin and identical with apocynamarin.

cymarin. $C_{30}H_{48}O_{10}$ = 568.35. A glucoside from the leaves and rhizome of *Apocynum cannabinum*, which hydrolyzes to cymarigenin and cymarose. Colorless prisms, m.135–140, slightly soluble in water, soluble in alcohol or ether, and therapeutically similar to strophanthin. Cf. *apocynamarin*.

cymarose. $C_7H_{14}O_4$ = 162.08. Digitose-methyl ether. A sugar, m.91, from cymarin.

Cymbopogon. A genus of aromatic grasses, sometimes included in *Andropogon*, q.v.

cymene. $C_{10}H_{14}$ = 134.17. p-isopropyl-toluene, 1-methyl-4-isopropyl-benzene. A constituent of the oils of eucalyptus, cumin, and thyme. A colorless liquid, $d_{16°}$.0.860, m. −23.5, b.176, insoluble in water, miscible with alcohol or ether. **o-.** b.157. **m-.** m.25; b.175–176. **hexahydro-** Menthane. **hydroxy-** **2-** Carvacrol. **3-** Thymol.

c. alcohol. $C_{10}H_{14}O$ = 150.16. 7-Cymol. An isomer of carvacrol.

cymenol. Carvacrol.

cymenyl. Cymyl. The monovalent radical, $C_{10}H_{13}$— derived from cymene.

cymic acid. $C_{11}H_{14}O_2$ = 178.1. A monobasic acid derived from cymene.

cymidine. $C_{10}H_{15}N$ = 149.2. Amino-cymene, carvacrylamine, 2-*p*-cymylamine, 2-amino-*p*-cymene, $Me_2CH.C_6H_3MeNH_2$. A colorless oil, d.0.994, m. −16, b.241.

cymograph. Kymograph.

cymol. **2-** Carvacrol. **3-** Thymol. **7-** Cymene alcohol.

cymyl. Cymenyl. **2-p-** Carvacryl. **3-p-** Thymyl.

cynapine. An alkaloid from *Aethusa cynapium* or fool's-parsley, an Umbelliferae. It forms colorless crystals.

cynoctonine. $C_{36}H_{34}O_{12}N_2$ = 702.28. An amorphous alkaloid, m.137, from *Aconitum septentrionale*, a Ranunculaceae.

cynodine. An alkaloid from the root of *Cynodon dactylon*, a Gramineae, dog's-tooth, Bermuda grass or the dooba (doob grass) of India.

cynoglossine. An alkaloid from the root of hound's tongue or *Cynoglossum officinale*, a Boraginaceae.

cynotoxin. $C_{20}H_{28}O_{16}$ = 524.3. A colorless crystalline principle from *Apocynum cannabinum*.

cynurenic acid. $C_{20}H_{14}O_6N_2.2H_2O$ = 395.14. Oxychinolin carbonic acid. A protein split-product found in dog's urine.

cynurine. $C_{10}H_{14}O_2N_2$ = 300.2. Colorless crystals. A base derived from cynurenic acid by heating it to about 260°C.

cyopin. Coloring matter of blue pus. Cf. *pyocyanin*.

cyperone. $C_{15}H_{22}O$ = 218.18. A sesquiterpene ketone from the oil of *Cyperus rotundus*.

cypral. $C_{12}H_{20}O$ = 180.15. An aldehyde from cypress oil.

cypress oil. Oleum cupressi. An essential oil from the leaves of *Cypressus sempervirens*. A pale-yellow, volatile liquid, $d_{15°}$ 0.88–0.89, $[\alpha]_D$ +4 to +18; it contains furfural, cypress camphor, d-pinene, d-camphene, d-sylvestrene, l-cadinene, and cymene. Cf. *cupressin, cypressene*.

cypressene. $C_{15}H_{24}$ = 204.19. A hydrocarbon from cypress oil, d.0.9647. Cf. *cupressin*.

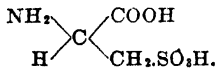
cyprinin. A protamin derived from the carp, *Cyprinus carpio*.

cypripedium. Lady's-slipper. The dried rhizome and roots of *C. pubescens* or *C. parvifolium*, American valerian, an Orchidaceae. It contains an essential oil and an acid; used medicinally.

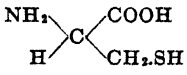
cypripedoid. The combined principles from the root of *Cypripedium pubescens*, or lady's-slipper. It is a tonic, stimulant, antispasmodic and mild diaphoretic.

cyprite. Chalcocite.

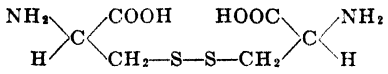
cysteic acid. $C_3H_7O_5NS$ = 169.12. α-amino-β-sulfonic propionic acid.



cysteine. $C_3H_7O_2NS$ = 121.13. Amido-thiolactic acid, alpha-amino-beta-thiol-propionic acid, β-mercaptoalanine. An aminoacid (q.v.) derived from cystine, and found in proteins and urinary calculi.



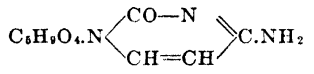
cystine. $C_6H_{12}O_4N_2S_2$ = 240.26. o-diamido-propionic acid, $\beta.\beta'$-dithiobisalanine, di-α-amino-β-thiopropionic acid. An amino-acid, (q.v.) found particularly in keratin, and occasionally as minute hexagonal crystals in urine, and forming the chief sulfur-containing acid of proteins.



cystopurin. $(CH_2)_6N_4.2NaC_2H_3O_2.6H_2O$. A molecular compound of hexamethylene tetramine and sodium acetate.

cytase. (1) Alexin. (2) A cytohydrolytic enzyme (q.v.) of the carbohydrase class.

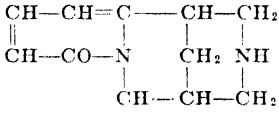
cytidine. $C_9H_{13}N_3O_5$ = 243.13. Ribosyl-cytosine, cytosine-riboside. Colorless needles, m.220; it is hydrolyzed by intestinal juice.



c. phosphoric acid. $C_9H_{12}N_3O_5.PO(OH)_2$. A pyrimidine nucleotide from cell nuclei. Cf. *solurol*.

cytidylic acid. A mononucleotide from yeast nucleic acid, composed of cytosine, d-ribose and phosphoric acid.

cytisine. $C_{11}H_{14}ON_2$ = 190.12. Ulexine, baptitoxine, sophorine. Alkaloid from the seeds of *Cytisus, Laburnum* and *Ulex* species, Leguminosae. Colorless crystals, m.152. soluble in water or alcohol, insoluble in ether or benzene.



It is a local antiseptic and powerful diuretic. Cf. *anagyrine, sparteine*.

c. hydrochloride. $C_{11}H_{14}ON_2.HCl$ = 226.59. Colorless crystals, soluble in water; used hypodermically as a nerve tonic. **c. nitrate.** $C_{11}H_{14}ON_2.HNO_3$ = 253.24. Yellow crystals, soluble in water, sparingly soluble in alcohol, insoluble in ether; used hypodermically as a nerve tonic.

cytochemistry. A branch of biological chemistry that deals with the chemical properties of living cells.

cytochrome. (1) The intracellular respiratory pigment. Cf. *chlorophyll, hemoglobin;* see table. (2) A pigment of bacteria; (*e.g.*, tuberculosis and diphtheria) related to chlorophyll but containing Fe and Cu. Cf. *porphin ring*. **c.-c.** A red secondary pigment from meat.

NATURAL PIGMENTS

Pigment	*Color*	*Metal*	*Occurrence*
chlorophyll.....	green	Mg	plants
hemoglobin.....	red	Fe	vertebrata
hemocyanin.....	blue	Cu	crustaceae
hemosycotopin...	blue	Cu, Zn	molluscs
chlorocruorin.....	green	Fe	worms
hemerythrin.....	red	Fe	worms
achroglobin.....	colorless	Mn	molluscs
pinnaglobin.....	colorless	Mn	molluscs

cytoclasis. The destruction of living cells.

cytoglobin. A protein derived from white blood corpuscles.

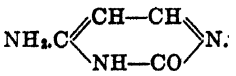
cytoligneous substances. The vegetable (bacteria) or animal (erythrocytes, spermatozoa, tissues) cells that cause cytolysis in sero-reactions.

cytology. The science of the structure and activity of living cells.

cytolysis. The destruction or dissolution of living cells.

cytoplasm. The protoplasm of the cell body, excepting the nucleus.

cytosine. $C_4H_5ON_3$ = 111.07. 2-oxy-6-amino-pyrimidine, 4-amino-2(1)pyrimidone,



A pyrimidine base derived from nucleic acid. Colorless, thin plates, sparingly soluble in water.

cytotoxin. An antibody having a specific action on the cells of certain organs; *e.g.*, nephrotoxin.

cytozyme. Thrombokinase. A substance of the body cells that causes coagulation of the blood (see *coagulen*).

D

D. (1) The symbol for deuterium, the hydrogen isotope of mass 2 = H^2. (2) An abbreviation for density of gases. $D_{(H_2)}$— Density compared with hydrogen gas taken as unity. $D_{(O_2)}$— Density compared with oxygen gas, taken as 32 (molecular weight). $D_{(air)}$— Density compared with air as unity. (3) The characteristic line of sodium. See *Fraunhofer lines.* (4) Abbreviation for diameter.

d. (1) Abbreviation for specific gravity or density of solids and liquids. d_4°= density at 4°C. d_{50}°=density at 50°C. d_c = critical density. (2) An abbreviation for dextro- or dextrorotary. (3) Differential, as in dy/dx.

d = dextro. *d(l)* = dextro- or levo-. *(dl)* = dextro-and levo-, *i.e.*, inactive.

δ. Greek letter, delta. (1) A symbol for the fourth carbon atom in a chain. (2) A *rate* of change, as in $\delta x/\delta y$.

Δ. Greek capital letter D. (1) A double bond, as Δ^1- between the first and second carbon atoms, $\Delta^{2,4}$- between the second-third and one between the fourth-fifth carbon atoms; $\Delta^{2(4)}$- a double bond between the second and fourth carbon atom. (2) Difference between two values, hence a *ratio;* as, $\Delta x/\Delta y$.

D.A. Blue cross.

dacite. An igneous rock in a class between the monzonite group and the quartz diorites; it consists chiefly of plagioclase, feldspar, mica and hornblende, and occurs in Yellowstone Park and at Mt. Lassen, California.

dacrene. $C_{20}H_{32}$ = 272.16. A diterpene from *Dacrydium biforme,* a Taxaceae, the mountain-pine of Australia and New Zealand.

dacryagogue. An agent that causes a flow of tears. Cf. *lacrimatory.*

dacryolin. The albuminous matter of tears.

dactylin. $C_{21}H_{28}O_{15}$ = 544.2. A glucoside from the pollen of orchard grass, *Dactylis glomerata,* and timothy, *Phleum pratense.* Pale yellow needles, m.184, readily soluble in hot water, slightly in cold water or alcohol.

-dag. Abbreviation-suffix for defloccuated Acheson graphite (see *graphite*).

Daguerre, Louis Jaques Mandé. 1789–1851. A French physicist and painter, noted as the inventor of the first photographic method. **D. process.** A polished silver plate is made light-sensitive by exposure to iodine vapor. The exposed surface coating of silver iodide is developed by means of mercury vapor and thiosulfate.

daguerrotype. A photograph made by Daguerre's process.

dahlia. A genus of composite plants whose bulbs yield inulin and a purple coloring matter. **d. paper.** A test paper impregnated with the coloring matter of d.; red with acids, green with alkalis. **d. violet.** See *pyoktanin.*

dahlin. (1) A purple aniline dye derived from mauveine. (2) Inulin.

dahllite. $Ca_6(PO_4)_4.CaCO_3$. A white, fibrous calcium phosphate-carbonate.

Dahl's acid. 2.5-Naphthylamine sulfonic acid. **D.a.II.** *1*-Naphthylamine-*4.6*-disulfonic acid. **D.a.III.** *1*-Naphthylamine-*4.7*-disulfonic acid.

dahmenite. An explosive that consists of 91 % ammonium nitrate, 6.5 % naphthalene and 2.5 % potassium dichromate.

daidzin. A pigment from soy-bean meal, *Soja hispida,* which hydrolyzes to daidzein (7.4'-dihydroxy-isoflavone).

Dakin, Henry Drysdale. 1880– . An English-born American biochemist. **D. antiseptic.** Chlorazene. **D. solution.** A solution of 0.5 % sodium hypochlorite with sodium bicarbonate; used in the treatment and irrigation of infected wounds.

Daland hematocrit. A centrifuge attachment holding two graduated glass tubes for separating blood corpuscles.

Dalen Martens rubber testing machine. A device for testing the tensile strength and elasticity of rubber.

John Dalton.

(Courtesy of Jour. of Chemical Education.)

Dalton, John. 1766–1844. An English chemist, mathematician, and physicist, and founder of the atomic theory. **D's Law.** (1) The pressure of a gas mixture equals the sum of the partial pressures of the constituent gases. Cf. *Charles' law.* (2) Laws of proportion. See *proportion.* (3) Absorption of gases: The solubility of different gases in a mixture is unaffected by the presence of other gases so long as no chemical reaction occurs.

dalton. A unit of mass; $\frac{1}{16}$ of the mass of an oxygen atom, approximately 1.65×10^{-24} gram.

daltonide. A name proposed for a chemical compound or chemical individual; as opposed to "berthollide" (q.v.) or alloy.

damalic acid. $C_{12}H_{22}O_2$ = 198.2. An acid in urine.

damaluric acid. $C_7H_{12}O_2$ = 128.1. An acid in urine.

damar. Dammar.

damascenine. $C_{10}H_{13}O_2N$ = 195.1. An alkaloid from the seeds of *Nigella damascena* (Ranunculaceae). $C_6H_2(OMe)(NHMe)COOMe$.

dambonite. $C_8H_{10}O_6$ = 202.1. p-dimethoxytetrahydroxybenzene. $C_6(OH)_4(OMe)_2$. Colorless crystals from Gaboon caoutchouc.

dambose. $C_6H_{12}O_6.2H_2O$ = 216.16. *i*-Inositol. A sugar from caoutchouc. Colorless, hexagonal prisms, m.220, soluble in water, insoluble in alcohol or ether.

damiana. The dried leaves of *Turnera diffusa*, (Turneraceae), a Mexican plant used as an aromatic nervine and tonic.

dammar. Dammara. An oleoresin from various Coniferae of Asia, Australia, and South America resembling copal. Yellowish or brownish masses, d.1.04–1.12, m.115–125, soluble in hot alcohol, chloroform, ether, or benzene; used in varnishes and plasters. **true-** The resin obtained from *Dammara orientalis* of the East Indies, or *D. australis* of New Zealand.

dammarylic acid. $C_{56}H_{80}O_8$ = 880.68. An acid in dammar.

damourite. An olivine rock consisting of a yellowish variety of muscovite.

damping period. The time needed for an excited electron to drop to the normal orbit and emit the characteristic radiations of the atom. Cf. *lingering period.*

danain. $C_{14}H_{14}O_5$ = 262.24. A glucoside from the root of *Danais fragrans*, a Rubiaceae of Madagascar.

danaite. (Fe,Co)AsS. An iron-cobalt sulfo-arsenide.

danalite. $(Zn, Mn, Fe, Be)_7SSi_3O_{12}$. A rare zinc manganese iron beryllium silicate and sulfide.

danburite. $CaB_2Si_2O_8$. A pale-yellow, orthorhombic calcium borosilicate, d.2.95, hardness 7, dissolved by HCl.

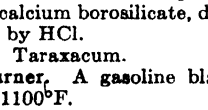
dandelion. Taraxacum.

Dangler burner. A gasoline blast burner; temperature 1100°F.

Daniell, John Frederic. 1790–1845. An English chemist and physicist noted for electrical and meteorological investigations. **D. cell.** A voltaic cell furnishing 1.08 volt and consisting of an amalgamated zinc electrode in dilute sulfuric acid (1:12) and a copper electrode in saturated copper sulfate solution. Used in telegraphy.

dannemorite. A rare amphibole.

daphnandrine. $C_{36}H_{38}O_6N_2$ = 594.32. An alkaloid from the bark of *Daphnandra micrantha*, a Monimiaceae of Australia. It is a cardiac and muscular paralyzant.

daphnetin. $C_9H_6O_4$ = 178.3. 7.8-dihydroxycoumarin.  A split-product of daphnin. Pale-yellow crystals, m.255, soluble in water or alcohol.

daphnin. $C_{15}H_{16}O_9.2H_2O$ = 376.2. A glucoside from the bark of *Daphne mezereum*, bay tree or laurel tree, a Thymelaceae. Transparent prisms, m.200.

daphniphylline. An alkaloid from the leaves and bark of *Daphniphyllum bancanum*, an Euphorbiaceae of the Dutch East Indies. It is a cardiac poison.

daphnite. $H_{56}Fe_{27}Al_{29}Si_{18}O_{121}$. A hydrous iron-aluminum silicate of the chlorite group.

darak. Tikitiki. A high grade Philippine rice bran.

darapskite. $NaNO_3.Na_2SO_4.H_2O$. A native sodium nitrate and sulfate, found in the Chilean and California nitrate beds.

D'Arcet metal. (1) Mellot's metal. An alloy of 8 pts. Bi, 5 pts. Pb, and 3 pts. Sn; m.100; used for filling teeth and making plates. (2) An alloy of 50 % Bi, 25 % Pb and 25 % Sn. Used as the low melting alloy (m.94) in fire-sprinklers and fusible plugs.

Dare hemoglobinometer. An optical device for estimating the hemoglobin content of fresh undiluted blood.

dari. A grain similar to millet; used for the production of alcohol by fermentation.

dasymeter. An instrument for measuring the heat loss of a furnace by analysis of the waste gases.

date palm. An extensively cultivated palm. Its fruit is used as food, its fiber for ropes, and its sap in making sugar.

datiscetin. $C_{15}H_{10}O_6$ = 286.1. A split-product of datiscin.

datiscin. $C_{21}H_{22}O_{12}$ = 466.2. A glucoside from the roots of *Datisca cannabina*, a Datiscaceae; used in fevers and stomachic troubles.

dative bond. See co-*valence.*

datolite. $2CaO.B_2O_3.2SiO_2.H_2O$. A rare zeolite. Colorless, grayish or greenish, monoclinic masses d.2.9, hardness 5–5.5.

Datura. Thorn apple, Jamestown weed. A genus of solanaceous plants; *e.g.*, *D. stramonium* (see *stramonium*).

daturic acid. Margaric acid.

daturine. Hyoscyamine. *dl*-Atropine.

daubreeite. BiOCl. An amorphous whitish, native bismuth oxychloride.

daubreelite. $FeCr_2S_4$. A black, iron-chromium sulfide, in meteorites.

daucine. An alkaloid from the leaves of *Daucus carota*, wild carrot, an Umbelliferae; sometimes used as a diuretic.

daughter cell. A cell formed by division from a single cell (mother cell). Cf. *karyokinesis.*

daviesite. A colorless, orthorhombic, native lead oxychloride.

Davy, Sir Humphry. 1778–1829. An English chemist who isolated sodium, potassium, barium, calcium, and strontium by electrolysis, and devised the miners' safety lamp. **D.'s lamp.** See *miners'* lamp.

davyum. A supposed element in platinum ores. (Cf. *celtium, masurium, rhenium.*)

dawsonite. $NaAlCO_3(OH)_2$. A basic, aluminum-sodium carbonate; white, monoclinic crystals.

daxad. Trade name for a group of dispersing agents.

day. A unit of time. **mean solar-** The average period from noon to noon, which consists of 1440 minutes = 86,400 seconds = 1.0027379 sidereal days. **sidereal-** Consists of 86164.10 seconds, and is the interval between successive passages of a star through the meridian. It is 3 minutes 55.91 seconds shorter than the solar day.

Db. Symbol for dubhium, q.v.

DDNP. Abbreviation for diazodinitro phenol.

DDT. Gesarol, neocid, GNB. Dichlorodiphenyl trichloroethane, an effective insecticide.

De. Symbol for denebium, q.v.

de- A prefix indicating removal, (*e.g.*, of atoms, radicals or water), as, dehydro.

Sir Humphry Davy.

Deacon process. A method of making chlorine by oxidizing hydrochloric acid with atmospheric oxygen. The hot gases pass over a cuprous chloride catalyst.

deactivation. (1) Rendering inactive. The opposite of activation (*e.g.*, of a catalyst). (2) Loss of the radioactivity of a preparation.

dead. A molten alloy, as steel, which is quiet and does not evolve gas.

dealcoholizing. The removal of alcohol from liquids.

deamidation. The substitution of the amino group by another radical.

deamidizing. The splitting off of the amino group; *e.g.*, by enzymes (adenase, guanase).

deamination. The hydrolysis of amines, and the removal of the amino-group;

$$R.NH_2 + H_2O \rightarrow R.OH + NH_3.$$

oxidative-:

$$R.CHNH_2.COOH \rightarrow R.CO.COOH + NH_3$$

reductive-:

$$R.CHNH_2COOH \rightarrow R.CH_2.COOH + NH_3$$

deaminizing. The splitting off of ammonia from amino acids and proteins with the formation of the corresponding fatty acids.

deaquation. Dehydration.

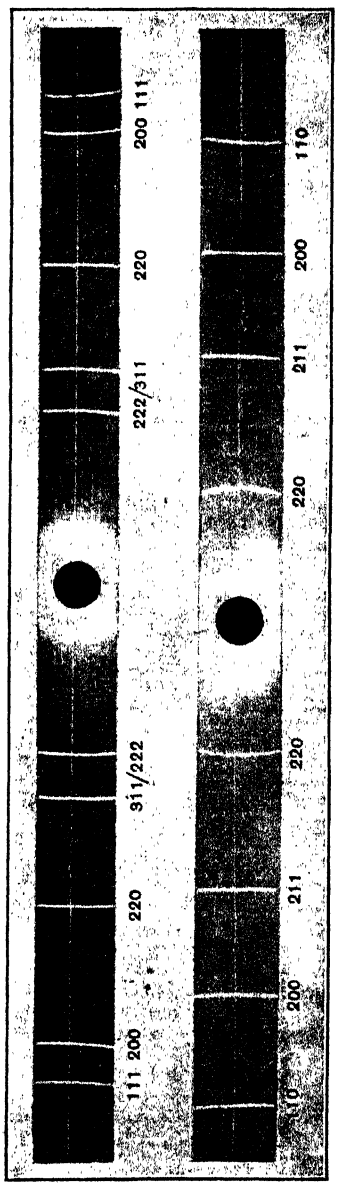
Debierne, André. 1874– . A French physicist, noted for work in radioactivity.

de Broglie. See *Broglie.*

Debye, Peter. 1884– . A Dutch physicist noted for research on crystal structure. **D. crystallogram.** A spectrum-like pattern produced by refracting monochromatic x-rays by a crystal. See figure. **D.-Hückel theory.** The distribution of ions; $n_{+(-)}$, in a small volume at distance r from a chosen ion is:

$$n_{+(-)} = ne\frac{-(+)r + (-)e\psi}{KT}$$

where n is the number of molecules of salt in 1 cc., e the elementary electric charge, ψ the potential due to the chosen ion at distance r, K the Boltzmann constant and T the absolute temperature.



Debye crystallogram made with apparatus manufactured by Adam Hilger, Ltd., London, and showing the crystal structures of copper (top) and iron (bottom).

deca. The Greek for ten; a prefix to denote ten times. Cf. *deci.*

decagram. Ten grams or 154.32349 grains (0.35 ounce).

decahydronaphthalene. Dekalin.

decal process. Decalcomania. A transfer process for placing designs upon surfaces, from railroad cars to sausage casings. It consists of making a lithographic print on specially prepared paper and transfering it to the surface by moistening the paper.

decalcify. To remove lime-salts from a tissue or bone.

decalescent. The absorption of heat, at a certain temperature, by a bar of steel during heating, due to allotropic changes. Cf. *recalescent.* **d. outfit.** A device for determining the hardening temperature of high carbon steel; it consists of a crucible furnace, rheostat, high resistance pyrometer with decalescent couple.

decalin. Dekalin.

decaliter. Ten liters, or 10,000 cubic centimeters.

decameter. Ten meters, or 393.7 inches, or 32.8 feet.

decanal. $C_{10}H_{20}O$ = 156.2. Decylaldehyde. $Me(CH_2)_8CHO$. A solvent.

decane*. $C_{10}H_{22}$ = 142.23. **normal-** The tenth hydrocarbon of the methane series. A colorless liquid, $d_{20°}$.0.730, m. −30, b.173, insoluble in water, miscible with alcohol or ether. **amino-** $C_{10}H_{23}N$ = 157.19. Decylamine*, $Me(CH_2)_9NH_2$. White crystals, d.0.951, m.17, b.218. **iodo-*** $C_{10}H_{21}I$ = 268.08. *n*-Decyliodide. A colorless liquid, $b._{15mm}$132.

d. carboxylic acid*. Undecylic acid. **d. dioic acid*.** Sebacic acid. **d. oic acid*.** Capric acid. **d. diol*.** $C_{10}H_{22}O_2$ = 174.17. Decamethyleneglycol, $CH_2OH(CH_2)_8CH_2OH$. White crystals, m.71.5, $b._{11mm}$.179. **d. nitrile*.** Capronitrile.

decanoic acid*. Capric acid.

decanol*. Decyl alcohol.

decanone*. $C_{10}H_{20}O$ = 156.16. **2-** The ketone $MeCO(CH_2)_7Me$. **5-** The ketone $Me(CH_2)_3CO(CH_2)_4Me$. Used as a solvent.

decant. To pour or syphon off a liquid layer.

decantation. A method of separating a sediment (liquid or solid) by pouring off the superimposed liquid layer.

decarbonization. To remove carbon.

decarboxylating. The splitting off of carbon dioxide from amino acids and proteins by bacterial action, with formation of amines.

decarboxylizing. The removal of one or more carboxyl groups from the molecule of an organic acid, and its decomposition to carbon dioxide; this is a property of some enzymes, *e.g.*, carboxylase of yeast.

decarboxyrissic acid. $C_{10}H_{12}O_5$ = 192.08. *3,4-* Methoxyphenoxy acetic acid. Colorless crystals, m.116.

decarburization. Removal of carbon from iron and steel.

decarburize. Decarbonize.

decatoic acid. Capric acid.

decatyl. Decyl.

decay. (1) The progressive, chemical decomposition of organic matter in presence of atmospheric oxygen; generally due to aerobic bacteria. Cf. *putrefaction.* (2) The progressive disintegration of radioactive substances. Cf. *disintegration, period of decay.*

decene*. $C_{10}H_{20}$ = 140.21. Decylene, octylethylene. **normal-** Diamylene, octylethylene. The unsaturated hydrocarbon $CH_2{:}CH(CH_2)_7Me$. A colorless liquid, $d_{0°}$.0.763, b.172, insoluble in water, miscible with alcohol or ether.

deceresol OT. The dioctyl ester of sodium sulfosuccinic acid, used as a wetting agent.

dechenite. PbV_2O_6(?). A rare lead vanadate, named after von Dechen, German mineralogist.

decholin. Trade name for dehydrocholic acid.

deci. The Latin for ten, used as a prefix to denote one-tenth. Cf. *deca.*

decibel. One-tenth of a bel, q.v.

decigram. One-tenth of a gram, or 100 milligrams; or 1.54 grain.

deciliter. One-tenth of a liter, or 100 cubic centimeters or 3.38 U. S. fluidounces, or 3.52 English fluidounces.

decimal. A fraction of ten, or divided into ten parts.

decimeter. One-tenth of a meter or 10 centimeters, 3.937 inches.

decimolar. One-tenth of the molecular weight (in grams). **d. solution.** A solution containing, in one liter, one-tenth of a gram molecule; *e.g.*, a M/10 solution of sodium hydroxide contains 4.01 grams of sodium hydroxide per liter.

decine. $C_{10}H_{18}$ = 138.20. Decinene, decyne*. **normal-** Octylacetylene, T^1-decine. The unsaturated hydrocarbon $HC{:}C(CH_2)_7Me$. A colorless liquid. **2-** Heptylmethylacetylene. $MeC{:}C(CH_2)_6Me$.

decinene. Decine.

decinormal. One-tenth of the normal or equivalent strength. **d. solution.** A solution containing, in one liter, one-tenth gram of the equivalent weight of a substance, *e.g.*, a N/10 solution of sulfuric acid contains 4.905 grams of sulfuric acid per liter.

declination. Deviation or bending; *e.g.*, magnetic declination is the variation of the compass needle from the true north.

decoction. A solution made by boiling the solute with the solvent. Cf. *infusion.*

decoctum. A soluble pharmaceutical preparation made by boiling vegetable drugs in water and straining.

decoic acid. Capric acid.

decolorant. An agent which absorbs or destroys a color.

decoloration. The staining or bleaching of colors by natural means.

decolorization. A process for bleaching or destroying a color artificially.

decolorizing. The removal or destruction of a color; *e.g.*, by charcoal or by a bleaching agent.

decompose. (1) To break down, split up, or analyze a substance. (2) To rot.

decomposition. The breaking down of a substance or splitting it into simpler constituents. **double-** Metathesis. A chemical change in which two molecules exchange one or more of their constituents. **hydrolytic-** The decomposition of substances, especially rocks, by water. Cf. *hydrolysis.* **single-** Analysis. A chemical change in which a molecule breaks apart into its constituents.

d. apparatus. A device for the electrolysis of water. **d. of rocks.** The disintegration of rocks following, in general, the successive stages of: solution, hydration, disintegration, and mechanical sorting.

decortication. The stripping of the bark, hull or other outer layer from a plant; as of ramie.

decoylamide. Caprylamide.

decrepitate. (1) To crackle. (2) To roast a moist material.

decrepitation. The property of crystals, when heated, of flying apart with a cracking sound.

decyl. Decatyl. The monovalent $C_{10}H_{21}$— radical, derived from decane. **d. alcohol.** $C_{10}H_{22}O$ = 158.23. (**normal-**) Decatyl alcohol, nonylcarbinol, *1*-decanol*, $Me(CH_2)_8CH_2OH$. A colorless, oily liquid, $d_{20°}$.0.830. m.7, b.231, soluble in alcohol. **d. aldehyde.** Decanal. **d. amine*.** Amino*decane*. **d. hydride.** Decane.

decylene. Decene*.

decylenic acid. $C_{10}H_{18}O_2$ = 170.14. An unsaturated acid occurring in butter; m. 0, b. 142.

decylethylene. Dodecylene.

decylic acid. Capric acid.

decyne*. Decine.

deduction. (1) A conclusion drawn from established facts and data. Cf. *speculation.* (2) An inference from general to particular. Cf. *induction.*

deenate. Trade-mark for insecticide based on DDT (q.v.), used for agricultural purposes.

deenol. Trade-mark for insecticide based on DDT (q.v.), used for industrial purposes.

defecation. The clarification of sugar solution in the sugar industry.

defervescence. Cessation of boiling.

defibrinated. Made free of fibrin. **d. blood.** A blood which has been d. by shaking with lead-bullets, beating or chemical precipitation.

definite proportions. "The proportion of elements by weight is always constant for the same compound."

deflagration. Sudden combustion, usually accompanied by a flame and crackling sound. **d. spoon.** A metal spoon with long handle, used to burn substances in gases.

deflect. To turn from a straight course.

deflocculation. The removal of flocculation.

deformability. The property of a substance by which its shape, flow, or elasticity may be altered without rupture. *E.g.*, pitch.

defrother. An agent which destroys or prevents foaming; as, butanol.

degasification. The elimination of gases from metals previous to coating or plating them with another metal.

Degener's indicator. Phenacetolin.

degeneration. The deterioration of cells or the loss of race-characteristics by an organism.

degradation. The conversion of an organic compound to a compound containing a smaller number of carbon atoms; as, $R.COOH \rightarrow R.H$. **energy-** See *thermodynamics.* **mass-** See *mass-energy cycle.*

degras. A dark-brown grease from sheep wool, used in the leather industry and in the manufacture of lanoline.

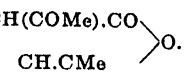
degreaser. A solvent which removes fat or oil; as, dichloroethylene, methylene chloride, tetrachloroethane.

degree. A position or a unit, generally a difference in temperature (as, 6°C), density (as 6°B), or direction (as 6° angle). **d. of freedom.** Variance. Each of the three variables: pressure, temperature and specific volume, one or more of which must be fixed in order to define the state of a system. See *phase rule.* **d. of hardness.** The hardness (*q.v.*) of a mineral is indicated by its position in an arbitrary scale of comparison; as, *Moh's scale.* **d. of ionization.** The percentage of ionized molecules in a solution. **d. of temperature.** A division of the thermometer scale, (q.v.) usually expressed on the centigrade scale, °C.

deguelin. $C_{23}H_{22}O_6$ = 370.15. A constituent of cube. Cf. *rotenone, tephrosin.*

deHaën salt. $SbF_3.(NH_4)_2SO_4$ = 310.8. A double salt of antimony trifluoride and ammonium sulfate, used as a mordant for textiles.

dehydracetic acid. $C_8H_8O_4$ = 168.04.



Methylacetopyronone. Colorless, rhombic scales, m.108, b.269.9, slightly soluble in hot water, alcohol, or ether. **iso-** Dimethyl *coumalic acid.*

dehydrant. A therapeutic dehydrater, q.v.

dehydrated food. Foodstuffs (*e.g.*, vegetables) from which water has been removed under conditions that reduce their bulk (for convenience of transport and storage) while maintaining their keeping properties. On re-addition of the water the foodstuff returns substantially to its original state.

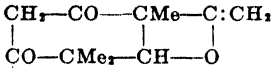
dehydrater. (1) A device for drying tissues for histological work. (2) Dehydrator. A substance which removes water; as, alcohol, butanol. C. *desiccant.*

dehydration. (1) The process of removing water from compounds and crystals; *e.g.*, by heating. (2) The process of removing hydrogen from organic compounds by reducing agents (dehydrogenation).

dehydrite. A brand of magnesium perchlorate used as desiccant. Cf. *anhydrone.*

dehydro- A prefix for an organic compound indicating the presence of less hydrogen; *e.g.*, dehydro-corydaline.

dehydroangustione. $C_{11}H_{14}O_3$ = 194.09. A bicylic diketone from the oil of *Backhousia angustifolia*, d.1.103, $b._{11mm}$127.



Cf. *angustione.*

dehydrocholic acid. $C_{24}H_{34}O_5$ = 402.31. A split product of cholic acid, obtained by treatment with nitric acid.

dehydrogenase. A dehydrogenating enzyme in the cell walls of *B. coli.*

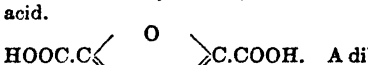
dehydrogenation. The removal of hydrogen from organic compounds by reducing or oxidizing agents in presence of catalysts.

dehydro-isodesoxycholic acid. $C_{22}H_{28}O_6$ = 388.2. β-diketo cholanic acid. An oxidation product of cholic acid.

dehydrolysis. The removal of hydrogen and oxygen in the proportions of water from organic substances; *e.g.*, cane sugar treated with sulfuric acid. Cf. *dehydration.*

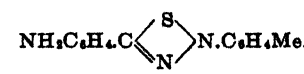
dehydrolyzing agents. A chemical which extracts water from organic compounds; *e.g.*, sulfuric acid, phosphorus pentoxide, or zinc chloride. Cf. *desiccant.*

dehydromucic acid. $C_6H_4O_5$ = 156.0. Furfurane dicarboxylic acid, *2.5*-furan-dicarboxylic acid.



A dibasic acid; colorless crystals obtained by dry distillation of mucic acid.

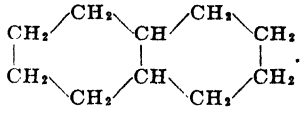
dehydrothiotoluidine. $C_{14}H_{13}N_2S$ = 255.1. Aminobenzenyl-o-amino-thiocresol.



Yellow needles, m.191, b.431; insoluble in water, soluble in alcohol or ether. Its solutions have a violet fluorescence; used as a dye.

dehydrothioxylidene. $C_{16}H_{16}N_2S$ = 268.2. Aminotoluenyl-o-amino-thio-xylenol. Yellow prisms, m.107, b.283; insoluble in water, soluble in alcohol. Used as a dye.

dekalin. $C_{10}H_{18}$ = 138.2. Decalin, decahydronaphthalene, bicyclo(0.4.4)decane. The saturated aromatic hydrocarbon



A colorless liquid, d.0.8947, b.192; miscible with alcohol or ether. Used as a cleaning fluid, solvent, and substitute for turpentine and lubricating oil; also in perfumery. Cf. *tetralin.*

de Khotinsky. See *Khotinsky.*

delcosine. $C_{21}H_{33}NO_6$ = 395.3. An alkaloid, m.198, isomeric with and occurring with deltaline in *Delphinium consolida.*

delessite. $(Mg,Fe)_4Al_4H_{10}Si_4O_{22}$. A green, hydrous, iron magnesium and aluminum silicate, related to chlorite.

delineascope. A projection apparatus consisting of a nitrogen-filled Mazda bulb, with a silvered glass reflector and slide carrier.

deliquescence. Gradual liquefaction by absorption of water from the atmosphere; as by calcium chloride. Cf. *hygroscopic.*

deliquescent. Becoming moist or liquefied after exposure to humid aid. Cf. *hygroscopic.*

deliriant. A cerebro-spinal neurotic drug which produces confusion of will power and delirium; as, belladonna, cannabis, cocaine, fishberries, hyoscyamine, solanine, stramonium.

delphin blue. $C_{30}H_{17}O_6N_3S$. A blue aniline dye obtained by heating aniline with gallocyanin and sulfating.

delphine. Delphinine.

delphinic acid. An acid from the oil of *Delphinium* species, Ranunculaceae.

delphinidin. $C_{15}H_{10}O_7.HCl$ = 338.53. An anthocyanidin, (q.v.) from the flowers of *Delphinium* species.

delphinin. $C_{41}H_{68}O_{21}Cl$ = 901.8. A glucoside from larkspur, *Delphinium consolida,* which hydrolyzes to delphinidin and p-hydroxybenzoic acid.

delphinine. $C_{22}H_{35}O_6N$ = 409.28 or $C_{34}H_{47}NO_9$ = 577.37. An alkaloid from the seeds of *Delphinium staphisagria,* a Ranunculaceae of Europe and Asia Minor. Colorless crystals, decomp. 120, soluble in alcohol, ether, or chloroform; used as an antispasmodic, anticonvulsive antineuralgic. Cf. *staphisagria alkaloids.*

Delphinium. A genus of Ranunculaceae, larkspurs, which yield staphisagria alkaloids, ajacine, delphinic acid, etc.

delphinoidine. $C_{22}H_{35}O_6N$ = 409.3. An alkaloid from the seeds of *Delphinium consolida* (larkspur), a Ranunculaceae of Europe and America.

delphisine. $C_{54}H_{46}O_8N_2$ = 850.5. An alkaloid from the seeds of *Delphinium staphisagria* (stavesacre), a Ranunculaceae.

delphocurarine. $C_{23}H_{33}NO_7$ = 435.3. An alkaloid, m.185, from the seeds of *Delphinium scopulorum.* An amorphous, white powder resembling curare in effect. Cf. *delcosine.*

delta. The Greek letter δ or Δ. δ is a symbol for (1) difference, or (2) the fourth carbon atom in a chain; Δ for double bond. **d. acid.** δ-acid. 2.7-Naphthylamine sulfonic acid. **d. metal.** A tough alloy of 60 parts copper, 38.2 parts zinc and 1.8 parts iron.

deltaline. $C_{21}H_{33}NO_6$ = 395.3. An alkaloid, m.180, from *Delphinium occidentale.* Cf. *delcosine.*

delvauxite. A hydrous ferric phosphate containing vanadium.

delvinal sodium. Sodium ethyl (1-methyl-1-butenyl) barbiturate. A rapidly acting sedative.

demagnetization. Any method by which an object is deprived of its magnetic properties.

demal. A solution containing one gram equivalent of solute per cubic decimeter (1 dm^3. = 1.000027 l.). Used in place of *normal* in electrical conductivity measurements.

demargarinate. To separate, almost completely, the solid glycerides from an edible oil by cooling.

dematoid. A light green andralite (iron garnet, q.v.).

demerol. Dolantin, dolantol. The ethyl ester of 1-methyl 4-phenyl piperidine 4-carbonic acid; it is a powerful analgesic.

demethylation. Removal of the methyl group.

demi. (French) Half. See *semi* (Latin) and *hemi* (Greek). **d. john.** A glass storage vessel, carboy-shaped but holding only 4 gallons.

Democritus of Miletus. [Gk. Demokritos.] 460–370 B.C. An early Greek philosopher of Abdera in Thrace, noted for his speculations on atoms and cosmology.

demolization. The purely physical dispersion of a molecular system produced by the action of highly superheated steam.

demulcent. An oily or mucilaginous drug, which soothes or protects an inflamed tissue; as, milk, glycerol, starch.

denaturation. (1) The addition of substances, harmful or inert, to a product such as alcohol or salt, by which it becomes unfit for human consumption. (2) The production of suspensoid properties in albumins and globulins by certain reagents.

dendrite. (1) Dentrite. A tree-like or arborescent crystalline structure; as, in geology the black or brown designs found in the joints and division planes of rocks (moss agate). They are due to the infiltration and subsequent evaporation of solutions of iron and manganese salts. (2) A protoplasmic protuberance on a nerve cell.

dendrobine. $C_{16}H_{25}NO_2$ = 263.2. An alkaloid from Chin-shih-hu, a variety of *Dendrobium* (Orchideaceae); a tonic and antipyretic.

dendrology. Dating trees from growth rings.

denebium. De. A supposed element isolated in 1916 by Eder, identical with thulium, Tm, atomic number 69.

denier. The thickness of a thread or yarn expressed as the weight in grams of 9000 meters.

Denigè's reagent. A solution of 5 gm. yellow mercuric chloride in 20 cc. conc. H_2SO_4 and 100 cc. H_2O, used as test for citric acid.

denitration. The removal of nitrates from a material; as, the d. of soils by growing plants.

denitrification. The removal of nitrogen from a material, *e.g.,* soil.

denitrify. To remove nitrogen or nitrates.

Dennstedt furnace. An electrically heated combustion furnace for elementary organic analysis.

densimeter. A hydrometer.

densi-tensimeter. An apparatus for the simultaneous determination of vapor pressure and vapor density.

densitometer. An optical device for measuring optical density *e.g.*, of a photographic plate. Cf. *absorptiometer.*

density. (1) In chemistry and physics, the weight of matter per unit volume of a substance. For solids and liquids: d. = spec. grav. For gases (M = molecular weight):

$D_{(air)}$ = d. in relation to air = 1.
$D_{(O_2)}$ = d. in relation to O_2 = 32 = M.
$D_{(H_2)}$ = d. in relation to H_2 = 1 = M/2.

Cf. *hydrometer* scales, normal and relative *density, specific gravity.* (2) In photography, the thickness of the image on an exposed plate, as measured photometrically. Cf. *optical* density. (3) In physics (*current-density*), the number of amperes passing per sq. cm. of an electrode. **limiting-** The density of a gas corresponding with the pressure at which it becomes an ideal gas and obeys Boyle's Law. The ratio of the limiting densities of two gases equals therefore, the ratio of their molecular weights. **normal-** The limiting density at atmospheric pressure, or the weight in grams of a liter of substance measured at N.T.P., the weights being reduced to sea-level at latitude 45°. **relative-** The weight of a volume of substance compared with that of a standard measured under the same conditions. For solids and liquids 1 cc. of water at 4°C. is the standard; for gases and vapors, an equal volume of hydrogen. **vapor-** The ratio of the weight of a given volume of a gas or vapor to that of the same volume of hydrogen measured at N.T.P. (1 cc. of hydrogen weighs 0.00009 gram). It follows from Avogadro's Law that the vapor density = ½ molecular weight.

Density comparator.

a. Projection system.
b. Photoelectric cell.
c. Spectrum negative.

d. comparator. A photoelectric densitometer, q.v. See figure. Cf. *microphotogram.*

d. fluids. A series of fluids for separating minerals by flotation; as,

d.5.3.....	thallium mercury nitrate solution
d.4.27.....	Clerici solution
d.3.5.....	Rohrbach solution
d.3.33.....	methylene iodide
d.3.17.....	Toulet's solution
d.2.97.....	acetylene tetrabromide
d.2.90.....	bromoform
d.1.94.....	ethyl iodide.

densograph. A curve showing the relation between the intensity of a source of illumination and the density of the image produced on a photographic plate.

dental alloy. A mixture of 66–69 % Ag, 5 % Cu, 0.5–1.7 % Zn and 26–26.5 % Sn, amalgamated with mercury. **d. cement.** A quick-setting mixture consisting of finely powdered (1) zinc oxide (= *zinc cement*), (2) copper oxide (= *copper cement*), or (3) aluminum calcium silicate (= *silicate cement*). This is mixed before use with orthophosphoric acid containing varying amounts of Al, Zn, and Na phosphates.

dentifrice. Toothpaste.

dentin. The hard substance of the teeth.

dentists' amalgam. An alloy of 70 parts mercury with 30 parts copper, used in dentistry.

dentrite. Dendrite.

denudation. Stripping or making bare. Cf. *erosion.* **chemical-** The loss of nutritive salts from the soil, and the progressive degeneration of agricultural land.

deodorant. An agent which removes, corrects, or represses undesirable odors.

deoxidation. Reduction, the removal of oxygen from a compound; or the lowering of the oxygen content, as in steel manufacture.

dephlegmator. Fractionating column.

dephlogisticated. An obsolete term which indicated the absence of phlogiston or the principle of inflammability. **d. air.** Oxygen, or airless phlogiston. **d. marine acid.** Chlorine.

depilating. In the leather industry, the removal of hairs and epidermis from hides.

depilatory. A drug or agent which removes superfluous hairs from the skin; *e.g.*, barium sulfide.

depolarization. The prevention or removal of polarization. **electrical-** The prevention of electrical polarization, *e.g.*, by separating the electrodes of an electric cell by a porous diaphragm. **optical-** The effect produced by placing a depolarizer between the analyzer and polarizer of a polarization apparatus.

depolarizer. An optical device refracting polarized rays into ordinary and extraordinary rays.

deposit. A collection of matter at any particular place; *e.g.*, geologic location, in test tubes (precipitate) or tissues, or on objects in an electrolytic bath.

deposition. The formation of a collection of matter; *e.g.*, sedimentation, incrustation, electroplating, or precipitation.

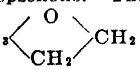
depressant. A cerebrospinal neurotic drug which diminishes the functional activity of an organ or organism; *e.g.*, arnica, antipyrine, cocaine, colchicine, hemlock, lobelia, phenacetin, tobacco.

depression. A lowering effect, *e.g.*, depression of the freezing-point of a solution by dissolved salts. **molecular-** The lowering of the freezing-

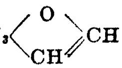
point of a solution containing a mole of a substance per liter. Cf. *Raoult's law*, *colligative*.

depressor. (1) A negative catalyst, q.v. (2) A buffer. (3) A substance used in flotation to reduce the tendency of gangue materials to be carried along with the froth; as, cyanides, silicates, sulfites. **d. effect.** The resistance of a solution to a change in hydrogen ion concentration. Cf. *buffer effect*.

depsanone. 1.2-dihydro-depsenone. The heterocyclic compound, $Ph.C_6H_3$



depsenone. 4-benzoyl-benzofuran. The heterocyclic compound, $Ph.C_6H_3$



depsides. A group of ester-like anhydrides of phenol carboxylic acids, obtained from lichens or synthesised.

depsiphore. A structural arrangement of atoms that is common to many substances having the property of tanning agents. Cf. *chromophore*.

derby red. Basic *lead* chromate.

derbylite. An antimonio-titanate of iron.

dericin. A light colored, viscous oil derived from castor oil; used as a solvent for pharmaceuticals.

derinatol. Basic *bismuth* gallate.

derivant. Derivative.

derivate. Derivative.

derivation. (1) The preparation of an organic substance from another compound. (2) The theoretical connection between the molecular structures of related organic compounds.

derivative. (1) A compound, usually organic, obtained from another compound by a simple chemical process; *e.g.*, acetic acid is a derivative of alcohol. (2) An organic compound containing a structural radical similar to that from which it is derived; *e.g.*, benzene derivatives containing the benzene ring. Beilstein classifies several types of d., according to the theoretical alteration of the compounds:

(a) index compound.........	CH_3OH	PhOH
(b) coupling compound.........	$HOCH_3$	$HOSO_2OH$
1st degree d.. ...	CH_3OCH_3	$PhOSO_2OH$
2nd degree d.....	CH_3OCHCl_2	$PhOSO_2NH_2$
3rd degree d......	—	$PhOSO_2NHCl$

Cf. *anhydrosynthesis*. **additive-** Additive compound. **functional-** A d. which contains a radical whose hydrogen is capable (theoretically) of further replacement. Cf. functioning *group*. **nonfunctional-** A d. which contains a radical without any replaceable hydrogen. Cf. nonfunctioning *group*. **nuclear-** A d. in which substitution took place on the carbon stem. Cf. stem *nucleus*. **side chain-** A d. in which substitution took place on the side chain, q.v.

derived units. Units (q.v.) of physical measurements which can be deduced from fundamental units. Thus, the fundamental unit of length, l, will give the unit of area, l^2, and the unit of volume, l^3; *e.g.*, m, m^2, and m^3.

dermatitant. A substance that irritates or inflames the skin; as, lobinol.

dermatol. Bismuth subgallate.

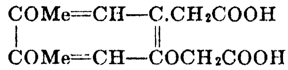
dermatoscope. A binocular microscope.

dermatosome. (1) The smallest fibre or fibril which can be detected microscopically. (2) The small fibre debris produced by the action of HCl on cellulose.

dermics. A drug used for skin diseases.

dermol. $Bi(C_{15}H_9O_4)_3.Bi_2O_3$. Basic bismuth chrysophanate. Amorphous yellow powder, used as antiseptic in skin diseases.

derric acid. $C_{10}H_{14}O_7$ = 243.09. An oxidation product of derrisic acid, m.170, soluble in water or alcohols.



Cf. *risic acid*.

derrid. An acid resin from *Derris elliptica*, a Papilionate of the East Indies; used by the Malays as an arrow poison.

derrin. An early name for rotenone.

derris. The leaves of *Derris uliginosa*, a Leguminosae of the South Sea Islands, used by the Fijians as fish poison. It contains rotenone, toxicarol, deguelin and a series of acid resins, and is not poisonous to man. Cf. *cube*. **d. extract.** An infusion of d. used as an aphicide, ascaricide, fly spray and in flea powders. **d. root.** Tuba root. The dried root of *Derris elliptica*, a Leguminosae of Sumatra, Borneo, Straits Settlements, Java, and Sarawak; used in insecticides.

derissic acid. $C_{23}H_{24}O_8$(?). A constituent of derris root.

derritol. $C_{21}H_{24}O_6$ = 372.19. An alcohol derived from rotenone. Yellow needles, m.161.

desalgin. A colloidal solution of chloroform.

desamidase. An enzyme (q.v.) which splits off the $—NH_2$ group.

desamidization. Deamidization.

desaulesite. A rare nickel-magnesium silicate.

Descartes, René. (1596–1650). A French philosopher, physicist and chemist.

descloizite. $Pb,Zn_4V_2O_4.H_2O$. A zinc-lead vanadate, occurring in greenish masses, d.6.1, hardness 3.5.

desensitization. (1) In photography: rendering silver salts less sensitive to light by physical or chemical means. (2) In biochemistry: destruction of immune bodies.

desensitizer. A substance (*e.g.*, certain dyes) which render the photographic emulsion less sensitive, *e.g.*, pinakryptol. Cf. *sensitizer*.

deshydro- A prefix, indicating containing less hydrogen; hence, unsaturated.

deshydroxy- A prefix, indicating containing less hydroxyl. **d. cholic acid.** A constituent of bile.

desiccant. An agent which dries; hence, a substance used to dry gases. Weights of the residual moisture in one liter of saturated air at 25°C. after passing through a U-tube containing the d. are:

Desiccant	*mg. of water*
P_2O_5	practically none
$Mg(ClO_4)_2$	practically none
KOH	0.003
Al_2O_3	0.003
H_2SO_4(95 %)	0.003
MgO	0.008
$Ba(ClO_4)_2$	0.14
NaOH	0.16
CaO	0.2
$CaBr_2$	0.2
$CaCl_2$	0.36
$ZnCl_2$	0.8
$ZnBr_2$	1.1
$CuSO_4$	1.4

Other d. are *ascarite, magnesium perchlorate, barium perchlorate.* **chemical-** A d. which acts by absorption, *e.g.*, reacts with water as, P_2O_5. **physical-** D. which act by adsorption, as, silica gel, charcoal, asbestos.

desiccated. Describing a dried substance.

desiccation. The process of drying by means of a deliquescent or hygroscopic substance.

desiccator. A device for drying substances; *e.g.*, a glass vessel containing a deliquescent substance, such as, calcium chloride, sulfuric acid, etc. **vacuum-.** A d. which may be evacuated.

desicchlora. An anhydrous, granulated barium perchlorate, used as a regenerable drying agent and absorbent for ammonia.

desivac process. A process of freezing and dehydrating aqueous preparations. Cf. *lyophilized biological.*

desmin. $(Na_2,Ca)Al_2Si_6O_{16}.6H_2O$. A sodium-calcium aluminum silicate; hardness 3.5–4.

desmolases. Enzymes whose activities result in the liberation of energy; as, reductases and oxidases.

desmotrope. One of a pair of tautomeric compounds. The seven most important types are:

1. keto-enol tautomerism

$$=CH.CO- \leftrightarrows =C:C(OH)-$$

2. keto-cyclo tautomerism

$$-CO-....-C(OH)= \leftrightarrows -C(OH)....C-$$
$$\qquad\qquad\qquad\qquad\qquad\quad \llcorner\!\!-O-\!\!\lrcorner$$

3. imino-amino tautomerism

$$=CH.C(:NH)- \leftrightarrows =C:CNH_2-$$

4a. nitroso-isonitroso- and

4b. oxime-isoxime tautomerism.

$$=CH.NO. \leftrightarrows =C:NOH \leftrightarrows =C(O)-NH$$

nitroso- isonitroso- oxime- isoxime-

5. nitro-isonitro tautomerism

$$=CH.NO_2 \leftrightarrows =C:N(:O)OH$$

6. nitrosamine-isodiazo tautomerism

$$-NH.N:O \leftrightarrows -N:N.OH$$

7. azo-hydrazone tautomerism

$$=CH.N:N- \leftrightarrows =C:N.NH-$$

desmotropism. Allelomorphism, dynamic allotropy. A form of isomerism (tautomerism) of organic compounds which exists between two molecules containing the same number and kind of atoms of like valency, in the same position, but with different linkages, *e.g.*, shifting of the double bond and wandering of a hydrogen atom and enol and keto forms. See *isomerism, tautomerism.*

desogen. A mixture of the methosulfates of a group of trimethylammonium bases; it is a disinfectant.

desorption. (1) The reverse of adsorption, q.v. (2) The evolution or liberation of a gas or volatile material from its solution; the reverse process to absorption.

desoxalic acid. $C_5H_8O_8$ = 194.1. *1.2.*-Dihydroxy-*1.1.2*-ethane tricarboxylic acid*. The tribasic acid $HO(HOOC)CH.C(OH)(COOH)_2$. A colorless liquid, decomp. on heating, slightly soluble in water or ether.

desoxy- A prefix indicating the removal of oxygen. **d. compound.** An organic compound in which the hydroxyl group has been replaced by hydrogen. It has been proposed to give such compounds the ending, -ane, thus, desoxyquinine becomes quinane, and desoxy-cinchonine becomes cinchonane. **d. sugar.** A group of carbohydrates occurring in nature in biologically important substances, which add H_2O and form a sugar; as, digitalose, fucose, rhamnose.

desoxyalizarin. Anthrarobin.

desoxybenzoin. $C_{14}H_{12}O$ = 196.1. Phenylbenzylketone, α-phenyl-acetophenone. $Ph.CH_2.CO.Ph$. Colorless scales, m.60, b.314, slightly soluble in hot water, soluble in alcohol or ether.

desoxycholic acid. $C_{24}H_{40}O_4$ = 392.32. An acid from bile. Cf. *cholane.*

desoxycodeine. Codeinane.

desoxycorticosterone. 21-Hydroxyprogesterone, a steroid hormone from adrenal cortex extracts.

desoxydation. The removal of oxygen from a molecule; or reduction.

desoxyephedrine. $C_{10}H_{15}N$ = 149.23. Desoxyn, methedrine, pervitine. Phenylisopropylmethylamine, $C_6H_5.CH_2.CH(CH_3).NH(CH_3)$. It is a vasoconstrictor and powerful cerebral stimulant; the hydrochloride is most frequently employed.

desoxymorphine. Morphane.

desoxyn. Desoxyephedrine (q.v.).

desoxyquinine. Quinane.

dessert-spoon. A measure equal to 2 fluid drams, or about 8 cc.

destructive distillation. The irregular decomposition of organic compounds by heating them out of contact with air; as, the production of wood tar or coal tar.

desulfuration. (1) The removal of sulfur from an organic substance, *e.g.*, by arsenic trioxide. (2) The reduction of sulfur content; as, in steel manufacture. (3) The precipitation of sulfides with lead or mercury cyanides in the cyanidization of gold ores.

desyl. The monovalent radical $PhCO(Ph)CH-$, derived from desoxybenzoin.

bi- See *bidesyl.*

detaline. Deltaline.

detection. The qualitative identification of an element or compound in a material. Cf. *determination.* **d. limit.** The smallest quantity of a particular substance (in γ) which may be detected by a particular chemical reaction.

detector. Any device for detecting electric waves; as, a valve or radio tube.

detergent. A cleansing agent. Synonym: abstergent.

DETERGENTS

Type	*Name and definition*
R.COOM.....	Soaps, the alkali salts of fatty acids.
$SO_2O.R.COOM$.....	Turkey red oils, or sulfonated fatty acids.
$(SO_2O)_xR.COOM$.....	Monopole soap or highly sulfonated fatty acids.
$SO_2O.R.OH$.....	Gardinols, or sulfonated fatty alcohols.

determinism. The principle that all properties of the atom may be related and determined. Cf. *indeterminancy, uncertainty.*

detonation. An explosion or a violent sound produced by a chemical change; as, the rapid decomposition of high explosives, or the rapid

ignition of an explosive mixture in an internal combustion engine causing knocking.

detonator. Primer. A fuse or compound which ignites an explosive mixture.

detoxicate. To make a poisonous substance harmless.

deuterate. A substance containing heavy water of crystallisation.

deuteric acid. An acid containing deuterium; as R.COOD, R.COOH^{b}, or R.COOH^{2}. **aceto-** $CH^{1}_{3}.COOH^{2}$. **benzo-** $C_6H^{1}_{5}COOH^{2}$. Cf. *deuterobenzoprotic acid.*

deuterium. D_2 = 4.02712. Heavy hydrogen, deuteronium, diplogen. The isotope of hydrogen of atomic weight 2.01356, H^2 or H^b. **d. oxide.** D_2O = 20.03. Heavy water, H^2_2O or H^b_2O. A colorless liquid, d.1.1056, m.3.8, b.101.42, n^{D}_{20}.1.3281; it inhibits the growth of seedlings and cells.

deutero- A prefix meaning: (1) second in order, (2) derived from, (3) containing heavy hydrogen (deuterium).

deuteroacetic acid. $CH^{2}_{3}.COOH^{2}$ or CD_3COOD.

deuteroacetoprotic acid. $CH^{2}_{3}COOH'$ or CD_3COOH.

deutero-albumose. A derivative of albumoses. A yellow powder, soluble in water.

deuteroammonia. The compound ND_3 or NH^{2}_{3}. It differs from ammonia as follows:

%D	NH_3	NH_2D	NHD_2	ND_3
	0	68	90	99
m.	195.2°A	197.9°A	198.6°A	199°A
b.	239.75°A	241.7°A mono-	242.1°A di-	242.3°A tri-

deuteroammonium. The radical ND_4^+. There are *mono-*, *di-*, *tri-* and *tetra-* derivatives.

deuteroartose. $C_{156}H_{244}N_{40}O_{56}S$. A secondary artose.

deuterobenzoic acid. $C_6D_5.COOD$ or $C_6H^{2}_{5}.COOH^{2}$.

deuterobenzoprotic acid. $C_6D_5.COOH$ or $C_6H^{2}_{5}.COOH'$.

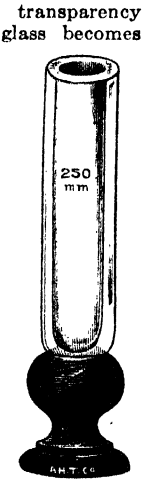
deuterochloroform. Chloroform-*d*.

deutero-fibrinose. A product formed from fibrin during digestion.

DEUTERIUM NOMENCLATURE

	Boughton names	Deuterio names
NH_2D	ammonia-*d*	deuterioammonia
NH_3	ammonia-d_3	trideuterioammonia
D_2SO_4	sulfuric acid-d_2	sulfuric dideuterioacid
$HDSO_4$	sulfuric acid-*d*	sulfuric deuterioacid or sulfuric monodeuterioacid
$Na_2SO_4.5D_2O$	sodium sulfate penta-hydrate-d_{10} or penta-(hydrate-d_2)	sodium sulfate pentadideuterio-hydrate
NH_2D_2OD	ammonium-d_2 hydroxide-*d*	dideuterioammonium deuterioxide
NHDOD	hydroxylamine-α,β-d_2 or hydroxyl-*d*-amine-*d*	α,β-dideuteriohydroxylamine or deuterioxyldeuterioamine
CH_3D	methane-*d*	deuteriomethane
CD_4	methane-d_4	tetradeuteriomethane
$CDCl_3$	chloroform-*d*	deuteriochloroform
$CH_2DC(CH_3)_2CH_3$	2,2-dimethylpropane-1-*d* or neopentane-*d*	1-deuterio-2,2-dimethylpropane or deuterioneopentane
CH_3CDO	acetaldehyde-*d*	acetodeuterialdehyde
CD_3CDO	acet-d_3-aldehyde-*d*	trideuterioaceto deuterioaldehyde
CH_3CH_2OD	ethyl alcohol-*d*	*O*-deuterioethyl alcohol or ethyl deuterioalcohol
CH_3CH_2COOD	propionic acid-*d*	propionic deuterioacid
CH_2DCH_2COOD	propionic-β-*d* acid-*d*	β-deuteriopropionic deuterioacid
$CH_2DCONHD$	acetamide-N,α-d_2 or acet-*d*-amide-*d*	N,α-dideuterioacetamide
C_6D_6	benzene-d_6	hexadeuteriobenzene
$2,3\text{-}D_2C_6H_3Cl$	chlorobenzene-2,3-d_2	1-chloro-2,3-dideuteriobenzene
$3\text{-}DC_6H_4CH_2D$	toluene-α,3-d_2	α,3-dideuteriotoluene
C_6H_5OD	phenol-*d*	*O*-deuteriophenol or benzene-deuteriol
$4\text{-}DC_6H_4OD$	phen-4-*d*-ol-*d*	*O*,4-dideuteriophenol
C_6H_5COOD	benzoic acid-*d*	benzoic deuterioacid
$2,4\text{-}D_2C_6H_3COOH$	benzoic-2,4-d_2 acid	2,4-dideuteriobenzoic acid
DHNC:CD.CH:CH.CH:CH	aniline-N,2-d_2	N,2-dideuterioaniline
HOOCC:C(COOD).CH:CD.CH:CH	phthalic-4-*d* acid-2-*d*	4-deuteriophthalic 2-deuterio-acid

deutero-globulose. A product formed from globulin during digestion.
deutero-proteose. Deutero-albumose.
deuteron. Deuton, diplon. A deuterium nucleus or a particle of mass 2.0 with one positive charge. Cf. *proton.*
deuteronium. Deuterium.
deuteroxyl. The OD^- or OH^{2-} ion.
deuton. A deuteron.
Devarda's alloy. An alloy of 50 % Cu, 45 % Al, and 5 % Zn. It is a strong reducing agent in alkaline solution.
developed dyes. Colors produced from colorless substances by chemical reactions.
developer. A reducing liquid used in photography for rendering the image on an exposed plate visible, usually by the formation of black metallic silver.
development. (1) In biology the growth and differentiation in the structure of an organism, and the acquirement of new, favorable characteristics. (2) In photography: rendering visible the image on an exposed plate, paper, or film, usually by reduction of light sensitive gold or silver salts to the metallic state.
deviation. The bending or turning of a direction or course.
devil's apple. Stramonium.
devitrifaction. The removal of transparency owing to crystallization; *e.g.*, glass becomes opaque with age or under the influence of certain chemicals.
devitrification. Devitrifaction.
dew. Moisture precipitated on a surface from an atmosphere saturated with water-vapor. **d. point.** The temperature of the atmosphere at which dew begins to form; it is an indication of the humidity of the air (q.v.).
Dewar, Sir James. 1842–1923. An English chemist, noted for the liquefaction of gases and experiments at low temperature.
D. flask. Vacuum flask. A double-walled, glass vessel, silvered or unsilvered, of varied shape and evacuated between the two walls; used for experiments with liquids at very low temperatures, or as container for liquefied gases.



Dewar flask.

deweylite. $Mg_4Si_3O_{10}.6H_2O$. An amorphous, white, magnesium silicate related to talc.
dextran. $(C_6H_{10}O_5)_x = (162.1)_x$. A gummy, fermentable carbohydrate produced by certain cocci from molasses, beet-juice, milk or wine; it causes ropiness.
dextrase. An enzyme changing dextrose to lactic acid.
dextrin. $(C_6H_{10}O_5)_x$. British gum, starch gum, amylin, gommelin, gummeline. A carbohydrate produced from starch by hydrolysis by dilute acids, diastase, ferments, or dry heat. It is an intermediate product between starch and the sugars into which starch hydrolyzes. An amorphous, odorless, white or yellowish powder; soluble in water or dilute alcohol and precipitated by strong alcohol. It does not give the blue iodine reaction of starch and is not fermentable, but changes to maltose by the action of enzymes (diastase), and to dextrose by action of acids. Used as a substitute adhesive for gum arabic; in calico printing; in the manufacture of inks, stains, water-colors and many other articles. **achroo-** See *achroo*-dextrin. **amylo-** See under *amylo*-dextrin. **animal-** Glycogen. **erythro-** See *erythro*-dextrin.
dextrinose. Gentiobiose.
dextro- *d-*. A prefix meaning toward the right; *e.g.*, dextro-rotatory. Cf. *levo-*.
dextrocarvol. Carvone.
dextro-compound. A dextrorotatory compound; *i.e.*, an optically active compound which turns the plane of polarized light to the right, that is clockwise.
dextrogyric. Dextrorotatory.
dextronic acid. Gluconic acid.
dextrorotary. Dextrorotatory.
dextrorotatory. Turning to the right, or clockwise. **d. compound.** A substance whose solution turns the plane of polarized light to the right, *i.e.*, clockwise. See *optical activity, asymmetric carbon atom, stereoisomerism.*
dextrosans. Glucosans.
dextrosazone. Glucosazone.
dextrose. Glucose.
deyamittin. $C_{18}H_{12}O_3N$. A glucoside from *Cissampelos pareira;* colorless crystals. Cf. *dyamettin, cissampeline.*
dg. An abbreviation for decigram, one-tenth of a gram, or 100 mg.
dhurrin. $C_{14}H_{17}NO_7 = 311.14$. A glucoside from millet and sorghum, which hydrolyzes to glucose, HCN and *p*-hydroxybenzaldehyde. Colorless needles, m.196.
Di. The symbol for didymium, a mixture of neodymium and praseodymium.
di- A prefix meaning two, or twice. Cf. *bi-*.
dia- A prefix meaning through, or opposite.
diabantite. A hydrous magnesium-iron aluminum silicate of the chlorite group, $H_{18}(Mg, Fe)_{12}Al_4Si_9O_{45}$.
diabase. An igneous rock formed in the transition from basalt to granitoid gabbros, and consisting of plagioclase, magnetite, augite, and sometimes olivine.
diabetin. Fructose.
diacetamide. $C_4H_7O_2N = 101.11$. Diacetylamine, *N*-acetylacetamide, $Me.CO.NH.CO.Me$. Colorless needles, m.78, b.223, soluble in water or ether. **phenyl-** Diacetanilide.
diacetanilide. $C_{10}H_{11}O_2N = 177.15$. Diacetylaniline, *N*-acetylacetanilide, *N*-phenyldiacetamide, acetoacetanilid, $Me.CO.NPh.CO.Me$. Colorless leaflets, m.37.5, $b._{11mm}142$, soluble in water or alcohol.
diacetate. (1) A salt of diacetic acid. (2) A salt containing two acetoxy groups, $CH_3COO—$.
diacetenyl. The radical —C:C—C:C—, as in **d. benzene. d. benzene.** Diphenyl diacetylene.
diacetic acid. (1) $C_4H_8O_4 = 144.1$. Diacetylacetic acid. $(MeCO)_2CH.COOH$. A colorless liquid, sometimes a constituent of diabetic urine. (2) Acetoacetic acid. (3) Succinic acid. **acetone-** Hydrochelidonic acid. **ethidene-** *β*-Methyl glutaric acid. **phenylene-** Phenylene diacetic acid. **propidene-** *β*-Ethyl glutaric acid. **d. ester.** $C_8H_{12}O_4 = 172.1$. Ethyldiacetate, ethyl diacetylacetate, ethyl diacetic ester. $(MeCO)_2CHCOOEt$. A colorless liquid, d.-1.101, decomp. 200, slightly soluble in water.
diacetin. $C_7H_{12}O_5 = 176.14$. Glyceryl diacetate, $(MeCOOCH_2)_2CHOH$. A colorless liquid, d.1.179, m.40, b.259, soluble in water, alcohol, or ether.
diacetonamine. $C_6H_{13}ON = 115.08$. *β*-Amino-isopropyl acetone. A product formed by

the action of ammonia on acetone or mesitone. A light liquid of characteristic odor. Cf. *acetonamine.*

diacetone. Acetylacetone. **d. alcohol** $C_6H_{12}O_2$ = 116.1. The ketone alcohol $MeCOCH_2CMe_2OH$. A colorless liquid, b.164; used as a solvent for nitrocellulose and resins.

diacetyl. (1) Biacetyl. (2) A prefix indicating the presence of two acetyl radicals. **methyl-** See *methyldiacetyl.*

d. amide. Diacetamide. **d. anilide.** Diacetanilide. **d. glucose.** $C_{16}H_{16}O_8$ = 264.2. Colorless crystals, m. exceeds 100, soluble in water, alcohol or ether. **d. morphine.** Heroine. **d. peroxide.** $C_4H_6O_4$ = 118.08. MeCO.O.O.COMe. A yellowish liquid, used in solution as an antiseptic. **d. tannin.** Tannigen. **d. urea.** $C_5H_8O_3N_2$ = 144.2. MeCO.NH.CO.NH.COMe. Colorless crystals, soluble in water.

diacetylene. C_4H_2 = 50.0. Butadiine, diacetylene. A colorless, gaseous hydrocarbon, HC:C.C:CH. **d. glycol** $C_6H_6O_2$ = 110.1. Hexadiin-diol, $CH_2OH.C:C.C:C.CH_2OH$. Colorless crystals, m.111.

diacetylenes. A group of unsaturated hydrocarbons containing two triple bonds, of the general type, C_nH_{2n-6}.

diacetylene, butadiine, butadiyne*	C_4H_2
pentadiine, pentadiyne*	C_5H_4
dipropargyl, hexadiine, hexadiyne*	C_6H_6

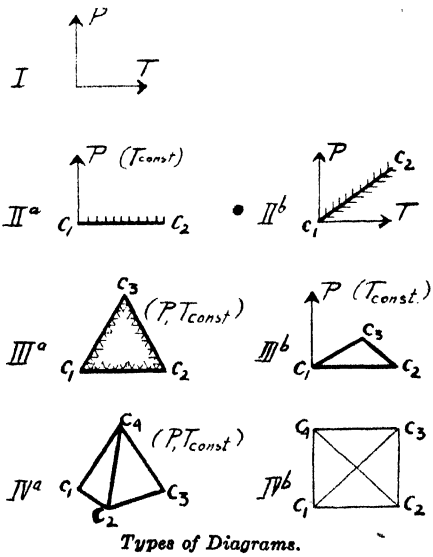
diacid. A compound which contains two hydroxyl groups; as $Ca(OH)_2$.

diacolation. A method of extraction in presence of sand, used for the preparation of pharmaceutical tinctures.

diad. An element or radical having a valency of two.

diadochite. $H_{24}Fe_4P_2S_2O_{29}$. A yellow, monoclinic ferric sulfate-phosphate, d.3.8, hardness 3.5–4.5, soluble in HCl.

diagnostic. Pertaining to the recognition of disease. **d. reactions.** Chemical tests to determine a pathological condition; *e.g.*, Fehling reaction, Ehrlich reaction etc. **d. reagents.** Test solutions used in diagnostic reactions. **d. test.** A biochemical experiment for detecting pathological conditions; *e.g.*, Wassermann test, Noguchi test, Widal test.

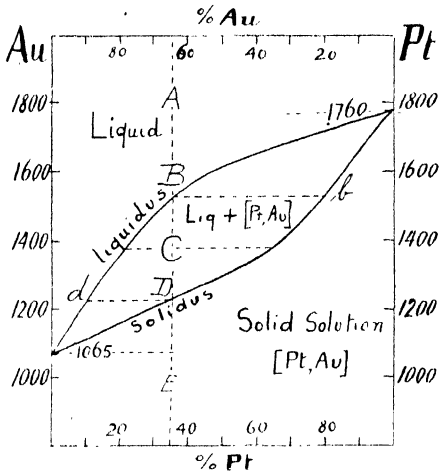


Types of Diagrams.

diagram. Phase rule plot. A graph showing the relation of one or more properties of one or more substances. Cf. *coordinates.* The types and forms of d. are shown in the preceding column.

I. One-component system: The relation of two quantities or properties of one substance, such as *T* and *P*.

II. Two component system: *a.* The relation of one quantity in a binary mixture is shown by plotting this quantity against concentration, c_1 and c_2. *b.* The relation of two quantities in a binary mixture is shown by a three dimensional model. See figure.

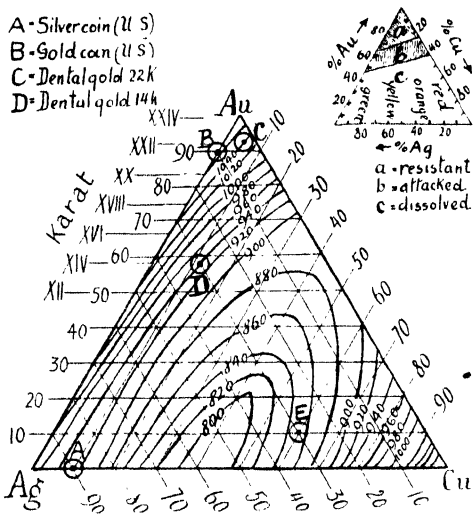


Two Component System (Gold-Platinum).

Temperature (vertical lines) is plotted against concentration or percentage composition. Any vertical line, as *AB*, is concentration vertical, any horizontal line, as *Bb*, is temperature horizontal. Curve *dB* is the liquidus, curve *Db* the solidus. Assume an alloy of 65 % gold and 35 % platinum molten at a temperature of 1800°C. This homogeneous liquid mixture, *A*, is allowed to cool. Solidification begins at *B* or 1525°C., but the solid which separates has composition *b*, that is 20 % gold and 80 % platinum, hence proportionately more platinum freezes as gold, the liquid portion becomes richer in gold, corresponding with the liquidus *B* to *d*. At *C*, 1380°C., the temperature horizontal indicates that the liquid consists of 80 % gold and 20 % platinum, while the solid alloy which has crystallized has the composition of 35 % and 65 % platinum. Cooling still further, until *D*, 1220°C. is reached, the entire mass has crystallized, the last portion to crystallize, *d*, consisting of 90 % gold and 10 % platinum. Hence while the total composition of the alloy at *E* is like that at *A*, it is now a heterogeneous mixture of larger or smaller crystals of composition varying from *b* to *d*.

III. Three component system: *a.* The relation of one quantity in a ternary system is shown by a curve in a triangle. *b.* Two properties can be shown by a three dimensional model. See figure.

IV. Four component system: Requires a model to adequately represent it, for even a three-dimensional model may not properly show the relation of one quantity.



Three component system (Gold-Silver-Copper).

The percentage of gold is shown by the horizontal lines, 100 % Au being at the apex of the triangle. The percentage of silver is indicated by the lines sloping upwards toward the left, copper the lines sloping upwards toward the right, Thus, point:

A = 10 % silver, 90 % copper, no gold
B = 90 % gold, 10 % silver, no copper
C = 92 % Au, 5 % Ag, 3 % Cu
D = 58 % Au, 30 % Ag, 12 % Cu
E = 10 % Au, 30 % Ag, 60 % Cu

In the smaller diagram are shown the colors of the alloys and the action of acids on them.

The curves indicate the melting points of these alloys, thus

A at 925°C
B at 1060°C
C at 1040°C
D at 940°C
E at 850°C

diakon. Trade name for a methyl methacrylate plastic.

dial. (1) A dialdehyde. (2) Diallyl barbituric acid. **d. uramide.** Uramil.

dialdehyde. Dial. A compound containing two aldehyde groups; as, *methane dial* or malonic aldehyde, *ethane dial* or succinic aldehyde.

dialin. $C_{10}H_{10}$ = 130.08. Dihydronaphthalene. **1.2-** Colorless liquid, d.0.996, m. −9, b.84.5. **1.4-** Colorless liquid, d.0.998, m.15, b.212.

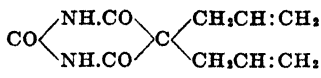
dialkene. Diolefine.

dialkyl. An organic compound containing two alkyl radicals.

dialkylene. An organic compound containing two alkylene radicals.

diallag. $(Mg,Fe)CaSi_2O_6$. A magnesium-iron calcium silicate, sometimes containing alumina, d.3.2, hardness 4.

diallyl. (1) C_6H_{10} = 82.1. $\Delta^{1,5}$-hexadiene* (q.v.), $CH_2{:}CH.CH_2.CH_2.CH{:}CH_2$. A colorless liquid, $d_{17°}$.0.687, b.59.5, insoluble in water. (2) An organic compound containing two allyl radicals. **d. amine.** $C_6H_{11}N$ = 97.09. Di-2-propenylamine*, $(CH_2{:}CH.CH_2)_2NH$ A colorless liquid, b.111. **d. barbituric acid.** $C_{10}H_{12}O_3N_2$ = 208.2. Dial.



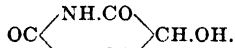
Colorless, shining scales, m.170, slightly soluble in water, soluble in alcohol or ether; used medicinally as a hypnotic and sedative. **d. sulfide.** Allyl sulfide. **d. urea.** Sinapolin.

dialozite. $MnCO_3$. A native manganous carbonate.

dialuramide. Uramil.

dialurate. A salt of dialuric acid.

dialuric acid. $C_4H_4O_4N_2$ = 144.1. Tartronylurea, 5-hydroxybarbituric acid,



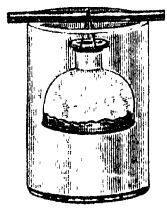
A monobasic heterocyclic acid derived from alloxan. Colorless prisms, slightly soluble in water.

dialysate. Dialyzate.

dialysed. Separated by dialysis. **d. iron.** A colloidal solution of ferric hydroxide.

dialysis. Ultrafiltration. Micro-filtration by means of a semi-permeable membrane, which separates crystalloids (molecules) from colloids (particles of ultramicroscopic size).

dialyzate. The crystalloid filtrate, which has dialysed through a membrane. Cf. *diffusate.*



Dialyzator.

dialyzator. An apparatus for separating colloids from non colloids (dialysis).

dialyzer. The semi-permeable membrane used in dialysis; *e.g.*, parchment, collodion, or a porous cup treated with certain chemicals. Cf. *diffusion shell.*

diamagnetic. Repelled by a magnet, or taking a position at right angles to the field of an electromagnet. Such substances have magnetic permeabilities less than unity. Cf. *paramagnetic.*

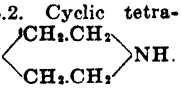
diameter. (1) A straight line passing through the center of a body or figure. Cf. *circle, caliber.* (2) A measure of magnification; the number of times the d. of the object is increased.

diamide. (1) Oxamide. (2) A compound containing two $-CONH_2$ groups.

diamidine. (1) Oxalamidine. (2) A compound containing two amidine groups.

diamido- A prefix indicating the presence of two amido radicals. **d. cyanidine.** Formoguanine.

diamidogen. Hydrazine.

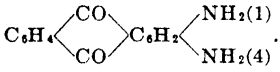
diamine. (1) Hydrazine. (2) See *diamines.* **amylene-** $C_5H_{14}N_2$ = 102.2. Pentamethylenediamine, cadaverine, 1.5-diaminopentane. **butylene-** $C_4H_{12}N_2$ = 88.2. Tetramethylenediamine, putrescine, 1.4-diaminobutane. **diethylene-** $C_4H_{10}N_2$ = 86.2. Cyclic tetramethylene diamine.  **dimethylene-** Ethylene diamine. **ethylene-** $C_2H_8N_2$ = 60.1. Dimethylenediamine. $NH_2{-}CH_2CH_2NH_2$. A colorless liquid, m.8.5, b.116.5. **hexamethylene-** $C_6H_{16}N_2$ = 116.2. Triethylenediamine. $NH_2(CH_2)_6NH_2$. **pentamethylene-** Amylene diamine. **phenylene-** C_6-

H_7N_2 = 107.1. **ortho-** 1.2-Diaminobenzene. **meta-** 1.3-Diaminobenzene. **para-** 1.4-Diamino*benzene*. **propylene-** $C_3H_{10}N_2$ = 74.2. Trimethylenediamine, $NH_2(CH_2)_3NH_2$. A colorless liquid, b.119. **tetramethylene-** Butylene diamine. (cyclic-) Piperazine. **triethylene-** Cyclic hexamethylene diamine. **trimethylene-** Propan diamine.

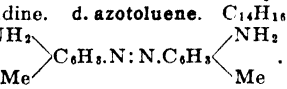
d. blue. Trypan blue.

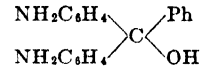
diamines. A group of compounds containing two $—NH_2$ groups. **aliphatic-** Compounds containing two amino groups attached to a carbon chain; *e.g.*, ethylene diamine. **aromatic-** Compounds containing two amino groups attached to a carbon ring; *e.g.*, the diamino benzenes (phenylene diamines). **heterocyclic-** Saturated ring compounds in which the amino group takes part in ring formation; *e.g.*, diethylene diamine, triethylene diamine. **homocyclic-** Aromatic diamines.

diamino- A prefix indicating the presence of two amino groups ($—NH_2$). **d. anthraquinone** $C_{14}H_{10}O_2N_2$ = 238.2. (**alpha-**) or 1.4-



Red needles, m.236, slightly soluble in alcohol or water, soluble in benzene. (**beta-**) or 2.3- Brownish-red needles, sublime on heating, soluble in water, alcohol or chloroform. (**ortho-**) or 1.2- Blue crystals, decomp. 130, insoluble in water, soluble in alcohol. **d. azobenzene.** Azobenzene. **d. azobenzene hydrochloride.** Chrysoidine. **d. azotoluene.** $C_{14}H_{16}N_4$ = 240.-

16.  . Isomers include 2.2′-diamino-4.4′-azotoluene, m.203; 3.-3′-diamino-2.2′-azotoluene, m.145. **d. benzene.** See *benzene*. **d. benzoic acid.** See *benzoic acid*. **d. benzophenone.** $C_{13}H_{12}ON_2$ = 212.2. **alpha-**, para- or 4.4′-$NH_2.C_6H_4.CO.C_6H_4.NH_2$. Colorless needles, m.172, soluble in water, alcohol, or ether. **beta-**, meta- or 3.3′-. Yellow needles, m.237, soluble in water, alcohol or ether. **d. diphenic acid.** $C_{14}H_{12}O_4N_2$ = 272.2. Benzidine dicarboxylic acid. Colorless crystals, insoluble in water, soluble in alcohol; used in synthesis of dyes. **d. diphenyl.** Benzidine. **d. diphenylamine.** $C_{12}H_{13}N_3$ = 199.3. $NH_2C_6H_4.NH.C_6H_4NH_2$. Colorless scales, m.-158, insoluble in water, soluble in alcohol or ether; used in organic synthesis. **d. diphenylethylene.** Diaminostilbene. **d. diphenylmethane.** $C_{13}H_{14}N_2$ = 184.19. para- or 4.4′-. Colorless scales, m.87, soluble in water or alcohol; used in organic synthesis. **d. naphthalene.** Naphthylene diamine. **d. naphthalene sulfonic acid.** $C_{10}H_4(NH_2)_2(SO_3H)_2$ = 318.24. **1.5.3.7-** Colorless crystals, insoluble in water, soluble in alcohol or ether. Used in organic synthesis. **1.8.3.6-** Long, thin colorless prisms, soluble in water or alcohol. Used in making H-acid. **d. naphthalene sulfonic acid.** $C_{10}H_5(NH_2)_3SO_3H$ = 238.17. **1.-4.2-** Small colorless crystals, slightly soluble in water, soluble in alcohol or ether; used in organic synthesis. **1.3.6-** Colorless crystals, slightly soluble in water, soluble in alcohol or ether; used in organic synthesis. **d. phenol.** See *phenol*. **d. phenol hydrochloride.** Amidol. **d. stilbene.** $C_{14}H_{14}N_2$ = 210.2. Diamino diphenyl ethylene, $NH_2C_6H_4.CH:CH.C_6H_4.NH_2$. Colorless scales, m.170, slightly soluble in water or ether, soluble in alcohol. **d. stilbene disulfonic acid.** $C_{14}H_{12}N_2(SO_3)_2$ = 370.23. **1.2.4-** or *α*-. A yellow crystalline powder, insoluble in water, soluble in alcohol or ether; used in organic synthesis. **d. triphenyl carbinol.** $C_{19}H_{14}ON_2$ = 286.2. An intermediate used in the dye industry.



d. triphenylmethane $C_{19}H_{18}N_2$ = 274.26. **para-**, or **4.4′-**. Colorless crystalline beads, m.139, slightly soluble in water, alcohol or ether; an intermediate in the synthesis of dyes.

diamino-phosphatides. A group of fatty substances containing two nitrogen atoms to one phosphorus atom; *e.g.*, aminomyeline, sphingomyeline etc. **diamino-diphosphatides.** Phosphatides containing two nitrogen atoms and two phosphorus atoms; *e.g.*, assurin. **diamino-monophosphatides.** Diamino-phosphatides.

diammonium. (1) N_2H_8 = 36.08. $NH_4.NH_4$. Cf. *hydrazinium*. (2) A prefix indicating the presence of two ammonium radicals; as, d. phosphate, $(NH_4)_2HPO_4$. **mercur-** See *mercurdiammonium*.

diamond. C = 12.001. A crystallized carbon, which occurs in colorless or variously tinted isomeric crystals, d.3.53, hardness 10, insoluble and non-fusible, but burning to carbon dioxide at high temperature. Used as a precious stone, for cutting glass and as bearings for delicate mechanism, watches, etc. **industrial-** D. occurs in three varieties: 1. *Carbons, carbonado, black Brazilian*, d. in porous clusters of microscopic crystals, fine to close-grained. 2. *Ballas*, nonporous, mostly round, consisting of innumerable minute *d.* crystals. 3. *Boarts, borts*. Translucent crystals which cleave in layers.

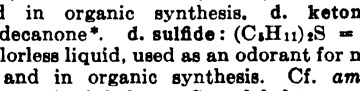
d. black. A black azo-dye, used for wool. $C_6H_3(OH)(COONa).N:N.C_{10}H_6N:N.C_{10}H_5(OH)SO_3Na$. **d. dust.** (1) The finely powdered diamonds collected as waste material in diamond cutting and polishing. (2) Finely-powdered glass, used as a polishing powder or for filtering acids. **d. flavin.** $C_{19}H_{14}O_4N_2$. A yellow azo-dye, $C_6H_4(OH).C_6H_3N:N.C_6H_3(OH)COOH$. **d. mortar.** A small mortar made of hardest steel.

diamyl. (1) Decane. (2) A compound containing two amyl radicals. **d. amine.** $C_{10}H_{23}N$ = 157.3. A colorless liquid, d.0.7775, b.187, soluble in alcohol, ether, or chloroform. Used in organic synthesis. **d. ketone.** 6-Hendecanone*. **d. sulfide:** $(C_5H_{11})_2S$ = 174.3. A colorless liquid, used as an odorant for natural gas and in organic synthesis. Cf. *amylmercaptan*. **d. phthalate.** See *phthalate*.

diamylene. (1) Decene. (2) A compound containing two amylene radicals. (3) Terpene.

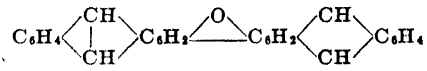
dianiline. A prefix indicating the presence of two aniline molecules. **d. calcium.** $(C_6H_5NH_2)_2Ca$ = 226.21. White crystals. **d. fluosilicate.** $(C_6H_5NH_2)_2.H_2SiF_6$ = 330.20. White plates, subliming at 230, very soluble in water.

dianisidine. $C_{14}H_{16}O_2N_2$ = 244.2. Dimethoxybenzidine, bianisidine



Colorless needles, m.170, slightly soluble in water or ether.

dianthrafurane. $C_{28}H_{16}O$ = 368.1. The heterocyclic compound,



dianthryl. Bianthryl.

diaphanometer. An instrument for measuring transparency; as, of the atmosphere, solutions, paper. Cf. *nephelometer.*

diaphanoscope. (1) A darkened box containing a source of light for viewing transparent or semitransparent objects. (2) An instrument for illuminating body cavities.

diaphoretic. A drug which stimulates the secretions from sweat glands and causes perspiration; *e.g.*, pilocarpine. Cf. *sudorific.*

diaphorite. $(Ag_2Pb)_5Sb_4S_{11}$. A metallic, orthorhombic lead-silver sulfoantimonite.

diaphragm. (1) A disk, with one or more holes, or with one hole of variable size, used to regulate the amount of light passing through a lens; *e.g.*, in a microscope, photographic apparatus etc. (2) The porous container of a galvanic cell separating the two liquids. (3) Any semipermeable partition or wall.

diaphthol. $C_9H_5N(OH)SO_3H$ = 225.14. Quinaseptol, o-oxyquinoline-m-sulfonic acid. Yellowish crystals, m.295, slightly soluble in water; used as an antiferment and non-poisonous antiseptic.

diarabinose. $C_{10}H_{18}O_9$ = 282.14. A disaccharide of arabinose, m.260.

diarsenate. A salt containing two arsenate radicals.

diarsenide. A compound containing two arsenic atoms.

diarsenite. A salt containing two arsenite radicals.

diarsenol. A Canadian brand of arsphenamine.

diarsenous acid. Pyroarsenic acid.

diarsine. Biarsine.

diarsonium. Cacodyl.

diarsyl. Biarsine.

diascope. A small portable x-ray tube and equipment, used for visual diagnosis (*e.g.* of teeth) by insertion into body-cavities.

diasone. Disodium formaldehyde sulfoxylate diaminodiphenylsulfone; $SO_2(C_6H_4.NH.CH_2.SO_2Na)_2.4H_2O$. A possible remedy for human tuberculosis.

diaspore. $Al_2O_3.H_2O$. A hydrous aluminum oxide formed as a decomposition product of rocks.

diastase. (1) Vegetable amylase. (2) Amylase. An enzyme from malt, converting starch by hydrolysis into maltose, dextrin and maltodextrins, a change which, within limits, is favored by H^+ and restrained by OH^-. A yellowish white or gray powder, soluble in water. Its properties are destroyed at about 75°C. Cf. *ptyalase.*

diastasic action. The conversion of starch into water soluble substances (dextrin, maltose etc.) by diastase.

diastasimetry. Measuring or determining the diastatic power of starch-digesting extracts.

diastatic action. Diastasic action.

diathermy. The slow penetration of heat.

diathesin. $C_7H_8O_2$ = 124.1. Salicyl-alcohol, o-oxybenzylalcohol. Colorless crystals, m.86, soluble in water. Used for rheumatism.

diatol. Diethylcarbonate.

diatom. A unicellular alga which has usually two symmetric halves. **d. ooze.** Oceanic sediments, about 1500 fathoms deep, consisting of empty shells of diatoms and containing about 23 % calcium.

diatomaceous earth. Kieselguhr.

diatomic. (1) A molecule of two atoms; *e.g.*, a binary compound. (2) A substance containing two replaceable hydrogen atoms. **d. alcohol.** A glycol, or organic compound having two hydroxyl groups. **d. acid.** An acid containing two replaceable hydrogen atoms. **d. bases.** A base containing two active hydroxyl groups.

diatomite. Kieselguhr.

diazacyclo- A prefix indicating the presence of 2 NH groups in a large ring; as, **d. dotriacontanine.** $NH.(CH_2)_{16}NH.(CH_2)_{15}$. **d. octacosanine.** $NH(CH_2)_{13}NH(CH_2)_{13}$.

diazene. Diazete.

diaezte. $C_2H_4N_2$ = 56.0. Diazene. The heterocyclic system. $CH_2{<}{}^{N}_{CH_2}{>}N$.

diazines. (1) A group of hydrocarbons, consisting of a hexatomic ring with two nitrogen atoms and four carbon atoms.

1.2- or ortho-	pyridazine
1.3- or meta-	pyrimidine
1.4- or para-	pyrazine

(2) A suffix, indicating a ring compound with two nitrogen atoms; as, benzo d., dibenzo para d., naphtho d., etc.

diazo- A prefix indicating the presence of the bivalent —N:N— radical. The isomer >N:N is diazonium. **d. compounds.** A group of very reactive organic nitrogen compounds which are formed when nitrous acid acts at low temperatures on the salts of primary aromatic amines. They are usually explosive, and are therefore not isolated in their crystalline form, but used in solution as intermediates in the manufacture of important dyestuffs. Cf. *disazo compounds.* **d. test.** A reaction shown by pathological urine, which turns red on the addition of diazobenzene sulfonic acid.

diazoacetate. A salt of diazoacetic acid. **ethyl-** $C_4H_6O_2N_2$ = 114.07. A colorless liquid, d.1.073, m. −24, b_{120mm}.143.

diazoacetic acid. $C_2H_2O_2N_2$ = 86.14. The monobasic acid N_2:CH.COOH.

diazoamino. Azimino. The bivalent radical —N:N.NH—. **d. benzene.** $C_{12}H_{11}N_3$ = 197.27. *1.3*-Diphenyltriazene*. The compound Ph.N:N.NH.Ph. Yellow leaflets, m.98, decomp. on further heating, insoluble in water, soluble in alcohol or ether. **d. naphthalene.** $C_{20}H_{15}N_3$ = 297.3. *1.3*-Di-*1*-naphthyltriazine*. Yellow leaflets, explode on heating, insoluble in water.

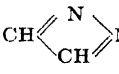
diazoate. A salt of the type Ar.N:NO.OM, derived from diazoic acid. Cf. *diazotate.*

diazobenzene. See *benzene.* **d. acid.** Nitranilide. **d. chloride.** $C_6H_5N_2Cl$ = 140.60. Benzene diazonium chloride*. Colorless needles, decomp. on heating, soluble in water or alcohol. **d. cyanide.** $C_7H_5N_3$ = 158.21. Yellow prisms, m.69, slightly soluble in water. **d. hydroxide.** Diazonium hydroxide. **d. imide.** $C_6H_5N_3$ = 119.20. A yellow, oily liquid,

d.1.098, explodes when heated, insoluble in water, sparingly miscible with alcohol or ether. **d. nitrate.** $C_6H_5O_3N_3$ = 167.19. Colorless needles which explode on heating, soluble in water or alcohol. **d. sulfonic acid.** $C_6H_4O_3N_2S$ = 184.18. Benzene azo sulfuric acid. Small. red prisms, decomp. on heating, insoluble in water. It is a reagent for pathological urine.

diazodinitrophenol. $C_6H_2N_4O_5$ = 210.1. DDNP, *4.6*-dinitrobenzene-*2*-diazo-*1*-oxide. Bright yellow needles, true d.1.63, apparent d.0.27–0.86; used as detonating compound for percussion caps.

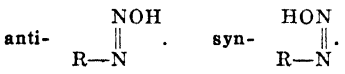
diazoethane. $C_2H_2N_2$ = 54.0. Aziethylene, aziethane. The heterocyclic compound



dimethyl- $C_4H_6N_2$ = 82.0. Colorless crystals, m.270.

diazohydrates. A group of compounds containing the bivalent —N:NO— group; *e.g.*, diazobenzenemethylether Ph—N:NO—Me.

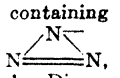
diazohydroxide. The monovalent —N:NOH radical, which occurs in two isomeric forms; as,



diazoic acid. An isomer Ph.N:NO.OH, of phenyl nitramine ($PhNH.NO_2$), from which diazoates are derived.

diazoimide. Hydrazoic acid.

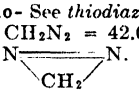
diazoimido compounds. Compounds containing the monovalent $—N_3$ radical,



derived from diazoimide. **d. phenyl.** Diazobenzeneimide.

diazoles. A group of pentacyclic hydrocarbons with two nitrogen atoms. **1.2-** Pyrazole. **1.3-** Imidazole. **iso-** See *isodiazole.* **ox-** See *oxdiazole.* **thio-** See *thiodiazole.*

diazomethane. CH_2N_2 = 42.04. Azimethylene, azimethane.



A poisonous, yellow, odorless gas, used for methylation in organic synthesis.

diazonium. The bivalent radical = N:N, which contains a pentavalent and a trivalent nitrogen atom. **d. compounds.** A group of aromatic nitrogen compounds containing the diazonium group, ArN(:N)—. **d. hydroxide.** The very unstable base PhN:NOH which in solution is ionized into 90 % $PhNN^+$ and OH^- and readily forms salts of the type PhNNX. Cf. *tyrotoxin.* **d. ion.** The basic $PhNN^+$ radical. **d. salts.** A group of compounds of the general type

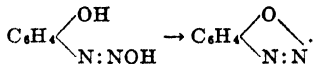
N:N, in which X is an acid radical; as,

diazobenzenechloride	PhNNCl
diazobenzenenitrate	$PhNNNO_3$
diazobenzenesulfate	$(PhNN)_2SO_4$
diazobenzenesulfocyanide	PhNN—SCN

diazo-oxyamido. The bivalent —N:N.N(OH)— radical. **d. benzene.** $C_{12}H_{11}ON_3$ = 213.1. Colorless crystals, m.127.

diazoparaffins. Aliphatic hydrocarbons containing the diazo group; as diazomethane.

diazophenol. (1) $C_6H_4ON_2$ = 120.1. p-Diazophenol, furo-(a,-b)-diazole. A colorless crystalline substance, explodes at 38. (2) A group of internal diazo oxides formed from true diazophenols by dehydration:

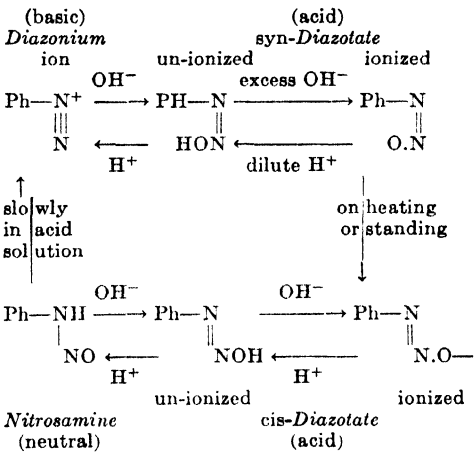


diazosalt. A compound of the type Ar.N:N.X, where Ar is an aromatic radical and X an acid radical or a halogen.

diazosplit. The decomposition of a diazosalt and the formation of an aryl compound: *e.g.*, ArNNX = ArX + N_2 where X is an acid or halogen radical. Cf. *Sandmeyer's reaction.*

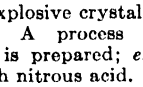
diazosulfide. Benzothiodiazole.

diazotate. A metal salt and tautomer of diazonium hydroxide; it is acid in character and contains the ArN:NO— radical. Cf. *diazoate.* Isomeric forms: *cis-* (*syn-* or normal) and *trans-* (anti- or iso-); either may occur ionized or un-ionized in solution, and may form salts of the type ArNNOM, where M is a monovalent metal. The chemical relations:



d. ion. The acid $PhNNO^-$ ion; exists in two isomeric forms. **d. split.** The decomposition of a diazotate to a phenol and nitrogen: ArNNOH = ArOH + N_2.

diazotetrazole. CN_6 = 96.06. The heterocyclic compound



which occurs as colorless, explosive crystals.

diazotization. A process by which a diazo compound is prepared; *e.g.*, the treatment of amines with nitrous acid.

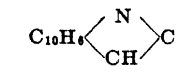
diazotizing. A method, discovered by Griess in 1860, extensively used in the manufacture of aniline dyes. Primary amines are treated with nitric oxides or compounds which release such oxides, *e.g.*, nitrites or nitrous acid.

diazoxy. The bivalent radical —N(:O)=N—.

diazthines. Thiodiazines.

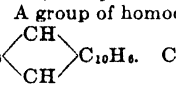
dibasic. (1) Describing compounds which contain two hydrogen atoms replaceable by a monovalent metal; or an acid which furnishes two hydrogen ions, as H_2SO_4. (2) Diatomic, dihydric. An alcohol containing two hydroxyl groups; as, ethylene glycol.

dibenzacridine. $C_{21}H_{13}N$ = 279.1. Naphthacridine. The heterocyclic compounds

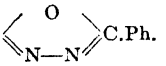


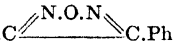
Six possibilities: $\alpha\alpha'$-, $\alpha\beta'$-, $\alpha\gamma'$-, $\beta\beta'$-, $\beta\gamma'$- and $\gamma\gamma'$-.

dibenzamide. (1) $C_{14}H_{11}NO_2$ = 225.09. Benzoyl benzamide, dibenzoyl amine. $(PhCO)_2NH$. Colorless crystals, m.148. (2) A compound which contains two monovalent —NH.CO.Ph radicals. **ethidine-** $C_{16}H_{16}O_2N_2$ = 268.2. $(PhCONH)_2CHMe$. Colorless crystals, m.204. **ethylene-** $C_{16}H_{16}O_2N_2$ = 268.2. $(PhCONHCH_2)_2$. Colorless crystals, m.249. **methylene-** $C_{15}H_{14}O_2N_2$ = 254.2. Colorless crystals, m.221.

dibenzanthracene. $C_{22}H_{14}$ = 278.1. Naphthophenanthrene, dinaphthanthracene, benzonaphthacene. A group of homocyclic hydrocarbons; as,  Cf. *pentacene*.

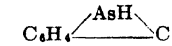
dibenzenyl. (1) Tolane. (2) A prefix indicating the presence of two benzenyl radicals, ≡C.Ph.

d. azoxime. $C_{14}H_{10}ON_2$ = 222.2. The heterocyclic compound  . Colorless crystals, m.108, b.290.

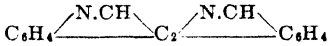
d. isazoxime. $C_{14}H_{10}ON_2$ = 222.2. The heterocyclic compound  .

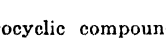
dibenzo- A prefix indicating the presence of two benzo groups, $(>C_6H_4)_2$.

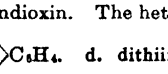
d. arsenole. $C_{12}H_9As$ = 228.2. Diphenylene arsine.



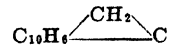
d. copyrine. $C_{16}H_{10}N_2$ = 230.1. The heterocyclic compound



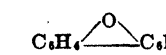
d. diazine. $C_{12}H_8N_2$ = 180.1. Phenazine. The heterocyclic compound  .

d. dioxin. $C_{12}H_8O_2$ = 184.1. Diphenylene-dioxide, phendioxin. The heterocyclic compound  . **d. dithiin.** Thianthrene.

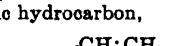
d. fluorene. $C_{21}H_{14}$ = 266.1. Dinaphthofluorene. The homocyclic hydrocarbon



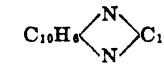
d. furane. $C_{12}H_8O$ = 168.1. Dibenzofurfurane, biphenyleneoxide, diphenyleneoxide,



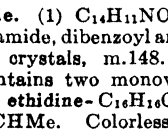
Colorless crystals, m.81, b.288. **d. furane-p-oxazine.** Phenoxazine. **d. furfurane.** D. furane. **d. phenanthrene.** $C_{22}H_{14}$ = 278.1. The homocyclic hydrocarbon,



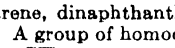
d. phenazine. $C_{20}H_{12}N_2$ = 280.1. Phenanthrophenazine, phenophenanthrazine, dinaphthazine. The heterocyclic hydrocarbon

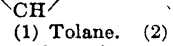


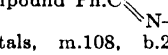
d. pyran. $C_{12}H_{10}O$ = 182.1. The heterocyclic compound . **d. pyrene.** $C_{24}H_{14}$ = 302.1.



d. pyrone. Xanthone. **d. quinoline.** Phenanthroquinoline. **d. selenophene.** $C_{12}H_8Se$ = 231.2. Diphenylene selenide.



d. pyrrole. Carbazole. **d. thiophen.** $C_{12}H_8S$ = 186.1. Diphenylene sulfide,  . Colorless crystals, m.97, b.333. **d. thioxine.** Phenothioxin. **d. xanthene.** $C_{21}H_{14}O$ = 282.2. The heterocyclic compound



dibenzoyl. (1) Benzil. (2) A prefix indicating the presence of two benzoyl radicals, PhCO—.

d. catechol. $C_{20}H_{14}O_4$ = 318.21. Colorless crystals, m.84. **d. furazane.** $C_{16}H_{10}O_3N_2$ = 278.3. The heterocyclic compound

Colorless crystals, m.118. **d. glucoxylose.** A glucoside, m.148, from *Danielia latifolia*, a Bignoniaceae of Brazil. **d. ethane.** $C_{16}H_{14}O_2$ = 238.1. Diphenazyl, $PhCO.CH_2.CH_2.COPh$. Colorless crystals, m.145. **d. ketone.** Diphenyltriketone. **d. malonitrile.** $C_{17}H_{14}N_2O_2$ = 278.3. $(PhCO.C:NH)_2CH_2$. Colorless crystals, m.130, b.360. **d. methane.** $C_{15}H_{12}O_2$ = 224.1. $(Ph.CO)_2CH_2$. Colorless crystals, m.81. **d. peroxide.** Benzoyl peroxide. **d. styrene.** $C_{22}H_{16}O_2$ = 312.2. Anhydro-acetophenone-benzil, $PhCO.CH:CPh.COPh$. Colorless crystals, m.129.

dibenzyl. (1) Bibenzyl. (2) A prefix indicating the presence of two benzyl radicals, $PhCH_2$—.

d. amine* $C_{14}H_{15}N$ = 197.2. A colorless liquid, d_{14}°.1.033, b.300, insoluble in water, soluble in alcohol. **d. diethyl stannane.** $(C_6H_5CH_2)_2SnEt_2$ = 358.89. A colorless liquid, b.223, soluble in alcohol or benzene. **d. ethane.** $C_{16}H_{18}$ = 210.14. Diphenylbutane $Ph(CH_2)_4Ph$. Colorless crystals, m.52, soluble in alcohol. **d. glycollic acid.** Oxatolic acid. **d. hydrazine.** $C_{14}H_{14}N_2$ = 207.3. $(PhCH_2NH—)_2$. Colorless crystals, m.65, used in organic synthesis. **d. hydroxylamine.** $C_{14}H_{15}N_3O$ = 223.5. $(PhCH_2)_2N.NOH$. **d. ketone.** $C_{15}H_{14}O$ = 210.09. $Ph.CH_2.CO.CH_2.Ph$. Colorless crystals, m.-33.9, b.231, decomp. 360, insoluble in water, soluble in ether. **d. mercury.** $Hg(C_6H_5CH_2)_2$ = 382.72. Colorless brittle needles, soluble in alcohol or benzene.

dibenzylidene. A compound containing two $=C_7H_6$ or $PhCH<$ radicals. **d. acetone.** Styryl ketone .

diborane diphosphine. $B_2H_6.2PH_3$ = 96.1. A white crystalline solid, dissociates above −30 into diborane and phosphine.

dibrom-, dibromo- A prefix indicating the presence of two bromine atoms. **d. acetic acid.** $C_2H_2O_2Br_2$ = 217.95. Colorless crystals, m.48, b.232, soluble in water, alcohol, or ether. **d. anthracene.** $C_{14}H_8Br_2$ = 336.0. 5.10-, or gamma-. Yellow needles, m.221, insoluble in water, slightly soluble in alcohol or ether, soluble in benzene. **d. anthraquinone.** $C_{14}H_6O_2Br_2$ = 366.05. (**alpha-**) Yellow needles, m.237, soluble in alcohol or benzene. (**beta-**) Yellow needles, m.275, sparingly soluble in alcohol, soluble in benzene. **d. barbituric acid.** Dibromine. **d. benzene.** See *benzene*. **d. indigo.** $C_{16}H_8O_2N_2Br_2$ = 319.93. Tyrian purple. Purple crystals occurring in *Murex* and *Purpura* species. **d. quinone chloroimide.** A reagent for phenols. **d. thymolsulfonphthalein.** An indicator, changing at pH 7.0 from yellow (acid) to blue (basic).

dibromide. An inorganic salt containing two negative bromine atoms, and ionizing to two bromide ions; *e.g.*, $FeBr_2$ = iron dibromide (ferrous bromide).

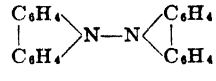
dibutyl. (1) A prefix indicating the presence of 2 butyl (C_4H_9) radicals not joined directly, but through a third atom or group. (2) Octane. **d. beryllium.** $Be(C_4H_9)_2$ = 123.16. Colorless liquid, $b._{25mm}$170, decomp. in water. **d. cadmium.** $Cd(C_4H_9)_2$ = 226.55. An oily liquid, d.1.306, m. −48, $b._{12.5mm}$103. **d. ditinbromide.** $(C_4H_9)_2SnBr_2$ = 392.67. White needles, m.20. **d. phthalate.** See *phthalate*. **d. tinchloride.** $(C_4H_9)_2SnCl_2$ = 303.75. Colorless needles, m.43.

di-i-butyl- A prefix indicating the presence of two isobutyl radicals. **d. cadmium.** $Cd(C_4H_9)_2$ = 226.55. An oily liquid, d.1.269, m. −37, $b._{20mm}$90.5. **d. mercury.** $Hg(C_4H_9)_2$ = 314.75. Colorless liquid, d.1.835, b.205, slightly soluble in water.

dibutyrin. $C_{11}H_{20}O_5$ = 232.15. Glyceryl dibutyrate. $C_3H_5(OH)(OOC.C_3H_7)_2$. Colorless liquid, d.1.803, m. −40, b.282; formed by the action of pancreatic lipase on butyrin.

dicacodyl. See *cacodyl*.

dicarbazyl. $C_{24}H_{16}N_2$ = 332.3. The heterocyclic ring system



dicarbonate. Bicarbonate.

dicarboxyl. Oxalic acid.

dicarboxylic acid. An organic compound with two —COOH groups.

dicentrine. $C_{20}H_{21}O_4N$ = 339.3. An alkaloid from the leaves and seeds of *Dicentra pusilla*, a Fumariaceae, related to glaucine.

dicetyl. $C_{32}H_{66}$ = 450.5. Dotriacontane. The hydrocarbon, $Me(CH_2)_{30}Me$, d.0.781, m.70, $b._{15mm}$ 310.

dichlor-, dichloro- A prefix indicating the presence of two chlorine atoms in an organic molecule. **d. acetal.** $C_6H_{12}O_2Cl_2$ = 187.09. A colorless liquid, $d._{14°}$1.1383, b.180–185. **d. acetamide.** See *acetamide*. **d. acetic acid.** See *acetic acid*. **d. acetone.** See *acetone*. **d. acetylchloranilide.** $C_8H_6NOCl_3$ = 258.5. $Cl_2CH.CO.NCl.Ph$. Used as a chlorinating agent. **d. acetyl chloride.** C_2HOCl_3 = 147.37. A colorless liquid, b.107; hydrolyzes with water or alcohol; soluble in ether. **d. aldehyde.** See *acetaldehyde*. **d. amide T.** $CH_3.C_6H_4.SO_2NCl_2$ = 240.06. p-toluene-dichlorosulfamine. A pale-yellow, crystalline powder of strong chlorine odor, m.78–83, insoluble in water, soluble in benzene or chloroform; used as an antiseptic. **d. aniline.** See *aniline*. **d. anthracene.** See *anthracene*. **d. benzene.** See *benzene*. **d. diethyl ether.** *2.2'*-D. ethyl ether. **d. diethyl sulfide.** Mustard gas. **d. difluoromethane.** CCl_2F_2 = 121.0. Kinetic 12, F12, Freon. A colorless gas, d.1.40, m. −155, b. −30, used as refrigerant. **d. ethyl ether.** $C_4H_8OCl_2$ = 142.98. Dichloroether, dichloroethyl oxide. **1.2-** or *α,β-*. $CH_2Cl.CHCl.OEt$. A colorless liquid, d.1.174, b.142, soluble in alcohol or ether; used in organic synthesis. **2.2-** or *β,β'-*. Dichlorodiethyl ether, $(CH_2Cl.CH_2)_2O$. A colorless liquid, d.1.213, m. −51.7, b.178, insoluble in water, soluble in alcohol, ether, benzene, etc.; used as an industrial solvent for fats, waxes, resins and pectins. **d. ethylene.** $C_2H_2Cl_2$ = 96.93. *1.2*-Acetylene dichloride, *1.2*-dichloroethene, dieline, dioform, CHCl:CHCl. A colorless liquid of pleasant odor, d.1.278, m. −80.5, b.55. A mixture of the two stereoisomers, *cis-*, d.1.265, m. −50, b.48.4; and *trans-* d.1.291, m. −80.5, b.60.3. Used as solvent for rubber and lacquer, for the extraction of dyes and perfumes, as a metal degreaser, anesthetic and refrigerant for conditioning air. **d. hydrin.** $C_3H_6OCl_2$ = 128.97. (**alpha-**) Dichlor-isopropyl alcohol, 1.3-dichlor-2-hydroxy-propane, *1.3*-dichloro-*2*-propanol*. A colorless, ethereal liquid, $d._{19°}$1.367, b.174, m. −4, miscible with alcohol or ether. Used as a solvent for resins, nitrocellulose, etc. and in the manufacture of varnishes, lacquers, water colors, etc. (**beta-**) Dichloropropylalcohol, 1.2-dichlor-3-hydroxy-propane, *2.3*-dichloro-*1*-propanol*. A colorless liquid, $d._{17°}$1.355, b.182. **d. methane.** Methylene chloride. **d. naphthalene.** See *naphthalene*. **d. nitrohydrin.** $C_3H_5O_3NCl_2$ = 186.0. *1.3*-Dichloro-*2*-propanol nitrate*. A colorless liquid, d.1.459, insoluble in water, miscible with alcohol or ether. **d. phenolindo-o-cresol.** An oxidation-reduction indicator. **d. phenolindophenol.** Tillmans' reagent. **d. phenosulfonphthalein.** Used as a pH indicator, changing at 6.0 from yellow (acid) to red (alkaline). **d. quinone chloroimide.** Used as a reagent for phenols.

dichloricide. *p*-Dichloro*benzene*.

dichloride. An inorganic salt containing two chloride chlorine atoms, *e.g.*, $FeCl_2$.

dichlorophenarsine hydrochloride. $C_6H_6AsCl_2NO.HCl$ = 290.41. Clorarsen, holarsol, phenarsen; 3-amino-4-hydroxyphenyl-dichlorarsine hydrochloride, $C_6H_3.ClAsCl.(NH_2)(OH).HCl$. A white powder, soluble in water; it is an antisyphilitic.

dichroism. The property by which certain crystals exhibit different colors when viewed in different directions, or when viewed by reflected or refracted light.

dichroite. Iolite.

dichromate. (1) A salt containing the divalent $=Cr_2O_7$ radical (bichromate). (2) Sodium dichromate.

dichromatic. The property by which certain solutions (*e.g.*, dyestuffs) exhibit different colors according to the thickness of the layer through which they are viewed. Cf. *dichroic*.

dichromic acid. The hypothetical acid, $H_2Cr_2O_7$ or $2CrO_3.H_2O$, from which the dichromates are derived.

dichroscope. An optical device for determining the refractive power of crystals.

dicinchonine. $C_{38}H_{44}O_2N_4 = 588.5$. An alkaloid from cinchona bark.

dick. Ethyl dichlorarsine.

dicodeine. $C_{72}H_{84}O_{12}N_4$. A polymer of codeine.

dicodide. $C_{18}H_{21}O_3N = 299.15$. Dihydrocodeinone. A derivative of codeine.

diconchinine. Diquinidine.

diconic acid. $C_9H_{10}O_6 = 214.1$. A derivative of citric acid.

dicyan. (1) An organic compound containing two cyan radicals. (2) Cyanogen. **d. acetylene.** $C_4N_2 = 76.09$. CN.C:C.CN. Colorless crystals or liquid, m.21, b.76. **d. diamide.** $C_2H_4N_4 = 84.18$. Cyanguanidine, param, $NH_2.C(:NH).NHCN$. An isolog of guanyl urea. Colorless leaflets or thin scales, m.205, soluble in water, ether or alcohol. **d. diamidine.** $C_2H_6ON_4 = 102.2$. Guanylurea. The amide of guanidine carboxylic acid, $NH_2.C(:NH).NH.CONH_2$. Colorless crystals, soluble in water or alcohol, m.105. The sulfate is used as a reagent for nickel. Cf. *Grossmann reagent.*

dicyanide. A salt containing two cyanide radicals. **d. imide.** $C_2HN_3 = 67.2$. CN.NH.CN.

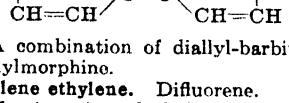
dicyanin(e). An aniline dye used as a photographic sensitizer for infrared radiations. **d.A.** $C_{21}H_{27}N_2O_2I = 466.2$. *1.1'*-Diethyl-*4.2'*-dimethyl-*6.6'*-diethoxy-*2.4'*-carbocyanin iodide. A quinoline dye used as photosensitizer for infra-red. Cf. *cyanin dyes.*

dicyanodiamide. Dicyandiamide.

dicyanogen. $C_2N_2 = 52.0$. Oxalonitrile, ethane dinitrile, CN—CN. A colorless, poisonous gas, b.-25. Cf. *cyanogen.*

dicyclic. Describing a ring system consisting of two fused rings; as, naphthalene, quinoline, indene, but not biphenyl.

dicyclopentadiene. $C_{10}H_8 = 128.0$. The homocyclic compound



didial. A combination of diallyl-barbituric acid and ethylmorphine.

didiphenylene ethylene. Difluorene.

didiphenylamine- A prefix indicating the presence of two diphenylamine radicals; as, **d. fluosilicate.** $[(C_6H_5)_2NH]_2.H_2SiF_6 = 482.26$. White crystals, m.169.

didymia. Didymium oxide.

didymium. Di. A supposed element, of the rare earth group, discovered by Mosander in 1841, in the earth didymia; it is a mixture of neodymium and praseodymium. "Didymium salts" are obtained as by-products in the manufacture of gas mantles but are mixtures of neodymium and praseodymium salts; hence, the symbol, Di, in the following salts means Nd and Pr. **d. carbonate.** $Di_2(CO_3)_6.6H_2O$. Pinkish powder, insoluble in water, soluble in acids. **d. chloride.** $DiCl_6.12H_2O$. Large purple or rose-red crystals, soluble in water or alcohol; used as a germicide. **d. nitrate.** $Di_2(NO_3)_6.12H_2O$. Large, purple or rose-red, asymmetric crystals, soluble in water or alcohol; used as an antiseptic. **d. oxide.** Di_2O_3. Gray powder, insoluble in water or alcohol, soluble in dilute acids. **d. salicylate.** $Di_2(C_7H_5O_3)_6$. Dymal. A fine, white powder, used as an antiseptic dusting powder. **d. sulfate.** $Di_2(SO_4)_3.6H_2O$. Pale, rose-red crystals, slightly soluble in water, insoluble in alcohol; used as a disinfectant.

dielectric. An insulator or non-conductor of electricity. **d. constant.** ϵ. Inductivity. Specific inductive capacity. The constant, ϵ, which depends upon the nature of the medium and is given by $\epsilon = ee'/fr^2$, where f is the force of repulsion between two point charges e and e' of electricity which are at a distance, r, apart in a uniform medium. Cf. *Clausius Mosotti equation, Helmholtz equation.*

dieline. Dichloroethylene.

Diel's hydrocarbon. $C_{18}H_{16}$. It is the theoretical basis of the sterol molecule.

diene. A suffix indicating the presence of two double bonds. **d. series.** Diolefines.

Diesel fuel. Heavy fuel oil in which combustion is started by spontaneous ignition due to compression, instead of by spark-plugs.

diet. The customary or prescribed food rations of an individual.

dietary. A systematized and regular diet repeated at definite time intervals, *e.g.*, a week or month. **d. standard.** The amount of nourishment required per day by a man, corresponding with 3000 calories or more, and varying according to the work performed by the individual. This includes 120 grams protein (429 calories), 500 gm. carbohydrates (2050 calories), and 50 gm. fat (465 calories) in addition to mineral matter and vitamins. Cf. *pelidisi.*

Dieterici's Rule. The internal latent heat is a function of the ratio of vapor volume to liquid volume:

$$M\lambda = P(V_2 - V_1) + CRT \ln \frac{V_2}{V_1}$$

total latent heat — *external work* — *internal latent heat,*

where V_2 is the molal fraction of the liquid, V_1 that of the vapor, M the molecular weight, λ the latent heat.

diethacetic acid. Diethylacetic acid.

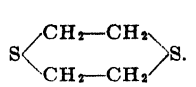
diethoxalic acid. $C_6H_{12}O_3 = 132.1$. 1-hydroxy-1-ethyl-butyric acid. Colorless triclinic crystals, m.80, soluble in water, alcohol, or ether.

diethanolamine. $C_4H_{11}NO_2 = 105.09$. Dihydroxy diethylamine, $NH(CH_2.CH_2OH)_2$. A colorless liquid, d.1.10, $b._{150mm}217$; used as solvent, emulsifying agent and detergent. Cf. *triethanolamine.*

diethyl- A prefix indicating the presence of two ethyl radicals. **d. acetal.** Acetal. **d. acetic acid.** See *acetic acid.* **d. aldehyde.** Acetal. **d. amine*.** $C_4H_{11}N = 73.12$. The secondary amine Et_2NH, occurring in putrefying fish. A colorless liquid, $d_{15°}.0.712$, b.56, m. −40, soluble in water, alcohol, or ether. **d. aminobenzaldehyde.** $C_{11}H_{15}ON = 177.2$. Colorless needles, m.78, b.280. **d. aminophenol.** $C_{10}H_{15}ON = 165.18$. Colorless crystals, m.74, b.276. **d. aniline.** See *aniline.* **d. arsine.** (1) $C_4H_{11}As$. Ethyl cacodyl, Et_2AsH. (2) $(AsEt_2)_2 = 266.02$. Colorless liquid, b.186. **d. arsinic acid.** $C_4H_{10}O_4As$. Ethyl cacodylic acid. $(EtO)_2AsO(OH)$. **d. barbituric acid.** Veronal. **d. benzene.** See *benzene.* **d. beryllium.** $BeEt_2 = 67.10$. A colorless liquid, m.12, $b._{15mm}$ 110. **d. cadmium.** $CdEt_2 = 170.49$. An oily liquid, d.1.656, m. −21, $b._{19.5mm}640$. **d. carbinol.** $C_5H_{12}O = 88.13$. $CHEt_2.OH$. A col-

orless liquid, $d_0°$.0.832, b.116, sparingly soluble in water, soluble in alcohol or ether. **d. carbonate.** $C_8H_{10}O_3$ = 118.1. Diatol, Et_2CO_3. A colorless liquid, d.0.968, b.125. Used as a solvent for nitrocellulose, and in lacquer manufacture. **d. carbonic ether.** Ethyl carbonate. **d. cyanamide.** $C_5H_{10}N_2$ = 98.08. A colorless liquid, b.186. **d. dioxide.** $C_4H_{10}O_2$ = 90.1. Ethylperoxide, diethylperoxide, EtO.OEt. A colorless liquid, d.0.825, b.65, slightly soluble in water, soluble in alcohol or ether. **d. disulfide.** $C_4H_{10}S_2$ = 122.21. Dithiene. Colorless liquid, d.0.993, b.153.5, very slightly soluble in water. It is toxic to *Ascaris*. **d. ether.** Ether(2). **d. glycerol.** $C_7H_{16}O_3$ = 148.2. The etheralcohol. $CH_2OEt.CHOH.CH_2OEt$. A colorless liquid, b.191; used as a solvent. Cf. *diethyline*. **d. glycol ether.** Ethylene diethylate. **d. hydrine.** Diethyline. **d. ketone.** $C_5H_{10}O$ = 86.09. 3-pentanone, Et.COEt. A colorless, liquid, d.0.814, b.103; soluble in water, alcohol, or ether; used medicinally as a hypnotic. **d. malate.** $C_8H_{14}O_5$ = 190.1. The ester EtOOC.CHOH.COOEt. A colorless liquid, b.250; soluble in water or alcohol. Used as a constituent of lacquers. **d. malonic acid.** See *malonic acid*. **d. malonylurea.** Veronal. **d. mercury.** $HgEt_2$ = 258.69. Colorless liquid, d.2.44, b.159, insoluble in water. **d. nitramine.** See *nitramine*. **d. nitrosamine.** Nitrosodiethyline. **d. oxalic acid.** Diethoxalic acid. **d. oxamide.** $C_6H_{12}O_2N_2$ = 144.21. Oxal ethyline. A nicotine alkaloid, EtNH.CO.CO.NHEt. Colorless needles, m.175; slightly soluble in water or ether, soluble in alcohol. **d. peroxide.** D. dioxide. **d. phosphate.** Ethyl phosphate. **d. phosphine.** $C_4H_{11}P$ = 90.11. Et_2PH. A colorless liquid, b.85. **d. phosphoric acid.** $C_4H_{11}O_4P$ = 154.12. $(EtO)_2PO.OH$. A colorless liquid, soluble in water, slightly soluble in alcohol. **d. phthalate.** See *phthalate*. **d. propylcarbinol.** Octanol*. **d. sulfate.** Ethyl sulfate. **d. sulfide.** Ethyl sulfide. (*dichloro-*) Mustard gas. **d. sulfine.** The bivalent radical > SEt_2. **d. sulfone.** Ethylsulfone. **d. sulfone diethylmethane.** Tetronal. **d. sulfone dimethylmethane.** Sulfonal. **d. sulfone ethylmethylmethane.** Trional. **d. sulfone methylethylmethane.** Trional. **d. tartrate.** $C_8H_{14}O_6$ = 206.1. The ester EtOOC.$(CHOH)_2$.COOEt. A colorless liquid, b.280; soluble in water or alcohol; used as a solvent for nitrocellulose, gums and resins. **d. telluride.** Ethyl telluride. **d. thiurea.** Ethylthiourea. **d. tin.** $SnEt_2$ = 176.78. Yellowish oily liquid, d.1.654, m. below −12, b.150, insoluble in water. **d. tin dibromide.** Et_2SnBr_2 = 336.61. White needles, d.2.068, m.63, b.232. **d. tin dichloride.** Et_2SnCl_2 = 247.69. White crystals, m.84, b.220. **d. tin difluoride.** Et_2SnF_2 = 214.78. White plates, m.229. **d. tin diiodide.** Et_2SnI_2 = 430.62. White crystals, m.45, b.242. **d. tin oxide.** Et_2SnO = 192.78. White powder, insoluble in water. **d. toluene.** See *toluene*. **d. toluidine.** $C_{11}H_{17}N$ = 163.22. $Me.C_6H_4.NEt_2$. **para-** A colorless liquid, d.0.9242, b.229. **d. urea.** See *urea*. **d. zinc.** $ZnEt_2$ = 123.46. A colorless liquid, d.1.182, b.118, which ignites in air.

diethylene. (1) Cyclobutane. (2) A prefix indicating the presence of two ethylene radicals. **d. diamine.** Piperazine. **d. dioxide.** Dioxan. **d. disulfide.** $C_4H_8S_2$ = 120.20. Dithiane.



Colorless crystals, m.111, b.200; insoluble in water, soluble in alcohol or ether. **d. glycol.** $C_4H_{10}O_3$ = 106.1. 2.2′-Oxybisethanol, *2.2′*-oxydiethanol*. The ether-alcohol, $CH_2OH.CH_2.O.CH_2.CH_2OH$. A colorless liquid, d.1.1175, b.224.5; miscible with water, alcohol, ether or acetone; used as a solvent for gums, resins and nitrocellulose, as a hygroscopic agent in cigarettes, as an antifreeze in refrigerators, sprinklers, water seals, and as a softener for glues, paper and cork. **d. glycol butyl ether.** Butyl carbitol. **d. glycol ethyl ether.** Carbitol. **d. oxide.** Dioxan.

diethylethylene. Δ^3-Hexylene.

diethylidene. (1) 2-Butylene. (2) A prefix indicating the presence of two ethylidene radicals, > CHMe.

diethylin. (1) The monovalent radical, —NEt_2, derived from diethylamine. (2) Diethyline.

diethyline. $C_7H_{16}O_3$ = 148.1. 1.2-Diethylglycerinester. $CH_2OEt.CHOEt.CH_2OH$. A colorless liquid. Cf. *diethyl glycerol*. **nitroso-** $C_4H_{11}ON_2$ = 102.09. Nitrosodiethylamine, diethylnitrosamine, $Et_2N.NO$. A colorless liquid, d.0.951, b.177; used in organic synthesis.

diethylstilbestrol. $C_{18}H_{20}O_2$ = 268.34. Stilbestrol; α,α'-diethyl-4,4′-stilbenediol, $HO.C_6H_4.(C_2H_5)C:C(C_2H_5).C_6H_4.OH$. Used medicinally as an estrogen.

dietics, dietetics. The science of the regulation of food in health and disease.

dietzeite. $7Ca(IO_3)_2.8CaCrO_4$. A native calcium chromate and iodate, which occurs in the Chilean nitrate beds.

differential. By selective increments. **adsorption-** The selective adsorption of dyestuffs; *e.g.*, some indicators, (q.v.) are adsorbed more in the presence of halogen ions than of others. **d. reduction.** The selective reduction by metals of one component in a mixture.

differentiation. (1) In mathematics: Defining an infinitesimal increment of a quantity. (2) In biology: The development of new characteristics of a cell or organism. In an evolutionary sense it means the specialization and division of labor between the various cells, tissues, or organs.

diffraction. The bending of a ray of light as it strikes the edge of an object. Cf. *refraction*. Interference color fringes are produced when a number of parallel light waves strike a number of closely spaced parallel edges forming a grating. Hertzian waves are analyzed by a coarse grating constructed of copper wires. X-rays are analysed by the rows of atoms in a crystal. **crystal-** See *x-ray spectrograph, crystal*. **d. formula.** The wavelength of a radiation is $\lambda = s \sin d/n$, when the angle of incidence is 90°; or $\lambda = (s/n)(\sin i - \sin d)$, where i is the angle of incidence, d the angle of diffraction, s the distance between the rulings of the grating (or the planes of atoms in a crystal) and n the order of the spectrum. **d. grating.** A glass, film, or metal plate with fine rulings, used to produce a series of spectra, and for spectroscopic measurements.

diffusate. That part of the liquid which passes through a dialyzer (q.v.).

diffuse. (1) Hazy in appearance. (2) Passing through a membrane. (3) Spreading through a gas, liquid or solid. **d. series.** See *series*.

diffused. (1) Widely scattered, without definite limits; *e.g.*, diffused light, diffused gases. (2) Spreading or passing through an object; *e.g.*, diffused crystalloids, diffused poison. **d. reflection.** The ratio of reflected to incident light; falling on a surface. See *albedo*.

diffusion. The spreading, or scattering of a material (gas, liquid), or energy (heat, light). **d. analysis.** Determination the size of particles and the molecular weight by diffusion. **d. of energy.** The irregular reflection of light or heat waves from the surface of a body, part being absorbed. **d. of matter.** The spreading or intermixing movement of gaseous or liquid substances, due to molecular movement. Thus, gases mix rapidly, and two liquids or solutions brought into contact will, in time, mix thoroughly (provided they are miscible). Even solids pressed together show diffusion to a small extent (*e.g.*, gold and lead). **d. constant.** The constant D in the relation

$$S = -D\frac{q.c.t.}{x}$$

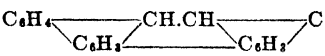
where S is the weight of substance diffusing in t seconds through a cylinder of length x and cross-section q, and c is its concentration in grams per cc. **d. law.** The velocity (v) of diffusion of two substances is in inverse proportion to the square-root of the vapor-density (d) or molecular weight (M); hence $v_1 : v_2 = \sqrt{d_2} : \sqrt{d_1} = \sqrt{M_2} : \sqrt{M_1}$. Cf. *Graham's law, atmolysis.* **d. shell.** A membrane for dialysis (*dialyzer*).

diflavine. The monohydrochloride of 2,7-diaminoacridine; used as an antiseptic in wounds.

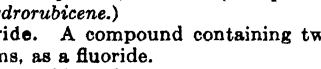
difluan. $C_6H_4O_6N_2$ = 200.2. A compound obtained by boiling alloxanic acid.

difluor-, difluoro- A prefix indicating the presence of two fluorine atoms. **d. benzene.** Benzene. **d. dichloromethane.** Dichlorodifluoromethane.

difluorene. $C_{26}H_{16}$ = 328.2. Didiphenyleneethylene.



difluorenylene. $C_{26}H_{16}$ = 328.2. The aromatic hydrocarbon



Colorless prisms, m.218. (Compare *difluorene, dihydrorubicene.*)

difluoride. A compound containing two fluorine atoms, as a fluoride.

diformyl. Glyoxal.

digallic acid. $C_{14}H_{10}O_9$ = 322.08. $C_6H_2(OH)_2$-$COOC_6H_2(OH)_2COOH$. Fine white needles, m.275 (foam and decomp.) slightly soluble in water or ether, soluble in alcohol or hot water. It occurs in Chinese tannin and in plant galls.

digentisic acid. $C_{14}H_{10}O_7$ = 290.08. C_6H_2-$(OH)_2.COO.C_6H_3(OH)_2COOH$, occurs in tannins. Needles, m.204, slightly soluble in water.

digestant. A drug which aids digestion.

digester. A large iron kettle with cover and safety valve, used to subject, decompose, soften or cook substances at high pressure and temperature. See *autoclave*.

digesting shelf. A rack for holding Kjeldahl flasks.

digestion. (1) In physiology, the metabolic transformation of food into living matter; *e.g.*, the change of proteins, carbohydrates, and fats, under the influence of ferments, into assimilable substances. (2) The treatment of substances with chemicals under heat and pressure; *e.g.*, wood to make wood pulp. (3) The disintegration of substances by strong chemical agents; *e.g.*, the decomposition of proteins with sulfuric acid in Kjeldahl determination. **artificial-** Digestion of food by ferments outside the living body. **gastric-** Digestion occurring in the stomach; *e.g.*, the action of pepsin in changing proteins to peptones. **intestinal-** Digestion in the intestines. **oral-** Salivary d. **peptic-** Gastric d. **primary-** Gastro-intestinal digestion. **salivary-** Digestion in the mouth; *e.g.*, diastase changes starch to dextrin. **secondary-** Assimilation of food by body-cells.

digifolin. A solution of glucosides from digitalis leaves.

digilanid. A term applied to each of the three natural glucosides of *Digitalis lanata* and specifically designated **d.A, d.B,** and **d.C**; they are more properly called lanatosides. Enzymatic hydrolysis yields the glucosides digitoxin, gitoxin, and digoxin, respectively, together with a molecule of glucose from each; the latter glucosides may be further hydrolyzed by acid to digitoxigenin, gitoxigenin, and digoxigenin, with three molecules of digitoxose from each.

digipoten. A mixture of glucosides from digitalis leaves.

digit. (1) Three-fourths of an inch. (2) A measure of the amount of an eclipse; one-twelfth of the apparent diameter of the sun or moon. (3) An integer under 10.

digitalein. $C_{22}H_{38}O_9$ = 446.4. A glucoside of digitalis leaves. A white powder, soluble in water; used as a diuretic and cardiac tonic.

digitaligenin. $C_{24}H_{32}O_3$ = 368.24. A split-product from the glucoside of digitalis seeds.

digitalin. $(C_5H_8O_2)x$. A glucoside from digitalis leaves. **amorphous-** Crude d. **crude-** Amorphous-. A mixture of glucosides (digitoxin, digitalin, and digitalein). Amorphous, yellow powder, soluble in water or alcohol giving foaming solutions, insoluble in chloroform or ether. **crystalline-** Digitonin. **French-** Homolle's-. A mixture of glucosides from digitalis leaves prepared by Homolle's method. Yellowish-white, amorphous powder, m.100. **German-** A mixture of glucosides from digitalis leaves prepared by the Wals method; mainly digitonin. Yellowish-white, amorphous powder, soluble in water or alcohol, insoluble in ether or chloroform. **true-** $C_{35}H_{56}O_{14}$ = 680.3. Digitalin verum, Schmiedeberg's digitalin. A glucoside from the seeds and leaves of digitalis. An amorphous, white powder or granules, m.217, soluble in 100 parts water, or 100 parts 50 % alcohol.

digitalis. The leaves of *Digitalis purpurea* (foxglove), a Scrophulariaceae. Used medicinally as a narcotic, cardiac, and stimulant. Many different glucosides and active principles have been isolated from it.

digitalose. A methyl pentose from digitalis.

digitogenin. $C_{26}H_{42}O_5$ = 434.3. A split product of digitonin.

digitonin. $C_{54}H_{92}O_{28}$ = 1188.7. A glucoside from digitalis leaves. Colorless crystals, decomp. on heating, nearly insoluble in water, ether or chloroform, soluble in a mixture of alcohol and chloroform. It is physiologically inactive, and hydrolyzes to glucose, galactose and digitogenin.

digitoxigenin. $C_{24}H_{36}O_4$ = 388.3. Colorless crystals, m.245, physiologically active. **anhydro-** $C_{24}H_{34}O_3$ = 370.3. Colorless crystals, m.184, physiologically inactive.

digitoxin. $C_{34}H_{54}O_{11}$ = 638.42. A glucoside from digitalis leaves, assumed to be the chief active principle. Thin white, rectangular, anhydrous leaflets, odorless with bitter taste, m.240, slightly soluble in water or ether, soluble in alcohol or chloroform, insoluble in benzene.

digitoxose. $C_6H_{12}O_4$ = 148.09. *3.4.5*-Trihydroxyhexanal. A crystalline split-product of digitoxin and gitoxin.

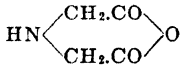
diglyceride. A compound of the type $HO.C_3H_5(OR)_2$. Cf. *glyceride.*

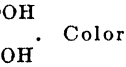
diglycerin. $C_6H_{14}O_5$ = 166.12. A colorless liquid, b.225, soluble in water.

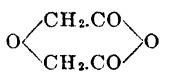
diglycol. A prefix indicating the presence of two $—CH_2OH$ groups. **d. laurate.** An odorless, pale yellow oil, emulsible in water, soluble in all proportion in alcohols, oils and hydrocarbons.

diglycollamic acid. $C_4H_7O_4N$ = 133.08. Colorless, rhombic prisms, m.150, decomp. on further heating, soluble in water or alcohol.

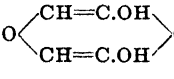
diglycollamide anhydride. $C_4H_5O_3N$ = 115.1. Diglycolloimide. The heterocyclic system



diglycollic acid. $C_4H_6O_5$ = 134.07. Oxybisacetic acid, oxydiethanoic acid*. The dibasic acid  . Colorless, rhombic prisms, m.148, soluble in water, alcohol, or ether. **d. anhydride.** $C_4H_4O_4$ = 116.0. The heterocyclic compound



Colorless crystals, m.97, b.240, soluble in alcohol.

diglycollide. $C_4H_4O_4$ = 116.0. The heterocyclic compound  . Colorless crystals, m.86.

diglycolloimide. Diglycollamide anhydride.

digoxigenin. $C_{23}H_{34}O_5$ = 390.3. A hydrolysis product, digoxin, m.220°C.

digoxin. $C_{41}H_{64}O_{14}$ = 780.5. An optically active glucoside, from digitalis, m.265; hydrolyzes to 3 mol. digitoxose and digoxigenin.

dihexyl. (1) Two hexyl radicals. (2) Dodecane*.

dihydracrylamic acid. Dilactamic acid.

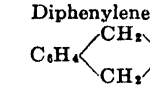
dihydracrylic acid. $C_6H_{10}O_5$ = 162.09. Colorless crystals, decomp. on heating. Soluble in water, alcohol, or ether.

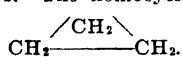
dihydranol. $C_6H_3(OH)_3.CH_2(CH_2)_5CH_3$. *n*-Heptylresorcinol, *2.4*-dihydroxy-phenyl-*n*-heptane. Used as 5 % solution in olive oil against intestinal putrefaction.

dihydrate. (1) A compound containing two hydroxyl groups. (2) A crystal containing two molecules of water of crystallization.

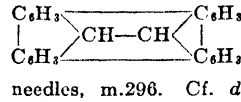
dihydric. Dibasic.

dihydride. A binary compound containing two hydrogen atoms; *e.g.*, CaH_2.

dihydro- A prefix indicating the presence of two additional hydrogen atoms in an organic compound. **d. anthracene.** $C_{14}H_{12}$ = 180.1. Diphenylene-dimethylene. The hydrocarbon  . **d. benzene.** See *benzene.* **d. bromide.** An organic compound containing two molecules of HBr; *e.g.*, morphine dihydrobromide. **d. butene.** C_4H_6 = 54.1. **1.2-** The hydrocarbon $CH_2{:}C{:}CHMe$. **1.3-** The hydrocarbon $CH_2{:}CH.CH{:}CH_2$. **d. carveol.** $C_{10}H_{18}O$ = 154.16. 8(9)-Terpene-ol-2. A colorless liquid, $d_{22°}$.0.927, b.225. **d. carvone.** $C_{10}H_{16}O$ = 152.16. 8(9)-Terpene-ol-2. A colorless liquid, $d_{19°}$.0.928, b.222. **d. cholesterol.** Formed from cholesterol in the body, and excreted in the gut. **d. cymene.** $C_{10}H_{16}$. The terpadienes: limonene, phellandrene, terpinene, etc. **d. lutidine.** $C_7H_{11}N$ = 109.07. A ptomaine from cod-liver oil. **d. naphthalene.** Dialin. **d. pentine.** C_5H_8 = 68.06. **2.4-** Piperylene, $MeCH{:}CH.CH{:}CH_2$. **2.3-** The hydrocarbon $MeCH{:}C{:}CHMe$. **d. propene.** C_3H_6 = 42.1. The homocyclic system

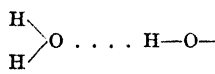


See *cyclopropane.* **d. quinazoline.** See *orexin, quinazoline.* **d. quinoline.** C_9H_9N = 131.08. A colorless liquid, b.223. **d. resorcinol.** $C_8H_8O_2$ = 112.07. Colorless prisms, decomp. 105, soluble in water, alcohol, or ether. **d. rubicene.** $C_{26}H_{14}$ = 326.1. The octocyclic hydrocarbon



Colorless needles, m.296. Cf. *difluorene, difluorenylene.*

dihydrol. A supposed polymerized form of liquid water, $(H_2O)_2$, which exists in equilibrium with the normal molecule: $2H_2O \leftrightarrows (H_2O)_2$. It is assumed to have the formula

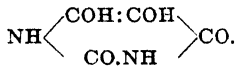


Cf. *trihydrol, hydrone theory, bonds.*

dihydroximic acid. $C_2H_4N_2O_4$ = 120.0. Hydroximic acid. $HON{:}C(OH)—C(OH){:}NOH$.

dihydroxy. A prefix indicating the presence of two hydroxyl groups. **d. acetone.** $C_3H_6O_3$ = 90.1. The ketone alcohol $(CH_2OH)_2CO$. A colorless solid substance, m.70; converted by alkali into fructose. **d. acetic acid.** Glyoxalic acid. **d. anthraquinones.** A group of dibasic phenols derived from anthraquinone: **1.2-** Alizarin. **1.3-** Xanthopurpurin. **1.4-** Quinizarin. **1.5-** Anthrarufin. **1.8-** Chrysazin. **2.3-** Hystazarin. **2.6-** Anthraflavic acid. **2.7-** Isoanthraflavic acid. **b. benzene. 1.2-** Catechol. **1.3-** Resorcinol. **1.4-** Quinol. **d. benzoic acid.** See *benzoic acid.* **d. benzophenone.** $C_{13}H_{10}O_3$ = 214.08. $HO.C_6H_4.CO.C_6H_4.OH$. Isomers: 2.5- m.122; 2.2'- m.59, b.340; 2.3'- m.126; 3.4'- m.197; 4.4'- m.210. **d. cholenic acid.** $C_{24}H_{38}O_4$ = 582.3. An isomer of apocholic acid, cf. *sterols.* Long needles, m.260. **d. cinnamic acid.** Caffeic acid. **d. disulfonic acid.** Chromatropic acid. **d. fluorescein.** Gallein. **d. naphthalene.** $C_{10}H_8O_2$ = 160.11. **(alpha-)** 1.4-. **(amphi-)** 2.6-. **(ana-)** 1.5-. **(beta-)** 2.3-. **(epi-)** 1.6-. **(kata-)** 1.7-. **(peri-)** 1.8-. **(pros-)** 2.7-. **1.6-** or epi-. Colorless prisms, m.134, soluble in alcohol or ether.

1.7- kata-. Colorless needles, m.178, soluble in water, alcohol, or ether. **1.8- peri-.** Colorless needles, m.140, slightly soluble in water, soluble in alcohol or ether. **2.3- beta-.** Rhombic, colorless, crystals, m.159, soluble in hot water, alcohol, or ether. **2.7- pros-.** Colorless needles, m.261, slightly soluble in water, soluble in alcohol or ether. **d. palmitic acid.** $C_{16}H_{32}O_4$ = 288.0. White needles, m.125, occurring in cod-liver oil. **d. phthalophenone.** Phenolphthalein. **d. propionic acid.** Glyceric acid. **d. stearic acid.** $C_{18}H_{36}O_4$ = 316.28. Rhombic crystals, m.126.5, found in castor oil; there are ten isomers. **d. succinic acid.** Tartaric acid. **d. uracil.**



An intermediate in the synthesis of uric acid.

dihydroxyl. Dihydroxy. **d. amine.** The hypothetical hydroxy-hydroxylamine, HO.NH.OH. **d. nicotine.** Pilocarpidine.

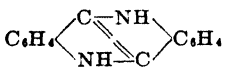
diimide. (1) The hypothetical compound HN:NH, known only as its organic derivatives. (2) A compound containing two —C:NOH groups; as, glyoxime.

diimines. A group of organic compounds which contain two imine, =NH, radicals.

diimino- A prefix indicating the presence of two imino groups. **d. hydrazine.** N_4H_2. The hypothetical compound HN:N.N:NH, known as its derivatives. Cf. *hydronitrogen.*

diindogen. Indigotin.

diindyl. $C_{14}H_{10}N_2$ = 206.2. Dindyl. The heterocyclic compound



Cf. *biindyl.*

diine. A suffix indicating the presence of two triple bonds. See *diacetylenes.*

diiod-, diiodo- A prefix indicating the presence of two iodine atoms in an organic compound. **d. acetic acid.** $C_2H_2O_2I_2$ = 311.97. Diiodoacetic acid. Yellow crystals, m.110, slightly soluble in water. **d. acetylene.** C_2I_2 = 277.7. Small needles, insoluble in water, soluble in oil of sweet almond. **d. hydrine.** Diiodoisopropanol. **d. tyrosine.** $C_9H_9NO_3I_2$ = 432.96. White crystals, m.205, slightly soluble in water. An amino acid found in gorgonin, spongin and thyroglobulin.

diiodide. A compound containing two iodine atoms as iodide; *e.g.*, mercury diiodide, HgI_2.

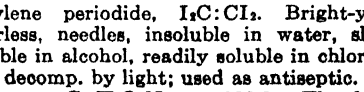
diiodoacetic acid. Diiodacetic acid.

diiodobenzene. $C_6H_4I_2$ = 329.90. **o-** Soluble in water or alcohol, m.23.4, b.279. **m-** Soluble in alcohol, m.34.2, b_{751mm}.286.5. **p-** Soluble in alcohol, m.129.4, $b_{756.5mm}$284.7.

diiodoeosin. See *rose bengal.*

diiodoform. C_2I_4 = 531.4. Tetraiodoethylene, ethylene periodide, $I_2C:CI_2$. Bright-yellow, odorless, needles, insoluble in water, slightly soluble in alcohol, readily soluble in chloroform and decomp. by light; used as antiseptic.

diisatogen. $C_{16}H_8O_4N_2$ = 292.3. The heterocyclic system

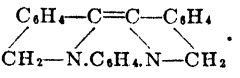


Cf. *isatogenic acid.*

diisoamyl. (1) 2.7-Dimethyl-octane. (2) A prefix indicating the presence of two isoamyl groups. **d. amine.** $C_{10}H_{23}N$ = 157.27. A colorless liquid, d.0.788, b.190, slightly soluble in water, miscible in alcohol or ether. **d. ketone.** $C_{11}H_{22}O$ = 170.24. A yellow liquid, b.226, insoluble in water, miscible with alcohol or ether.

diisobutyl. (1) The compound 2.5-dimethylhexane. (2) A prefix indicating the presence of two isobutyl groups. **d. amine.** $C_8H_{19}N$ = 129.24. A colorless liquid, $d_{14°}$.0.7577, b.139.5, sparingly soluble in water, miscible with alcohol or ether. **d. ketone.** $C_9H_{18}O$ = 142.23. Valerone. $Me_2.C.CO.CMe_3$. A colorless liquid, $d_{20°}$.0.833, b.181, insoluble in water.

diisoindoloquinoxaline. $C_{32}H_{16}N_2$ = 308.2. The heterocyclic compound



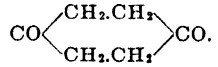
diisonitrosoanetholperoxide. $C_9H_8O_2N_2$ = 176.2. Colorless crystals, m.97.

diisopropenyl. (1) C_6H_{10} = 82.078. *2.3*-Dimethyl butadiene. $CH_2:CMe.CMe:CH_2$. A colorless liquid, d.0.731, b.69.6. Cf. *hexine, hexadiene.* (2) A prefix indicating the presence of two isopropenyl groups.

diisopropyl. (1) A prefix indicating the presence of two isopropyl radicals. (2) An isomer of hexane (2.3-dimethyl-butane or dimethyl-isopropylmethane). **d. ketone.** $C_7H_{14}O$ = 114.12. A colorless liquid, $d_{16°}$.0.853, b.123.7, soluble in alcohol or ether.

dika fat. The fat of *Irvingia gabonensis*, a Simarubaceae, from Sierra Leone.

diketo- A prefix indicating the presence of two bivalent =CO groups. **d. hexamethylene.** $C_6H_8O_2$ = 112.1. The homocyclic compound



d. hydrindene. Is *indandione.*

diketone. A compound containing two —CO radicals. **1.2-** A compound containing the bivalent —CO.CO— radical; *e.g.*, diacetyl or 2.3-butanone. **1.3-** A compound containing the bivalent —CO.CH_2.CO— radical; *e.g.*, acetyl-acetone or 2.4 pentanone. **1.4-** A compound containing the bivalent —CO.CH_2.CH_2.CO— radical; *e.g.*, acetonyl-acetone or 2.5-hexanone. **alpha-** 1.2-. **beta-** 1.3-. **gamma-** 1.4-.

diketopurine. Xanthine.

diketotriazolidine. Urazole.

diketotrimethylpurine. Caffeine.

dilactamic acid. $C_4H_{11}O_4N$ = 161.2. MeCHOH.COO.CHMe.$CONH_2$. Colorless crystals, soluble in water.

dilactic acid. $C_6H_{10}O_5$ = 162.1. (1) Lactyl-lactate, lactolactic acid. MeCHOH.COO.CHMe.COOH. (2) Lactylic anhydride, lactic acid anhydride. MeCHOH.CO.O.CO.CHOH-Me.

dilantin sodium. $C_{15}H_{11}N_2O_2Na$ = 274.25. Diphenylhydantoin sodium, an antiepileptic.

dilatancy. A form of thioxtropy (q.v.) in which a viscous suspension sets solid under the influence of pressure.

dilatation. Distention or expansion.

dilatometer. An instrument for measuring expansion (*dilation*) due either to a change in temperature or to chemical action.

dilatometry. The measurement of small volume changes in liquids, due to physical or chemical reactions; as, esterification.

dilaudide. $C_{17}H_{19}O_3.HCl$. Dihydro-morphinone hydrochloride. A white powder, soluble in water; used as heroine substitute.

dilevulinic acid. $C_{10}H_4O_6$ = 220.0. Decane-4.7-dione diacid. The dibasic keto-acid, $(—CH_2-CO.CH_2.CH_2.COOH)_2$.

dilituric acid. 5-Nitrobarbituric acid.

dill. Anetum. The dried ripe fruit of *Peucedanum graveolens*, a Compositae; used as a spice and carminative. **d. oil.** The essential oil of d., d.0.895–0.915, soluble in alcohol. It contains phellandrene, terpinene and carvone.

diluent. (1) An inert, solid or liquid, used to increase the bulk of some other substance. (2) An inert substance used to increase the bulk of a solution; it need not necessarily be a solvent for the dissolved substance. (3) A liquid added to the solvents and plasticizers of lacquers to increase flow and evaporation; as, benzene, toluene, xylene.

dilution. (1) The process of diluting; increasing the bulk of a substance by adding a material. (2) The state of being diluted or diffused; as, a solute in a solvent. **heat of-** The heat, in gram calories, which is liberated or absorbed on diluting infinitely one gram molecule of a substance with water.

d. law. Ostwald's law. **d. ratio.** A measure of the solvent power of a diluent (definition 2). It equals the volume of a diluent required to produce incipient precipitation of a dissolved substance, divided by the total volume of solvent in which it occurs. **d. rule.** To mix or dilute a with b to make c, use the diagram:

a \ / (difference c − b) = x
  c
b / \ (difference a − c) = y

and take x parts of a and y parts of b, where a, b, and c are expressed in the same unit (*e.g.*, of percentage, moles, karats, density, price). With solutions to be diluted with water, b is zero concentration or 1.0 density; thus: Dilute a 75 % solution (a) with water (b) to make it 55 % (c) strong—

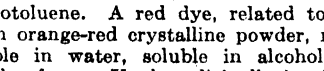
75 \ / (55 − 0) = 55
  55
0 / \ (75 − 55) = 20

take 55 parts of 75 % solution and add 20 parts of water.

dimalonic acid. $C_5H_6O_8$ = 206.03. Ethane-tetracarboxylic acid. The tetrabasic acid $CH(COOH)_2.CH(COOH)_2$.

dimazon. $C_{18}H_{19}O_4N_3$ = 341.3. Diacetylamino-azotoluene. A red dye, related to scarlet R. An orange-red crystalline powder, m.75; insoluble in water, soluble in alcohol, ether, or chloroform. Used medicinally in ointments or as a dusting powder to promote the growth of epithelial tissue.

dimedone. $C_8H_{10}O_2$ = 138.08. Dimethylcyclohexanedione.



dimension. A magnitude in one definite direction. **four-** The concept of space and time; as, length, width, height and duration. **three-** The concept of space.

dimensional equation. A mathematical expression showing the dimensions of a quantity in terms of fundamental units, (q.v.) thus: energy = ML^2T^{-2}, where M is mass, L is length, and T is time.

dimercurammonium. The monovalent HgN— radical. **d. chloride.** HgNCl = 250.1. A yellow powder. **d. oxide.** $(HgN)_2O$ = 445.2. A colorless powder.

dimercuriammonium. Dimercurammonium.

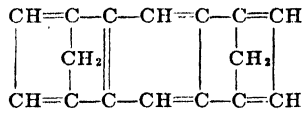
dimercurousammonium. The monovalent —$HgNH_2$ radical.

dimer. A condensation product or polymer of two molecules. Cf. *trimer, dimeric.*

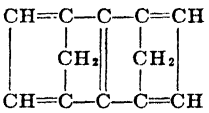
dimeric. Able to form two-fold polymers.

dimethacetic acid. Dimethylacetic acid.

dimethano- A prefix indicating the presence of two —CH_2— bridges in a ring; as, **d. anthracene.**



d. naphthalene.

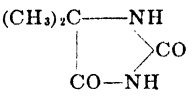


dimethoxalic acid. Isobutyric acid.

dimethoxy- A prefix indicating the presence of two methoxy radicals, —OCH_3, or —OMe. **d. catechol.** Veratrol. **d. ethane.** $C_4H_{10}O_2$ = 90.08. Glycol dimethyl ether, $MeOCH_2.CH_2OMe$. A colorless liquid, d.0.873, b.84.5; used as a solvent in lacquers. **d. phthalaldehydic acid.** Opianic acid.

dimethyl. (1) Ethane. (2) A prefix indicating the presence of two methyl radicals. **d. acetal.** $C_4H_{10}O_2$ = 90.1. Ethylidene dimethylether. $(MeO)_2CH.Me$. A colorless liquid, $d_0°$.0.879, b.62.5, miscible with water, alcohol, ether or chloroform. Used medicinally as an anesthetic instead of chloroform. **d. acetic acid.** Isobutyric acid. **d. acetylene.** Crotonylene. **d. allylene.** 3-Methyl-butine. **d. amine*.** C_2H_7N = 45.11. The secondary amine $Me_2.NH$. A volatile liquid or colorless vapor, $d_6°$.0.6865, b.7, soluble in water, alcohol, or ether. Used as a bait for boll weevils. **d. aminoazobenzene.** $C_{14}H_{15}N_3$ = 225.13. Butter yellow. Yellow scales, soluble in water, acids, or oils. Used as indicator in the analysis of gastric lactic acid; also as a coloring matter for oils. (Acids—rose-red, alkalis—yellow.) **d. aminoazobenzenesulfonic acid.** Sulfobenzene azodimethylaniline. **d. aminobenzal rhodanine.** $C_{12}H_{12}NOS_2$. A colorimetric reagent for copper, mercury and silver. **d. aminobenzene.** Dimethylaniline. **d. aniline.** $C_8H_{11}N$ = 121.14. $Ph.NMe_2$. A yellow or brown, oily liquid, $d_{20}°$.0.958, m.2.5, b.193.3, soluble in water, alcohol, or ether. Used in organic synthesis, as reagent for nitrates, and in the manufacture of dyes (methyl violet). **d. anilinesulfonic acid.** $C_8H_{11}O_3NS$ = 201.22. **2-**, or ortho-. Yellow masses, m.229, soluble in alcohol. **4-** or para-. Brownish scales, m.257, insoluble in water, soluble in alcohol or ether. Used in organic synthesis. **d. anthracene.** $C_{16}H_{14}$ = 206.12. **(alpha-)** or **1.4-**. Colorless scales, m.225, insoluble in water, soluble in alcohol or

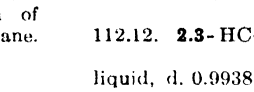
ether. (**beta-**) or 1.3-. Colorless leaflets, m.204, insoluble in water, soluble in alcohol or ether. **2.3-** m.246. **2.4-** m.71. **2.6-** m.231. **d. arsenic acid.** Cacodylic acid. **d. arsine.** C_2H_7As = 106.07. Me_2AsH. A colorless liquid, $d_{29°}$.1.213, b.36, miscible with alcohol, ether, or chloroform. **d. benzene.** Xylene. **d. benzoic acids.** $C_6H_3.Me_2.COOH$ = 150.13. Xylic acids. **d. beryllium.** $BeMe_2$ = 39.07. White needles, subliming at 200, decomp. by water to CH_4. **d. cadmium.** $CdMe_2$ = 142.46. An oily liquid, d.1.985, m. −4.5, b.106. **d. carbinol.** Isopropylalcohol. **d. carbonate.** Methyl carbonate. **d. cyclooctadiene.** See *cyclooctadiene*. **d. diamidotoluphenazine.** Neutral red. **d. diethyl tin.** Me_2SnEt_2 = 206.82. A colorless liquid, d.1.232, m. −13, b.145, soluble in alcohol or benzene. **d. ether.** Methyl ether. **d. ethylamine.** $C_4H_{11}N$ = 73.1. Ethyldimethylamine. The tertiary amine $EtNMe_2$. **d. ethylcarbinol.** Tert. iso*amylalcohol*. **d. ethylmethane.** Isopentane. **d. ethylene.** Butylene. **d. glyoxime.** $C_4H_8O_2N_2$ = 116.10. Diacetyl-dioxime. White needles or crystalline powder, m.234, insoluble in water, soluble in alcohol or ether. Used as a reagent in the detection, separation, and determination of nickel or palladium. **d. hexane.** Octane. **d. hydantoin.** $C_5H_8N_2O_2$ = 128.1.



A white, odourless solid, m.178 (sublimes) Very soluble in water, alcohol or ether. Used as a plasticiser for resins. **d. hydrazine.** See *hydrazine*. **d. hydrazone.** See *hydrazone*. **d. hydroxy benzene sulphonphthalein.** Xylenol blue. **d. ketone.** Acetone. **d. mercury.** $HgMe_2$ = 230.66. A colorless liquid, d.3.069, b.94. **d. nitrosamine.** $C_2H_6ON_2$ = 74.11. Nitrosodimethylin. A yellow, oily liquid, b.153, insoluble in water, soluble in alcohol or ether. **d. naphthalene.** See *naphthalene*. **d. octane.** $C_{10}H_{22}$ = 142.17. A group of isomeric liquid hydrocarbons of the methane series, *e.g.*,

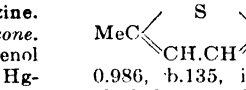
2.6-	d.0.734	b.159
2.7-	d.0.722 m. −53	b.160
***l*-3.6-**		b.162
***d*-3.6-**	d.0.735	b.160

d. oxalate. $C_4H_6O_4$ = 118.07. Colorless, monoclinic prisms, m.54, b.163.3. **d. oxamide.** $C_4H_8O_2N_2$ = 116.16. (**asymmetric-**) $NH_2.OC.CO.NMe_2$. Oxalmethylin. Colorless leaflets, m.104, soluble in alcohol, ether, or water. (**symmetric-**) MeNH.OC.CO.NHMe. Colorless needles, m.209, slightly soluble in water, soluble in alcohol or ether. **d. oxyquinizine.** Antipyrine. **d. phosphine.** C_2H_7P = 62.07. Me_2PH. A colorless liquid, b.25, insoluble in water. **d. phosphinic acid.** $C_2H_7O_2P$ or $(CH_3)_2PO.OH$ = 94.07. Colorless crystals, m.76, soluble in water, alcohol, or ether. **d. phosphoric acid.** $C_2H_7O_4P$ = 126.07. $(MeO)_2PO(OH)$. **d. phenylenediamine.** $C_8H_{12}N_2$ = 136.2. Aminodimethylaniline, dimethylaminoaniline. $NH_2C_6H_4NMe_2$. **o-** b.218. **m-** b.270. **p-** Brown, crystalline masses, m.41, b.262, insoluble in water, soluble in alcohol, ether, or chloroform; used as a reagent for cellulose and fibers and in organic synthesis. **d. phenylenediamine hydrochloride.** $C_8H_{12}N_2.HCl$ = 172.6. **para-** Hygroscopic crystals, soluble in alcohol. **d. phenylenediamine sulfate.** $C_8H_{12}N_2.H_2SO_4$ = 234.29. **para-** Colorless or brownish crystals, soluble in water. **d. phenol.** Xylenol. **d. piperazintartrate.** Lycetol. **d. propylcarbinol.** Hexyl alcohol (4). **d. propylmethane.** 2-Methylpentane. **d. pyrazine.** Ketine. **d. pyrazole.** $C_3H_4N_2$ = 96.1. A precipitant for cobalt. **d. pyridine.** Lutidine. **d. pyrrole.** C_5H_9N = 95.07. A colorless, oily liquid, $d_{19°}$.0.935, b.165, slightly soluble in water, soluble in alcohol or ether. **d. silicane.** SiH_2Me_2 = 60.12. A colorless gas, $d_{(-80°C)}$.0.68, m. −150, b. −20.1. **d. sulfate.** $C_2H_6O_4S$ or $(CH_3O)_2SO_2$ = 126.12. A colorless liquid, b.188.5, soluble in water, alcohol, or ether. Used as a reagent for detecting coal tar oils, and as methylating agent in organic synthesis. **d. sulfine.** The bivalent C_2H_6S— radical. **d. sulfinic acid.** C_2H_6SO = 78.1. Me_2SO. **d. sulfone.** $C_2H_6SO_2$ = 94.1. Me_2SO_2. **d. sulfourea.** $C_3H_8N_2S$ = 104.2. MeNH.CS.NHMe. **d. thetine.** $C_3H_8O_2S$ = 120.07. Colorless crystals, decomp. on heating, soluble in water or alcohol. **d. thiophen.** C_6H_8S = 112.12. **2.3-**



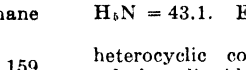
A colorless liquid, d. 0.9938, b.136. **2.4-**

A colorless liquid, d.0.9956, b.138. **2.5-**

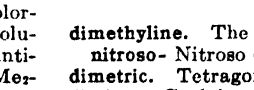


A colorless liquid, d.-0.986, b.135, insoluble in water, soluble in alcohol or ether. **d. urea.** See *urea*. **d. yellow.** Dimethyl aminoazo benzene. **d. xanthine.** Theobromine.

dimethylene. (1) Ethylene. (2) A prefix indicating the presence of two methylene radicals. **d. diamine.** Ethylene diamine. **d. imine.** C_2H_5N = 43.1. Ethyleneimine, vinylimine. The heterocyclic compound



A colorless liquid b.55; insoluble in water. **d. oxide.** Ethylene oxide. **d. sulfide.** Ethylene sulfide. **d. trisulfide.** Ethylene sulfide. **d. trisulfide.** $C_2H_4S_3$ = 124.1. The heterocyclic compound



dimethyline. The monovalent radical, —NMe_2. **nitroso-** Nitroso dimethyl amine.

dimetric. Tetragonal. Cf. *crystal systems*.

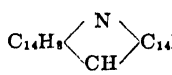
dimine. Cyclohexylethylamine dithiocarbamate, m.93, decomp. 100. Used as a catalyst in the vulcanisation of rubber.

diminution. (1) Proposed term for reduction. Cf. *augmentation*. (2) A lessening or decrease.

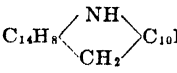
dimorphic. Occurring in two crystalline forms having different melting points.

dimorphism. The property of certain substances of occurring in two different crystalline forms, Cf. *polymorphism*.

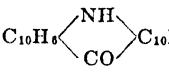
dinaphthacridine. $C_{29}H_{17}N$ = 379.2. The heterocyclic compound



6 isomers: $\alpha\alpha'$-; $\alpha\beta'$-; $\alpha\gamma'$-; $\beta\beta'$-; $\beta\gamma'$-; and $\gamma\gamma'$-. Cf. *dibenzacridine*. **dihydro-** $C_{20}H_{19}N$ = 381.2. The heterocyclic compound



dinaphthacridone. $C_{21}H_{13}ON$ = 295.1. The heterocyclic compound



dinaphthanthracene. Dibenzanthracene.

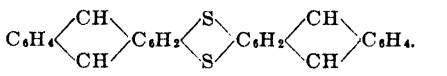
dinaphthazine. Dibenzophenazine.

dinaphtho- A prefix indicating two $C_{10}H_6$= groups. Cf. *naphthalene*.

dinaphthofluorene. Dibenzofluorene.

dinaphthol. $C_{20}H_{14}O_2$ = 286.22. $HO.C_{10}H_6.C_{10}H_6OH$. **alpha-** Colorless rhombic crystals, m.300; insoluble in water, soluble in alcohol or ether. **beta-** White needles, m.218; insoluble in water, soluble in alcohol or ether.

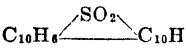
dinaphthothianthrene. $C_{28}H_{16}S_2$ = 416.2. The heretocyclic compound



dinaphthoxanthene. $C_{21}H_{14}O$ = 282.1. Colorless crystals, m.199.

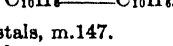
dinaphthyl. (1) Binaphthyl. (2) A prefix indicating the presence of two naphthyl radicals, $C_{10}H_7$—.

d. mercury. $Hg(C_{10}H_7)_2$ = 329.68. Rhombic crystals, d.1.929, m.243, insoluble in water. **d. methane.** $C_{21}H_{16}$ = 268.2. $C_{10}H_7.CH_2.C_{10}H_7$. **alpha-** Colorless prisms, m.109, b.360, soluble in hot alcohol, ether, or benzene. **beta-** Small needles, m.92, soluble in alcohol or benzene. **d. sulfone.** $C_{20}H_{12}O_2S$ = 316.2. The heterocyclic compound:



d. tin. $Sn(C_{10}H_7)_2$ = 372.81. White powder, m.200.

dinaphthylene. A prefix indicating the presence of two naphthylene groups, $C_{10}H_6$=. **d. methane.** See *picene* and *fluorene*. **d. thiophen.** $C_{20}H_{12}S$ = 284.1.



Colorless crystals, m.147.

dindyl. Diindyl.

dineric. Having two liquid layers (phases). Cf. *dimer*.

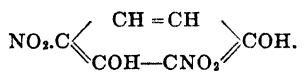
Dingler, Emil Maximilian. 1806–1874. A German technical chemist and editor. **D., Johann Gottfried.** 1778–1855. A German apothecary and founder of "*Polytechnischen Journal*" (1820).

dinicotinic acid. $C_7H_5O_4N$ = 167.1. 2.4- or *3.5*-pyridinedicarboxylic acid*. Colorless crystals. m.314.

dinitramidobenzoic acid. **ortho-** Chrysalicic acid. **para-** Chrysanisic acid.

dinitraniline. Dinitroaniline.

dinitro- A prefix indicating the presence of two nitro groups. **d. amidobenzene.** Dinitraniline. **d. aniline.** Dinitroaniline. **d. anthraquinone.** $C_{14}H_6O_6N_2$ = 298.07. **(alpha-)** Yellow, monoclinic, microcrystalline powder, m.356, slightly soluble in water, alcohol or ether. **(beta-)** Yellow needles, m.280, sparingly soluble in water, alcohol or ether, soluble in glacial acetic acid. **d. benzaldehyde.** $C_7H_4O_5N_2$ = 196.08. **2.4-** Yellow prisms, m.72, b.190, slightly soluble in water, soluble in alcohol or ether. **d. benzene.** See *benzene*. **d. benzoic acid.** See *benzoic acid*. **d. chlorobenzene.** $C_6H_3O_4N_2Cl$ = 202.55. **1.2.3-** Colorless needles, m.38.8, soluble in alcohol or ether. **1.2.4-** Colorless, monoclinic crystals, m.37, soluble in alcohol. **1.3.2-** Colorless crystals, $d_{16°}$.1.687, m.42, b.315, slightly soluble in alcohol, soluble in ether. **1.3.4-** Colorless crystals, $d_{22°}$.1.697, m.50, b.315, soluble in alcohol. **1.3.5-** Colorless needles, m.59, soluble in alcohol or ether; a reagent for mercaptans. **d. cresol.** $C_7H_6O_5N_2$ = 198.2. An orange colored and poisonous coaltar dye, commercially known as "saffron substitute," m.104, b.312, (decomp.). **d. glycerin, d. glycerol.** $C_3H_6(NO_2)_2$ = 182.06. Glycerol-1.3-dinitrate. An oily liquid, d.1.47, m. −30, $b._{15mm}$148; used as a high explosive. **d. naphthalene.** $C_{10}H_6O_4N_2$ = 218.2. Yellow crystals, m.153, insoluble in water, soluble in alcohol, ether, chloroform, or benzene. α- is 1.5-; β- is 1.8-; γ- is 1.3-. **1.2-** m.103. **1.3-** m.145. **1.4-** m.129. **1.5-** m.216. **1.6-** m.162. **1.7-** m.156. **1.8-** m.170; used in dyestuff manufacture. **d. naphthol.** $C_{10}H_6O_5N_2$ = 234.06. A group of intermediates in organic synthesis: **2.4-**α- m.138. **4.5-**α- decomp. 230. **4.8-**α- decomp. 235. **1.6-**β- m.195. **1.8-**β- m.198. **d. phenamic acid.** Picramic acid. **d. phenol.** $C_6H_4O_5N_2$ = 184.14. Hydroxy-dinitrobenzene. α- is 2.4-; β is 2.6-; γ- is 2.5-; δ- is 3.4-; ϵ- is 2.3-; ξ- is 3.5-. **2.3-** Yellow needles, m.144, slightly soluble in alcohol, soluble in ether; used as a pH indicator. **2.4-** Yellow scales, $d_{24°}$.1.683, m.114, slightly soluble in water, soluble in alcohol or ether. It was used as defatter, but is very poisonous and increases body metabolism and body temperature. **2.6-** Yellow needles, m.61.8, slightly soluble in water or alcohol, soluble in ether. **3.4-** Colorless needles, m.134, **3.5-** Colorless leaflets, m.122. **2.5-** or **3.6-** Colorless leaflets, m.104. **d. phenylhydrazine.** $(NO_2)_2$-$C_6H_3NH.NH_2$ = 198.08. Reddish needles, d.1.868, m.197, explode on further heating; used as reagent for aldehydes and malic acid. **d. resorcinol.** $C_6H_4O_6N_2$ = 200.10. **2.4.1.3-** The nitrated phenol



Yellow scales, m.142, soluble in hot water, alcohol, or chloroform. **(crude.)** Solid green, dark green, chlorin, diquinoyldioxime. A grayish-brown soft mass, sparingly soluble in water, soluble in dilute alkalis or alcohol. Used as a green pigment in calico printing, and in dyeing textiles which must be pretreated with iron salts. **d. salicylic acid.** $C_6H_2(OH)(NO_2)_2$-COOH. A reagent for glucose. **d. toluene.** $C_7H_6O_4N_2$ = 182.17. α- or *meta-* is 2.4-; β- or *para-* is 2.5-; γ- or *ortho-* is 3.4-. **2.4-** Colorless

needles, $d_0°$.1.321, m.70.7, slightly soluble in water, soluble in alcohol or ether. **2.3-** m.63. **2.5-** Colorless needles, m.48, soluble in alcohol, ether, benzene or carbon disulfide. **2.6-** Colorless needles, m.66, soluble in alcohol. **3.4-** Colorless needles, d.1.32, m.59, insoluble in water, soluble in alcohol, ether or carbon disulfide. **3.5-** Colorless needles, m.92, sparingly soluble in water, soluble in alcohol or ether. **d. xylene.** $C_8H_9O_4N_3$ = 196.18. **2.4.1.3-** Long, colorless prisms, m.93, soluble in hot alcohol. **2.3.1.4-** Colorless, small needles, m.-123.6, sparingly soluble in alcohol. **2.5.1.4-** Colorless, hexagonal crystals, m.93, soluble in alcohol.

dinitroaniline. $C_6H_5O_4N_3$ = 183.19. Dinitraniline, $C_6H_3NH_2(NO_2)_2$. **2.3-** m.127. **2.4-** Yellow, monoclinic crystals, d.1.165, m.181, insoluble in water, soluble in alcohol or ether. **2.5-** m.137. **2.6-** Large yellow needles, m.138, soluble in alcohol. **3.4-** m.154. **3.5-** m.159. **d. fluosilicate.** $(C_6H_4NH_2NO_2)_2SiF_6$ = 420.2. Rhombic crystals, m.200.

dinitroso-. A prefix indicating the presence of two —NO groups; as, **d. resorcinol,** used as a reagent for iron.

dinucleotide. A compound formed from two purine bases; as, adenine-uracil.

dioctyl. (1) Hexadecane. (2) A prefix indicating the presence of two octyl radicals. **d. acetic acid.** Isostearic acid.

dioform. $C_2H_2Cl_2$ = 96.93. Acetylene dichloride. CHCl=CHCl. A colorless liquid of chloroform-like odor, d.1.29, b.55. It is a mixture of **cis-** d.1.265, m. −50, b.48, and **trans-** d.1.291, m. −80.5, b.60.3.

-dioic. A suffix indicating two —COOH groups.

diol. Glycol. An organic compound with two hydroxyl groups. Cf. *glycols.*

diolefine. Diene series. An unsaturated aliphatic hydrocarbon with the general formula C_nH_{2n-2} and two double bonds; *e.g.*,

allene (propadiene)	C_3H_4
divinyl (1.3-butadiene)	C_4H_6
piperylene (1.4 pentadiene)	C_5H_8
isoprene (2-methyl-1.3-butadiene)	C_5H_8
diallyl (1.5-hexadiene)	C_6H_{10}
conylene (1.4-octadiene)	C_8H_{14}

diolein. $C_{57}H_{72}O_5$ = 596.5. Glycerol dioleate. The dioleic ester of glycerol, formed from triolein by the action of lipase.

diondiacids. A group of organic acids containing two keto and two carboxyl groups; *e.g.*, hexan-3.4-diondiacid, $HOOC.CH_2.CO.COCH_2.COOH$ (*ketipic acid*); decan-4.7-diondiacid, $HOOC.CH_2.CH_2.CO.CH_2CH_2.CO.CH_2.CH_2.COOH$ (*dilevulinic acid*).

-dione. A suffix indicating the presence of two keto-groups, >CO; as, butadione.

dionine. $C_{19}H_{23}O_3N.HCl$ = 349.66. Ethylmorphine hydrochloride. A colorless, crystalline powder, soluble in water or alcohol; used medicinally as a substitute for morphine and codeine. Cf. *codethyline.*

diopside. $CaMgSi_2O_6$. A monoclinic, white, yellowish, or greenish, rock-forming pyroxene containing chromium, d.3.2, hardness 5–6. Cf. *baikalite.*

dioptase. CuH_2SiO_4. A greenish, hexagonal, hydrous copper silicate, d.3.3, hardness 5, soluble in sulfuric acid.

diopter. The unit of "power" of a lens. The number of diopters is the reciprocal of the focal length in meters.

dioptra. An optical device for measuring heights and angles.

dioptrics. A branch of optics dealing with the refraction of light.

diorite. An igneous rock containing quartz, plagioclase, and small amounts of femic minerals; as, camptonide, corsite, auvergnose, daeite and malchite.

diorsellinic acid. Lecanoric acid.

dioscin. $C_{24}H_{38}O_9.3H_2O$ = 524.4. A saponin from the roots of *Dioscorea japonica,* a Dioscoraceae. White, silky needles, m.248, insoluble in water or ether, slightly soluble in hot water, soluble in alcohol or sulfuric acid.

dioscorea. Yam root. A genus of tropical shrubs with edible tubers (yams). The rhizome of *Dioscorea villosa* (wild yam) is used as an antispasmodic and diaphoretic. **d. sapotoxin.** $C_{23}H_{28}O_{10}$ = 464.3. A toxic principle from *Dioscorea* species.

Dioscorides. A Greek philosopher of Anazarba, Asia Minor, who made mercury from cinnabar (A.D. 50).

dioscorine. $C_{13}H_{19}O_2N$ = 221.2. An alkaloid from the rhizome of *Dioscorea hirsuta,* a Dioscoreaceae of Java.

dioscoroid. The combined principles from the root of *Dioscorea villosa* (wild yam). The fluid extract is an antispasmodic.

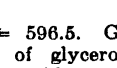
diose. A monosaccharide containing two carbon atoms (see *carbohydrates*). Cf. *biose.*

diosmeleoptene. $C_{10}H_{18}O$ = 154.2. A terpene of peppermint-like odor; an isomer of borneol obtained from the essential oil of the leaves of *Diosma* (or *Barosma*) *betulina.* Cf. *buchu.*

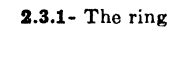
diosphenol. $C_{12}H_{16}O_2$ = 168. Buchu camphor, 2-hydroxy-Δ^1-3-p-menthenone. A crystalline camphor from the essential oil of *Diosma betulina.*

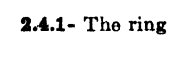
diothane. A registered trade-mark for piperidinopropanediol diphenylurethane. $C_{22}H_{27}O_4N_3$ = 397.3. Colorless needles, m.195–200, soluble in hot water; used as local anesthetic.

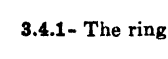
dioxadiene. p-Dioxin.

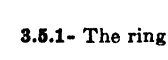
dioxan. $C_4H_8O_2$ = 88.06. Diethylene dioxide, dihydro-*p*-dioxin,  . A colorless liquid, d.1.038, m.11, b.101; soluble in water. A solvent for cellulose esters, used in the silk and varnish industries and as dehydrating agent in histology. Cf. *dithiane.*

dioxazine. $C_3H_3O_2N$ = 85.1.

2.3.1- The ring compound  .

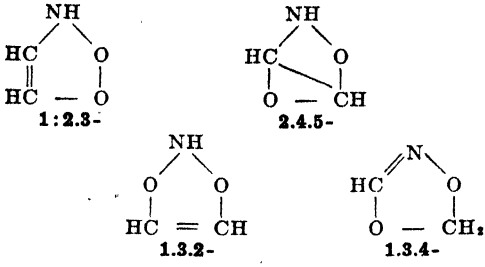
2.4.1- The ring compound  .

3.4.1- The ring compound  .

3.5.1- The ring compound  .

Cf. *dithiazine.*

dioxazole. $C_2H_3O_2N$ = 73.1. A group of heterocyclic compounds with one nitrogen and two oxygen atoms, as



Cf. *dithiazole.*

dioxdiazine. $C_2H_2O_2N_2$ = 86.1. A group of heterocyclic hydrocarbons with two nitrogen and two oxygen atoms in the hexatomic ring. Possible isomers: **1.2.3.4- 1.2.3.5- 1.2.3.6- 1.2.4.5- 1.3.2.4- 1.3.2.5- 1.3.4.5- 1.3.4.6- 1.4.2.3- 1.4.2.5- 1.4.2.6-.** The first two numbers indicate the position of the oxygen, the last two that of the N atoms.

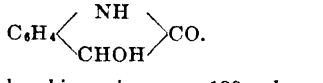
dioxdiazole. $CH_2O_2N_2$ = 74.1. A group of heterocyclic hydrocarbons with two nitrogen and two oxygen atoms in the pentatomic ring. Isomers: **1.2.3.4- 1.2.3.5- 1.3.2.4- 1.3.4.5-.** The oxygen atoms occupy the positions indicated by the first two numbers. Cf. *dithiodiazole.*

dioxide. A compound containing two atoms of oxygen, viz: (1) Normal or true dioxides in which the valency of oxygen is two; as *e.g.*, in manganese dioxide. (2) Abnormal dioxides or peroxides, such as barium dioxide (peroxide), hydrogen dioxide (peroxide) etc. The true dioxides only give oxygen with concentrated acids, and chlorine with concentrated hydrochloric acid. Peroxides only give hydrogen peroxide. The oxygen atoms are linked thus:

dioxime. The monovalent —HC:NOH radical occurring in two isomeric forms:

dioximes. A group of compounds containing two dioxime radicals. **alpha-** Glyoximes. **beta-** Glyoxime peroxides. **gamma-** Compounds in which the two oxime radicals are separated by the ethylene radical; *e.g.*, succinaldehydedioxime, HON:CHCH$_2$.CH$_2$.CH:NOH.

dioxindole. $C_8H_7O_2N$ = 149.08. o-Aminomandelic acid lactame,

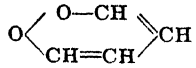


Colorless, rhombic prisms, m.180, decomp. 195°, soluble in water, alcohol or ether.

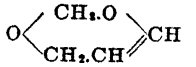
dioxine. $C_{10}H_7O_2N$ = 173.1. Betaoxynaphthoquinoxime. A yellow aniline dye.

dioxins. $C_4H_6O_2$ = 86.1 and $C_4H_4O_2$ = 84.1. A group of heterocyclic hydrocarbons:

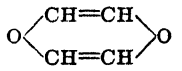
o- or 1.2-



m- or 1.3-



p- or 1.4-

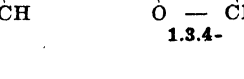


dihydro-p- Dioxan.

dioxogen. A brand of hydrogen peroxide.

dioxolan(e)s. $C_3H_6O_2$ = 74.04. A group of heterocyclic compounds of 3 carbon atoms and 2 oxygen atoms. Many derivatives of the 1.3-isomer are known.

dioxole. $C_3H_4O_2$ = 72.04. The heterocyclic compound



dioxtriazine. CHO_2N_3 = 87.1. A group of aromatic hydrocarbons which contain three nitrogen-atoms and two oxygen atoms in the hexatomic ring. Isomers: **1.2.3.4.5- 1.2.3.4.6- 1.3.4.5.6- 1.3.2.4.5- 1.3.2.4.6- 1.4.2.3.5-** The nitrogen atoms occupy the positions indicated by the last three numbers.

dioxy- (1) A prefix indicating two additional oxygen atoms in an organic compound. (2) Incorrectly used for dihydroxy. **d. anthracene.** See *chrysazol, rufol.* etc. **d. anthranol.** Anthrarobin. **d. benzene.** See *catechol, resorcinol, quinol.* **d. ethylene.** Dioxan. **d. phthalaldehydic acid.** Noropianic acid. **d. quinoline.** See *quinoline.* **d. tetrazotic acid.** $CH_2O_2N_4$. A structural arrangement, which is known only in combination. **d. xanthone.** 1.7-. Euxanthone.

dipalmitate. A compound containing two palmitic acid radicals.

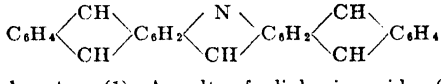
dipalmitin. $C_{35}H_{68}O_5$ = 568.5. Glycerol dipalmitate. A dipalmitic acid ester of glycerin formed from tripalmitin by the action of lipase.

dipentene. Terpene. **d. glycol.** Terpine.

dipeptide. A peptide (q.v.) or compound of the type $NH_2RCO.NH.R.COOH$; as, anserine.

diphenamic acid. $C_{14}H_{11}O_3N$ = 241.09. Phenylphthalamic acid, carbamylphenylbenzoic acid. Ph.C_6H_3(CONH$_2$).COOH.

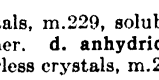
diphenanthracridine. $C_{29}H_{17}N$ = 379.2. The heterocyclic compound



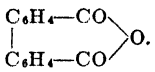
diphenate. (1) A salt of diphenic acid. (2) Diphenylate.

diphenazyl. Dibenzoylethane.

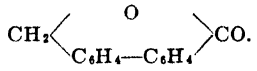
diphenic acid. $C_{14}H_{10}O_4$ = 242.09. Bibenzoic acid, o^2-biphenyldicarboxylic acid.



Colorless crystals, m.229, soluble in hot water, alcohol or ether. **d. anhydride.** $C_{14}H_8O_3$ = 224.09. Colorless crystals, m.213.



diphenide. $C_{14}H_{10}O_2$ = 210.1.

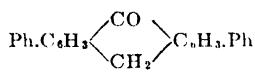


diphenimide. $C_{14}H_9O_2N$ = 223.1. Colorless crystals, m.219.

diphenol. A diatomic phenol, q.v.

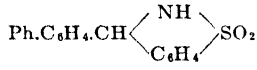
diphenoquinone. $C_{12}H_8O_2$ = 184.1. Bibenzenone. O:C_6H_4:C_6H_4:O.

diphenyl. (1) Biphenyl. (2) A prefix indicating the presence of two phenyl radicals. **d. acetic acid.** $C_{14}H_{12}O_2$ = 212.17. Colorless needles, m.148, soluble in hot water, alcohol, or ether. **d. acetonitrile.** $C_{14}H_{11}N$ = 193.2. Colorless crystals, m.72, b_{12mm}.184. **d. acetylene.** Tolane. **d. amine.** See *diphenylamine**. **d. aniline.** Triphenylamine. **d. anthrone.** $C_{26}H_{18}O$ = 346.2. The cyclic ketone

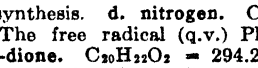


Colorless crystals, m. 192.

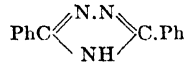
d. benzene. See *benzene*. **d. benzidine.** $C_{24}H_{20}N_2$ = 336.14. A very sensitive reagent for nitrates, zinc, etc. **d. benzylsultam.** $C_{19}H_{15}O_2NS$ = 321.2.



Colorless crystals, m.210. **d. carbazide.** $C_{13}H_{14}N_2O$ = 214.08. Phenyl hydrazine urea, diphenyl carbohydrazide, $CO(NH.NHPh)_2$. A white powder, m.170, used as an indicator (alkalis: pink, acids: white), and reagent for cadmium (blue-violet), chromium (red) and mercury (blue). **d. carbinol.** Benzohydrol. **d. chlorarsine.** Blue-cross. **d. cyanarsine.** Ph_2AsCN = 255.0. D.C. Colorless prisms, d.1.45, m.32, with a slight odor of bitter almonds. A nose-irritant war poison gas. **d. diacetylene.** $C_{16}H_{10}$ = 202.08. Diacetenyl benzene. The hydrocarbon Ph.C:C.C:C.Ph. Colorless needles, m.88, soluble in alcohol or ether. **d. dicarboxylic acid.** Diphenamic acid. **d. diethylene.** $C_{16}H_{14}$ = 206.1. The hydrocarbon Ph.CH:CH.CH:CH.Ph. Colorless crystals, m. 148, b.250. **d. diketone.** A group of compounds containing two phenyl and two keto groups; *e.g.*, diphenyldiketohexane. Ph.CO.$(CH_2)_4$.CO.Ph; diphenyldiketooctane. Ph.CO.$(CH_2)_6$.CO.Ph. **d. dimethylethane.** $C_{16}H_{18}$ = 210.2. The hydrocarbon Ph.CHMe.CHMe.Ph. Colorless crystals, m.123. **d. endoanilodihydrotriazole.** Nitron. **d. ethane.** Dibenzyl. **d. ether.** Phenylether. **d. ethylene.** Stilbene. **d. guanidine.** $C_{13}H_{13}N_3$ = 211.2. Melaniline. $(PhNH)_2C$:NH. White microcrystalline needles, m.147, slightly soluble in water, soluble in alcohol, acids, or chloroform. Used as standard in acidimetry. **d. hydrazine.** $C_{12}H_{12}N_2$ = 184.24. PhNH.NHPh. Yellow, triclinic crystals, d.1.190, m.34.5, b.302, slightly soluble in water, soluble in alcohol or ether; used as a reagent for aldehydes and ketones. **d. hydrazone.** Osazone. **d. imide.** Carbazole. **d. ketone.** Benzophenone. **d. methane.** $C_{13}H_{12}$ = 168.17. Methylenediphenyl. Ditan. Benzylbenzene. $Ph.CH_2.Ph$. Long, colorless needles, d.1.012, m.26.5, b.261, insoluble in water, soluble in alcohol or ether; used in organic synthesis. **d. nitrogen.** $C_{12}H_{10}N$ = 182.09. The free radical (q.v.) Ph_2N. **4.5-d. octan-2.7-dione.** $C_{20}H_{22}O_2$ = 294.2. The ketone, $MeCO.CH_2.CHPh.CHPh.CH_2.COMe$. Colorless crystals, m.161, b.335. **d. oxide.** Phenylether. **d. pentadienone.** Styryl ketone. **d. phosphine.** Ph_2PH. **d. sulfide.** Phenylsulfide. **d. tetraketone.** $C_{16}H_{10}O_4$ = 266.1. The ketone Ph.CO.CO.CO.CO.Ph. Colorless crystals, m.87. **d. tetraketoxime.** $C_{16}H_{11}O_4N_3$ = 295.2. Diphenyltetraketone-1.4-dioxime. Colorless crystals, m.176. **d. tetrazine.** $C_{14}H_{10}N_4$ = 234.3. The heterocyclic compound

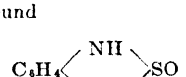


d. thiocarbazone. Dithizone. A reagent for lead with which it produces a compound soluble in certain organic solvents and enables the lead to be separated from other metals. **d. thiourea.** Sulfocarbanilide. **d. tin.** $SnPh_2$ = 272.78. Yellow amorphous powder, m.226, insoluble in water. **d. triazole.** $C_{14}H_{11}N_3$ = 221.3. The heterocyclic compound



d. triketone. $C_{16}H_{10}O_3$ = 238.1. Dibenzoylketone, PhCO.CO.COPh. Colorless crystals, m.70, b_{176mm}.289. **d. urea.** Carbanilide.

diphenylamine*. $C_{12}H_{11}N$ = 169.19. Phenylaniline. The secondary amine Ph_2NH, Colorless leaflets, d.1.159, m.54, b.302, sparingly soluble in water, soluble in alcohol, or ether. Used as a reagent for nitric acid in water, milk, etc.; in organic synthesis; and as an indicator in titrations of iron with dichromate. **3-hydroxy-** $C_{12}H_{11}ON$ = 185.10. m- phenylaminophenol. Colorless crystals, m.82, b.340, **4-hydroxy-** $C_{12}H_{11}ON$ = 185.10. p-phenylaminophenol. Colorless crystals, m.70, b.330. **seleno-** Phenoselenazine. **thio-** Phenothiazine. **d. sulfoxide.** $C_{12}H_9ONS$ = 215.1. The heterocyclic compound

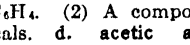


Cf. *biphenylamine, xenylamine.*

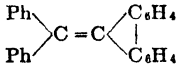
d. blue. Diphenylbenzidine. An oxidation product of d. used as an oxidation-reduction indicator. **d. chlorarsine.** $NH.(C_6H_4)_2.AsCl$ = 277.5. Adamsite, D.M. Yellow odorless crystals, d.1.65, m.195, insol. in water. The vapors are a nose-irritant war poison gas.

diphenylate. A compound containing two phenoxy groups, PhO—.

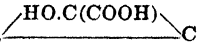
diphenylene. (1) The bivalent $C_{12}H_8$=radical,



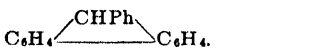
(2) A compound with two $C_6H_4<$ radicals. **d. acetic acid.** Fluorene carboxylic acid. **d. dimethylene.** Dihydroanthracene. **d. dioxide.** Dibenzodioxin. **d. diphenylethylene.** $C_{26}H_{18}$ = 330.2. The hydrocarbon



Yellow crystals, m.229; cf. *difluorene*. **d. ether.** Benzofuran. **d. glycollic acid.** $C_{14}H_{10}O_3$ = 226.1. meso-oxyfluorene carboxylic acid.



Colorless crystals, m.162. **d. imide.** Carbazole. **d. ketone.** Fluorenone. **d. methane.** Fluorene. **d. oxide.** Dibenzofurane. **(methylene-)** Xanthene. **d. oxycarbinol.** Xanthydrol. **d. phenylmethane.** $C_{19}H_{14}$ = 242.1. Msphenylfluorene. The hydrocarbon



Colorless crystals, m.146. **d. sulfide.** Dibenzothiophen. (**methylene-**) Thioxanthene.

diphenylenimide. Carbazole.

diphosgene. $C_2Cl_4O_2$ = 198.0. Perstoff, surpalite, trichloromethyl chloroformate, $Cl.COOCCl_3$. A lung-irritant poison gas, d.1.66, m. −57, b.128, used in World War I.

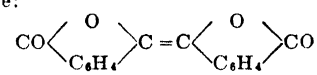
diphosphate. (1) A compound containing two phosphoric acid radicals, $\equiv PO_4$. (2) A compound containing the divalent $=HPO_4$ radical; *e.g.*, sodium diphosphate (Na_2HPO_4), calcium diphosphate $Ca(HPO_4)_2$.

diphosphenyl. $C_{12}H_{10}P_2$ = 216.2. Ph.P:P.Ph. A yellow, crystalline powder.

diphosphoric acid. Pyrophosphoric acid. **anhydro-oxymethylene-** $C_2H_8O_9P_2$ = 238.09. A constituent of green plants (see *phytin*) containing about 26 % phosphorus.

diphospho glyceric acid. $C_3H_8O_{10}P_2$ = 266.0. $[(HO)_2PO.O]_2C_2H_3.COOH$, m.174. It occurs in blood.

diphthalyl. $C_{16}H_8O_4$ = 264.1. The heterocyclic ketone:



Colorless crystals, m.234.

dipicolinic acid. $C_7H_5O_4N$ = 167.1. 1.5 or 2.6-pyridinedicarboxylic acid*. Colorless needles, m.225, slightly soluble in warm water, alcohol, or ether.

dipicrylamine. Hexanitro diphenylamine.

dipiperidyls. Compounds formed by the reduction of pyridine or dipyridyl. They are very soluble in water, giving strongly alkaline solutions which absorb carbon dioxide very readily and regenerate it if subsequently heated.

diplococcin. An antibiotic substance obtained from cultures of certain streptococci.

diplogen. Deuterium.

diplomethane. Methane-*d*.

diplon. Deuteron.

diplosal. $C_{14}H_{10}O_5$ = 258.08. Salicylosalicylic acid, $HO.C_6H_4COOC_6H_4COOH$. Colorless crystals, m.148; used in medicine.

dipole. (1) A co-ordinated valence link between two originally neutral atoms, whereby one loses, and the other gains a share of two electrons. (Cf. *co-valence*). (2) The electrical symmetry of a molecule, hence a charge of positive electricity very close to an equal negative charge. It is measured by the d. moment. **d. moment.** A molecular constant, μ, which indicates the distribution of electrical charges in a neutral molecule. It is zero if they are symmetrically distributed, and up to 5×10^{18} e.s.u., if they are not. Cf. *Debye equation, association.*

Dippel, Johann Konrad. 1673–1734. A German alchemist. **D.'s oil.** The distillation-product of bones and other animal matter, chiefly containing pyridine and pyridine bases. Used as an antiseptic and for denaturing alcohol.

dipping refractometer. See *refractometer.*

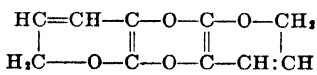
dipropargyl. (1) Bipropargyl. (2) A prefix indicating the presence of two propargyl radicals.

dipropyl- A prefix indicating the presence of two propyl radicals. **d. amine.** $C_6H_{15}N$ = 101.19. The secondary amine $(MeCH_2CH_2)_2NH$. A colorless liquid, $d_{25°}$.0.736, b.110, soluble in water or alcohol. **d. beryllium.** $Be(C_3H_7)_2$ = 95.1. A colorless liquid, m. −17, b.245. **d. cadmium.** $Cd(C_3H_7)_2$ = 198.52. A colorless liquid, d.1.4201, m. −83, b_{21mm}.84. **d. carbinol.** $C_7H_{16}O$ = 116.2. Heptane-4-ol, 3-propylbutanol, $(MeCH_2CH_2)_2CHOH$. A colorless liquid, $d_{22°}$.0.820, b.154, soluble in alcohol or ether. **d. ether.** Propylether. **d. ketone.** Butyrone. **d. mercury.** $Hg(C_3H_7)_2$ = 286.73 A colorless liquid, d.2.124, b.190; insoluble in water. **d. tin.** $Sn(C_3H_7)_4$ = 204.8. A colorless liquid. **d. tin dibromide.** $Sn(C_3H_7)_2Br_2$ = 364.64. Yellow crystals, m.54. **d. tin dichloride.** $(C_3H_7)_2SnCl_2$ = 275.72. White crystals, m.81.

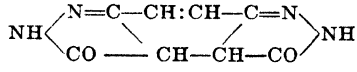
diprotocatechuic acid. $C_{14}H_{10}O_7$ = 290.08. Fine needles, m.237; soluble in acetone or alcohol. It occurs in tannins. Cf. *diresorcylic acid.*

dipsomania. A state of acute craving for alcohol.

dipyranodioxin. The heterocyclic compound



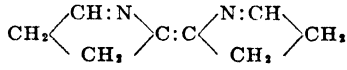
dipyrazolone. A compound containing two pyrazolone groups; *e.g.*, **hexahydrobenzo-** $C_8H_6O_2N_4$. The heterocyclic system



dipyridine. $C_{10}H_{10}N_2$ = 158.22. Nicotyrine. Colorless needles, m.108, soluble in water, alcohol, or ether.

dipyridyl. $C_{10}H_8N_2$ = 156.21. Bipyridine. $C_5NH_4—C_5NH_4$. **beta-** Colorless needles, m.68, b.287, soluble in alcohol or ether. **gamma-** Colorless needles, m.73, b.305, sparingly soluble in water, soluble in alcohol or ether.

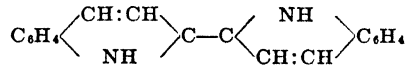
dipyrrole. $C_8H_{10}N_2$ = 134.1. The heterocyclic system



furo- See *furodipyrrole.*

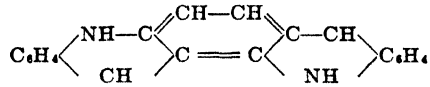
diquinidine. Diconchinine. An alkaloid from cinchona.

diquinoline. $C_{18}H_{14}N_2$ = 258.29.



Yellow needles, m.114, insoluble in water, soluble in alcohol or ether. **alpha-** $C_{18}H_{12}N_2$ = 256.27. Monoclinic scales, m.175, insoluble in water, sparingly soluble in alcohol or ether. **beta-** Monoclinic leaflets, m.191, insoluble in water, soluble in alcohol or ether.

diquinolopyridine. $C_{20}H_{14}N_2$ = 296.3. The heterocyclic ring system.



direct dyes. Substantive dyes.

direct-vision spectroscope. A spectroscope in which a series of prisms is arranged in a tubular container so that the emergent rays follow the direction of the incident rays; the spectrum can thus be viewed directly through a stationary eyepiece.

diresorcinol. $C_{12}H_{10}O_4,2H_2O$ = 254.17. A white, crystalline powder, or long needles, m.310,

soluble in hot water, alcohol ether or glacial acetic acid.

diresorcylic acid. $C_{14}H_{10}O_7$ = 290.08. An isomer of digentisic acid. $(HO)_2.C_6H_2.COO.C_6H_3(OH)COOH$. Micro-needles, decomp. 215, soluble in hot water. It occurs in tannins.

disaccharides. A group of carbohydrates that yield two simple sugars (monosaccharides) on hydrolysis. See *carbohydrates*.

disagglomeration. The transformation of compact masses into a fine powder by chemical means; *e.g.*, the treatment of lead with a solution of lead salts.

disalicylic acid. (1) Salicylic anhydride. (2) Diplosal. **acetylmethylene-** Urasol.

disalicylide. $C_{14}H_{10}O_6$ = 274.1. Salosalicylide. $C_2H_4(OH)COO.C_6H_3(OH)COOH$.

disassimilation. The oxidation of assimilated material, accompanied by the liberation of energy used for work.

disassociation. The breaking apart or splitting of a molecule into simpler constituents. **electrical-** The splitting of molecules into ions; *e.g.*, ionization. **photo-** The disarrangement of molecules under the influence of light; *e.g.*, silver salts. **thermal-** (commonly, *dissociation*). The breaking apart of a molecule into simpler constituents (smaller molecules or atoms) by the action of heat. By lowering the temperature, the split-products again unite and form the original molecule. Cf., *dissociation*.

disazo compound. A compound containing two azo groups of the type R.N:N.R.N:N.R. Many dyes belong to this group. Cf. *diazo compounds*.

disc. A round, plate-like object. **alundum-** A porous plate made of alundum; used as a filter.

discharge. (1) The sudden escape or liberation of stored or accumulated energy; *e.g.*, of electricity (spark-discharge), or of chemical energy (explosion). (2) Any waste liquid of a manufacturing plant. (3) The output of a pump. **disruptive-** A crackling, noisy discharge of electrical energy. **silent-** A slow, or gradual loss of electrical energy due to the conductivity of air. Cf. *saturation current*.

discol. An internal combustion fuel, which contains 50 % of alcohol, 25 % of benzol and 25 % of hydrocarbons.

discrasite. Dyscrasite.

discutient. A drug which effects the disappearance of tumors and inflammatory exudations; *e.g.*, iodine, ichthyol, glycerin.

diselenide. A compound of the type R.Se.Se.R.

disgregation. The reverse of aggregation; *e.g.*, dispersion, separation.

dish. A shallow or flat vessel made of glass or metal. Used extensively in laboratory work. **aluminum-** A dish of aluminum used in milk analysis. **alundum-** A dish made of alundum used for incinerations. **crystallizing-** A shallow glass vessel used for the evaporation and crystallization of solutions. **culture-** A shallow vessel with a flat bottom, made of heavy glass; used for growing cultures of bacteria (Petri-dishes). **filtering-** A dish-shaped cone of porous material, used for filtering. **incineration-** q.v. **moisture-** A d. with loose fitting cover. **weighing-** A flat, covered platinum, aluminum or German silver dish used for weighing.

disilane. See *silanes*. **hexafluoro-** Si_2F_6 = 170.1. A gas, m. −18.7.

disilicic acid. Silicic acid.

disiloxane. $(SiH_3)_2O$ = 106.95. A colorless, odorless combustible gas; m. −144, b. −15.2.

disinfect. To free from infection, especially by destroying disease germs or other harmful microorganisms. Cf. *sterilize*.

disinfectant. An agent that frees from infection; usually a substance which destroys microorganisms (bacteria, protozoa, etc.) but not bacterial spores, *e.g.*, sublimate, phenol, cresol, formaldehyde.

disinfection. A process or method of destroying micro-organisms.

disinfest. To free from infesting insects, rodents or other small animals.

disintegration. (1) Decomposition. (2) See *atomic d.* **artificial-** See *radio elements*.

disintoxicate. Detoxicate.

disk. Disc.

dismutation. The change of one substance into two; as, in Cannizzaro's aldehyde reaction which produces acids and alcohols.

disoxidation. Deoxidation.

dispensary. A place where medicines are dispensed; *e.g.*, an apothecary's shop.

dispensatory. A book giving detailed information of all substances used as drugs. It is more complete than a Pharmacopoeia (q.v.). Cf. *formulary*.

dispensing. The act of compounding medicines and preparing dosages. **d. balance.** A delicate scale, less sensitive than an analytical balance, used in drug stores. **d. dose.** See *dosage*.

dispergator. A peptizing agent. Cf. *peptizator*.

dispersed. Finely divided. Colloidal. **d. phase.** Colloidal matter. Cf. *colloids*. **d. system.** An apparently homogeneous substance which consists of a microscopically heterogeneous mixture of two or more finely-divided phases (solid, liquid, or gaseous), *e.g.*, liquid and liquid (milk); solid and gas (smoke); liquid and gas (fog). See *colloids, orientation, zone*.

dispersimeter. A device for measuring the average grain of optically heterogeneous media; *e.g.*, the uniformity of a tri-color screen or autochrome plate.

dispersion. Scattering. (1) The degree of dispersion of a substance depends on the size of the finely-divided particles, which may be microscopic (microns), ultramicroscopic (submicrons), or subultramicroscopic (amicrons). (2) The separation by refraction of the constituent rays of a beam of non-homogeneous light, *i.e.*, the angle between the extreme rays of the spectrum produced. **coefficient of-** The constant B in the formula $\mu - 1 = A(1 + B/\lambda^2)$, where μ is the refractive index for the wavelength λ, and A a constant. B is used for the identification of oils etc. **d. medium.** The material surrounding dispersed matter.

dispersivity. The difference between the refractivities of a substance for rays of different wavelengths. **specific-** The ratio,

$$r_a - r_b = \frac{n_a^2 - 1}{(n_b^2 + 2)d} - \frac{n_b^2 - 1}{(n_b^2 + 2)d};$$

r_a and r_b are the specific refractivities, and n_a and n_b are the refractive indices for the rays of wave-lengths a and b, respectively, and d is the density of the substance.

dispersoid. A colloidal or finely-divided substance.

displacement. (1) A chemical change in which one element, molecule or radical is removed by another element, molecule or radical. (2) An

ionic change in which one element exchanges charges with another element either by oxidation or reduction. **electron-** Displacement (2). **d. law.** The first enhanced spark-spectrum of an element has a structure similar to that of the element preceding it in the Periodic Table. **d. reaction.** The general equation for displacement of metals is $M + YX = MX + Y$, the metal M being more positive than the metal Y; hence, M is oxidized. The general displacement equation of non-metals is $N + YX = YN + X$, the nonmetal N being more electronegative than the non-metal X; hence N is reduced. **d. series.** Electromotive series, Volta series, constant series. Arrangement of the elements in order of their relative potentials. At the top of the list are the most negative elements, which displace all anions following, and are thus reduced. At the end of the list are the most positive elements which displace all preceding cations and thus become oxidized.

DISPLACEMENT SERIES

Negative	
fluorine	HYDROGEN
CHLORINE	
OXYGEN	TIN
NITROGEN	LEAD
BROMINE	germanium
IODINE	zirconium
SULFUR	cerium
selenium	nickel
tellurium	COBALT
PHOSPHORUS	thallium
chromium	columbium
vanadium	cadmium
tungsten	IRON
molybdenum	ZINC
CARBON	manganese
boron	uranium
GOLD	gadolinium
osmium	indium
platinum	gallium
iridium	ALUMINUM
tantalum	rare-earth metals
palladium	beryllium
ruthenium	scandium
ANTIMONY	yttrium
BISMUTH	MAGNESIUM
ARSENIC	lithium
MERCURY	CALCIUM
SILVER	strontium
COPPER	BARIUM
silicon	SODIUM
titanium	POTASSIUM
	rubidium
HYDROGEN	cesium
	Positive

disproportionation. The conversion of like into two or more unlike molecules; as, $2C_2H_4 = C_2H_2 + C_3H_6$. Cf. *dismutation.*

disruption. A tearing apart or a sudden outburst; *e.g.*, a disruptive charge.

dissection. A cutting to pieces; as, the removal of tissues from an animal or vegetable organism to expose underlying structures.

dissemination. (1) Dispersion. (2) The scattering of seeds by natural causes.

dissipation. The transformation of mechanical into heat energy; as, the internal friction of solids and liquids. **d. constant.** $Q = E/\omega\mu$, where E is Young's modulus, $\omega = 2\pi f$, and μ is the internal viscosity. Q is a measure of the internal friction; values are:

Quartz	100,000
aluminum	50,000
brass	40,000
duralumin	30,000
iron	20,000
permalloy	9,000
silver	6,000
copper	3,000
nickel	2,000
zinc	1,900
glass	1,600
graphite	900
tin	800
lead	30

dissociated. Split into simpler constituents. **electrolytically-** Ionized.

dissociation. The breaking apart of a molecule by physical means. **electrolytic-** Ionization. **photo-** See *disassociation.* **thermal-** Occurs when a solid, liquid, or gaseous molecule is split into simpler molecules or atoms under the influence of heat and re-unites after the temperature is lowered; as,

$$PCl_5 = PCl_3 + Cl_2$$
$$2NH_4Cl_{(solid)} = NH_3 + HCl + NH_4Cl_{(vapor)}$$

Cf. *disassociation.*

d. constant. See law of *mass action.* **d. pressure.** The sum of the partial pressures of dissociated molecules in a system.

dissolution. (1) Solution. (2) Hydrolysis of organic tissues.

dissolve. To bring a solid into solution; as, water dissolves salt, salt dissolves in water.

dissolved. In a state of solution. **d. substance.** A solute, q.v.

dissolvent. Solvent.

dissonance. (1) A discord. (2) A combination of sounds which produces beats.

dissymmetry. Absence of complete symmetry. The optically-active substances are not identical with their mirror images, but have axes of symmetry in their molecular configuration. Cf. *asymmetry.*

distance. The length between two points. Cf. *magnitudes.*

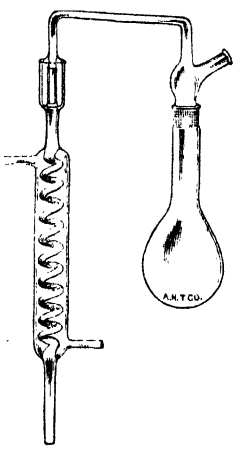
distearin. $C_{39}H_{76}O_5$ = 623.7. Glycerol distearate. The distearic ester of glycerin, m.74.5.

disthene. Cyanite.

distilland. That which is undergoing distillation.

distillate. A liquid which has been produced by condensation from its vapor.

distillation. The purification of a liquid by heating it to its boiling point, and condensing and collecting the vapors. **cold-** Distillation at low temperatures, *e.g.*, in a vacuum **con-** See *condistillation.* **destructive-** The distillation of complex, organic matter (*e.g.*, wood) which decomposes into a number of split products. **fractional-** Slow distillation of a mixture of substances and separate collection of the distillates at each boiling point, or after definite



Distillation apparatus.

temperature intervals. **isothermal-** The transference of water in the form of vapor from a weak to a strong solution in an enclosed space, owing to the difference in vapor-pressures. **repeated-** Cohobation. **steam-** Distillation by the passage of steam through a liquid.

d. apparatus. A device for distillation which generally consists of a closed vessel (retort, flask, kettle) connected with a condenser which leads into a receiver. **d. flask.** A flask of heat-resisting glass having a long neck with tubular outlet. **d. value.** The ratio between the concentration of a steam-volatile substance in the vapor of its boiling solution, to that in the liquid. It is constant for a particular substance, and equals $\log(1 - y)/\log(1 - x)$, where x is the volume of the distillate and y the amount of substance it contains. Cf. *Henry's law.*

distilled. Describing a liquid which has been vaporized and condensed.

distilled water. Vaporized and condensed water; used extensively in the laboratory as solvent. **double-** Water which has been distilled twice, the last time in a still made entirely of glass or of platinum. Used for hypodermic injections.

distillery. A place where distillation is performed; generally a factory making alcohol from fermented sugars. **d. waste.** The residue from the stills from which alcohol has been distilled; it contains K and is used as a fertilizer.

distribution. (1) The occurrence of an element or substance on the earth's surface; the materials may be either diffused or localized, abundant or scarce. Cf. *abundance.* (2) The assimilation or spread of a substance or drug in the animal organism. **d. coefficient.** Partition coefficient, Overton coefficient. A ratio indicating the diffusibility of a substance into the cell protoplasm; *e.g.*, if S_f denotes the solubility of a substance in fat, lecithin, phosphatides, etc., and S_w its solubility in water; then S_w/S_f is the distribution coefficient which will determine its velocity of diffusion into the cell protoplasm. **d. law.** If a substance is dissolved in two immiscible liquids, a and b, then the ratio of its concentrations in each (c_a and c_b), will be a constant; $c_a/c_b = K$. Cf. *partition, Nernst's law.* **d. principle.** Michael's rule. If HX adds on to an olefine linkage, where x is a halogen, x unites with the carbon atom having the lesser number of hydrogens; thus, $CH_3CH{:}CH_2 + HBr \rightarrow CH_3.CHBr.CH_3$. Cf. *Markownikoff's rule.*

distributors. A three- or four-way stop-cock or switch.

distyrene. $C_{16}H_{14}$ = 206.11. The hydrocarbon $(PhCH{:}CH{-})_2$. White crystals, m.124.

disulfate. (1) A pyrosulfate, $M_2S_2O_7$. (2) A bisulfate, $MHSO_4$.

disulfide. A compound containing two sulfur atoms as sulfide. **alkyl-** A organic compound containing a carbon chain and the bivalent —S.S— radical. **ethyl-** Et_2S_2 = 122.22. A colorless liquid, b.151. **methyl-** Me_2S_2 = 94.19. A colorless liquid, b.112.

disulfo- A prefix indicating the presence of two sulfur atoms, either as sulfide or sulfuric acid. **d. acid.** *1*-Naphthylamine-*4.8*-disulfonic acid. **d. benzoic acid.** See *benzoic acid.* **d. chloride.** Sulfur monochloride. **d. cyanate.** Dithionate. **d. cyanic acid.** Dithionic acid. **d. metholic acid.** Methionic acid. **d. naphtholic acid.** Naphthalene disulfonic acid.

disulfole. Dithiole.

disulfonic acid. See *sulfonic acids.*

disulfuric acid. Pyrosulfuric acid.

dita bark. Alstonia, Australian fever bark, Australian quinine. The bark of *Alstonia scholaris*, an Apocynaceae of Australia; used as a febrifuge. It yields ditaine, ditamine, echicerin, echitenine. Cf. *alstonine.*

ditaine. $C_{22}H_{28}O_4N_2$ = 384.23. Echitamine. An alkaloid from the bark of *Alstonia scholaris* or dita bark. Colorless crystals, m.206, soluble in water, alcohol, ether, or chloroform. It is used medicinally like curare. **d. sulfate.** $C_{22}H_{28}O_4N_2.H_2SO_4$ = 700.48. Colorless needles, soluble in water.

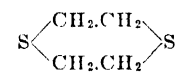
ditamine. $C_{16}H_{19}O_2N$ = 257.2. An alkaloid from the bark of *Alstonia scholaris.* Colorless crystals, m.75, insoluble in water, soluble in ether, chloroform or acids.

ditan. Diphenyl methane.

diterpenes. A group of compounds of general formula $C_{20}H_{32}$. See *terpenes.*

dithanol. Dioxyanthrarobin.

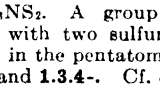
dithiane. (1) Diethylene disulfide. (2) A group of heterocyclic hydrocarbons with two sulfur atoms in the hexatomic ring, as p- or 1.4-



dithiazine. $C_4H_3NS_2$. A group of heterocyclic hydrocarbons with two sulfur atoms and one nitrogen atom in the hexatomic ring, as **1.2.3-, 1.2.4-, 1.3.2-, 1.3.4-, 1.3.5-, 1.4.2-.** The first two numbers indicate the positions of the sulfur atoms.

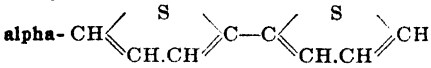
dithiazol. $C_2H_3NS_2$. A group of heterocyclic hydrocarbons with two sulfur atoms and one nitrogen atom in the pentatomic ring, as **1.2.3-, 1.2.4-, 1.3.2-** and **1.3.4-.** Cf. *dithiole.*

dithiene. $C_4H_4S_2$ = 116.1. A group of heterocyclic hydrocarbons with two sulfur-atoms in the hexatomic ring, as p- or 1.4-



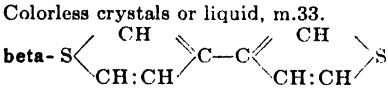
dithienyl. $C_8H_6S_2$ = 166.1.

alpha-



Colorless crystals or liquid, m.33.

beta-



Colorless crystals, m.83, b.266.

d. ketone. $C_9H_6OS_2$ = 194.1. Thienone. Colorless crystals, m.88, b.324. **d. methane.** $C_9H_8S_2$ = 180.1. $(C_4H_3S)_2CH_2$. Colorless crystals, m.43, b.267. **d. phenylmethane.** $C_{15}H_{12}S_2$ = 257.2. $(C_4H_2S)_2.CH.Ph$. Colorless crystals, m.75.

dithiobenzoic acid. $C_6H_5.CSSH$ = 154.1. An oily liquid.

dithiobisalanine. Cystine.

dithiocarbamic acid. $NH_2.CS.SH$ = 93.2. Colorless needles, decomp. by water, soluble in alcohol or ether.

dithiocarbonic acid. CH_2OS_2 = 100.00. The theoretical acid HO.CS.SH. Cf. *xanthic acid.*

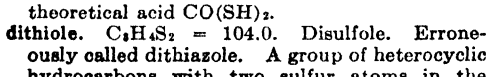
dithiodiazole. $CH_2N_2S_2$. A group of heterocyclic hydrocarbons with two sulfur and two nitrogen atoms in the pentatomic ring. There are the isomers: **1.2.3.4-, 1.2.3.5-, 1.3.2.4-**

1.3.2.5-, 1.3.4.5-. The first two numbers indicate the positions of the sulfur atoms.

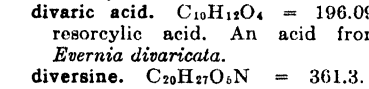
dithioethidene. A compound containing the bivalent —S.CH(CH$_3$).S— radical. **ethylene-** $C_4H_8S_2$ = 120.1. A colorless liquid, b.173.

dithiolcarbonic acid. CH_2OS_2 = 100.00. The theoretical acid CO(SH)$_2$.

dithiole. $C_3H_4S_2$ = 104.0. Disulfole. Erroneously called dithiazole. A group of heterocyclic hydrocarbons with two sulfur atoms in the pentatomic ring, as **o-** or **1, 2-**



m- or **1.3-**



Cf. *dioxole.*

dithion. A mixture of sodium dithiosalicylates. Yellowish-gray powder, soluble in water. Used in veterinary medicine.

dithionate. A salt of the type $M_2S_2O_6$.

dithionic acid. (1) $H_2S_2O_6$ = 162.1. An acid, HO.SO$_2$.SO$_2$.OH, known only in solution and as salts, the hyposulfates. (2) The organic acid, R.CS.SH. Cf. *thio acid.*

dithionite. Hyposulfite. A salt of the type $M_2S_2O_4$.

dithionous acid. $H_2S_2O_4$ = 130.1. Hyposulfurous acid. An acid, HO.SO.SO.OH, known only in solution and as salts (hyposulfites).

dithiosalicylate. Thioform.

dithiosalicylic acid. See *thioform.*

dithiourazole. $C_2H_3S_2N_3$ = 133.2. Colorless crystals, m. 245. Cf. *urazole.*

dithiourethane. Ethyl dithiocarbamate. NH$_2$.CS.SEt.

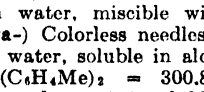
dithiozone. Dithizone.

dithizone. $C_{13}H_{12}N_4S$ = 360.09. Diphenylthiocarbazone, phenylazothionoformic acid, dithiozone, PhN:N.CS.NH.NHPh. Blue-black crystals, soluble in CCl_4 (green color), in alkalis (with red color) and sulfuric acid (blue color). Used as microreagent for lead (brick red), copper (yellow brown) and zinc (purple); also to separate these from other metals.

dithranol. Dioxyanthranol, anthrarobin. 1,8-Dihydroxyanthranol, $C_{14}H_7(OH_3)$; used in treating psoriasis and other skin infections.

ditolyl. $C_{14}H_{14}$ = 182.19. Dimethyldiphenyl. Me.C$_6$H$_4$.C$_6$H$_4$.Me. **2.2'-**, or o,o-. A colorless liquid, b.272, insoluble in water, soluble in alcohol or ether. **2.3'-**, or o,m-. A colorless liquid, b.228, insoluble in water, soluble in alcohol or ether. **3.3'-**, or m,m-. A colorless liquid, b.286, insoluble in water. **4.4'-**, or p,p-. Colorless prisms, m.121, soluble in alcohol or ether. **d. amine.** $C_{14}H_{15}N$ = 197.23. A group of 9 isomers, (MeC$_6$H$_4$)$_2$NH; as, (**ortho-**) A colorless liquid, b.313, sparingly soluble in water. (**meta-**) A colorless liquid, b.319, insoluble in water, miscible with alcohol or ether. (**para-**) Colorless needles, m.79, b.330, insoluble in water, soluble in alcohol or ether. **d. tin.** Sn(C$_6$H$_4$Me)$_2$ = 300.81. A yellow amorphous powder, m.111, soluble in benzene.

diurea. $C_2H_4O_2N_4$ = 116.1. Biurea, *p*-urazine, bishydrazicarbonyl,



Colorless crystals, m.270, an isomer of urazine. Cf. *biuret.* **acetylene-** Glycol uril.

diureide. A compound that contains two —NH.CO.NH— radicals.

diuretic. A drug which increases the kidney or renal excretions and thereby produces an increased discharge of urine; *e.g.*, caffeine, digitalis, theobromine, acetates, citrates, bitartrates.

divalent. (1) Describing an element occurring in two states of oxidation; as, mercury (1 and 2) or cobalt (2 and 3). (2) Bivalent.

divanadyl. The tetravalent $V_2O_2^{++++}$ radical.

divaric acid. $C_{10}H_{12}O_4$ = 196.09. 6-propyl-β-resorcylic acid. An acid from the lichen *Evernia divaricata.*

diversine. $C_{20}H_{27}O_5N$ = 361.3. An alkaloid found in the root and stem of *Sinomenium acutum*, a Menispermaceae. A yellow, amorphous powder, m.85, insoluble in water, alcohol or benzene, soluble in petroleum ether. Cf. *sinomenine.*

divi-divi. The pods of *Caesalpinia coriaria*, which are rich in tannin and are used in the tanning and dyeing industry.

divinyl. (1) Bivinyl. (2) A prefix indicating the presence of two vinyl radicals. **d. acetylene.** C_6H_6 = 78.046. *1.5*-Hexadien-*3*-yne*. The hydrocarbon CH$_2$:CH.C:C.CH:CH$_2$, obtained as oily liquid, d.0785, b.83.5, by passing acetylene into ammoniacal cuprous chloride; it is a basis for synthetic rubber. Cf. *duprene, chloroprene.* **d. benzene.** $C_{10}H_{10}$ = 130.08. The unsaturated aromatic hydrocarbon, CH$_2$:CH.C$_6$H$_4$.CH:CH$_2$. **d. ether.** C_4H_6O = 72.05. Vinyl ether, ethenoxyethene*, (CH$_2$:CH$_2$)$_2$O. A colorless liquid, d.0774, b.28.3, an anesthetic. **d. ketone.** Pentedienone.

dixanthylurea. The alcohol-insoluble product of xanthydrol and urea [O(C$_6$H$_4$)$_2$CHNH]$_2$CO; used to determine the latter in urine.

dixylyl. Two xylyl radicals, C$_6$H$_3$Me$_2$—. **d. tin.** Sn(C$_6$H$_3$Me$_2$)$_2$ = 328.84. Colorless crystals, m.157.

djalmaite. A yellow, brown or black radioactive crystalline mineral of Brazil containing 72 % Ta_2O_5 and traces of rare earths.

djenkol bean. See *jenkolic acid.*

djenkolic. Jenkolic.

djenkolik acid. See *jenkolic.*

dkg. Abbreviation for dekakilogram—10 kg.

dkl. Abbreviation for dekaliter—10 liters.

dkm. Abbreviation for dekameter—10 m. **dkm^2.** Abbreviation for square dekameter —100 m^2. **dkm^3.** Abbreviation for cubic dekameter—1000 m^3.

dl. Abbreviation for deciliter—0.1 liter.

dl- A dextro- *and* levo- compound, *e.g.* inactive (*i-*) or racemic (*r-*).

d(l)- A dextro- *or* levo-compound.

D.M. Diphenylamine chlorarsine.

dm. Abbreviation for decimeter—0.1 m. **dm^2.** An abbreviation for square decimeter—100 cm^2. **dm^3.** Abbreviation for cubic decimeter —1000 cm^3.

Dobell solution. An aqueous solution of 1.5 % sodium borate, 1.5 % sodium bicarbonate, 0.3 % carbolic acid and glycerin. Used as alkaline antiseptic.

Döbereiner, Johann Wolfgang. 1780–1849. A German chemist, noted for organic syntheses, experiments on the catalytic action of platinum, and the classification of elements. **D.s matchbox or lamp.** A portable device for producing a flame by passing hydrogen gas over platinum sponge in contact with air. **D.'s rule.** The atomic weights of similar elements, A, B and C, is approximately 2B = A + C (see *triads*).

Döbner's violet. See *violet.*

docosane*. $C_{22}H_{46}$ = 310.5. The hydrocarbon, $Me(CH_2)_{20}Me$, m.44.

docosanoic acid*. Behenic acid.

docosanol*. $C_{22}H_{46}O$ = 326.5. A group of monoatomic alcohols; *e.g.* **1-** or $Me(CH_2)_{20}CH_2OH$.

docosoic acid. Behenic acid.

doctor solution. Sodium plumbite solution containing flowers of sulfur. **d. test.** Gasoline is mixed with d. solution, and the presence of sulfur is shown by the formation of lead sulfide. **d. treatment.** Petroleum is agitated with sodium plumbite solution and free sulfur.

dodecahedron. A solid with twelve equal surfaces.

dodecanal*. Lauricaldehyde.

dodecane*. $C_{12}H_{26}$ = 170.28. The hydrocarbon $Me(CH_2)_{10}Me$. A colorless liquid, $d_{20°}$.0.768, m. −12, b.214.5, insoluble in water, soluble in alcohol or ether.

dodecanic acid. Lauric acid. **hydroxy-** Sabinic acid.

dodecanoic acid*. Lauric acid.

dodecanol*. Dodecyl alcohol.

dodecenal*. $C_{12}H_{22}O$ = 182.20. Δ^2-dodecene-1-aldehyde, $Me(CH_2)_9CH{:}CH.CHO$. An aldehyde in the essential oil from the stems and leaves of *Eryngium foetidum*, an Umbelliferae.

dodecene*. Dodecylene.

dodecoaldehyde. Lauric aldehyde.

dodecoic acid. Lauric acid.

dodecyl. The monovalent radical $C_{12}H_{25}$—. Cf. *lauryl*. **d. alcohol.** $C_{12}H_{26}O$ = 186.20. *n-* or *l*-Dodecanol*, $Me(CH_2)_{11}OH$. Colorless crystals, d.0.831, m.24, b.259. **d. amine*.** $C_{12}H_{27}N$ = 185.22. Aminododecane. Colorless crystals, m.28, $b._{15mm}$135.

dodecylene. $C_{12}H_{24}$ = 168.27. Decylethylene, *l*-dodecene*, $CH_2{:}CH(CH_2)_9Me$. A colorless liquid, $d_{20°}$.0.785, m. −31.5, b.213 insoluble in water, soluble in alcohol or ether.

dog grass. Triticum.

dogwood. (1) A genus of trees and shrubs. (2) Cornus. The dried roots of *C. florida* of Eastern United States; used as an astringent and tonic. Cf. *cornuoid*. **Alder-** Frangula. **Jamaica-** Piscidia. **pond-** or **swamp-** See *cephaletin*.

dolerite. A coarse-grained basalt.

dolerophanite. Cu_2SO_5. A copper persulfate in volcanic sublimates.

Dolezalek electrometer. A quadrant electroscope.

dolomite. $CaMg(CO_3)_2$. An important calcium-magnesium carbonate, which forms mountain ranges as a white, grayish, or yellowish rock, d.2.85–2.95, hardness 3.5–4, soluble in acids. See *brown spar*, *bitter spar*, *rhombic spar*.

dolomol. $Mg(C_{18}H_{35}O_2)_2$ = 590.8. Magnesium stearate, containing small amounts of the oleate and 7 % MgO. A soft white, light unctuous powder, odorless and tasteless, insoluble in water; used as a dusting powder, to substitute zinc stearate.

dome. A dome-shaped crystal-face, chiefly in the rhombic system. **d. faces.** Prism faces developed parallel to a lateral axis, and intersecting the other two axes. *Brachy-* A dome face parallel to the brachy (shorter) axis. *Macro-* A dome face parallel to the macro (longer) axis.

domesticine. $C_{19}H_{19}O_4N$ = 325.15. An alkaloid from the sacred bamboo of Japan, *Nandina domestica*, a Berberidaceae. Cf. *nandinine*.

domeykite. Cu_3As. A rare copper arsenide.

domingite. $Pb_3Sb_4S_9$. Warrenite. A lead sulfostibate.

donarite. An explosive consisting of 70 % ammonium nitrate, 25 % trinitrotoluol and 5 % nitroglycerin.

donaxine, Gramine.

donor. See *induced reactions*.

Donnan, F. G. 1870– . An English physical-chemist. **D. equilibrium.** If a nondiffusible substance (*e.g.*, protein, P) is separated from diffusible substances by a semipermeable membrane, the ions will pass through in different amounts, and establish an electrostatic difference (the membrane potential); hence the osmotic pressure within is greater than that of the outer solution. Thus, at equilibrium in, *e.g.*, *neutral* solution:

$$[Na^+] \times [P] \times [Cl^-] = [Na^+] \times [Cl^-].$$

acid solution:

$$[Cl^-] \times [Cl^- \text{ on } P] \times [H^+] = [Cl^-] \times [H^+].$$

basic solution:

$$[Na^+] \times [Na^+ \text{ on } P] \times [OH^-] = [Na^+] \times [OH^-]$$

dopa. $C_9H_{11}NO_4$ = 197.08. *3,4*-Dihydroxyphenylalanine. An amino acid and the precursor of melanin.

dope. (1) A lacquer or varnish, especially for aircraft. (2) The absorbent material in high explosives. (3) A narcotic.

Döppler principle. (1842.) Wave-type radiations (*e.g.*, of light or sound) emitted by a moving object decrease and increase in wave-length as the object approaches and recedes from the observer, respectively.

dopplerite. $C_{12}H_{14}O_6$. Masses of humus imbedded in peat; 56.5 % C, 5.5 % H.

Doremus ureometer. A graduated glass tube bent at its open end and blown into a bulb; used for determining urea in urine.

dormiol. $CCl_3.CHOH.OMe_2Et$ = 233.49. Amylene chloral, ethyldimethyl-carbinolchloral. A colorless liquid, d.1.24, insoluble in water, soluble in alcohol, ether, chloroform, or benzene. Used as a hypnotic.

Dorn-Goetz tube. A glass tube, partly evacuated and filled with gas; used for spectroscopic investigations.

dorosmic acid. $C_{17}H_{34}O_2$ = 270.27. A fatty acid from the oil of *Dorosma nesus* which forms small needles, m.55, soluble in hot alcohol, ether or benzene. It is probably identical with margaric acid.

dose. The quantity of medicine given at one time. **daily-** The quantity of drugs administered per day. **fatal-** The quantity of medicine to cause death. **lethal-** Fatal d. **maximum-** The largest amount of medicine which can be given with safety. **minimum-** The smallest amount of medicine that will produce a physiological action. **poisonous-** Toxic d. **safe-** A dose between the minimum and maximum dose. **single-** A medicine that is given once only. **toxic-** The d. which will produce poisonous and harmful effects.

dotriacontane*. Diacetyl.

double bond. △. A condition which exists in unsaturated compounds where two single valence bonds connect two atoms; *e.g.*, $H_2C{=}CH_2$. It is characterized by a readiness to become saturated. Cf. *unsaturated*.

double salt. A compound which crystallizes as a single substance but which, on dissolving,

ionizes as two substances; *e.g.*, $KAl(SO_4)_2 \rightarrow K^+ + Al^{+++} + 2SO_4^{--}$. (Cf. *complex salts.*) **d. weighing.** A method of obtaining the true weight of a substance independent of irregularities in the length of the balance-arm, by weighing it first on one side of the balance and then on the other.

doublet. (1) See *multiplet.* See *duplet.*

douglasite. $K_2FeCl_4.2H_2O$. A potassium-iron chloride from Stassfurt, Germany. It causes miner's damp, as it reacts with water and forms hydrogen.

D.O.V. Distilled oil of vitriol, containing approx. 96 % H_2SO_4.

Dover's powder. A mixture of morphine, emetine, and camphor, used as an anodyne and hypnotic.

dowicide-P. Trade name for a wood-preserving spray containing sodium tetrachlorophenoxide and sodium dichloro-orthophenyl phenoxide.

dowtherm. A eutectic mixture of phenyl ether and 26.5 % of diphenyl, m.12, b.258. Used for heating purposes in a manner similar to steam; it enables temperatures to be carefully controlled.

dP. Abbreviation for difference in pressure.

dr. Abbreviation for dram—3.88 grams. **dr. ap.** Apothecaries' dram, = ʒ. **dr. av.** Avoirdupois dram. **dr. fl.** Fluid dram.

dracaenic acid. $C_{12}H_{12}O_3$ = 204.09. An acid from *Dracaena draco*, the dragon-tree of Teneriffe.

dracilic, dracylic acid. (1) Obsolete term for benzoic acid. (2) *p*-Aminobenzoic acid.

drachm. Dram.

dracoalban. $C_{20}H_{40}O_4$ = 344.4. A white substance, m.200, from dragon's blood.

dracoresin, dracoresene. $C_{26}H_{44}O_2$ = 388.34. A yellow, resinous substance from dragon's blood.

draconic acid. Anisic acid.

draconis sanguis. Dragon's blood.

draconyl. $C_{14}H_7$ = 175.1. A hydrocarbon obtained by the distillation of dragon's blood.

draconylic acid. Anisic acid.

dracylic acid. See *dracilic acid.*

draft gauge. A barometer-like instrument for measuring drafts in flues.

Dragendorff, Johann Georg Noel. 1836– . A German pharmacist, analyst and author. **D. reagent.** Suspend 1.5 gm. bismuth subnitrate in 20 cc. hot water; add 7 gm. potassium iodide and 20 drops of dilute hydrochloric acid. **D. reaction.** The sulfates of many alkaloids give an orange-red precipitate with D. reagent.

dragon's blood. Sanguis draconis. The resinous exudation from the fruits of rattan palms, a group of climbing Palmae of India, Sumatra, and Borneo. Odorless, tasteless masses, insoluble in water, soluble in alcohol or ether giving a red solution. Used to color plasters. **d. gum.** Tragacanth.

dram. Drachm. A unit of apothecaries weight, ʒ. One dram = 0.16 ounces = 3 scruples = 60 grains = 3.8879351 grams. **fluid-** One eighth of a fluid ounce; 60 minims.

Draper effect. The period of hesitation or photochemical induction observed when a mixture of hydrogen and chlorine is exposed over water to diffused daylight. **D. law.** Absorption law. Only rays which are absorbed by a system are effective in producing a chemical change in it.

drastic. A drug having powerful irritating and purgative action; *e.g.*, croton oil, elaterin.

draught. A current of air or gas. **d. gauge.** See *draft gauge.* **d. tube.** A glass tube used in qualitative analysis. The substance is placed in it, heated in a current of air and the decomposition products observed.

draw-tube. A tube sliding within another; as, the portion of the microscope carrying the eyepiece. Cf. *draught tube.*

drierite. Anhydrous calcium sulphate used as desiccant.

driers. (1) Siccatives. A group of oxidizing substances which, when added to varnishes, paints, etc. hasten the drying; as, solutions of resinates of lead, manganese, zinc, cobalt and/or manganese borate, oleate, dioxide, etc. (2) A mechanical device for removing moisture from a substance, either by heat, air currents or both.

dritt. (1) The uncertain motion of a galvanometer needle when registering a false e.m.f. (*e.g.*, with a poisoned hydrogen electrode). (2) The passage of an electron from its normal position without complete transference. Cf. *bonds.*

drikold. Dry ice.

drimin. $C_{13}H_{14}O_4$ = 234.1. A crystalline substance, m.256, from the leaves of *Drimys winteri*, a Magnoliaceae of South America. Cf. *winter's bark.*

drimol. $C_{28}H_{58}O_2$ = 426.6. A wax from the leaves of *Drimys granatensis*, a Magnoliaceae of South America.

drip. (1) The amount of liquid which seeps or leaks from a container. (2) That portion of liquid which can be expressed from muscle substance.

dried. Hide steeped in chrome alum, dried, and soaked in melted paraffin wax to render it waterproof.

dropping bottle. A small glass bottle with pipette and rubber bulb; or with a specially designed glass stopper enabling the contents to be delivered drop by drop. **d. funnel.** A separatory funnel with long stem, and glass stopcock. **d. pipette.** A small glass tube drawn out to a point at one end, with a rubber bulb at the other end.

Dropping bottle.

drop-reaction. Spot test.

drops. Small round masses of liquid, ordinarily 0.1–0.3 cc. **Prince Rupert-** Solidified glass drops with tips, which possess great internal strain and shatter to a fine powder when the tips are broken off.

drosera. Sundew. The air-dried, flowering plant of *Drosera rotundifolia*, or other Droseraceae; used as a mild astringent and a remedy in respiratory diseases, as fluid extract.

dross. Scum, scurf. The impurities floating on molten metals. **opium-** Yenshee.

Druce, F. G. R. An English chemist noted as codiscoverer of the element dvimanganese (rhenium).

drug. (1) A substance used as medicine. It is assumed that drugs contain a pharmacophore and anchoring group (q.v.). (2) A material derived from vegetable or animal sources. **crude-** The commercial form of a drug which requires refining before use. **inorganic-** Inorganic salts, acids, or bases used as medicines; *e.g.*, sodium bicarbonate, mercury salts. **official-** D. listed in Pharmacopoeias. **organic-** Organic compounds used as medicines.

Drugs, Classification:

1. According to composition or principal constituents:
   Inorganic chemicals—acids, bases, salts (q.v.).

Organic chemicals—alkaloids, glucosides, terpenes, synthetics (q.v.).
Biochemicals—proteins, starches, gums, oils (q.v.).

2. According to structure or physical characteristics:
Underground organs—roots, rhizomes, tubers, bulbs (q.v.).
Overground stems—woods, barks, herbs (q.v.).
Outgrowths of stems—leaves, flowers, fruits, seeds (q.v.).
Plant secretions and products—extracts, sugars, resins, gums, camphors, essential oils (q.v.).
Animals and animal tissues—insects, ductless glands (q.v.).
Animal secretions—serum and bacterial products (q.v.).

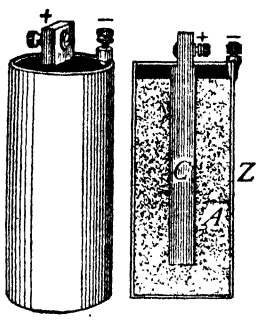
3. According to effect and use:
Therapeutic agents (q.v.).

4. According to origin and source:
Botanical classification (q.v.).
Insects, animal secretions and ductless glands (q.v.).

drumine. An alkaloid from the milky juice of *Euphorbia drummondii*, an Australian Euphorbiaceae; used as a local anesthetic.

Drummond, Thomas. 1797–1840. An English engineer, who invented the calcium light or limelight, q.v.

dry. (1) Free from moisture. (2) To evaporate. **air-Dried** in air. **bone-** completely free from water. **d. battery.** Set of dry cells. **d. cell.** An electrical cell of moist paste instead of a liquid electrolyte. See *Gassner cell* and figure. **d. ice.** Drikold. Solid carbon dioxide used as a refrigerant. **d. method.** Analysis by heat; e.g., blowpipe analysis, spectrum analysis, pyrolysis.



Dry cell.
C = carbon
Z = zinc
A = ammonium nitrate

dryers. Driers.

drying. The removal of moisture or water by heat, vacuum, or chemical agents. Cf. *dehydration.* **d. agents.** (1) Driers. (2) An agent that removes water, as heat or chemicals (see *desiccant*). Drying agents for organic liquids (alcohols, etc.) are, metallic sodium, calcium oxide, metallic calcium, barium oxide, aluminum amalgam. **d. oil.** A liquid fat which absorbs oxygen and becomes hard and resinous. They are mainly the glycerides of linoleic and linolenic acids which dry up forming varnish-like masses, and do not produce elaidin, *e.g.*, linseed oil, poppy oil, tung oil. **d. oven.** A receptacle used for drying by heat. **d. tube.** A U-shaped glass tube filled with a drying agent; (*e.g.*, calcium chloride, sulfuric acid); used for drying gases and vapors.

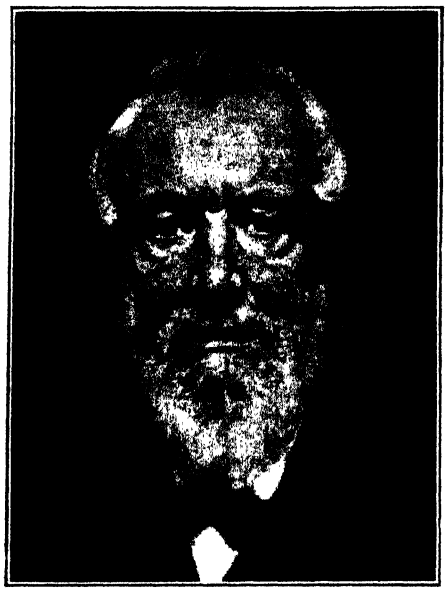
drypophantin. $C_{23}H_{18}O_5$ = 544.2. The coloring matter of red pea gall. It yields purpurogallin and glucose on hydrolysis.

Ds. The symbol for dysprosium. (Also Dy.)

dualin. An explosive composed of 50 % nitroglycerin and 50 % nitrated sawdust.

dubhium. Db. A supposed element isolated in 1916 by Eder, but identical with ytterbium.

duboisine. $C_{17}H_{23}O_3N$ = 289.2. *l*-Hyoscyamine. An alkaloid from the leaves of *Duboisia myoporoides* (corkwood), a Solanaceae of New South Wales. Microscopic, white needles, m.107, sparingly soluble in water, soluble in alcohol, ether, or chloroform. Used as a sedative, hypnotic, and mydriatic, and related to belladonine, atropine and hyoscyamine. **d. hydrobromide.** $C_{17}H_{23}O_3N.HBr$ = 370.13. A yellow, granular, hygroscopic powder, soluble in water, alcohol, or ether. **d. hydrochloride.** $C_{17}H_{23}O_3N.HCl$ = 325.67. A yellowish, deliquescent powder, soluble in water, alcohol or ether. **d. sulfate.** $(C_{17}H_{23}O_3N)_2H_2SO_4$ = 676.4. A yellowish powder, soluble in water, alcohol or ether; used for hypodermic medication as a substitute for atropine.


Emil Du Bois-Reymond.

Du Bois-Reymond, Emil. 1818–1896. A German physiologist and pioneer in the study of diffusion and animal electricity. He devised the mirror galvanograph and the spring myograph.

Duboscq colorimeter. See *colorimeter.*

duco. A trade name for lacquer.

ductile. Able to be drawn out into a fine wire.

ductility. The extent to which a solid is ductile. **d. machine.** A mechanical device for testing the ductility of materials; *e.g.*, metals, asphalt, and bituminous materials. Cf. *chew.*

ductless glands. Glands of the mammalian body that secrete enzymes into the blood which perform important chemical reactions. Cf. *hormones.* Some are used therapeutically, *e.g.*, Thyroidum siccum (dried thyroid gland), Suprarenalum siccum (dried suprarenal gland). Cf. *adrenaline, hypophamine, thyroxine.*

Dudley apparatus. A glass apparatus for the determination of sulfur in iron and steel by the bromine method. **D. pipet.** A pipet graduated

so as to deliver 100 cc. water at 10°C. in 35 seconds. Used for viscosity tests.

dufrenite. $H_3Fe_2PO_7$. A fibrous, greenish, orthorhombic, hydrous iron phosphate.

dufrenoysite. $Pb_2As_2S_5$. A gray, orthorhombic, brittle, lead sulfarsenide, d.5.5, hardness 3.

dugaldine. A glucoside from *Helenium* (*Dugaldia*) *hoopesii*, Western sneezewood, a Compositae.

dugong oil. The oil from the superficial fat of the sea-cow, *Halicore australis*, a herbiverous aquatic mammal; used as a substitute for cod-liver oil.

dulcamara. Bittersweet, woody nightshade, scarlet berry, felonwood, violet bloom. The young branches of *Solanum dulcamara*, a Solanaceae; used medicinally as fluid extract. It contains several glucosides and 1 % solanine, dulcamarin, etc.

dulcamarin. $C_{22}H_{34}O_{10}$ = 458.3. A glucoside from the stems of *Solanum dulcamara;* it is hydrolysed by dilute acids to dulcamarrhetin.

dulcamarrhetin. $C_{16}H_{26}O_6$ = 314.2. A dark-brown, tasteless, resinous substance, obtained as split product from dulcamarin.

dulcigen. A compound which yields a sweet-tasting substance. Cf. *chromogen.*

dulcin. (1) Sucrol. (2) Dulcitol.

dulcine. Dulcitol.

dulcite. Dulcitol.

dulcitol. $C_6H_{14}O_6$ = 182.15. Euonymin, dulcin, *1.2.3.4.5.6*-hexanehexol*, dulcite, dulcose, melampyrine, hexahydrohexane, $HOCH_2(CHOH)_4CH_2OH$. A hexatomic alcohol from the sap of *Melampyrum*, *Scrophularia*, and *Euonymus* species. Colorless, monoclinic needles, d.1.466, m.188.5, b.275-280, slightly soluble in water, alcohol, or ether; used as a sweetening for diabetics. **iso-** Rhamnose.

dulcose. Dulcitol.

Dulin rotarex. An electrically-driven centrifuge, used for determining the mineral matter in asphalts, etc.

Dulong, Pierre Louis. 1745–1838. A French chemist noted for work on the specific heat of elements and on nitrogen compounds. **D. and Petit law.** The elementary atoms or molecules have an equal capacity for heat, (the atomic heat capacity, AH). Thus, atomic weight × specific heat is approximately 6.2, and is the same for all elements (at constant pressure). Certain elements of low atomic weight and high melting-point, obey the law only at high temperatures (*e.g.*, Be, B, C, Si).

Dumas, Jean Baptiste André. 1800–1884. A French chemist noted for research on atomic weights, the gravimetric decomposition of water and the composition of air. **D. bulb.** A thin, blown, glass bulb drawn out to a fine opening; used in vapor-density determinations.

dumasin. An isomer of mesitone obtained on dry distillation of calcium acetate.

dumortierite. $Al_6HBSi_3O_{20}$. An orthorhombic, blue, black-green, lavender, or black, rock-forming aluminum boro-silicate, d.3.3, hardness 7.

dumosa oil. An oil from *Eucalyptus dumosa.* Cf. *lerp.*

dundakine. An alkaloid from the bark of *Sarcocephalus esculentus*, (dundaki), a Rubiaceae of the Cameroons.

dundasite. A rare aluminum and lead carbonate.

dung bacteria. Caprophyl. The bacteria which occur normally in manure.

dunite. A grayish-green peridotite rock, consisting of chrysolite and olivine, from Corundum Hill, N. C.

Dunning colorimeter. A device for comparing colored solutions, especially adapted to the estimation of phenolsulfonephthalein which is excreted with urine in the renal function test.

duotal. Guaiacol carbonate.

duplet. Doublet. A pair of electrons which is shared by two atoms and corresponds with a single, nonpolar bond.

duplex slide rule. A slide rule marked with chemical and physical constants.

duponol. The trade-mark of a group of fatty alcohol sulfates possessing surface-active properties.

Dupont nitrometer. An arrangement of gas burettes for the determination of nitrogen in explosives.

duprene. Trade name for a synthetic rubber made by polymerization of chloroprene. Cf. *vinyl acetylene.*

durain. A constituent of coal, q.v.

duralium. An alloy of 93–95 % Al, 3.5–5.5 % Cu, and small amounts of magnesium and manganese; used for chemical equipment.

duralumin. A strong, hard, and resistant alloy of 0.5 % Mg, 0.25–1.00 % Mn, 3.5–4.5 % Cu, and 93–95 % Al, with traces of Fe and Si. It can be machined like wrought iron, and resists dilute acids and sea-water.

durangite. $AlNaFAsO_4$. An orange-red, monoclinic sodium aluminum fluo-arsenate, soluble in sulfuric acid, d.3.95, hardness 5.

durene. $C_{10}H_{14}$ = 134.16. α- or **s-**. Durol, 1.2.4.5-tetra-methylbenzene, $C_6H_2Me_4$. Colorless, monoclinic crystals, m.79, b.193; insoluble in water, soluble in alcohol, ether, or benzene. β- or **iso-** 1.2.3.5-tetramethylbenzene. A colorless liquid, b.195. γ- or **v-** Prehnitene. 1.2.-3.4-tetramethylbenzene. A colorless liquid, m. −4, b.204. **hexahydro-** Tetramethyl *cyclohexane.*

durenol. $C_{10}H_{14}O$ = 150.1. The phenol derived from durene: 1.2.4.5-tetramethyl-3-hydroxybenzene.

duridine. $C_{12}H_{15}N$ = 149.12. Aminodurene, 3-amino-1.2.4.5-tetramethyl benzene.

duriron. A resistant alloy of 84.5 % Fe, 14 % Si, and 1.5 % of other elements.

durite. Trade name for a phenol-formaldehyde plastic.

durium. A synthetic resin used particularly for phonograph records.

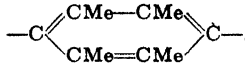
durol. Durene.

durra. Kaffir corn, broom corn, shallu. The plant or seeds of *Sorghum vulgare* (*Andropogon sorghum*) of South Africa.

durrin. $C_{14}H_{17}NO_7$ = 311.14. A cyanogenetic glucoside from the young plants of durra.

duryl. The monovalent radical, Me_4C_6H—, derived from durene. **d. aldehyde.** $C_{10}H_{12}O$ = 148.09. 2.4.5-trimethylbenzaldehyde. $Me_3C_6H_2CHO$.

durylene. The bivalent radical



durylic acid. $C_{10}H_{12}O_2$ = 164.1. 2.4.5-trimethylbenzoic acid, cumylic acid, $C_6H_2Me_3.COOH$. A monobasic acid derived from durene. Colorless crystals, m.150, are soluble in water, alcohol, or ether. **iso-** 2.4.6-Trimethyl-benzoic acid.

dust. A finely-powdered earth or waste material. The median size of outdoor d. is 0.5 microns; industrial d. 1.5 microns. **cosmic-** The finely divided matter floating in the outer layers of the atmosphere; and supposed to originate from meteors, and comets. **industrial-** The organic (fibers, flour, etc.) and inorganic (rocks, metals) particles produced in mills, mines, polishing, cutting and other plants.

Dust	Millions of particles per cubic foot air		
	Min.	Av.	Max.
Outdoor air during rain.	0.3	0.3	0.4
Grinding shop.....	1.2	4.8	25.0
Cement plant.....	0.6	26.0	105.0
Granite cutting.....	2.4	59.2	201
Coal mining.....	5.3	112.0	253
Anthracite mining.....	3.6	231	954

d. chamber. An enlargement in a flue in which the more solid particles of fumes, gases or vapors may collect. **d. precipitator.** A d. chamber equipped with charged high-tension wires, which precipitate solid particles from fumes or vapors. See *Cottrell precipitator.*

dusting. Applying a fine powder as, **cotton-**, spraying a cotton field; **forest-**, spraying a forest with calcium arsenate or other disinfectants from an airplane in order to control pests. **d. powders.** The fine-grained solids used in medicine to sprinkle over wounds or on the skin; as, talcum powder.

Dutch liquid. Ethylene dichloride. **D. metal.** An alloy of 80 % copper and 20 % zinc. **D. process.** An old method of preparing white lead, still used today. It is the slow formation of lead carbonate from lead by the carbon dioxide evolved from fermenting bark. **D. white.** A white lead pigment adulterated with 2 parts barium sulfate in 3 parts of pigment.

dvi. The Sanskrit for two or second. It has been applied to the second un-discovered element of a group in the periodic system. Cf. *eka-elements.*

dvicesium. Virginium, verium. The element of atomic number 87, Dc = 224; more correctly named eka-cesium. Cf. *russium.*

dvimanganese. The element of atomic No. 75. See *rhenium.*

dvitellurium. Polonium.

Dvorkovitz process. The low temperature carbonization of coal in vertical retorts, the gas being drawn off at the bottom.

dwi. Dvi.

Dy The symbol for dysprosium. (Also Ds.)

dyad. A divalent element or radical. Cf. *monad, triad.*

dyamettin. A glucoside from the root of *Cissampelos pareira.* Cf. *deyamettin.*

dye. A coloring matter used in solution for staining materials, as opposed to pigments which are used in suspension, *e.g.*, for painting. A dye consists of a chromophore group and a salt-forming group (anchoring group). Cf. *dyes.* **d. bath.** A solution of a dye for dyeing. **d. stuff.** Dye. **d. wood.** A wood that yields a coloring matter on extraction. Cf. *brazilwood, hematoxylon.*

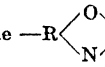
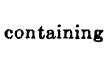
Dyer, Bernard. 1856– . A British chemist noted for his work on analysis, with particular reference to foodstuffs, and agricultural products.

dyes. Dyestuffs. They are generally coal tar or aniline colors. Classification:

A. based on application:
1. Substantive or direct d., which dye directly by mere immersion in (a) *acid*, or (b) *basic* bath.
2. Adjective or mordant d., which require a fixing agent.
3. Sulfur d., which need a sodium sulfide bath followed by oxidation.
4. Vat d., which are generally insoluble and applied in their soluble and colorless, reduced or leuco-state and oxidized afterwards.
5. Ingrain colors, deposited on the fabric as a result of the formation of an insoluble dye by chemical reaction. The fiber is immersed first in one, then the other reagent.

B. based on structure:
1. nitro-nitroso dyes; *e.g.*, aurantia, naphthol yellow.
2. azo-oxy dyes; *e.g.*, curcumin.
3. pyrazolone dyes; *e.g.*, tartrazine.
4. azo-tetrazo dyes; *e.g.*, tropaeolin, acid yellow, tropidines.
5. hydroxyketone dyes; *e.g.*, alizarin dyes.
6. di-, triphenylmethane dyes; *e.g.*, auramine, malachite green.
7. pyrone, xanthone, fluorane derivatives; *e.g.*, eosin.
8. indamines and indophenols; *e.g.*, toluene blue.
9. azines.
10. oxazines, and thiazines; *e.g.*, methylene blue.
11. quinoline and acridine dyes; *e.g.*, quinoline yellow.
12. thiazole and sulfur dyes; *e.g.*, primulin.
13. natural dyes; *e.g.*, luteolin, morin.

See *blue* d., colors. **acid-** (1) D. which color the acidophile or basic granules of the protoplasm (generally the cytoplasm); as, eosin, congo red, methyl blue. (2) Substances used for dyeing fibers in an acid solution; *e.g.*, nitro and azo d. **acid-mordant-** Substances used for dyeing animal fibers in acid solution with the aid of a mordant. **acridine-** D. derived from acridine. **adjective-** Mordant dyes. **artificial-** Synthetic coloring matters; (*e.g.*, coal tar dyes) as opposed to natural coloring matters. **azine-** Those containing the tetravalent =N—N= group. **azo-** D. containing the azo-group. **bacteriologic-** D. used to stain protoplasm; they may be acid-, basic-, neutral- or specific-. **basic-** (1) D. which color the basophile or acid granules of the protoplasm (generally the nucleus and nucleo proteins); as, hematin, safranine, methylene blue. (2) D. used for dyeing in alkaline solution. **direct-** Substantive dyes. **leuco-** Vat dye. **mineral-** inorganic substances used in dyeing; *e.g.*, iron salts, chromates, and copper salts. **mixed-** Polygenetic d. **monogenetic-** Substances which dye only in one color. **mordant-** Substances which require an additional substance for fixation on the fibre. **natural-** Coloring matters

from vegetable or animal materials; *e.g.*, indigo, carmine. **neutral-** D. which color both the acidophile and basophile portions of protoplasm. **nitro-** Substances used for dyeing and containing the nitro radical. **nitroso-** D. containing the nitroso group. **oxyazine-** D. containing the  group. **oxyazo-** Substances containing azo- and oxy-groups. **oxyketone-** D. containing the quinone group. **polygenetic-** D. which produce two or more colors; *e.g.*, alizarin. **provisional-** See writing *ink*. **pyronine-** Substances used for dyeing containing the  group. **specific-** D. which color a definite and selective portion of protoplasm. **substantive-** Substances which stain a fibre directly, without use of a mordant. **sulfide-** Insoluble d. used in a sodium sulfide bath and oxidized afterward. **sulfite-** Substances used for dyeing in sodium sulfite solution. **thiazine-** D. containing the  group. **triphenylmethane-** D. derived from triphenylmethane. **vat-** D. developed by oxidation after saturating the fiber or material with colorless solutions, and generally derived from anthracene or indigo, **vegetable-** D. derived from plants; as

Reds and Purples:	
alkanet	madder
annatto	rouge
brazilwood	sandalwood
camwood	sappan
cudbear	turkey red
hematoxylon	turnsole
litmus	
Yellows and Oranges:	
fustic	osage orange
gamboge	saffron
henna	weld
morin	
Blues and Greens:	
indigo	Chinese green-indigo
woad	

dymal. Didymium salicylate.

dynad. The intra-atomic field of force.

dynalkol. A mixture of 70 % gasoline, 26 % alcohol and 4 % benzene; used as motor fuel.

dynambin. A papaverine-yohimbine tartrate, used in the treatment of pyorrhea and endocrine disturbances.

dynamic. Forces not in equilibrium, and resulting in motion; opposed to static. **d. allotropy.** Desmotropy. **d. formula.** See *benzene ring*. **d. isomerism.** Tautomerism.

dynamics. A branch of physics dealing with the mathematical theories of forces not in equilibrium, hence producing action:

electrons in motion = electrodynamics
atoms in motion = } thermodynamics
molecules in motion = }
masses in motion = (gravitation) mechanics.

dynamites. A class of explosives, usually a mixture of trinitroglycerin, TNG with an absorbing inert material (*e.g.*, kieselguhr, gelatin). See table.

dynamo. A machine for converting mechanical into electrical energy. Cf. *alternator, electric motor, commutator*.

dynamometer. An apparatus which measures the force or power developed by an engine.

dyne. The c.g.s. unit of force, or the force which, when acting for one second, will give to one gram a velocity of one centimeter per second; hence, 1 dyne = 1 gram/gravity acceleration in cm. per sec. per sec. = 1/980.665 gram = 1.02 mg.; and 980.665 dynes = 1 gram. **mega-** Bar. 10^6 or 1,000,000 dynes = 1.013 kg. **d. centimeter.** The work done by a force of one dyne exerted along a distance of one centimeter; *e.g.*, the work required to raise 1.02 mg. one centimeter. 1 dyne-centimeter = 1 erg.

dypnone. $C_{16}H_{14}O$ = 222.11. PhCO.CH:CMePh. A condensation product, b_{22mm}.225, of two molecules of hypnone.

dysalbumose. An albumose obtained from fibrin by the action of pepsin. A brownish powder, insoluble in water.

dyscrasite. Ag_3Sb. A grayish-black, rhombic silver antimonide, d.9.6, hardness 3.5.

dyslysin. (1) $C_{24}H_{36}O_3$ = 372.4. A resinous, dehydrated split-product of choline acids. (2) An anhydrous decomposition product of bile acids.

dysprosium. Ds or Dy = 162.46. Atomic number 66. A rare earth metal discovered in holmia by Lecoq de Boisbaudran in 1886. It is trivalent, forms yellow or greenish salts and occurs in small amounts in samarskite and gadolinite. **d. acetate.** $Dy(C_2H_3O_2)_3.4H_2O$ = 411.59. Yellow needles, decomp. 120, soluble in cold water. **d. chloride.** $DyCl_3$ = 268.9. Greenish-yellow crystals d.3.67, m.680, soluble in water. **d. nitrate.** $Dy(NO_3)_3.5H_2O$ = 438.5. Yellow crystals, m.88, soluble in water. **d. oxalate.** $Dy_2(C_2O_4)_3.10H_2O$ = 769.08. Yellowish prisms, insoluble in water. **d. oxide.** Dy_2O_3 = 373.0. A colorless powder, d.7.81, insoluble in water. **d. sulfate** $Dy_2(SO_4)_3.8H_2O$ = 757.0. A yellow crystalline powder, soluble in water.

dystectic mixture. An alloy or mixture of maximum melting or freezing point; *i.e.*, those proportions of two or more metals which produce the highest constant melting point. Cf. *eutectic mixture*.

DYNAMITES

Kieselguhr d	72–75 % TNG, 28–25 % kieselguhr
Pittsburgh d	40 % TNG, 44 % $NaNO_3$, 15 % woodpulp, 1 % $CaCO_3$.
U.S.A. gelatin d	20–80 % TNG, 0.3–4.5 % guncotton, 6–16 % combustible m., 1.5–62 % $NaNO_3$, 1 % $CaCO_3$.
U.S.A. straight d	15–75 % TNG, 5–66 % $NaNO_3$, 5–20 % combustible m., 1 % $CaCO_3$.
U.S.A. ammonia d	12–25 % TNG, 7–50 % NH_4NO_3, 14–60 % $NaNO_3$, 8–20 % combustible m., 1 % $CaCO_3$.

E

E Symbol for (1) electromotive force, (2) electrode potential. **E_0.** Symbol for electroaffinity.

E An einstein, 6.06×10^{23} quanta. Cf. *faraday*.

e The base of natural logarithms, e = 2.718,281,828 . . (see *exponential*). e^{-1} A mathematical constant, $e^{-1} = 0.367,879,441$ . . .

e (1) The symbol for an electron; as in $H = H^+ + e$. (2) The elementary electrical charge; the charge on an electron; half the charge on an α-particle. $e = 4.770 \times 10^{-10}$ e.s.u. $= 1.591 \times 10^{-20}$ e.m.u. $= 1.591^{-19}$ coulombs. *e/m* The ratio of charge to mass of an electron.

VALUE OF *e/m*

	Spectroscopic	*By deflection*
e/m	(1.761 ± 0.001) $\times 10^7$	(1.769 ± 0.002) e.m.u. per g.
(*e/m*)c	(5.279 ± 0.003) $\times 10^{17}$	(5.303 ± 0.006) e.s.u. per g.

ϵ The Greek letter, epsilon. (1) An ergon or quantum, q.v. (2) An etheron, q.v. (3) A symbol for dielectric constant. (4) Electrode potential, ϵ_c to a normal calomel electrode, ϵ_h to a normal hydrogen electrode.

η The Greek letter, eta. (1) The symbol for viscosity.

earth. (1) The soil. (2) The solid portion of the globe, or lithosphere, (see *abundance*). (3) The globe, as distinguished from other heavenly bodies. **diatomaceous-** Kieselguhr. **Fuller's-** *Fuller's* earth. **green-** Terra verde. **infusorial-** Kieselguhr. **rare-** See *rare earth metals*. **red-** Ocher. **siliceous-** Kieselguhr.

e. age. The period of existence of our planet as calculated from geologic, radioactive and cosmic data. Thus the four stages of the e. are assumed to be:

1. gaseous 2. fluid surface	10^5 years
3. intermediate	$\pm 10^5$ years
4. solid	2.3×10^9 years

e. constants. The physical data of the e.:

equatorial radius (a) 6,378,388 meters = 3,963.2 miles
polar radius (b) 6,356,911 meters = 3,949.8 miles
one degree latitude at equator = 68.70 miles
one degree latitude at pole = 69.41 miles
mean density of the earth 5.5247
mean density of continental surface 2.67
Rigidity of the earth (n) 8.6×10^{11} c.g.s. units
Viscosity of the earth (e) 10.9×10^{16} c.g.s. units
Volume of the earth . . . . . $1,083,319 \times 10^6$ km³
Area of the earth . . . . . 510,100,934 km²
Area of the land . . . . . 148,847,000 km²
Area of the ocean . . . . . 361,254,000 km²
Mean distance from earth to sun = 149,500,000 km = 92,900,000 miles.
Mean distance from earth to moon = 384,393 km = 238,854 miles.

e. alkali metals. The elements of the second group of the periodic system; Mg, Ca, Sr, Ba, and Ra. They are all divalent. **e. flax.** Amianthus. **e. inductor.** An electrical coil, which rotates in a frame. **e. metals.** The elements of the third group of the periodic system: Al, Sc, Y, La. They are all trivalent. **rare-** The elements of the fifth sub-period from cerium (atomic number 58) to hafnium (atomic number 72). **e. nut oil.** Arachis oil. **e. oil.** Petroleum or asphalt. **e. shellac.** Acaroid resin. **e. wax.** Ozocerite.

earthenware. Pottery made from dried clay See *ceramics*.

East Indian oil. An essential oil d.0.948–0.970 from *Anethum sowa*, an Umbelliferae. It contains limonene and apiol.

Easton syrup. A pharmaceutical preparation containing iron, quinine, and strychnine phosphates.

eau. French for water. **e. de cologne.** Cologne *water*. **e. dejavelle.** A solution of potassium hypochlorite, used as a bleaching agent. **e. de labarraque.** A solution of sodium hypochlorite, used as a bleaching agent.

Ebert and Merz's acid. Naphthalene-2.6- or *2.7*-disulfonic acid.

eblanin. Paraxanthine.

Ebner fluid. A mixture of 2.5 cc. hydrochloric acid, 2.5 gm. sodium chloride, 100 cc. water, and 500 alcohol; used for decolorizing in bacteriological work.

ebonite. A black, vulcanized, hard rubber. Cf. *vulcanite*.

ebony. A hard, dark heavy wood from various *Diospyros* species (Ebenaceae).

ebul, ebulus. The dwarf elder, *Pilea grandis*, an Urticaceae of the West Indies. The berries are used for an alcoholic beverage.

ebullient. Bubbling or boiling.

ebulliometry. Ebullioscopy.

ebulliscope. An apparatus for the exact determination of the boiling point; *e.g.*, a molecular weight apparatus.

ebullioscopic equation. An equation showing the relation of the molecular weight of the solute to the rise in boiling-point of a solution in which it is present: Mol. Weight = p(d/t), where p is the percentage (weight in grams per 100 grams solvent), d the molecular rise in boiling point, and t the observed rise in boiling point.

ebullioscopy. A branch of physical chemistry that deals with the determination of molecular weights from the increase in boiling point of a solution. Cf. *Raoult's law*.

ebullition. The formation of bubbles; *e.g.*, in boiling.

ecbalin. Elateric acid.

ecballium. Elaterium.

ecbolics. Oxytocics.

ecboline. An alkaloid of ergot.

eccentric. (1) Not concentric. (2) Not circular; *e.g.*, an orbit. (3) With the axis away from the center. (4) Outside the center or away from the center; the center misplaced.

ecgonidine. *dl*-Anhydroecgonine.

ecgonine. $C_9H_{15}O_3N.H_2O$ = 203.19. Tropine carboxylic acid. A split-product of cocaine, q.v. White, monoclinic prisms, m.198, soluble in water or alcohol, slightly soluble in ether. **anhydro-** See *anhydro.* **ethylbenzoyl-** Cocethyline. **methylbenzoyl-** Cocaine.

e. hydrochloride. $C_9H_{15}O_3N.HCl$ = 239.66. Colorless, triclinic leaflets, m.246, soluble in water, slightly soluble in alcohol.

echelon cell. A wedge-shaped glass cell used in absorption spectroscopy for the rapid photography of spectra through different thicknesses of absorbing liquid.

echicaoutchin. $C_{25}H_{40}O_2$ = 372.4. An elastic resin-like substance from the bark of *Alstonia scholaris,* dita bark, q.v.

echiceric acid. $C_{30}H_{46}O_4$ = 470.5. An oxidation product of echicerin.

echicerin. $C_{30}H_{48}O_2$ = 440.5. A principle from dita bark. Colorless needles, m.157, insoluble in water, soluble in alcohol, ether, or chloroform.

echiine. An alkaloid from *Echium vulgare,* a Boraginaceae, which produces tetanic convulsions.

echinacea. The dried rhizome of *Brauneria pallida* (*Echinacea angustifolia*) a Compositae of Northern America; used as an alterative, eliminative, and "systemic" antiseptic, as fluid extract.

echinacoid. The combined principles of echinaceae; used in the dry state.

echinochrom. A brown respiratory pigment found in sea urchins. Cf. *porphin derivatives.*

echinopsine. $C_{10}H_9ON$ = 159.1. An alkaloid from *Echinops* species, globe thistle, a Compositae; it is similar in action to strychnine.

echinulate. A growth of bacteria characterized by toothed or pointed margins or outgrowths.

echitamine. Ditaine.

echitenine. $C_{20}H_{27}O_4N$ = 345.0. An alkaloid from dita bark. A brown, amorphous powder, m.120, soluble in alcohol or chloroform.

echitin. $C_{32}H_{52}O_2$ = 468.51. An acid from dita bark. Colorless leaflets, m.170, soluble in hot alcohol, or chloroform, sparingly soluble in ether.

echugin. $(C_5H_8O_2)_x$. A crystalline glucoside from *Adenium bœhmianum* and an active principle of African arrow poisons, its effect is to arrest the heart in systole. Small, colorless, rhombic scales, readily soluble in water or alcohol, insoluble in ether.

eclogite. A rock consisting chiefly of augite and hornblende.

ecology. A branch of biology dealing with the habits of organisms, and their mode of life in relation to their surroundings.

ectoplasm. The outer compact hyaline layer of protoplasm of a cell.

eddy currents. The electrical currents set up by alternating currents in masses of metal near or in the circuit. Cf. *Foucault current.*

edenite. A light-colored hornblende containing some iron.

Eder's solution. A solution of mercuric chloride and ammonium oxalate, used in photometric determinations. The amount of Hg precipitated is related to the intensity of the x-ray irradiation.

edestan. A protean and slightly denatured edestin.

edestin. A globulin, M.W. 29,000, from hemp, rye and cotton seeds, which is deficient in cystine and lysine.

edge filtration. Same as stream-line filtration.

edingtonite. $BaAl_2Si_3O_{10}.4H_2O$. A grayish-white, rhombic, barium aluminum silicate, d.2.7, hardness 4–4.5, soluble in HCl.

edinol. $C_7H_9O_2N$ = 139.08. p-Amino-saligenin; used as a photographic developer.

Edison, Thomas Alva. 1847–1931. An American physicist and inventor noted for many important inventions, e.g., telegraphic transmission, phonograph, incandescent lamps, moving pictures, poured concrete buildings. **E. cell.** An accumulator consisting of iron and nickel oxide electrodes in 20 % potassium hydroxide solution. **E. effect.** An electrode opposite a glowing filament becomes negatively charged. **E. Lelande cell.** A voltaic cell of 0.7 volt, consisting of an amalgamated zinc electrode and copper electrode in a solution of KOH.

effective. Producing an action or bringing about a result. **e. acid.** The amount of acidity, q.v.

effervescence. The frothing or bubbling of a liquid due to the escape of gas, but not due to boiling; *e.g.,* from carbonate solutions when acids are added.

effervescent. Giving off gas bubbles, as in soda water, champagne. **e. mixture.** A mixture of substances which will form a gas when moistened or brought into solution; *e.g.,* baking powders, soda water mixtures. **e. salts.** Medicinally-active substances mixed with sodium bicarbonate and citric or tartaric acid. Used to administer medicinal agents of a refreshing draught.

efficiency. (1) The ratio of the useful work done by a machine to the energy supplied. (2) In statistics: The proportion of the total available data which is relevant according to the theory of probability.

efflorescence. The property of a crystalline substance to become anhydrous when exposed to air and crumble to a powder, (*e.g.,* washing soda, $Na_2CO_3.10H_2O$).

efflorescent. Tending to lose the water of crystallization and crumble to a powder.

effluent. (1) A waste product discharged from a process. (2) Emergent, *e.g.,* radiations.

efflux. The flowing or the velocity of a liquid.

effuse. Describing a thin, veil-like, spreading growth of bacteria.

effusiometer. An instrument invented by Bunsen for the determination of the molecular weights of gases from effusion measurements.

effusion. (1) Pouring out or discharge. (2) The escape of a gas under pressure through the small aperture of a vessel. The relative rates of effusion of gases into air are inversely proportional to the square roots of their molecular weights.

e.g. An abbreviation for exempli gratia = for example.

egg. An ovum consisting of shell, egg-white and yolk. **acid-** A closed acid-resistant storage tank for strong acids. **dried-** Dehydrated and powdered e. used in baking. **storage-** An e. kept in waterglass solution or in a frozen condition.

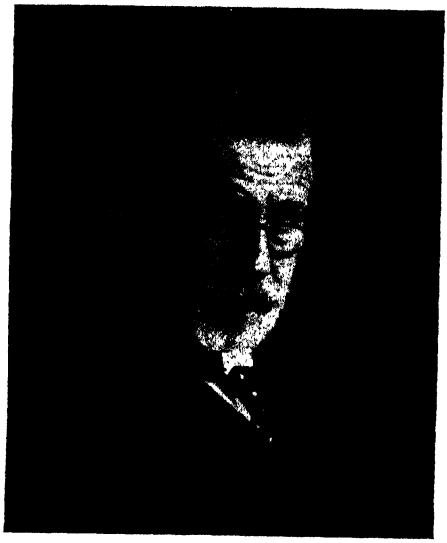
e. albumen. A crystallizable protein, M.W. 33,800, from egg-white. **e. magma.** The frozen mixture of churned yolks and whites of selected eggs, used for mayonnaise manufacture and baking.

eglantine. $C_{12}H_{16}O_2$ = 192.12. *i*-Butyl-α-toluate, $Ph.CH_2COOC_4H_9$. A colorless liquid, d.0.990, b.254, insoluble in water; a flavoring.

eglestonite. Hg_4Cl_2O. A rare, native, mercuric chloride-oxide named after Thomas Egleston, an American mining engineer (1832–1900).

egols. A group of antiseptic substances consisting of the o-nitro-p-sulfonates of phenol, cresol, or thymol, with mercury and potassium; *e.g.*, **cres-** Cresegol, derived from cresol. **phen-**, Phenegol (q.v.), derived from phenol. **thym-**, Thymegol, derived from thymol.

egonol. An unsaturated alcohol from ego-oil from the seeds of *Styrax japonica*.



Paul Ehrlich.
(From Muldoon "Organic Chemistry.")

Ehrlich, Paul. 1854–1915. A German biochemist and founder of modern chemotherapy. He discovered salvarsan and staining methods, and advanced the side-chain theory. **E. 606.** Arsphenamine. **E. diazo reaction.** An intense red color produced by pathological urine on addition of the diazo reagent. **E. diazo reagent.** Solution A = 1 gm. sodium nitrite in 200 cc. water. Solution B = 5 gm. sulfanilic acid, 50 cc. hydrochloric acid and 950 cc. water. Mix 1 cc. of A and 50 cc. of B. **E. side chain theory.** See Ehrlich theory. **E. solution.** A solution of 2 gm. p-dimethyl-amidobenzaldehyde, 50 cc. hydrochloric acid, and 50 cc. water; used for detecting urobilinogen in urine. **E. theory.** Side-chain theory. A chemical theory explaining the phenomena of immunity by the action of antibodies (synonyms: immune substance, haptins, free receptors) which when circulating in an organism unite with and make harmless the antigen (synonyms: poisonous substance, invading substance, toxin, etc.) and thereby prevent the antigen from attaching itself to the chemical system of the protoplasm. It is assumed that any poisonous substance, before it affects a living cell, must enter the dynamic, ever-changing and reacting protoplasm by combining with certain atomic groups or radicals (the side-chains or receptors) of the protoplasm. The action may be expressed as follows: Antigen, the inciting substance or poisonous molecule. Antibody, the immune substance or neutralizing molecule. Active State (poisoning or infection). The antigen reacts with the protoplasm and forms antibodies. Immunization. The antigen is prevented from reacting with the protoplasm by combining with the antibodies—the cast-off sidechains or free receptors. The molecules are represented as geometrical figures which fit into each other. These and similar figures found in the literature indicate only the possibility of chemical union and have no other meaning.

Direct action: The antigen consists of a haptophoric group which anchors the toxin to the protoplasm, and a toxophoric group which causes the toxic disturbances in the cell:

(antigens)	(antibodies)
enzymes cause	antienzymes
phytotoxins cause	antitoxins
bacterial exotoxins cause	antitoxins
bacterial proteins cause	agglutinins
vegetable proteins cause	precipitins
animal proteins cause	precipitins
bacterial aggressins cause	opsonins
animal venoms cause	antivenins
foreign complements cause	anticomplements
foreign amboceptors cause	antiamboceptors.

Indirect action: The antigen consists of two substances, namely

(a) the *complement*, *addiment* (of Ehrlich), *cytase* (of Bordet and Metchnikoff), or *alexine* (of Buchner), which is composed of a zymphoric group, containing the poisonous radical, and a haptophoric group, with which it is anchored to the amboceptor.

(b) the *amboceptor*, *fixateur* (of Metchnikoff) *preparateur* (of Müller), *immune body* (of Pfeiffer), *sensitizer* or *intermediate body*, which is the bridge or link between the complement and the receptor. It contains a complementophile group which combines with the complement, and a cytophile group which combines with the receptor of the cell. Vegetable cells and bacteria result in bacteriolysins. Animal cells result in cytolysins, hemolysins or leukotoxins. **E. triacid stain.** A mixture of 120 cc. saturated aqueous solution of orange G, 80–165 cc. saturated aqueous solution of acid fuchsin, 125 cc. aqueous solution of methylene green, 200 cc. alcohol, 100 cc. glycerin, and 300 cc. water. Used for differentially staining white blood corpuscles.

eicosane*. $C_{20}H_{42}$ = 282.4. A saturated hydrocarbon of the methane series and a constituent of petroleum. A colorless liquid, d.0.777, m.37, $b._{15mm}$ = 205; insoluble in water, soluble in alcohol or ether.

eicosanic acid. $C_{20}H_{40}O_2$ = 312.28. A white solid, m.74, found (0.06%) in Japan wax. Cf. *arachidic acid.*

eicosanoic acid*. Arachidic acid.

eicosanol*. Eicosyl alcohol.

eicosinene. Icosinene.

eicosyl. The monovalent radical $—C_{20}H_{41}$. **e. alcohol.** $C_{20}H_{42}O$ = 298.32. Arachidic alcohol, eicosanol*. The saturated compound, $Me(CH_2)_{18}CH_2OH$. A colorless solid, m.71, b.220 in palm wax of Madagascar.

eicosylene. The unsaturated hydrocarbon $C_{20}H_{40}$.

eigenfunktion, eigenfunction. [German for proper or characteristic function.] The *s*, *p*, *d*, or *f* state of the atom or ion. See *quantum numbers.*

eigenwert. A proper or characteristic value.

eigons. A group of compounds of iodine or bromine with proteins which, administered

internally, as antiseptics, liberate iodine or bromine in the alimentary canal or in wounds.

eikonogen. $NH_2C_{10}H_5OH.SO_3Na.2\frac{1}{2}H_2O$. Sodium amido-β-naphthol monosulfate. A white crystalline powder, used as a developer in photography.

eikonometer. A measuring scale which fits on to the eyepiece of a microscope and is seen superimposed on the image of the object.

eikosane. Eicosane.

-ein, -eine. A suffix which often indicates an internal anhydride.

Einstein, Albert. A German physicist noted for his mathematical generalizations. **E. equation for diffusion.** The diffusion coefficient, D, is related to the gas constants by $D = RT/6\pi Nr\eta$, where N is Avogadro's number, r the radius of the molecule and η the viscosity. **E. formula.** The relation between mass and energy is: $Mc^2 = E$, where M is the mass in grams, c the velocity of light in cm. per sec., and E the energy in ergs. Cf. *mass-energy cycle.* **E. law.** In a photochemical reaction one quantum of energy affects one molecule of matter, thus: $HI + h\nu = H + I$. **E. particle equation.** The motion of a particle in a liquid depends on its radius r, and the viscosity, η, of the liquid. Let L be the length of the path during time t, then

$$L = \sqrt{t} \cdot \sqrt{\frac{RT}{N}} \cdot \frac{1}{3\pi\eta r}$$

E. theory. See *relativity.* **E. unit.** Einstein. **E. viscosity formula.** $\eta = \eta_0(1 + k\phi)$, where η is the viscosity of the colloidal solution, η_0 the viscosity of the pure suspending medium, ϕ the total matter of colloid per unit volume, and k a constant varying from 1.5 to 4.75.

einstein. A unit of energy, $E = 6.06 \times 10^{23}$ quanta, analogous to the faraday (6.06×10^{23} electrons). It is the amount of radiation absorbed by a system to activate 1 gram-molecule of matter; hence, $E = Nh\nu$, where N is Avogadro's constant.

eka. The Sanskrit for one or first. A prefix applied to the first undiscovered element in a group of the periodic system. Cf. *dvi-.*

eka-elements. The missing elements of the periodic table. Cf. *eka, dvi.* The following elements have been discovered and named as shown:

eka-aluminum	gallium
eka-boron	scandium
eka-cesium	virginium, verium
eka-iodine	alabamine, eline
eka-manganese	(nipponium), masurium
eka-neodymium	illinium
eka-silicon	germanium

ekaosmium. Eo. The element 94 obtained by neutron bombardment of uranium; it has a half-life of 90 minutes. Synthesized by Enrico Fermi (1936), and named esperium.

ekarhenium. Er. The element 93, obtained by neutron bombardment of uranium; it has a half-life of 13 minutes. Synthesized by Enrico Fermi (1936) and named ausonium.

ekatantalum. Et. The element 91, which consists of the isotopes:

Pa or protactinium	32,000 years
UZ or uranium Z	9.7 hours
Bv or brevium	1.65 mins.

e. pentoxide. Et_2O_5. A white powder with slightly basic properties, forming salts with acids.

ektebin. An antigen ointment containing concentrated tuberculin (dead human and bovine tubercle bacilli) used in the treatment of tuberculosis.

elæ- Elae-, ele-.

elaeodic acid. Ricinoleic acid.

elaeolite. Nephelite.

elaeomargaric acid. Eleostearic acid.

elaeometer. A hydrometer for ascertaining the quality of an oil from its density.

elaeostearic acid. Eleostearic acid.

elaidic acid. $C_{18}H_{34}O_2 = 282.37$. *trans-9*-Octadecenoic acid*. An unsaturated, monobasic acid, and *trans*-isomer of oleic acid. Colorless leaflets, $d_{79°}$.0.851, m.51.5, $b._{60mm}$266, insoluble in water, soluble in alcohol or ether.

elaidin. $C_{57}H_{104}O_6 = 885.1$. The elaidic ester of glycerin. It occurs in many oils other than drying oils and fish oils, and is an isomer of olein.

elain. Obsolete name for ethylene.

elaoptene. The liquid part of an essential oil, as opposed to the stereoptene or solid part.

elastic. Describing a substance which assumes its original shape after the pressure or force, causing distortion, is removed. **e. coefficient.** Young's modulus. **e. constants.** The numerical expressions of the force or pressure to which a material (solid, liquid, or gaseous) can be subjected without deformation of its shape or condition after the pressure has ceased to act. **e. fluid.** A gas, as compared with a liquid. **e. limit.** The stress or force which produces a permanent elongation or shortening of 0.001 % of the length of a substance. **e. modulus.** Modulus of elasticity.

elastica. Rubber.

elasticity. The property of a substance of being able to recover from distortion or deformations caused by pressure or stress, and return to its original shape. **adiabatic-** See *adiabatic,* **cubical-** The bulk modulus, or the hydrostatic pressure divided by the resulting decrease in volume per unit volume. **limit of-** The smallest value of a stress which produces permanent alteration. **longitudinal.** Young's modulus. **modulus of-** Rigidity modulus. The relative flexibility, or the ratio of stress intensity to percentage strain. **shear-** See *rigidity.* **torsional-** See *rigidity.*

elasticum. A layer of carbohydrate material between the epithelium and cortex of wool, which is responsible for the shrinking of the latter.

elastin. A protein of yellow, elastic tissue, soluble in hot conc. potassium hydroxide or sulfuric acid, partly attacked by pepsin and digestible by trypsin.

elastomer. A generic term (proposed by Fisher) for all substances having the properties of natural, reclaimed, vulcanised or synthetic rubber. **synthetic-.** Rubber substitutes. Five classes, produced by: (a) Polymerisation of butadiene alone or with styrene (*e.g.*, Ameripol, Buna, Hycar, Perbunan); (b) intereaction between sodium polysulfides and dihalides (*e.g.*, Thiokol); (c) polymerisation of chloroprene (*e.g.*, Duprene, Neoprene); (d) polymerisation of isobutylene (*e.g.*, Vistanex); (e) polymerisation and plasticisation of vinyl chloride (*e.g.*, Koroseal).

elastoplast. (1) A substance having both elastic and plastic properties. (2) Trade name for a boracic acid-plaster first-aid dressing.

elateric acid. $C_{20}H_{28}O_5$ = 348.27. Ecbalin. An acid of elaterium, m.200.

elaterin. $C_{20}H_{28}O_5$ = 348.22. Memordicin. A neutral principle from the juice of *Ecballium elaterium* and *Memordica balsamina*, a Cucurbitaceae. A white, crystalline powder, α-m.232, β- m.195, insoluble in water, soluble in chloroform, sparingly soluble in alcohol or ether; used as a drastic purgative.

elaterite. $(CH_2)_x$. Mineral caoutchuc, elastic bitumen. An inflammable, elastic, dark-brown, mineral resin, d.0.8–1.23.

elaterium. Ecballium. Unpurified sediment from the juice of the fruit of *Ecballium elaterium* (squirting cucumber) chiefly containing elaterin; used medicinally as a powerful cathartic.

elaterone. $C_{24}H_{30}O_5$ = 398.23. A ketone from elaterium. Colorless crystals, m.300.

elatic acid. $C_8H_{12}O_2$ = 140.09. An acid from colophony.

elayl. Ethylene. **e. chloride.** Ethylene dichloride.

elbon. $C_{16}H_{14}O_3N_2$ = 282.2. Cinnamyl-p-oxyphenylurea. White, fine, tasteless needles, m.204, insoluble in water, soluble in alcohol, acetone, or oils. Used medicinally for disorders of the respiratory organs.

elder. Sambucus. **dwarf-** (1) Ebulus, (2) *Aralia hispida.*

eldrin. Barosmin.

Eldred's wire. A nickel-steel wire with a copper jacket and a platinum sheath, which may be sealed into glass.

elecampane. Inula.

elecampin. Inulin.

electret. The electrical equivalent of a permanent magnet. Thus waxes, *e.g.*, carnauba wax, when solidified in a strong electric field acquire a polarization (orientation of molecules) in the direction of this field.

electric. Charged with or capable of developing electricity. Cf. *electrical.* **e. arc.** The luminous arc produced by the passage of electricity at high voltage from one electrode to another. **e. axis.** The axis of a crystal that offers least resistance to the passage of an electric current. **e. attraction.** The force by which oppositely charged bodies are drawn together. **e. battery.** A series of dry cells (q.v.) or galvanic (q.v.) elements. **e. calamine.** $ZnSiO_4.H_2O$. A native zinc silicate. **e. charge.** A definite quantity of electricity, q.v. Cf. *ballometer.* **e. conductivity.** See *conductivity.* **e. current.** The quantity of electricity, or the number of electrons flowing past a point per unit time. When measured in e.s.u. units it is the amount of electricity transferred in one second; in e.m.u. units it is a current of such strength that one centimeter of the wire experiences a side-thrust of a force equal to one dyne, if at right angles to a magnetic field of unit intensity. The practical unit is the ampère, q.v.; its quantity the coulomb, q.v.; and its potential difference the volt, q.v. **e. double layer.** See *electrolytic solution pressure.* **e. field.** The forces around an electrically-charged body. **e. field intensity.** A unit of force; (*e.g.*, magnetic) the ratio of the force acting on a quantity of electricity at a point to that quantity of electricity. **e. furnace.** A furnace, q.v. used where hydro-electric power is cheap for dealing with molten electrolytes; as in the manufacture of aluminum. **e. lines of forces.** The imaginary curves radiating from a positive toward a negative charge. **e. potential.** Electromotive force. **e. radiation.** See *electromagnetic radiation, spectrum.* **e. spark.** A luminous discharge produced by the disruptive passage of electricity at high voltage from one electrode to another. **e. surface density.** The distribution of electrons on a surface, measured by number per unit area. **e. tension.** Electromotive force. **e. transformer.** See *induction coil, transformer, rectifier.* **e. valve.** A device which allows an e. current to pass in one direction only; as, a transformer, rectifier or vacuum tube. **e. wind.** The effect produced by the motion of electrically-charged gas molecules.

electrical. Pertaining to electricity. **e. birefringence.** Kerr effect. **e. capacity.** See *capacity, electrostatic.* **e. cell.** Voltaic cell. Galvanic cell. **e. condenser.** See *condenser.* **e. conductivity.** Molal conductivity, molecular conductivity. (1) The quantity of electricity transmitted by a unit area in unit time under a unit potential gradient. (2) For solutions: the conductivity in reciprocal ohms (mhos) of one gram equivalent of electrolyte, in a solution between electrodes one centimeter apart. **e. current.** Electric c. **e. elements.** Voltaic cells. **e. flux.** The flow of an electric current. **e. pressure.** Electromotive force. **e. units.** See table.

Unit of conductivity—MHO;
unit of electricity resistance—OHM;
unit of electricity current—AMPERE;
unit of electromotive force—VOLT;
unit of quantity of electricity—COULOMB;
unit of capacity—FARAD;
unit of work—JOULE;
unit of power—WATT.

e. work. The work necessary to decompose a compound expressed in electrical units.

electricity. A form of energy that produces magnetic, chemical, thermal and radiant effects, generated by friction, induction or chemical means. (a) *material conception:* An all-pervading fluid consisting of negative electrons; their continuous motion is a "current," their abrupt motion a "discharge," their absence a "positive charge." (b) *dynamic conception:* A stress or strain in the ether resulting in "electric waves" and "radiation." (c) *magnetic conception:* A field of force. **acid-** Positive electricity. **animal-** Electrical phenomena associated with animal organisms; *e.g.*, Volta's experiment on frogs. **atmospheric-** The e. of the atmosphere; *e.g.*, from charged clouds. **chemical-** Galvanic. **dynamic-** Current-, or galvanic- as opposed to static e. It indicates electrons in movement, *e.g.*, which can be utilized for work. It may be either set in motion by chemical reactions (voltaic-), by induction (faradic-), or by a magnet (magnetic-). **faradic-** Induced- A current of high tension produced in a secondary coil when a galvanic current passes through the primary coil of an induction machine. **franklinic-** Static-. **frictional-** Static e. obtained by friction; *e.g.*, rubbing a glass rod with flannel or fur. **galvanic-** Dynamic- or voltaic-. **induced-** Faradic-. **negative-** The presence or accumulation of electrons; or a current of electrons passing from anode to cathode outside the galvanic cell, and from cathode to

anode within the galvanic cell. **photo-** See *photoelectricity*. **piezo-** See *piezoelectricity*.

crude metals (Cu, Pb, Ni, Ag, Au); or (*b*) electroplating, to produce a protective coating

RELATIONSHIPS OF ELECTRICAL UNITS

Symbol	*Unit of*	*Practical e.m.u.*	*C.G.S. e.m.u.*	*C.G.S. e.s.u.*
O.....	resistance.....	1 ohm	10^9	1.1124×10^{-12}
A.....	current (strength)....	1 ampere	10^{-1}	2.998×10^9
V.....	electromotive force (potential).....	1 volt	10^8	0.0033349
F.....	capacity.....	1 farad	10^{-9}	8.9892×10^{11}
C.....	quantity.....	1 coulomb	10^{-1}	2.998×10^9
H.....	inductance.....	1 henry	10^9	1.1124×10^{-12}
J.....	work.....	1 joule	10^7	10^7

E.M.U. = electro-magnetic units, based on the strength of magnetic poles (m and m'): $m = r\sqrt{F\mu}$ where μ is the magnetic permeability of the medium, a quantity arbitrarily assumed as unity for air, F, the force at a point in the magnetic field, and r the distance. It follows that $F = mm'/\mu r^2$ and the intensity, H, of the magnetic field = F/m.

E.S.U. = electrostatic units, based on the strength of electrical charges (q and q'): $q = r\sqrt{Fk}$ where k is the specific inductive capacity or dielectric constant, a quantity arbitrarily assumed as unity for air, F, the force between two charges, r, the distance. It follows that $F = qq'/kr^2$.

The dimensions of some electrical units are expressed in terms of the fundamental units of Length, Time, and Mass as follows:

Name	*Symbol*	*Electrostatic*	*Electromagnetic*
electric quantity	q	$[L^{\frac{3}{2}}T^{-1}M^{\frac{1}{2}}k^{\frac{1}{2}}]$	$[L^{\frac{1}{2}}M^{\frac{1}{2}}\mu^{-\frac{1}{2}}]$
magnetic quantity	m	$[L^{-\frac{1}{2}}M^{\frac{1}{2}}k^{\frac{1}{2}}]$	$[L^{\frac{3}{2}}T^{-1}M^{\frac{1}{2}}\mu^{\frac{1}{2}}]$
magnetic field	H	$[L^{\frac{1}{2}}T^{-2}M^{\frac{1}{2}}k^{\frac{1}{2}}]$	$[L^{-\frac{1}{2}}T^{-1}M^{\frac{1}{2}}\mu^{-\frac{1}{2}}]$
current	I	$[L^{\frac{3}{2}}T^{-2}M^{\frac{1}{2}}k^{\frac{1}{2}}]$	$[L^{\frac{1}{2}}T^{-1}M^{\frac{1}{2}}\mu^{-\frac{1}{2}}]$
potential or electromotive force	V, E	$[L^{\frac{1}{2}}T^{-1}M^{\frac{1}{2}}k^{-\frac{1}{2}}]$	$[L^{\frac{3}{2}}T^{-2}M^{\frac{1}{2}}\mu^{\frac{1}{2}}]$

positive- (1) An absence or deficiency of negative electrons. (2) A current in the direction opposite to negative-. According to this theory the true current of electricity flows from negative to positive, *i.e.*, from the region of an accumulation of electrons to that of a deficiency of electrons. **static-**, frictional-, or franklinic-, as opposed to dynamic-. It indicates electrons at rest, and their sudden, explosive-like escape after accumulating on the surface of an insulated conductor. It is produced by friction between solid surfaces. **thermo-**. (1) E. produced by heat. (2) Pertaining to the heating effects of electricity. **tribo-** E. produced by friction. **voltaic-** A current produced by an electric battery.

electrification. Charging with electricity or electrons.

electrify. To charge with electricity, or separate the neutral charge of a substance into negative (accumulation of electrons) and positive (deficiency of electrons) portions.

electrion. An early name for an electron.

electroaffinity. E or E_0. Electrolytic potential. The electrode potential (q.v.) for a concentration corresponding with 1 gram ion per liter of ions liberated from an electrode. Thus it is the force with which the atoms hold their ionic charges. See *electromotive force, free energy*.

electroanalysis. Analytical methods based either on electrolysis or conductometry; as electrometric titration. Cf. *polarograph, spectrograph, magneto-optic method, sectrometer*.

electrochemical. Pertaining to both chemistry and electricity. **e. constant.** Faraday. **e. deposition.** The formation of a metallic layer by electrolysis either for (*a*) recovery of metals from solutions of ores (Cu, Zn, Cd), or refining (Au, Ag, Ni, Cr, Cu) or for reproduction (Ni, Cu, Zn) *e.g.*, in photo-engraving. **e. equivalent.** The mass in grams of any element deposited from an electrolytic cell by an electric current of one coulomb. The electrochemical equivalent (E) of any element is

$$E = (A/V)0.00001036.$$

where A is the atomic weight, and V the valency of the element for the electrolyte used. Cf. *Faraday's Law*. A/V is the chemical equivalent. **e. series.** Displacement series. **e. spectrum.** A current-voltage graph produced by the polarograph (q.v.).

electrochemistry. A branch of science dealing with the processes of transforming chemical into electrical energy, and vice versa; hence, the study of chemical reactions which cause, or are caused by, a flow or transfer of electrons; as in batteries and in electrolysis. **applied-** The application of e. to industry, as electro-deposition and electrolysis, q.v.

electrocratic. Describing a colloid (*e.g.*, gold), that owes its stability in to an electric charge.

electrode. The appliance by which an electric current passes in or out of a cell, apparatus, or body. It may vary in form from a simple wire to complex devices, (hydrogen e., calomel e.), or it may be the container of the cell itself, (crucible, vacuum tube or valve). **auxiliary-** A standard calomel or other e. which is inserted in the electrolyte during an electrodeposition reaction, and is used to measure the potential at which this occurs. **calomel-** See (1) *calomel e.* (2) *Hildebrand e.* **capillary-** See *Lippmann e.* **dropping-** A standard e. formed by a stream of mercury falling in fine droplets through a capillary tube into the electrolyte. A fresh surface is thus obtained continuously. Cf.

polarograph, Heyrovsky. **gas-** See *gas e.* **gas-jet-** See *sprudel effect.* **glass-** An e. produced by a thin glass membrane separating solutions of known and unknown pH value, the potential difference between the two sides being measured and used to determine the pH value of the unknown. **Hildebrand-** q.v. **hydrogen-** q.v. **negative-** The cathode, negode, or negatively charged pole, by which the "current passes out." **positive-** The anode, posode, or positively charged pole by which the current enters. **quinone-** q.v. **reversible-** An e. which owes its potential to ionic changes of a reversible nature; as $H_2 \rightleftharpoons 2H^+ + 2e^-$

e. potential. The tendency, expressed electrically as volts, of a metal to dissolve in a solution containing its ions. The algebraic difference of the two e.p. of the electrodes gives the voltage, E, of the cell.

$E = E_0 + 2.3026 \frac{RT}{nF} \log_{10} C$, where E is the electrode potential for a concentration C, in gram-ions per liter of the ions given off by the electrode; E_0 the electro-affinity; R the gas constant; T absolute temperature; n the valency of the ion; and F one faraday—96450 coulombs.

Or: $E = E_0 + \frac{0.058}{n} \log C$.

electrodeposition. The precipitation of a metal on an electrode; as, in electrorefining, q.v., electrowinning, q.v., electroplating, q.v., and electroforming, q.v. **e. analysis.** The quantitative electrodeposition of an element from a solution. The electrode is weighed before and after deposition to obtain the amount of the element present originally.

electrodynamics. A branch of practical physics dealing with moving charges e.g., an electric current.

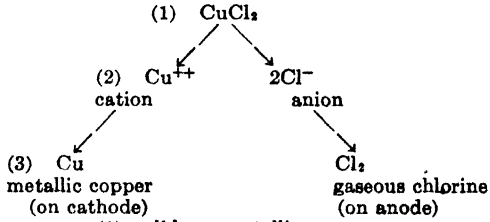
electrodynamometer. An instrument for measuring the intensity of faradic and alternating currents.

electro-endosmosis. The production of endosmosis (q.v.) by an electric potential.

electroforming. The production of metallic tubes or sheets, or the reproduction of patterns by electrolysis.

electrographic analysis. The metal to be tested is made the anode or cathode, and placed in contact with paper impregnated with a reagent giving a color reaction with the metal to be detected. Any other suitable metal may be used as electrode on the other side of the paper.

electrolysis. The local and spacial separation of the ions of an electrolyte and the transfer of their respective charges; hence, the decomposition of a compound, either liquid, molten, or in solution, by an electric current, *E.g.*,



(1) solid or crystalline
(2) ionised in solution
(3) decomposed or electrolysed

Cf. *electrochemical decomposition.* **internal-** Th separation of a metal in the presence of a much more electropositive (*i.e.* baser) metal, by inserting an anode of the baser metal in the solution, and connecting it directly with a platinum cathode on which the metal is deposited. No external current is required. *E.g.*, Cu on Zn immersed in $CuSO_4$ solution.

electrolyte. (1) Any substance which dissociates into two or more ions, to a great or small extent, when dissolved in water. Solutions of e. thus conduct the electric current and are decomposed by it (*electrolysis*, q.v.). (2) Battery acid. Sulfuric acid, d.1.150–1.835, used in batteries and accumulators. **non-** Substances which do not dissociate into ions. **strong-** E. which are highly-dissociated even at moderate dilutions, and do not obey Ostwald's dilution law. **weak-** E. which are fully or partly dissociated only at high dilution; they obey the dilution law.

electrolytic. Pertaining to decomposition by an electric current. **e. apparatus.** A set of instruments for quantitative electro-deposition. It consists of an ammeter, voltmeter, rheostat, platinum anode, and a device for rotating the anode. **e. dissociation.** Ionization. **e. gas.** A mixture of hydrogen (2 vol.) and oxygen (1 vol.) obtained by electrolysis of water. **e. potential.** Electro-affinity. **e. separation.** The graded separation by electro-deposition (q.v.) of metals from a solution, by varying the applied electrolytic potentials according to the respective electrode-potentials of the metals. **e. solution tension theory.** Nernst theory.

electrolyze, electrolyse. To decompose by electrolysis.

electromagnet. A piece of soft iron around which is wound an insolated wire; so long as the electric current passes through the wire, the iron has magnetic properties.

electromagnetic. Pertaining to electricity and magnetism. **e. field.** The area of force surrounding an electro-magnet or a conductor through which a current flows. The intensity, H, of the magnetic field at the center of a circular conductor of radius, r, is 2(i/r), where i is the current. **e. law.** See *Coulomb.* **e. radiation.** See *radiation, ray, waves.* **e. separation.** The separation of the magnetic constituents of ores by means of an electromagnet. **e. units.** e.m.u. or "emu." A system of electrical units based upon dynamics; it includes the practical units (volt, ampere, ohm, etc.) which are multiples or fractions of the c.g.s. electro-magnetic units. See table of electrical units.

electromerism. A mobile electron tautomerism shown by a set of compounds in which the electron constellations vary, although the atomic kernels remain in position. Cf. *chelate bond.*

electromers. Isomers which differ in the distribution of the electrons amongst their atoms.

electrometer. An instrument for measuring the quantity or intensity of an electric current. **absolute-** Galvanometer. Ammeter. **capillary-** An e. used as a null-instrument which detects potentials down to 1 millivolt by the motion, in a capillary tube, of a dilute sulfuric acid-mercury interface. The motion is due to a change of surface tension produced by the potential. **emanation-** See *emanation.* **photo-** Photo-galvanometer. **quadrant-** Galvanoscope.

electromotion. Mechanical action produced by electricity.

electromotive. In motion produced by electricity. **e. force.** E, EMF, emf or E.M.F., or e.m.f., electrical pressure, voltage. The work done per unit quantity of electricity flowing through a cell; *i.e.*, the driving force behind the electrons comprising a current. A potential gradient is set up between any two elements, especially metals, placed in a solution, which can be expressed by e.m.f. = volts = I/R = amperes/ohms. If the elements and ions are arranged according to decreasing e.m.f., the displacement series (q.v.) results; this measures the capacity of an atom to retain its electrical charge or hold its negative valence electrons. The unit of e.m.f. is the volt.

1 International volt = 1.00043 absolute volt.
1 absolute volt = 0.99957 international volt
= 1 practical e.m.u.
= 10^8 c.g.s. e.m.u.
= 0.0033349 e.s.u.

For molar concentrations the e.m.f. of an electrolytic cell is the algebraic difference between the electro-affinities (q.v.) of the ions of the metals forming the electrodes. See *electrode potential.* **e. series.** Displacement series.

electron. (1) An alloy containing about 90 % magnesium, 5 %, aluminum and a little zinc, manganese or copper. (2) Negatron, beta-particle. An elementary unit of electricity, or a negatively charged corpuscle, whose accumulation on an insolated conductor causes the phenomena of static electricity, and whose flow through a conductor produces an electric current. Electrons are constituents of the atom; they are assumed to be in the atomic nucleus and the atomic shell, and their number and the arrangement of the outer electrons accounts for valency and other properties of the atom. Electrons are liberated from the atom by radioactive disintegration, and transferred from one atom to another in oxidation-reduction reactions (electronation). They are made visible by the Wilson track method, and Millikan's fog chamber. Their mass changes with their velocity. Constants are:

mass..... 9.035×10^{-28} gm.
charge..... 4.770×10^{-10} e.s.u.
or
1.591×10^{-20} e.m.u.
spin (angular momentum) 9.02×10^{-28} erg. sec.

Cf. *e, e/m, atom, quantum, Bohr, Schrödinger.* **binding-** An electron which holds together the positive charges in the atomic nucleus. **cementing-** An electron which is assumed to hold together the two hydrogen nuclei of the helium atom. **free-** (1) A corpuscle or charge of negative electricity (mass 9.01×10^{-28} gram), equal to 1/1845 the mass of a hydrogen atom. (2) An e. in the octet of an atom which is not shared by another atom; thus the N in ammonia has two, and the O in water four free e. which can form co-ordinate bonds. **heavy-** Yukawa particle. A penetrating component of cosmic rays, believed to carry an electronic charge greater than that of an electron, but less than that of a proton. **lodged-** A singular position of electrons in equilibrium in the atom, as opposed to binding electrons which are supposed to occur in couples or pairs. **metastasic-** An electron which changes its position within the atom due to radioactive changes. They are generally valence electrons moving from the valence orbit into the interior of the atom. **negative-** Negatron or a free electron. Cf. *positive e.* **nuclear-** E. of the atomic nucleus. **orbital-** E. in the orbits of an atom. **paired-** A couple of e. which constitute a non-polar bond, q.v. Cf. *twin e.* **phoretic-** E. which produce electrical conduction by passing freely from atom to atom when their outer orbits are in contact. **photo-** E. liberated from a surface by exposure to visible or invisible light. **piezo-** A supposedly disk-shaped e. in the helium nucleus. **positive-** (1) A heavy, but very small corpuscle which is never found associated with a mass less than that of hydrogen, and which is assumed to be a hydrogen nucleus or a hydrogen atom from which an electron has been removed (hydrogen ion or proton). (2) Positron. A particle (q.v.) of nearly zero mass with a positive charge. **recoil-** E. which are scattered by bombardment of a substance with α- or β-rays. **twin-** A couple of e. which constitutes a polar bond, q.v. Cf. *paired e.* **valency-** The electrons located in the outer shell or orbit of the atom which are responsible for valency, and which may either pass from one atom to the other (polar bond) or be held in common by two atoms (non-polar bond). The number of valence electrons ranges from 1 to 8, (see *periodic system*), and an atom with 1 electron (alkali metals) is positive and monovalent; an atom with 2 electrons (earth-alkalis) positive and divalent; an atom with 3 electrons (earth-metals) positive and trivalent; an atom with 4 electrons (carbon group) non-polar and tetravalent; an atom with 5 electrons (nitrogen group), negative and trivalent; an atom with 6 electrons (oxygen group), negative and bivalent; an atom with 7 electrons (chlorine group) negative and monovalent; an atom with 8 electrons (noble gases) inert and non-valent. The term "positive" indicates the loss and "negative" the gain of an electron or electrons. See *Lewis-Langmuir theory, octet theory, valency, bond.*

e. affinity. The capture by a substance, *e.g.*, an oxidizing agent, of the electrons of other substances. See *electronation.* **e. attraction.** The pull exerted by an atom or radical on the shared electron-pair, which joins it to some other atom or radical. See *e. formula, Lucas theory.* **e. beam.** A stream of *e.*, as in a cathode tube. See *sectrometer, Wilson tracks.* **e. diffraction.** The investigation of the structure of a surface by the diffraction of a stream of electrons directed upon it. Cf. *Kikuchi lines, electron microscope.* **e. displacement.** A shift of an e. pair held in common between two atomic nuclei, towards one of the nuclei. See *Lucas theory.* **e. eye.** Iconoscope. **e. formula.** A chemical notation which depicts the displacement of the e.s. in an organic compound. The relative orbital position of the e. pair is represented by the symbols o—, —o—, —o—; each circle represents two electrons. **e. fugacity.** The tendency to lose electrons by an electrode immersed in a solution. **e. lens.** The electrostatic field surrounding an aperture in a charged conductor; thus a circular hole will focus electrons according to, $f = 2V/(G_2 - G_1)$, where f is the focal length, V the energy of incident particles in volts and

G_1, G_2 the potential gradient on the two sides of the plate. The diameter of the hole is not involved. **e. microscope.** See *microscope.* **e. optics.** The study of the control of the motion of electrons by means of charged electric fields, in a manner analogous to the effect of lenses on light. **e. pair.** A couple of electrons which is held in common by two atoms, and accounts for a non-polar and non-ionizable bond. **e. replacement** (cf. *displacement*). Electronation. **e. screening effect.** See *screening effect.* **e. transfer.** The passage of one or more electrons from an atom or iron to another atom or ion during an oxidation-reduction reaction, q.v. Cf. *polar number, valency.* **e. tube.** A device for an electric discharge; as, thermionic valve, vacuum tube, radio tube, x-ray tube or rectifier. **e. volt.** EV. Volt of energy or equivalent volt $= 1.59 \times 10^{-12}$ erg. It is the energy acquired by an e. when it falls through a potential of one volt, and is related to wavelength (cf. *quantum mechanics, radiation*) as follows:

1	EV	= 12,337	a
4.3	EV	= 2,900	å
6.4	EV	= 2,000	å
10	EV	= 1,250	a
25	EV	= 500	å
100	EV	= 12.3	å

electronate. To cause electronation or reduction. **de-** To cause de-electronation or oxidation.

electronating agent. A substance which loses one or more electrons during a chemical reaction. **de-** A substance that gains one or more electrons during a chemical reaction.

electronation. A general term proposed by Cady and Taft for reduction, or the addition of an electron or electrons to an element during a chemical reaction. **de-** Oxidation, or the removal of an electron or electrons from an element during a chemical reaction. *E.g.:*

Electronated or reduced from +1 to 0

$$A^+ + B = B^+ + A$$

De-electronated or oxidized from 0 to +1

A^+ is the de-electronating or oxidizing agent, as its valence number decreases from (+1) to 0. B is the electronating or reducing agent, as its valence number increases from 0 to (+1).

Electronated or reduced from 0 to −1

$$C + D^- = D + C^-$$

De-electronated or oxidized from −1 to 0

C is the de-electronating or oxidizing agent, as its valence number decreases from 0 to (−1). D^- is the electronating or reducing agent as its valence number increases from (−1) to 0. **e. reactions.** Oxidation-reduction reactions, or all chemical reactions in which an exchange of electrons takes place; hence, any reaction in which the valences of the elements are increased or lowered. Classification:

(a) oxidation and reduction.
(b) nitridation and denitridation.
(c) chlorination and de-chlorination.
(d) bromination and de-bromination.
(e) sulfidation and de-sulfidation.
(f) cyanation and de-cyanation.

electronegative. (1) Having a negative charge or an excess of electrons. (2) Capable of capturing electrons. **e. element.** An element located on the left side of the periodic table, especially the non-metals (upper half of the periodic table). Its atom has four or more valence electrons and has a tendency to complete its quota of eight. **e. ion.** Anion, or negative ion. **e. radical.** An acid radical or a group of atoms having a negative charge; as, OH^-, SO_4^{--}.

electronic. Pertaining to electrons. **e. charge.** A quantity (e) of electricity which is numerically equal to the charge on an electron. $e = (4.770 \pm 0.005) \times 10^{-10}$ absolute e.s.u. **e. formula.** See *formula.* **e. mass.** The mass (m) of a negative electron when moving with a velocity much less than that of light. **e. number.** The number of peripheral electrons present in the elements making up a compound. **e. ratio.** The ratio of electronic charge to electronic mass,

$$e/m = 5.305 \times 10^{17} \text{ e.s.u.} = 1.769 \times 10^7 \text{ e.m.u.}$$

e. structure symbol. A notation showing the distribution of electrons in the molecule; see *bonds, molecular diagram.*

electronyl. A term for the atomic entity which is active by virtue of the number of electrons in excess of or less than the nuclear charge.

electroösmosis. The diffusion of a substance through a membrane within an electric field.

electrophoresis. The migration of particles in an electric field.

electrophorus. Insulated discs of ebonite and brass, used to produce frictional electricity.

electroplating. The formation of a metallic coat on a baser metal by electrolysis; hence, any electrolytic process for covering a metallic object with a fine deposit of silver, gold, nickel, copper, or chromium.

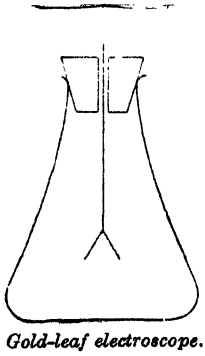
electropositive. (1) Having a positive charge or a deficiency of electrons. (2) Capable of losing or giving up electrons. **e. elements.** The elements on the right-hand side of the periodic table, especially the light-metals (upper half of the periodic table). **e. ion.** Cation. An atom which has lost one or more negative electrons and has become positive. **e. radical.** A basic radical or a group of atoms having a positive charge; as, NH_4^+, $Cu(NH_3)_4^{++}$.

electropotential. Electrode-potential

electrorefining. The purification of metals, especially copper, nickel, or tin, by electrolysis.

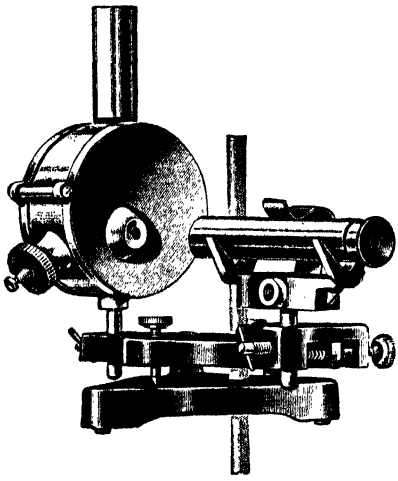
electroresponse. The increase in resistance shown by certain cells with increase of current. Such cells may contain cuprous oxide and sodium silicate, and are used as automatic cut-outs for lighting systems.

electroscope. A device for detecting electrical charges or gaseous ions. Cf. *Curie, emanation, radioscope.* **gold-leaf-** Two strips of gold leaf suspended from an insulated conductor and



Gold-leaf electroscope.

enclosed in a glass vessel. **measuring-** An insolated gold leaf mounted in a closed case having an adjustable insulated plate which can be rotated so that an electrostatic and



Measuring electroscope.

gravitational balance is established. The position of the leaf is read in a low focus microscope.

electroscopy. The measurement of the degree of ionization of a gas in terms of the rate of fall of the leaf of a charged gold electroscope.

electrosol. A colloidal solution of a metal obtained by passing electric sparks between metal electrodes immersed in distilled water. See *collosol.*

electrostatic. Pertaining to electric charges at rest; as, the accumulation of electrons or an electric field of force. **e. capacity.** The ratio of quantity of electricity to difference of potential. **e. law.** See *Coulomb.* **e. units.** Esu or e.s.u. A system of electrical units based on static data. See table under *electrical.*

electrostenolysis. The precipitation of metals within the pores of a membrane by electrolysis.

electrostriction. (1) The contraction of the solvent of a solution resulting from the attractions of the water dipoles by the ions of the solute. (2) Mechanical deformation due to the application of an electric charge; the reverse of piezoelectricity.

electrosynthesis. Synthetic reactions caused by an electric current; especially those used in organic synthesis.

electrotaxis. Electrotropism. The movement or motion of living cells caused by an electric current.

electrotropism. Electrotaxis.

electrotyping. The reproduction of type, reliefs, etc. by copper-electro deposited on the layer of graphite with which the mold or object has been covered.

electrovalence. A fundamental type of atomic linkage corresponding with ionised or polar linkages, and opposed to covalency. It is due to the transfer as distinct from sharing of electrons. Cf. *polar, non-polar bonds.*

electrowinning. The separation of metals (as zinc or copper) from their ores by electrolysis. Cf. *electrorefining.*

electrum. (1) Amber. (2) An alloy of 80 % gold and 20 % silver, d.13.0–16.0, hardness 2.5–3.0.

elemecin. $C_{12}H_{16}O_3$ = 208.10. *3.4.5*-Trimethoxy propenyl benzene, iso-elemicin, $C_6H_2(OMe)_3C_3H_5$. An aromatic ether d.1.073, b.153, from elemi.

elemene. $C_{15}H_{26}$ = 206.2. A hydrocarbon, d.0.883, b_{10mm}.119, from elemi.

element. Matter which consists of atoms of one type; hence, a substance which cannot be further decomposed by chemical means; a chemical unit or an ultimate constituent of matter. There are 92 possible elements from hydrogen to uranium, inclusive. The atoms of an element are chemically alike but may differ physically, hence an e. may consist of a mixture of two or more atoms of different mass which have similar chemical properties but different atomic weights (isotopes). An element, while chemically undecomposable, may consist of two or more isotopes, and the atomic weight is the mean of the atomic weights of the isotopes calculated in the proportion of the amounts of the individual isotopes present. The elements of higher atomic weight are radioactive, indicating their complex nature (subatomics). **abundance of-** See *abundance.* **alkaline-** E. of the first group of the periodic system; Li, Na, K, Rb, and Cs. **basylous-** E. of the first, second, and third groups of the periodic system, located in the upper right half of the periodic table, whose oxides form bases with water. **bio-** See *bioelements.* **bridge-** E. in the lower half of the periodic table, especially those of the rare earth metals, which show a gradation of properties from one to the other. **Bunsen-** *Bunsen cell.* **chemical-** Element. **dvi-** See *dvi-.* **electrical-** Galvanic, or voltaic cell. **earthy-** E. of the third group of the periodic system; *e.g.*, Al, Sc, etc. **eka-** See *eka element.* **electrical-** An electrolytic cell. **electronegative-** E. whose atoms have more than four valency electrons. They are located on the left of the periodic table. **electropositive-** E. whose atoms have less than four valence electrons. They are located on the right in the periodic table. **extinct-** The supposed e. of very low atomic weight, which may have formerly existed on the earth but have become extinct on account of the age of the earth; *e.g.*, nebulium, a hypothetical constituent of certain planetary nebuli giving characteristic spectral lines which seemed to indicate a low atomic weight but which are now considered due to oxygen and nitrogen. **future-** The hypothetical e. of very high atomic weight which may in future appear on our earth on account of evolutionary processes and gradual condensation. (Cf. *old age theory, hypon, transuranium.*) **gaseous-** E. which are, under normal conditions, in the gaseous state: H, O, N, Cl, F, and the noble gases. **group-** E. belonging to the same group in the periodic system, as opposed to period-elements. **haloid-** E. of the seventh group of the periodic table: F, Cl, Br, and I. **heating-** A unit of resistance wire used in heating apparatus. **inert-** E. of the zero group of the periodic table; (the noble gases He, A, Kr, Xe, and Nt), which are electrically inert, and of which very few compounds are known. **liquid-** E. which are in the liquid state under normal conditions; bromine and mercury. **metallic-** E. of the lower half and right upper half of the periodic table; the light-metals, and heavy-metals. **negative-** Electronegative-. **non-metallic.** E.

located in the left upper half of the periodic table, q.v. **normal-** Standard cell. **period-** An e. whose properties are closely related to the e.s. of the same period of the periodic table; *e.g.*, Mn-Fe-Co-Ni, Rh-Ru-Pd. Antonym: group element. **primal-** The original, nebulous form of matter from which all other elements are supposed to have evolved: the protyle, pantagon, or urstoff. **principal-** The fourteen most common, most abundant, and most important elements; *viz.* aluminum, calcium, carbon, chlorine, hydrogen, iron, magnesium, nitrogen, oxygen, phosphorus, potassium, silicon, sodium, and sulfur. Cf. *abundance*. **radio-** Any e. made artificially radioactive by bombardment with particles; as, radiosodium, radionitrogen. **radioactive-** Those e. of atomic numbers 82 to 92. **terminal-** E. of the zero-group of the periodic system which form the terminals of each period, *i.e.*, the noble gases or inert elements. **transition-** (1) E. of the fourth group of the periodic system which form the transition from light-metal to non-metal, light-metal to heavy metal, and heavy-metal to non-metal, *i.e.*, elements of the carbon group. (2) The triads Fe, Co, Ni; Ru, Rh, Pd and Os, Ir, Pt which connect the seventh and first group. (3) The e. from Ti to Ni, Zr to Pd, and Hf to Pt which connect the A series in the periodic system. **typical-** The e.s. of the second period of the periodic system, which show the typical characters of each group —neon, sodium, magnesium, silicon, phosphorus, sulfur, and chlorine.

Note

For alphabetical list of elements giving *atomic weights* and *atomic numbers*, see *atomic weight*.

For numerical list of atomic numbers including *valency* and *atomic structure* of elements, see *periodic chain*.

See also *ions*, *ionic numbers*, *radioactive elements*.

For a list of *isobars*, *isotopes*, see *abundance*, *displacement series*, *isomorphs*.

HISTORICAL TABLE

Prehistoric and Archaic Time:		
	carbon	
	sulfur	
	gold	
	silver	
4000 B.C.	copper (Egypt)	
3500 B.C.	iron	
?	lead	
1600 B.C.	tin (Chaldaea)	
1000 B.C.	antimony	
300 B.C.	mercury (Theophrastus)	
Alchemistic period:		
1220	arsenic	Albertus Magnus
1450	bismuth	Basil Valentine
1520	zinc	Paracelsus
1669	phosphorus	Brand
Beginnings of Chemistry:		
1773	cobalt	Brandt
1750	platinum	Wood
1751	nickel	Cronstedt
1758	sodium in salts	Marggraf
1758	potassium in salts	Marggraf
Founding of Chemistry:		
1766	hydrogen	Cavendish
1772	nitrogen	Rutherford
1774	oxygen	Priestley
1774	chlorine	Scheele
1774	manganese	Scheele, Gahn
1774	barium	Scheele
1782	tellurium	Müller
1782	molybdenum	Hjelm
1783	tungsten	d'Elhujar
1787	strontium	Cruikshank
1789	zirconium	Klaproth
1789	uranium	Klaproth
1789	titanium	Gregor
1794	yttrium	Gadolin
1797	chromium	Vauquelin
1797	beryllium	Vauquelin
1801	columbium	Hatchett
1802	tantalum	Ekeberg
1803	cerium	Klaproth
1803	osmium	Tennant
1803	iridium	Tennant
1804	palladium	Wollaston
1804	rhodium	Wollaston
Beginnings of electrochemistry:		
1808	calcium	Davy
1808	magnesium	Davy
1808	boron	Davy
1812	iodine	Courtois
1817	selenium	Berzelius
1817	lithium	Arfvedson
1817	cadmium	Strohmeyer
1823	silicon	Berzelius
1826	bromine	Balard
1828	aluminum	Wöhler
1828	thorium	Berzelius
1830	vanadium	Sefström
1839	lanthanum	Mosander
1841	(didymium)	Mosander
1843	erbium	Mosander
1845	ruthenium	Claus
Beginnings of spectroscopy:		
1860	cesium	Bunsen
1861	rubidium	Bunsen
1861	thallium	Crookes
1863	indium	Reich, Richter
Beginnings of systematization:		
1872	(eka-elements)	Mendeleycev
1875	gallium	Boisbaudran
1878	terbium	Delafontaine
1878	ytterbium	Marignac
1878	holmium	Soret
1878	thulium	Cleve
1879	samarium	Boisbaudran
1879	scandium	Nilson
1880	gadolinium	Marignac
1885	praseodymium	Welsbach
1886	dysprosium	Boisbaudran
1886	neodymium	Welsbach
1886	germanium	Winkler
1886	fluorine	Moissan
Modern Chemistry:		
1894	argon	Ramsay and Rayleigh
1895	helium	Cleve, Ramsay
1898	neon	Ramsay and Travers
1898	krypton	Ramsay and Travers
1898	xenon	Ramsay and Travers
	(radioactivity)	
1898	polonium	Curie
1898	radium	Curie
1898	actinium	Debierne, Giesel
1898	radon (niton)	Curie, Dorn
1900	europium	Demarcay
1907	lutecium	Urbain, Welsbach
1913	brevium	Fajans
	(mass-spectrograph)	
1923	hafnium	Coster and Hevesy
1925	masurium	Noddack and Tacke
1925	rhenium	Noddack and Tacke

HISTORICAL TABLE—(*Continued*).

1926 illinium.....	Hopkins
(magneto optic method)	
1930 virginium.....	Allison and Murphy
1931 alabamine.....	Allison, etc.
(neutron bombardment)	
1935 ekarhenium.....	Rolla
1935 ekaosmium.....	Rolla
(artificially produced)	
1936 ausonium (No. 93)..	Fermi
1936 esperium (No. 94)..	Fermi
(chemically isolated)	

elementary. (1) Ultimate, simple, fundamental. (2) Pertaining to elements. **e. analysis.** The determination of carbon and hydrogen in organic compounds. Cf. *analysis*. **e. charge.** The charge on an electron, e = 4.770 × 10^{-10} e.s.u. **e. molecule.** A combination of similar atoms; as, O_2 or S_4. **e. space.** The space surrounding the positively charged nucleus in which the electrons are arranged in definite positions. Cf. *dynad*.

elementide. A group of atoms or elements which are transferred as whole complexes during a chemical reaction.

elemi. (1) Gum elemi. A soft, white or yellowish, aromatic resin from *Canarium commune*, a Burseraceae of the Philippines. Used in pharmacy in plasters and ointments; or to impart toughness to varnishes. Cf. *nauli gum*. (2) Originally the resin of *Amyris elemi fera*. **e. oil.** An essential oil, d.0.870–0.910, from e. containing dipentene.

elemic acid. $C_{35}H_{56}O_4$ = 540.6. A colorless, crystalline acid derived from elemi.

elemicin. $C_{12}H_{16}O_3$ = 208.1. *1*-Allyl-*3.4.5*-trimethoxybenzene. A colorless liquid, d.1.063, b.144, from elemi oil. **iso-** Elemecin.

elemin. $C_{40}H_{68}O$ = 564.7. A crystalline resinous substance in elemi.

elemol. $C_{15}H_{26}O$ = 222.2. A camphor from elemi, α- m.46, $b._{10mm}$143, d.0.941; β- $b._{10mm}$144, d.0.943.

elemonic acid. An acid, m.220.5, from elemi.

eleonorite. $Fe_6P_4O_{19}.8H_2O$. A hydrous iron phosphate occurring in brownish, rhombic masses, d.2.52–2.59, hardness 7.

eleoptene. The liquid terpene or hydrocarbon of an essential oil, as compared with the solid part or stearoptene.

eleostearic acid. $C_{18}H_{30}O_2$ = 280.27. Elaeomargaric acid, octadeca-*9.11.13*-trienoic acid*. $Me(CH_2)_7(CH{:}CH)_3(CH_2)_3COOH$. An unsaturated, aliphatic, monobasic acid from the oil of the seeds of *Elaeococca vernicia*. Colorless rhombic scales, α- m.48; β- m.71; insoluble in water, soluble in alcohol or ether. Both, α- and β- occur in tung oil. ε-. Couepic acid. A solid, m.75, from the fat of the seeds of *Couepia grandiflora*, a Rosaceae of South America.

elevation. (1) Anything which projects or rises above the surrounding surface; *e.g.*, altitude. (2) A rise or increase, as the elevation of temperature.

d'Elhujar, Juan José and Fausto. de Elhuyar, de Luyart. Two Spanish chemists, brothers, who discovered ceria and tungsten (1783).

elimination. The expulsion or excretion of waste materials from the body.

eline. El = 218 (?). Ekaiodine. A supposed halogen element, atomic number 85, occurring as a black metallic solid or as brownish crystalline masses, d.5.9 (?), m.360 (?), b.430 (?), insoluble in ordinary solvents. It is widely distributed, but in small quantities, and is found in the water of Great Salt Lake and in some deserts oils of Western U.S. **e. chlorides.** El_xCl_y. White waxy masses or crystalline fibres, soluble in water, alcohol or ether. **e. nitrate.** $ElNO_3$ (?). A yellowish white solid, soluble in water or carbon tetrachloride. **e. sulfate.** $El(SO_4)_2$ (?). A white, hygroscopic solid, soluble in water, alcohol or ether.

elinvar. An alloy of Fe, Ni and Cr, used in the manufacture of hair-like watch springs [*elasticity invariable*].

elixir. (1) A liquid pharmaceutical preparation for the administration of drugs in an attractive and pleasant form. They are usually sweetened and aromatized alcoholic liquids or cordials. (2) In alchemical language, the principle of everlasting life and youth, and the means of converting the baser metals into gold, (philosopher's stone).

elkerite. Pseudofucosan. A native bitumen formed by the slow oxidation of crude oil. It is a fucose pentosan. Cf. *fucosan*.

ellagic acid. $C_{14}H_6O_8$ = 302.05. Gallogen. A yellow, odorless, tasteless, crystalline powder, $d._{18°}$1.667, decomp. on heating, insoluble in ether, sparingly soluble in hot water or alcohol. Soluble in alkalis. It occurs in many tannins; as, myrobalans, dividivi and valonia.

ellagitannic acid. $C_{14}H_{10}O_{10}$ = 338.1. A tannin-like substance extracted from the pods of *Caesalpinia coriaria*, a Leguminosae, and the root bark of *Punicia granatum*, a Punicaceae; slightly soluble in water.

Elliot tester. An apparatus for determining the flash-point of illuminating oil.

elliptone. $C_{20}H_{16}O_6$ = 352.0. A toxic constituent of Derris root (*D. elliptica*).

elm bark. Ulmus, elm bark, slippery elm. The bark of *Ulmus campestri* or *U. fulva*, an Urticaceae, used as demulcent, and an adulterant for cassia. Cf. *ulmin, ulmic acid*.

elpidite. $Na_2ZrSi_6O_{15}.3H_2O$. A reddish, pearly, sodium zirconium silicate, d.2.5, hardness 7.

elscholtzaldehyde. $C_6H_6O_2$ = 110.06. *3*-Methyl-*2*-furaldehyde. $Me.C_4H_2O.CHO$ from *Elscholtzia* species, a Labiatae.

elscholtzic acid. $C_6H_8O_3$ = 126.06. *3*-Methyl pyromucic acid. The acid $Me.C_4H_2O.COOH$, from *Elscholtzia* species, Labiatae.

eluant. A liquid used for the extraction of one solid from another, *e.g.*, in chromatography, q.v.,

eluate. The solution resulting from elution.

elution. A process of extracting one solid from another.

elutriation. The process of washing and separating suspended particles by decantation.

elwotite. A hard alloy of tungsten containing not more than 30 % titanium.

Em. The symbol for emanation (see *radon*).

em. The c.g.s.-electromagnetic unit of the quantity of electricity.

eman. A radioactive unit for the Rn content of the atmosphere. 1 eman = 10^{-10} curie per liter. Cf. *mache unit*.

emanation. Em. An element, atomic number 86, consisting of the isotopes radon, thoron and actinon. A gaseous disintegration product of radio-active substances. **actinium-**, AcEm, Actinon. An isotope of radon, a disintegration product of AcX, and the parent-substance of AcC'. **radium-**, RaEm, radon, Rn. Disintegration product of radium and the parent-

substance of RaC'. **thorium-**, ThX. Thoron. An isotope of radon. The gaseous disintegration product of ThX, and the parent-substance of ThC'. See *radioactive, isotopes.*

e. electrometer. A delicate electrometer for detecting radio-activity in substances, such as spring water or minerals. **e. electroscope.** An electroscope designed by Rutherford for measuring the amounts of emanation from radio-active bodies.

emamium. An early name for actinium.

Embden ester. A glucose-phosphoric acid ester formed in muscle during muscular activity.

embedding. The fixing of tissues in a solid material (*e.g.*, paraffin) so that they can be cut into thin sections. **e. bath.** A device for heating paraffin and placing tissues in the molten liquid. **e. oven.** An incubator with drawers.

embeliate. A salt of embelic acid.

embelic acid. $C_{18}H_{28}O_4$ = 308.22. Embelin, embellic acid. The active principle, m.142, from the berries of *Embelia ribes*, a Myrsinaceae; used medicinally against tapeworms.

embelin. Embelic acid.

embellic acid. Embelic acid.

embolite. 2AgBr.3AgCl. A rare silver chloride-bromide occurring as grayish mases, d.5.8, hardness 1.5.

embryology. The branch of biology which deals with the development of an organism from a single cell or fertilized egg up to its stage of independent life.

embutal. Pentobarbital.

emerald. A green variety of beryl, used as a precious stone. **oriental-** A green variety of corundum. **e. green.** Copper aceto-arsenite.

emergent column. The portion of the thread of a thermometer which is not immersed in the substance whose temperature is being measured. A correction for its contraction is given (for mercury in glass) by: $N(T - t) \times 0.000156$, where N is the number of degrees on the emergent stem, T the temperature as read, and t the temperature at a point half-way up the emergent column as given by a second similar thermometer.

emeri. Emery.

Emerson calorimeter. A device for rapidly testing the heat value of coals or fuel oils.

emery. A dark, impure variety of crystalline corundum mixed with oxides of iron; used in powder form as a polishing, grinding, and abrasive material. **e. cloth.** An abrasive fabric coated with glue and emery. **e. paper.** A paper coated with glue and emery, used in place of sand paper.

emetamine. $C_{29}H_{36}O_4N_2$ = 476.29. An alkaloid from ipecac. Colorless crystals, m.156.

emetic. A drug which causes vomiting; used especially in cases of poisoning; *e.g.*, any one of the following taken in warm water:

	(8 oz.)	250	cc.
Mustard powder...	1 tablespoon	15	gm.
Common salt.....	2 tablespoons	30	gm.
	(4 oz.)	125	cc.
Zinc sulfate.....	30 grains	2	gm.
Copper sulfate.....	5 grains	0.3	gm.
Ammonium carbonate.....	30 grains	2	gm.

mechanical- Causing vomiting by tickling the throat with a feather.

emetine. $C_{30}H_{40}O_5N_2$ = 508.26. An alkaloid related to cephaeline from the root of *Cephaelis ipecacuanha*, ipecac. Colorless, transparent crystals, or white powder, m.74, sparingly soluble in water, soluble in alcohol or chloroform. Used medicinally as a specific against ameba, especially in hypodermic medication. **iso-** $C_{29}H_{44}O_4N_2$ = 480.32. An alkaloid from ipecac, m.98. **e. hydrochloride.** $C_{30}H_{40}O_5N_2.2HCl$ = 581.26. A white crystalline powder, m.53, soluble in water or alcohol; used hypodermically similarly to emetine.

emetoid. A ten per cent trituration of the alkaloids of ipecac, containing emetine and cephaeline hydrochlorides; used as an expectorant and eliminant.

emf. or **E.M.F.** Abbreviation for electromotive force.

emission. The liberation or sending out of energy by a substance; as, radiations from atoms, heat from bodies. Cf. *scattering, line.* **e. spectrum.** See *spectrum.*

emitron. An electron-tube (q.v.) used in television.

emmenagogue. A drug which produces or increases menstrual flow; *e.g.*, apiol, ergot, quinine, cotton root bark, oil of savin.

emmenin. A crystalline female sex hormone related to oestrone.

emmer. A variety of wheat which was formerly very abundant in Central Europe and the Near East.

Emmerling tube. A glass cylinder filled with glass beads; used for the absorption of gases by liquids.

emodin. $C_{15}H_{10}O_5$ = 270.09. *1.3.8*-Trihydroxy-6-methylanthraquinone. An anthraquinone derivative occurring in many *Rhamnus* species; the purgative principle of rhubarb, aloe, senna, etc. Orange colored, monoclinic prisms, m.234, sparingly soluble in water, soluble in glacial acetic acid; used as a purgative. **aloe-** 1.9-dioxy-3-carbinolanthraquinone. An isomer of emodin and constituent of aloes. found in cascara, senna and frangula; it is related to chrysophanic acid and rhein.

emollient. A drug applied externally to soften or soothe irritated or tense skin; *e.g.*, zinc stearate, boric acid, bismuth subnitrate, talcum.

empiric. Knowledge which is gained by experience, without theoretical considerations. Cf. *scientific.*

empirical formula. A chemical formula which shows the number and variety of atoms, but does not indicate the way in which the atoms are linked together; *e.g.*, $Fe_2S_3O_{12}$ is the empirical formula for $Fe_2(SO_4)_3$.

emplastrum. An adhesive plaster.

emplectite. $CuBiS_2$. A native, copper, bismuth sulfide occurring in grayish, metallic masses, d.6.4, hardness 2.5; soluble in nitric acid.

empyreal air. See *oxygen.*

empyreumatic. Any odorous substance formed by the destructive distillation of vegetable or animal matter. **e. oils.** The oily liquids produced by destructive distillation of vegetable or animal matter; *e.g.*, creosote, oil of cade, oil of tar.

emu or **e.m.u.** Abbreviation for electromagnetic units.

emulsic acid. $C_{21}H_{42}O_{10}N_6$ = 562.8. An acid substance derived from emulsin.

emulsification. The process of making an emulsion. Thus if two pure immiscible liquids are agitated they form an unstable emulsion. To make a stable emulsion, that is, prevent the

droplets from coalescing, an emulsifier, (q.v.), must be added. **de-** The breaking up of an emulsion either by (a) addition of an excess of the dispersed phase, (b) destroying the emulsifying agent, (c) heating, (d) freezing or (e) centrifuging.

emulsifier. Emulsifying agent. A substance used to make an emulsion more stable; as, ammonium linoleate. Its action is explained by either:

A. Surface Tension Theory: The e. lowers the surface tension and thus lowers the tendency of the droplets to coalesce.

B. Oriented Wedge Theory: The e. forms an oriented zone between the two phases.

C. Viscosity Theory: The droplets are surrounded by a viscous film of e.

emulsify. To make an emulsion.

emulsin. Synaptase. An enzyme contained in almonds, and the seeds of the Rosaceae. A white, amorphous, albuminous powder, soluble in water, and contains 48.7 % C, 7.1 % H, 28.7 % O, 14.1 % N, and 1.25 % S. It hydrolyses glucosides to glucose and their other combined substance; as amygdalin to dextrose, benzaldehyde and hydrogen cyanide.

emulsion. Emulsoid. A fluid consisting of a microscopically heterogeneous mixture of two phases, both of which are liquid at ordinary temperatures; *e.g.*, liquids which do not mix, such as oil and water, and in which one liquid forms minute droplets suspended in the other liquid; *e.g.*, oil droplets in water, or water droplets in oil. Cf. *colloids, emulsifier.*

emulsoid. Emulsion.

en. (1) Greek prefix meaning in, on, or at. (2) A suffix which often indicates a hydrocarbon or cyclic compound, *e.g.* thiophen. (3) A prefix indicating a C:C bond; as, enamic, enolic. Cf. *ene.*

enamel. (1) A paint which dries with a gloss. (2) A vitreous, opaque or transparent glaze, which is fused over metal or pottery, as: **grayware-** A mixture of 50 % feldspar, 30 % borax with Na_2CO_3, $NaNO_3$ and cryolite. **jewelry-** A mixture of 14 % silica, 20 % boric acid, 10 % $NaNO_3$ and 23 % KNO_3. **white cover-** A mixture of 10–22 % quartz, 18–33 % feldspar, 18–34 % borax, 3–10 % soda, 2–5 % sodium nitrate, 3–17 % cryolite. These may be colored with a metallic oxide, generally Pb_3O_4.

enamic form. The amine form of an imine, which is characterized by the radical >C:CH.NO—; cf. *enimization.*

enanthaldehyde. $C_6H_{13}CHO$ = 114.1. Heptylic aldehyde, oenanthylic aldehyde, heptanal, oenanthal, heptoic aldehyde, oenanthic aldehyde. A colorless volatile liquid, d.0.85, b.155, slightly soluble in water, soluble in alcohol or ether. Used in organic synthesis.

enanthic acid. Heptoic acid.

enanthic acid. Heptoic acid. **e. aldehyde.** Enanthaldehyde. **e. ether.** $C_9H_{18}O_2$ = 158.2. Cognac oil, oenanthylic ethyl-ether, ethyl pelargonate, $C_6H_{13}.O.C_2H_5$. A colorless oily liquid, insoluble in water, soluble in alcohol or ether. Used in organic synthesis and in flavoring extracts.

enanthine. Heptine.

enanthol. Heptyl alcohol.

enanthotoxin. $C_{17}H_{22}O_3$ = 306.17. A poisonous resin from the rhizomes of *Oenanthe* (five-finger root).

enanthyl. The monovalent radical, C_7H_{13}—, derived from hexane.

enanthylic acid. Enanthic acid.

enantiomers. Optical isomers which are related as object and non-superimposable image. Cf. *enantiomorph.*

enantiomorph. (1) A crystal which corresponds with another crystal as an object with its image. (2) The opposite optically-active substance; the dextroform is the enantiomorph of the levoform and vice versa.

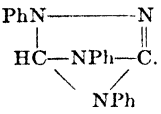
enantiomorphus. Related to one another as object and mirror image; as, an optically active substance which crystallizes in enantiomorphs.

enantiotropic. Existing in two crystal forms, one stable above, the other below a certain temperature (transition point q.v.)

enantiotropy. The phenomena of occurring in enantiotropic, (q.v.), forms.

enargite. Cu_3AsS_4. Grayish-black, metallic, rhombic crystals, d.4.3–4.5, hardness 3, soluble in nitric acid forming free sulfur.

endo- A prefix indicating a "bridge" linkage (or linkage which joins two non-adjacent atoms in a ring) in an organic molecule; *e.g.*, nitron is an endo-compound of 1.2.4. triazole:



endocrine. Pertaining to the secretion of ductless glands; as, hormones, q.v.

endogenous. Generated within, or originating within the body. **e. purines.** The purine bodies of excretions, which are the waste products of metabolism. Cf. *exogenous purines.*

endomorph. A mineral enclosed within another (the perimorph).

endosmosis. The diffusion of a liquid through an organic membrane; *e.g.*, into a cell. Cf. *exosmosis.*

endothermic. The absorption of heat. Antonym: exothermic. **e. compound.** A compound absorbing heat during its formation, and liberating heat on its decomposition. **e. reaction.** A chemical change which proceeds slowly and absorbs a definite number of calories. In an endothermic reaction the stable exothermic compounds are transformed to unstable endothermic compounds.

endotoxin. The poisonous substances of bacteria which remain within the bacterial cell during its life, but which are set free by autolysis after cell death.

endoxerosis. The internal decline of a plant.

endoxy- A prefix indicating oxygen in a ring.

end point. (1) That stage in titration at which the reaction is complete. (2) The point of balance between two forces.

-ene. A suffix which indicates: (1) a hydrocarbon of the ethylene and benzene series. Cf. *-diene,-yl.* (2) A cyclic compound; as, terpene, menthene. (3) A bivalent radical with points of attachment on separate C-atoms; as, ethylene and ethylidene. Cf. *-idene.*

energetics. (1) A branch of physics dealing with forces at work. (2) A branch of philosophy which denies the existence of matter as a passive inert substance and conceives the universe as arrangements of energies distributed in space.

energon. An indivisible unit of energy; see *ergon, quantum.*

energy. Capacity or power to do work and overcome resistance; *e.g.*, heat, light, electricity,

UNITS OF SPECIFIC ENERGY*

		Meter-gravity, lat. 45°	Meter-leo or dynamic meter	Joule. / gm.	Kw. hr./ tonne or mw. hr./ gm.	Water-degree C. or cal./gm.
Potential energy	Meter in London.....	1.0006	0.9812	9.812×10^{-3}	2.726×10^{-3}	2.347×10^{-3}
	Meter in lat. 45°.....	1	0.9806	9.806×10^{-3}	2.724×10^{-3}	2.346×10^{-3}
	Dynamic meter.....	1.0198	1	10×10^{-3}	2.778×10^{-3}	2.392×10^{-3}
Kinetic energy	10 meters per sec.....	5.10	5	0.0500	0.0139	0.0120
Heat	Water 1°C at 20°C.....	426	418	4.18	1.16	1
	Air at const. pressure 1°C.	103	101	1.01	0.280	0.242
	Air at const. vol. 1°C.....	73	71.5	0.715	0.199	0.171
Latent heat	Water-ice at 0°C.....	34.1×10^{3}	33.4×10^{3}	334	93	80
	Steam-water at 100°C.....	230×10^{3}	226×10^{3}	2260	627	540
Calorific value	Hydrogen (to H_2O).....	12.4×10^{6}	12.1×10^{6}	121×10^{3}	34×10^{3}	29×10^{3}
	Carbon (to CO_2).....	3.4×10^{6}	3.3×10^{6}	33×10^{3}	9.3×10^{3}	8×10^{3}
Electrical energy	Kilowatt hours per tonne.	367.1	360	3.6	1	0.861

* From F. J. W. Whipple, *Nature*, vol. 121, p. 356, 1928.

chemical action or mechanical energy. (See table of *energy units*.) It is described as the work done by the force which produces either a change in the velocity of a body or a change in its shape and configuration, or both. It can be defined by *force* multiplied by *distance*, or as *one-half mass* multiplied by the *square of velocity*. **atomic-** See *atomic*. **available-** Free-. **chemical-** E. involved in chemical changes. See *thermodynamics*. **conservation of-** The concept that e. may be transformed from one form to another, but that it cannot be destroyed or created. **creation of-** The concept that e. is created when matter is annihilated; as, in the interior of a star. Cf. *mass-energy cycle*. **degradation of-** The tendency for e. to be always

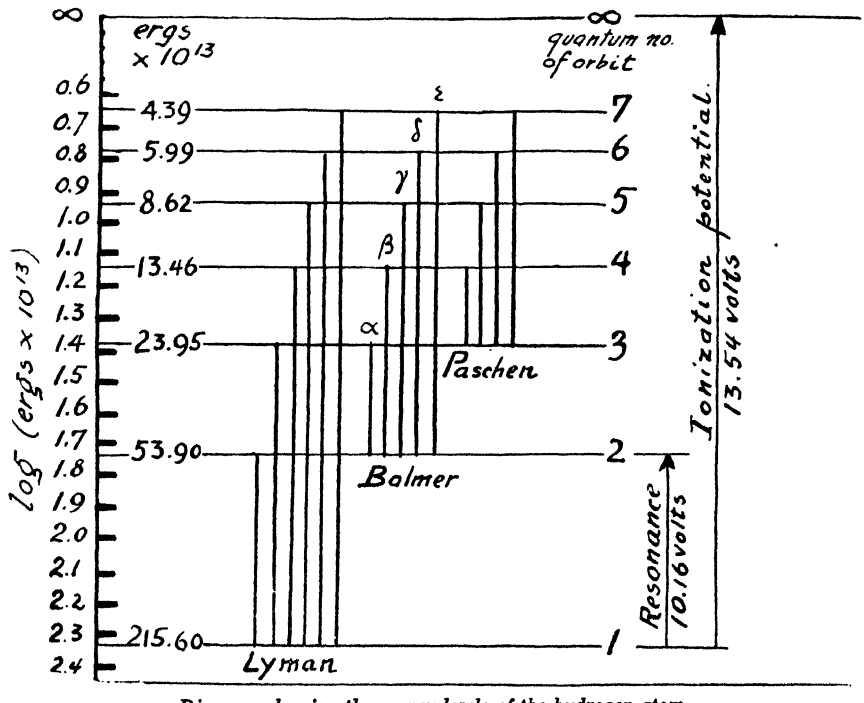


Diagram showing the energy levels of the hydrogen atom.

CONVERSION FACTORS FOR ENERGY UNITS
(Smithsonian Physical Tables, p. 197, 1920).

	Joule	*Kilogram meter*	*Foot-pound*	*Gram-calories (20°C.)*	*Kilowatt-hours*
1 joule (absolute)	1	0.1020	0.7376	0.2390	0.2778×10^{-6}
1 kilogram meter	9.807	1	7.233	2.344	2.742×10^{-6}
1 foot pound	1.356	0.1381	1	0.3240	0.3766×10^{-6}
1 gram calorie	4.184	0.4167	3.086	1	1.162×10^{-6}
1 kilowatt hour	3600000	367100	2655000	860300	1

changing to a lower form, *e.g.*, into heat (Kelvin). **destruction of-** The conversion of e. into matter, the reverse of the creation of e. Cf. *mass-energy cycle.* **dissipation of-** Degradation of-. **dynamic-** Kinetic. **electric-** Electricity. **free-** The available e. of a substance; the amount of e. which can be utilized for work. The change in the free e. of a reacting substance is a measure of its affinity. **ionization-** Ionization potential. **kinetic-** The power of a body due to its motion. It equals the product of half its mass and the square of its velocity. Cf. *kinetics, Boltzmann's law.* **latent-** Potential e. **lattice-** The forces which hold the atoms together in a crystal, q.v. **mechanical-** E. manifesting itself in mechanical work. **medial-** The e. of a medium or solvent on which its dielectric powers and its powers of ionization, association, tautomerism, etc. depend. It is related to the latent heat of evaporation. **potential-** Static, latent e. The e. resting unreleased in a body due to its position, composition or condition; as, a lifted weight, an endothermic compound, or a compressed gas. **radiant-** See *radiations.* **solution-** The e. forces between the molecules of solute and solvent. Cf. *bond, liquids.* **specific-** The power of a body due to its relative position (potential e.) and motion (kinetic e.). See table for units. Potential-. **thermal-** See *heat.*

e. change of atom. The change of voltage, V, where λ is the wavelength; $V = 12{,}336/\lambda$. **e. diagram.** A figure giving a relative picture of the stationary states of a radiating atom. See figure. Cf. *spectrum, Bohr atom, quantum, hydrogen atom.* **e. levels.** The stationary states or orbits of an atom. An electron changing from one to another will either absorb (excitation) or emit (radiation) energy. In the e. diagram of hydrogen the energy, in 10^{13} ergs, required to cause an electron to change its orbit is indicated by the quantum number, q.v., plotted on a logarithmic scale. The lines connecting the various levels correspond with the sources of the spectrum lines; *e.g.*, Lyman, Balmer, and Paschen series. Cf. quantum numbers. See figure. **e. mass cycle.** See *mass energy cycle.* **e. quanta.** See *quantum theory, Stoner quanta.* **e. units.** Units of energy are based upon the work done by a certain force which either produces a change in velocity (= change of kinetic energy), or a change of condition or shape (= change of potential energy), or both. The kinetic energy of mass, m, moving with velocity, v, is $K = \frac{1}{2}mv^2$. The potential energy of a mass, m, raised through a distance, h, is $P = mgh$, where g is the acceleration due to gravity. The energy units resolve themselves into the fundamentals (see table, p. 306):

energy $= ML^2T^{-2}$ = mass × (velocity of light)^2

or into units of mass (or weight), length, and time, and can be expressed in the C.G.S. or F.P.S. systems, thus:

unit of velocity: $v = LT^{-1}$
unit of acceleration: a = 981 C.G.S. units
unit of force: F = Ma
unit of pressure: p = dyne per cm^2 (981 C.G.S. units)
p = atmosphere (1,013,663, C.G.S. units)
unit of work: erg = dyne per cm.
1 kilogram meter = 981×10^5 ergs

Practical conversion factors:

1 International joule = 1.00034 absolute joules.
1 absolute joule = 0.99966 international joules.
= 10^7 ergs.
= 0.101972 kilogram meters.
= 0.737560 foot-pounds.
= 0.277778×10^{-6} kilowatt-hours.

enesol. Mercury salicylarsenite.

engineering. Utilizing the physical properties of matter in inventing, designing, constructing, building and managing structures and machines. See applied *physics.* **chemical-** The branch of e. or chemistry concerned with the design, erection and operation of chemical plants.

Engler, Carl. (1842–1925). A German chemist noted for his work on petroleum and as an editor. **E. degree.** A relative unit of viscosity.

enhanced. Intensified, *e.g.*, the enhanced lines of a spectrum.

enidin. An anthocyanin and a split-product of enin.

enimization. An intramolecular rearrangement of amines and imines analogous to the keto-enol equilibrium:

$$\underset{\text{enamic form}}{-C:CH.NH-} \leftrightarrows \underset{\text{enimic form}}{-CH.CH:N-}$$

enin. A glucoside and coloring matter of black grape skins; hydrolyzed to enidin and glucose.

enndecane. Nonadecane.

ennea- A prefix indicating nine.

enneadekane. Nonadecane.

enol form. The alcohol form of a ketone characterized by the bivalent C=(OH)R radical. See *isomerism, desmotropy, ketone.*

enolic ester type. A compound of the enol form, $R_2C{=}C(OH)R$.

ensilage. (1) Silage, or fodder preserved in a silo. (2) The process of making silage.

ensmartis. Ferriammonium chloride.

enstatite. $MgSiO_3$. A grayish, rhombic, magnesium silicate, d.3.1, hardness 5.5.

enterokinase. An activating enzyme of the intestinal epithelium, which transforms trypsinogen to trypsin.

enthalpy. The heat content, H, per unit mass expressed in B.Th.U. per pound. $H = E + PV/J$, where E is internal energy, P absolute pressure (lb. per ft.^{2}), V specific volume (ft.^{3} per lb.) and J = joules equivalent (778 ft.-lb. per B.Th.U.)

entropy. The unavailable energy of a substance which is due to the internal (irregular and compensating) motion of the molecules; it is used internally and cannot be utilized for mechanical work. Cf. *free energy.* The state of molecular chaos of a system (Gibbs) or the extent to which an energy system has "run-down" (Tolman). Entropy is directly proportional to the quantity of heat contained in a body, and inversely proportional to its temperature; hence when a substance absorbs or radiates heat, a change in e. occurs. At absolute zero e. vanishes. The same concept is expressed by the statements: entropy tends to a maximum; free energy tends to a minimum; a reaction tends to an equilibrium, and at equilibrium, the entropy is at maximum.

-enyl. A suffix indicating a bivalent unsaturated hydrocarbon radical; as, ethenyl.

enzyme. A catalyst produced by living cells which has a specific action and optimum activity at a definite pH value. The classification is based upon the type of reaction, or the material (substrate) acted upon. The first e. crystallized was *urease* (Sumner 1926) later *pepsase* (Northrop, 1930), *trypase* (Northrop and Kunitz 1931) and *amylase* (Caldwell, Booher and Sherman 1931). They are generally proteins. The more common enzymes and their pH optima are:

Amylase, salivary	6.1–6.9
Amylase, pancreatic	7.0
Amylase, malt	4.6–5.2
Catalase	7.0
Erepsin, intestinal	7.7
β-Glucosidase	5.0
Lipase, pancreatic	8.0
Lipase, gastric	4–5
Lipase, salivary	7.6–7.8
Lipase, ricinus	4.7
Melibiase	5.5
Maltase	6.1–6.8
Maltase, Solanum indicum	5.5
Papain	4–7
Pectolase	4.5–6.7
Pepsin (on egg albumin)	1.2–1.6
Pepsin (on gelatin)	3.0–3.5
Pepsin, synthetic action	4.0
Phosphatase, bone	9.5
Phosphatase, plasma	8.8–9.2
Phosphatase, red blood cells	6.0–6.8
Phosphatase, plant sources	3.4–6.0
Phosphatase, synthetic action	9.4
Protease, autolytic (kidney, liver)	4.5
Rennin	5.4
Sucrase, intestinal	6.8
Sucrase, yeast	4.4–4.6
Sucrase, Solanum indicum	6.0
Trypsin, pancreatic	8.0
Trypsin, synthetic action	5.7
Tyrosinase	6–8
Urease	7.0

amylolytic- E. hydrolyzing starch to dextrin and maltose; *e.g.*, amylase, amylo-pectinase. **anti-** A substance which inhibits the action of an e. **apo-** See *holo-*. **holo-** The whole enzyme, which is divided into the apo-enzyme (or protein carrier) and the co-ferment (q.v.). **blood-** E. of the blood, q.v. **co-** See *coferment.* **coagulating-** E. changing soluble proteins to insoluble products; *e.g.*, thrombin, myosinase, rennet. **cytohydrolytic-** The enzymes which render cellulose soluble, *e.g.*, cytase, cellulase. **deamidizing-** E. hydrolyzing amines to ammonia and hydroxy acids or purine bodies; *e.g.*, deamidase, adenase, guanidase. **decarboxylizing-** E. splitting CO_2 from organic acids; *e.g.*, carboxylase. **desmo-** An insoluble e. linked to insoluble cell constituents. *Cf. lyo-.* **glycolytic-** E. hydrolyzing glucosides to glucose and residue; *e.g.*, glucosidase. **hydrolytic-** The large group of enzymes hydrolyzing carbohydrates to simpler sugars; *e.g.*, inulase, pectinase. **inactive-** A non-reactive e. Cf. *zymogen, optimal.* **inverting-** E. which change optically inactive sugars to optically active carbohydrates; or dextro-rotary to levorotary or vice versa; *e.g.*, invertase. **lipolytic-** E. hydrolyzing esters (fats, etc.) to fatty acids and alcohols; *e.g.*, lipases, butyrases. **lyo-** The soluble form of an e. which can be dissolved from the cell. Cf. desmo-. **pro-** A zymogen, q.v. **proteolytic-** E. hydrolyzing proteins to albumoses and peptones; *e.g.*, pepsin, trypsin. **oxidizing-** E. oxidizing alcohols or aldehydes to acids, or phenols to quinones; *e.g.*, oxidase, aldehydase, alcoholoxydase, phenolases. **reducing-** E. which reduce oxidizing agents such as hydrogen peroxide, *e.g.*, peroxidase, catalase. **yellow-** A compound of protein with lactoflavine phosphate, obtained from yeast.

e. elixir. A palatable preparation of pepsin and rennet used as general gastric tonic.

ENZYMES

A. HYDROLASES, or hydrolytic enzymes which hydrolyze complex compounds to simpler compounds according to the general equation $R.R' + H_2O = RH + R'OH$

1. carbohydrases		splitting carbohydrates
	cellulase	acts upon cellulose
	cytase	acts upon hemicellulose
	diastase, and amylase	act upon starch
	invertase	acts upon sucrose
	lactase	acts upon lactose
	maltase	acts upon maltose
	pectinase	acts upon pectin
	inulase	acts upon inulin
2. esterases		splitting fats
	lipase	fat to glycerol and fatty acid
	butyrase	fat to alcohol and fatty acid
	chlorphyllase	chlorophyll to phytol.
3. glucosidases		splitting glucosides
	emulsin (amygdalase)	beta-glucosides
	invertase	alpha-glucosides
	rhamnase	monosaccharides
	myrosinase	monosaccharides
	phytase	phytin to inositol
	tannase	tannin to gallic acid
4. proteases		splitting proteins
	peptase (pepsin)	to peptones
	tryptase (trypsin)	to peptides
	peptidase	to peptides
	ereptase (erepsin)	to aminoacids
	arginase	to urea
	carbamase	to amines
	nuclease	to nucleins
5. amidases		splitting urea
	urease	to CO_2 and NH_3
6. deaminases		liberating ammonia
	desamidase	aminoacids to hydroxy acids
	guanase	guanine to xanthine
	adenase	adenine to hypoxanthine
7. coagulases		coagulate proteins
	thrombase (thrombin)	fibrinogen to fibrin
	rennase (rennin)	caseinogen to casein
	chymase (chymosin)	casein to paracasein

B. ZYMASES, or fermenting enzymes which generally change monosaccharides to lactic acid, butyric acid or alcohol, etc.

1. alcoholases (yeast ferment, zymase) sugars
2. lactacidase ..... milk sugar
3. vinegar-oxidase ..... alcohol
4. endo-tryptase ..... peptids

C. OXIDASES, or oxidizing ferments.

1. aldehydases ..... aldehydes to acids
2. alcoholoxidases ..... alcohols to acids
3. phenolases ..... phenols to quinons
4. laccases ..... phenols
5. purine-oxidases ..... purines
6. uricase ..... urine
7. tyrosinase ..... tyrosine

D. REDUCTASES, or reducing enzymes,

1. hydrogenase ..... (in fresh milk)

E. CATALASES or catalyzing enzymes which decompose or synthesise, as

1. catalase ..... Hydrogen peroxide to water
2. nitrilase ..... Hydroxynitriles to aldehydes
3. oxynitrilase .. Aldehydes to hydroxynitriles
4. phosphatase .. Combine sugars and phosphates

F. ANTICATALASES, oppose catalaytic action:

1. cozymase ..... assists zymase
2. carboxylase ..... oxidizes —COOH to CO_2

enzymolysis. A chemical change produced by enzyme action.

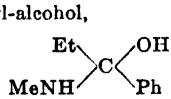
enzymosis. Enzymolysis, with special reference to fermentation.

eosin, eosine. $C_{20}H_8O_5Br_4$ = 648.84. Tetrabromfluorescein, bromeosin. Red, triclinic needles, insoluble in water, soluble in alcohol, alkalis; or acetic acid; used as a dye and indicator (alkalis = greenish fluorescence, acids = yellow). **soluble-** (1) Commercial eosin. (2) Eosin, yellowish.

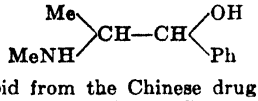
e. bluish. Erythrosin. **e. dyes.** Dyestuffs for wool and silk derived from fluorescein; *e.g.*, eosin, erythrosin, phloxin, uranin, rose bengal. **e. soluble.** Eosin, yellowish. **e., yellowish.** $C_{20}H_6O_5Br_4K_2$ = 724.83 or $C_{20}H_6O_5Br_4Na_2$ = 691.83. The potassium or sodium salt of eosin. A reddish to brownish powder, soluble in water or alcohol; used as a dye for coloring solutions, etc.

eosins. A group of dyestuffs derived from triphenylmethane.

ephedrine. $C_{10}H_{15}ON$ = 165.1. α-methylamino-α-ethyl benzyl-alcohol,

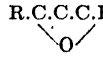


An alkaloid from *Ephedra gracilis*, a Gnetaceae of Europe. **levo-** α-phenyl-β-methyl-β-methyl-amino-ethanol,



An alkaloid from the Chinese drug MaHuang from *Ephedra equisetina*, a Gnetaceae. White crystals, m.38–40, soluble in water, alcohol, or chloroform; used similarly to e. hydrochloride. **pseudo-** The dextroisomer of α-phenyl-β-methyl-β-methyl amino ethanol. An alkaloid from *Ephedra vulgaris*, a Gnetaceae of Japan. Colorless crystals, m.115, insoluble in water, soluble in alcohol, ether, or chloroform. Cf. *hordenine, anhaline, adrenalin.* **e. hydrochloride.** $C_{10}H_{15}ON.HCl$ = 201.57. White needles, m.214, soluble in water or alcohol. Used medicinally as a mydriatic, and in ophthalmology as an atropine substitute. **levo-** Colorless crystals, readily soluble in water. Used as an adrenalin substitute to raise blood pressure; also in bronchial asthma and hay fever. **(pseudo-)** Yellowish crystals, m.175, soluble in water or alcohol. Used in ophthalmology as 10 % solution.

epi- (1) A Greek prefix indicating upon, through, or toward. (2) A prefix indicating a bridge or intramolecular connection; as,



epi-position. ϵ- The 1.6-position of naphthalene or other condensed rings.

epiborneol. $C_{10}H_{18}O$ = 154.20. 3-camphanol, 3-hydroxy camphane. An isomer of borneol, q.v.

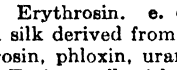
epiboulangerite. $Pb_3Sb_2S_8$. A metallic sulfantimonide of lead.

epicaine. A vasopressor and local anesthetic, said to be α-(3.4-dihydroxyphenyl)-β-(p-aminobenzoyl-β-diethylaminoethanol)-α-ethanone hydrochloride.

epicamphor. $C_{10}H_{16}O$ = 152.2. 3-Camphanone, 3-ketocamphane, β-camphor. An isomer of camphor in which the keto group is in the 3-position.

epicatechol. $C_{15}H_{14}O_6$ = 290.11. *d-* or Catechol-c. Colorless prisms, m.245, from gambir catechu. *l-* Thick white prisms, m.245. *dl-* Colorless needles, m.225.

epichlorohydrin. C_3H_5OCl = 92.51. Chloropropylene oxide, *1*-chloro-*2.3*-epoxypropane,



A colorless liquid, $d_0°$.1.203, b.117, insoluble in water, miscible with alcohol or ether. Used as a solvent for resins and nitrocellulose, and in the manufacture of varnishes, lacquers, and cements for celluloid articles. Cf. *epihydrin.*

epichlorite. A basic, aluminum-iron silicate of the chlorite group.

epicyanohydrin. C_3H_5OCN = 83.07. Cyanopropylene oxide, β,γ-expoxybutyronitrile. Colorless prisms, m.162, soluble in hot water or alcohol.

epidichlorohydrin. $C_3H_4Cl_2$ = 110.95. *2-3*-Dichloropropene*. A colorless liquid, $d_{25°}$.1.209, b.96, insoluble in water, soluble in alcohol or ether; used as a solvent.

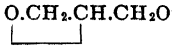
epididymite. $Na_2O.2BeO.6SiO_2.H_2O$. A beryllium silicate. Rhombic crystals, d.3.55.

epidosite. A crystalline schist derived from diabase.

epidote. $HCa_2(Al,Fe)_3Si_3O_{16}$. Pistacite. A crystalline schist which occurs commonly in gneisses, garnet rock, amphibolite, etc. Greenish, monoclinic masses, d.3.3–3.5, hardness 6–7, soluble in hydrochloric acid after calcination.

epidotization. The disintegration of feldspar, hornblende, augite and biotite into epidote.

epiethylin. $C_5H_{10}O_2$ = 86.07. Glycidyl ethyl ether, *2.3*-epoxy-*1*-ethoxypropane.



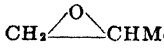
A colorless liquid, d.0.94, b.124; used as solvent for shellac, copals, synthetic resins, and gums.

epigenite. $Cu_7As_2S_{12}$. A sulfoarsenide of copper containing iron.

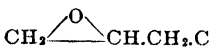
epiguanine. $C_6H_7ON_5$ = 165.1. 2-amino-6-methyl-8-oxypurine, methylguanine. A purine body found in the urine, especially during leukemia.

epihydric acid. Glycidic acid. **e. alcohol.** Glycidol.

epihydrin. C_3H_6O = 58.1. Propylene epoxide. The heterocyclic compound



A colorless liquid, d.0.859, m.35, soluble in water. **e. alcohol.** Glycidol. **e. carboxylic acid.** $C_4H_6O_3$ = 102.1. The monobasic acid



Colorless crystals, m.225.

epihydrinic acid. Glycidic acid.

epiiodohydrin. C_3H_5OI = 183.89. *1.2*-Epoxy-*3*-iodopropane, γ-iodopropylene oxide. A colorless liquid, d_{15}°.2.03, b.160, insoluble in water, but miscible with alcohol; used as a solvent.

epimeric. Having the relationship of epimerides, q.v.

epimerides. Epimers. An isomeric pair of substances differing only in the arrangement of H and OH on the last asymmetric carbon atom of a chain; as, *d*-glucose and *d*-mannose, or *d*-ribose and *d*-arabinose.

epimers. Epimerides.

epinephrine. The U.S.P. and B.P. name for adrenalin, q.v. **e. bitartrate.** Suprarenin.

epinine. $C_9H_{13}NO_2$ = 167.1. *3.4*-Dihydroxy phenyl ethyl amine, $(HO)_2C_6H_3(CH_2)_2NHMe$. Colorless crystals; synthetic substitute for epinephrine, used as vasoconstrictor.

episin. $C_{15}H_{12}N_2$ = 232.2. Methyldiphenylenamidoazol. Glassy prisms, m.195, insoluble in water, soluble in alcohol. Used medicinally as an anodyne and morphine substitute.

epipastic. A dusting powder.

epiphenylin. $C_9H_{10}O_2$ = 150.08. Glycidyl phenyl ether, *2.3*-epoxy-*1*-phenoxy propane, $O.CH_2.CHCH_2OPh$. A colorless liquid, d.1.11, b_{22mm}.131, used as solvent for shellac, resins and nitrocellulose.

epiphyte. An organism living on, but not feeding on another organism; *e.g.*, orchids.

epipolic. Fluorescent.

episol. A brand of sodium morrhuate used as sclerosing agent.

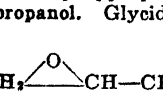
epispastic. A vesicant, or a drug which blisters the skin.

episperm. The membrane between the shell and kernel of a seed.

epistilbite. $Ca_2Al_4Si_{11}O_{30}$. A colorless, monoclinic calcium aluminum silicate, d.2.24–2.36, hardness 3.5–4.

e.p.m. Abbreviation for equivalents per million = p.p.m./equivalent weight in mgms. Used to express water analyses.

epoxy- A prefix indicating a —O— bridge in a molecule; as, $O.CH_2.CH_2$ epoxyethane*; $CH_2.CH_2CH_2$ 1.3-epoxypropane* cf. *methoxy-*, *ethoxy-*. **e. propanol.** Glycidol. **e. propionic.** The radical



e. propionic acid. Glycidic acid.

epsilon. The Greek letter ε. The symbol for ergon, etheron, dielectric constant, electrode potential, epiposition. ε. **acid.** *3-6*-Naphthylamine disulfonic acid.

Epsom salts. Magnesium sulfate.

epsomite. $MgSO_4$. A native magnesium sulfate occurring in colorless, rhombic prisms, d.1.7, hardness 2.

epuration. The purification of sugary liquors by defaction etc.

epuré. A bituminous mixture obtained from Trinidad; used for constructional work.

equation. (1) A symbolical expression of equality. (2) A chemical notation indicating a change or chemical reaction. The formulae of the reacting substances are placed on the left, those of the reaction products on the right, separated by the equality sign; this indicates that the total number of atoms of each kind on the left and on the right must balance. The equation:

(a) $2NaOH + H_2SO_4 = Na_2SO_4 + 2H_2O$

is translated into the statement: Two molecules of sodium hydroxide and one molecule of sulfuric acid will give one molecule of sodium sulfate and two molecules of water. The ionic equation:

(b) $Ba^{++} + SO_4^{--} = BaSO_4$

is translated into: One barium ion (furnished by any soluble barium salt) and one sulfate ion (furnished by any soluble sulfate or by sulfuric acid) will give barium sulfate (which relatively, is unionized, since itis almost insoluble). **analytical-** An equation showing the separation or decomposition of a compound into simpler constituents (see *analysis*). **electronic- Ionic-. ionic-** An equation indicating changes involving ions; *e.g.*, substances in solution. Cf. equation (b). **metathetical-** An equation expressing a metathesis. **molecular-** An equation indicating a molecular change or molecular reaction. Many molecular equations can be put into ionic form. In this case, the molecular equation indicates a specific instance of a certain reaction, while the corresponding ionic equation is the general statement of the reaction; *e.g.*, equation (a) in the ionic form becomes

(c) $2OH^- + 2H^+ = 2H_2O$,

which is the general equation for neutralization. **transmutation-** An e. which indicates the disintegration or synthesis of elements; thus,

$$_1H^1 + {}_5B^{11} \rightarrow 3{}_2He^4$$

means that element No. 5 (boron with isotopic weight 11) is bombarded by a proton (element No. 1, hydrogen with weight 1) and forms 3 atoms of element 2 (helium of weight 4). Similarily $_4Be^9 + {}_2He^4 \rightarrow {}_0n^1 + {}_6C^{12}$, where element No. 0 is a neutron. The sum of the atomic numbers (prefixed subscripts) as well as the sum of the isotopic weights (suffixed superscript) is the same on both sides.

e. of state. A group of mathematical expressions derived from the equation pv = RT, which define the physical conditions of a homogeneous liquid or gaseous system by relating concentration or volume (v), pressure (p), and absolute temperature (T) for a given mass of substance

(1) **Ramsay-Young equation** $p = kT - c$.
(2) **Van der Waal equation**

$$RT = \left(p + \frac{a}{v^2}\right)(v - b).$$

(3) Dieterici equation

$$p(v - b) = RTe - \frac{A}{RTv}.$$

(4) Clausius equation

$$RT = \left[p + \frac{a}{T(v + c)^2}\right](v - b).$$

k and c are constants depending on the volume, R is the gas constant, *a* the constant correcting for molecular attraction, and *b* the volume occupied by the molecules; A expresses the work done to overcome molecular attraction and e is the base of natural logarithms. See *gas constants, van't Hoff's factor.*

equilenin. $C_{18}H_{18}O_2$ = 266.2. *3*-Hydroxy-*17*-keto-estrapentaene. A sterol (q.v.) and sex hormone produced by the biological degradation of cholesterol occurring in the urine during pregnancy. See *cholane.*

equilibrium. A condition in which contending forces are balanced or equalized independently of time. Cf. *triple point, quadruple point, diagram.* **chemical-** The balanced state reached when chemical reaction apparently stops, that is, when the concentrations of reaction products and the original reacting substances are such that decomposition and recombination proceed with equal speed; as, $2Fe + 3H_2O \leftrightarrows 3H_2 + Fe_2O_3$. See *mass action.* The more general types are

	Acid-base e.	Oxidation-reduction e.
Maintained by.....	Buffer	Poiser
Determined by.....	pH-indicator	rH-indicator
Expressed as.....	pH	rH

disturbed- The removal of one or more reaction products or reacting substances from a chemical equilibrium, causing a shift of the equilibrium. *E.g.*, if a gas is formed during a chemical reaction, and is continuously removed, the reaction will be completed. **heterogeneous-** A chemical equilibrium between two (or more) phases; *e.g.*, a solid and gas, or liquid and gas. **homogeneous-** A chemical equilibrium in a single phase; *e.g.*, between two dissolved substances, or between gas and gas, liquid and liquid, etc. **invariant-** An e. in which the quantity of one component approaches zero. **ionic-** An e. which involves a balanced condition of ions. **kinetic-** The balanced state of two opposite reactions. Cf. *static e.* **molecular-** An e. in which the components are molecules. **monophase-** Homogeneous-. **polyphase-** Heterogeneous-. **stable-** A mobile condition which, after a casual displacement, is again restored. **static-** The equilibrium attained when all reaction ceases.

e. constant. Same as dissociation constant. See *Mass Action Law.*

equilin. $C_{18}H_{20}O_2$ = 268.2. *3*-Hydroxy-*17*-keto-estratetraene. A female sex hormone produced by the biological degradation of cholesterol. See *cholane.*

equipartition. (1) The orderly arrangement of atoms, *e.g.*, in a crystal. (2) The condition of molecules in a gas, where the molecules keep the same average distance apart under the same pressure.

equisetic acid. Aconitic acid.

Equisetum. A genus of herbaceous, spore-producing plants (horsetail, scouring rush, bottle brush) which are rich in silica.

equivalence. The relative combining powers of a set of atoms or radicals. **e. point.** The theoretical end-point of a titration, which differs by the titration error from the actual end-point obtained in practice.

equivalent. (1) The weight in grams of an element that combines with or displaces one gram of hydrogen. (2) The weight of a substance contained in one liter of a normal solution. This quantity is determined by (a) dividing the atomic weight of an element by its valency (*e.g.*, an equivalent of a ferrous salt = 56/2); or (b) by dividing the molecular weight of a compound by the valency of its principal atom or radical. (*E.g.*, an equivalent of NaOH is 40/1, an equivalent of sulfuric acid is 98/2.) (c) By calculating the quantity of a substance that combines with one gram of hydrogen or with 8 grams of oxygen. (3) Having the same valency. **electrochemical-** See *electrochemical.* **gram-** The equivalent weight of a substance in grams. *E.g.*, sodium hydroxide, 40 grams; sulfuric acid, 49 grams. **milli-** The weight of a substance in grams contained in 1 milliliter of a normal solution. **toxic-** The lethal dose (q.v.).

e. charge. The amount of electricity in a gram-e. of substance, *i.e.*, 6.06×10^{23} electrons or 96,494 Int. Coulombs. Cf. *Faraday.* **e. conductivity.** See *conductivity.* **e. weight.** A gram-equivalent; *e.g.*, the equivalent of a substance in grams, which is calculated by dividing its formula weight by its valency. (With *acids*, the number of replaceable H-atoms, with *bases* the number of OH-groups.)

Er. The symbol for erbium.

era. See *geologic era.*

erbia. Erbium oxide.

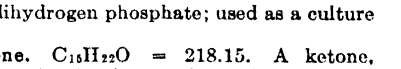
erbium. Er = 167.2. Atomic number 68. A rare earth metal, discovered in 1879 by Cleve in the erbia of Marignac (1878) and Berlin (1860). The erbia discovered and named in 1843 by Mosander was actually terbium. A metallic substance, d.4.77, insoluble in water, soluble in acids. Erbium is trivalent and forms red salts. It is not used in industry. **e. acetate.** $Er(C_2H_3O_2)_3.4H_2O$ = 416.77. Pink triclinic crystals, d.2.144, soluble in water. **e. nitrate.** $Er(NO_3)_3.6H_2O$ = 461.8. Pink crystals, soluble in water or alcohol. **e. oxalate.** $Er_2(C_2O_4)_3.10H_2O$ = 779.44. A reddish powder, d.8.64, decomp. 575. **e. oxide.** Er_2O_3 = 383.4. Erbia. An orange, amorphous powder, insoluble in water, soluble in acids. At high temperature it glows with a greenish light. See e. **e. sulfate.** $Er_2(SO_4)_3.8H_2O$ = 767.6. Rose-red crystals, soluble in water.

Erdmann, H. 1862–1910. A German chemist noted for qualitative and quantitative analytical methods. **E., Otto Linné.** (1804–1869). A German chemist noted for atomic weight determinations, and as author and editor (*Journal für praktische Chemie*). **E. float.** A small, partly filled, sealed glass tube for obtaining accurate burette readings. **E. reagent.** (1) Concentrated sulfuric acid containing 2 drops

of conc. nitric acid per 100 cc.; used as a reagent for alkaloids. (2) A solution of 1.8-aminonaphthol-4.6-disulfonic acid, which gives an intense red color with nitrites.

erdschreiber. An extract made by autoclaving earth with a solution of sodium nitrate and sodium dihydrogen phosphate; used as a culture medium.

eremophilone. $C_{15}H_{22}O$ = 218.15. A ketone, m.42, occurring in the wood oil of *Eremophila mitchelli*, a Myoporaceae of Australia.



erepsin. A proteolytic enzyme of the intestinal mucous membrane, the pancreatic juice, and other animal and vegetable tissues; it splits proteoses, peptones, etc. to amino acids.

ereptase. Erepsin.

erg. The C.G.S. unit of work or energy: the force necessary to overcome the resistance of one dyne acting through one centimeter.

1 Joule = 10^7 ergs.
1 Foot-poundal = 4.214×10^6 ergs.
1 gram-calorie (20°C.) = 4.184×10^7 ergs.

ergamine. Histamine.

ergine. (1) $C_{16}H_{17}N_3O$ = 267.14. A base obtained by hydrolysis from ergotoxine and ergotinine. Cf. *lysergic acid.* (2) Erogone. A categorical name for substances which exert biological catalytic effects in small quantities (*e.g.*, vitamins, hormones and enzymes).

ergobasine. Ergometrine.

ergochrysin. $C_{28}H_{28}O_{12}$ = 556.2. A yellow pigment, m.366, from ergot.

ergoflavine. $C_{15}H_{14}O_7$ = 306.1. A yellow pigment, m.344, from ergot, resembling vitexine.

ergometrine. $C_{19}H_{23}N_3O_2$ = 329.2. Ergobasine, ergotocin, ergostetrine. An active alkaloid from ergot; colorless crystals, m.159, $[\alpha]_D^{20}$ + 90°, soluble in water with blue fluorescence. Used in obstetrics.

ergon. (1) ϵ. or $h\nu$. An energy quantum, q.v. $\epsilon = 6.554 \times 10^{-27}$ erg. sec. $= h\nu$. (2) Vitazyme.

ergonovine. Ergometrine.

ergosine. $C_{30}H_{35}N_5O_5$ = 545.3. An alkaloid, m.228, produced by treating ergosinine with acid.

ergosinine. $C_{30}H_{35}N_5O_5$ = 545.3. An alkaloid, decomp. 228, from ergot.

ergostane. $C_{27}H_{48}$ = 372.5. The hydrocarbon corresponding with ergosterol and isomeric with cholestane. Cf. *sterols.*

ergosterin. Ergosterol.

ergosterol. Ergosterin. An inert alcohol derived from ergot, which occurs in yeast and is the provitamin of vitamin D. For its structure see *sterols.* It is a mixture of (1) $C_{26}H_{40}O$ = 368.31, a white solid, d.1.041, m.154, $b_{22mm.}$ 185; and (2) $C_{27}H_{42}O$ = 383.32, a colorless solid, m.165. Cf. *irradiation.* **irradiated-** Viosterol.

ergostetrine. Ergometrine.

ergot. Ergota, spurred rye, *Secale cornutum.* The dried sclerotium of *Claviceps purpurea*, a Hypocreaceae or fungus, occurring on numerous grasses; especially replacing the grain of rye, *Secale cereale, Gramineae.* From this hard, black, shining, and elongated mycelium or spawn, a number of different medicinal preparations are made, usually from the yearly and new crop of Spanish ergot. Among the numerous substances identified as active principles are: ergometrine, ergotoxine, histamine, tyramine, and acetylcholine. The inert substances of ergot are: ergotinine, ergothioneine, secalonic acid, sclererythrin, clavicepsin, ergosterol, fungisterol, vernine, amino acids, and secale aminosulfonic acid. See *ergotine.*

ergotamine. See *gynergen.*

ergothioneine. $C_9H_{15}O_2N_3S.2H_2O$ = 265.44. An inert alkaloid of ergot.

ergotic acid. An acid, $C_{15}H_{30}O_{15}(NH_2)SO_3H$, in ergot.

ergotine. A dark, red-brown extract of ergot, used medicinally as an emmenagogue, oxytocic, vaso-constrictor, and hemostatic. **E. Bonjean.** An aqueous extract of e., purified by alcohol. **E. Bombelon, E. Denzel, E. Keller, E. Kohlmann.** Extracts of ergot prepared by different methods. **E. Wernich.** A dialysed extract of ergot which has previously been purified by alcohol or ether. **E. Wiggers.** A dried extract of fat-free ergot. **E. Yvon.** An extract of ergot made with tartaric acid.

ergotinine. $C_{35}H_{39}O_5N_5$ = 609.6. The anhydride of ergotoxine and an alkaloid of ergot. Yellowish, long needles which darken on exposure to air, m.219–229, insoluble in water, soluble in alcohol or ether. It is physiologically inactive. **amorphous-** Ergotoxine. **hydro-** Ergotoxine.

e. citrate. An amorphous, grayish powder, slowly soluble in water. **e. Kraft.** Ergotoxine. **e. Tanret.** Ergotoxine.,

ergotocin. Ergometrine.

ergotoxine. $C_{35}H_{41}O_6N_5$ = 627.8. Ergotinine Kraft, or Tanret. Hydro-ergotinine, amorphous ergotinine. A yellowish, amorphous powder, m.138, sparingly soluble in water, soluble in alcohol or ether, and physiologically inactive.

Ericaceae. Heather family, a group of shrubs or trees with bell-shaped flowers. Many plants of this group contain glucosides, and their leaves are used as drugs.

Arctostaphylos uva ursi	bearberry
Arctostaphylos glauca	manzanita
Gaultheria procumbens	wintergreen
Chimaphila umbellata	pipsissewa
Epigaea repens	trailing arbutus
Vaccinium crassifolium	vaccinium
Vaccinium oxycoceus	cranberry
Kalmia latifolia	mountain laurel
Ledum latifolium	Labrador tea
Oxygendrum arboreum	sourwood
Rhododendron maximum	great laurel

ericin. Mesotan.

ericinol. $C_{10}H_{16}O$ = 152.2. An alcohol of *Ledum palustris* or wild rosemary, an Ericaceae and the split-product of ericolin. A colorless, oily liquid with a peculiar odour, which becomes darker and yellow on exposure.

ericolin. $C_{35}H_{56}O_{21}$ = 800.6. A glucoside from *Ledum palustris* or wild rosemary, an Ericaceae. A brownish, soft, mass, soluble in water.

erigeron. Fleabane, coltstail, prideweed. The herb or seeds of *E. canadense*, a Compositae, used as an astringent and tonic. **e. oil.** The essential oil of e., d.0.845–0.865, containing d-limonene, terpineol and esters.

erilite. A plastic made from casein and formaldehyde. Cf. *galalith.*

erinite. $Cu_3(AsO_4)_2.2Cu(OH)_2$. Native, basic copper arsenate. It is emerald green in color and is a decomposition product of enargite.

eriodictyol. A chalcone of phloroglucinol occurring as glucoside in eriodictyon. It is isomeric with hesperidin.

eriodictyon. Mountain balsam. Yerba santa. The dried leaves of *Eriodictyon californicum*, a Hydrophyllaceae. It is used medicinally as an aromatic and expectorant as a fluid-extract or syrup. **e. oil.** The essential oil of e., d.0.937, soluble in 70 % alcohol.

erionite. A rock-forming mineral of the zeolite group.

Erlangen blue. Prussian blue.

Erlenmeyer, R. A. K. E. 1825–1909. A German chemist noted for organic research. **E. flask** or **erlenmeyer.** A conical glass flask with flat bottom, used extensively in chemical laboratories.

erogone. Ergine (2).

erose. A bacterial growth characterized by irregularly toothed margins.

erosion. Denudation. The wearing away, especially of rocks, due to the action of weather or chemical substances, *e.g.*, alkaline waters. Cf. *corrosion, surrosion.*

errhine. A drug which causes an increase in nasal secretions. Cf. *sternutatory.*

error. (1) Deviation from the truth. (2) The principle that the accuracy of a determination depends on the accuracy of the data on which it is based, and which it therefore, cannot exceed. **mean-** The quantity $\pm\sqrt{\Sigma d^2/(n-1)}$; where Σd is the sum of the deviations of individual values from the mean, n the number of determinations. **mean- of the mean.** The quantity $\pm\sqrt{\Sigma d^2/n(n-1)}$.

erucic acid. $C_{22}H_{42}O_2$ = 338.45. *cis- 13*-Docosenoic **acid***. A fatty acid found in the oil of raisin seeds, grape seeds, and mustard oil. Small, colorless needles, d.0.860, m.33, $b._{15mm}$ = 264, insoluble in water, soluble in alcohol. It is an isomer of brassidic and cetoleic acids.

erucidic acid. Brassic acid.

eryodiction. Eriodictyon.

erysicine. A mixture of erysodine and erysovine (q.v.) from *Erythrina* alkaloids.

erysimin. A glucoside from the seeds of *Erysimum* species, Cruciferae. It resembles digitalis physiologically.

erysodine. An alkaloid, m.201, from *Erythrina* species.

erysopine. An alkaloid, m.242, from *Erythrina* species.

erysovine. An alkaloid, m.178, from *Erythrina* species.

erytaurin. A glucoside from centaury, *Erythraea centaurium*, a Gentianaceae.

erythraea. Bitter herb, canchalaqua. The herb of *Erythraea chilensis*, a Gentianaceae resembling centaurea, q.v. It is used as a bitter tonic and stimulant.

erythrene. Bivinyl.

erythric acid. (1) $C_4H_8O_6$ = 136.1. The dextrotrihydroxy-butyric acid, $CH_2OH(CHOH)_2COOH$. (2) Sometimes applied to *erythrin.* (3) e. of Brugnatelli. Alloxan.

erythrin. (1) $C_{20}H_{22}O_{10}$ = 422.20. A colorless, microcrystalline powder, m.137, sparingly soluble in water, soluble in alcohol; a constituent of *Roccella tinctoria.* (2) A native cobaltous arsenate. Cf. *erythrine.*

erythrina. (1) The coral tree, a Papilionaceae of the West Indies, East Indies, Central America, and the Malay States. (2) A genius of Leguminosae (Cf. *erysodine, erysovine*).

erythrine. An alkaloid from the seeds of *Erythrina broteroi* of the Dutch Indies, *Erythrina carraloides* of Mexico, *Erythrina corallodendron* of Brazil, and other species of leguminous plants. Used medicinally as antidote to strychnine, as a hypnotic, and in epilepsy. Cf. *erythrol.*

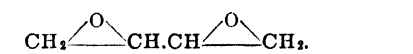
erythrinine. An alkaloid from the bark of *Erythrina broteroi.*

erythrite. (1) Phycsite, red cobalt. A native cobalt arsenate. (2) Erythritol.

erythritic acid. Erythric acid.

erythritol. $C_4H_{10}O_4$ = 122.09. Erythrol, erythrite, phycite, tetrahydroxy-butane, erythroglucin, lichen sugar, $H(CHOH)_4H$. A tetrahydric alcohol from the lichen, *Protococcus vulgaris;* a split-product of erythrine. Tetragonal prisms, $d_{17°}$.1.452, m.112, b.330, soluble in water or alcohol, insoluble in ether. **nitro-** E. tetranitrate. **penta-** $C_5H_{12}O_4$ = 136.1. A tetrahydric alcohol; colorless crystals, m.250. Cf. *pentaerythritol.*

e. benzene. Fuchsin. **e. ether.** $C_4H_8O_2$ = 86.1. The heterocyclic compound



e. tetraacetate. $C_{12}H_{18}O_8$ = 290.14. White crystals, used as plasticizer for cellulose acetate, to increase the transmission of ultraviolet light. **e. tetranitrate.** $C_4H_6O_{12}N_4$ = 302.3. $C_4H_6(NO_3)_4$. Tetranitro erythrol, tetranitrol. Yellowish crystals which explode when heated, m.61, slightly soluble in water, soluble in alcohol. Used medicinally as a vasodilator and prophylatic in preventing pain; and as an explosive.

erythrocentaurin. $C_{17}H_{24}O_8$ = 476.2. The red coloring matter of *Erythraea centaurium* and *Sabbatia angularis*, which resembles santonin. Needle-shaped crystals, darkening in light, m.136, insoluble in water, soluble in hot alcohol.

erythrocephaelin. The coloring matter of ipecac.

erythrocruorin. Hemoglobin.

erythrocyte. A red-blood corpuscle.

erythrodextrin. A split-product of starch; dextrin which gives a red color with iodine. Cf. *achrodextrin.* It is an intermediate in the salivary digestion of starch.

erythroglucin. Erythrol(2).

erythrol. (1) Erythritol. (2) $C_4H_8O_2$ = 88.04. *3*-Butene-*1.2*-diol, $CH_2OH.CHOH.CH{:}CH_2$. White crystals, d.1.047, m.196.5.

erythrolitmin. $C_{26}H_{23}O_{13}$ = 543.2. Deep-red crystals derived from *Corona solis.*

erythronium. The name given by del Rio in 1804 to vanadium, which was rediscovered by Sefström in 1831.

erythrooxyanthraquinone. $C_{14}H_8O_3$ = 224.08. Oxy-anthraquinone. Orange-red needles, m.190, soluble in alcohol, ether, or alkalis.

erythrophloeine, erythrophlœine. An alkaloid from the bark of *Erythrophloeum guinense*, a Leguminosae of Guinea, used by natives as an ordeal poison. A dark-yellow, syrupy liquid, sparingly soluble in water, soluble in ether, alcohol, or glacial acetic acid; its use as a local anesthetic has been proposed. Cf. *sassy bark.*

Erythrophloeum, Erythrophlœum. A genus of leguminous trees of West Africa furnishing the

sassy, casca, or mancona bark; used by the natives as ordeal poison.

erythroprotid. $C_{13}H_8O_8N$ = 258.1. A red split-product of proteins obtained by boiling them with concentrated alkali.

erythroquine reaction. A test for alkaloids in which a characteristic color is formed on adding, in succession, chloroform, bromine water and potassium ferrocyanide.

erythroretin. $C_{28}H_{36}O_{14}$ = 716.4. A red coloring matter from rhubarb.

erythrose. $C_4H_8O_4$ = 120.1. Trihydroxybutyricaldehyde, $CHO.(CHOH)_2.CH_2OH$. A tetrose or sugar derived from erythrol; it occurs in dextro- and levo- forms. Its isomers are threose, erythrulose.

erythrosiderite. K_2FeCl_5. A rare potassium-ferric chloride mineral.

erythrosin. (1) $C_{13}H_{18}O_6N_2$ = 298.2. A red compound obtained by treating tyrosine with nitric acid. (2) $C_{20}H_8O_5I_4$ = 835.84. Tetraiodofluorescein. Pyrosin. Yellow crystals, insoluble in water, soluble in alcohol; used as a dye. (dye) (3) $C_{20}H_6O_5I_4Na_2$ = 879.82. Eosin bluish, sodium iodoeosin, sodium tetraiodofluorescein. Reddish-brown powder, soluble in water or alcohol; used as a dye, and hydrogen ion indicator, changing at pH 2.0 from orange (acid) to magenta (basic). Cf. *iodeosin.*

erythroxyline. Cocaine.

erythroxylon. Coca.

erythrulose. $C_4H_8O_4$ = 120.06. A ketose and tetrose derived from erythritol.

erythrytol. Erythritol.

es. or **e.s.** An abbreviation for the c.g.s.-electrostatic unit of quantity of electricity.

Esbach, Georges Hubert. 1843–1890. A French physician, noted for clinical analytical methods. **E. albuminometer.** A graduated test tube for estimating the amount of albumin in urine. **E. reagent.** A solution of 1 gm. trinitrophenol and 2 gm. citric acid in 100 cc. water, used for determining albumin in urine.

escaping tendency. Potential of temperature. A measure of the tendency of a substance to change from one state to another, *e.g.*, from solid to liquid.

escharotic. A caustic drug or a substance that produces a crust of dead tissue.

eschatin. An extract of lipoids from the suprarenal cortex; used in the hormone therapy of Addison's disease.

Eschka mixture. A mixture of 2 parts magnesium oxide and 1 part dried sodium carbonate; used as a reagent for determining sulfur in coal or coke.

eschwegite. $5Y_2O_3.5(Ta,Nb)_2O_5.10TiO_2.7H_2O$. A reddish gray, isotropic rare-earth mineral.

esciorcin, æsciorcin. Escorcin.

escoquinine. Quinine aesculinate.

escorcin. $C_9H_8O_4$ = 180.1. Escorcinal, æscorcin. A brown powder, soluble in alkalis, and derived from aesculetin. Used in ophthalmology.

esculetin. $C_9H_6O_4$ = 178.1. Aesculetin, 6,7-dihydroxycoumarin. A split-product of aesculin. **methoxy-** Gelseminic acid. **methyl-** Scopoletin.

esculetinic acid. $C_9H_8O_5$ = 196.06. Aesculetinic acid. Colorless crystals, m.168.

esculin. $C_{15}H_{16}O_9$ = 340.20. Aesculin, aesculinic acid, anallachrom, polychrom, bicolorin. A glucoside from the seeds of *Aesculus hippocastanum*, or horse chestnut. White colorless needles, slightly soluble in water, readily soluble in alcohol or alkalis, giving fluorescent solutions. Sulfuric acid converts it into esculetin and glucose. Used medicinally as an antimalarial, and in ophthalmology.

-ese. A suffix denoting a synthesizing enzyme (q.v.). It is added to the name of the substance formed by the synthesis. Cf. *-ase.*

esenbeckic acid. An acid, resembling quinovic acid, from the bark of *Esenbeckia febrifuga*, a Rutaceae of tropical America.

esenbeckine. $C_6H_{18}NO_6$ = 200.2. An alkaloid from the bark of *Exostemma souzanum.*

eseridine. $C_{15}H_{23}O_3N_3$ = 293.2. An alkaloid derived from eserine, occurring in calabar beans. Colorless crystals, m.132, soluble in alcohol, ether, or chloroform; used as a laxative in veterinary medicine.

eserine. Physostigmine.

Esmarch bottle. A device for sampling water at any depth by removing and replacing the stopper mechanically.

eso- Prefix indicating that an element or radical is substituted for a hydrogen atom attached to a ring atom.

esotoo. Trade name for liquid sulfur dioxide.

esoxin. A ptomaine from the sperm of white fish, pike and lake trout.

esparto. A tall grass, *Stipa tenacissima*d an *lygeum spartum*, Gramineae of Northern Africa, used in the manufacture of paper. Cf. *alfa.*

esperium. Es. See *ekaosmium.*

essence. (1) A solution of a volatile or essential oil in alcohol. (2) The active principle of a plant. (3) A fruit essence, q.v. **e. niobe.** Methyl benzoate.

essential. Pertaining to an essence. **e. oils.** Volatile oils, ethereal oils. A group of volatile oils of characteristic odors, distilled from plants, leaves, flowers, etc. Distinguished from fatty oils by their volatility, non-greasiness, and non-saponifying property. Two classes:

A. Existing in plants, as such, and imparting the characteristic odor to flower, leaves or woods:
   1. Terpenes (oil of turpentine, juniper, etc.).
   2. Terpenes and stearoptenes (oil of peppermint, lemon, etc.).

B. Developed from plant constituents by:
   1. Enzyme action (oil of mustard, bitter almond, etc.).
   2. Produced by heat (empyreumatic oils, cade, tar, creosote etc.).

They are inflammable, soluble in alcohol or ether, slightly in water. Constituents:

Hydrocarbons:	Ocymene, myrcene, cymene, styrene, pinene, camphene, fenchene, limonene, phellandrene, etc.
Alcohols:	Methanol, benzyl-alcohol, rhodinol citronellol, geraniol, linalool, nerol, menthol, terpinol, etc.
Phenols:	Anol, chavicol, charvacrol, thymol, anethol, safrol, estragol, etc.
Ethers:	Anethole, eugenole, eucalyptole, safrole, geranyl alkyl ethers, phenyl alkyl ethers.
Aldehydes:	Citronellal, geranial, santalal, benzaldehyde, anisaldehyde, cinnamaldehyde, vanillin, ionone, etc.
Ketones:	Anisacetone, menthone, irone, ionone, fenchone, camphor, carvone, pulegone, etc.
Acids:	Hydrocyanic acid, tiglic acid, caproic acid, etc.
Esters:	Benzyl acetate, cinnamyl acetate, geranyl acetate, linalyl acetate, eugenyl acetate, methyl benzoate.

e. salt. Any salt obtained by evaporating the juices of plants.

essolube. A trade-mark for a high quality lubricating oil made by blends of solvent extracted base stocks.

essonite. $6CaO.3SiO_2 + 2Al_2O_3, 3SiO_2$. Garnet lime-alumina, wolfsbergite. Calcium garnet. A white or pale yellow mineral.

ester. (1) Ethereal salt. An organic salt formed from an alcohol (base) and an organic acid by elimination of water: (see list)

$$\underset{\text{alcohol}}{R.OH} + \underset{\text{acid}}{R'.COOH} = \underset{\text{ester}}{R'COO.R} + \underset{\text{water}}{H_2O}$$

(2) Compounds of the type R_2SO_4 or R.COOM are erroneously called esters. (3) The ethyl esters of an acid; *e.g.*, diacetic ester is ethyl diacetyl diacetate.

HCOOMe	methyl formate
HCOOEt	ethyl formate
MeCOOEt	ethyl acetate
$MeCOOC_5H_{11}$	amyl acetate (*banana oil*)
$MeCOOC_4H_8Me$	isoamyl acetate (*pear oil*)
EtCOOMe	methyl propionate
EtCOOEt	ethyl propionate
PrCOOMe	methyl butyrate
PrCOOEt	ethyl butyrate (*pineapple oil*)
$C_4H_9COOC_5H_{11}$	*iso*-amyl *iso*-valerate (*apple oil*)
C_6H_5COOMe	methyl benzoate
$C_6H_4(OH)COOMe$	methyl salicylate (*oil of wintergreen*)
$C_6H_4(NH_2)COOMe$	methyl anthranilate

acid- Ether acid. Corresponding with the acid salts, the acid esters are compounds of polybasic acids in which not all the carboxyl hydrogen atoms are replaced by alcohol radicals; *e.g.*, R.OOC.R.COOH. **alkamine-** See *alkamine ester*. **basic-** Corresponding with the basic salts, the basic esters are compounds of polyhydric alcohols in which not all the hydroxyl groups are replaced by acid radicals; *e.g.*, R.COO.R.OH or X.R.OH where X is a halogen. **imido-** See *imido ester*. **mixed-** An e. in which the radicals R of, R.COOR, are different. **Robison-** Hexosemono-phosphoric acid; formed in the fermentation of sugar by yeast.

e. number. The difference between the saponification number and acid number. It is therefore the number of mg. KOH needed to saponify the neutral esters in 1 gm. of a fat, oil, or wax. **e. oils.** Pale edible oils produced by esterification of refinery acids with glycerol.

esterase. An enzyme or ferment capable of saponifying esters.

esterification. The formation of an ester by dehydrating or catalytic agents. **e. law.** Meyer's law. Esterification of aromatic acids is retarded and prevented in presence of 1- and 2-ortho-substituents, respectively.

esterol. A brand of benzyl succinate used as antispasmodic.

estimation. An approximate evaluation; often incorrectly used for "determination."

estoral. Menthyl borate

estradiol. Oestradiol.

estragole. $C_{12}H_{16}O$ = 178.14. Methyl chavicol, *p*-allylanisole, *p*-methoxy allyl benzene. $MeO.C_6H_4.C_5H_{11}$. An ether of anise-like odor, occurring in estragon oil.

estragon oil. Tarragon oil. A yellowish essential oil, d.0.9–0.94, obtained from the herb *Artemisia dracunulus*, a Compositae.

estrane. $C_{18}H_{30}$ = 246.2. The parent compound of female sex-hormones. See *androstane* and *cholane* derivatives.

e. diol. $C_{18}H_{30}O_2$ = 278.2. *3.17*-Dihydroxyestrane. Cf. *oestrone*. **e. triol.** $C_{18}H_{30}O_3$ = 294.2. *3.16.17*-Trihydroxyestrane.

estranol. $C_{18}H_{30}O$ = 262.2. *3*-Hydroxyestrane Cf. *oestrone*.

estratriene. $C_{18}H_{24}$ = 240.2. $\Delta^{1.3.5}$-estratriene. The parent compound of oestrone. Cf. *androstane, cholane*.

estrin. Oestrone.

estriol. Oestriol.

estrogen. Any drug inducing estrus.

estrone. Oestrone.

esu or e.s.u. E.S.U. or electro-static units. For values and conversion to e.m.u., see *electromagnetic units*.

Et. (1) An abbreviation for the ethyl radical, $-C_2H_5$. (2) The symbol for ekatantalum.

-et. A suffix. See *-uret*.

eta. The Greek letter η. A symbol for viscosity.

Étard's reaction. The oxidation of methyl radicals to aldehyde radicals by means of chromyl chloride:

$$R.CH_3 + Cr(OCl)_2 = R.CHO + H_2O + CrCl_2.$$

E. salt. The complex potassium chromium sulfate, $K_3[Cr(SO_4)_3]$.

etch-figure. The characteristic pattern produced when a polished metallic surface is etched by a suitable reagent

eteline. See *chlorinated* solvents.

ethacetic acid. *n-Butyric acid*.

ethal. Cetyl alcohol.

ethaldehyde. Cetyl aldehyde.

ethalic acid. Palmitic acid.

ethamine. Ethylamine.

ethanal*. Acetaldehyde. **hydroxy-*** Glycolaldehyde. **trichloro-*** Chloral. **e. acid.** Glyoxalic acid.

ethanamide*. Acetamide.

ethanamidine*. Acetamidine.

ethane*. C_2H_6 = 30.05. Methylmethane, dimethyl, Me.Me; ethylhydride, EtH. An alkane or a saturated hydrocarbon of the methane series. Colorless gas, $d_{air=1}$.1.049, m. −172, b. −86, slightly soluble in water, soluble in alcohol or ether; a constituent of natural and illuminating gas. The following radicals are derived from ethane:

monovalent:	
ethyl-	$-CH_2Me$. or $-C_2H_5$ or Et
divalent:	
ethylene-	$-CH_2.CH_2-$
ethylidene-	$=CH.CH_3$ or $=CHMe$.
trivalent:	
ethenyl-	$\equiv C.CH_3$ or $\equiv CMe$.
ethenylidene-	$=CH.CH_2-$
tetravalent:	
acetylene	$=CH.CH=$

The following unsaturated hydrocarbons are derivatives of ethane:

ethene* or ethylene	$CH_2:CH_2$
ethyne*, ethine or acetylene	CH:CH

amino- Ethylamine*. **bromo-*, chloro-*,** etc. See *ethyl bromide, ethyl chloride*, etc. **dibenzoyl-** Diphenazine. **dibenzyl-** Diphenylbutane. **dibromo-*, dichloro-*,** etc. See *ethyl-*

ene bromide, ethylene chloride, etc. **dihydroxy-** Glycol. **diphenyl-** Dibenzyl. **hexabromo-*** Hexabromo ethane. **hexachloro-*** Hexachloroethane. **hydroxy-** Ethanol*. **nitro-** See *nitroethane*. **nitroso-** See *nitrosoethane*. **perchloro-** Hexachloro-. **phenyl-** Ethyl benzene. **triethoxy-*** Ethenyltrimethyl ether.

e. dial*. Glyoxal. **e. diamide*.** Oxamide. **e. diamine*.** Ethylene diamine. **e. dinitrile*.** Cyanogen. **e. dioic acid*.** Oxalic acid. **e. diol*.** Glycol. **e. dioyl chloride*.** Oxalyl chloride. **e. dithiol*.** Dithioglycol. **e. nitrile*.** Acetonitrile. **e. sulfinic acid*.** Ethyl sulfinic acid. **e. sulfonic acid*.** Ethyl sulfonic acid. **e. thiol*.** Ethyl mercaptan. **e. thiolic acid*.** Thiol*acetic acid*. **e. thionamide*.** Thioacetamide.

ethano- A prefix indicating the presence of a $—CH_2.CH_2—$ bridge; thus in 1.4-ethano anthracene the $—CH_2.CH_2—$ bridge is between the first and fourth carbon atom of anthracene.

ethanoic acid*. Acetic acid. **oxo-*.** Glyoxylic acid. **e. anhydride*.** Acetic anhydride.

ethanol*. C_2H_6O = 46.046. Ethyl alcohol, alcohol, spirit, spirit of wine, grain alcohol, absolute alcohol, ethyl hydrate, etc. (1) Absolute alcohol, dehydrated alcohol. Et.OH. A colorless liquid, d^{25}_4.0.78505, m. −117.3, b.78.32, miscible with water or ether. Used as a reagent and solvent. (2) 99 % alcohol. The "absolute alcohol" of the U. S. and British Pharmacopoeia, used extensively for tinctures and pharmaceutical preparations, as a solvent and preservative, as an antiseptic medium and in perfumery. (3) Grain alcohol, cologne spirits. A colorless liquid containing 90 % ethanol and 10 % water. (4) Diluted alcohol, proof spirits. A colorless liquid containing about 49 % (by weight) ethanol and 51 % (by weight) water. (5) Denaturated alcohol. An alcohol made unpotable by the addition of poisonous substances such as methanol, pyridine, formaldehyde, sublimate or other denaturant. It is used in industry, the arts and commerce, principally as a solvent or fuel. See also *methylated spirits*. **amino-*** Colamine. **butoxy-*** Butyl*cellosolve*. **chloro-*** Ethylene chlorohydrin. **cyano-** Ethylene cyanohydrin. **ethoxy-*** Cellosolve. **imino-** See *iminoethanol*. **oxybis-** Diethylene glycol. **phenyl-** Benzyl carbinol. **tribromo-*** Avertin. **trichloro-*** See *trichloroethanol*. **trimethyl-** Butyl carbinol.

ethanolamine. C_2H_7ON = 61.05. β-Hydroxyethylamine, monoethanolamine, $NH_2(CH_2)_2OH$. A colorless liquid, d.1.04, $b._{150mm}$171, readily soluble in gasoline or CCl_4 and useful for dry cleaning, cleaning grease spots, machinery, etc. **di-** Diethanolamine. **tri-** Triethanolamine.

ethanoyl*. Acetyl.

ethene*. C_2H_4 = 28.04. (1) Ethylene, olefiant gas. Colorless, inflammable gas of peculiar odor, $d_{air=1}$.0.978, m. −189, b. −102.7, slightly soluble in water, soluble in alcohol or ether. From ethene the radicals vinyl-, $—CH:CH_2$, and vinylene-, —CH:CH—, are derived. Used in surgery and dentistry to produce anesthesia, as a substitute for nitrous oxide. (2) The radical ethylene (*q.v.*). **e. dichloride.** Ethylene chloride. **e. series.** Olefines. The homologs of ethene; or a group of aliphatic hydrocarbons (q.v.) having the general formula, C_nH_{2n}.

etheno- A prefix indicating the presence of a —CH:CH— bridge; thus, *4,7*-ethenoindene has a —CH:CH— bridge between the fourth and seventh carbon atom of indene. Cf. *ethano-*.

ethenol. Vinyl alcohol.

ethenone. Ketene.

ethenyl. The trivalent $H_3C.C\equiv$ radical, derived from ethane. **e. amide.** Acetamidine. **e. amine*.** Vinyl amine. **e. aminophenol.** C_8H_7ON = 133.06. A colorless liquid, $d_0°$.1.136, b.201, insoluble in water, soluble in alcohol. **e. aminothiophenol.** C_8H_7SN = 149.20. A colorless liquid, b.238, insoluble in water, soluble in ether or alcohol. **e. bromide.** Vinyl bromide. **e. chloride.** Trichloroethane. **e. diphenylamidine.** $C_{14}H_{14}N_2$ = 210.13. Colorless needles, m.131, sparingly soluble in water, soluble in alcohol or ether. **e. triethylether.** $C_8H_{18}O_3$ = 162.17. Triethoxyethane. A colorless liquid, $d_{22°}$.0.94, b.142, decomp. by hot water, soluble in alcohol or ether. **e. tricarboxylic acid.** $C_5H_6O_6$ = 162.07. Colorless prisms, decomp. on heating, insoluble in water, soluble in alcohol or ether.

ethenylidene. The trivalent radical $=CH.CH_2—$. **e. chloride.** β-Trichloroethane.

ether. (1) An alkyl or aryl oxide of the general type R.O.R., derived from an alcohol by replacing the hydrogen of the hydroxyl group by another radical; *e.g.*,

$$R.OH + R.OH = R.O.R. + H_2O$$

See *ethers*. (2) $C_4H_{10}O$ = 74.10. Ethylic ether, ethyl oxide, ethoxy ethane*, diethyl ether, sulfuric ether, Et_2O. A clear, colorless, mobile liquid, d.0.720, m. −116, b.35, slightly soluble in water, miscible with alcohol or benzene. Used as a reagent and solvent for fats, resins, alkaloids, and other organic compounds and medicinally as an anesthetic. (3) In physics: Æther. A hypothetical, all-pervading and all-permeating medium of the universe, which is considered the medium for the transmission of radiations such as, light, heat, and electricity. It is supposed to consist of etherons, (q.v.) but its existence has not been proved by experiment.

acetic- Ethyl acetate. **aldehyde-** Crotonic aldehyde. **anhydrous-** Ethyl ether which has been distilled over sodium; used as a reagent and solvent. **allophanic-** Ethyl allophanate. **anesthetic-** Ether (2). **decachlor-** Perchlor ether. **dichloro-** Dichlorethyl ether. **diethyl-** Ether (2). **dimethyl-** See *methyl ether*. **formic-** Ethyl formate. **hydrobromic-** Ethyl bromide. **hydrochloric-** Ethyl chloride. **hydrocyanic-** Ethyl cyanide. **hydroiodic-** Ethyl iodide. **isopropyl-** See *propyl-* **methyl-** Methyl ether. **mixed-** An e. in which the R of R.O.R differ; as MeOEt. **petroleum-** Distilled petroleum. The 50–60°C. fraction. **simple-** An e. in which both R of R.O.R are, alike; as Et.O.Et. **sulfuric-** Ether (2).

e. acid. An acid ester, q.v. **e. alcohol.** A compound of the type R.O.R.OH; as, the mono- or di-ether of a glycol or glycerol. **e. of crystallization.** The molecules of e. in a crystal lattice as a component part of the crystal.

ethereal. Resembling or made with ether; *e.g.*, highly volatile. **e. fruit oil.** See fruit oil. **e. liquid.** A highly volatile liquid. **e. oil.** Essential oil. **e. salt.** Ester.

etherene. Ethylene.

etheric acid. Acetoacetic acid.

etheride. A compound containing the —COX radical, in which X is a halogen.

etherification. The process of making an ether from an alcohol. Cf. *ethers.*

etherin. Obsolete name for ethylin. **e. theory.** A theory of the constitution of organic compounds (Dumas & Boullay, 1828).

etherion. A supposed element, atomic weight 0.001, expelled from substances at high temperatures and extremely low pressures.

etheron. Ætheron. A supposed particle of ether, smaller and faster than an electron, having a mass of $\frac{1}{4^1_7} \times 10^9$ that of hydrogen and a speed of 294,000 miles per second.

etherophosphoric acid. Ethyl phosphoric acid.

etherosulfuric acid. Ethyl sulfuric acid.

etherphone. An instrument for the production of music by electricity. It works on the principle of the oscillating wireless valve.

ethers. (1) A group of alkyl or aryl oxides, derived from the alcohols by replacing the hydrogen of the hydroxyl group by another radical:

$$R.OH + R.OH = R.O.R + H_2O$$

They are named R-oxides, or indicated by the prefix R-oxy- or alkoxy-; thus dimethyl oxide or methoxymethane*, ethyl methyl oxide or methoxyethane*. (2) The halogen derivatives of alkyl and aryl radicals are sometimes called ethers; *e.g.*, R.Cl. (3) The esters of inorganic or organic acids are sometimes called ethers; *e.g.*, $R.NO_2$, R.COO.R. **complex-** Compound-. **compound-** (1) Alkyl or aryl oxides in which two different radicals are joined by the oxygen, R.O.R'; *e.g.*, methylethylether. (2) Esters. **haloid-** Alkyl or aryl halides. **mixed-** Compound- **simple-** Alkyl or aryl oxides having two like radicals, R.O.R; *e.g.*, diethylether. **thio-** An alkyl or aryl sulfide; *e.g.*, an ether in which the oxygen is replaced by sulfur (see *mercaptans*). Examples of ethers:

a. Aliphatic, saturated:

methyl ether	Me.O.Me
ethyl methyl ether	Et.O.Me
ethyl ether	Et.O.Et
ethyl propyl ether	Et.O.$(CH_2)_2CH_3$
n-propyl ether	$(MeCH_2CH_2)_2O$
i-propyl ether	$(Me_2CH)_2O$

b. Aliphatic, unsaturated:

vinyl ether	$(CH_2{:}CH)_2O$
allyl ether	$(CH_2{:}CHCH_2)_2O$
crotonyl ether	$(CH_3CH{:}CHCH_2)_2O$
propargyl ether	$(CH{:}CCH_2)_2O$

c. Cyclic ethers:

ethylene oxide	CH_2CH_2O
1.2-propylene oxide	$Me.CH.CH_2.O$
1.3-propylene oxide	$CH_2.CH_2.CH_2.O$

d. Diethers and triethers:

methylal	$(MeO)_2CH$
acetal	$(EtO)_2CHMe$
dioxan	$CH_2.CH_2.O.CH_2.CH_2.O$
trioxymethylene	$CH_2.O.CH_2.O.CH_2.O$
paraldehyde	CHMe.O.CHMe.O.CHMe.O

e. Aromatic ethers:

anisole	Me.O.Ph
phenetole	Et.O.Ph
veratrole	$MeO.C_6H_4.OMe$
phenyl ether	Ph.O.Ph
benzyl phenyl ether	$Ph.CH_2.O.Ph$
benzyl ether	$Ph.CH_2.O.CH_2.Ph$
naphthyl ether	$C_{10}H_7.O.C_{10}H_7$

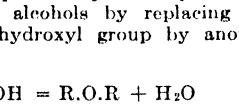
ethide. A compound of ethyl radical and a metal, as lead ethide ($PbEt_2$), zinc ethide ($ZnEt_2$), and magnesium ethide ($MgEt_2$).

ethidene. Ethylidene.

ethine. Acetylene. **e. series.** Acetylene series, q.v. A group of unsaturated aliphatic hydrocarbons with one triple bond; general formula, C_nH_{2n-2}.

ethinyl. Acetenyl. The univalent CH:C— radical, derived from acetylene.

ethionic acid. $C_2H_6O_7S_2 = 206.1$. Ethylene sulfonic acid, $HO.SO_2.CH_2.CH_2.SO_2OH$. A dibasic acid known only in solution. Cf. *isethionic acid.* **amino-** Taurine. **e. anhydride.** $C_2H_4O_6S_2 = 188.2$. The heterocyclic compound



colorless crystals.

ethiops mineral. Black mercurous sulfide.

ethocaine. Procaine. **e. borate.** Borocaine.

ethodin. Rivanol.

etholide. A tertiary lipid formed from alcohol-acids by the esterification of the hydroxyl group of one with the carboxyl groups of the other molecule.

ethoxalyl. The monovalent radical, EtOOC.CO—.

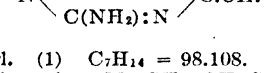
ethoxide. Ethylate.

ethoxy. The monovalent C_2H_5O— or EtO— radical derived from ethanol. Cf. *oxethyl.* **e. acetic acid.** Ethyl glycollic acid. **e. acetone.** $C_5H_{10}O_2 = 102.1$. The ketone ether, $MeCOCH_2OEt$. A colorless liquid, b.128; used as a solvent for nitrocellulose. **e. amine*.** $C_2H_7ON = 61.06$. 2-hydroxyethylamine, α-ethyl hydroxylamine. $NH_2.CH_2.CH_2OH$. **e. aniline.** $C_8H_{11}ON = 137.10$. A colorless liquid, $d_0°$.1.11, b.286, sparingly soluble in water, soluble in alcohol or ether. **e. benzoic acid.** The ethyl ether of salicylic acid. $EtO.C_6H_4.COOH$. **e. butyric acid.** Hydroxy-ethylbutyric acid. **e. catechol.** $C_8H_{10}O_2 = 138.1$. A homolog of guaiacol. **e. caffeine.** $C_{10}H_{14}O_3N_4 = 238.51$. Colorless crystals, m.140. Difficultly soluble in water or alcohol, soluble in hot ether. Used medicinally as a narcotic.

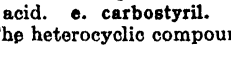
ethoxyl. Same as ethoxy.

ethyl. (1) The monovalent C_2H_5— or Et— radical, derived from ethane. (2) A trade-mark for an antiknock compound for admixture with gasoline to prevent or reduce knocking in internal combustion engines, as well as for the resultant fuel. Also a trade-mark for other products not necessarily associated with fuels or internal combustion engines. See *ethyl gasoline.* **e. acetamide.** $C_4H_9OH = 87.08$. $MeCONHEt$. A colorless liquid, $d_4°$.0.942, b. 200, used in organic synthesis. **e. acetate.** $C_4H_8O_2 = 88.06$. Acetic ether, acetic ester, acetidin, ethyl acetic ester. $Me.COOEt$. A colorless liquid, $d_0°$.0.900; m. −82.4, b.77, slightly soluble in water, miscible with alcohol or ether. Used medicinally as a stimulant and antispasmodic, as a reagent in organic synthesis, as a solvent for lacquers and in the separation of dyes. **e. acetoacetate.** $C_6H_{10}O_3 = 130.11$. Acetoacetic ester, diacetic ether, $MeCOCH_2COOEt$. A colorless liquid, $d_{15}°$.1.030, m. −80, b.181, slightly soluble

in water, miscible with alcohol or ether; used as a solvent for nitrocellulose, and in organic synthesis. **e. acetylene.** Butine. **e. acid phosphate.** See *e. phosphate.* **e. acid.** E. arsenic acid. **e. acid sulfate.** E. sulfuric acid. **e. aconitate.** $C_{12}H_{18}O_6$ = 258.2. A colorless, oily liquid of aromatic odor. **e. acrylate.** $C_5H_8O_2$ = 100.09. A colorless liquid, $d_0°$.0.939, b.98.5. **e. alcohol.** Ethanol*. **e. aldehyde.** Acetaldehyde. **e. allyl.** (1) C_5H_{10} = 70.09. A colorless liquid, b.70. (2) A prefix indicating the presence of an ethyl and an allyl radical. **e. allylether.** $C_5H_{10}O$ = 86.11. 3-ethoxypropylene, $EtOCH_2CH{:}CH_2$. A colorless liquid, $d_{25°}$.0.799, b.66, insoluble in water, soluble in alcohol or ether. **e. amine*.** C_2H_7N = 45.11. Ethamine. Aminoethane, $EtNH_2$. A ptomaine from putrefying yeast and wheat flour. A colorless liquid, d.0.689, b.16.5, m. −84, miscible with water, alcohol, or ether. **e. aminoacetate.** $C_4H_9O_2N$ = 103.1. Ethylglycin, ethylglycocoll. NH_2CH_2COOEt. **e. aminobenzoate.** Benzocaine. **e. aminobenzoic acid.** $C_9H_{11}O_2N$ = 165.20. $EtNH.C_6H_4.COOH$. Colorless prisms, m.112, slightly soluble in water; soluble in alcohol or ether. **e. ammeline.** $C_5H_9ON_5$ = 155.4. Ethylamido cyanurate.



e. amyl. (1) C_7H_{14} = 98.108. Δ^1-heptene. The hydrocarbon $Me(CH_2)_4CH{:}CH_2$. A colorless liquid, b.99. (2) A prefix indicating the presence of an ethyl and an amyl radical. **e. amylaniline.** $C_{13}H_{21}N$ = 191.2. Amyl-ethyl-phenyl-amine, $Et.N\langle^{C_5H_{11}}_{Ph}$. A colorless, oily liquid, b.262, soluble in alcohol. **e. amylether.** $C_7H_{16}O$ = 116.2. The mixed ether $Et.O.C_5H_{11}$. A colorless volatile liquid. **e. amylketone.** $C_8H_{16}O$ = 128.17. Colorless liquids, nearly insoluble in water; miscible with alcohol or ether. **n-** $Et.CO.(CH_2)_4Me$. *3*-Octanone*. d.0.825, b.165. **active-** $Me.CH_2.CHMe.CH_2.CO.Et$. 5-Methyl-3-heptanone*. b.161. **tert-** $Me.CH_2.CMe_2.CO.Et$. *4.4*-Dimethyl-3-hexanone*, d.0.825, b.151. **e. amylsulfide.** $C_7H_{16}S$ = 132.2. The mixed thioether $Et.S.C_5H_{11}$. A colorless liquid. **e. aniline.** See *aniline.* **e. anthracene.** $C_{16}H_{14}$ = 206.12. Colorless scales, m.60, insoluble in water, soluble in alcohol. **(dihydro-)** $C_{16}H_{16}$ = 208.14. A colorless oil, $d_{16°}$.1.049, *m*.320, insoluble in water; miscible with alcohol or ether. **e. antimonide.** Acid antimony ethide. **e. arsen.** See *arsine.* **e. arsenate.** A salt of e. arsenic acid. **e. arsenic acid.** $C_2H_7O_4As$ = 170.1. Ethylacid. $EtO.AsO.(OH)_2$. **e. arsenite.** A salt of e. arsenous acid. **e. arsenous acid.** $C_2H_5O_3As$ = 152.1. $EtO.AsO_3$. **e. arsine.** The primary arsine $EtAsH_2$. **e. arsinic acid.** E. arsenic acid. **e. azotate.** E. nitrate. **e. azotite.** E. nitrite. **e. benzene.** See *benzene.* **e. benzoate.** $C_9H_{10}O_2$ = 150.13. The ester $PhCOOEt$. A colorless liquid, b.213, slightly soluble in water, miscible with alcohol or ether. **e. benzoic acid.** See *benzoic acid.* **e. benzoylacetate.** $C_{11}H_{12}O_3$ = 192.16. Benzoylacetic ester, $PhCOCH_2COOEt$. A colorless liquid, d.1.121, b.267, insoluble in water, miscible with alcohol or ether. **e. benzylaniline.** $C_{15}H_{17}N$ = 211.2. Ethyl benzyl phenyl amine. The tertiary amine $Ph.N\langle^{Et}_{CH_2Ph}$, b.$_{710mm}$ 285. **e. benzylate.** E. benzylether. **e. benzylbenzene.** $C_{13}H_{16}$ = 196.2. The hydrocarbon $Et.C_6H_4.CH_2Ph$. **e. benzylether.** $C_9H_{12}O$ = 136.15. Ethyl benzylate, benzylethyl oxide. $Et.OCH_2Ph$. A colorless liquid, $d_{15°}$.0.950, b.186, insoluble in water, miscible with alcohol or ether. **e. benzylketone.** $C_{10}H_{12}O$ = 148.15. 1-phenyl-butan-2-one, $Et.CO.CH_2Ph$. A colorless liquid, $d_{17°}$.0.998, b.223, insoluble in water, miscible with alcohol or ether. **e. borate.** A salt of ethanol and boric acid: **(ortho-)** $C_6H_{15}O_3B$ = 146.2. E. orthoborate, boron triethoxide, triethylic borate. $B(OEt)_3$. A colorless inflammable liquid. **(meta-)** $C_4H_{10}O_4B_2$ = 144.1. E. metaborate, $(EtO)_2(BO)_2$. A colorless, heavy liquid. **(pyro-)** $C_2H_5B_3O_5$ = 141.4. E. triborate. A colorless gummy mass. **e. boric acid.** $Et_2B(OH)_3$ = 73.87. White crystals, subliming 40, soluble in water, alcohol or ether. **e. borosalicylate.** Boryl. **e. bromacetate.** $C_4H_7O_2Br$ = 167.04. A colorless liquid, $d_{25°}$.1.507, b. −159, insoluble in water, miscible with alcohol or ether. **e. bromide.** C_2H_5Br or EtBr = 109.01. Aethylium bromatus, aether bromatus, monobromoethane, bromic ether, bromoethane*, EtBr. A colorless liquid, d.1.450, m. −116, b.39, almost insoluble in water, miscible with alcohol or ether. Used medicinally as a local anesthetic. Cf. *ethylene bromide.* **e. butylether.** $C_6H_{14}O$ = 102.15. The mixed ether EtOBu. A colorless liquid, $d_{20°}$.0.752, b.92, insoluble in water, miscible with alcohol or ether. **e. butylketone.** $C_7H_{14}O$ = 114.16. Heptan-3-one, $Et.CO.Bu$. A colorless liquid, b.147, insoluble in water, soluble in alcohol or ether. **e. butyrate.** $C_6H_{12}O_2$ = 116.11. Ethylbutyric ester. $PrCOOEt$. A colorless liquid, d.0.902, b.121, insoluble in water, miscible with alcohol or ether. If sufficiently diluted, its odor resembles pineapple, hence, it is sometimes used for flavoring. **(iso-)** Ethylisobutyric ester. $Me_2CHCOOEt$. A colorless, aromatic liquid, $d_0°$.0.890, m. −93.3, b.110, sparingly soluble in water, soluble in alcohol or ether. **e. cacodyl.** Diethyl arsine. **e. cacodylic acid.** Diethyl arsinic acid. **e. caproate.** $C_8H_{16}O_2$ = 144.2. E. caproic ester, $Me(CH_2)_4COOEt$. A colorless liquid, $d_0°$.0.888, m.167, soluble in alcohol or ether. **e. caprylate.** $C_{10}H_{20}O_2$ = 172.17. Ethyl caprylic ester. A colorless liquid, $d_{15°}$.0.873, b.30, soluble in alcohol. **e. carbamate.** Urethane. **e. carbazole.** $C_{14}H_{13}N$ = 195.13. Colorless scales, m.68, soluble in hot alcohol or ether. **e. carbimide.** E. isocyanate. **e. carbinol.** Propanol. **e. carbonate.** $C_5H_{10}O_3$ = 118.11. Carbethylic acid, carbonic ester, diethyl carbonic ether, diatol, Et_2CO_3. A colorless, inflammable, aromatic liquid, d.0.978, b.126, insoluble in water, soluble in alcohol. Used in organic synthesis, and as a solvent for nitrocellulose and resins. **(ortho-)** $C_9H_{20}O_4$ = 192.2. Tetraethylcarbonate, tetraethoxymethane. $C(OEt)_4$. A colorless, aromatic liquid. **e. carbonic acid.** Propionic acid. **e. carbostyril.** $C_{11}H_{11}ON$ = 174.12. The heterocyclic compound



Colorless crystals, m.168. **e. carbylamine.** EtNC. E. isocyanide. **e. chaulmoograte.** The ethyl esters of the mixed acids of chaulmoogra oil; a clear pale yellow liquid, d.0.904. **e. chloracetate.** $CH_2Cl.COOEt$ = 122.53. A colorless liquid, $d_{20°}$.1.159, b.145, insoluble in water. **e. chloracetoacetate.** $C_6H_9O_3Cl$ = 164.55. The ester $MeCOCHClCOOEt$. A colorless liquid, $d_{25°}$.1.179, b.197, slightly soluble in water, miscible with alcohol or ether. Used in organic synthesis. **e. chloralurethane.** Somnal. **e. chloride.** C_2H_5Cl or EtCl = 64.50. Monochlorethane, hydrochloric ether, aethylium chloratus, aether, chloratus, kelene, chloroethane*, chelen, anodynon. A colorless liquid, $d_0°$.0.921, m. −141.2, b.12.2, very slightly soluble in water, miscible with alcohol or ether. On account of its low boiling point, it is marketed in sealed glass tubes; used as a local anesthetic and constituent of cognac essence, and as a refrigerant and ethylating agent. **e. chlorocarbonate.** E. chloroformate. **e. chloroformate.** $C_3H_5O_2Cl$ = 108.52. E. chlorocarbonate. ClCOOEt. A colorless liquid, d.1.139, b.93, decomp. in water, miscible with alcohol or ether. **e. chloropropionate.** $C_5H_9O_2Cl$ = 136.55. Ethyl chlorpropionic ester, aether chlorpropionicus, $MeCHClCOOEt$. A colorless aromatic liquid, d.1.087, b.146, slightly soluble in water, miscible with alcohol or ether. **e. chlorostannic acid.** $H_2SnEtCl_6$ = 327.04. Colorless, deliquescent crystals, decomp. in water. **e. cinnamate.** $C_{11}H_{12}O_2$ = 176.16. Ethyl cinnamic ester, $PhCH:CHCOOEt$, aether cinnamylicus. A colorless, oily liquid, d.1.050, m.12, b.271, insoluble in water, soluble in alcohol or ether; used in flavoring extracts on account of its odor of strawberries. **e. crotonic acid.** $C_6H_{10}O_2$ = 114.09. The unsaturated acid: $MeCH:CEt.COOH$. Colorless monoclinic crystals, m.40 (subliming) sparingly soluble in water, soluble in alcohol or ether; used in peppermint flavoring extracts. **e. cyanacetate.** $C_5H_7O_2N$ = 113.13. Ethyl cyanacetic ester, aether cyanaceticus, $CN.CH_2.COOEt$. A colorless liquid, d.1.066, b.207, insoluble in water, miscible with alcohol or ether. **e. cyanamide.** C_3H_6N = 56.1. $CN.NHEt$. A colorless, oily liquid. **e. cyanate.** C_3H_5ON = 71.1. Cyanetholin, EtOCN. A colorless, unstable liquid, insoluble in water. (iso-) EtNCO = 71.1. Ethyl carbimide. A colorless liquid, b.60, soluble in alcohol. **e. cyanide.** C_3H_5N = 55.10. Propionitrile, hydrocyanic ether, ether cyanatus, propane nitrile*, EtCN. A colorless liquid, $d_{20°}$.0.780, b.97.1, soluble in water, miscible with alcohol or ether. (iso-) E. isocyanide. **e. cyanuramide.** E. cyanamide. **e. diacetoacetate.** $C_8H_{12}O_4$ = 172.14. The ester $(MeCO)_2CHCOOEt$. A colorless liquid, d.1.101, b.200, slightly soluble in water. **e. dibromoacetate.** $C_4H_6O_2Br_2$ = 246.0. Ethyl dibromoacetic ester, $Br_2CHCOOEt$. A colorless liquid, miscible with alcohol or ether. **e. dibromocinnamate.** Zebromal. **e. dichloroacetate.** $C_4H_6O_2Cl_2$ = 156.97. Ether dichloraceticus, ethyl dichloracetic ester. $Cl_2CHCOOEt$. A colorless liquid, d.1.283, b.156, very slightly soluble in water, miscible with alcohol or ether. **e. dichlorarsine.** $C_2H_5AsCl_2$ = 175.0. Dick. A liquid, d.1.66, b.155. A vesicant and lung-irritant poison gas. **e. dichloride.** Ethylene chloride. **e. diethylacetoacetate.** $C_{10}H_{18}O_3$ = 186.19. Diethylacetoacetic ethyl ester, $MeCO.CEt_2.COOEt$. A colorless liquid, $d_{22°}$.0.974, b.218, insoluble in water, miscible with alcohol or ether. **e. diethylmalonate.** $C_{11}H_{20}O_4$ or $Et_2C(COOEt)_2$ = 216.22. A colorless liquid, d.0.992, b.223, insoluble in water, miscible with alcohol or ether. **e. diiodoacetate.** $C_4H_6O_2I_2$ = 339.8. The ester, $I_2CHCOOEt$. An oily, colorless liquid, soluble in alcohol or ether. **e. diiodobrassidate.** Lipoiodine. **e. diiodosalicylate.** $C_9H_8O_3I_2$ = 417.8. Ether diiodosalicylicus. $C_2H_3I_2(OH)COOC_6H_4$. Colorless crystals, m.132, sparingly soluble in water, soluble in alcohol, benzene or oils. Used as an iodoform substitute. **e. diisoamyl tin bromide.** $C_5H_{11}SnEtBr$ = 369.83. A colorless liquid, d.1.3650. **e. diisobutyl tin bromide.** $C_4H_9SnEtBr$ = 341.80. A colorless liquid, d.1.4089, $b._{13mm}$ 130.6. **e. dimethylamine.** The tertiary amine $EtNMe_2$. **e. dimethyl malonate.** $C_9H_{16}O_4$ or $Me_2.C.(COOEt)_2$ = 188.18. A colorless liquid, d.1.002, b.196.5, insoluble in water, miscible with alcohol or ether. **e. dioxythiocarbonate.** $C_5H_{10}O_2S$ = 134.1. Cf. Xanthic acid. A colorless, strongly refractive liquid, soluble in alcohol. **e. diphenylamine.** $C_{14}H_{15}N$ = 197.25. Diphenyl ethylamine, $EtNPh_2$. A colorless liquid, b.296, insoluble in water, soluble in alcohol. **e. diphenylphosphine.** $C_{14}H_{15}P$ = 214.2. Diphenylethylphosphine, $EtPPh_2$. A colorless liquid, b.293, insoluble in water, soluble in alcohol or benzene. **e. diselenide.** $C_4H_{10}Se_2$ = 216.3. Diethyl selenide, ethyl perselenide, EtSe.SeEt. A heavy, brown and pungent liquid, b.186. **e. disilicate.** $C_{12}H_{30}O_7SiO_2$ = 346.6. $[(EtO)_3Si]_2O$. A colorless, oily, inflammable liquid, with an odor resembling peppermint. **e. disulfide.** $C_4H_{10}S_2$ = 122.21. Ethyl persulfide, ethyl dithioethane*, EtS.SEt. A colorless liquid with garlic-like odor, $d_{22°}$.0.993, b.153, sparingly soluble in water, soluble in alcohol. **e. dithiocarbonate.** $C_5H_{10}OS_2$ = 150.23. Dithiourethane, $CO(SEt)_2$. d.1.085, b.196.5. **e. ene.** Ethylene. **e. ether.** Et_2O. A colorless liquid, d.0.720, m. −116°, b.35°, slightly soluble in water. Used as a solvent for organic compounds and as an anesthetic. **e. fluoride.** C_2H_5F = 48.05. Fluoroethane*. EtF. A colorless gas, $d_{air=1}$.1.7, b. −32, soluble in water or alcohol. **e. formamide.** C_3H_7ON = 73.1. The aminoaldehyde $EtNH.CHO$. A colorless liquid, $d_{21°}$.0.952, b.199, soluble in alcohol or ether. **e. formate.** $C_3H_6O_2$ = 74.07. Ethyl formic ester, HCOOEt. A colorless liquid, d.0.917, m. −80, b.54.4, slightly soluble in water, miscible with alcohol or ether; used in flavoring extracts. **e. furoate.** C_4H_3COOEt. A colorless liquid, d.1.1174, m.-34, b.197; used as a solvent and industrial perfume. **e. fumarate.** $C_8H_{12}O_4$ = 172.1. The ester $EtOOC.CH:CH.COOEt$. A colorless, oily liquid. **e. gas, e. gasoline.** E. petrol, "ethyl." The trade-mark *ethyl* designates a gasoline meeting certain specifications, with which a fluid containing tetraethyl lead, halogens and other constituents as components of an antiknock compound is mixed. **e. glycerate.** $C_5H_{10}O_4$ = 134.11. The ester $CH_2OH.CHOH.COOEt$. A colorless liquid, d.1.091, b.235, slightly soluble in water, miscible with alcohol or ether. **e. glycine.** $C_4H_9O_2N$ = 103.08. The amino acid $EtNH.CH_2.COOH$. Colorless scales, decomp. 160, soluble in water or alcohol. **e. glycolether.**

Cellosolve. **e. glycollate.** $C_4H_8O_3$ = 104.07. E. hydroxyacetate, $HOCH_2COOEt$. A colorless liquid, $d_{23°}$.1.083, b.160, soluble in alcohol or ether; an isomer of ethyl glycollic acid. Used as a solvent for nitrocellulose and many resins. **e. glycollic acid.** $C_4H_8O_3$ = 104.07. Ethoxyacetic acid, $EtO.CH_2.COOH$. A colorless liquid, b.206, soluble in alcohol; isomeric with ethyl glycolate. **e. green.** Ethylated *crystal violet* (q.v.).. **e. hydrate.** Ethanol. **e. hydrazine** $C_2H_8N_2$ = 60.15. $NH_2.NHEt$. A colorless liquid, b.100, soluble in alcohol, water, or ether. **e. hydride.** Ethane. **e. hydrine.** Ethylin. **e. hydrobromide.** E. bromide. **e. hydrochloride.** E. chloride. **e. hydrocupreine.** Optochine. **e. hydrogen sulfate.** E. sulfuric acid. **e. hydroperoxide.** $C_2H_6O_2$ = 62.06. The peroxide EtO.OH. A colorless liquid, $b._{150mm.}26°$, soluble in water, alcohol, or ether. **e. hydroselenide.** E. selenomercaptan. **e. hydrosulfide.** E. mercaptan. **e. hydroxyacetate.** E. glycollate. **e. hydroxylamine.** C_2H_7ON = 61.11. (**alpha-**) Ethoxylamine NH_2OEt. A colorless liquid, $d_{7°}$.0.883, b.68, soluble in water, alcohol, or ether. (**beta-**) Hydroxylethylamine, EtNHOH. Colorless leaflets, d.-0.908, m.60, soluble in alcohol, ether, or water. **e. hydroxypropionate.** $C_5H_{10}O_3$ = 118.1. (**alpha-**) E. lactate. (**beta-**) The ester $CH_2OH.CH_2.COOEt$. A colorless liquid, b.187, soluble in water, alcohol or ether; it is a solvent for resins. **e. iodide.** C_2H_5I = 156.02. Iodoethane*, hydroiodic ether, e. hydroiodic ester, ether iodatus, EtI. A colorless liquid of penetrating, ethereal odor, d.1.92, m.−112, b.72.3, slightly soluble in water, soluble in alcohol or ether. Used for the separation of minerals; and in iodine therapy for inhaling, producing short analgesia. **e. iodine calcium.** EtCaI = 196.04. An amorphous powder, decomp. in water. **e. iodoacetate.** $C_4H_7O_2I$ = 214.0. K.S.K., $CH_2I.COOEt$. A colorless heavy oil, d.7.44, b.179. It is a lacrimatory war poison gas. **e. isoamylether.** $EtOC_5H_{11}$ = 116.17. A colorless liquid, d.0.761, b.112, insoluble in water, miscible with alcohol or ether. **e. isobutylether.** $EtOC_4H_9$ = 102.15. A colorless liquid, d.0.751, b.78, insoluble in water, miscible with alcohol or ether. **e. isobutylketone.** $EtCOC_4H_9$ = 114.16. 2-methylhexane-4-one. A colorless liquid, $d_{17°}$.0.815, b.136, insoluble in water, miscible with alcohol or ether. **e. isobutyrate.** $C_6H_{12}O_2$ = 116.13. Ethyl dimethylacetate, $Me_2CH.COOEt$. A colorless liquid, $d_{20°}$.0.869, b.110, slightly soluble in water, miscible with alcohol or ether. **e. isocyanate.** See *e. cyanate*. **e. isocyanide.** EtNC = 55.1. E. carbylamine*. A colorless liquid, $d_{4°}$.0.759, b.79; soluble in water, alcohol or ether. **e. isophthalate.** $C_6H_4(COOEt)_2$ = 222.2. A colorless, oily liquid, m.0, b.285. **e. isopropylacetoacetate.** $C_9H_{16}O_3$ = 172.18. The ester $MeCO.CH(CHMe_2).COOEt$. A colorless liquid, $d_{20°}$.0.947, b.200, slightly soluble in water, miscible with alcohol or ether. **e. isopropylether.** $C_5H_{12}O$ = 88.13. Isopropyl ethoxide, Me_2CHOEt. A colorless liquid, $d_{0°}$.0.745, b.54, soluble in water, alcohol, or ether. **e. isopropylketone.** $C_6H_{12}O$ = 100.13. 2-methyl-pentan-3-one, $Me_2CH.CO.Et$. A colorless liquid, $d_{0°}$.0.830, b.114.5, slightly soluble in water or alcohol, miscible with ether. **e. isosuccinate.** $C_8H_{14}O_4$ = 174.15. The ester $MeCH(COOEt)_2$. A colorless liquid, d.1.021, b.198, sparingly soluble in water, miscible with alcohol or ether. **e. isosulfocyanate.** See *e. thiocyanate*. **e. isothiocyanate.** See *e. thiocyanate*. **e. isovalerate.** $C_7H_{14}O_2$ = 130.16. The ester Me_2CHCH_2COOEt. A colorless liquid, d.0.872, b.134.3, insoluble in water, miscible with alcohol or ether. **e. kairine.** See *kairine*. **e. ketone.** Diethyl ketone. **e. lactate.** $C_5H_{10}O_3$ = 118.1. Ethyl-α-hydroxypropionate, $MeCH(OH)COOEt$. A colorless liquid, $d_{19°}$.1.032, b.154, soluble in water, ether, or alcohol. Used as a solvent for nitrocellulose and resins in the manufacture of lacquers. **e. laurate.** $C_{14}H_{28}O_2$ = 226.3. Colorless crystals, soluble in alcohol or ether. **e. malate.** $C_8H_{14}O_5$ = 190.15. The ester $EtOOC.CH_2.CHOH.COOEt$. A colorless liquid, $d_{25°}$.1.124, b.248, miscible with water, alcohol, or ether. Used as a constituent of lacquers. **e. malonate.** $C_7H_{12}O_4$ = 160.14. The ester $CH_2(COOEt)_2$. A colorless liquid, d.1.061, m.−50, b.198, slightly soluble in water, miscible with alcohol or ether; used as plasticizer for cellulose acetate. **e. malonic acid.** $C_5H_8O_4$ = 132.07. The acid $EtCH(COOH)_2$. Colorless, rhombic prisms, m.111, decomp. 160, soluble in water alcohol, or ether; isomeric with dimethylmalonic acid, methyl-succinic acid, and glutaric acid. **e. mannite.** $C_{10}H_{10}O_5$ = 210.1. A substitution product of mannite; a colorless syrupy liquid. **e. melamine.** E. cyanamide. **e. mercaptan.** C_2H_6S = 62.11. Thioethylalcohol, e. hydrosulfide, ethanethiol*, EtSH. A colorless liquid, $d_{20°}$.0.839, m.−144, b.37, slightly soluble in water, miscible with alcohol or ether. It is one of the odorous constituents of feces. **e. mercaptide.** A compound of the general type, Et.S.M, where M is a monovalent metal. **e. mercuric chloride.** EtHgCl = 265.11. Silvery, iridescent leaflets, d.3.5, m.192.5, insoluble in water. **e. mercuric hydroxide.** EtHgOH = 246.66. Silvery, iridescent leaflets, m.190, insoluble in water. **e. metanilic acid.** $C_8H_{11}NO_3S$ = 201.0. $C_6H_4NHEt.SO_3H$. Colorless needles, decomp. 294. **e. methyl acetic acid.** $C_5H_{10}O_2$ = 102.11. Methyl ethyl acetic acid, $Et.CH.Me.COOH$. A liquid b.175. **e. methylether.** C_3H_8O = 60.1. Ethyl methyloxide Et.O.Me. A colorless volatile liquid, used medicinally as an anesthetic. **e. monotartrate.** $C_6H_{10}O_6$ = 178.11. Colorless rhombic crystals, m.90, soluble in water or alcohol. **e. morphine hydrochloride.** Dionine. **e. mustard oil.** E. isothiocyanate (see *e. thiocyanate*). **e. naphthalene.** $C_{12}H_{12}$ = 156.16. Naphthylethane, $C_{10}H_7Et$. (**alpha-**) A colorless liquid, $d_{15°}$.1.064, b.256, insoluble in water, miscible with alcohol or ether. (**beta-**) A colorless liquid, $d_{0°}$.-1.008, m.−19, b.251, insoluble in water, miscible with alcohol or ether. **e. naphthylamine.** $C_{12}H_{13}N$ = 171.21. Ethylamine-naphthalene. $EtNH.C_{10}H_7$. (**alpha-**) A colorless liquid, b.303. (**beta-**) A colorless liquid, b.305. **e. naphthylether.** $C_{12}H_{12}O$ = 172.16. Ethoxynaphthalene, $C_{10}H_7(OEt)$. (**alpha-**) A colorless liquid, m.5.5, b.272, insoluble in water, miscible with alcohol or ether. (**beta-**) Bromelia. Colorless crystals, m.37, b.274, insoluble in water, slightly soluble in alcohol, soluble in ether. **e. nicotine.** A substitution product of nicotine. **e. nitramine.** See *nitramine*. **e. nitrate.** $EtNO_3$ or $C_2H_5O_3N$ = 91.09. Aether nitricus, $EtO.NO_2$. A colorless liquid, d.1.116, d.1.116, m.−112, b.87.6, insoluble in water,

miscible with alcohol or ether. **e. nitrite.** $EtNO_2$ or $C_2H_5O_2N$ = 75.09. Aether nitrosus. Sweet spirits of niter. EtO.NO. A colorless liquid, d.0.900, b.17, slightly soluble in water, miscible with alcohol or ether. Used medicinally as a 15 % alcoholic solution, as a diuretic and diaphoretic. Cf. *nitroethane.* **e. nitrobenzoate.** $C_9H_9O_4N$ = 195.16. $NO_2.C_6H_4.COOEt$. (ortho-) Colorless triclinic crystals, m.30, soluble in alcohol or ether. (meta-) Colorless prisms, m.48, insoluble in water, soluble in alcohol or ether. (para-) Colorless crystals, m.57, soluble in alcohol or ether. **e. nitrocarbamate.** Urethane. **e. nitrolic acid.** $C_2H_4O_3N_2$ = 104.12. $MeC(NOH).NO_2$. Yellow, rhombic crystals, m.86 (decomp.), soluble in water, alcohol, ether, or alkalis. **e. nonylate.** $C_{11}H_{22}O_2$ = 186.2. E. pelargonate, oenanthic ether, e. pelargonic ester. $C_8H_{17}COOEt$. A colorless liquid of stupefying, wine-like odor and acrid taste, d_{17}°.0.8635, b.227, insoluble in water, soluble in alcohol or ether; used in flavoring extracts in place of wine and cognac essences. **e. oenanthate.** $C_9H_{18}O_2$ = 158.2. Cognac oil. The ester $C_6H_{13}COOEt$. A colorless, oily liquid and a constituent of old wines; used in flavoring extracts. **e. orthoacetate.** $C_5H_{12}O_3$ = 162.2. Triethoxyethane, acetyltriethyl ether. $MeC(OEt)_3$. **e. orthocarbonate.** $C_9H_{20}O_4$ = 192.2. Tetraethoxymethane. $C(OEt)_4$. **e. orthoformate.** $C_7H_{16}O_3$ = 148.2. Triethoxymethane, formyltriethyl ether, acton. $CH(OEt)_3$. **e. orthophosphate.** See *e. phosphate.* **e. orthosilicate.** See *e. silicate.* **e. oxalurate.** $C_6H_{10}O_4$ = 146.10. The ester $(COOEt)_2$. A colorless liquid, d.1 085, b.186; slightly soluble in water, miscible with alcohol or ether. **e. oxalurate** $C_5H_8O_4N_2$ = 160.1. Oxaluric e. ester. $NH_2.CO.NH.CO.COOEt$. **e. oxamate.** $C_4H_7O_3N$ = 117.1. Oxaminic e. ester, oxamethane, ethyl oxamide, $NH_2.CO.COOEt$. Colorless crystals, soluble in alcohol. **e. oxanilate.** $C_{10}H_{11}O_3N$ = 193.1. Oxanilic e. ester, $PhNH.CO.COOEt$. Colorless crystals, soluble in alcohol or ether. **e. oxide.** Ether. **e. oxydithiocarbonic acid.** Xanthic acid. **e. palmitate.** $C_{15}H_{31}.COOEt$ = 284.39. Colorless needles, m.24.2, insoluble in water, soluble in alcohol or ether. **e. pelargonate.** E. nonylate. **e. pentasulfide.** $C_4H_{10}S_5$ = 218.39. Et_2S_5. **e. perchlorate.** $C_2H_5ClO_4$ = 128.5. Perchloric ether. A colorless, explosive liquid with a sweet, pleasant odor. **e. perchloride.** Hexachloroethane. **e. peroxide.** Diethyldioxide. **e. persulfide.** E. disulfide. **e. phenacetin.** See *phenacetin.* **e. phenate.** Phenetol. **e. phenol.** $C_8H_{10}O$ = 122.12. $Et.C_6H_4OH$. (ortho-) Phlorol, 1.2-. A colorless liquid, d_0°.1.037, b.206.8, soluble in alcohol or ether. (para-), 1.4-. Colorless needles, m.47, b.214, insoluble in water, soluble in alcohol or ether. **e. phenylacetate.** $C_9H_{12}O_2$ = 164.15. The ester $PhCH_2COOEt$. A colorless liquid, d.1.086, b.229, insoluble in water, miscible with alcohol or ether. **e. phenylacetylene.** $C_{10}H_{10}$ = 130.10. The unsaturated aromatic hydrocarbon $PhC{:}CEt$. A colorless liquid, d_{21}°.0.923, b.202, soluble in alcohol. **e. phenylcarbinol.** $C_9H_{12}O$ = 136.11. Ethyl phenylhydroxymethane,

A colorless liquid, d_{15}°.0.992, b.212, insoluble in water, miscible with alcohol or ether. **e. phenylcinchonate.** Acitrin. **e. phenylether.** Phenetole. **e. phenylhydrazine.** $C_8H_{12}N_2$ = 136.16. (alpha-) $PhNEt.NH_2$. A colorless oily liquid, b.237, soluble in alcohol. (beta-) $PhNH.NHEt$. A colorless, oily liquid, sparingly soluble in water, miscible with alcohol or ether. **e. phenylketone.** $C_9H_{10}O$ = 134.13. The aromatic ketone PhCOEt. Colorless leaflets, d.1.015, m.15, b.218, insoluble in water, soluble in alcohol or ether. **e. phenylsulfone.** $C_8H_{10}O_2S$ = 170.21. $PhSO_2Et$. Colorless monoclinic scales, m.42, b. above 300, sparingly soluble in water, soluble in alcohol or ether. **e. phenylurea.** $C_9H_{12}ON_2$ = 164.23. $PhNH.CO.NHEt$. Colorless needles, m.99, insoluble in water, soluble in alcohol. **e. phosphate.** Ethyl phosphoric acids: (di-) See 2. (mono-) See 1. (normal-) See 3. (pyro-) See 4. (tetra-) See 4. (tri-) See 3. (1) $C_2H_5.H_2PO_4$ = 126.06. Monoethylphosphoric acid, ethyl phosphoric acid, monoethyl phosphate. A dibasic acid; a colorless, oily liquid, forming metallic salts (ethylphosphates). (2) $(C_2H_5)_2.HPO_4$ = 154.09 Diethylphosphoric acid, diethylic phosphate. A monobasic acid, a colorless syrupy liquid which forms a series of crystalline salts (diethylphosphates). (3) $(C_2H_5)_3PO_4$ = 182.15. E. phosphate, triethylic phosphate. A colorless aromatic liquid, b.215, decomp. in water, soluble in alcohol or ether. (4) $(C_2H_5)_4P_2O_7$ = 290.16. E. pyrophosphate, tetraethylic phosphate. A colorless, oily liquid having a peculiar odor. **e. phosphine.** C_2H_7P = 62.11. $EtPH_2$. A colorless liquid, b.25. **e. phosphinic acid.** $C_2H_5.H_2PO_2$ = 110.1. $Et.PO.(OH)_2$. An isomer of ethyl phosphite (1). **e. phosphite.** E. phosphorous acids. (1) $C_2H_5H_2PO_3$ = 110.06. Acid ethyl phosphite, ethyl phosphorous acid. A dibasic acid, forming the ethylphosphites. (2) $(C_2H_5)_2.HPO_3$ = 138.09. Diethylphosphite, diethylphosphorous acid. A monobasic acid, forming diethyl phosphites. (3) $(C_2H_5)_3PO_3$ = 166.12. Normal ethyl phosphite, triethylphosphite. A colorless liquid of disagreeable odor. (4) $(C_2H_5)_2H_2P_2O_5$ = 202.10. E. pyrophosphite, e. pyrophosphorous acid. A dibasic acid forming ethylpyrophosphites. **e. phosphoric acid.** See *e. phosphate.* **e. phosphorous acid.** See *e. phosphite.* **e. phthalate.** $C_6H_4(COOEt)_2$ = 222.17. A colorless liquid, d_{20}°.1.118, b 295, insoluble in water, soluble in alcohol or ether. (iso-) See *e. isophthalate.* (meta-) *E. isophthalate.* (ortho-) *E. phthalate.* (para-) E. terephthalate. (tere-) See *e. terephthalate.* **e. piperidine.** $C_7H_{15}N$ = 113.2. A synthetic; a derivative of piperidine. **e. platinocyanide.** $Et_2Pt(CN)_4.2H_2O$ = 393.50. Yellowish crystals. **e. propiolate.** $C_5H_6O_2$ = 98.07. The ester $HC{:}CCOOEt$. A colorless liquid, b.119, insoluble in water, miscible with alcohol or ether. **e. propionate.** $C_5H_{10}O_2$ = 102.11. The ester $EtCOOEt$. A colorless liquid, d.0.896, b.98.3, slightly soluble in water, miscible with alcohol or ether; used in perfumery. **e. propyl.** Pentane. **e. propylcarbinol.** $C_6H_{14}O$ = 102.15. Hexan-3-ol, $Pr.CHOH.Et$. A colorless liquid, d_{20}°.0.819, b.135, miscible with alcohol. **e. propylene.** Amylene. **e. propylether.** $C_5H_{12}O$ = 88.13. Ethylpropyloxide, $Et.O.Pr$. A colorless liquid, d_0°.0.755, b.60, slightly soluble in water, miscible with alcohol or ether. **e.**

propylketone. $C_6H_{12}O$ = 100.13. Hexan-3-one, Et.CO.Pr. A colorless liquid, $d_{18°}$.0.818, b.122, sparingly soluble in water, miscible with alcohol or ether. **e. pseudocyanate.** E. isocyanate. **e. pyrrole.** See *pyrrole*. **e. pyoctanin.** See *pyoktanin*. **e. pyridine.** C_7H_9N = 107.12. α- C_5H_4NEt. A liquid, $b._{763mm}$ 123. **e. pyruvate.** $C_5H_8O_3$ = 116.1. The ketone ester MeCOCOOEt. A colorless liquid, d.1.060, b.144; used as a solvent for nitrocellulose. **e. racemate.** An optically-active isomer of ethyl tartrate. **e. red.** $C_{23}H_{23}N_2I$. *1.1*-Diethyl isocyanin iodide. A quinoline dye used as photosensitizer. **e. rhodanate.** E. thiocyanate. **e. saccharate.** $C_{10}H_{18}O_8$ = 266.2. Saccharic ethyl ester. A bitter crystalline compound, soluble in water. **e. salicylate.** $C_9H_{10}O_3$ = 166.13. Sal ethyl, $HO.C_6H_4.COOEt$. A colorless, volatile liquid of pleasant odor and taste, $d_{20°}$.1.132, b.231, insoluble in water, miscible with alcohol or ether; used medicinally as an antiseptic, also as a solvent for nitrocellulose. **e. selenide.** $C_4H_{10}Se$ = 137.1. Diethylselenide, Et_2Se. A colorless, heavy, oily liquid, b.107. (di-) See *e. diselenide*. (per-) See *e. diselenide*. **e. selenomercaptan.** C_2H_6Se = 109.1. Ethyl hydroselenide, EtSeH. A colorless liquid of disagreeable odor. **e. silicate.** A group of compounds of ethyl and silicic acid: (1) $(C_2H_5)_4SiO_4$ = 208.6. Ethyl orthosilicate. A colorless, inflammable liquid; an isolog of ethyl orthocarbonate. (2) $(C_2H_5)_2SiO_3$ = 134.4. Ethyl metasilicate. Colorless liquid, $d_{20°}$.-0.933, b.165; decomp. by water. An isolog of e. carbonate. (3) $(C_2H_5)_6Si_2O_7$ = 342.8. E. disilicate. **e. silicon.** The trivalent $EtSi\equiv$ radical, silicon monoethide. **e. stannic acid.** EtSnO.OH = 180.75. A white powder, insoluble in water. **e. stearate.** $C_{20}H_{40}O_2$ = 312.4. Stearic ethyl ester. A waxy substance, insoluble in water, soluble in alcohol. **e. strychnine.** A derivative of strychnine, (q.v.). **e. suberate.** $C_{12}H_{22}O_4$ = 230.2. The ester $EtOOC.(CH_2)_6COOEt$. A colorless liquid of agreeable odor, soluble in alcohol or ether. **e. succinate.** $C_8H_{14}O_4$ = 174.16. The ester $EtOOC(CH_2)_2COOEt$. A colorless liquid, d.-1.044, m.−20.8, b.216.5, insoluble in water, miscible with alcohol or ether; used as a plasticizer for cellulose acetate. (iso-) See *e. isosuccinate*. **e. succinic acid.** $C_6H_{10}O_4$ = 146.11. The dibasic acid $HOOC.CH_2.CHEt.COOH$. Colorless prisms, m.98, soluble in water, alcohol, or ether. **e. succinolactate.** $C_{11}H_{18}O_6$ = 246.2. A colorless, oily liquid. **e. succinylsuccinate.** $C_{12}H_{16}O_6$ = 256.2. Light-green, prismatic crystals, soluble in water, alcohol, or ether, giving a solution with blue fluorescence. **e. sulfas.** E. sulfate. **e. sulfate.** $(C_2H_5)_2SO_4$ = 154.15. Normal ethyl sulfate, diethyl sulfate. A colorless, oily liquid with peppermint odor, d.1.184, m.−24.5, b.208, insoluble in water, soluble in alcohol. (acid-) E. sulfuric acid. (di-) E. sulfate. (mono-) E. sulfuric acid. **e. sulfide.** $(C_2H_5)_2S$ = 90.15. Diethylsulfide, ethylthioether, ethylthioethane*, Et_2S. A colorless, volatile liquid, $d_{20°}$.0.837, m.−90.5, $b._{764mm}$92, insoluble in water, miscible with alcohol or ether. (di-) See *e. disulfide*. (dichloro-) Mustard gas. (penta-) E. pentasulfide. (per-) E. disulfide. **e. sulfinic acid.** $C_2H_6O_2S$ = 94.11. Ethane sulfinic acid*, Et.SO.OH. A colorless, syrupy liquid; an isolog of propionic acid. **e. sulfite.** $(C_2H_5)_2SO_3$ = 138.15. $(EtO)_2SO$. A colorless liquid, $d_{0°}$.-1.106, b.161, slightly decomp. by water, soluble in alcohol; it is an isolog of e. carbonate. **e. sulfocarbonate.** E. thiocarbonate. **e. sulfochloride.** $C_2H_5.SOOCl$ = 128.60. A colorless liquid, $d_{20°}$.1.357, m.29, b.122 (decomp.); decomp. by water. **e. sulfocyanate, -ide.** E. thiocyanate. **e. sulfohydrate.** E. mercaptan. **e. sulfone.** $C_4H_{10}O_2S$ or Et_2SO_2 = 122.15. Ethyl sulfonyl ethane*, diethyl sulfone: Colorless, rhombic crystals, d.1.357, m.73, b.248, sparingly soluble in water. **e. sulfonic acid.** $C_2H_6O_3S$ or $EtSO_2.OH$ = 110.11. Ethane sulfonic acid*. Colorless, deliquescent crystals, soluble in alcohol, water, ether, or alkalis. **e. sulfonic chloride.** $C_2H_5O_2SCl$ or $EtSO_2Cl$ = 128.55. Ethane sulfonyl chloride*, sulfonyl chloride. A colorless liquid, b.177, decomp. by water or alcohol, miscible with ether. **e. sulfonic oxide.** E. sulfoxide. **e. sultoxide.** Et_2SO or $C_4H_{10}OS$ = 106.20. Ethyl sulfinyl ethane*. A colorless liquid, miscible with alcohol, m.4−6, $b._{15mm}$ 88. **e. sulfuric acid.** $C_2H_6O_4S$ or $EtHSO_4$ = 126.09. Monoethyl sulfate, acid ethylsulfate, sulfovinic acid, e. hydrogen sulfate. A colorless, syrupy liquid, $d_{15°}$.1.316, decomp. by heat or water, miscible with alkalis. Used medicinally as its salts, and technically for precipitating casein from milk. **e. sulfurous acid.** $C_2H_6O_3S$ or $EtHSO_3$ = 110.1. Monoethylsulfite, acid ethylsulfite. EtO.SO.OH. **e. tartrate.** $C_8H_{14}O_6$ = 206.16. Ethyl racemate, diethyltartrate. The ester $EtOOC(CH_2OH)_2COOEt$. A colorless liquid, d.1.209, b.280, slightly soluble in water, miscible with alcohol or ether. Used as solvent for nitrocellulose, gums and resins. **e. tartronic acid.** $C_5H_8O_5$ = 146.05. Colorless, triclinic scales, m.116, decomp. on further heating, soluble in water, alcohol, or ether. **e. telluride.** $C_4H_{10}Te$ or Et_2Te = 185.5. Tellurium ethyl, diethyl telluride. A heavy, oily, reddish liquid giving off yellow fumes. (di-) Et_2Te_2 = 313.1. Diethylditelluride, ethylpertelluride. A dark-red liquid, decomp. by water. **e. terephthalate.** $C_6H_4(COOEt)_2$ = 222.17. Ethyl-p-phthalate. A colorless liquid, b.119, insoluble in water, miscible with alcohol or ether. **e. thioalcohol.** E. mercaptan. **e. thiocarbamide.** $C_3H_8N_2S$ = 104.1. E. thiourea. $EtNH.CS.NH_2$. **e. thiocarbimide.** E. isothiocyanate (see *e. thiocyanate*). **e. thiocarbonate.** (1) $C_5H_{10}O_2S$ = 134.14. $CS(EtO)_2$. A liquid, d.-1.028, b.162. (2) $C_5H_{10}S_3$ = 166.1. $(EtS)_2CS$. A yellow, oily liquid of unpleasant odor; an isolog of ethyl carbonate and ethyl sulfite. **e. thiocyanate.** C_2H_5SCN = 87.15. E. rhodanate, e. sulfocyanide. A colorless liquid, d.1.007, b.148, insoluble in water, miscible with alcohol or ether. (iso-) $C_2H_5.NCS$ = 87.15 E. mustard oil. A colorless liquid, $d_{23°}$.0.995, m.−5.9, $b._{753mm}$131, insoluble in water, miscible with alcohol or ether. **e. tin tribromide.** $EtSnBr_3$ = 387.49. Colorless needles, m.310, soluble in water. **e. toluate.** $C_{10}H_{12}O_2$ = 164.15. The ester MeC_6H_4COOEt. **ortho-** Ethyl-1.2-toluate. A colorless liquid, d.1.039, b.221, insoluble in water, miscible with alcohol or ether. **meta-** Ethyl-1.3-toluate. A colorless liquid, b.228, insoluble in water, miscible with alcohol or ether. **para-** Ethyl-1.4-toluate. A colorless liquid, b.229, insoluble in water, miscible with alcohol or ether. **e. toluene.** E. methyl *benzene*. **e. urea.** See *urea*. **e.**

urethane. See *urethane*. **e. valerate.** $C_7H_{14}O_2$ = 130.16. E. valeriate, e. valerianate, Bu-COOEt. A colorless liquid, $d_{20°}$.0.877, b.144.5, insoluble in water, miscible with alcohol or ether. **e. vanillate.** $C_{10}H_{12}O_4$ = 196.15. Colorless crystals, m.44, b.292, insoluble in water, soluble in alcohol or ether. **e. vanillin.** See *vanillin*. **e. vinyl ether.** C_4H_8O = 72.08. The ether $C_2H_5.O.C_2H_3$. A colorless liquid, $d_{14.5°}$ 0.7625, b.35.5; soluble in alcohol or water. **e. violet.** A hydrogen ion indicator changing at pH 2.0 from blue-green (acid) to purple (alkali). **e. xylene.** Dimethyl ethyl *benzene*.

ethylal. Acetaldehyde.

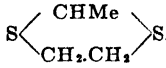
ethylamine. See *ethyl amine*.

ethylate. An alcoholate or ethoxide. A compound derived from ethanol by replacing the hydrogen of the hydroxy group by a monovalent metal (M) *e.g.*, MOEt. EtONa, sodium ethylate. EtOK, potassium ethylate. Cf. *ethoxide, alcoholate*.

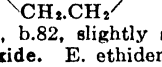
ethylation. The introduction of an ethyl group into a compound.

ethylene. (1) Ethene*. (2) Acetene. Elayl. The divalent —$CH_2.CH_2$—, or C_2H_4= radical. Cf. *ethylidene*. **azi-** Diazoethane. **bromo-** Vinyl bromide. **chloro-** Vinyl chloride. **di-** See *diethylene*. **dichloro-** Acetylene chloride. **diethyl-** Δ^3-Hexylene. **dimethyl-** ψ-Butylene. **diphenyl-** Stilbene. **keto-** Ketene. **pentyl-** Heptene. **perchloro-** See *tetrachloroethylene*. **phen-, phenyl-** Styrolene. **tetrachloro-** q.v. **tetraiodo-** Diiodoform. **tetraphenyl-** q.v. **trimethyl-** Pental. **vinyl-** Bivinyl.

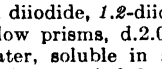
e. acetate. $C_6H_{10}O_4$ = 146.11. Glycol diacetate. The ester $MeCOOCH_2.CH_2OOCMe$. A colorless liquid, $d_{0°}$.1.128, b.186, soluble in water, alcohol, or ether. **e. alcohol.** E. glycol. **e. aldehyde.** Acrolein. **e. benzoate.** $C_{16}H_{14}O_4$ = 270.1. The ester $Ph.COO.CH_2:CH_2.OOC.Ph$. Colorless, rhombic prisms, m.73, b.360, insoluble in water, soluble in ether. **e. bichloride.** E. chloride. **e. bromide.** $C_2H_4Br_2$ = 187.96. Glycol dibromide, bromoethylene, e. dibromide, 1.2-dibromoethane*, $BrCH_2.CH_2Br$. A colorless liquid, d.2.189, m.9, b.131, slightly soluble in water, miscible with alcohol or ether. Used as an anesthetic and in organic synthesis; also added to ethyl-gasoline, q.v. **e. bromohydrin.** Glycol bromohydrin. **e. carboxylic acid.** Acrylic acid. **e. chlorohydrin.** C_2H_5OCl = 80.06. Chlorethylalcohol, 2-chlorethanol, 1-hydroxy-2-chlorethane. $ClCH_2.CH_2OH$. A colorless liquid, $d_{8°}$.1.28, m. −69, b.128, miscible with water, alcohol, or ether. Used in organic synthesis, and for the forced sprouting of plants. *commercial-* A 40 % solution, d.1.097, b.96, used in chemical synthesis for introducing the hydroxy-ethyl group into a molecule (*e.g.* novocaine). **e. chloride.** $C_2H_4Cl_2$ = 98.94. Glycol dichloride, elaylchloride, ethene dichloride, 1.2-dichlorethane*, vinylene chloride, Dutch liquid, $ClCH_2.CH_2Cl$. A colorless liquid, d.1.2569, m. −35.3, b.83.7, slightly soluble in water or alcohol, miscible with ether. Used in organic synthesis; as a solvent for lacquers; as an extractive for fats and oils; as a spotting agent for removal of tar, paint, etc. from textiles; alone or with carbon dioxide as an insecticidal fumigant for foodstuffs. Cf. *dichloroethylene*. **1.1-** Ethylidene chloride. **e. cyanohydrin.** C_3H_5ON = 71.07. Glycol cyanhydrin, 2-cyano-ethanol, 1-hydroxy-2-cyanoethane. A colorless liquid, $d_{0°}$.1.059, m.221, miscible with alcohol, water, or ether. **e. cyanide.** $C_4H_4N_2$ = 80.07. Succinonitrile, e. dicyanide, e. dicarbonitrile, glycol dicyanide, 1.2-dicyanoethane. Colorless crystals, m.54, b.265, soluble in water, alcohol, or ether. **e. diamine.** $C_2H_8N_2$ = 60.09. Diaminoethane, *1.2*-ethane diamine*, $NH_2CH_2.CH_2NH_2$. A constituent of ptomaines. Colorless liquid or crystals, d.0.87, m.10, b.117, soluble in water, alcohol, or ether. Cf. *sublamine*. **e. dibenzamide.** See *dibenzamide*. **e. dibromide.** See *e. bromide*. **e. dicarbonitrile.** E. cyanide. **e. dicarboxylic acid.** *cis-* Maleic acid. *trans-* Fumaric acid. **e. dichloride.** E. chloride. **e. dicyanide.** E. cyanide. **e. diethylate.** $C_6H_{14}O_2$ = 118.1. Diethylglycolether. $EtO.CH_2.CH_2OEt$. **e. dihydrate.** E. glycol. **e. diiodide.** E. iodide. **e. dinitrate.** E. nitrate. **e. dinitrite.** E. nitrite. **e. dioxide.** Dioxan. **e. dioxy.** The bivalent radical —$OCH_2.CH_2O$—. **e. diphenate.** E. diphenylether. **e. diphenyldiamine.** $C_{14}H_{16}N_2$ = 212.17. Colorless crystals, m.59, insoluble in water, soluble in alcohol or ether. **e. diphenylether.** $C_{14}H_{14}O_2$ = 214.19. E. diphenate. Colorless crystals, m.98.5, sparingly soluble in water, soluble in alcohol or ether. **e. disulfhydrate.** E. mercaptan. **e. disulfonic acid.** E. sulfonic acid. **e. dithioethidene.** $C_4H_8S_2$ = 120.1. The heterocyclic compound



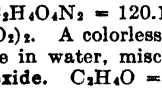
b.173. **e. ethidene ether.** $C_4H_8O_2$ = 88.07. Ethyl ethylidene oxide. The heterocyclic compound



. A colorless liquid, $d_{0°}$.1.002, b.82, slightly soluble in water. **e. ethylidenoxide.** E. ethidene ether. **e. glycol.** Glycol. **e. glycol ethyl ether.** Cellosolve. **e. hydride.** Ethane. **e. imide.** C_2H_5N = 43.1. The heterocyclic compound

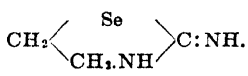


e. imine. (1) Ethylenimine. (2) Piperazine. **e. iodide.** $C_2H_4I_2$ = 281.98. Glycol diiodide, diiodoform, e. diiodide, *1.2*-diiodoethane*, $CH_2I.CH_2I$. Yellow prisms, d.2.07, m.81, slightly soluble in water, soluble in alcohol or ether; used medicinally as an iodoform substitute. **e. mercaptan.** $C_2H_6S_2$ = 94.20. Glycol sulfohydrate, e. disulfhydrate, glycol mercaptan, dithioethylene glycol, $HSCH_2.CH_2.SH$. A colorless liquid, $d_{23°}$.1.123, b.146, soluble in alcohol or ammonia. **e. monoacetate.** Glycol acetate. **e. naphthalene.** Acenaphthene. **e. nitrate.** $C_2H_4O_6N_2$ = 152.12. Glycol dinitrate, e. dinitrate, $(CH_2NO_3)_2$. A yellow liquid, $d_{8°}$.1.483, explodes when heated or hammered, insoluble in water, soluble in alcohol. **e. nitrite.** $C_2H_4O_4N_2$ = 120.12. Glycol dinitrite, $(CH_2NO_2)_2$. A colorless liquid, $d_{0°}$.1.216, b.96, insoluble in water, miscible with alcohol or ether. **e. oxide.** C_2H_4O = 44.04. Dimethylene oxide, *1.2*-epoxyethane*. The heterocyclic compound



. A colorless gas, $d_{0°}$.0.897, m. −111, $b._{746mm}$14, soluble in water, alcohol, or ether. On heating in aqueous solution it forms e. glycol. Used as an insecticide and fumigant to destroy weevils and

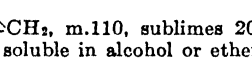
other insects; injected into the soil to kill barberry, other weeds and plants. *Cf. carboxide.* **e. oxide sulfone.** $C_{14}H_{14}O_4S_2$ = 310.30. $(PhSO_2)_2C_2H_4$. Soluble in alcohol or acid ether, m.-179.5. **e. perchloride.** Carbon dichloride. **e. periodide.** Diiodoform. **e. rhodanate.** E. sulfocyanide. **e. selenurea.** $C_3H_6N_2Se$ = 149.3. E. pseudoselenourea, imidotetrahydroselenazole. The heterocyclic compound



e. series. Olefines, ethene series, alkenes. A group of unsaturated hydrocarbons of general formula C_nH_{2n} which contain one double bond:

ethylene, ethene*	C_2H_4
propylene, propene*	C_3H_6
butylene, butene*	C_4H_8
amylene, pentene*	C_5H_{10}
hexylene, hexene*	C_6H_{12}
heptylene, heptene*	C_7H_{14}
octylene, octene*	C_8H_{16}
nonylene, nonene*	C_9H_{18}
decylene, decene*	$C_{10}H_{20}$
cetene, hexadecene*	$C_{16}H_{32}$
eicosene*	$C_{20}H_{40}$
cerotene, hepteicosene*	$C_{27}H_{54}$
melene, triacontylene*	$C_{30}H_{60}$

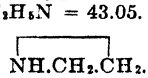
e. sulfate. (acid-) $C_2H_4(HSO_4)_2$ = 222.1. Ethylenesulfuric acid. A colorless, syrupy liquid. (**basic-**) $(OH)C_2H_4(HSO_4)$ = 142.1. Ethylenehydroxysulfuric acid. An acid known only as its compounds. **e. sulfide.** C_2H_4S = 60.06 or $(C_2H_4S)_2$. The heterocyclic compound



m.110, sublimes 200, insoluble in water, soluble in alcohol or ether. **e. sulfocyanide.** $C_2H_4(SCN)_2$ = 144.21. E. thiocyanate. Colorless rhombic crystals, m.90, sparingly soluble in water, soluble in alcohol. **e. sulfonic acid.** Ethionic acid. **e. sulfuric acid.** See *e. sulfate.* **e. tetrabromide.** Tetrabromoethane. **e. tetrachloride.** Tetrachloroethane. **e. trichloride.** Trichloroethylene. **e. thiocyanate.** E. sulfocyanide. **e. trichloride.** Trichloroethylene. **e. urea.** $C_3H_6ON_2$ = 86.09. Colorless needles, m.131, soluble in water, alcohol, ether or chloroform.

ethylene glycol. See *glycol.*

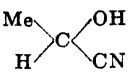
ethylenimine. C_2H_5N = 43.05. Azirane.



Cf. piperazine.

ethylic acid. Acetic acid.

ethylidene. Ethidene. The bivalent MeCH=, or $CH_3.CH$= radical from ethane, isomeric with ethylene. **e. acetone.** C_5H_8O = 84.09. The liquid ketone MeCO.CH = CH.Me, $d_{15°}$.-0.86, $b._{741mm}$122. **e. bichloride.** E. chloride. **e. bromide.** $C_2H_4Br_2$ = 187.96. E. dibromide, $MeCHBr_2$. 1.1'-dibromoethane*. A colorless liquid, d.2.100, m.112, insoluble in water, miscible with alcohol or ether. **e. chloride.** $C_2H_4Cl_2$ = 98.94. Ethylidene dichloride, ethylidene perchloride, 1.1'-dichloroethane*, chlorinated hydrochloric ether. A colorless liquid, d.1.178, b.59, sparingly soluble in water, miscible with alcohol or ether. **e. cyanhydrin.** $C_2H_4(OH)CN$ = 71.08. 1-cyanoethanol, lactonitrile.



1-hydroxy-1'-cyanoethane. A colorless liquid, m.−12, b.182 (decomp.), miscible with water, alcohol, or ether. **e. dichloride.** E. chloride. **e. diiodide.** E. iodide. **e. glycol.** $Me.CH(OH)_2$. Known only in its derivatives; *e.g.*, chloral hydrate. **e. iodide.** $C_2H_4I_2$ = 281.98. E. diiodide, 1.1-diiodoethane*, $MeCHI_2$. A colorless liquid, $d_{0°}$.2.84, b.178, insoluble in water, miscible with alcohol or ether. **e. lactic acid.** Lactic acid. **e. perchloride.** E. chloride. **e. urea.** $C_3H_6ON_2$ = 86.15. Colorless needles, m.126, decomp. 165, slightly soluble in water, soluble in alcohol or ether. **e. urethane.** $C_8H_{16}O_4N_2$ = 204.2. Colorless needles, m.125, decomp. on further heating, soluble in water, alcohol, or ether.

ethylin. A compound derived from glycerol by substituting one or more ethoxy groups for the hydroxy group: mono- $C_3H_5(OH)_2OEt$ = 118.1. A colorless liquid, b.230. di- $C_3H_5.OH.(Et)_2$ = 146.1. **1.3-** Diethyl glycerol. **1.2-** Diethylin. tri- $C_3H_5(OEt)_3$ = 174.2. A colorless liquid, b.185.

ethylogen. A complex carbide, from which water liberates ethylene slowly.

ethyloic. Having $—CH_2.COOH$ as a sidechain. *Cf. methyloic, propyloic.*

ethylol. Oxethyl. The $CH_2OH.CH_2—$ radical. *Cf. ethoxy.*

ethyne*. Acetylene.

ethynyl*. The radical HC:C—. **e. bromide.** Bromoacetylene.

etiline. Tetrachloroethane.

etiology. The study pertaining to the cause or origin of a disease.

etiophyllin. $C_{31}H_{34}N_4Mg$ = 457.58. Aetiophyllin. The decarboxylated magnesium base of chlorophyll. Blue tablets, m.205. See *porphin derivatives.*

etioporphyrin. $C_{31}H_{34}N_4$ = 435.26. A magnesium tetrapyrrole derivative from chlorophyll and hemoglobin. See *porphin.* Violet crystals, m.280.

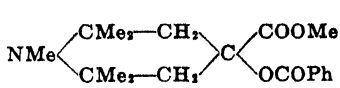
Ettinghausen effect. The galvanomagnetic change in temperature of a plate through which a current is flowing. The effect is positive when the upper edge of a metal plate, placed between two magnetic poles, has a higher temperature, the electric current flowing from left to right. *Cf. Hall, Leduc,* and *Nernst effects.*

ettringite. $Ca_{12}Al_4(OH)_{24}(SO_4)_6.5H_2O$. A mineral found in the contact zones of chalk and dolomite, in Ireland.

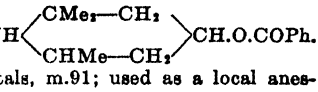
Eu. The symbol for europium.

eu-chlorine. A mixture of chlorine and chlorine dioxide obtained from potassium chlorate and concentrated hydrochloric acid.

eucaine A. $C_{19}H_{27}O_4N$ = 333.3. Tetramethyl-N-methyl-β-benzoxypiperidine-γ-carboxylic ester, α-eucaine.



Colorless crystals, m.103, used medicinally as an anesthetic and substitute for cocaine. **e. B.** $C_{18}H_{21}O_3N$ = 247.17. β-eucaine, benzamine, betacaine, trimethyl benzoyl-oxy-

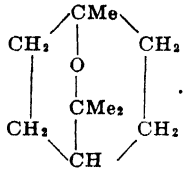
piperidine.  Colorless crystals, m.91; used as a local anesthetic.

e. hydrochloride. α- $C_{19}H_{27}O_4N.HCl$ = 368.8. Colorless crystals m.200, soluble in water; used as an anesthetic. β- $C_{15}H_{22}O_2NCl$ = 283.64. Colorless crystals, m.268.

eucairite. CuAgSe. A silverwhite, metallic, isometric copper silver selenide.

eucalin. $C_{12}H_{12}O_6$ = 252.1. A disaccharide produced by the hydrolysis of melitose. It is non-fermentable and resembles inositol. Cf. *eucalyptolene.*

eucalyptene. $C_{10}H_{16}$ = 136.2. A terpene derived from eucalyptol. A colorless liquid, b.170, soluble in alcohol; used as an antiseptic.

eucalyptole. $C_{10}H_{18}O$ = 154.20. Cineole, cajeputole.  . A colorless liquid, $d_{20}°$.0.927, m. −1, b.176, insoluble in water, miscible with alcohol or ether. A chief constituent of eucalyptus and cajeput oils, used medicinally as an antiseptic, antispasmodic, antiperiodic, and expectorant.

eucalyptolene. $C_{10}H_{16}$ = 136.2. An isomer of eucalyptene, and a constituent of eucalyptus oil. A heavy, yellowish liquid, b.300, miscible with alcohol.

eucalyptus. (1) A genus of trees of the Myrtaceae. Cf. *lerp, mallee bark, marri kino.* (2) Blue-gum tree. The dried leaves of *Eucalpytus globulus,* a Myrtaceae originally of Australia, which are used as an antiperiodic, tonic, and antipyretic. **e. oil.** The essential oil distilled from the leaves of various eucalyptus species, varying from peppermint to turpentine in odor. The chief constituents are eucalyptole, pinene, capronaldehyde, valeraldehyde, butyraldehyde. A colorless or slightly yellowish liquid, d.0.91–0.93, miscible with alcohol or ether; used medicinally as an internal or external antiseptic.

eucasin. Ammonium caseinate.

eucasol. Anytol.

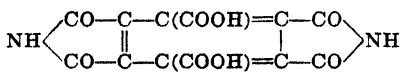
eucatropine. Euphthalmine.

eucazulene. $C_{15}H_{18}$ = 198.14. A blue, liquid hydrocarbon from eucalyptus oil.

euchinine. Quinine ethyl carbonate.

euchlorine. Eu-*chlorine.*

euchroic acid. $C_{12}H_4O_8N_2$ = 304.1. Mellitic acidimide. The heterocyclic compound:



euchroite. $Ca_4As_2O_9$. A native, greenish, calcium arsenate; rhombic masses, d.3.4, hardness 3, soluble in nitric acid.

eucodal. $C_{18}H_{21}O_4N$ = 315.02. Di-hydro-hydroxy codeinone. White powder, used as hypnotic.

eucodeine. $C_{18}H_{21}O_3N.CH_3.Br$ = 396.2. Methyl-codeine-bromide. White powder, m.-261, soluble in water. Used medicinally as a sedative.

eucol. Guaiacol acetate.

eucolloid. A colloid, the primary valencies of which are satisfied, forming particles of chain length over 2500 Å. (M. W. over 1000). Cf. *mesocolloid.*

eucryptite. $LiAlSiO_4$. A white, transparent, hexagonal lithium aluminum silicate.

euctolite. A basaltic rock from Italy.

eucupine. $C_{24}H_{34}O_2N_2$ = 282.41. *i*-amylhydrocupreine. A quinine alkaloid, q.v. A white powder, insoluble in water, but soluble in alcohol or ether. **e. hydrochloride.** Colorless crystals, soluble in water; used as a powerful bactericide.

eudalene. $C_{14}H_{16}$ = 186.11. 7-Iso-propyl-1-methyl naphthalene. A hydrocarbon obtained from eudesmol and selinene by treatment with sulfur.

eudeiolite. A native calcium-iron-cerium columbate-titanate-thorate. A dark-brown, shining mass of d.3.44, hardness 4.

eudesmene. $C_{15}H_{24}$ = 204.15. A bicyclic sesquiterpene from eucalyptus oil.

eudesmol. $C_{15}H_{26}O$ = 222.2. 2-Isopropyl-8-methylene-1,10-methyl-decahydronaphthol-2. A phenol from eucalyptus oil.

eudialite. $Na_{13}(Ca,Fe)_6(Si,Zr)_{20}O_{52}Cl$. A sodium calcium-iron, silicate-chloride.

eudiometer. A graduated glass tube with platinum electrodes, closed at one end, used to demonstrate or measure volume changes during the combination of gases.

Eudiometer.

eudiometry. Gasometric analysis. Gasometry.

eudoxine. $(C_6H_2I_2OBi_2)_2.COC_6H_4O$. Bismuth tetraiodophenolphthalein, bismuth nosophene. A reddish-yellow, tasteless, odorless powder, insoluble in water, decomposed by alkalis; used medicinally in intestinal irritations.

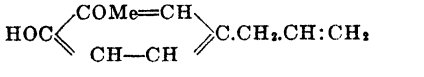
euflavine. $C_{14}H_{14}N_3Cl$ = 261.8. 2.8-Diamino-10-methylacridinium chloride. A dye similar to acriflavine (q.v.), to which the term is sometimes erroneously applied.

eugallol. Pyrogallol monoacetate.

eugenic acid. (1) Eugetinic acid. (2) Eugenol.

eugenin. $C_{10}H_{12}O_2$ = 164.1. An isomer of eugenol, from oil of cloves.

eugenol. $C_{10}H_{12}O_2$ = 164.15. Allyl-4.3-guaiacol, 2-methoxy-1-hydroxy-4-allylbenzene, 1-allyl-3-hydroxy-4-methoxybenzene.



A constituent of many essential oils such as oil of cloves, cinnamon; an isomer of chavibetol and eugenin. A colorless liquid, $d_{15}°$.1.063, m.-10.3, b.253.2, slightly soluble in water, miscible with alcohol or ether. Used medicinally as an antiseptic and antituberculosic; technically, in perfumery and for manufacturing vanillin. **iso-** Propenyl guaiacol. An isomer with the sidechain —CH:CH.Me. A colorless liquid, b.240. **cinnamyl- E.** cinnamate. **methyl-** $C_{11}H_{14}O_2$ = 178.17. Eugenol methyl ether, allyl 3.4-veratrol, 1.2-methoxy-4-allyl-benzene. A colorless liquid, $d_{15}°$.1.035, b.244, insoluble in water, miscible with alcohol or ether.

e. acetamide. $C_{12}H_{15}O_3N$ = 221.2. Colorless shining scales, m.110, soluble in water or alcohol; used medicinally as an anesthetic. **e. benzoate.** Benzo-eugenol. **e. cinnamate.** $C_{19}H_{18}O_3$ = 282.14. Cinnamyl eugenol. Colorless needles, used as antiseptic.

eugetic acid. Eugetinic acid.

eugetinic acid. $C_{11}H_{12}O_4$ = 208.10. Eugenic acid, eugetic acid. $C_6H_2(OH)(OMe).C_3H_5.COOH$. Colorless prisms, m.124, sparingly soluble in water, soluble in alcohol or ether.

euglenarhodon. A xanthophyll carotenoid from certain flagellates.

eukairit. CuAgSe. A native copper and silver selenide.

eukinase. The desiccated and powdered pancreatic juice of pigs, consisting mainly of trypsin.

eulachon oil. Candle fish oil. The oil of *Thaleichthys pacificus*, candle fish; used as a substitute for cod-liver oil.

eulysin. $C_{24}H_{36}O_5$ = 404.3. A yellow split-product of decacrylic acid.

eulytin. $Bi(SiO_4)_3$. A bismuth silicate, d.6.1, hardness 5–6; brownish, yellow, or grayish masses.

eumenol. A fluid extract from the root of a Chinese Araliaceae, (tang-kui, man-mu); used medicinally as an emmenagogue.

eumydrine. Methyl-atropine nitrate, atropine methylnitrate. White, odorless crystals, soluble in water, sparingly soluble in ether or chloroform; used medicinally as a mydriatic, antihidrotic, and antispasmodic.

eunatrol. Sodium oleate.

euonic acid. An acid from the bark of *Euonymus.*

euonymin. Euonymus. A glucoside from the bark and root of *Euonymus* species. It is a yellow amorphous powder, used medicinally as a cholagogue and cathartic.

euonymit. Dulcite.

euonymoid. The combined principle from *Euonymus.* A greenish powder, soluble in alcohol; used medicinally as a hepatic stimulant and mild cathartic.

euonymus. (1) *Euonymus.* A genus of shrubs of the Celastraceae. (2) Indian arrowroot, wahoo, spindle-tree, burning bush. The dried bark of the root of *E. atropurpureus*, a Celastraceae; used medicinally in the form of fluid extract as a laxative, cathartic, and diuretic.

euosmite. $C_{34}H_{29}O_2$ = 469.3. A fossil resin.

euparal. A synthetic resin, n.1.53, used as substitute for Canada balsam in microscopic work.

euparin. $C_{12}H_{11}O_3$ = 203.1. A yellow, crystalline principle from the leaves of *Eupatorium purpureum*, a Compositae (purple hemp); used as an aromatic.

eupatheoscope. An instrument which measures the cooling effect of aircurrents. Cf. *katathermometer.*

eupatirin. Stevioside.

eupatorin. A crystalline glucoside from the leaves of *Eupatorium perfoliatum*, boneset, thoroughwort, and *Eupatorium cannabinum*, hemp-weed, a Compositae of Europe, America, and Asia.

eupatorium. (1) *Eupatorium.* A genus of Compositae:

E. cannabinum	hemp, agrimony.
E. perfoliatum	eupatorium (boneset).
E. purpureum	queen-of-the-meadow.

(2) Indian page, boneset, thoroughwort. The dried leaves and flowering tops of *Eupatorium perfoliatum;* used as a diaphoretic tea, tonic, and laxative.

Euphorbia. A genus of plants characterized by their milky juice. **e. gum.** Potato gum. A latex gum from the West African *E.*, containing about 10 % rubber and 50 % resins. Cf. *euphorbium.* **e. pilulifera.** Pill-bearing spurge. The dried herb of *E. pilulifera*, an Euphorbiaceae of the Antilles and Australia. It contains glucosides and is used medicinally for asthma and chronic bronchitis.

Euphorbiaceae. The spurge family, a group of herbs, shrubs or trees, usually with a milky, acrid juice that in some cases yields rubber.

roots:	
Stillingia sylvatica	stillingia
Euphorbia species	euphorbium
Euphorbia corrollata	flowering spurge
Euphorbia ipecacuanha	ipecacuanha spurge
Euphorbia resinifera	euphorbium
Jatropha manihot	tapioca
herbs:	
Mercurialis annua	mercurialine
Mercurialis perennis	mercurialis
Euphorbia pilulifera	Australian euphorbia
barks:	
Croton eluteria	cascarilla bark
seeds:	
Ricinus communis	castor-oil seed
	castor-oil
Aleurites fordii	tung oil
Manihot species	cassava, manioc
	cearea rubber
Croton tiglium	croton seed
	croton oil
Curcas purgans	purging nuts
Jatropha species	physic nut
glands:	
Mallotus philippinensis	kamala, rottlera
plant products:	
Hevea brasiliensis	para-rubber

Cf. *buxine, drumine, jatrophine, phyllanthine, wagofo, yulocrotine.*

euphorbic acid. $C_{24}H_{30}O_6$ = 390.3. An acid from the resinous juice of *Euphorbia* species.

euphorbin. $C_{30}H_{48}O$ = 424.5. A bitter principle from the resinous juice of *Euphorbia* species.

euphorbium. A resin from *E. resinifera* of Morocco, used as an emetic and aperient. Cf. *euphorbia gum.*

euphorine. Phenylurethane.

euphthalmine. $C_{17}H_{25}O_3N.HCl$ = 327.7. Eucatropine. A synthetic alkaloid, the mandelic acid derivative of eucaine. A white powder, m. 113, soluble in water, alcohol, or ether. Used as a mydriatic.

euphurbin. $C_{15}H_{24}O$ = 220.2. A crystalline principle from the resinous juice of *Euphorbia resinifera.*

euphylline. Theophylline ethylene diamine.

eupion. A constituent of woodtar. A clear, aromatic liquid, b.47, used as an antiseptic.

eupittone. Eupittonic acid.

eupittonic acid. $C_{19}H_8O_3(OMe)_6$ = 470.3. Pittacol, eupittone, hexamethoxy aurine. A hexamethoxylated, amino-dye. Orange-yellow needles, decomp. 200, soluble in hot alcohol, glacial acetic acid and alkalis, with blue coloration.

eupurpuroid. The combined principles from *Eupatorium purpureum*, purple boneset, Joe-pye weed; used as a diuretic and renal tonic.

eupyrine. $C_{18}H_{18}O_5N$ = 328.15. Vanillin ethylcarbonate-p-phenetidine. Greenish-yellow crystals, m.87, soluble in alcohol, ether, or chloroform, sparingly soluble in water. Used medicinally as an antipyretic.

euquinine. Quinine ethylcarbonate.

eureka burner. A self-lighting gas burner of the bunsen type.

euresol. $C_8H_8O_2$ = 152.06. Resorcin monoacetate, resorcinyl acetate, 3-hydroxy-phenylacetate. A yellow, oily liquid, b.283, insoluble in water, soluble in acetone, used medicinally as an antiseptic in skin diseases.

eurobin. Chrysarobin triacetate. A yellowish-red powder; used for skin diseases.

europhen. $C_{22}H_{29}O_2I$ = 452.1. Diisobutylcresol iodide, isobutyl-o-cresol iodide. A yellow, amorphous powder of saffron-like odor, m.110, insoluble in water, soluble in alcohol, ether, chloroform, or oils. Used medicinally as an iodoform substitute, as antiseptic, antisyphilitic, and dusting powder.

europium. Eu = 152.0. Atomic number 63. A rare earth metal discovered (1896) by Demarcay in cerium minerals. Its principal valency is three, and its compounds are rose-colored. **e. nitrate.** $Eu(NO_3)_3$ = 338.0. A colorless crystalline powder, which is soluble in water. **e. oxide.** Eu_2O_3 = 352.00. A white powder, insoluble in water or alcohol. **e. sulfate.** $Eu_2(SO_4)_3.8H_2O$ = 736.2. Colorless crystals, soluble in water.

eurybin. A glucoside from *Eurybia* (or *Olearia*) *moschata*, of New Zealand.

eurythrol. An aqueous extract from the spleen of the ox; used medicinally in anemia and chlorosis.

euscopol. $C_{17}H_{21}O_4N.HBr$ = 384.11. An optically-inactive scopolamine hydrobromide. Colorless crystals, soluble in water or alcohol, m.181; used medicinally as a hypnotic.

eustenin. Theobromine sodium iodide.

eutannin. $C_{28}H_{20}O_{19}$ = 660.2. Colorless crystals; used as an intestinal antiseptic. Cf. *chebulinic acid.*

eutectic. The alloy of two or more metals in which the proportions of the constituents are such that it has the lowest possible melting point. **e. alloy.** A mixture of metals which solidifies completely at the e. temperature. **e. mixture.** A mixture of two or more substances which has the lowest constant melting point of any mixture of its constituents. Cf. *dystectic mixture.* **e. temperature.** The melting-point of a eutectic mixture. Cf. *diagram.*

euthiochronic acid. $C_6H_4O_{10}S_2$ = 300.20. Yellow, quadratic needles, soluble in water, alcohol, or ether.

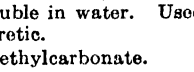
eutropic series. A series in which crystalline form and physical constants show a regular variation.

eutropy. The progression of the isomorphism of crystals of salts of an element, with the atomic number of the latter.

euxanthic acid. $C_{19}H_{18}O_{11}.H_2O$ = 440.16. Purreic acid, hamathionic acid. A yellow, crystalline substance from East Indian yellow (purree). Decomp. 160, soluble in hot water, alcohol, or ether. Cf. *coccinic acid.*

euxanthin. $C_{19}H_{16}O_{10}$ = 404.2. The principal constituent of East Indian yellow, (purree); yellow crystals.

euxanthinic acid. Euxanthic acid.

euxanthone. $C_{13}H_8O_4$ = 228.06. Purrone, purrenone, porphyric acid, 1.7-dihydroxyxanthone,  Yellow crystals, m.237, soluble in alcohol. **iso-** 3.6-Dioxyxanthone. Yellow crystals, soluble in alkalis with fluorescence. **methoxy-** Gentisin.

euxanthonic acid. $C_{13}H_{10}O_5$ = 246.08. Yellow needles, decomp. 200; soluble in hot water or alkalis.

euxantogen. Mangiferin.

euxenite. $(Y,Er,Ce)_2(Ti,Nb)_6Fe(UO)O_{16}$. (Probable formula.) Polycrase. A rare earth mineral containing helium, germanium and uranium. It is a source of Ge, U, Y and Nb.

EV. An abbreviation for electron-volt.

evacuant. A purgative or cathartic.

evacuate. The removal of a gaseous substance from a container; *i.e.*, to produce a vacuum.

evansite. $H_6Al_3PO_{10}$. A hydrous aluminum phosphate.

evaporate. (1) To convert a liquid into its vapor by the application of heat or low pressure. (2) To concentrate a solution by removing part of the solvent as gas or vapor.

evaporating. The act of converting a liquid into its vapor. **e. burner.** A gas burner of cast iron or copper, consisting essentially of a disk with a number of holes by which a large area can be heated. **e. dishes.** A flat or shallow dish of glass, porcelain, or silica, used to contain evaporating solutions.

evaporation. The process of converting a liquid into a vapor. **direct-** Evaporating by means of gas, coal, oil flame, or other direct sources of heat. **indirect-** Evaporating by means of steam, water, oil bath, or other indirect sources of heat. **latent heat of-** The amount of heat energy absorbed by a unit weight of substance as it passes from the liquid to the vapor state. If T is the absolute boiling-point, and E the molecular elevation of boiling point of a solution, then the latent heat of evaporation (L) is given by $L = \frac{0.02T^2}{E}$. (See *latent heat.*) **spontaneous-** Evaporating spontaneously, or by application of sun-heat or air currents (electric fans). **vacuum-** Evaporating in vacuo; *e.g.*, by exposure to low pressure.

evaporator. A device to volatilize liquids. **solar-** An appliance for evaporating and heating a liquid by infra-red radiation from above, using gas or electricity.

evaporimeter. An instrument to measure the rate of evaporation of a liquid in terms of the rate of fall in its level.

evernesic acid. Everninic acid.

evernic acid. $C_{17}H_{16}O_7$ = 332.13. Colorless needles, m.164, insoluble in water, soluble in alcohol or ether. A homolog of lecanoric acid, extracted from *Evernia prunastri*, a lichen.

everniine. $C_{16}H_{14}O_7$ = 318.11. An amorphous yellow powder, from gums and lichens, soluble in water, alkalis and acids, insoluble in alcohol.

everninic acid. $C_9H_{10}O_4$ = 182.09. Evernesic acid, 4-methoxy-6-methylsalicylic acid, 2-hydroxy-6-methyl anisic acid. An acid derived from lichens. Colorless crystals, m.157, soluble

in hot water, alcohol, or ether. **ethyl ester of-** Lichenol. **methyl ester of-** Sparassol.

Everitt's salt. Potassium ferrous ferrocyanide.

evipal. Hexobarbitone (q.v.). **e. sodium.** Evipal soluble; the sodium derivative of hexobarbitone.

evipan. Hexobarbitone (q.v.).

evodene. A terpene from *Evodia rutaecarpa.*

evodiamine. $C_{19}H_{17}ON_3$ = 303.14. An alkaloid from *Evodia rutaecarpa.* Colorless crystals, m.278.

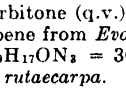
evolution. (1) In chemistry, the escape or liberation of a gas. (2) In biology the gradual development of a species through many generations, or the gradual change by which new species are formed and develop into higher and more specialized organisms. **atomic-** See *spectral* classification.

evonymin. Euonymin.

Ewer and Pick's acid. Naphthalene-*1.6*-disulfonic acid.

ex- A Greek prefix meaning "out of," or "out from."

exalgin. $C_9H_{11}ON$ = 149.1. Methylacetanilide, methylphenyl acetamide, acetmethylanilide. Cf. *acetotoluide.*



Colorless crystals, m.101, sparingly soluble in water, soluble in alcohol or ether; used medicinally as an analgesic and antipyretic.

exaltation. The amount by which the molecular refractivity of a compound exceeds the sum of the refractivities of its atoms; it is an indication of constitution (presence of double bonds, etc.).

exaltone. Cyclopentadecanone.

examination. The investigation of the properties of a substance by chemical or physical means; *e.g.*, qualitative and quantitative analysis, microscopical, spectroscopical, electrical or biological tests.

excelsin. A globulin, M.W. 14,738, from Brazil nuts.

excess. The use of a larger amount of a reagent than is required for a certain reaction.

excidants. Stimulants.

excipient. An inert or indifferent substance, used as a carrier for a medicinal agent; as, starch or milk sugar in tablets.

excitation. Activation. The disturbance of an electron so that it passes from its normal orbit to one of higher energy content as the result of the absorption of radiations. Cf. *energy levels, lingering period.* It differs from ionization in the degree to which the electron is separated, as expressed by the equations:

excitation	ionization
a. $H_2 + h\nu = H_2^*$	c. $H_2 = H_2^+ + e$
b. $H_2 + n(h\nu) = 2H^*$	d. $H_2 = H^+ + H^-$
	e. $H_2 = H + H^+ + e$

where $h\nu$ is a quantum, e an electron, H_2^* an excited and H_2^+ an ionized *molecule,* H^* an excited and H^+, H^- ionized *atoms.* On returning from the excited to the normal state the absorbed radiation is emitted, *i.e.*, the substance is luminescent or fluorescent. **photochemical-** Excitation. **thermal-** See *thermal.*

excited. Activated, fluorescent, luminescent. **e. atom.** An atom in which the electrons are moving in elliptical orbits or in higher energy levels than normal. **e. molecule.** (1) An atom in which the valence electrons are in a state of excitation, q.v. (2) Activated *atom,* q.v.

excitomotors. A group of drugs which excite the nerve-activities.

exciton. The energy of an electron, which can be passed from one electron to another.

exclusion principle. *Pauli's principle.*

excretin. $C_{20}H_{36}O$ = 292.4. A cholesterol-like substance found in human feces. Yellow needles, m.96; insoluble in water, sparingly soluble in alcohol, soluble in ether.

exinite. A perhydrous constituent of coal which includes preserved plant structures of a protective nature (*e.g.*, spore cones and cuticles).

exo- A prefix to indicate substitution on a side-chain. Cf. *endo-.*

exocondensation. Ring-formation.

exocyclic. Pertaining to a cyclic compound in which a substitution or a double bond is in the side-chain, that is, outside the ring.

exogenous. Produced outside. **e. purines.** The purine bodies of excretions which have passed through the system and have their origin in the food eaten; cf. *endogenous.*

exograph. A radiograph obtained by use of x-rays, the film being placed outside the body.

exosmosis. The diffusion of salts through the plant membrane from the protoplasm into water. Antonym: endosmosis.

exothermic. A term indicating the liberation or escape of heat. **e. compound.** A stable compound formed with liberation of heat, as a result of an exothermic reaction. **e. reaction.** A reaction in which heat is liberated. It usually proceeds rapidly; sometimes explosively. Cf. *endothermic.*

exotoxin. The soluble and poisonous substances of bacteria or parasites.

expansion. An increase of dimension. **adiabatic-** The rapid expansion of a gas with the production of a cooling effect. **cubical-** Volume expansion, or increase in three dimensions. **linear-** Increase in length. **thermal-** The increase in volume due to increase in temperature. The rate varies with the temperature and depends on the coefficient of expansion, (q.v.). It is relatively small for solids and liquids, but large for gases.

e. equations. (1) *Linear* expansion of solids: If l_0 is the length at 0°C., x the coefficient of expansion, then the length at t°C. is: $l_t = l_0(1 + xt)$. The coefficient of expansion is: $x = \frac{l_t - l_0}{l_0 . t}$. (2) *Cubical* expansion of solids: $l_t = l_0(1 + at + bt)$, where a and b are the first and second coefficients of expansion. (3) *Volume* expansion of solids or liquids (approximately): $V_t = V_0(1 + 3xt)$. (4) Expansion of *gases:* The volume, V_t, of a gas at temperature t°C. is (at constant temperature) for an original volume V_0 at 0°C.: $V_t = V_0(1 + 0.00367t)$. Cf. *Charles' Law, gas laws.* **e. regulators.** Thermo-regulators.

expectorant. A drug which promotes the secretion of mucus from the respiratory tract; *e.g.*, ipecac, cephaeline, ammonium chloride, lobelia, terpine hydrate.

experiment. A test or trial to illustrate natural phenomena, or to determine some unknown fact by careful observation and variation of the conditions under which the test is performed. It is distinguished from *observation* by the fact that the experimenter arranges the experimental conditions himself beforehand.

while an observer must accept the conditions which nature offers. **lecture-** An operation carried out in the lecture room to illustrate or demonstrate some chemical or physical fact.

experimental. Pertaining to knowledge obtained by actual tests; hence, based upon facts, and not speculation.

experimentation. The performance of experiments.

expired air. The air given off from the lungs of living organisms; it has less O_2, but more CO_2 and moisture than normal air.

exploding atom. An atom which is undergoing a radioactive change by the spontaneous emission of electrons or helium nuclei.

explosion. A sudden, violent, and noisy, exothermic chemical change in which heat, light, and gases are produced. Cf. fugitive *pressure*.

e. spectrum. See *spectrum*.

explosives. A group of endothermic compounds or mixtures of substances which cause explosions. Generally applied to mixtures used for ordnance, pyrotechnics or mining operations; also, in the construction of roads, canals and tunnels. E. may be classified into eight groups: (Cundill, Dictionary of Explosives).

1. Gunpowders—mixtures of potassium nitrate, sulfur, and charcoal, e.g., black powder.

2. Nitrate mixtures—Contain another nitrate in place of potassium nitrate, *e.g.*, barium, or sodium nitrate.

3. Chlorate mixtures—Contain potassium chlorate.

4. Dynamites—Contain nitroglycerin.

5. Gun-cottons—Contain nitro-compounds, *e.g.*, trinitrotoluol.

6. Picrates—Contain picric acid or its derivatives.

7. Spreng explosives—Mixtures which are not explosive, but becomes so on the addition of an oxidizing substance and detonator.

8. Miscellaneous and fulminating mixtures.

blasting- An e. used in mining. **detonating-** High e. **high-** Detonating e. An e. which is more sudden in exploding than gunpowder. It possesses high brisance, great shattering power, but little propelling power. **military-** E. used in warfare; as, smokeless, flashless powder, TNT (trinitrotoluene) and TNX (trinitroxylene). **nondetonating-** E. which explode. like gunpowder. **permissible-** Those which pass the safety tests of a government agency (Bureau of Mines, Ordnance Dept. etc.); as, Class A = less than 53 l.; Class B = from 53 to 106 l.; Class C = from 106–158 l. of poisonous gases from 680 gm. (1.5 pds.) explosive. **safety-** E. which can be used in coal mines.

1. *Simple explosives* (*PURE substances*)

nitromannite	650*
nitroglycerin	600
nitropentaerythrol	460
tetranitroaniline	400
guncotton	360
hydrazine nitrate	360
tetryl	360
hexanitrophenylsulfide	355
dinitroglycerin	330
hexanitrodiphenylamine	330
trinitrobenzene	330
nitrostarch	305
trinitroanisole	305
picric acid	300
TNT or trinitrotoluene	300
trinitrocresol	275
dinitrobenzene	250
ammonium chlorate	240
ammonium nitrate	140
ammonium perchlorate	140

2a. *Compound explosives* (*BLASTING powders*)

blasting gelatin	500–600
Nobel's explosive	300–540
donarite	400
Kieselguhr dynamite	300–370
Pittsburgh dynamite	280
cheddite	215
silesia explosive	200
carbonites	120–180
black powder	30

2b. *Compound explosives* (*PROPULSIVE powders*)

cordite	725
cannonite	720
shotgun powder	700
amberite	630
sporting powder	590
Schultze powder	570

* Approximate volume (in $cm.^3$) of total gases evolved from 1 gm. explosive.

exponential. A function expressed by the base of the Naperian system of logarithms, e, raised to the power indicated by the variable, x. Thus e^x is the exponential of x.

$$e = 1 + \frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} \cdot m \cdot n \cdot = 2.718281828$$

$$e^x = 1 + x + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} \cdot m \cdot n \cdot$$

The logarithm of e is 0.43429.

exposure. To open a sensitized plate to the action of light, *e.g.*, in taking a photograph. **e. meter.** Photometer. **e. test.** Aging test.

expressed. Squeezed out. **e. oil.** A fatty oil (q.v.) as compared with essential oil (distilled).

expression. (1) The squeezing out of a liquid; *e.g.*, plant juices, oils, etc. (2) A mathematical symbol or equation.

extinction. Fading-out. Cf. *optical density*. **e. coefficient.** E. The quantity $1/cy$ ($\log I_0/I$), where I_0 and I are the intensities of light, respectively *falling on* and *transmitted* by a solution *y* cm. thick and of molar concentration *c*. Characteristic curves are obtained when E is plotted against the wave-length of light used (Cf. *Lambert's* law).

Exton reagent. A reagent for albumin consisting of a solution of 200 gm. $Na_2SO_4.10H_2O$ and 50 gm. sulfosalicylic acid in 1 l. water.

extract. A pharmaceutical preparation made from vegetable tissues either by expression, maceration, digestion, or infusion with a solvent. **acet-** Acetic acid extracts, prepared by macerating the drug with acetic acid solution. **alcoholic-** An extract prepared by exhausting the drug with concentrated or dilute alcohol. **aqueous-** An extract prepared by infusing or percolating the powdered drug with water. **dry-** Powdered-. **fluid-** An extract of such strength that 1 cc. represents 1 gm. of the active principles of the drug. **nitrogen-free-** The difference between the weight of a vegetable material and the combined weights of its moisture, ash, fat, protein and crude fiber. It represents the non-protein, nonfatty material soluble in water, or brought into solution by

boiling successively with dilute (1.25 %) sulphuric acid and caustic soda. Sugars and starches are the main constitutents of the nitrogen-free extract. Hence, in reports of analyses, the term *carbohydrates* is sometimes substituted for *nitrogen-free extract*. **powdered-** An evaporated and powdered extract. **solid-** A thick, semi-solid extract.

extraction. The process of separating the active constituents of drugs by suitable methods. The solvent may be:

1. Water—see *infusions, decoctions.*
2. Alcohol—see *fluid extracts, and tinctures.*
3. Wine—see *wines.*
4. Dilute acetic acid—see *vinegars.*
5. Ether—see *ethereal extracts, oleoresins.*

e. apparatus. Apparatus used for the extraction of fats, oils, or waxes from substances, preparatory to or as part of their analysis. See *Soxhlet, Bailey-Walker.* **e. flasks.** Small round flasks of high-resistance glass. **e. thimble.** A cup made of some fat-free porous material (filter paper, alundum) in which the substance to be extracted is placed. **e. tube.** A specially designed tube holding e. thimbles, which enables the solution to flow downward into the container, and the vapors to pass above the thimbles into the condenser. *E.g., Soxhlet tube.*

extractive. Undetermined substance(s) extracted with a certain solvent in chemical analysis; *e.g.*, ether-extractives, alcohol-extractives, etc.

extracts. A dried plant juice. The following extracts and inspissated juices are official (U.S.P.):

Aloes	Guarana
Catechu	Glycyrrhiza
India-rubber	Lactucarium
Kino	Opium

extrusion. Forcing a substance through an aperture or die.

exudate. A material that has filtered through the walls of living cells and accumulates in the adjacent tissues. **vegetable-** A. Soluble in water, insoluble in alcohol—GUMS; B. Soluble in alcohol and insoluble in water—RESINS.

exude. Oozing out, either under heat or pressure, of a softer or more fusible substance from a harder or less fusible material.

eyebright. The herb of *Euphrasia officinalis*, a Scrophulariaceae, used for eye lotions.

F

F. (1) The symbol for fluorine. (2) Abbreviation for magnetomotive force, (3) faraday, (4) Fahrenheit, (5) degree of freedom, (6) free energy, (7) force.

F acid. (1) 2.7-Naphthylaminesulfonic acid. (2) 7-Amino-2-naphthalene-sulfonic acid. (3) β-Naphthol-8-sulfonic acid.

F 12. Freon.

f. An abbreviation for (1) farad (not *faraday*), (2) force, (3) function, (4) acceleration.

f. Function; thus $x = f(t)$, x is a function of t.

φ, ϕ, Φ. The Greek letter phi. (1) An abbreviation for phenyl. (2) A symbol for fluidity.

faba. Latin for bean. **f. physostigma.** See *physostigma.*

fabiana. The dried leaves of *F. imbricata*, a Solanaceae of South America. **f. resin.** $(C_{18}H_{30}O_2)_8$. F. tannoid. A crystalline resin from f. Cf. *crocin, pichi.*

fabianol. $C_{54}H_{90}O_2$ = 771.0. A volatile oily liquid from *Fabiana imbricata.*

fabrikoid. Trade-mark for pyroxylin-coated and impregnated fabrics widely used for upholstery, luggage, bookbinding, etc.

face-centered cube. A unit of crystal structure, (q.v.) consisting of a space lattice (q.v.) in which a fifth atom is located centrally to the four corners of a plane.

facing. The addition of a coloring matter to food to improve its appearance; as, tea, flour, rice.

fact. Anything that has real existence. Known to be true. A result established by repeated experiment. Opposed to fancy or conjecture.

factice. A white, light, and fluffy rubber substitute, obtained by vulcanizing linseed oil.

factitious. Made artificially.

factor. (1) A reacting substance, (reactant) which takes part in a chemical change. (2) When two quantities are multiplied together, each is known as a factor of the multiplication. (3) Vitamin, q.v. **accessory food-** Vitamin. **analytic-** Gravimetric- or volumetric-. **conversion-** See *conversion.* **gravimetric-** A quantity which, multiplied by the weight of precipitate obtained in gravimetric analysis, gives the amount of the related substance being determined. **volumetric-** A quantity which, multiplied by the number of cubic centimeters of a standard solution, gives the amount of the corresponding substance that is being determined in volumetric analysis. **volumetric correction-** A quantity (determined by experiment) which, multiplied by the number of cubic centimeters of a volumetric solution, gives the number of cubic centimeters of a normal solution. *E.g.*, volumetric solutions which deteriorate or which are difficult to standardize may be used for titrations, provided their correcting factor is known.

f. quantity. A factor used as an aid to rapid calculation in quantitative analysis. *E.g.*, in the determination of carbon in steel by weighing it as CO_2, the f. quantity is 2.73; thus, if 2.73 gm. of steel are taken for analysis the number of decigm. of CO_2 found is numerically equal to the CO_2 present as %.

facultative. Permissive or optional. **f. aerobe.** A bacterium which, while having preference for anaerobic conditions, can live in an atmosphere containing oxygen. **f. anaerobes.** Bacteria which, while having preference for an oxygen atmosphere, can also live in absence of such atmosphere.

fadeometer. An instrument for comparison of the fading-properties of dyed fabrics etc. which are exposed under standard conditions of humidity etc. to a carbon arc (artificial sunlight).

fæcal. See *fecal.*

fæces. See *feces.*

fagacid. An acid resin from beech wood, soluble in alkalis; used as an antiseptic in soaps and plasters.

fagarine. The name applied to the three alkaloids of *Fagara coco*, a tree of Argentina; they are differentiated by the prefixes α, β, and γ. The α-fagarine ($C_{19}H_{21}NO_4$) is a possible substitute for quinidine. β-Fagarine is identical with skimmianine; γ-fagarine is a methoxydictamine.

fagine. An alkaloid obtained from the fruit of the beech tree, *Fagus sylvatica*, a Cupuliferae.

fahlerz. Tetrahedrite.

Fahr. Abbreviation for Fahrenheit.

Fahrenheit, Gabriel Daniel. 1686–1736. A German physicist who devised meteorological instruments, thermometers, and hygrometers. **F. scale.** A thermometer scale invented by F. and based upon the lowest temperature which he could obtain by freezing mixtures. Water freezes at 32°F, and boils at 212°F. Hence, 1°C = 1.8°F, and absolute zero −273°C = −459.4°F. See *thermometer scales.*

faïence. Glazed pottery.

Fairbanks cement testing machine. A lever device resembling a balance, and having a stress capacity of 1000 pounds; used for testing the tensile strength of cement blocks.

Fajans, Kasimir. 1887– . A German physicist noted for his work on radioactive substances and the discovery of brevium. **F.-Soddy law.** When an α-particle is expelled from a radioactive substance the product is two places lower in the periodic table. A β-ray change, or expulsion of an electron, produces a rise of one place.

false hellebore. Adonis.

false unicorn. Aletris. **f. u. root.** See *chamaelirin, helonias.*

Fament's process. The removal of P and S from iron by treatment with a current of hydrogen in heated retorts.

family. (1) A group, or a part of a period of elements that have similar properties; *e.g.*, the first *group:* Li, Na, K, Rb, Cs is the alkali family, while the *period* Cr, Mn, Fe, Co, Ni is the iron family. See *periodic system.* (2) Order. A biological division higher than genus.

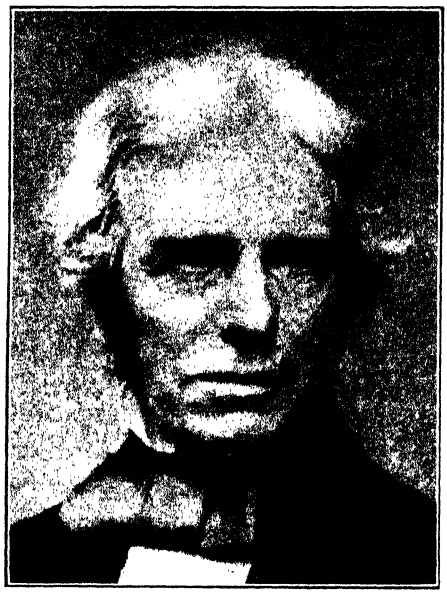
fanghi di sclefani. A light-yellow, fine powder of volcanic origin, mainly sulfur with small amounts of manganese, iron, and calcium.

faolite. A material made from phenolformaldehyde resin and asbestos.

farad. f. A unit of electrical capacity; the capacity of a condenser charged to a potential

of one volt by one coulomb of electricity. Cf. *faraday*. It is 10^{-9} C.G.S. unit. **micro-** The one-millionth part of a farad = 10^{-6} farad; the practical unit.

Faraday, Michael. 1791–1867. An English chemist and physicist noted as a famous experimentalist in the liquefaction of gases, the effect of an electric current on the magnetic needle, electrolysis, and as discoverer of benzene. **F. effect.** A beam of polarized light when passed through a magnetic field is rotated in the direction of the lines of magnetic force. **F. laws.** (1) The weight of an ion deposited electrolytically is proportional to the strength of the current passing through the solution. (2) 96,489 coulombs (1 faraday) liberate 1 gram equivalent of any ion during electrolysis. (See *electrochemical equivalent*.) **F. law demonstration apparatus.** A device for illustrating



Michael Faraday.

Faraday's law by simultaneously electrolysing various solutions and weighing the amounts deposited with a set of balances of the specific gravity type. **F. tube.** Ammonia tube. A V-shaped tube of hard glass, which, inverted, is used for distillation, purification and crystallizing of liquids under pressure; as, liquid ammonia, by placing each arm alternately in ice water and warm water. **F. unit.** See *farad, faraday*. **F. washing bottle.** *Washing bottle.*

faraday. F. The quantity of electricity which liberates one gram equivalent of a metal in electrolysis. 1 Faraday = 96,489 coulombs = 9648.9 ± 0.7 e.m.u. = (2.89270 ± 0.00021) × 10^{14} e.s.u. = 6.06 × 10^{23} electrons per mole. Cf. *farad*. Cf. *Avogadro, einstein, Faraday's law.*

faradiol. $C_{30}H_{50}O_2$ = 442.39. A diatomic alcohol from colt's foot, *Tussilago farfara*, a Compositae.

faradization. The use of induced high-voltage currents for therapeutic purposes.

farina. (1) Flour or a fine meal. (2) A starch, usually from potato.

farinaceous. Containing or consisting of flour.

farinose. The cellulose of starch; *e.g.*, the substance of which the cell walls of starch granules are composed.

farnesal. $C_{15}H_{24}O$ = 220.2. The aldehyde of farnesol.

farnesene. $C_{15}H_{24}$ = 204.2. *3.7.11*-Trimethyl-*2.6.10*-dodecatetrene. A sesquiterpene from citronella oil.

farnesol. $C_{15}H_{26}O$ = 222.2. The alcohol CMe_2:-$CH(CH_2)_2CMe$:$CH(CH_2)_2$.CMe:$CH.CH_2OH$ an isomer of nerolidol, d.0.895, b.$_{0.2mm}$120. It is obtained from the flowers of *Acacia farnesiana*, from oil of cassia, ambrette seed oil, etc. and has a fine floral odor; used in perfumery.

Farrar's process. Pig iron is treated with ammonium chloride, potassium ferrocyanide and manganese dioxide.

fast red. Azo-β-naphthol-α-naphthyl-aminosulfonic acid. A red dye used as an indicator from pH 10.5 – 12.1.

fastness. The extent to which a dye or dyed fabric etc. resists loss or change of color on exposure to the sun and atmosphere, (antonym, *fadeability*).

fat. (1) A solid or liquid oil consisting of the glyceryl esters of the higher fatty acids; *e.g.*, tristearin, tripalmitin, and triolein. See *fats*. (2) Abounding, rich. Cf. *lean*. **animal-** A fat derived from an animal source. **mineral-** See *mineral oil*. **vegetable-** A fat derived from a vegetable source.

f. asphalt. An asphalt low in gravel and sand. **f. clay.** A clay of good plasticity. **f. coal.** Coal rich in volatile matter. **f. ore.** A high-grade ore. **f. sand.** A sand for molding. containing a large amount of clay and alumina. **f. soluble.** A substance soluble in oils; as, fat-soluble A (see *vitamin A*).

fatal. Causing death. **f. dose.** The quantity of a drug that causes death.

fatigue. The localized deformation of metals produced by repeated stresses.

fats. (1) Greasy or oily substances. (2) Fixed oils, fatty oils, expressed oils. The glyceryl ester of a fatty acid, or a mixture of fatty acids. They are generally odorless, colorless and tasteless in the pure state, but they may be flavored by various ingredients, according to the source. Fats are insoluble in water, soluble in ether, chloroform or benzene. They occur in every animal and vegetable tissue and are generally obtained by heating or boiling bones, fishes, or other animal matter, or by extracting seeds under pressure. Classification:

(a) Source:	Liquid fats.
Animal fats.	1. drying oils
Vegetable fats.	2. non-drying oils
(b) Properties:	3. fish oils
Solid fats.	4. fluid waxes.

Their principal chemical values are:—Saponification value, (q.v.); iodine number, (q.v.); acid number, (q.v.); acetyl number, (q.v.). Cf. *oils, waxes, linin, sterols.*

fatsin. $C_{31}H_{58}O_{20}$ = 745.4. A glucoside from *Fatsia japonica*, an Araliaceae of Japan.

fatty acid. (1) A group of organic, monobasic acids derived from the hydrocarbons by the equivalent of an oxidation of a methyl group:

$$R—CH_3 \rightarrow R.CH_2OH \rightarrow R.CHO \rightarrow R.COOH$$

(hydrocarbon, alcohol, aldehyde, acid). (2) The three acids occurring most frequently in fats as glyceryl esters; palmitic, stearic and oleic acid.

The fatty acid series are:

A. Saturated..... $C_nH_{2n+1}COOH$ or $C_nH_{2n}O_2$
formic acid..... HCOOH
acetic acid..... MeCOOH or CH_3COOH
propionic acid.... EtCOOH or C_2H_5COOH
butyric acid..... PrCOOH or C_3H_7COOH
valeric acid..... BuCOOH or C_4H_9COOH
caproic acid..... $C_5H_{11}COOH$
enanthylic acid... $C_6H_{13}COOH$
caprylic acid..... $C_7H_{15}COOH$
pelargonic acid... $C_8H_{17}COOH$
capric acid..... $C_9H_{19}COOH$
undecylic acid.... $C_{10}H_{21}COOH$
lauric acid..... $C_{11}H_{23}COOH$
tridecoic acid..... $C_{12}H_{25}COOH$
myristic acid..... $C_{13}H_{27}COOH$
pentadecanoic acid $C_{14}H_{29}COOH$
palmitic acid..... $C_{15}H_{31}COOH$
margaric acid..... $C_{16}H_{33}COOH$
stearic acid..... $C_{17}H_{35}COOH$
nondecylic acid... $C_{18}H_{37}COOH$
arachidic acid..... $C_{19}H_{39}COOH$
behenic acid..... $C_{21}H_{43}COOH$
carnaubic acid.... $C_{23}H_{47}COOH$
hyenic acid..... $C_{24}H_{49}COOH$
carboceric acid.... $C_{25}H_{51}COOH$
cerotic acid..... $C_{26}H_{53}COOH$
lacceroic acid..... $C_{31}H_{63}COOH$
melissic acid..... $C_{29}H_{59}COOH$
montanic acid.... $C_{28}H_{57}COOH$
psyllic acid..... $C_{32}H_{65}COOH$

B. Unsaturated.. $C_nH_{2n-1}COOH$ or $C_nH_{2n-2}O_2$
See *acrylic acids*.

C. Unsaturated.. $C_nH_{2n-3}COOH$ or $C_nH_{2n-4}O_2$
See *acetylene acids*. Also
sorbic acid..... C_5H_7COOH
linoleic acid..... $C_{17}H_{31}COOH$

D. Unsaturated. $C_nH_{2n-5}COOH$ or $C_nH_{2n-6}O$
linolinic acid..... $C_{17}H_{29}COOH$.

fatty compounds. Aliphatic compounds. **fatty series.** The compounds of the aliphatic series or methane series (q.v.).

fault finder. An electrical resistance instrument for measuring the resistance of conductors; used to locate breaks or faults in a cable or electrical wire.

fauna. The animals of a given region or country, either geographical, topographical, or geological. Cf. *flora*.

fayalite. (1) Fe_2SiO_4. A ferrous orthosilicate, of the olivine group from Fayal (Madeira). (2) Fe_2SiO_4. A constituent of iron slags from copper smelters.

Fe. The symbol for iron (ferrum).

feather ore. Jamesonite.

febrifacient. A drug or agent that produces fever.

febrifuge. A drug which reduces or prevents fever; *e.g.*, an antipyretic.

fecal, fæcal. Obnoxious, foul. **f. odor.** A rank odor, *e.g.*, of skatole or naphthylamine.

feces, fæces. The excrements or alimentary refuse. Examination:

1. Macroscopic: color, character, consistency, blood-streaks, mucus, parasites, apparent digestion.

2. Microscopic: Protozoa, vegetable cells, red blood cells, epithelial cells, pus cells, fat cells, starch cells, muscle fibre, food particles.

3. Chemical: Occult blood by benzidine or guaiacol test, sublimate test, fermentation tests, nitrogen, mineral matter.

4. Bacteriological: Gram's stain, etc.

Fehling, Herman von. 1812–1885. A German chemist, noted as an investigator of organic compounds, and of analytical methods. **F. solution.** A solution for the detection or determination of reducing sugars; it consists of solution A (34.639 gm. copper sulfate in 500 cc. water), and solution B (173 gm. sodium-potassium tartrate, 60 gm. sodium hydroxide in 500 cc. water) mixed in equal parts before using. For volumetric determination, the solution is standardized against a solution of dextrose of known strength. Cf. *Benedict's*, *Pavy's solution*.

Feic. Abbreviation for the ferricyanide ion, $Fe(CN)_6^{---}$.

feints. The impure portion of the second distillate of fermentation alcohol.

feldspar. Felspar. (1) A group of igneous crystalline rock minerals which are chiefly silicates of alumina with soda, potash or lime. (2) The mineral $K_2O,Al_2O_3,6SiO_2$.

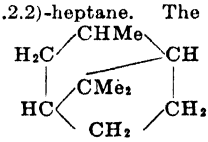
felite. A form of belite.

fellanic acid. $C_{50}H_{72}O_6$ = 768.7. An acid derived from bile.

felspar. Feldspar.

femic. Containing iron and magnesium. **f. minerals.** Igneous rocks richer in iron than in aluminum. Cf. *alferric*.

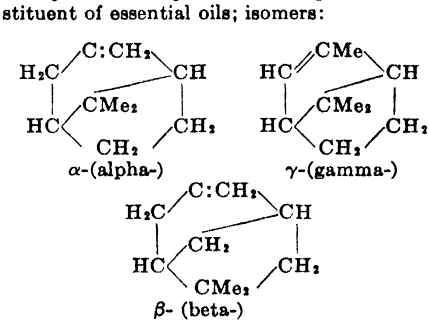
-fen, -phen. A suffix which indicates a sulfur-containing hydrocarbon.

fenchane. $C_{10}H_{18}$ = 138.2. 2.7.7-trimethylbicyclo-(1.2.2)-heptane. The saturated hydrocarbon  . An isomer of camphane, pinane, and carane. Cf. *terpenes*.

fenchanol. Fenchyl alcohol.

fenchanone. Fenchone.

fenchene. $C_{10}H_{16}$ = 136.2. 7.7-Dimethyl-2-methylenenorcamphane. A terpene and constituent of essential oils; isomers:



A colorless liquid, soluble in alcohol or ether. α- d.0.866, b.155. β- d.0.860, b.152. γ- d.0.854, b.146.

fenchol. Fenchyl alcohol.

fencholic acid. $C_{10}H_{16}O_2$ = 170.5. A colorless crystalline substance, m.19, b_{17mm}.152, soluble in alcohol.

fenchone. $C_{10}H_{16}O$ = 152.1. Fenchanone, oxyfenchane, *1.3.3*-trimethyl-*2*-norcamphanone. A ketone in essential oils. A colorless liquid, d.0.9465, m.5, b.192, insoluble in water, miscible with alcohol or benzene. Cf. *pinone*.

fenchoxime. $C_{10}H_{17}ON$ = 167.2. A colorless crystalline substance, m.161, b.240; insoluble in water, soluble in alcohol or ether.

fenchyl. The monovalent radical, $C_{10}H_{17}$—, derived from fenchane. **f. alcohol.** $C_{10}H_{18}O$ =

154.3. Fenchol, 1-hydroxy-fenchane, 2-fenchanol. A colorless crystalline substance, m.38.5, b.201.4, in some essential oils; (pine oil, turpentine).

fenchyval. The isovaleric ester of fennel oil; used medicinally in hysteria.

fennel. Foeniculum. The dried, ripe fruit of *Foeniculum vulgare* an Umbelliferae. Used medicinally as an aromatic, and carminative; as a flavoring agent; and as spice. **f. oil.** Oleum foeniculi. The essential oil from the fruits of *Foeniculum vulgare*, an Umbelliferae. A colorless, strongly aromatic, liquid, d.0.965–0.075, containing chiefly pinene, phellandrene, limonene, dipentene, fenchone, and anethole. Used medicinally as a carminative and antispasmodic, and technically in flavoring extracts. Cf. *ferulene*. **water-** The oil, d.0.85–0.89, from *Oenanthe aquatica*.

Fenton's reagent. Hydrogen peroxide containing some Fe^{++}; it is used for oxidizing sugars and alcohols.

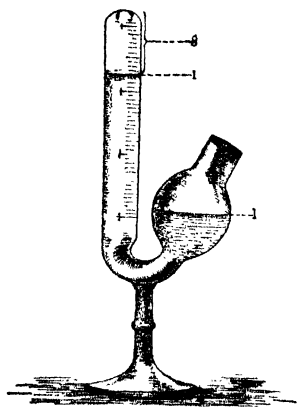
fenugreek. The seeds of *Trigonella foenum greekum*, a Leguminosae of Morocco and India, used as a condiment and emollient, and externally in poultices.

Feoc. Abbreviation for the ferrocyanide ion, $Fe(CN)_6^{----}$.

ferberite. $FeWO_4$. A dark metallic, iron tungstate, containing less than 20 % of manganese tungstate (cf. *hubnerite*).

fergusonite. $Y(Cb,Ta)O_4$. A dark-brown or metallic, lustrous yttrium columbate and tantalate, d.5.8–5.9, hardness 5.5–6.

ferment. (1) A substance which causes chemical changes, especially fermentation, without yielding any of its own matter to the products of fermentation. See *catalyst*, *enzymes*. The terms, ferment and enzyme, are used interchangeably, but it is the custom to apply "ferment" to a catalytic agent produced by organisms and still associated with the living organism, and "enzyme" to a catalyst which may be separated from the living organism. Hence: *ferments* or organized catalyzers are those substances not removable from the cell, while *enzymes* or unorganized catalyzers are removable and exist in filtered solutions. **active-** A ferment produced from a zymogen with or without the aid of an activator. **co-** Coferment. **organized-** A ferment. **pro-** *Zymogen*. **unorganized-** An enzyme.



Fermentation tube.
1. Fermenting liquid.
g. Gas formed during fermentation.

(2) Undergoing fermentation, q.v.

fermentation. (1) A chemical change of organic matter brought about by the action of an enzyme or ferment. The changes tend towards a chemical simplification of the existing compounds. (2) The boiling stage in the puddling process. **acetic-** The production of vinegar from alcoholic liquids by f. **alcoholic-** The change from sugar to alcohol and carbon dioxide by the ferment of the yeast cells. **amylolytic-** The hydrolysis of starch to dextrins by the action of saliva. **butyric-** The formation of butyric acid. **lactic-** The souring of milk; *e.g.*, the formation of lactic acid from sugars. **panary-** The f. processes associated with the manufacture of bread. **vinous-** The production of wine by fermentation.

f. alcohol. Ethanol made by fermentation. **f. chemistry.** Zymurgy. **f. processes.** The utilization of f. for industrial purposes; *e.g.*, to produce:

acids	acetic butyric, citric, oxalic, gluconic, lactic, gallic acid.
alcohols	ethanol, butanol, pentanol.
carbohydrates	cellulose, hemp, burlap, ensilage, indigo.
fats	vegetable oils.
fuel gas	methane from sewage and cellulose.
foods	pickles, vinegar, cheese, bread, sauerkraut, olives.
luxuries	tobacco, beer, wine, coffee, tea.
proteins	gelatin, glue, leather.

f. tube. A bent glass tube used in tests for fermentation to collect the gases evolved (see figure).

Fermi, Enrico. 1902– . An Italian-born physicist noted for his synthesis of transuranium, element 93, by bombarding uranium with neutrons. Cf. *ausonium*, *ekaosmium*.

fern. See *Filices*.

ferrate. (1) A salt of the unknown acidic oxide FeO_3, (ferric acid) containing the divalent $=FeO_4$ radical, as in Na_2FeO_4— sodium ferrate. The solutions are deep red in color and unstable. (2) Erroneously applied to ferrite, q.v.

ferratogen. Ferric nucleinate.

ferri- A prefix indicating the presence of a ferric ion, Fe^{+++}, in a compound.

ferriammonium- A prefix indicating the presence of both, the trivalent iron, Fe^{+++} and ammonium, NH_4^+, in a compound. **f. chromate** $(NH_4)Fe(CrO_4)_2 = 305.0$. A brownish, crystalline crust, soluble in water. **f. chloride.** $(NH_4)FeCl_4 = 215.6$. Ammoniated iron, ammonio chloride of iron, ammonium ferratum chloratum, flores martialis, aes martis. Reddish-orange, crystalline grains of styptic taste. Soluble in water; used medicinally in epilepsy and scrofula. **f. citrate.** $Fe(NH_4)_3(C_6H_5O_7)_2 = 488.2$. Ferric ammonium citrate. Iron and ammonium citrate. Brown scales, soluble in water; used medicinally in anemia, and contains 21–22.5 % iron. (*green-*) Ferric ammonium citrate green, green iron and ammonium citrate. Green scales, soluble in water; used in hypodermic medication and contains 14–15 % iron. Light changes it to the brown form. **f. oxalate.** $(NH_4)_3Fe(C_2O_4)_3.3H_2O = 427.8$. Green crystals, soluble in water. Used in photography and in the preparation of sensitive paper (blue-print paper). **f. sulfate.** (NH_4)-$Fe(SO_4)_2.12H_2O = 482.01$. Iron and ammonium sulfate, iron and ammonium alum, ammonio-ferric sulfate, ammonium ferric alum. Pale violet, octahedral crystals, soluble in

water. Used as a styptic and astringent; technically in the dye-industry; chemically as reagent and indicator in volumetric analysis. **f. tartrate.** $NH_4Fe(C_4H_4O_6)_2$. Iron and ammonium tartrate. Brown crystals, soluble in water. Used medicinally as a styptic.

ferric. Ironic. A compound of trivalent iron, Fe≡ or Fe^{+++}, usually more stable than the corresponding ferrous salt, and has a yellowish, brownish, or reddish color. **f. acetate.** $Fe_2(C_2H_3O_2)_3$ = 288.8. Brownish-red scales soluble in water. Used as a tonic; and technically as a mordant in the dye-industry. (*basic-*) $Fe(OH)(C_2H_3O_2)_2$ = 190.9. Ironic acetate. A red, amorphous powder, sparingly soluble in water; used in the dye industry. **f. albuminate.** A cinnamon brown powder, soluble in water; used medicinally as a tonic and for beri-beri. **f. alginate.** $Fe_3C_{76}H_{77}O_{22}N_2$. A brown, tasteless powder, insoluble in water, soluble in ammonia; used as a hematinic. **f. ammonium.** Ferriammonium. **f. arsenate.** $FeAsO_4.2H_2O$ = 230.9. A brown powder insoluble in water or alcohol, soluble in dilute acids. The iron arsenate of commerce is ferrous arsenate. **f. arsenite.** $4Fe_2O_3.As_2O_3.5H_2O$ = 926.72. A brown powder. **f. benzoate.** $Fe_2(PhCOO)_2$ = 353.78. A brown powder, slowly soluble in oils; used to make oily, iron preparations; *e.g.*, ferrated codliver oil. **f. bromide.** $FeBr_3$ = 295.6. Ironic bromide. Dark-red crystals, d.3.18, decomp. on heating, soluble in water, alcohol, or ether. **f. cacodylate.** $Fe(Me_2AsO_2)_3$ = 467.2. Iron cacodylate. A yellowish or brownish, odorless, powder, slowly soluble in water. Used medicinally in hypodermic medication (ampoules) for anemia, chlorosis, tuberculosis, syphilis. It contains 39.7–44.9 % arsenic. **f. camphorate.** Iron camphorate. A yellowish-red, bulky powder, insoluble in water, soluble in alcohol; used medicinally for chlorosis. **f. carbonate.** A mixture containing varying amounts of $Fe_2(CO_3)_3$, $Fe(OH)_3$ and $Fe(OH)_3$. A reddish-brown powder, insoluble in water, soluble in acids. Used medicinally as a hematinic. (*saccharated-*) See *ferrous carbonate.* **f. chloride.** $FeCl_3$ = 162.2. Ironic chloride, iron-3-chloride. Brown or black, hexagonal, iridescent crystals, d.2.52, m.298, soluble in water, alcohol, or ether. (*hydrous*) $FeCl_3.xH_2O$. A yellow or orange colored crystalline mass, containing 12, 6, or 5 molecules of crystal water, readily soluble in water, alcohol, or ether. Used technically in the dye industry; medicinally as a styptic (containing not less than 20 % Fe). **f. chromate.** $Fe_2(CrO_4)_3.xH_2O$. A dark-brown solution of ferric chromate, miscible with water; used as mordant in the dye industry. (*acid*) $Fe_2(Cr_2O_7)_3$ = 759.7. Ferric bichromate, acid iron chromate. A reddish-brown, granular powder, soluble in water; used technically in pigments, mixed with glue, gum, oil, or waterglass. **f. citrate.** $FeC_6H_6O_7.3H_2O$. Iron citrate, ferri citras. Transparent red scales, slowly soluble in water; used medicinally as a hematinic. (*green*). Ferriammonium citrate. **f. ferricyanide.** $Fe[Fe(CN)_6]$ = 267.7. Ironic ferricyanide. A red substance, soluble in water. **f. ferrocyanide.** $Fe_4[Fe(CN)_6]_3$ = 859.1. Ironic ferrocyanide, insoluble. Prussian blue (q.v.), Turnbull's blue. Dark-blue crystals, insoluble in water, alcohol, or ether, soluble in concentrated acids and oxalic acid. Used as a tonic and antiperiodic; technically as a pigment (Prussian blue, Berlin blue, Paris blue), and in blue inks (with oxalic acid). α- or *soluble-* Potassium ferric ferricyanide. **f. fluosilicate.** $Fe_2(SiF_6)_3$ = 537.86. A flesh-colored gel, soluble in water. **f. formate.** $Fe(HCOO)_3$ = 190.9. A red, crystalline powder, soluble in water or alcohol. **f. glycerophosphate.** $Fe_2[C_3H_5(PO_4)(OH)_2]_3$ = 616.2. Iron glycerophosphate. Yellow scales, soluble in water or alcohol. Used medicinally as a tonic in anemia, chlorosis, malaria, etc. **f. hydroxide.** $Fe(OH)_3$ = 106.9. Ironic hydroxide. A reddish-brown, amorphous powder, d.3.4–3.9, insoluble in water or alcohol, soluble in acids. Used as a hematinic and antidote for arsenic compounds; technically, in the rubber industry. **f. hypophosphite.** $Fe(H_2PO_2)_3$ = 250.9. Dihydric ferric hypophosphite. A white or gray powder sparingly soluble in water, soluble in conc. alkali citrate solution; used as a tonic. **f. iodate.** $Fe(IO_3)_3$. A brownish-powder, usually containing some Fe_2O_3, readily decomp. when heated; used medicinally as an alterant. **f. iodide.** FeI_3 = 436.8. Black, shining crystals, soluble in water. **f. lactate.** $Fe(C_3H_5O_3)_3$ = 322.9. A brownish-red powder, used medicinally as a tonic. **f. malate.** $Fe_2(C_4H_4O_5)_3$ = 507.7. A red powder, or brown deliquescent scales, soluble in water, alcohol, or ether; used medicinally as a tonic and alterant. **f. nitrate.** $Fe(NO_3)_3.9H_2O$ = 404.0. Ironic nitrate. Colorless, rhombic crystals, d.1.683, m.47, soluble in alcohol, ether, or water. (*solution*). An aqueous solution containing 33 % ferric nitrate or 7.5 % iron. A dark-red liquid, d.1.25 used technically in the dye industry, for calico printing, in the tanning industry, and in the manufacture of iron pigments. **f. nucleinate.** Ferratogen, ferrinol. A grayish-white or yellowish powder obtained from yeast grown in ferruginous media, soluble in water; used medicinally as a tonic. **f. oleate.** $Fe(C_{18}H_{33}O_2)_3$ = 899.9. A deep-red, soft, mass, used in paints. **f. oxalate.** $Fe_2(COO)_3$ = 375.7. Ironic oxalate. Yellow scales or amorphous powder, decomp. at 100, soluble in water, insoluble in alcohol. **f. oxide.** Fe_2O_3 = 159.7. Ironic oxide, red iron oxide, Pompey red, iron sesquioxide. An oxide of iron occurring in nature as red hematite or martite as red, hexagonal or rhombic crystals, or a brown powder, d.5.12–5.30, m.1541. Insoluble in water, or alcohol, soluble in acids. Used as a pigment and abrasive for polishing glass, porcelain, and metals. (*magnetic-*) Ferriferrous oxide. **f. peptonate.** A yellowish-brown amorphous powder, or reddish, deliquescent scales, containing 5 % or 25 % ferric oxide, soluble in water. Used medicinally as a non-astringent hematinic. **f. perchlorate.** $Fe(ClO_4)_3$ = 354.2. Brown crystals, soluble in water. **f. perchloride.** Ferriferrous chloride. **f. persulfate.** Ferriferrous sulfate. **f. phenate.** A group of compounds of ferric iron and phenol of variable composition. They form purple, deliquescent masses, soluble in water. **f. phosphate.** $FePO_4.2H_2O$ = 186.91. Ironic phosphate. Yellow, rhombic or monoclinic crystals, d.2.87, insoluble in water, soluble in acids; used in dentistry. (*green-*) Ferriammonium phosphate. **f. potassium ferrocyanide.** Potassium f. ferrocyanide. **f. pyrophosphate.** $Fe_4(P_2O_7)_3$ = 745.5. A white powder, insoluble in water, soluble

in carbonated water; used medicinally as a tonic. (*green-*) A group of compounds of ferric pyrophosphate with ammonium citrate, sodium citrate, magnesium citrate, or potassium citrate; used in hypodermic medication. **f. pyrosulfate.** FeS_2O_7 = 231.9. A white, microcrystalline powder. **f. pyrothioarsenate.** $Fe_4(As_2S_7)_3$ = 1345.3. A grayish brown powder. **f. rhodanate.** F. thiocyanate. **f. stearate.** $Fe[C_{18}H_{35}O_2]_3$ = 906.0. A light-brown powder, insoluble in water. **f. subcarbonate.** Sesquioxide of iron, saffron of mars, red oxide of iron, hydras ferricus, crocus martis. A hydrous precipitate from iron solutions, consisting of variable mixtures of ferric oxide and ferric hydroxide; used medicinally as a tonic. **f. subsulfate.** $Fe_4O(SO_4)_5$ or $Fe_2(SO_4)_3.Fe_2(SO_4)_2O$ = 719.49. Monsel's salt. Reddish brown, transparent scales, very soluble in water; used medicinally as a styptic. **f. succinate.** $FeC_4H_4O_4(OH)$. An amorphous reddish-brown powder, nearly insoluble in water; used as a tonic. **f. sulfate.** $Fe_2(SO_4)_3.9H_2O$ = 562.1. Yellow rhombic crystals, or a grayish white powder, d.2–2.1, soluble in water or alcohol. **f. sulfide.** Fe_2S_3 = 207.9. Yellowish green crystals, d.4.25–4.41, decomp. on heating or with solvents. **f. sulfocyanate.** F. thiocyanate. **f. tannate.** $Fe_2(OH)_3C_{14}H_7O_9$ = 481.78. A dark brown powder, insoluble in water; used medicinally. **f. tartrate.** $Fe_2(C_4H_4O_6)_3.H_2O$ = 573.9. Brown scales, soluble in water; used medicinally as an emmenagogue and tonic. **f. thiocyanate.** $Fe(CNS)_3.3H_2O$ = 284.1. Ironic sulfocyanide, f. rhodanate, f. thiocyanide. Dark red crystals or a brown granular powder, soluble in water, alcohol or ether. **f. valerianate.** $Fe(OH)_2C_5H_9O_2$ = 190.9. A brown, amorphous powder, insoluble in water, soluble in acids; used as a tonic and emmenagogue. **f. vanadate.** $Fe(VO_3)_3$ = 352.8. Ironic metavanadate. A dark grayish-brown powder, insoluble in water.

ferricyanic acid. The hypothetical acid, $H_3Fe(CN)_6$, from which the ferricyanides are derived.

ferricyanide. A salt of ferricyanic acid containing the trivalent $Fe(CN)_6\equiv$ radical. **ferric-** Ferric ferricyanide. **ferrous-** Ferrous ferricyanide. Cf. *nitroprusside.*

ferriferous. (1) Containing iron in the ferric state. (2) Yielding or bearing iron.

ferriferrous. Describing a compound containing both, divalent and trivalent iron, Fe= and Fe≡; synonym: ferrosoferric. **f. chloride.** Fe_3Cl_8 or $FeCl_2.2FeCl_3$ = 451.2. Ferrosoferric chloride. Yellow, deliquescent crystals, soluble in water. **f. cyanide.** (1) Ferric ferrocyanide. (2) Ferrous ferricyanide. **f. hydroxide.** $Fe_3(OH)_8$ = 303.61. A black powder, soluble in hydrochloric acid. **f. oxide.** Fe_3O_4 or $FeO.Fe_2O_3$ or $Fe:(FeO_2)_2$ = 231.5. Ferrosoferric oxide, magnetic iron oxide, martial ethiops, black iron oxide. A black, regular crystalline powder, d.5.16, m.1537, insoluble in water, alcohol or alkalis, soluble in acids. **f. sulfate.** $Fe_2(SO_4)_4$ = 551.7. Ferrosoferric sulfate. There are several basic and acid derivatives, some of which occur as minerals. **f. sulfide.** Fe_3S_4 or $FeS.Fe_2S_3$ = 295.7. Ferrosoferric sulfide. A black powder, insoluble in water, decomp. by acids.

ferrimagnesium citrate. $FeMg_3(C_6H_5O_7)_3.(H_2O)_3$. Iron and magnesium citrate, ironic magnesium citrate. Reddish-brown scales, soluble in water; used medicinally as a hematinic and tonic.

ferrimanganese. An alloy of iron and manganese, used for the deoxidation and desulfurization of molten steel.

ferrimanganic. A compound containing both, trivalent iron, Fe≡, and manganese, Mn≡. **f. citrate.** $FeMn(C_6H_5O_7)_2$. Brown scales, slowly soluble in water; used medicinally similarly to ferric citrate. **f. pyrophosphate.** $Fe_2Mn_2(P_2O_7)_3.(H_2O)_x$. A yellow powder of variable composition, used medicinally as tonic. **f. tartrate.** $FeMn(C_4H_4O_6)_3$. Brown scales, slowly soluble in water.

ferrinol. Ferric nucleinate.

ferripotassium. A double salt containing potassium and trivalent iron. **f. citrate.** $FeK_3(C_6H_5O_7)_2.(H_2O)_x$. Iron and potassium citrate, ironic potassium citrate. Transparent brown scales or leaflets, soluble in water; used medicinally as a tonic and hematinic. **f. cyanide.** Potassium ferricyanide. **f. oxalate** $K_3Fe(COO)_3.3H_2O$ = 359.3. Iron and potassium oxalate. Smaragd-green crystals, soluble in water. **f. sulfate.** Potassium ferric sulfate.

ferripyrine. $2FeCl_3.3C_{11}H_{12}ON_2$. A compound containing 36 % ferric chloride and 64 % antipyrine. A red crystalline powder, soluble in water or alcohol, insoluble in ether; used medicinally as a styptic and hematinic.

ferrisodium. A double salt containing sodium and trivalent iron. **f. benzoate.** A mixture of equal parts ferric benzoate and sodium benzoate. **f. citrate.** $FeNa_3(C_6H_5O_7)_2(H_2O)_x$. Iron and sodium citrate, ironic sodium citrate. Light brown leaflets, soluble in water, used medicinally as a tonic and astringent. **f. oxalate.** $Na_3Fe(COO)_3.4\frac{1}{2}H_2O$ = 338.0. Iron and sodium oxalate, ironic sodium oxalate, sodium ferric oxalate. Green crystals, soluble in water; used medicinally as a tonic, astringent and emmenagogue, and technically in photography. **f. pyrophosphate.** $Na_3Fe(P_2O_7)_2.7H_2O$ = 599.1. Iron and sodium pyrophosphate. A gray, granular powder, slowly soluble in water; used medicinally as a tonic. **f. sulfate.** $NaFe(SO_4)_2.12H_2O$. Sodium iron alum, sodium ferric sulfate. Octahedric, brown crystals, soluble in water.

ferrite. (1) An unstable compound of ferric oxide with a strong base, as $NaFeO_2$ or $Ca(FeO_2)_2$, which exists in strongly alkaline solutions of iron. Cf. *ferrate.* (2) α-, β-, or γ-. One of the allotropes of iron (q.v.).

ferro- A prefix indicating metallic iron (as in ferroaluminum) or divalent iron (as in ferrocyanide). **f. prussiate.** Potassium ferrocyanide.

ferroaluminum. An alloy of 80 parts iron and 20 parts aluminum, d.6.30, m.1480.

ferroammonium. Describing a compound containing divalent iron and ammonium. **f. bromide.** $(NH_4)_2FeBr_4$ or $FeBr_2.2NH_4Br$ = 411.8. Iron and ammonium bromide. A brown powder, soluble in water. **f. chloride.** Ferriammonium chloride. **f. cyanide.** Ammonium ferrocyanide. **f. sulfate.** $(NH_4)_2Fe(SO_4)_2.6H_2O$ = 392.0. Iron and ammonium sulfate, ammonium ferrosulfate, ironous ammonium sulfate, Mohr's salt. Green crystals, soluble in water; used in photography, and as a standard in volumetric analysis.

ferrocarbon titanium. An alloy obtained by the reduction of titanium oxide with carbon in the

electric furnace; used for deoxidation of molten steel in steel manufacture.

ferrocerium. A pyrophoric alloy made by fusing cerium chloride and iron together; it is used as flint in automatic lighters.

ferrochrome. Ferrochromium.

ferrochromium. An alloy of 50 % iron and 50 % chromium, d.6.9, m.1458; used in the manufacture of steel.

ferroconcrete. Reinforced concrete.

ferrocyanic acid. The hypothetical acid, $H_4Fe(CN)_6$, from which the ferrocyanides are derived.

ferrocyanide. A compound containing the tetravalent $Fe(CN)_6\equiv$ radical. **ferric-** Ferric ferrocyanide. **ferrous-** See *ferrous ferrocyanide.*

ferrodolomite. The mineral $CaFe(CO_3)_2$.

ferroferric. Ferriferrous.

ferroferricyanide. Ferrous ferricyanide.

ferroferrocyanide. Ferrous ferrocyanide.

ferromagnesium. (1) An alloy of magnesium and iron. (2) A compound containing both, divalent iron and magnesium. **f. lactate.** Iron and magnesium lactate. A yellow powder, soluble in water; used medicinally as a tonic. **f. sulfate.** $MgFe(SO_4)_2.6H_2O$ = 380.2. Iron and magnesium sulfate. Green crystals, soluble in water; used medicinally as a tonic in anemia and chlorosis.

ferromagnetism. Magnetism due to the presence of magnetic iron and independent of an electric current.

ferromanganese. An alloy of 50 % iron and 50 % manganese, d.7.0, m.1325; used in the manufacture of tough steels.

ferromanganic. Describing a compound containing divalent iron and trivalent manganese.

ferromanganous. Describing a compound containing both, divalent iron and divalent manganese. **f. chloride.** $MnFeCl_4$ = 252.6. Orange crystals, soluble in water. **f. iodide.** $MnFeI_4$ = 618.2. A brown granular powder or prismatic crystals, soluble in water. **f. lactate.** Iron and manganese lactate. A white powder, soluble in water; used medicinally as a tonic. **f. sulfate.** $MnFe(SO_4)_2.12H_2O$ = 518.8. Iron and manganese sulfate. A yellowish crystalline powder soluble in water; used medicinally as a tonic.

ferromolybdenum. A steel which contains about 2 per cent of molybdenum and does not soften on heating; used for high-speed lathe tools.

ferron. 7-Iodo-8-hydroxyquinoline-5-sulphonic acid; used as a reagent, *e.g.*, for fluorides.

ferronickel. An alloy of 74.2 % iron, 25 % nickel and 0.8 % carbon, d.8.1, m.1500; used in the manufacture of steel and tools; Cf. *invar.* **valve steel-** An alloy of 67.8 % iron, 32 % nickel, and 0.2 % carbon, d.8.0, m.1480.

ferrophosphorus. A by-product obtained by heating phosphate rock, silica and coke in an electric furnace or blast furnace. Used in steel making to increase fluidity during casting.

ferropotassium. Describing a compound of divalent iron and potassium with another radical. **f. cyanide.** Potassium ferrocyanide. **f. tartrate.** A mixture of iron tartrates and potassium tartrates of variable composition; used for medicinal baths.

ferropyrine. Ferripyrine.

ferrosilicon. A hard steel alloy of 97.6 % iron, 2 % silicon, and 0.4 % carbon; 90 % of the steel manufactured is deoxidized with f. **f. zirconium.** An alloy of iron, silicon and zirconium, used to purify molten steel and give it added resistance to shock.

ferrosilite. Clinoferrosilite. Acicular crystals of $FeSiO_3$ in obsidian.

ferrosoferric. Ferriferrous. **f. oxide.** Ferriferrous oxide.

ferrosoferro-. Ferrous ferro-.

ferrotitanium. An alloy of titanium and iron made by reducing titanium dioxide with powdered aluminum and iron; used for deoxidation of molten steel.

ferrotungsten. Tungsten steel. An alloy of 94.5 % iron, 5 % tungsten and 0.5 % carbon; used for tools. **high speed-** High speed tool steel, an alloy of 75 % iron, 18 % tungsten, 6 % chromium, 0.3 % vanadium and 0.7 % carbon.

ferrous- Ironous. A prefix indicating compounds containing divalent iron, Fe=. They are generally of a greenish color, give the ferrous ion, Fe^{++} in aqueous solution, and are good reducing agents. **f. acetate.** $Fe(CH_3COO)_2$ = 114.0. Green crystals, used in solution as *iron liquor* (printer's liquor), and as a mordant. **f. ammonium.** Ferroammonium. **f. arsenate.** $Fe_3(AsO_4)_2.6H_2O$ = 553.6. Ironous arsenate. A green, amorphous powder, insoluble in water or alcohol, soluble in ammonia or hydrochloric acid; used as an insecticide. **f. bromide.** $FeBr_2.6H_2O$ = 323.8. Ironous bromide. A red, crystalline powder, soluble in water, alcohol or ether; used medicinally. **f. carbonate.** $FeCO_3$ = 115.8. A grayish green, rhombohedric crystalline powder, d.3.8, decomp. by heat, insoluble in water, soluble in carbonated water and acids. It oxidizes on exposure to air; used in the preparation of carbonated "ferruginous" waters. **f. chloride.** $FeCl_2.4H_2O$ = 198.8. Ironous chloride. Green, monoclinic crystals, d.1.926, soluble in water or alcohol. Used as a reducing and adsorbing reagent; technically, in calico-printing and as a stain; also in the extraction of copper from ores. **f. ferricyanide.** $Fe_3[Fe(CN)_6]_2$ = 591.3. Ferroferricyanide. A dark blue powder, insoluble in water, alcohol, or alkalis, soluble in dilute acids, decomp. by heat; used as a pigment and dye. **f. ferrocyanide.** $Fe_2[Fe(CN)_6]$ = 323.6. Ferrosoferrocyanide. A white powder, insoluble in water. **f. fluoride.** FeF_2 = 93.84 and $FeF_2.8H_2O$ = 237.97. A white powder, sparingly soluble in water. **f. fluosilicate.** $FeSiF_6.6H_2O$ = 305.99. Colorless crystals, d.1.961, soluble in water. **f. hydroxide.** $Fe(OH)_2$ = 89.8. Ironous hydroxide. A white amorphous powder which rapidly oxidizes and becomes successively greenish, yellowish and finally brown; insoluble in water or alcohol, soluble in acids or ammonia. **f. hypophosphite.** $Fe(H_2PO_2)_2$ = 185.8. Dihydric ferrous hypophosphite. A white powder which rapidly oxidizes to the ferric compound. **f. hyposulfite.** FeS_2O_3 = 167.8. A white, amorphous powder, soluble in water; rapidly oxidizes. **f. iodide.** $FeI_2.4H_2O$ = 381.7. Ironous iodide. Green, deliquescent, scales, d.2.873, anhydrous at 177, soluble in water, alcohol or ether, decomp. on heating. **f. lactate.** $Fe(C_3H_5O_3)_2.3H_2O$ = 287.8. Iron lactate. Pale, greenish-white crusts of small needles or transparent green scales, with a slight peculiar odor; slowly soluble in water, and used medicinally. **f. nitrate.** $Fe(NO_3)_2.6H_2O$ = 288.0. Ironous

nitrate. Colorless or pale-green crystals, m.-60.5, very soluble in water. **f. oleate.** A yellowish, soft soap. **f. oxide.** FeO = 71.84. Ironous oxide, black iron oxide, iron monoxide. A black powder, m.1419, insoluble in water, or alcohol, soluble in acids. **f. oxalate.** $Fe(COO)_2$ = 143.8. A yellow, odorless powder sparingly soluble in water, soluble in acids. **f. perchlorate.** $Fe(ClO_4)_2.6H_2O$ = 362.86. A soluble green powder. **f. phosphate.** $Fe_3(PO_4)_2.8H_2O$ = 501.7. Colorless or bluish monoclinic crystals, d.2.58, insoluble in water or alcohol, soluble in acids. Native as vivianite. Cf. *ludlamite.* **f. phosphide.** FeP = 86.86. A black powder, d.5.2. In addition there are: Fe_2P, Fe_2P_3, Fe_3P, Fe_3P_4. **f. platinichloride.** $FePtCl_6$ = 463.8. **f. pyrothioarsenate.** $Fe_2As_2S_7$ = 485.7. A grayish green powder. **f. structure.** The crystal structure of cast iron. **f. sulfate.** (1) *heptahydrate* or crystallized: $FeSO_4.7H_2O$ = 278.0. Ironous sulfate, iron sulfate, green vitriol, green copperas, Ferri sulphas. Pale bluish-green, monoclinic crystals, d.1.875, m.64, decomp. when further heated; soluble in water, insoluble in alcohol. It occurs native as melanterite; used in large quantities for mordanting wool; as a disinfectant; and in the manufacture of ink and Prussian blue. (2) *pentahydrate:* $FeSO_4.5H_2O$ = 241.9. Pale green crystals, d.2.2, which occur native as siderotilate. (3) *tetrahydrate:* $FeSO_4.4H_2O$ = 223.9. (4) *monohydrate:* $FeSO_4.H_2O$ = 169.9. A white powder, obtained by heating iron sulfate to about 140. It occurs native as szomolnokite. (5) *anhydrous:* $FeSO_4$ = 151.8. A white powder obtained by heating iron sulfate crystals to 300. **f. sulfide.** FeS = 87.9. Iron sulfide, ironous sulfide, pyrite. A black, amorphous powder or crystalline masses, d.4.84, m.1197, insoluble in water, soluble in acids; used as a reagent for making hydrogen sulfide. **f. sulfite.** $FeSO_3$ = 135.8. Colorless or greenish crystals, soluble in water. **f. sulfocyanide.** F. thiocyanate. **f. tantalate.** See *tantalite.* **f. tartrate.** $FeC_4H_4O_6$ = 203.9. A white crystalline powder, slightly soluble in water. **f. thiocyanate.** $Fe(CNS)_2.3H_2O$ = 226.04. F. sulfocyanide. Green crystals, soluble in water or alcohol. **f. thiosulfate.** FeS_2I_3 = 167.99. A pale-green crystalline powder. **f. titanate** $FeTiO_3$. Ilmenite. **f. tungstate** FeWO4. See *ferberite, wolframite.*

ferrovanadium. An alloy of iron and vanadium, used in the manufacture of steel for automobile parts.

ferroxyl indicator. A jelly of potassium ferrocyanide and phenolphthalein in agar-agar, used to test for the corrosion of iron. A pair of iron wires dipped into it will turn red (cathode) and blue (anode).

ferrugineous. Ferruginous.

ferruginous. (1) Containing iron. (2) A drug whose therapeutic effect depends upon the presence of iron, *e.g.*, chalybeates.

ferrum. The official Latin for iron. **f. reductum.** A mixture of iron and Fe_3O_4 obtained by the reduction of Fe_2O_3 in a stream of hydrogen: ferry metal. Frary's metal.

fertiliser. Fertilizer.

fertilizer. (1) A plant food which is added to the soil; as, potassium salts, nitrates, phosphates and calcium salts. (2) Manure. **f. grade.** The minimum guaranteed plant food expressed in terms of *nitrogen*, available *phosphoric acid*, and water-soluble *potash*.

Ferula. A genus of Umbelliferae, yielding asafetida, galbanum, sagapenum and sumbul.

ferulaldehyde. $C_{10}H_{10}O_3$ = 178.08. *p*-coniferaldehyde, 4-hydroxy-3-methoxy cinnamaldehyde, hadromal. Colorless crystals, m.82.5, used in perfumery. It occurs in woody tissues, and gives a red color with phloroglucinol in HCl.

ferulene. $C_{15}H_{26}$ = 206.20. A dihydrosesquiterpene from fennel; d.0.870, b.$_{7mm}$126.

ferulic acid. $C_{10}H_{10}O_4$ = 194.1. Ferulaic acid, m-methoxy-p-hydroxycinnamic acid. A constituent of asafetida and black fir resin occurring in colorless rhombic needles, m.169, decomp. by heat, soluble in hot water, alcohol, or ether. Cf. *coniferol.* **iso-** Hesperitinic acid. **hydro-** $C_{10}H_{12}O_4$ = 196.1. Colorless crystals, m.89, soluble in water or alcohol.

fervanite. A vanadium mineral similar to steigerite, q.v.

Féry calorimeter. A thermo-electric device for determining the calorific power of foods. **F. refractometer.** An instrument for the direct reading of the refractive index of any transparent liquid; accuracy 0.0001, range 1.3300–1.6726.

Feser lactoscope. A graduated glass cylinder used for the determination of fat in milk by its degree of translucency.

fetron. A mixture of 3 parts stearic acid and 97 parts petrolatum; used as a base for ointments.

feverbark. See (1) *Alstonia*, (2) *Cinchona.*

feverfew. The herb of *Pyrethrum parthenium*, a Compositae, used as carminative. Cf. *pyrethrum camphor.*

fiber. A long, thread-like cell or tissue of vegetable or animal origin, used for paper (cf. *tracheid*), textiles, cordage, wickerwork and brushes. **animal-** A f. obtained from animals, as alpaca, bristles, camel-hair, horse-hair, silk, and wool. **artificial-** (1) F. made from mineral matter; as, spun glass, metallic threads, slag wool. Cf. *mineral f.* (2) F. imitating natural f.; as, rayon. **bast-** A f. from the bast of plants, as hemp, jute, kapok, ramie. **cordage-** A fiber used for making ropes, *e.g.*, coir, manila hemp, hemp, sisal, New Zealand flax. **crude-** The vegetable material left after boiling the fat-free ground plant successively for ½ hour in 1.25 % sulfuric acid and 1.25 % caustic soda. **horn-** Vulcanized f., leatheroid. A hard, tough, bone-like substance used in electric insulation, and made by compressing alternate layers of paper treated with acids or zinc chloride. **linen-** A fiber used for making threads or yarn from flax. **mineral-** Asbestos-. Cf. *artificial f.* **staple-** Fiber, either natural or synthetic, in comparatively short and uniform lengths, from which it is spun either alone or in admixture into continuous threads. Natural fibers usually occur in this form, but rayon (which is manufactured as a continuous filament for silk-type fabrics) has to be cut accordingly if used for making cotton-type fabrics. World production (1940) 1250 million lbs. **sugarcane-** Bagasse, **synthetic-** Yarn. **vegetable-** A fiber obtained from plants:

1. Hair fibers (from seed hairs).
   Gossypium..... cotton
   Eriodendron..... kapok
   Calotropis..... vegetable silk.

2. **Bast fibers** (from stalks and stems).

Linaceae, *Linum*	flax
Moraceae, *Cannabis*	hemp
Malvaceae, *Hibiscus*	Deccan hemp
Abutilon	Chinese jute
Leguminosae, *Crotalaria*	sunn hemp
Spartium	Spanish broom
Urticaceae, *Boehmeria*	ramie
Tiliaceae, *Corchorus*	jute
Umbelliferae, *Eryngium*	caraguata

3. Cordage fibers (from vascular bundles).

Musaceae, *Musa*	abaca
Amaryllidaceae, *Agave*	sisal
Furcraea	Mauritius hemp
Liliaceae, *Sansevieria*	bowstring hemp
Phormium	New Zealand hemp
Bromeliaceae, *Tillandsia*	veget. horsehair
Palmae, *Cocos*	coir
Attalea, Leopoldina	piassaba
Borassus	palmyra
Caryota	kittool
Raphia	raffia
Sabal	sabal

4. Paper fiber (from gramineae and coniferae).

Wheat, oat, barley etc	straw fiber
Pine, fir, etc	wood fiber
Cyperus papyrus	papyrus
Stipa species	esparto
Saccharum officinarum	bagasse

vulcanized- Horn-.

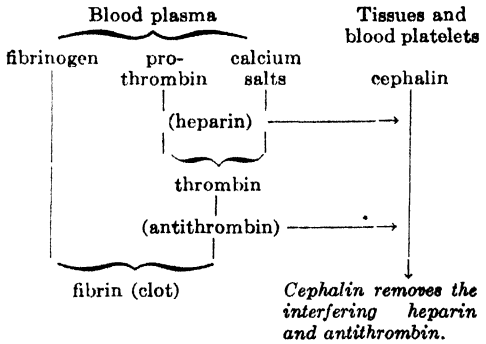
fibestos. Trade name for a cellulose acetate plastic.

fibre. Fiber.

fibril. A small fiber or filament.

fibrin. A protein from blood (0.1–0.4 %) and muscle tissue, formed from fibrinogen by the action of ferments. It occurs in colorless or yellowish, horn-like masses, insoluble in water, but swelling in slightly acid solution to a gelatinous solution; used technically in photography, in the dye, textile and leather industry, also in the manufacture of various utensils, and foods. **muscle-** Syntonin. **vegetable-** Gluten. Gluten-fibrin. A by-product in the manufacture of starch. Yellow, horn-like masses, insoluble in water soluble in hot alcohol, alkalis or dilute acids. It has a high food value.

fibrinogen. A globulin of the blood plasma which gives fibrin by the action of paraglobulin or of the fibrin enzyme, thrombin. It is essential in the coagulation of blood, which can take place only in the presence of cephalin (from ruptured tissue) which removes the interfering heparin and antithrombin; according to Howell:



fibrinolysin. A substance formed in the blood that causes the fibrin clots to dissolve.

fibrinolysis. The hydrolysis of fibrin.

fibrogen. A registered trade-mark for a highly purified lung tissue, rich in fibrinogen and used as a hemostatic.

fibroin. $(C_{15}H_{23}O_6N_5)_x = (369.2)x$. A constituent of silk and spider webs. It is an indigestible protein, and contains diketopiperazine in its molecule.

fibrolite. Al_2O_3,SiO_2. Sillimanite. The yellow, native aluminum silicate.

fibrolysin. A sterilized 15 % solution of thiosinamine and sodium salicylate; used as a hypodermic injection for dissolving or breaking up fibrous tissue.

fibroplastin. Paraglobulin.

fibrox. A fibrous variety of siloxicon (q.v.) used as a heat insulator.

F.I.C. An abbreviation for Fellow of the Institute of Chemistry; revised in 1943 to F.R.I.C., Fellow of the Royal Institute of Chemistry.

fichtelite. $C_{18}H_{32} = 248.25$. A white, crystalline hydrocarbon, m.46, occurring in the peat beds of the Fichtelgebirge, Bavaria.

ficin. A proteolytic, crystalline enzyme; the active principle of oje, the milky sap of the fig tree, which dissolves live *Ascaris* (parasitic worms).

F.I.D. An abbreviation for "Food Inspection Decisions" of the Department of Agriculture, U.S.A.

field. (1) The region or space within which a phenomenon occurs. (2) In optics, the area visible at any one time through an instrument, *e.g.*, a microscope. **atomic-** The space surrounding an atom which cannot normally be penetrated by other atoms. **electric-** The space surrounding an electrically-charged body in which its action is perceptible. **electromagnetic-** q.v. **gravitational-** The region surrounding the earth in which bodies are attracted towards its center. **intra atomic-** Dynad. **inter atomic-** The space between dynads. Cf. *molecular diagram, atomic radius.* **magnetic-** The space surrounding a magnet, in which its magnetic action is perceptible. **molecular-** The space surrounding a molecular which is impenetrable by other molecules.

field-intensity. The intensity of the energy of a limited region or space. **electric-** The energy of an electric field, measured by the force exerted on unit charge, $H = q/r^2$, in which H is the field intensity at a point, distant (r) from an electrical charge (q) in a vacuum. In a dielectric the equation becomes $H = q/Kr^2$, where K is the dielectric constant of the medium. **magnetic-** The energy of a magnetic field, measured by the force exerted at a point by an isolated magnetic pole of strength m: $H = m/\mu r^2$, where μ is the magnetic permeability, and r the distance of the point from the magnet.

fig. The dried fruit of *Ficus carica*, an Urticaceae; used as food and mild laxative. Cf. *cradin.*

figwort. Scrophularia.

filament. A fine thread-like body or structure. **carbon-** A fine thread of graphite or carbon, used in electric bulbs (lamps, valves). **nuclear-** The thread-like chromatin in the nucleus of a cell. **protoplasmic-** A thread-like protoplasm, as cilia, or flagella. **tungsten-** A fine thread of tungsten, used in electric bulbs, *e.g.*, tungsten or mazda lamps.

filamentous. (1) Having the shape of a filament. (2) A growth of bacteria composed of long, interwoven threads.

filar micrometer. A scale-attachment for microscopes; 0.001 mm. can be estimated, and exact measurements of microscopic objects made.

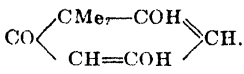
file. A very hard steel tool with a rough surface of fine sharp ridges; used for smoothing or shaping objects. **rat-tail-, round-** A tool used for smoothing out round holes, as in a cork or rubber stopper. **triangular-** A tool used for cutting glass tubing by making a sharp cut with one of the edges, and then breaking the tube.

Filices. [Sing. Filix, q.v.] Ferns. An order of Pteridophytae or spore-bearing plants which yield aspidium, polystichum, filicin, etc.

filicic acid. $C_{14}H_{14}O_5$ = 262.2. Colorless crystals, decomp. 184.6, insoluble in water or alcohol, soluble in ether or carbon disulfide; a constituent of *Aspidium* species, and a decomposition product of filicin. (2) $C_{36}H_{42}O_1$ = 682.32. White crystals, m.125, from Aspidium species. Cf. *filixic acid, filicinic acid.*

filicin. $C_{35}H_{40}O_{12}$ = 652.4. Filicic acid anhydride. A constituent of the root of *Aspidium filix-mas*, and the active principle of its fluid extract; used as a vermifuge.

filicinic acid. $C_8H_{10}O_3$ = 154.07.



A reduction product of filmaron and filixic acid.

filiform. A uniform growth of bacteria along the line of inoculation.

filix. [pl., Filices, q.v.]. A fern, as filix-mas, the male fern. **f. extract.** A fluid extract made from the root of the male fern, *Aspidium filix-mas.* It contains filicic acid, filicin, albaspidin, aspidinol, and filmaron.

filitannic acid. The tannin of the male fern.

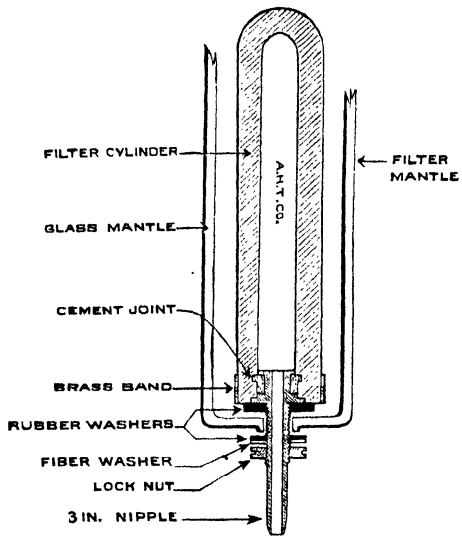
filixic acid. $C_{35}H_{38}O_{12}$ = 650.29. An acid, m.183, from filix extract. Cf. *filicic acid, filicinic acid.*

fillers. Materials used (1) to close the pores of paper; (2) to increase the bulk or weight of substances (loading); (3) to modify the properties of synthetic substances or insulating compositions. Cf. *finishing materials, adulterants.*

film. (1) A membrane or covering layer. (2) A light-sensitive, flexible transparent sheet coated with opaque silver salts for taking photographs. (3) The transparent developed form of (2). **motion picture-** A f. used to project moving scenes on a screen. **silent-** runs 16 frames per second. **sound-** 24 frames per second. For scientific purposes the rate of projection may be *bradykinetic-* (slower) *isokinetic-* (same) or *tachykinetic-* faster than the rate at which the photograph was taken.

filmaron. $C_{47}H_{54}O_{16}$ = 874.5. An amorphous substance, m.60, obtained from and considered to be the anthelmintic principle of filix extract.

filter. (1) A strainer or purifier. (2) In chemistry, a porous material through which a liquid passes either for the purpose of (a) removing a precipitate or suspended matter, or (b) straining or clarifying the liquid. Cf. *membrane.* (3) In physics, an absorbing, semi-transparent substance, *e.g.*, light filter. **asbestos-** A mixture of asbestos and glass wool used for filtration. **Berkefeld-** A tube made of diatomaceous earth, used for filtering and sterilizing liquids (see figure). **Chamberland-** A tube made of porous clay and used for the filtration and sterilization of liquids, vaccines, or sera. **folded-** A piece of filter paper, folded in alternate directions, and used for the rapid filtration of liquids; (not in quantitative analysis). **gas-** A device for removing solid or liquid impurities from gases. **glass-** (1) A Gooch type of crucible made of glass, and having a sintered glass base of appropriate pore size. Used in quantitative analysis; no additional filter pad is required. (2) Glass wool. **Gooch-**



Berkefeld filter.

A platinum, glass or porcelain crucible with a perforated bottom covered by asbestos fibers. A precipitate may thus be heated and weighed without transference. **Kelly-** A leaf filter for filtering slurries under pressure. **light-** Color screen. **membrane-** A disk of nitrocellulose with porosity generally from 0.03–3 microns used in analytical and bacteriological work. **paper-** F. paper. **paper**

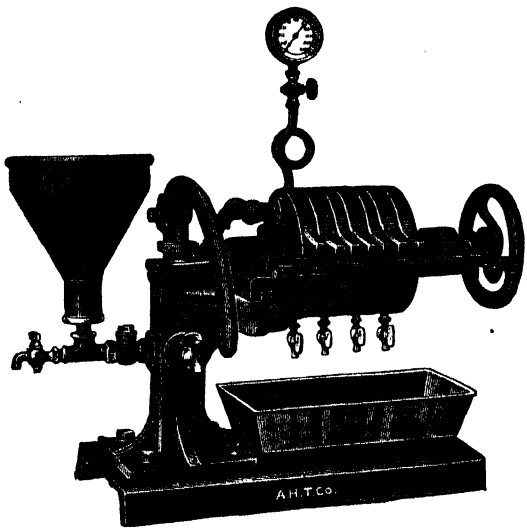
	Time*	Pore sizes of materials not passing
coarse	1–10 sec.	0.5–3μ (kaolin)
medium	10–30 sec.	0.1–1μ (bacteria)
fine	30–100 sec.	0.05–0.5μ (colloidal gold)
ultra fine or colloidal:		
fast	1–5 min.	(fine colloids)
medium	6–30 min.	(benzopurpurin dyes)
fine	50–150 min.	(albumen)
finest	<150 min.	(congo-red dyes)

* *The time for 100 cc. distilled water to pass through the filter.*

pulp- A mass of filter paper moistened and made into a pulp; used similarly to glass wool for filtration. **Pasteur-** A tube made of unglazed porcelain through which liquids to be filtered are forced by pressure or vacuum. **Pukal-**

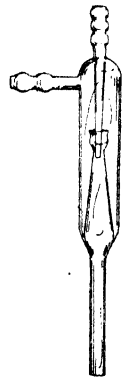
An Erlenmeyer-shaped piece of unglazed porcelain used for the filtration of vaccines, sera, or antitoxins. **stream line-** See *streamline filtration, filter press.* **ultra-** See *ultrafiltration, Zsigmondy, membrane filters.* **vacuum-** See *vacuum.*

f. aid. A powder (*e.g.*, kieselguhr) added to the solution to be filtered; it forms a porous bed on the f. and renders filtration easier. **f. apparatus.** Any device used for filtration. The simplest is a funnel with filter paper; others utilize porous materials through which liquids are forced, either by pressure or by vacuum. **f. bag.** A sack made of felt, used for straining liquids. **f. cloth.** A piece of strong canvas for use in a filter press. **f. cone.** A cone made of porous materials, as alundum or paper; used for filtration. **f. crucible.** A crucible of platinum, nickel, or porcelain with a porous bottom, and covered by asbestos; used for quantitative filtration. Cf. Gooch crucible. **f. cylinder.** A porous tube used as a f. **f. dish.** A conical dish made of porous material and fitting into a funnel; used for filtration instead of filter paper. **f. flask.** A conical flask with side-neck made of heavy glass, and used for vacuum filtration. **f. mantle.** A glass or metal tube around a f. cylinder. **f. paper.** An unsized, porous paper used for filtration. It is made in various textures and in many grades of purity. (*qualitative-*) A common or ordinary filter paper used for straining, clearing, and purifying solutions or the collection



Filter press.

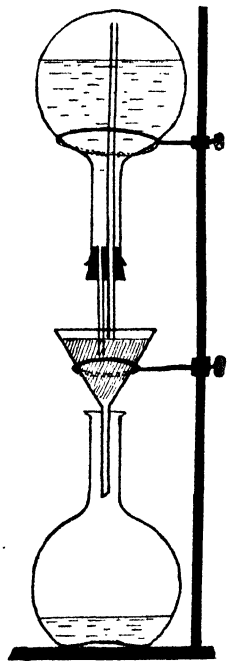
of precipitates or suspended particles. (*quantitative-*) A high-grade filter paper, resistant to dilute acids and consisting of pure cellulose with a very small ash (less than 0.5 mg.). It is prepared by repeated acid and water washings of the paper pulp. **f. paper analysis.** (1) Identification of substances by a spot test or f. paper test. (2) Capillary analysis. (3) The germination of seeds on moist f. paper and examination of the exudation from the rootlets (*e.g.*, by fluorescence methods). **f. paper test.** A color-reaction made with minute quantities of materials and reagents, with which a filter paper is successively moistened. **f. press.** A machine for the filtration of large amounts of liquids. It consists essentially of an iron-frame on which perpendicular iron-plates are suspended and pressed together by a screw. The liquid to be filtered is pumped into canvas-bags hanging between the plates and, when the bags are filled, the tightening of the screw furnishes the pressure necessary for filtration (see figure). **f. pump.** A pressure or vacuum pump used for filtration. Laboratory pumps are usually small vacuum pumps connected to the water faucet and operated by the water current drawing the air from a container (see figure). **f. tube.** (1) A glass tube to connect a Gooch crucible to a filter flask. (2) Bougie.



Water filter pump.

filtrate. The liquid that has passed through a filter.

filtration. The process of separating a solid from a liquid by means of a porous substance through which the liquid passes. (Cf. *decantation, straining, centrifugation, syphoning.*) **auto-**



Automatic filtration.

matic- A convenient method of filtering in the laboratory (see figure). **centrifugal-** The separation of filtrate from precipitate by centrifuging. **direct-** The ordinary way of separating a solid from a liquid by means of a filter, through which the liquid passes by gravitation. **edge-** Stream line f. **forced-** Centrifugal-, pressure-, or vacuum-filtration. **meta-** See *metafiltration.* **pressure-** Forcing the liquid by air-pressure through the filter. **stream line-** See *stream line.* **vacuum-** Forcing the liquid by suction through the filter.

filtros. A porous, acid-proof mineral used for filtration.

fimbriate. A growth of bacteria characterized by large and extremely long filaments on the border of the colony.

fineness. (1) The state of sub-division of a powder or granulated substance. It is determined by passing the substance through a series of sieves (see table). (2) The purity of a gold alloy expressed in parts per 1000. See *gold.*

Sieve No.	Fineness	Average diameter of particles
100	extremely fine powder	0.14 mm
80	very fine powder	0.17 mm
60	fine powder	0.23 mm
50	moderately fine powder	0.28 mm
40	fine coarse powder	0.38 mm
30	moderately coarse powder	0.54 mm
20	coarse powder	0.85 mm
12	very coarse powder	1.47 mm
6	granular powder	3.00 mm

finings. Substances added to a fermented beverage to clear it from suspended matter (yeast etc.), and render it brilliant; *e.g.*, isinglass.

finishing material. A substance used in industry for the last or finishing stage of manufacture, as in the textile industry: (a) Substances making fibers soft, hygroscopic and pliable, *e.g.*, glycerin, sugar, fats, coconut oil, calcium chloride, etc. (b) Coloring substances, *e.g.*, dyes. (c) Waterproofing substances, *e.g.*, rubber solutions. (d) Fire-proofing substances, *e.g.*, waterglass. (e) Antiseptic substances, *e.g.*, phenol. (f) Inert substances added for weighting, *e.g.*, barytes, gypsum, chalk, clay.

Finsen lamp. A mercury-vapor arc lamp in a quartz container; used as a source of intense ultra-violet rays in the treatment of skin diseases.

fiolax. A trade name for an alkali-free glass resistant to sudden temperature changes; used for test-tubes, and other chemical glassware.

fir. (1) A coniferous tree of the Abies genus. (2) Same as firkin. (3) A *Pinus* species. **balsam of-** Canada balsam. **oil of-** Pine oil.

fire. A bright flame caused by combustion. **f. air.** Scheele's name for oxygen. **f. brick.** A fire-clay or fire-resistant brick for lining furnaces, containing as crystalline phases: mullite, cristobalite and tridymite. **f. clay.** Stowbridge clay. A refractory clay containing large proportions of silica and alumina in comparison with the basic oxides. **f. damp.** An explosive mixture of methane and air. It occurs in coal mines and is detected by the "corpse light" in a Davy lamp. **f. extinguisher.** An agent that extinguishes fires. It may act either by cooling the burning substance (*e.g.*, water), or by covering it with a medium in which combustion cannot occur; as, carbon tetrachloride, sand, fire-foam. **f. foam.** A colloidal blanket of alumina and carbon dioxide by which fires are extinguished, *e.g.*, in oil-tanks. The blanket is produced by spraying over the burning surface two solutions, one containing alum, the other sodium carbonate and glue, or sodium silicate. **f. point.** The minimum temperature at which an inflammable oil will burn continuously. Cf. *flash point.* **f. proofing.** See *fireproofing.* **f. tester.** A device for determining the flash-point of illuminating oils.

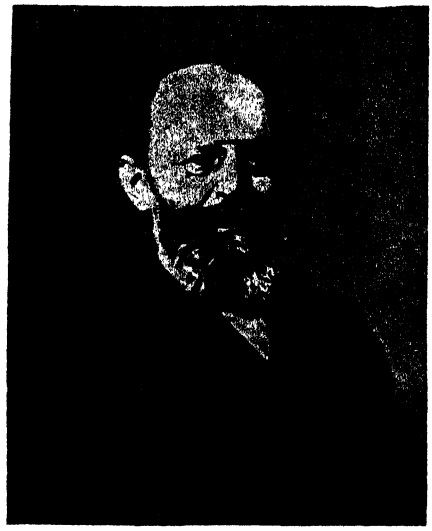
firepolishing. To smooth the sharp edges of glass by slightly fusing them in a flame.

fireproofing. The coating or impregnation of a combustion material with a substance that makes it less combustible; as, waterglass for textiles and wood, or selenium for wire insulators in telephone switchboards.

fireworks. A pyrotechnic display such as colored flames, and sky-rockets. **daylight-** F. utilizing colored smokes for effects.

firkin. (1) Fir. An obsolete measurement: 9 gallons = 34.06799 liters. (2) A wooden vessel.

firn. Snow in a granular, compact form.



Emil Fischer.

(From Moore "History of Chemistry." McGraw-Hill Book Company, New York, N. Y.)

Fischer, Emil. 1852–1919. A German chemist noted for his work in biochemistry and on the synthesis of polypeptides and carbohydrates. **F., Hans.** A German biochemist noted for his work on blood, and synthesis of hemin (Nobel prize 1940).

fisetic acid. Fisetin.

fisetin. $C_{15}H_{10}O_6$ = 285.1. Fisetic acid. Tetraoxymethylanthraquinone, *3.7.3'.4.'*-tetrahydroxy flavone. A yellow coloring matter from the wood of *Quebracho colorado*, fustic, or *Rhus cotinus.* Yellow, crystalline, glistening needles, m.360. Cf. *fustin.* **iso-** Luteolin.

fish bean. See *tephrosia.* **f. berry.** Cocculus indicus, Indian berry, oriental berry. The dried fruit of *Anamirta cocculus*, a Menispermaceae. It is an active narcotic poison. **f. glue.** See *isinglass.* **f. guano.** F. scrap, f. tankage. A fertilizer made from non-edible fish and from offal (heads, tails, etc.) from fish canneries by cooking, expressing the oil, and grinding. It contains 6–10 % N,

0.4–8 % P_2O_5. **f. oil.** Liquid fats obtained from fishes; as, dugong, porpoise, seal, sperm and sardine. They are characterized by their great absorption of oxygen without drying to a varnish, and yield little or no elaidin. They are colored dark red by concentrated acids. **f. poison.** (1) A ptomaine produced by the decaying proteins of fishes. (2) The poisonous substances produced by certain species of fishes, as fugu toxin, or ichthyotoxin. (3) A poisonous substance used by natives to stupefy fish prior to catching them; usually derived from *Derris*, *Cracca* and *Lonchocarpus* species. **f. scrap.** F. guano. **f. tankage.** F. guano.

fission. A division. (1) In biology the separation of a single cell into two or more equal parts, capable of developing to the original size of the parent cell. Cf. *karyokinesis*. (2) In astronomy the separation of a spherical and semi-liquid body into two parts that revolve around each other. Certain double stars are assumed to have been formed by fission from a single star. (3) In chemistry, the splitting of an atom into two atoms of nearly identical weight when bombarded by neutrons, as occurs with uranium 235 and certain other elements.

fistelin. The aglucone of the glucoside fustin.

Fittig, Rudolf. 1835–1910. A German chemist noted for organic research. **F. reaction.** *Fittig synthesis.* **F. synthesis.** The formation of an aromatic homolog from an aryl iodide or bromide by means of an alkyl iodide or bromide and metallic sodium, *e.g.*,

$$RBr + R'Br + 2Na = R{-}R' + 2NaBr$$

five finger grass. Cinquefoil. The herb of *Potentilla reptans*, a Rosaceae, used as a febrifuge and astringent. **American-** The herb of *P. canadensis* used similarly. Cf. *tormentil*.

fixanal. An analytical chemical, accurately weighed and sealed in a glass ampule; used for the rapid preparation of volumetric solutions. Error 0.2 %. Cf. *analoid*.

fixation. The process of rendering permanent. (1) In photography, the process of dissolving light-sensitive silver salts from plates, films, or paper, thus making them insensitive to the further action of light. (2) In microscopy, the preparation of minute structures in their original form on a slide. (3) In immunology, the prevention of hemolysis by the complement, q.v. (4) In industry, the combining of atmospheric nitrogen in the form of a useful compound. See *nitrogen fixation.* **complement-** See *complement fixation.* **nitrogen-** See *nitrogen fixation.*

fixative. A substance used to make an object permanent, as (a) a mordant used in dyeing, (b) a varnish for pastel paintings, (c) an agent employed in botany, zoology and histology to make permanent tissues. *E.g.*,

	1	2	3
formaldehyde (40 %)	6.5	12	10 cc.
glacial acetic acid	2.5	4	2 cc.
alcohol 95 %	55	34	30 cc.
water	45	56	60 cc.

1. *Formal-acetic-alcohol* for all plant specimens and many animals.

2. *Carl's solution* for insects and arthropods; remove specimen after 42 hours and transfer to 70 % alcohol.

3. *Kahle's solution* for insects, insect eggs and embryos.

(d) in perfumery, a f. makes a substance less volatile and more permanent; as, methylanisate, benzyl cinnamate, benzoisoeugenol.

fixator. Amboceptor.

fixed. Made permanent or definite. **f. air.** An early name for carbon dioxide. **f. oils.** A liquid fat which absorbs oxygen and becomes resinous (drying oils) or remains liquid (non-drying oils) as compared with evaporating oils (essential or volatile oils). **f. proportions, Law of.** See *constant proportions.* **f. white.** Barium sulfate.

fixing. The act of rendering permanent.

fixing-bath. A 20 % solution of sodium thiosulfate; used for the fixation of photographic plates, films or papers. **hardening-** A freshly mixed solution of

A. 500 gm. sodium hyposulfite
2000 cc. water.

B. 45 gm. sodium sulfite
25 gm. chrome alum
10 gm. sulfuric acid
500 cc. water.

Used for hardening and fixing photographic films, plates or papers.

Fizeau, Armand, Hippolyte, Louis. 1819–1896. A French physicist noted for research on the interference of light and heat, and the determination of the velocity of light and electricity.

fl. An abbreviation for fluid. **fl. dr.** A fluid dram or drachm. **fl. oz.** A fluid ounce.

Fl. An abbreviation for fluorine, F.

flag. See *calamus*.

flagella. A thin, hair-like protuberance on protozoa.

flagstaffite. $C_{12}H_{24}O_3$. An orthorhombic mineral, m.99–105.

flame. A source of heat consisting essentially of a stream of gas or vapor heated as the result of chemical reaction, usually oxidation. The luminosity of the flame may depend on glowing solid particles, *e.g.*, dust, carbon, etc. It consists usually of a number of cones, the temperature of which depends upon the degree of combustion taking place. **acetylene-** The hot, ignited gases emerging from a blowpipe fed with acetylene and compressed air or oxygen. **Bunsen-** The flame produced by a bunsen burner burning gas; it is either non-luminous (with air) or luminous (without air). **dark-** A non-luminous flame, *e.g.*, produced by burning pure hydrogen in oxygen, or ethylene in chlorine. **hydrogen-** A bluish or non-luminous flame produced by the oxidation of hydrogen in air. **luminous-** A bright or pale, colored flame, *e.g.*, candle flame, sodium light. **non-luminous-** Dark-. **oxidizing-** The non-luminous flame of a gas burner, used in blowpipe analysis for oxidation. **reducing-** The luminous blowpipe flame. It owes its properties to the presence of solid particles of carbon. **oxy-hydrogen-** The hot gas-mixture from a blow-pipe fed with compressed hydrogen and oxygen. **solar-** Protuberances on the sun consisting of hydrogen flames or luminous gases.

f. coloration. A qualitative test performed by placing the substance, moistened with hydrochloric acid on a platinum wire, in the non-luminous flame of a bunsen burner, and observing the resulting color of the flame.

Bright yellow	sodium
Brick red	calcium
Crimson	strontium
Red	lithium
Green-yellow	molybdenum, boron
Green	barium
Blue	indium
Blue-white	lead, arsenic, antimony
Purple	potassium
Blue, changing to green	copper

f. reactions. See *Bunsen, f. tests.* **f. spectra.** Spectra produced by the vapors of elements; used for the spectroscopic detection, identification or determination of elements. The characteristic lines of the f. spectra are due to electrons falling back to normal orbits from the lowest or more easily excited levels. Cf. Arc and spark *spectrum.* **f. temperature.** The following temperatures are produced by different sources of heat (Féry, 1907).

alcohol and air	1705°C
gas (bunsen burner—no air)	1712°C
gas (bunsen burner—½ air)	1812°C
gas (bunsen burner—full air)	1871°C
hydrogen and air	1900°C
gas and oxygen	2200°C
hydrogen and oxygen	2420°C
acetylene and air	2458°C
acetylene and oxygen	3000°C
thermite (Al + Fe)	3000°C

f. tests. Qualitative test made with the bunsen burner, such as the flame reactions or colorations, bead tests, and other blowpipe tests.

flamo. A compressed natural gas shipped in cylinders.

flash. (1) A sudden, luminous and temporary flame. (2) A volatile mixture, thrown on the fires of a kiln to produce a colored glaze on bricks or tiles which are being baked; thus, **black-** containing manganese. **zinc-** containing zinc salts (yellow and green shades).

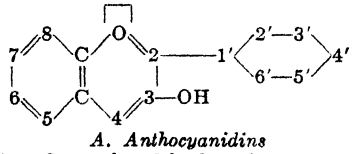
flash-light. A mixture of combustible solids used in photography; as, magnesium powder.

flash point. The lowest temperature at which the vapors of a liquid may be ignited momentarily. It is a constant of oils. Cf. *auto-ignition.* **f.** *firepoint.* **f. tester.** A device for heating substances gradually to the temperature at which spontaneous combustion of their vapors occurs; used in the analysis of oils.

flash spectrum. The reversal of the Fraunhofer lines of the solar spectrum in the form of a bright line spectrum, immediately before a total eclipse.

flask. A glass, metal, paraffin, or rubber receptacle or vessel for holding solids, liquids, or gases. **Aberhalden-** A small glass vessel intermediate in shape between a beaker and an erlenmeyer. **acetylation-** A small pear-shaped flask used in menthol determinations. **assay-** A conical glass beaker used for precipitation. **boiling-** A spherical glass vessel with long neck. **delivery-** A f. graduated to deliver a specified volume of liquid as distinct from a f. containing this volume. Cf. *volumetric* **f. Dewar-** Vacuum flask, with side tube in its neck. **erlenmeyer-** A conical-shaped flask with narrow neck and wide flat bottom. **filtering-** An erlenmeyer flask with heavy walls and side

FLAVANOLS



A. Anthocyanidins

f. = flavanol or 3-hydroxybenzopyran

pelargonidin	5.7.4′-trihydroxy-*f.*
fisetinidin	7.3′.4′-trihydroxy-*f.*
cyanidin	5.7.3′.4′-tetrahydroxy-*f,*
delphinidin	5.7.3′.4′.5′-pentahydroxy-*f.*
peonidin	3′-methoxy-5.7.4′-trihydroxy-*f,*
oenidin	3′.4′-dimethoxy-5.7.5′-trihydroxy-*f,*
hirsutidin	3′.5′-dimethoxy-5.7.4′-trihydroxy-*f,*
myrtillidin	7-methoxy-5.3′.4′.5′-tetrahydroxy-*f,*

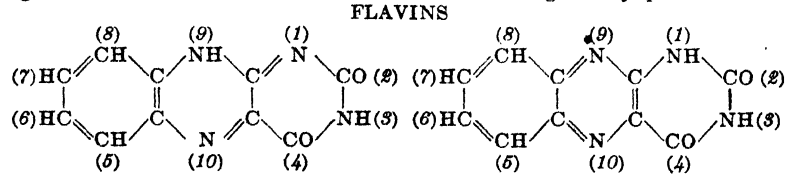
B. Anthocyanins

c. = cyanidin or tetrahydroxy-*f.*

p. = pelargonidin or trihydroxy-*f.*

chrysanthemin	3-glucosidyl-*c.*
pelargonenin	5-glucosidyl-*p.*
oxycoccincyanin	3′-methoxy-3-glucosidyl-*c.*
oenin	3-glucosidyl-oenidin 3-galactosidyl-*c.*
pelargonin	3.5′-diglucosidyl-*p.*

FLAVINS



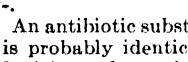
flavin or isoalloxazine — alloxazin

lumilacto flavin	*6.7.9*-trimethyl-flavin
lumichrome	*6.7*-dimethyl-alloxazin
lactoflavin	*6.7*-dimethyl-*9*(*2′.3′.4′*-trihydroxy propyl) flavin.

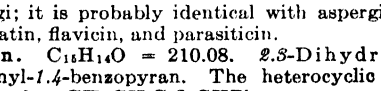
tube. **mercury-** The commercial unit of measurement of mercury; equivalent to 75 pounds. **silica-** A flask made of semi-opaque silica. **vacuum-** Dewar vessel. A double-walled glass vessel of various shapes; used for holding liquefied gases. **volumetric-** A flask with long graduated neck. **Wurtz-** Distillation f-.

flavacidin. An antibiotic substance obtained from fungi; it is probably identical with aspergillin, flavatin, flavicin, and parasiticin.

flavan. $C_{15}H_{14}O$ = 210.08. *2.3*-Dihydro-*2*-phenyl-*1.4*-benzopyran. The heterocyclic hydrocarbon



flavaniline. $C_{16}H_{14}N_2$ = 234.28. α-aminophenyl-γ-methylquinoline, *2*-(*p*-aminophenyl) lepidine.

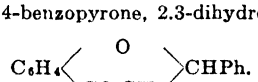


Colorless, long prisms, m.97, insoluble in water, soluble in alcohol, ether or benzene.

flavanol. $C_{15}H_{10}O_3$ = 238.1. 3-hydroxy-flavone, Yellow needles, m.170, soluble in alcohol.

flavanols. A group of vegetable dyes derived from flavonol (see table).

flavanone. $C_{15}H_{12}O_2$ = 224.09. 2.3-dihydro-2-phenyl-1.4-benzopyrone, 2.3-dihydro flavone,



flavatin. See *flavacidin.*

flavazine. $C_{16}H_{13}N_4O_4SNa$. The sodium salt of *1*-*p*-sulfophenyl methyl-*4*-phenyl-diazonium-*5*-pyrazolone, used as a yellow acid dye.

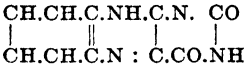
flaveanhydride. $C_2H_2N_2S$ = 86.2. Cyanogen monosulphydrate, $NC.CS.NH_2$.

flavianic acid. $C_{10}H_6N_2O_8S$ = 314.0. *2.4*-dinitro-*1*-naphthol-*7*-sulfonic acid. Yellow crystals, used in the separation of amines.

flavicid. $C_{18}H_{22}N_3Cl$ = 315.5. *2.7*-Dimethyl-*3*-dimethylamino-*6*-amino-*10*-methyl acridinium chloride. A reddish-brown, water-soluble powder, used as antiseptic.

flavicin. See *flavacidin.*

flavin(e). (1) $C_{10}H_6N_4O_2$ = 214.05. Isoalloxazine. The heterocyclic ketone.



(2) Quercetin. (3) One of a group of yellow plant pigments as

(a) lactoflavin, the free yellow pigment.

(b) lumiflavin, a cleavage product formed on irradiation of (a).

(c) protein flavin, united to proteins.

(d) purine flavin, united to purines.

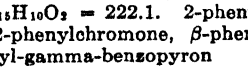
(e) carbohydrate flavin, united to carbohydrates, as in vitamin G.

flavine. (1) Acriflavine. (2) Flavin.

flavinduline. A yellow dye, 9-phenyl-9αγ-dibenzophenazonium.

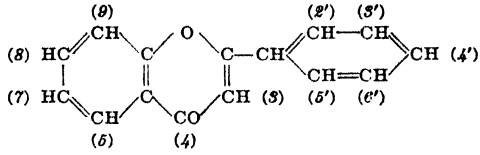
flavol. *1.3*-Anthradiol. Cf. *flavanol.*

flavone. $C_{15}H_{10}O_2$ = 222.1. 2-phenylbenzo-1.4-pyrone, 2-phenylchromone, β-phenylchromon, beta-phenyl-gamma-benzopyron



Colorless needles, m.97, insoluble in water, soluble in alcohol. It is present in many flower colors; cf. *flavones.* **dihydro-** Flavanone.

flavones. A group of vegetable coloring matters, the hydroxy or methoxy derivatives of flavone (see table). Cf. *flavylium, syringetin, anthoxanthin.*



Flavone (in *iso*-flavone the phenyl group is at 3). *h.* = hydroxyflavone; *h.i.* = hydroxy-isoflavone

flavanol	3-*h.*
chrysin	5.7-di-*h.*
daidzein	7.4-di-*h.i.*
baicalin	5.7.8-tri-*h.*
quercetin	2.3′.4′-tri-*h.*
genistein	5.7.5-tri-*h.i.*
apigenin	3.7.4-tri-*h.*
luteolin	5.7.3.4-tetra-*h.*
quercitin	3.5.7.3.4-penta-*h.*
morin	3.5.7.2′.4′-penta-*h.*
myricetin	3.5.7.3.4.5-hexa-*h.*
gossypetin	3.5.7.8.3′.4′-hexa-*h.*
quercetagin	3.4.5.6.7.3′.4′-hepta-*h.*
wogonin	7-methoxy-5.6-di-*h.*
hesperetin	4-methoxy-5.7.3-tri-*h.*
rhamnazin	7.3-dimethoxy-3.5.4-tri-*h.*
rhamnetin	7-methoxy-3.5.2.4-tetra-*h.*
Flavone-glucosides	
genistin	7-glucosidyl-genistein
daidzin	7-glucosidyl-daidzin

flavopannin. $C_{21}H_{26}O_7$ = 390.2. A monobasic acid from the root of *Aspidium athamanticum.*

flavophenine. Chrysamine. Cf. *pannol.*

flavopurin. $C_{14}H_8O_5$ = 256.13. 1.2.7-trihydroxy-anthraquinone, alizarin X, alizarin R.G., C.A., S.D.G., and I.O. A yellow powder, used as a dye.

flavopurpurin. $C_{14}H_8O_5$ = 256.13. 1.2.6-trihydroxy-anthraquinone. Yellow needles, m.459, slightly soluble in hot water, soluble in hot alcohol or ether; used as a dye.

flavoxanthin. $C_{40}H_{56}O_2$ = 584.5. A carotinoid pigment, m.184, from the petals of *Ranunculus acer.*

flavor, flavour. The taste of a substance.

flavoring agents. Any substance of a pleasant taste, used to improve the taste or odor of a drug, food or beverage. The flavor is usually due to some essential oil, *e.g.*, peppermint, cinnamon, clove, lemon extract.

flavylium. A salt derived from flavones which contains tetravalent oxygen. Cf. *anthocyanidin.*

flax. Byssus. The bast fiber of *Linum usitatissimum*, or flax plant, an annual herb about two feet high. It is grown in Europe and Egypt for the fiber, in the United States, Russia, and Argentine for the seeds (linseed oil). The unbleached flax is used for ropes, twine and coarse fabrics. The sunbleached flax or linen is used for fine linens, laces, etc., while linen rags are the stock for the highest quality of paper. **earth-** Asbestos. **mountain-** (1) A fine silky variety of asbestos. (2) The herb of *Linum catharticum*, purging flax, used as a laxative. **New Zealand-** See New Zealand *hemp.* **stone-** Asbestos.

flax seed. Linseed.

fleabane. The herb or seeds of *Erigeron Canadense*, a Compositae; used as a diuretic and tonic.

Fleischl hemometer. An optical instrument used for determining the percentage of hemoglobin in the blood, by comparing the sample with a set of pale to deep blood color glass-wedges.

Fleming tube. A glass apparatus used for the absorption of CO_2 in the determination of carbon in steel or iron.

Flemming's solution. A fixative and preservative for small organisms: 25 cc. 1 % chromic acid, 10 cc. 1 % osmic acid, 5 cc. glacial acetic acid and 60 cc. water.

Fletcher furnace. A laboratory furnace burning gas or gasoline, with or without blast; used for metallurgical, or ceramical operations. **F. burner.** A gas ring-burner.

flex. Flexible insulated copper wire, used for electrical connections.

flexibility. (1) The property of a substance of bending without breaking, *e.g.*, a lead pipe. (2) Adaptability.

flexible. Pliable, pliant, capable of being bent or twisted without breaking, *e.g.*, copper wire, lead tubing.

flexile. Flexible.

flexure. Any curved or bent portion or section.

flint. SiO_2. Flintstone. An opaque quartz found in chalk stone, and resembling chalcedony. Used in the ceramic and glass industries, and for road-making. **f. brick.** A brick made of powdered flint; used as a fire-brick. **f. glass.** Potash-lead glass. A highly refractive and easily fusible glass; used in optical instruments (prisms, lenses) and for chemical apparatus (tubing). **f. stone.** Flint.

float. A buoyant, sealed glass tube used in burettes for easier and more accurate reading. **f. stone.** A light, porous quartz that floats on water.

floats. A finely-ground phosphate rock, used as fertilizer.

floccose. A growth of bacteria characterized by short, curved chains, resembling wool threads.

flocculation. The coagulation or coalescence of a finely-divided precipitate.

flocculent. Woolly or cloudy, flake-like, and non-crystalline, *e.g.*, a liquid containing irregularly shaped particles. In bacteriology, a growth of bacteria characterized by the presence of pseudo-zooglea, *e.g.*, small, adherent masses of bacteria of various shapes floating in the culture media.

flora. The plants of a region or geographical district. Cf. *fauna*.

Florence test. The formation of brown needles or plate-shaped crystals on addition of a solution of I in KI solution to semen. It is a test for spermatic fluid.

florentium. Ft. The element of atomic number 61, claimed to be discovered in 1924 by Rolla and Fernandez. Cf. *illinium*.

flores. (1) The flowers or blossoms of a plant. (2) A chemical obtained by sublimation. See *flower*. **f. martiales.** Ferriammonium chloride.

floridin. A variety of fuller's earth from Florida.

flotation. A method of concentrating ores by grinding them with a frother, (*e.g.*, oils or acids) and separating the differentially-moistened or wetted mineral particles by floating them on water, usually agitating the mixture by compressed air. The wet gangue settles, and the concentrated ore is skimmed off. Cf. *wetting, zone, Horwood process, Owen process.* **f. activator.** A reagent producing a metallic coat; as, Na_2S or $CuSO_4$. **f. collector.** An agent which increases the carrying capacity of air bubbles; as, xanthates. **f. depressor.** An agent preventing the gangue from being carried by the air bubble; as, cyanides. **f. frother.** A reagent producing a foam of stable air bubbles; as, f. oils. **f. oils.** Petroleum and wood oils; as, pine oil, tar oil, creosote, which are used to wet the metallic particles. **f. regulator.** A reagent which controls the pH value; as $Ca(OH)_2$ or H_2SO_4.

flour. Wheat flour, farina tritici. The white starchy powder made by bolting wheat. In its wider sense any powdered cereal or seed used for food. **baker's-** A second grade wheat flour. **bleaching-** See *Agene, beta-chlora* and *Golo processes*. **buckwheat-** A powder made from buckwheat. **enriched-** Plain white flour, to which vitamin concentrates and calcium salts, or a proportion of the wheat germ, have been added. **Graham-** An unbolted wheat meal. **National-** A war-time enriched f. (q.v.). **patent-** A high-grade, white, wheat meal, which has been bolted and all bran removed. **rye-** A powdered rye.

flow. The motion or passage of a fluid. Cf. *flux*. **cold-** See *cold*. **molecular-** The relative number of gas molecules which pass through a fine orifice: $Q = p_2 - p_1/(W\sqrt{\rho})$, where Q is the quantity of gas in cc. per second which flows through a tube or opening at a difference of pressure $p_2 - p_1$, while ρ is the density of the gas at 1 barye pressure (= M/83.15 + 10.6T), and W is the resistance or work overcome in passing through the orifice. For a circular opening in a thin plate: $W = 3.184/d^2$, and for a tube of length l and diameter d: $W = (2.3941/d^3) + (3.184/d^2)$. **f. sheet.** The diagrammatic representation of a works process, showing the sequence and interdependence of the successive stages.

flowers. (1) A chemical obtained by sublimation; usually a metallic oxide, as **f. of antimony** (= antimony trioxide), **f. of arsenic** (= arsenic trioxide), **f. of sulfur** (= sublimed sulfur), **f. of tin** (= stannic oxide). (2) The blossoming portion of a plant, consisting normally of a calyx (composed of the sepals), corolla (composed of the petals), and stamens and pistils. Many flowers contain anthocyanin or other coloring materials, essential oils and other odoriferous substances. The following flowers are official (U.S.P.):

Anthemis	Matricaria
Arnica	Pale rose
Calendula	Red rose
Cloves	Sambucus
Kousso	Santonica

floz. Fl. *oz.* Abbreviation for fluid ounce.

fluavil. $C_{20}H_{32}O$ = 288.3. A resinous product derived from guttapercha, m.42, soluble in alcohol.

fluctuate. To vary or move within certain limits.

fluctuation. Successive rises and falls.

flue. A channel for gases or liquids.

fluellite. $AlF_3.H_2O$ = 102.67. Hydrous aluminum fluoride occurring in orthorhombic, colorless crystals, d.2.17, hardness 3.

fluid. A form of matter that cannot permanently resist any shearing force, however small. Such forces cause flow, but fluids do not recover their shapes when it ceases. **elastic-** A gas, *e.g.*, a condition of matter in which the molecules flow

apparently without resistance. **inelastic-** A liquid, *e.g.*, a condition of matter in which the molecules move freely but are restricted by gravitation. **perfect-** A hypothetical state of matter in which the molecules yield immediately and offer no mechanical resistance, *e.g.*, flow without viscosity. **viscous-** A syrup or soft mass which flows slowly, *e.g.*, a very viscous liquid.

fluid acetextract. A solution made by extracting a drug with dilute acetic acid.

fluid-dram. A pharmaceutical measurement. 1 fl. dr. = 60 minims = 3.69661 cc. or 3.7 ml. = 0.125 fl. oz. (U. S. A.).
1 fl. dr. = 60 minims = 3.55 cc. = 0.125 fl. oz. (*British*).

fluid extract. An alcoholic solution of a drug representing the drug-weight by volume, *e.g.*, 1 gm. of the drug corresponds with 1 cc. of fluid extract. Cf. *tincture*.

fluid-friction. Viscosity.

fluid-ounces. Floz. A pharmaceutical measurement of volume:
1 fl. oz. = 29.57 cc. or 29.6 ml. = 8 fl. dr. = $\frac{1}{128}$ Am. gallons. (U. S. A.).
1 fl. oz. = 28.41 cc. = 8 fl. dr. = $\frac{1}{160}$ Imper. gallons (*British*).

fluid-wax. Liquid waxes obtained from the oils of marine animals. They consist of esters of mono-atomic alcohols, with traces of glycerides.

fluidity. The property of flowing easily, as opposed to viscosity. It is measured in ρ = rhe, the reciprocal of poise, (q.v.).

fluo- (1) A prefix indicating the presence of fluorine, *e.g.*, fluobenzene, fluoform, etc. (2) A prefix indicating the property of fluorescence, *e.g.*, fluoflavine, fluorane.

fluobenzene. C_6H_5F = 96.1. Fluorobenzene, phenyl fluoride. Colorless liquid, d.1.023, m. −41.2, b.86, soluble in alcohol.

fluobenzoic acid. $C_7H_5O_2F$ = 140.1. Fluorobenzoic, fluorbenzoic acid. Colorless rhombic crystals, m.182, soluble in alcohol, ether, or hot water.

fluoborate. A salt of fluoboric acid containing the monovalent BF_4— radical, *e.g.*, ammonium fluoborate, NH_4BF_4.

fluoboric acid. HBF_4 = 87.8. The hypothetical acid from which the fluoborates are derived.

fluocerite. $(Ce,La,Nd,Pr)_2OF_4$. A rare earth mineral containing the fluorides of the ceria-earths.

fluochromate. A salt of fluochromic acid containing the monovalent CrOF— radical

fluochromic acid. HCrOF = 88.1. A monobasic acid.

fluoflavine. $C_{14}H_{10}N_4$ = 234.1. A fluorescent substance, m.360, soluble in alcohol or ether.

fluoform. See *fluoroform*.

fluogermanate. M_2GeF_6. A salt, derived from fluogermanic acid.

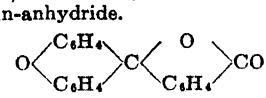
fluogermanic acid. H_2GeF_6 = 188.6. Hydrofluogermanic acid. An acid obtained by passing GeF_4 into water.

fluohydric acid. Hydrofluoric acid.

fluomethane. Fluoromethane.

fluoplumbic acid. H_2PbF_6 = 323.2. Hydrofluoplumbic acid. A white powder obtained by passing PbF_4 into water.

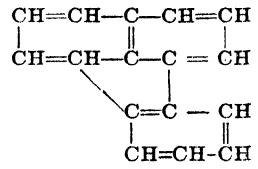
fluoran(e). $C_{20}H_{12}O_3$ = 300.20 o-phenolphthalein-anhydride.



Colorless needles, m.182, soluble in alcohol or acids. It is an intermediate in the manufacture of dyes.

fluorandiol. Fluorescein.

fluoranthene. $C_{16}H_{10}$ = 206.16. Idryl. A hydrocarbon in coal tar.



Colorless monoclinic needles, m 110, b.250, soluble in hot water, alcohol, ether, carbon disulfide or glacial acetic acid.

fluoranthraquinone. $C_{16}H_7O_2$ = 219.1. Colorless crystals, m.188, soluble in alcohol.

fluorapatite. The mineral $CaF_2.3Ca_3(PO_4)_2$. Cf. *apatite*.

fluoration. The introduction of fluorine into an organic molecule.

fluorbenzene. See *fluobenzene*.

fluorbenzoic acid. See *fluobenzoic acid*.

fluorometry. The measurement of fluorescence. Cf. *fluorescence analysis*.

fluorene. $C_{13}H_{10}$ = 166.15. α-Dipheneylenemethane. $C_6H_4\langle CH_2 \rangle C_6H_4$. Fluorescent, colorless scales, m.113, b.295, insoluble in water, soluble in alcohol, ether, carbon disulfide or benzene. It occurs in coal tar and is used in the manufacture of dyes. Its radicals are fluoryl and fluorylidene. **amino-** Fluoryl amine. **benzo-** Chrysofluorene. **chryso-** See *chrysofluorene*. **di-** See *difluorene*. **dibenzo-** q.v. **dinaphtho-** Dibenzofluorene. **naphtho-** q.v. **oxo-** Fluorenone*. ***ms*-phenyl-** Diphenylene dimethyl ethane. **picene-** q.v.

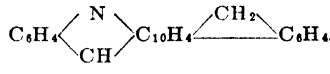
f. alcohol. $C_{13}H_{10}O$ = 182.15. Diphenylenecarbinol, fluorenol*, $C_6H_4.CHOH.C_6H_4$. Colorless crystals, m.153, soluble in alcohol. **f. carboxylic acid.** $C_{14}H_{10}O_2$ = 210.15. Diphenylene acetic acid.

fluorenic acid. $C_{14}H_{10}O_2$ = 210.08. Colorless crystals, soluble in water or alcohol.

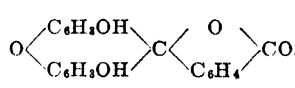
fluorenol*. Fluorene alcohol.

fluorenone*. $C_{13}H_8O$ = 180.15. Diphenyleneketone, oxofluorene, $C_6H_4\langle CO \rangle C_6H_4$. An oxidation product of fluorene. It occurs in yellow prisms, m.84, b.341, soluble in alcohol.

fluoren-naphthacridine. $C_{24}H_{15}N$ = 317.13. The heterocyclic system



fluorescein. $C_{20}H_{12}O_5$ = 332.20. Uranin A, 3.6-dihydroxyfluoran, resorcinolphthalein, resorcinphthalein, fluorandiol, dioxyfluoran.



An orange-red powder, insoluble in water, ether, or chloroform, soluble in hot alcohol, hot acetic acid, and alkalis with orange color and green fluorescence; used in the manufacture of eosin and other dyes and as an indicator: pH3.6 (yellow) to pH5.6 (fluorescent). **dihydroxy-**

Gallein. **dimethyl-** Cresorcin. **sodium-** Uranin A. **tetrabromo-** Eosin. **tetrabromodichrolo-** Phloxin. **tetraiodo-** Erythrosin.

f. paper. Zellner's paper. Paper impregnated with a solution of fluorescein in alcohol, and used as an indicator. *potassium-* Potassium fluorescein. *sodium-* Uranin.

fluorescence. The transformation of light by matter; *e.g.*, the property of certain substances to radiate, when illuminated, an unpolarized light of a different, usually greater wavelength. It may occur with solids, liquids or gases, and is due to the return of electrons displaced by the exciting radiation to a more stable position. It differs from phosphorescence, q.v., where the luminescence, q.v., continues, even after illumination has ceased. Cf. *excitation, phototropy, Raman effect, scattering, Compton effect.* **f. analysis.** The examination of substances in ultraviolet light with the object of identifying or determining them or assessing their quality or purity from the color and intensity of the f. produced. **f. microscopy.** Microscopical examination using ultraviolet instead of visible light; the structures of many objects appear fluorescent. **f. serology.** The diagnosis of disease from the f. of sera. Cf. *fluorometry.*

FLUORESCENCE OF SOLIDS

Substance	Exciting light	Reflected light	Intensity
novocaine	mercury vapor lamp	violet	20
β-naphthol		violet	19
benzidine		violet	16
sodium salicylate	ditto	pale blue	15
aniline	ditto	pale violet	12
antipyrin	ditto	pale violet	10
resorcinol	ditto	red	8

FLUORESCENCE OF SOLUTIONS

Substance	Exciting light	Reflected light
anthracene in alcohol	white	blue
eosin in water	white	yellow-green
esculin in alcohol	white	blue
fluorescein in water	white	green*
naphthalene-red in alcohol	white	red
quinine sulfate in water	white	purple
resorcin blue in water	white	red
rhodamine in water	white	green

* Recognizable in a dilution of 1 part in 2 million.

FLUORESCENCE OF GASES AND VAPORS

Substance	Temperature	Exciting light	Reflected light
iodine	10–30°C	mercury arc	greenish yellow
mercury	10–30°C	aluminum spark	blue
oxygen	10–30°C	mercury arc	ultra-violet
potassium	300–400°C	white light	red
rubidium	250–300°C	white light	red
sodium	300–400°C	white light	yellow

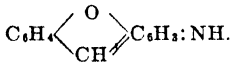
fluorescent. Epipolic. The property of having different colors by transmitted and reflected lights. **f. screen.** A glass plate covered with a fluorescent substance, *e.g.*, a tungstate or platinocyanide. Used for making visible those rays which are normally invisible to the eye. **f. unit.** The standard luminescence produced by 1 mg. radium element on 1 square centimeter of a barium platinocyanide screen. See *fluorimeter.*

fluorescin. $C_{20}H_{14}O_5$ = 334.2. A light yellow powder, insoluble in water, soluble in alcohol or ether; used as a dye. Cf. *fluorescein.*

fluoric acid. An incorrect term for hydrofluoric acid, HF. The name fluoric acid indicates the compound HFO_3, which does not exist.

fluoride. A salt of hydrofluoric acid containing the monovalent F— radical. **acid-** A salt of the type MHF_2.

fluorime. $C_{13}H_9ON$. The heterocyclic system

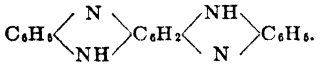


fluorimes, Compounds derived from fluorime.

fluorimeter. An absorbing screen of varying thickness or other instruments, used for measuring the intensity of fluorescence, especially the fluorescence caused by X-rays, cathode-rays and radium. See *fluorimetry.*

fluorination. The introduction of fluorine into an organic molecule.

fluorindene. $C_{16}H_{12}N_4$ = 260.3. The heterocyclic system



Substitution usually takes place on the nitrogen atoms.

fluorine. F = 19.00. An element, atomic number 9. A halogen and poisonous pale green gas, $d_{(air=1)}$.1.31, m.−233, b.−187, d. of liquid F 1.14, soluble in water, alcohol or ether. Fluorine is the most negative element, and hence even more reactive than oxygen. It has a valency of 1, and forms only one series of compounds, the fluorides; no oxysalts are known. It was discovered in 1771 by Scheele in fluorite, cryolite and other minerals, and isolated (1886) by Moissan. Liquid fluorine has a bright yellow color, and solid fluorine is colorless. Fluorine salts are of the types:

MF or M_2F_2 ..... normal fluorides
MHF_2 ..... acid fluorides.

proto- Coronium. **f. hydride.** Hydrofluoric acid. **f. iodine.** Fluoriodine. **f. oxide.** OF_2 = 54.0. A gas less active than fluorine, having the same odor, soluble in alkali, sparingly soluble in water. There also exist a brown gas, O_2F_2 = 70.0, and a colorless gas, OF = 35.0.

fluorinion. Fluorion.

fluoriodate. A compound derived from the iodates by the partial replacement of the oxygen by fluorine; as difluoriodates $R.IO_2F_2$, in which R may be potassium, sodium, ammonium, rubidium, cesium, or pyridine.

fluoriodine. F_5I = 221.8. Iodine pentafluoride. A colorless, heavy, fuming liquid, m. −8, b.97, of great chemical reactivity, decomp. by water and solvents.

fluorion. The monovalent fluorine ion, F^-.

fluorite. CaF_2 = 78.09. Fluorspar. Siliceous sinter. Native calcium fluoride, variously colored, brittle, d.3.18, hardness 4. Used as flux in the steel and glass industries and in the manufacture of hydrofluoric acid.

fluorobenzene. Fluobenzene.

fluorochrome. A substance capable of causing another substance with which it comes in contact to fluoresce.

fluoroform. CHF_3 = 70.0. Fluoform, trifluoromethane*. A colorless gas, d.2.53, $b._{40atm}$ 20, slightly soluble in water, soluble in alcohol or chloroform.

fluoroformol. A 2.8 % solution of fluoroform in water. A colorless, odorless, tasteless, nonirritant liquid. Used medicinally for the treatment of tuberculosis.

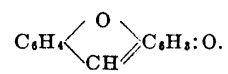
fluorogen. Fluorophore.

fluorometer. Fluorimeter.

fluoromethane. CF_4 = 88.0. Fluomethane, carbon tetrafluoride. A colorless gas formed as by-product in the manufacture of metallic aluminum from cryolite.

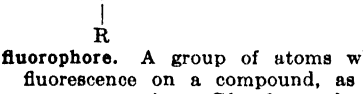
fluorometry. The measurement of the color and intensity of fluorescence (q.v.); as, in fluorescence analysis and microscopy. Cf. *fluorimetry.*

fluorone. $C_{13}H_8O_2$ = 196.06. 3-isoxanthone. The heterocyclic system



An isolog of fluorime.

fluorones. A group of compounds of the type



derived from fluorene.

fluorophore. A group of atoms which confers fluorescence on a compound, as the oxazine or pyrone ring. Cf. *chromophore, resonator, constellation.*

fluoroscope. (1) A fluorescent screen used for making visible certain rays, *e.g.*, X-rays, cathode rays, radioactive rays. (2) An apparatus to determine the fluorescence of a solution by comparison with a standard.

fluorosis. Disease (and in particular mottling of the enamel of the teeth) due to an excess of fluorine ions in the system; usually derived from drinking water.

fluorspar. Fluorite.

fluoryl. The monovalent radical, $C_{13}H_9$—, derived from fluorene. There are five isomers. **f. amine.** $C_{13}H_9NH_6$ = 181.09. Aminofluorene. White crystals, insoluble in water.

fluorylidene. The bivalent radical, $C_{13}H_8$=, derived from fluorene.

fluosilicate. Silicofluoride. A salt of the type M_2SiF_6 derived from fluosilicic acid.

fluosilicic acid. H_2SiF_6 = 144.3. Hydrofluosilicic acid, silicofluoric acid, hydrosilicofluoric acid. A strong acid which exists only in solutions, and decomposes on concentration or heating into HF and SiH_4. It forms insoluble K and Ba salts, and is obtained by the action of SiF_4 on water.

fluotitanic acid. H_2TiF_6 = 163.9. Hydrofluotitanic acid. A dibasic acid obtained by passing TiF_4 into water.

flüssigas. Calorgas.

flux. (1) A continuous flowing or discharge. See *electrical, luminous, magnetic, thermal.* (2) A substance that causes other substances to melt more readily by dissolving their oxides or surface impurities, *e.g.*, sodium carbonate, saltpeter, zinc chloride, sodium pyroborate, lead oxide, or borax. It increases the fluidity of the materials and brings them into more intimate contact. **aluminum-** A mixture of the alkali chlorides and fluorides. **black-** A flux and reducing agent used in metallurgy; a mixture of potassium carbonate and charcoal made by heating tartar. **radiant-** The amount of radiant energy (electromagnetic radiation) that flows along a beam per unit of time. **reducing-** A mixture of 50 % borax glass, 15 % boric acid, 25 % argol and 10 % animal charcoal. **oxidizing-** A mixture of 30 % borax glass, 20 % boric acid, 5 % silica, 20 % $KClO_3$ and 25 % sodium perborate. **soldering-** A mixture of 55 % borax glass, 35 % boric acid, 10 % silica or dry sodium silicate.

f. density. The radiant f. per unit area. Cf. *intensity.*

fly ash. The fine ash or flue-dust carried by the combustion products of pulverized coal plants.

foam. A heterogeneous mixture of a gaseous phase in a liquid phase, or finely-divided gas bubbles suspended in a liquid. Cf. *flotation, colloids.*

foaming. Describing a liquid which on heating or on agitation forms a surface foam.

focal. Pertaining to a focus.

focus. A point on which rays converge and produce an intensified effect. **acoustic-** The meeting point of waves reflected from a concave surface. **anterior-** A point before an optical system, which corresponds with the posterior focus. **aplanatic-** The point from which rays pass through a lens without spherical aberration. **conjugate-** The anterior and posterior foci of a lens. They are mutually convertible. **posterior-** A point behind an optical system corresponding with the anterior focus. **principal-** The point on which parallel rays passing through a lens converge. **real-** The point at which convergent rays intersect. **virtual-** The point at which rays if prolonged, would intersect one another.

focusing. The adjustment of lenses or mirrors to produce a distinct image, *e.g.*, in a photographic camera, lantern or microscope.

fodder. Dry food for domestic animals *e.g.*, hay, straw, corn.

fog. A heterogeneous mixture of a liquid phase in a gaseous phase (see *colloid, dispersed systems);* finely-divided liquid droplets suspended in a gas. **f. chamber.** Cloud chamber. A small container in which a haze is produced by sudden pressure changes. Cf. *Wilson tracks.*

fogging. (1) To cause a mist by agitating or heating a liquid in a closed container. (2) In photography, a uniform haze over the plate, due to over-exposure or light leakage.

foil. A thin sheet of metal, *e.g.*, of aluminum, gold, platinum, tin.

folia. Latin for leaves.

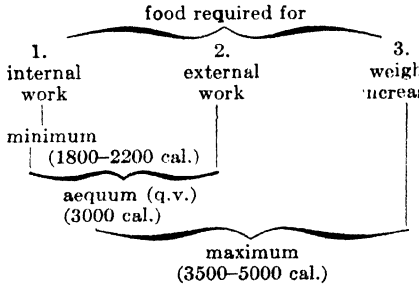
folic acid. A probable B-vitamin present in green leaves and animal tissues, and important in yeast nutrition.

Folin, Otto. 1867–1934. An American biochemist born in Sweden, noted for devising analytical methods and apparatus, particularly for the determination of uric acid and its constituents. **F. apparatus.** A glass apparatus consisting of a specially-designed absorption tube, a cylinder with a rubber stopper, drying tube and bottle; is used for the rapid determination of nitrogen. urea, or ammonia in urine or other fluids. **F. diet.** A daily food ration consisting of 500 cc. milk, 300 cc. cream, 450 gm. eggs, 200 gm. Horlick's malted milk, 20 gm. sugar, 6 gm. salt, and 2100 cc. water.

folliculin. Oestrone.

fongisterol. $C_{28}H_{40}O.H_2O$ = 382.39. Fungisterol. A sterol (q.v.), m.144, from ergot.

food. A substance which serves to build up tissues, repair waste, and supply living organisms with heat. The essential constituents are: Water, carbohydrates (starch, glucose, etc.), fats, proteins (albumins, etc.), salts vitamins. The food essential for the human body is expressed as follows:



The approximate daily quantity for a person of 70 kg. body weight is:

120 gm. proteins	(430 calories)
500 gm. carbohydrates	(2000 calories)
50 gm. fat	(450 calories)

with a daily mineral requirement of:

10	gm. NaCl	0.35 gm.	Mg
3	gm. K	0.015 gm.	I
1.50	gm. Mn	0.010 gm.	Fe
1.30	gm. P	0.002 gm.	Cu
0.7	gm. Ca	traces of	Zn, Al, Si, F

in addition, vitamins, q.v.:

A	200 Int. Units	(0.004 gm. haliver oil)
B	200 Int. Units	(20 gm. dried yeast)
C	400 Int. Units	(40 cc. lemon juice)
D	1100 Int. Units	(0.1 gm. haliver oil)
G	450 Sherman Units	(30 gm. dried yeast)
E	doubtful.	

See also *f. sources.*

animal- A nourishing material derived from animals; as, meats, fish, milk, eggs, cod liver oil, etc. **flesh-forming-** The proteins and salts necessary as tissue builders. **heat-forming-** The carbohydrates and fats which supply the body-heat. **iron-** F. containing iron. The iron percentage varies from 0.01921 % (parsley) to 0.00015 % (lemon). **nitrogenous-** The proteins, lecithins, and other foods containing nitrogen. **non-nitrogenous-** The carbohydrates and salts. **protective-** F. which supply calcium, vitamin A, C, and G (milk, cheese, and green vegetables), in which common diets are often deficient. **staple-** F. which are most frequently used; as, bread, bacon, rice, etc. **vegetable-** Nourishing materials derived from plants; *e.g.*, cereals or seeds, nuts, vegetables, fruits, sugars.

f. and drug act. A legislative measure in force in the U. S. A. since Jan. 1, 1907 and in Great Britain since 1860, prohibiting the manufacture, sale, or transportation of adulterated, misbranded, poisonous, or deleterious foods, drugs, medicines, or liquors. **f. hormones.** Vitamins. **f. poisons.** Toxic substances developed by decomposition of foods, especially ptomaines and other protein split-products. **f. sources:**

1. CEREALS—the seeds of Gramineae; rich in carbohydrates.
   - *Avena sativa* ..... oats
   - *Fagopyrum esculentum* .. buckwheat
   - *Hordeum vulgare* ..... barley
   - *Oryza sativa* ..... rice
   - *Panicum miliaceum* ..... millet
   - *Secale cereale* ..... rye
   - *Triticum sativum* ..... wheat
   - *Zea Mays* ..... maize, corn
2. PULSES—the seeds of Leguminosae; rich in proteins.
   - *Arachis hypogaea* ..... peanut
   - *Cajanus indicus* ..... cowpea
   - *Glycine* species ..... soya bean
   - *Lathyrus* species ..... peas
   - *Lens esculenta* ..... lentils
   - *Phaseolus vulgaris* ..... kidney beans
   - *Phaseolus lunatus* ..... Lima beans
   - *Pisum sativum* ..... peas
   - *Vicia gaba* ..... broad beans
3. NUTS—the oily seeds of various plants; rich in fats.
   - *Bertholletia excelsa* ..... brazilnut
   - *Carya* species ..... pecan
   - *Castanea vulgaris* ..... chestnut
   - *Cocos nucifera* ..... coconut
   - *Corylus Avellana* ..... hazelnut
   - *Juglans regia* ..... walnut
   - *Juglans cinerea* ..... butternut
   - *Pistacia vera* ..... pistachio
4. ROOTS and TUBERS—the underground reserves of certain plants; generally rich in carbohydrates.
   - *Allium cepa* ..... onion
   - *Beta vulgaris* ..... beets
   - *Brassica campestris* ..... turnips
   - *Colocasia antiquorum* ... taro
   - *Daucus carrota* ..... carrots
   - *Dioscorea* species ..... yam
   - *Helianthus tuberosus* .... Jerusalem artichoke
   - *Ipomoea batatas* ..... sweet potato
   - *Manihot utilissima* ..... cassava
   - *Maranta arundinacea* ... arrowroot
   - *Peucedanum sativum* .... parsnip
   - *Raphanus sativus* ..... radish
   - *Solanum tuberosum* ..... potato
5. GREEN VEGETABLES—the leaves, inflorescences, stems and young shoots of certain plants; generally containing vitamins and salts.
   - *Allium sativum* ..... garlic
   - *Apium graveolens* ..... celery
   - *Asparagus officinalis* .... asparagus
   - *Bambusa* species ..... bamboo sprouts
   - *Brassica oleracea* ..... cabbage, cauliflower
   - *Cynara scolymus* ..... artichoke
   - *Lactuca sativa* ..... lettuce

Lepidium sativum..... cress
Rheum Rhaponticum.... rhubarb
Spinacia oleracea..... spinach

6. FRUITS used as VEGETABLES—the fleshy fruits of various plants:
Artocarpus incisa..... breadfruit
Cucumis sativus..... cucumber
Cucurbito Pepo..... squash, pumpkin
Solanum lycopersicum.. tomato
Solanum melongena..... eggplant

7. FRUITS and BERRIES; generally containing acids, sugars and salts;
Ananas sativus..... pineapple
Citrus species..... orange, lemon
Cucumis melo..... melon
Ficus carica..... fig
Fragaria vesca..... strawberry
Magnifera indica..... mango
Musa sapientum ..... banana
Phoenix dactilyfera..... date
Prunus species..... apricot, cherry, peach, plum, prune, nectarine
Psidium guajava..... guava
Punica granatum..... pomegranate
Pyrus species..... apple, pear
Ribes species..... black and red currant, gooseberry
Rubus species..... blackberry, loganberry, raspberry, thimbleberry
Vaccinium species..... cranberry, bilberry, blue huckleberry
Vitis vinifera..... grapes.

8. MEAT and FISH; rich in proteins.
Beef, Veal, Mutton, Pork
Chicken, Goose, Turkey
Mackerel, Salmon, Tuna, Herring

9. DAIRY PRODUCTS; rich in calcium and vitamins
Milk, Cream, Buttermilk
Eggs
Butter, Cheese

10. MISCELLANEOUS
Mushrooms and Yeast
Honey, Sugar, Maple syrup
Sago, Tapioca
Spices and Condiments.

foot. A unit of length, 1 foot = 12 inches = 0.304801 meter. **board-** q.v. **square-** Sq. ft. or ft^2. A measure of area. 1 $ft.^2$ = 144 $in.^2$ = 0.092903 $m.^2$ = 929.03 cm^2. **cubic-** Cb. ft. or ft^3. A measure of volume. 1 $ft.^3$ = 1728 $in.^3$ = 0.02832 $m.^3$ = 2832 cm^3.

foot-candle. A measure of illumination: 1 ft. candle = 1 lumen per $ft.^2$ = the illumination given by a standard candle upon a surface of 1 sq. ft. one foot distant. 1 ft. candle = 1.076 milliphots = 10.76 lux. Cf. *meter candle.*

foot-pound. A unit of work in the F.P.S. system; the work required to lift one pound one foot, where g = 32.2 ft./$sec.^2$ 1 ft. pd. = 0.1383 kg. m. = 1.356 joules = 0.3240 calories = 0.001285 British thermal units = 0.3766×10^{-6} kilowatt hours. 1 horse power = 33,000 ft. pds. of work/min. **f.p. second.** F.P.S. system. A system of measurements based upon the foot, pound, and second. Cf. *c.g.s., system, M.K.H. system.*

foot-poundal. A unit of force in the F.P.S. system; the force which during one second will accelerate a mass of one pound one foot per second = poundal.

foot-powder. A mixture of fine salicylic acid and French chalk, used as an antiseptic dusting powder.

foots. The sediment which settles from an oil on standing. It is chiefly albuminous matter.

forbesite. A rare nickel-cobalt arsenate.

forbidden explosives. A group of unstable chemicals and mixtures which may not normally be transported or shipped, and which are condemned by the U. S. Bureau of Explosives. They include liquid nitroglycerin, dynamite containing over 60 % nitroglycerin, nitrocellulose dry and uncompressed in quantity greater than 10 pounds, and dry mercury fulminate. **f. lines.** Spectrum lines corresponding with atomic transitions not in harmony with Pauli's principle.

force. The rate of change of momentum. The interaction between two bodies whereby their state of rest or motion, or their form or size is changed. Cf. *attraction, repulsion, acceleration, electromotive force, energy, action.* The unit of force is the dyne (C.G.S. system) or poundal (F.P.S. system). Force = (Mass × Velocity) / Time = Mass × (Velocity / Time) = Mass × Acceleration. Suggested classification of forces (P. E. Wells):

1. *Electronic*, which bind electrons together into atoms.
2. *Atomic*, which bind atoms together into molecules.
3. *Molecular*, which bind molecules together into masses.
4. *Molar*, which affect masses; as, gravitation.

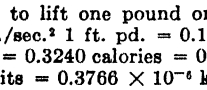
catabiotic- The heat energy derived by a living organism from food. **catalytic-** The chemical work performed by a catalyst. **centrifugal-** See *centrifugal.* **chemical-** See *affinity.* **cohesive-** See *cohesion.* **electromotive-** See *electromotive force.* **kinetic-** See *kinetic energy.* **latent-** See *latent energy.* **living-** See *vital force.* **vital-** The energy obtainable from a living organism or cell.

forceps. A small V-shaped instrument for grasping, pulling or holding objects such as analytical weights. Cf. *tongs.*

forensic. Pertaining to courts of law. **f. analysis.** Chemical analysis performed for the purpose of detecting crime, especially the examination of body-fluids and tissues for poisons. **f. chemistry.** Legal chemistry, judicial chemistry. The application of c. for purposes of law, e.g. detection of crime, misbranding and adulteration. **f. medicine.** See *medicine.*

forgenin. $C_5H_{13}O_2N$ = 119.1. Tetramethylammonium formate. $HCOONMe_4$. Colorless hygroscopic crystals, used medicinally. In small doses it stimulates; in large doses it acts like curare.

forked chain. A chain of carbon atoms linked together with two smaller chains;

as,  . Cf. *branched chain.*

formal. (1) $C_3H_8O_2$ = 60.1. Methylal, dimethoxymethane*, methylene dimethylate, methyl aldehyde, formyl aldehyde, oxymethylene, methylene dimethyl ether. $CH_2(OMe)_2$. A colorless liquid, used medicinally as an anesthetic and hypnotic. (2) Containing one gram-molecular weight in 1 liter; cf. *molar* (in 1000 cc.), and *molal* (in 1000 gm.).

formaldehyde. CH_2O = 30.03. Formic aldehyde, methanal*, methylene oxide. The simplest aldehyde H.CHO, derived from methanol.

A colorless gas, m. −92, b. −21, soluble in water, alcohol or ether; marketed as an aqueous solution. **f. solution.** A 37 % aqueous solution of formaldehyde. A clear colorless liquid with a characteristic odor. Used extensively as a reagent, preservative, (not for foods), embalming agent, antiseptic, and deodorant; industrially in large quantities in the synthesis of many substances; and in for the formation of plastic, *e.g.*, bakelite.

formalin. A 27 % (U. S.) or 40 % (British) formaldehyde solution.

formaldoxime. CH_3ON = 45.1. The simplest oxime, $H_2C{:}NOH$. A colorless liquid, b.84.

formaloin. $CH_2{:}C_{17}H_{16}O_7$. A condensation product of formaldehyde and aloin. A yellow, amorphous, tasteless powder, soluble in water; used medicinally.

formamide. CH_3ON = 45.1. Formic acid amide, formyl amine, methanamide*, $H.CO.NH_2$. A colorless hygroscopic liquid, d.1.337, m.4, $b._{10mm}$ 105–106, soluble in water, alcohol, or ether; decomp. into NH_3 and CO by heating. **ethyl-** C_3H_7ON = 73.1. A colorless liquid, b.199. **allyl-** C_4H_7ON = 85.1. A colorless liquid, b.109. **phenyl-** Formanilide.

formamides. A compound containing the monovalent HCONH— radical.

formamidine. A compound containing the bivalent —N:CH.NH— radical. **diphenyl-** $C_{13}H_{12}N_2$ = 196.2. Methenyldiphenyldiamine. PhN:CH.NHPh. Colorless crystals, m.135. **o-phenylene-** Benzimidazole.

formamido. (1) The monovalent radical, H.CO.NH—, derived from formamide. (2) CH_4N_2 = 44.05. $HN{:}CH.NH_2$.

formamine. Hexamethylenetetramine.

formamyl. Amide group. The $—CONH_2$ radical, the presence of which confers weakly basic properties.

Formanek's indicator. Alizarin green, dihydroxydinaphthazoxonium sulfonate. A green oxazine dye, used as an indicator: pH 0.3 = violet; pH 1.0 = pink; pH 12.0 = yellow; pH 14.0 = brown.

formanilide. C_7H_7ON = 121.14. Phenylformamide, formylaniline, formamidobenzene, carbanil aldehyde. Colorless or slightly yellow prisms, d.1.144, m.50, b.271, soluble in water, alcohol, glycerin or oils; used medicinally as an antiseptic. **thio-** Thioformanilide.

formate. Formiate. A compound containing the monovalent H.COO— radical, *i.e.*, a salt of formic acid.

formation. (1) The process of being made. (2) A geologic era, q.v. **heat of-** See *heat.*

formazyl. (1) $C_{13}H_{12}N_4$ = 224.2. Formazylhydride. Ph.N:N.CH:N.NH.Ph. Colorless crystals, m.116. (2) The monovalent radical $PhN{:}N\diagdown$ $PhNH.N\diagup C—$. **f. carboxylic acid.** $C_{14}H_{12}O_2N_4$ = 268.4. PhN:N.C(COOH):N.NHPh. Colorless crystals, m.162. **f. hydride.** Formasyl. **f. methylketone.** $C_{15}H_{14}ON_4$ = 266.4. PhN:N.C(COMe):N.NHPh. Colorless crystals, m.134.

formhydroxamic acid. The theoretical compound H.CO.NH.OH.

formiate. Formate.

formic acid. CH_2O_2 = 46.03. Formylic acid, methanoic acid*, aminic acid, methane acid. A monobasic acid, the first member of the aliphatic series, HCOOH. A colorless liquid, $d_{20°}$.1.218, m.8.6, b.100.8, miscible with water, alcohol, or ether. It is contained in the bodies of ants, spiders, and various plants; used as a reagent for detecting nitrates in water and in the analysis of essential oils. **acetyl-** Pyruvic acid. **amidobenzoyl-** Isatic acid. **amino-** Carbamic acid. **benzoyl-** Benzoylformic acid. **carbamyl-** Oxamic acid. **carbobenzoyl-** Phthalonic acid. **formyl-** Glyoxylic acid. **hydrazino-** Carbazic acid. **hydrazobis-** Bicarbamic acid. **hydroxy-** Carbonic acid. **formyl-** Glyoxylic acid. **phenyl-** Benzoic acid. **styryl-** Cinnamic acid. **f. aldehyde.** Formaldehyde. **f. nitrile.** Hydrocyanic acid.

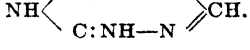
formin. The glycerol esters of formic acid:

monoformin	$C_3H_5(OH)_2OOCH$
diformin	$C_3H_5(OH)(OOCH)_2$
triformin	$C_3H_5(OOCH)_3$.

bromoethyl- Bromalin.

formine. Hexamethyleneamine. **f. salicylate.** Saliformin.

formoguanine. $C_3H_5N_5$ = 111.1. Diamidocyanidine.



formohydrazide*. Formyl hydrazine.

formol. A commercial antiseptic consisting of a solution of formaldehyde in methanol and water. **f. nitrogen.** That part of nitrogen in the protein molecule which combines with formaldehyde, *e.g.*, the nitrogen of unsubstituted amino groups. **f. titration.** A method for the determination of aminoacids by titration with an alkali, after formaldehyde has been added to annul the alkalinity of the amino group.

formolide. A commercial antiseptic; an aqueous solution containing 15 % alcohol, 2 % boric acid, 0.5 % sodium benzoate, and 0.25 % formaldehyde.

formonitrile. Hydrocyanic acid.

formonitrolic acid. CH_2O_3N = 90.03. Methylnitrolic acid, nitroformoxime. $HC\langle^{NOH}_{NO_2}$. Colorless crystals, m.64, very soluble in water, alcohol or ether. Cf. *nitrolic acid.*

formose. i-Fructose.

formosul. Rongalite (q.v.), a condensation product of formaldehyde and phenols.

formoxime. CH_3NO = 45.03. Formaldoxime, formaldehyde oxime, HCH:NOH. A colorless liquid, b.84, decomp. in hot water. **nitro-** Formonitrolic acid.

formoxyl. *Formyl.* **f. hydride.** Formic acid.

formoyl. Methanoyl. The H.COO— group.

formula. A combination of chemical symbols expressing the composition of a molecule. All formulae indicate: (a) the kind of elements and the number of atoms which constitute the molecule; (b) the weight relations of these elements and the molecular weight of the compound; (c) the percentage by weight of the elements composing the molecule; (d) the valency of the elements. In addition formulae for gases or vapors indicate: (e) the volume relation of gaseous constituents; (f) the specific gravity or density of the gas or vapor; (g) the weight of one liter gas or vapor; (h) the volume occupied by one gram of gas or vapor. Thus, chemical formula H_2O means: (a) a molecule of water consists of two atoms of hydrogen

and one atom of oxygen, making three atoms in the molecule; (b) the molecular weight is the sum of the atomic weights, hence $2 \times 1.0 + 16.0 = 18.0$. (c) The percentage composition by weight is calculated from (b); thus in 18 parts by weight water are 2 parts hydrogen, hence 18:2::100:x, or $(2 \times 100)/18 = 11.11$ % hydrogen by weight; and in 18 parts water are 16 parts oxygen, hence 18:16::100:x, or $(16 \times 100)/18 = 88.89$ % oxygen by weight. (d) The valence of hydrogen is +1, hence two atoms, or +2 are the equivalent of oxygen, whose valency is −2. (e) Two volumes hydrogen and one volume oxygen combine to give two volumes water (vapor). (f) The density of water vapor is: (1) compared with oxygen, the molecular weight, hence—$D_{(O_2=32)} = 18.00$; (2) compared with hydrogen, one-half of the molecular weight, hence—$D_{(H_2=1)} = 9.00$; (3) compared with air the molecular weight divided by 28.95, hence—$D_{(air=1)} = 0.622$. Water vapor is thus about half as heavy as oxygen gas or air and nine times heavier than hydrogen. (g) A gram-molecule of any gas or vapor occupies 22.4 liters, hence 22.4 liters water vapor weigh 18 grams, and 1 liter weighs 18/22.4 = 0.803 grams. (h) As 18 grams of water vapor occupy 22.4 liters, then 1 gram will occupy 22.4/18 = 1.245 liters.

FORMULA SIGNS

. = Periods are used to separate radicals ($CH_3.COOH$), the constituents of a double salt ($KCl.PtCl_3$), or the water of crystallization ($CuCl_2.6H_2O$).

, = Commas are used in a formula to indicate elements which are interchangeable: (Ni,Fe)AsS means FeAsS and NiAsS in variable proportion; or to separate water of crystallization *e.g.*, $FeSO_4, 7H_2O$.

( ) = Parentheses are used to group elements together, or to indicate radicals, *e.g.* $(NH_4)_2SO_4$ or $Cu_2(SO_4)_2$.

· + = Plus-signs or upper dots indicate positive charge or cation, K^+ or NH_4^-.

′ − = Minus-signs (vertical or horizontal) indicate a negative charge or anion, Cl^- or SO_4''.

→ = Arrows indicate direction of the reaction.

⇋ or ⇌ = Indicate equilibrium or a tendency to react.

* = asterisk indicates (a) an excited atom or molecule, as, Cl* or Cl_2*; or (b) a name recommended by the International Union of Chemistry.

] = Square brackets are used in addition to parentheses, *e.g.* $Fe_4[Fe(CN)_6]_3$ to indicate radicals; or in coordination formulae, to show the relationship to the central atom.

1, 2, . . . = *Numeral behind* the symbol or parenthesis is a multiplier for the preceding symbol; *numeral before* a formula is a multiplier of the whole formula. Thus $2Al_2(SO_4)_3.6H_2O$ means two molecules of crystalline aluminum sulfate each containing 6 molecules of water of crystallization.

$A^{1,2,3}$ . . . = *Small upper numerals* behind the symbol of an element indicate the isotopic weight.

$_{1,2,3}$ . . . A = *Small lower numerals* before the symbol of an element indicate the atomic number; thus, $_1H^2$, $_3Li^6$ etc.

M, X = Letters such as M or X indicate a metal or halogen. For other abbreviations (not symbols), see *radicals*.

— or = or ≡ = Lines or dots either single,
. or : or ⁝ = double, or triple, indicate valence bonds in a structural formula.

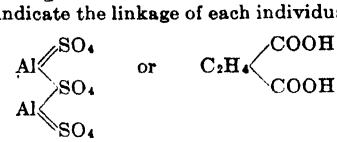
: = Dots which indicate electron pairs, in the octet formula.

—o— = Lines and circles to indicate the position of shared electron pairs in the polarity formula.

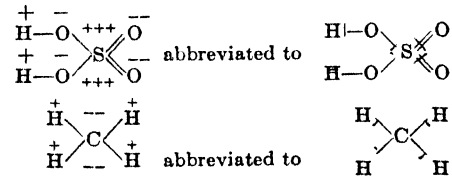
abbreviated- An abbreviation of radicals, thus Am for ammonium, Ac for acetyl, Bz for benzyl, Cy for cyanide, Et for ethyl, Me for methyl, Ph for phenyl. **atomic-Structural-.** **Beckmann's-** See *Beckmann's reaction.* **coordinate-** An expression indicating the relation of complex compounds to a central atom, thus

$$\left[\begin{matrix} NH_3 . & . NH_3 \\ NH_3 . Co . & NH_3 \\ NH_3 . & . Cl \end{matrix}\right] Cl_2$$

shows that two of the chloride atoms are less firmly held by the cobalt atom, and can readily be separated from it. **constitutional-** A notation indicating constitution by valence bonds or the linkage between radicals and atoms; it does not indicate the linkage of each individual atom:



dynamic- See *benzene ring* (figs. k′ and k″) **electronic-** A notation that indicates the electropositive or electronegative character of an atom in a compound, as

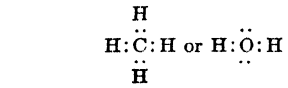


empirical- A notation showing the number and kind of atoms without indicating their grouping:

$Al_2S_3O_{12}$ or $C_4H_6O_4$

excitation- See *excitation.* **general-** An algebraic expression representing the formula of a series of compounds; thus, $M_2X(SO_4)_2.12H_2O$ is the general equation for the alums, in which M may be any monovalent metal, and X any trivalent metal. C_nH_{2n-2} is the general equation for the methane series. **graphic-** Diagrammatic. A f. showing space relations; as, a tetrahedron

for carbon. Cf. *structure, symbol.* **ionic-** The symbol for an electrically charged atom or radical, as Na^+ or NH_4^-. **molecular-** A formula for a complex compound indicating the participating molecules; thus $NH_3.HCl$ is the molecular equation for NH_4Cl. **octet-** A f. showing the number of electrons; as



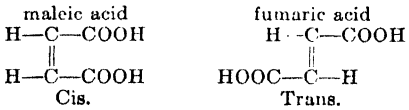
Cf. *Lewis-Langmuir theory.* **polar-** Octet-. **polarity-** A f. which indicates the relative position of the electron pairs held in common between two atoms:

C—o—C and C—o—O

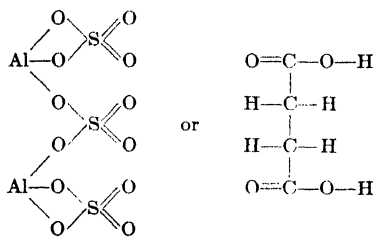
or

C—:—C and C—:—O

rational- A formula indicating, by the use of radicals the intra-atomic arrangement, thus $Al_2(SO_4)_3$ or $C_2H_4(COOH)_2$. **shorthand-** See *structure symbol.* **space-** Stereometric-. **stereochemic-** Stereometric-. **stereometric-** A diagram depicting the arrangement of atoms in an optically-active compound, *e.g.*,



structural- A notation indicating the spatial structure of a compound and the linkage of every atom, thus



Cf. *molecular diagram.* **symbolic-** Structure symbol. **transmutation-** See *equation.*

formula-symbol. Structure symbol.

formula-weight. The molecular weight expressed in grams,—one mol.

formulary. A collection of recipes and prescriptions. Cf. *dispensatory.*

formvar. Trade name for a polyvinyl formaldehyde plastic.

formyl. (1) The monovalent HCO— radical, derived from formaldehyde or formic acid. (2) An obsolete term for methenyl, HC≡. **f. acetic acid** $C_3H_4O_3$ = 88.0. $CHO.CH_2.COOH$. **f. aldehyde.** Formaldehyde. **f. amide.** Formamide. **f. bromide.** Bromoform. **f. chloride.** Chloroform. **f. diphenylamine.** $C_{13}H_{11}ON$ = 197.2. Colorless crystals, m.73, insoluble in water, soluble in alcohol. **f. hydrazine.** CH_4ON_2 = 60.1. Formohydrazide*. $NH_2.NH.CHO$. Colorless crystals, m.54, soluble in alcohol. *di*-$C_2H_4O_2N_2$ = 88.1. Colorless crystals, m.106, soluble in alcohol. **f. sulfaldehyde.** $C_3H_6S_3$ = 138.2. $CH_2SH.CH_2.CSSH$. Colorless, tetragonal prisms, m.218, sparingly soluble in water, slightly soluble in alcohol or ether. **f. trichloride.** Chloroform. **f. triiodide.** Iodoform.

formylation. The introduction of the formyl radical into an organic compound.

formylene. Methenyl.

formylic acid. Formic acid.

forsterite. Mg_2SiO_4. A white orthorhombic magnesium silicate of the olivine group, containing iron oxide; d.3.2–3.3, hardness 7.

fortified. Strengthened. **f. wine.** (1) Wine to which a fermentable sugar has been added. (2) Wine to which alcohol or wine brandy has been added.

fortoin. $CH_2(C_{14}H_{11}O_4)_2$ = 500.3. Methylene dicotoin. Yellow needles or powder of faint cinnamon-like odor, m.211, insoluble in water, soluble in alcohol, ether, acetone, or chloroform. Used medicinally as an antiseptic and astringent.

fossil. Traces or remains of prehistoric organisms imprinted or entombed in geological formations.

fossil copal. See *copals.*

fossilin. Vaselin.

Foster tester. An apparatus for determining the flash point of illuminating oils.

foto- Photo-.

fotosensin. A condensation product of phthalic acid and resorcinol, with small amounts of Cu and Fe, used to sensitize plant growth.

fouadin. Fuadin.

Foucault. Jean Bernard Léon. 1819–1868. A French physicist. **F. current.** Eddy current. **F. pendulum.** A Galileo pendulum. **F. prism.** A polarizing prism using a thin film of air for reflection. Cf. *Nicol prism.*

Fourneau 309. A complex urea compound, used as a cure for sleeping sickness.

Fowler solution. An aromatic solution of potassium arsenite (1 % arsenic trioxide); used medicinally as an antiseptic, and technically in the preservation of furs.

fowlerite. $(Mn,Fe,Ca,Zn,Mg)SiO_3$. A red, brownish or yellowish triclinic iron-manganese silicate, d.3.4–3.7, hardness 5–6.5.

Fowler's series. The lines of the helium spectrum. $1/\lambda = 4N\left(\frac{1}{3^2} - \frac{1}{n_2^2}\right)$, where n_2 is 4, 5, 6; λ the wavelength and N a constant.

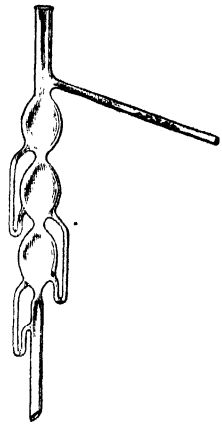
foxglove. See *digitalis.*

foyaite. A nepheline syelite found in Portugal.

F.P.S. Abbreviation for foot-pound system, q.v.

fraction. A part or separated portion of a whole.

fractional. Pertaining to separated parts. **f. column.** Dephlegmator. Same as f. distilling tubes. **f. combustion.** A method of separating gas mixtures by removing one constituent by combustion. **f. condensation.** A method of separating gases in a mixture by lowering the temperature or increasing the pressure until one of the gases liquefies. **f. condensing tube.** An air-cooled vertical condenser tube



Fractional distilling tube.

of varied shape used in fractional distillation to promote condensation. **f. crystallization.** A method for separating or purifying compounds in solution by successive slow crystallizations, the mother liquor being removed for further crystallization. **f. distillation.** A method of separating volatile substances by collecting separately the distillates evaporating at certain temperatures. **f. distilling tube.** A group of variously shaped glass tubes which are used for collecting the distillates at different temperatures separately (see figure.) **f. expression.** The collection of plant oils or juices expressed at different temperatures, *e.g.*, peanut oil. Usually the lower the temperature, the better the grade of oil. **f. filtration.** The filtration of solutions consecutively through coarse, medium, and fine filters. **f. precipitation.** Salting out. **f. weights.** The analytical weights less than one gram.

fractionating. Separating into parts. **f. column.** Dephlegmator. A device for fractional distillation. Cf. *still head.*

fractionation. Fractional distillation.

fracture. A sharp edge produced on breaking a solid substance. Cf. *cleavage.* **conchoidal-** The irregular fracture of an amorphous body. **crystalline-** A fracture producing the plane faces and sharp edges of a crystal, *i.e.*, cleavage.

fragility. Brittleness. The characteristics of falling or breaking apart; not tenacious.

fragment. A detached or broken-off part.

fragrance. A pleasant odor.

francisceine. An alkaloid from the root of *Franciscea uniflora*, Brazilian manaca, a Solanaceae; used as a diuretic and purgative.

franckeite. $Pb_5FeSn_3Sb_2S_{14}$. A rare tin-lead sulfostibide.

francolite. A calcium phosphite containing calcium carbonate.

frangula. Buckthorn bark, arrow-wood. The dried bark of *Rhamnus frangula*, a Rhamnaceae; used medicinally as a laxative. **f. emodin.** Emodin.

frangularoside. A rhamnoside from the freshly-dried bark of black alder.

frangulic acid. A dihydroxyanthraquinone derived from frangula.

frangulin. $C_{20}H_{20}O_9$ = 404.15. A glucoside from the bark of *Rhamnus frangula.* Yellow crystals, m.226, insoluble in water, soluble in hot alcohol or ether.

Frangulineae. Rhamnales. A group of plants comprising the Rhamnaceae (buckthorn) and Vitaceae (grape) families.

frangulinic acid. Frangulic acid.

frankincense. Olibanum. **American-** An oleoresin from the bark of *Pinus palustris*, the common pine. Cf. *colophony.*

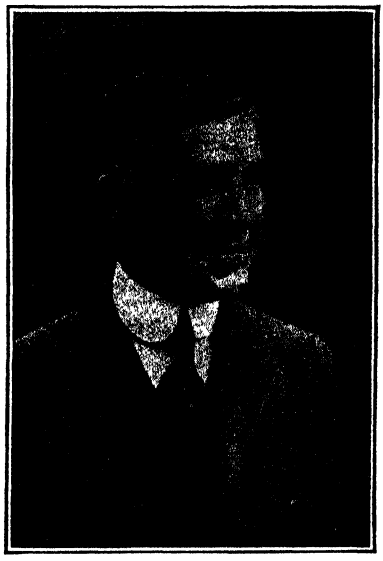
Frank, Adolf. 1834–1916. A German industrial chemist and developer of the potash industry.

Frankland, Sir Edward. 1825–1899. A British chemist noted for research on organo-metallic compounds, valency, water-supply, the theory of flames; and a co-worker of Lockyer in the discovery of helium in the sun. **F. notation.** The grouping together of radicals in a formula, and the assumption that certain salts are addition compounds, thus SO_2Ho_2 for H_2SO_4; SO_2Nao_2 for Na_2SO_4; $SO_2Ho_2Zno.6OH$ for $ZnSO_4.7H_2O$; in which Ho is hydroxyl, Nao "sodoxyl," and Zno "zincoxyl." **F. reaction.** The synthesis of hydrocarbons by the zinc-alkyl condensation:

$$Zn(CH_3)_2 + 2R.Br = 2R.CH_3 + ZnBr_2$$

Franklin, Benjamin. 1706–1790. An American statesman and scientist, noted as founder of the American Philosophical Society; for electrical experiments; and the use of fertilizers.

Franklin, Edward Curtis. 1862–1937. An American chemist noted for his theory of the ammonia system (q.v.) of compounds.



Edward Curtis Franklin.

franklinic. Static. Cf. *franklinizations.*

franklinite. $(Fe,Zn,Mn)Fe_2O_4$. A black or blue, brittle, isometric, spinel, d.5–5.1, hardness 6.1–6, 5; used as an iron ore and source of zinc.

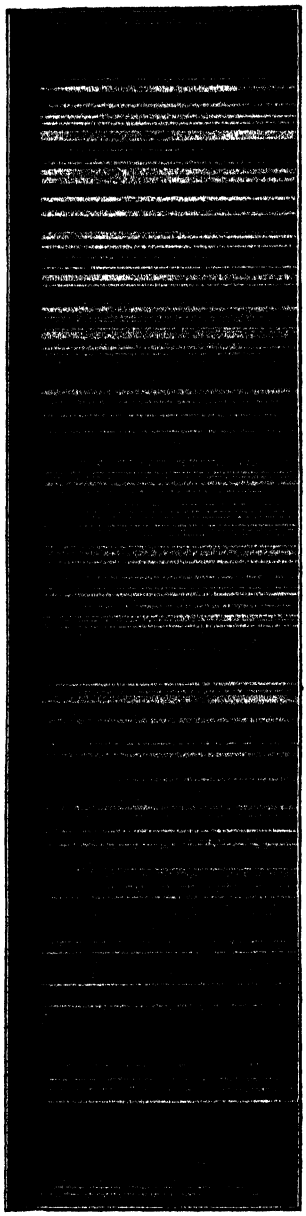
franklinization. The therapeutic application of static electricity.

Frary's metal. An alloy of lead with small amounts of barium and calcium. It is made by electrolytic deposition of Ca and Ba in molten lead, and is as hard as Pb-Sb alloys. Used during World War I for shrapnel bullets.

fraserin. The combined principles from the root of *Frasera walteri*, American calumba; used medicinally as a tonic and stimulant.

Fraude reagent. Perchloric acid.

Fraunhofer, Joseph von. 1787–1826. A German physicist noted for developing optical lenses, prisms, and diffraction gratings. He mapped the dark lines of the sun spectrum and measured the wavelength of sodium light (D-line). **F. lines.** The dark lines in the spectrum of the sun and other stars. They are produced by the absorption of certain rays of the photosphere by the incandescent gases of the solar atmosphere. Some 20,000 of them have been measured in the sun spectrum, and more than 5000 have been identified with chemical elements. A study of F. lines and the corresponding bright emission lines gives an indication of stellar conditions; as, composition, motion, temperature, magnitude and mass.



Fraunhofer lines in a section of the solar spectrum, photographed with a grating.

It should be noted that Fraunhofer lines H and K are due to calcium. Spectrum lines H_α, β etc. are due to hydrogen.

The principal F lines (and the corresponding bright emission lines) are shown in the table.

WAVE LENGTHS OF FRAUNHOFER LINES

Line	Wave length in Ångström units	Line due to	Color
A′	7621.28	oxygen of	crimson
A″	7594.06	earth atmosphere	crimson
a	7164.72		red
B	6870.18	oxygen	red
C or H^α	6563.04	hydrogen	red
	6278.30	oxygen	orange
D_1	5896.15	sodium	yellow
D_2	5890.18	sodium	yellow
D_3	5875.98	helium	yellow
E_1	5270.56	iron	green
	5270.43	calcium	green
E_2	5269.72	iron	green
b_1	5183.79	magnesium	green
b_2	5172.85	magnesium	green
b_3	5169.22	iron	green
	5169.07	iron	green
b_4	5167.68	iron	green
	5167.50	magnesium	green
F or H_β	4861.53	hydrogen	bluish green
d	4383.72	iron	blue
G′ or H_γ	4340.63	hydrogen	blue
f	4325.94	iron	blue
G	4308.08	iron	indigo
	4307.91	calcium	indigo
g	4226.90	calcium	indigo
h or H_δ	4101.80	hydrogen	purple
H	3968.62	calcium	purple
K	3933.82	calcium	purple
K	3933.82	calcium	ultraviolet
L	3820.58	iron	ultraviolet
M	3727.78	iron	ultraviolet
N	3591.35	iron	ultraviolet
O	3443.15	iron	ultraviolet
P	3361.33	iron	ultraviolet
Q	3286.89	iron	ultraviolet
R	3181.39	calcium	ultraviolet
	3179.45	calcium	ultraviolet
	3100.78	iron	ultraviolet
	3100.43	iron	ultraviolet
S	3100.04	iron	ultraviolet
s	3047.72	iron	ultraviolet
T	3020.76	iron	ultraviolet
t	2994.53	iron	ultraviolet
U	2947.99	iron	ultraviolet

fraxetin. $C_{10}H_8O_5$ = 208.06. A crystalline split product of fraxin, m.227.

fraxin. $C_{16}H_{18}O_{10}$ = 370.14. A glucoside from the bark of *Fraxinus* and *Aesculus* species, m.190. Colorless needles, soluble in hot water or alcohol.

fraxinine. $C_{42}H_{36}O_{27}$ = 972.3. A bitter, crystalline principle from the bark of *Fraxinus excelsior*.

Fraxinus. A genus of trees including ash. Cf. *manna*

fraxitannic acid. $C_{28}H_{32}O_{14}$(?). A tannin from the leaves of the ash, *Fraxinus excelsior*. A brown powder, soluble in water.

free. Uncombined, unattached, or available. **f. acid.** (1) See degree of *acidity*. (2) The HCl of the stomach juices. **f. charge.** An electric charge on a body; *e.g.*, free electrons attached to an atom or molecule and not a part of its structure. **f. electron.** An electron which takes no part in the chemical constitution of matter, but is free to move from one kind of matter to another, as in a galvanic current. **f. energy.** That portion, F, of the total energy which can be utilized for work. F = (H − TS), where H is the heat content (the internal energy +

pressure × volume), T the absolute temperature of the system, and S the entropy. **f. path.** The average distance traveled by an electron, ion, or molecule before colliding with another atom, ion, or molecule. See *ionization, electrons, radioactive bombardment, ionic mobility, kinetic theory.* (*molecular-*) The average distance travelled by a molecule of a gas or by an ion in solution between collisions. **f. radical.** An organic compound in which all the valencies are not satisfied; hence, an unsaturated molecule; as,

$$2Ph_3C \rightleftharpoons Ph_3C—CPh_3$$

triphenylmethyl from hexaphenylethane,

$$2Ph_2N \rightleftharpoons Ph_2N—NPh_2$$

diphenylnitrogen from tetraphenylhydrazine, in a strict sense also

$$2NO_2 \rightleftharpoons N_2O_4$$

nitrogen peroxide from nitrogen tetroxide

f. valence. An unsatisfied bond.

freedom. Variance. In the phase rule: P + F = C + 2, where P is the number of phases, C the number of component substances reacting, F, the degree of freedom, an integer which indicates the least number of variable factors (pressure, temperature or volume) which must be arbitrarily fixed in order to define the state of equilibrium of a chemical system. The one-component system (solid-liquid-gas) is invariant, *i.e.*, has no degree of freedom. A one-component (liquid-gas) system is univariant (F = 1); while a one component gas system is bivariant, or has two degrees of freedom.

freeness. The extent to which a pulp for the manufacture of paper has not been hydrated by beating. Antonym—*wetness.*

freeze. (1) To lower the temperature until a liquid solidifies. (2) The interlocking of accurately machined and polished steel parts of machinery; it is avoided by chromium plating one part.

freezing. The solidification of a liquid or solution by lowering its temperature. **f. attachment.** A device attached to microtomes for freezing tissues by means of liquid or solid carbon dioxide. **f. mixture.** Frigorific mixtures. A mixture of substances that absorbs heat and thus lowers the temperature of themselves or of their immediate surroundings. Used in analytical and synthetic chemistry for reactions at a low temperature. *E.g.*,

1 pt. NH_4NO_3, 1 pt. Na_2CO_3 and 1 pt. of water.....	=	10 to −26°C
5 pts. NH_4Cl and 10 parts powdered ice or snow.....	=	−5 to −18°C
5 pts. NaCl, 5 pts. NH_4NO_3 and 12 pts. ice or snow....	=	−15 to −25°C
3 pts. $CaCl_2$ and 1 pt. ice or snow.....	=	−40 to −70°C
10 pts. dilute H_2SO_4 and 8 pts. ice or snow.....	=	−65 to −90°C
solid CO_2 and ether or chloroform.....	=	−77°C.

f. point. Congelation or solidification point. The temperature at which a liquid freezes. **f. point apparatus.** A device for the accurate determination of the freezing point of liquids or solutions. It is used in physiological and physical chemistry to determine the concentration of solutions, osmotic pressure, and molecular weight. See *cryoscopy, freezing-point depression.* **f. point depression.** The phenomenon that solutions freeze at a lower temperature than the pure solvent. This lowering or depression of the freezing point of dilute solutions is proportional to the concentration of the dissolved substance. See *Raoult's law.* A solution containing one-tenth gram molecule lowers the freezing point of water by −0.186°C.; hence the molecular weight (M) can be determined. Cf. *additive properties.* **f. salt.** Crude sodium chloride.

freibergite. $(Ag,Cu)_3Sb_2S_7.(Fe,Zn)_4SbS_7$. A grayish-black, silver-copper and iron-zinc sulfantimonide, d.4.85–5.

freierslebenite. $(Pb,Ag_2)_8Sb_4S_{11}$. A black, metallic silver-lead sulfantimonide d.2–2.5.

Fremy, Edmond. 1814–1894. A French chemist noted for developing the manufacture of iron and steel, sulfuric acid, saponification of fats, and artificial rubies. **F. salt.** Potassium hydrogen fluoride.

French chalk. A hydrated silicate of magnesium.

freon. Trade-mark for a group of halogenated hydrocarbons containing one or more fluorine atoms and which are widely used as refrigerants and propellants. **f-12.** Trade-mark for dichlorodifluoromethane (CCl_2F_2), used as a refrigerant and propellant.

frequency. (1) The rapidity with which an occurrence, oscillation or vibration is repeated. (2) The number, ν, of complete vibrations or waves per unit time. Thus $\nu = c/\lambda$, where c is the velocity of light and λ the wavelength of the ray concerned. The numerical value of ν is very great, *e.g.* for green light it is 6×10^{14} vibrations per second. F. is related to energy (e) and mass (m) by $h\nu = e = mc^2$, and if the energy unit is 9×10^{20} ergs: F = E = M. **high-** A rapid alternating electric current, q.v. **molecular-** The molecular vibrations. See *gas laws, excitation,* state of *aggregation.* **radiation-** The f. of the emitted radiation is proportional to the amount of energy radiated; $W_1 - W_2 = E = h\nu$, where W_1 and W_2 is the energy of the atom in the initial and final state, respectively, E the energy expressed in ergs, and h Plank's constant, q.v.

f. curve. Histogram. A curve obtained by dividing a number of values obtained for a particular determination into classes differing by a standard amount, and plotting the number of samples in each class against the corresponding values. The maximum gives the most correct result (*median*), and the ends of the series are the *quartiles;* 25 % of the values being in each quartile. Cf. *mean.*

Fresenius, Karl Remigus. 1818–1897. A German chemist noted for his work on analytical methods. **F. desiccator.** A desiccator with bell-shaped cover. **F. nitrogen bulb.** A conical flask with side-tubes having two bulbs near the base.

Fresnel, Augustin Jean. 1788–1827. A French physicist noted for experiments on aberration and diffraction of light.

Freund acid. *3.6*-Naphthylamine disulfonic acid.

Freundlich, Herbert. 1881–1941. A German-born chemist, noted for his work on colloid chemistry.

freyalite. A variety of thorite, q.v.

friction. The resistance offered to sliding motion by rubbing. **fluid-** Viscosity. **internal-** The resistance to bending of metals due to their

crystalline structure. **mechanical-** See *f. coefficient.*

friction coefficient. A number (f) indicating the relation of the force (F) necessary just to move an object along a horizontal plane under pressure (N): F = fN. It depends on the material of the substance, but not on the velocity or area of the surfaces in contact. Cf. *lubricants.*

Friedel, Charles. 1832–1899. A French chemist noted for his work on mineralogical and organic chemistry.

Friedel-Crafts reaction. The synthesis of an aromatic hydrocarbon homolog by the catalytic action of aluminum chloride:

$$R + R'.Cl + AlCl_3 = R.R' + HCl + AlCl_3$$

as in the synthesis:

$$3C_6H_6 + CHCl_3 = (C_6H_5)_3CH + 3HCl.$$

or

$$C_6H_6 + CH_3Cl = C_6H_5.CH_3 + HCl.$$

F. C. condensation. The condensation of hydrocarbons and halogen compounds in the presence of anhydrous aluminum chloride according to the Friedel-Crafts reaction. Alkyl halides yield hydrocarbons; acyl halides, ketones; carbonyl halides, ketones and acids.

friedelin. $C_{30}H_{50}O$ = 426.4. A sterol (q.v.), obtained from cork and related to the hydrocarbon $C_{30}H_{52}$.

Friedenthal cryoscope. A device for determining molecular weight from the lowering of the freezing point; used in physiological work.

Friedrichs condenser. A condensing screw or worm surrounded by a glass or metal tube. **F. gas bottle.** A glass cylinder with a spiral tube for washing gases.

frieseite. $Ag_2Fe_5S_8$. A rare silver-iron sulfide.

frigid. Cold.

frigidity. Coldness.

frigorific. All agent that produces coldness, or freezing. **f. mixture.** Freezing mixture.

fringe tree bark. Chionanthus.

fringes. The dark, parallel and equidistant lines observed in the interferometer.

frit. (1) Enamel. A complex alkaline borosilicate glass, usually containing fluorine, produced by melting a mixture such as borax, feldspar, quartz, and cryolite. (2) To sinter.

fritted, frittered. Having been heated near its melting point. **f. glass.** A glass powder heated sufficiently to stick together; used in filter crucibles, etc.

fritting. Becoming pasty and beginning to melt; as, some soft coals.

Froehde reagent. A solution of 5 mg. molybdic acid in 1 cc. hot concentrated sulfuric acid; used as a reagent for alkaloids.

froth. Foam. **iron-** A fine, spongy variety of hematite.

frother. A chemical used in the flotation process to cause frothing; as, pine oil causing a thin transient foam, or cresylic acid, causing a heavy permanent foam.

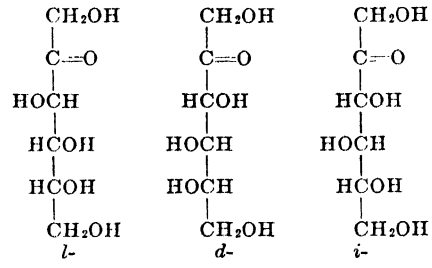
frothing. Foaming. **f. agent.** A substance which produces a froth when shaken with a liquid; as, saponin, oleic acid, lactic acid, essential oils, or phenols when shaken with water.

F.R.S. Abbreviation for Fellow of the Royal Society.

fructosamine. $C_6H_{13}NO_5$ = 179.11. *i*-dextrosamine, *i*-glucosamine. $CH_2OH(CHOH)_3CONH_2$. A colorless syrup, insoluble in alcohol.

fructosans. A group of sugar anhydrides which hydrolyse to fructose. Cf. *hemicellulose.*

fructose. $C_6H_{12}O_6$ = 180.13. Levulose, fruit sugar, l-fructose. A carbohydrate in all sweet fruits and honey. Colorless needles, $d_0°$.1.555, m.94, soluble in water, alcohol, or ether. Used as food for diabetics, as a preservative, etc. **dextro-** d-*Fructose.* **inactive-** i-Fructose, acrose, or formose. An unfermentable carbohydrate which is synthesized by polymerization of formaldehyde in lime water. **levo-** l-fructose, or levulose. **pseudo-** Allulose.



fructoside. A glucoside which hydrolyses to fructose.

fruit. The ripened ovary of a plant together with parts of the flower that share in its development. The following fruits are official (U.S.P.) and used medicinally (see also *seeds*):

Anise	Hops
Capsicum	Lemon
Caraway	Orange
Cardamon	Pepper
Cassia fistula	Poke berries
Chenopodium	Pimenta
Colocynth	Prune
Conium	Raspberry
Coriander	Rhus glabra
Cubeb	Staranise
Fig	Tamarind
Fennel	Vanilla

fruit-essence. An artificial mixture imitating the taste of a fruit, and consisting of the esters of alkyl radicals with organic acids, usually in alcoholic solution which must be highly diluted. **f. oil.** See *oil.* **apple-** A mixture containing chiefly amyl valerate. **banana-** A mixture containing chiefly amyl acetate. **pear-** A mixture containing chiefly amyl acetate. **pineapple-** A mixture containing chiefly ethyl butyrate.

fruit-sugar. Fructose.

ft. The abbreviation for foot. $ft.^2$ = square foot. $ft.^3$ = cubic foot.

fuadin. Fouadin, stibophen, neoantimosan. Sodium antimony-bispyrocatechol-3,5-sodium disulfonate. See *stibophen.*

fuchsin. $C_{20}H_{19}N_3HCl$ = 337.8. Magenta red, rosaniline hydrochloride, aniline red, azaleine, harmaline, rosein, erythrobenzene, rubine, solferino. A red dyestuff, a mixture of the hydrochlorides of rosaniline and pararosaniline. Rhombic, red crystals with greenish fluorescence, d.1.220, soluble in water or alcohol. Used as dyestuff and coloring matter for inks, stains, microscopical stains, and as dye for wool, silk and cotton. **acid-** A mixture of the disulfonic and trisulfonic acids of pararosaniline; used as a dye and stain. **English-** A mixture of the acetates of rosaniline and pararosaniline; used as a dyestuff. **German-** Fuchsin.

fuchsite. A variety of muscovite containing chromium.

fuchsone. $C_{19}H_{14}O$ = 258.1. Quinonediphenylmethane. $O{=}C_6H_4{=}C(C_6H_5)_2$. An intermediate in the manufacture of rosaniline dyes.

fucitol. $C_6H_{14}O_5$ = 166.11. A sweet, five-atomic alcohol, m.153, from fucus.

fucosan. A polymer of fucose contained in the cell-walls of marine algae.

fucose. $C_6H_{12}O_5$ = 164.09. *2.3.4.5*-Tetrahydroxy hexanal*. A colorless and crystalline methylpentose, $C_5H_9MeO_5$, obtained from fucus, m.145, soluble in water. It is an isomer of rhodeose.

fucosite. A mineral composed of the degenerated, modified and least water-soluble portion of seaweed. It contains fucose, algarose and an oil. **pseudo-** Elkerite.

ucoxanthin. $C_{40}H_{56}O_6$ = 632.5. A carotenoid (q.v.) pigment of brown algae. Brick red crystals, m.160.

fucus. Bladderwrack, seawrack. The dried thallus of *Fucus vesiculosus*, a Fucaceae or seaweed; used medicinally as an alterative and resolvent.

fucusamide. Fucusine.

fucusine. $C_{15}H_{12}O_3N_2$ = 268.2. Fucusamine. A crystalline alkaloid from seaweeds and fucus species.

fucusoic acid. β-Pyromucic acid. A constituent of seaweeds.

fucusol. $C_5H_4O_2$ = 96.1. A colorless, oily liquid, resembling furfurol, which is distilled from sea-weeds.

fuel. A material that furnishes heat by combustion. Classification: *Natural f.* or *solid f.* as wood, peat, lignite, coal, (q.v.). *Prepared f.*, dried f., as, briquettes and compressed fuels. *Liquid f.*, as petroleum, gasoline. *Gaseous f.*, as coal or water gas. **metallic-** Finely powdered magnesium or aluminum. Cf. *thermit*. **f. gases.** The compressed gases used for welding and cutting metals; as, blau-gas, butane, coal-gas, Pintsch-gas, pyrogen, thermoline, prestolite. **f. oil.** Crude petroleum.

fugacity. The escaping tendency of a substance in a heterogeneous mixture, by which a chemical equilibrium responds to altered conditions. In a dilute solution obeying the gas laws, the f. equals the osmotic pressure. In other solutions it is the value of the pressure for which these equations are still valid. Cf. *activity*.

fugin. Fugutoxin, tetrodonine. A poisonous protein in the organs of *Tetrodon* species, a fish of the Japanese and Chinese seas.

fugitive. Unstable, not fast (as a color).

fugitometer. An apparatus for the rapid testing of dyed materials for fastness to light. Cf. *fadeometer*.

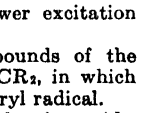
fugugetin. $C_{17}H_{12}O_6.5H_2O$ = 402.5. The coloring matter of fukugi, *Garcinia spicata*, a plant of Japan, m. 288. Cf. *garcinin*.

fugutoxin. Fugin.

Fulcher spectrum. That portion of the hydrogen spectrum between H_α and $H\beta$, which consists of many fine lines due to a lower excitation level of the H_2 molecule.

fulgenic acids. A group of compounds of the type $R_2C{:}C(COOH).C(COOH){:}CR_2$, in which R is either a hydrogen, alkyl or aryl radical.

fulgides. The anhydrides of fulgenic acids, or compounds of the type



They show phototropy; *i.e.*, change the color under the influence of radiation. **diphenyl-** A form (yellow green) $\rightleftharpoons$ B form (blue). **triphenyl-** A form (orange) $\rightleftharpoons$ B form (blue).

fulguration. Burning or melting together, with an electric spark. Cf. *fritting*.

fulgurator. An atomizer of salt solutions for producing flame spectra.

fulgurite. Fritted sand produced by lightning passing through the soil.

full gas. A term for a class of combustible gases, consisting of saturated hydrocarbons, *e.g.*, water gas.

fuller's earth. Calcium montmorillonite. An impure kaolin containing magnesium and iron; used extensively for decolorizing solutions, oils and other liquids, as a substitute for absorbent charcoal, and medicinally, as a dusting powder.

fulmar oil. An oil from the petrel species, *Procellaria glacialis*, a seabird of the Northern Coast of England; used as a substitute for cod-liver oil.

fulmargin. A colloidal solution of silver.

fulminate. A salt of fulminic acid containing the monovalent CNO— radical. **silver.** AgCNO = 149.89. Small, white needles which explode readily.

fulminates. A group of explosive compounds (general formula, MONC) consisting of the salts of fulminic acid; used to detonate high explosives.

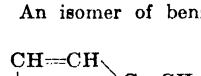
fulminating. Capable of causing detonation or explosion. **f. caps.** Small amounts of fulminates used to explode the charge of shells, grenades, torpedoes, etc. They usually contain mercuric fulminate. **f. gold.** Aurodiamine. **f. powder.** Percussion powder.

fulminic acid. CNOH = 43.0. Paracyanic acid *ψ-i*-cyanic acid. C:N.O.H. An isomer of cyanic acid known only as its very explosive salts.

fulminurate. A salt of fulminuric acid.

fulminuric acid. $C_3H_3N_3O_3$ = 129.14. *2*-Cyano-*2*-nitroethanamide*, isocyanuric acid, cyanonitroacetamide, $CN.CH(NO_2).CONH_2$. Colorless needles or prisms, m.138, explode at 145, soluble in alcohol, water, or ether. It is a trimer of cyanuric acid. Cf. *pentoxime*.

fulvene. (1) C_6H_6 = 78.1. Methylenecyclopentadiene. An isomer of benzene; a yellow oily liquid.



(2) A general term for colored products formed on exposure of indanthrene resins to light. **benzo-** See *benzofulvene*.

fumaramic acid. $C_4H_5O_3N$ = 115.1. $NH_2{-}CO.CH{:}CH.COOH$. Colorless crystals, m.217.

fumaramide. $C_4H_6O_2N_2$ = 114.1. $NH_2CO.CH{:}{-}CH.CONH_2$. Colorless crystals, m.266.

fumarhydrazide. $C_4H_6O_2N_4$ = 142.1. Colorless crystals, m.220.

fumaria. The dried herb of *Fumaria officinalis*, common fumitory; used medicinally as a sedative, general tonic and alterative

Fumariaceae. A family of herbs yielding alkaloids:

Corydalis cava	corydalis
Corydalis tuberosa	corydaline
Dicentra pucilla	dicentrine
Fumaria officinalis	fumarine

fumaric acid. $C_4H_4O_4$ = 116.05. *trans-* Butenedioic acid*, *trans-1.2*-ethylene dicarboxylic acid. A dibasic acid occurring in *Fumaria officinalis*, and an isomer of maleic acid: trans-ethylene dicarboxylic acid, allomaleic acid,

HOOC.C.H
‖
H.C.COOH

Colorless prisms, d.1.635, m.286, b.290, (sublimes), slightly soluble in water, soluble in alcohol or ether. **ethyl-** $C_8H_8O_4$ = 144.1. Ethylethylene dicarboxylic acid. Colorless crystals, m.194. **methyl-** Mesaconic acid.

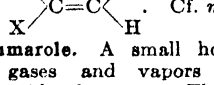
f. acid series. A group of dibasic acids with a double bond; general formula, $C_nH_{2n-4}O_4$. There are many isomers; *e.g.*,

fumaric, maleic acid	HOOC.C_2H_2.COOH
glutaconic, citraconic, itaconic, ethidene-malonic, mesaconic acid	HOOC.C_3H_4.COOH
allylmalonic, propylidenemalonic, hydromuconic; pyrocinchonic acid	HOOC.C_4H_6.COOH
allylsuccinic, carboprolactonic, teraconic acid	HOOC.C_5H_8.COOH
xeronic acids	HOOC.C_6H_{10}.COOH
cetylmalonic acid	HOOC.$C_{17}H_{32}$.COOH

fumarimide. $C_4H_4O_2N_2$ = 112.1. Colorless crystals.

fumarine. $C_{21}H_{19}O_4N$ = 349.2. Protopine. An alkaloid from *Fumaria officinalis*, a Papaveraceae. Colorless, tasteless crystals, m.199, insoluble in water, soluble in chloroform, benzene, alcohol or ether; used medicinally as an antiphlogistic.

fumaroid. A structural arrangement of ethylene derivatives characterized by trans-isomerism:



Cf. *malenoid*.

fumarole. A small hole from which volcanic gases and vapors escape. **f. acid.** Boric acid. **f. gases.** The vapors escaping from fumaroles; those of Italy contain steam, boric acid, carbon dioxide, ammonia and hydrogen sulfide.

fumaryl. The bivalent radical —OC.CH:CH.CO— derived from fumaric acid. **f. chloride.** $C_4H_2O_2Cl_2$ = 152.9. A colorless liquid, d.1.410, b.160.

fume. A visible or invisible vapor or smoke. Fine particles of solid or liquid suspended in a gas. **f. cupboard.** A glass-enclosed shelf or table provided with a fan or other ventilating device for performing experiments involving the production of poisonous or unpleasant fumes or gases.

fumigacin. An antibiotic substance produced by different strains of *Aspergillus fumigatus*. It is identical with helvolic acid.

fumigant. A gaseous insecticide. A substance that produces disinfecting vapors which are used to destroy insects; as,

chloropicrin	0.8
ethylene oxide	2.0
trichloroethylene	7.0
vinyl chloride	8.0

The figures indicate the pounds per 1000 ft.^{3} needed to destroy all insects and larvae within 24 hours at 75–80°F.

food- A f. used to destroy insect pests on foodstuffs; as ethylene oxide, ethylene dichloride, propylene chloride.

fumigate. To disinfect by means of vapors or smokes.

fumigatin. $C_8H_8O_4$ = 168.1. *3*-Hydroxy-*4*-methoxy-*2.5*-toluquinone. Maroon-colored crystals, m.116, occurring in laboratory cultures of *Aspergillus fumigatus*. It has antibacterial qualities. Cf. *penicillin*.

fumigation. Disinfection by means of volatile substances.

fumigator. A closed chamber in which to carry out fumigations.

fuming. Emitting smoke or vapors, *e.g.*, fuming nitric acid.

function. (1) Any specific power. (2) In physiology, the work or purpose of an organ. (3) In mathematics, one quantity is a function of another when for each value of the latter (y) there corresponds a definite value of the former (x). It is represented thus x = f(y). **chemical-** (1) *simple-* Describes a substance containing only one type of radical, which may, however, be repeated several times in the same molecule; *e.g.*, an alcohol, glycol, polyhydroxy alcohol. (2) *complex-* Describes a molecule having two or more different types of radicals; as, hydroxy aldehydes, amino acids, nitrophenols.

fundament. The foundation or basis of a structure, either physical or mental.

fundamental. Pertaining to the basis for groundwork. **f. chain.** The longest chain of a branched hydrocarbon. **f. units.** Units of measurement to which all physical phenomena may be reduced, *i.e.*,

L or length, (L^2 = surface, L^3 = volume)
M or mass (M/L^3 = density)
T or time (LMT = velocity, acceleration)
K or the dielectric constant (basis of electrostatic system)
μ or the magnetic permeability (basis of magnetic system)
θ or the temperature.

Cf. *dimensional equation*.

fungi. Plural of fungus.

fungicide. An agent that destroys spores and fungi; as Bordeaux mixture, arsenicals, etc.

fungisterin. Fungisterol.

fungisterol. $C_{28}H_{40}O$ = 356.3. Fungisterin. An inert alcohol in ergot; colorless wax-like masses, m.144.

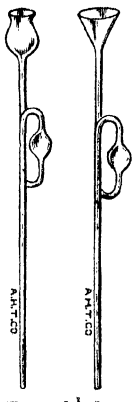
fungus. (Plural: fungi). (1) A main division of *Thallophyta* or primitive plants, either parasitic or saprophytic, distinguished from *Algae* by the absence of chlorophyll. They include:

Eumycetes	mushrooms
Schizomycetes	bacteria
Phycomycetes	alga-like fungi
Blastomycetes	yeasts
Hypomycetes	molds

(2) Popularly, the mushrooms and toadstools. **f. dyestuff.** Any pigment obtained from a f.; as, muscarufin, litmus.

funnel. A glass tube with one enlarged, and usually conical end. It is used chiefly for filling containers and for filtering solutions. **Buchner-** A porcelain funnel having a flat perforated round bottom; used for rapid filtration by suction. **bunsen-** The ordinary, conical glass funnel. **double wall-** A metal funnel with two

walls, between which hot water or steam is circulated. Used for the hot filtration of liquids, *e.g.*, gelatin or agar solutions. **dropping-** A separatory f., with long stem and glass stopcock. **Hirsch-** A porcelain f. with a fixed porcelain plate. **hot-air-** Double wall-. **hot-water-** Double wall-. **separatory-** A funnel of varied shape with a stop-cock on its stem; used to separate immiscible liquids. **tap-** Separatory-.



Funnel tubes.

funnel tube. A glass tube with a conical or thistle-shaped top; used to convey liquids into a chemical apparatus.

fur. (1) An abbreviation for furlong. (2) The hairy coat of animals.

furac. See *lead* and *zinc dithiofuroates.*

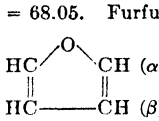
furacrolein. Furfur acrolein.

furacrylic. Furanacrylic.

fural. Furfural, furfurylidene. The bivalent radical O.CH:CH.CH:C.CH=, derived from furfural; there are two isomers.

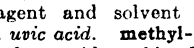
furaldehyde. Furfural.

furan. C_4H_4O = 68.05. Furfuran, tetrol,



A colorless liquid, d_{15}°.0.9444, b.31, miscible with alcohol or ether, insoluble in water, in pine and fir tar. **dimethyl-** C_6H_8O = 96.1. Colorless liquid, d.0.902, b.94, soluble in water. A tanning agent and solvent for polyvinyl plastics. Cf. *uvic acid.* **methyl-** Sylvan. **tetrahydro-** Butylene oxide. **thio-** Thiophen.

f. carbinol. Furfuralcohol. **f. carboxylic acid.** *2-* Pyromucic acid.



3- Furoic acid. **f. dione.** Maleic anhydride. **f. methylamine.** Furfurylamine.

furanacrylic acid. $C_7H_6O_3$ = 138.05. *β-2-*furylacrylic acid, 2-furalacetic acid. White crystals, m.141, b.226, insoluble in water.

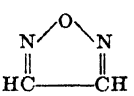
furanose. A sugar having a furan ring, as γ-glucose.

furanoside. A glucoside derived from pentoses, having a furan ring; as, adenosine. Cf. *pyranoside.*

furancarboxylic acid. Pyromucic acid.

furandione. Maleic anhydride.

furazan. $C_2H_2ON_2$ = 70.1. Azoxazole, oxdiazole.



methylethyl- $C_5H_8ON_2$ = 124.1. Ethylmethyl-1.2.5-oxidiazole. A colorless liquid, b.170. **phenyl-** $C_8H_6ON_2$ = 146.2. Phenyl-1.2.5-oxidazole. Colorless crystals, m.30.

f. carboxylic acid. $C_3H_2O_3N_2$ = 114.2. Colorless crystals, m.107. (*methyl-*) $C_4H_4O_3N_2$ = 128.2. Colorless crystals, m.74. **f. propionic acid.** $C_5H_6O_3N_2$ = 142.2. Colorless crystals, m.86. **f. dicarboxylic acid.** $C_4H_2O_5N_2$ = 158.2. Colorless crystals, m.178.

furfuracrolein. $C_7H_8O_2$ = 122.1. Colorless crystals, m.51.

furfuracrylic acid. $C_7H_6O_3$ = 138.1. A colorless crystalline acid.

furfural. (1) $C_5H_4O_2$ = 96.06. *α-*Furfuraldehyde, furol, furfurol, furfuryl aldehyde, *2-*furancarbonal*, 2-furaldehyde, $C_4H_3O.CHO$. A colorless liquid, turning yellow on standing, d_{22}*.1.159, m.−36, b.161, soluble in water, miscible with alcohol or ether. Used as a reagent for urea, alkaloids, santonin, cholesterol, ketones, or phenols, and in organic synthesis. (2) Fural. **3-,** *3-*furancarbonal*. A liquid of benzaldehyde odor, d.1.111, b.144, n_D^{20}.1.4945.

furfuralcohol. $C_5H_6O_2$ = 98.07. Furancarbinol, furfurylalcohol, $C_4H_3O.CH_2OH$. A solid, m.200, (sublimes), $b._{170mm}$.168, soluble in water, alcohol or ether.

furfuraldehyde. Furfural.

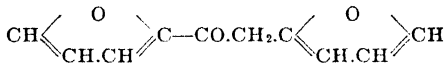
furfuramide. $C_{15}H_{12}O_3N_2$ = 268.11. Furfuryl amide. Colorless crystals, m.121, decomp. 250. It is an isomer of furfurine.

furfuran. Furan.

furfurbutylene. $C_8H_{10}O$ = 122.1. Butylfurfuran. A colorless oily liquid.

furfurine. $C_{15}H_{12}O_3N_2$ = 268.1. Light brown rhombic crystals, m.116, insoluble in water, soluble in alcohol or ether. An isomer of furfuramide.

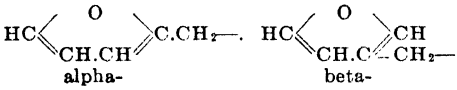
furfuroin. $C_{16}H_8O_3$ = 176.1. Furfuryl-furfural, furfuryl-fural. The compound



furfurol(e). Furfural.

furfurostilbene. $C_{10}H_8O_2$ = 160.1. Colorless crystals, m.101.

furfuryl. The monovalent C_5H_5O— radical, derived from furfural. Two isomeric forms:



alpha- beta-

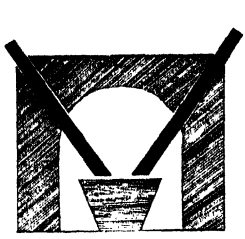
f. acetate. $CH_3COO.C_5H_5O$. A colorless liquid, d.1.1175, b.176, insoluble in water, soluble in alcohol or ether; used as a solvent. **f. alcohol.** $C_5H_6O_2$ = 98.08. Furyl carbinol, $C_5H_5O.CH_2OH$. A colorless liquid, d_{20}°.1.136, b.170, soluble in water, alcohol or ether. Used as a lacquer solvent. **f. aldehyde.** Furfural. **f. amide.** Furfuramide. **f. amine.** C_5H_7ON = 97.1. Colorless liquid, b.145, soluble in water, alcohol or ether. **f. fural.** Furfuroin. **f. methylether** $C_6H_8O_2$ = 112.1. A colorless liquid, b.135.

furfurylidene. Fural.

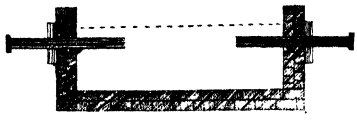
furil. $C_{10}H_6O_4$ = 190.1. Difurylglyoxal, bipyromucil. $C_4H_3O.CO.CO.C_4H_3O$. Yellow needles, m.165, insoluble in water. Cf. *furoin.* **f. dioxime.** A color reagent for copper.

furlong. An eighth part of one mile.

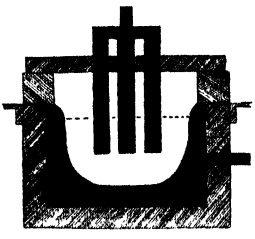
furnace. An apparatus for heating, fusing or hardening materials by exposing them to high temperatures; the heat may be produced by burning gas, oil, alcohol, coal, hydrogen or other fuels, or electrically. Classification: (see figures)



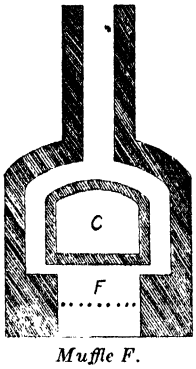
Direct Arc F.



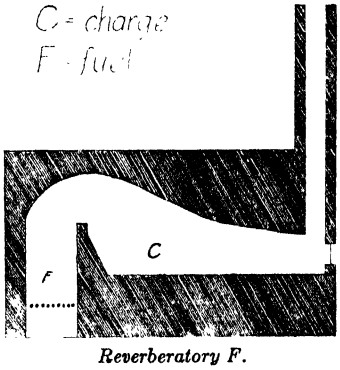
Indirect Arc F.



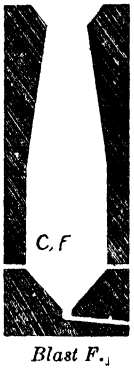
Héroult F.



Muffle F.



Reverberatory F.



Blast F.

Types of furnace.

	The fuel is	*The combustion products are*
blast f.....	+	+
reverberatory f...	−	+
muffle f.....	−	−

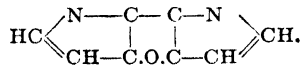
+ in contact with the charge
− not in contact with the charge

arc- A device for obtaining high temperatures by means of an electric arc. **blast-** A tall oven, in which molten iron is produced by heating a mixture of iron ore and coal by a blast of hot air. **crucible-** A small laboratory device for heating crucibles by gas, oil or electricity. **combustion-** An oven, elongated to take a combustion tube, and heated either by a row of bunsen burners or a coil of resistance wire; used in organic analysis. **electric-** See *arc-* or *resistance-*. **Héroult-** An electric arc f. used for the reduction of iron. **induction-** A f. heated from outside by electrically induced currents. **muffle-** A f. made of refractory material, and completely enclosed except for a small air inlet. **reducing-** (1) A shaft f. in which ores are reduced to metals. Cf. *aludel*. (2) A furnace in which incomplete combustion occurs, or an atmosphere of reducing gases is maintained. **resistance-** (1) A modified arc f., in which the electrodes dip into the molten material. (2) A heating device consisting of a wire-wound electrical resistance coil embedded in a refractory material. **reverberatory-** A f. for roasting ores, so constructed that the flame and hot gases are reflected by the curved roof and come in direct contact with the material to be heated, which is not contaminated by the solid fuel. **revolving-** A sloping, revolving metal cylinder lined with fire bricks, down which the charge passes and up which the hot gases are driven. **roasting-** q.v. **tank-** A large oil- or gas-heated container in which glass is melted.

furoates. The methyl, ethyl, butyl, or amyl esters of furoic acid, used in perfumery.

furodiazole. Oxdiazole.

furodipyrrole. $C_8H_4ON_2$ = 144.2. The heterocyclic compound



furoic acid. Pyromucic acid. **f. acid esters.** See *furoates*.

furoin. $C_{10}H_8O_4$ = 192.1. A condensation product of furfuran: $C_4H_3O.CHOH.CO.C_4H_3O$. Colorless crystals, m.135.

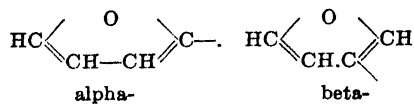
furol. Furfural.

furomonazole. a- Isoxazole. **b-** Oxazole.

furonic acid. $C_7H_8O_3$ = 140.1. Furfuryl acetic acid. Colorless crystals, soluble in water, alcohol, or ether.

furoyl. 2- Pyromucyl. **3-** The monovalent radical CH:CH.O.CH:C.CO—.

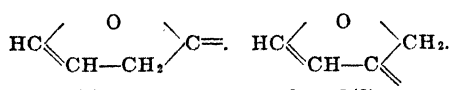
furyl. The monovalent —C_4H_3O radical. Two isomers:



alpha- beta-

Cf. *furfuryl*. **f. acrolein.** $C_7H_6O_2$ = 122.05. *3(2-*furyl)propenal*, $(C_4H_3O)CH:CH.CHO$. Yellow crystals, m.51, b.200, insoluble in water. **f. alcohol.** Furfuralcohol.

furylidene. The bivalent radicals:



α- or 2(3)- β- or 3(2)-

fusain. Mineral charcoal. Mother of coal. A constituent of coal (q.v.).

fuschin. Magenta, erythrobenzene.

fuscochlorin. A dark-green pigment from algae.

fuscorhodin. A dark red pigment from algae.

fuse. (1) To melt. (2) A safety device to protect electrical instruments, consisting of a fine wire which melts when the electric current becomes too strong. (3) Fuze. A device for igniting an explosive charge. **Abel-** An ignition fuse consisting of potassium perchlorate and copper sulfate, and ignited by an electric current. **combination-** A military fuse for shells consisting of a time fuse and concussion fuse. **electric-** A device for igniting an explosive charge by electric sparks, *e.g.*, Abel fuse. **concussion-** An explosive mixture which ignites by concussion, *e.g.*, fulminates. **time-** A device used in shells, grenades, etc. consisting of slow burning material, which ignites an explosive mixture after a certain time.

fused. Cooled to a compact mass after having been molten or sintered, as fused ash, slag or sodium hydroxide.

fused ring. A polycyclic compound in which two rings have two atoms in common, *e.g.*, naphthalene, quinoline.

fusel oil. Potato spirit, fermentation amyl alcohol. A crude mixture of isoamyl, amyl, butyl and propyl alcohols, obtained in spiritous fermentation and used as a source of amyl acetate.

fusibility. The property of solid matter of becoming liquid when heated.

fusible. Capable of being melted. **f. alloys.** An alloy having a low melting point, which is lower than the mean melting-point of the constituents, *e.g.*, Wood's alloy, Lippowitz metal, etc. **f. metals.** Any metal or alloy of relatively low melting point; as, Na, Pb, Sn. Cf. metal *bath*.

fusing. Melting. **f. point.** Melting point.

fusion. The act of melting or flowing together, *e.g.*, the transformation of a solid into a liquid by the application of heat and without using a solvent other than a flux. **alkaline-** The substitution of the $-SO_3H$ group of an organic compound by the $-OH$ group by means of concentrated NaOH, followed by treatment with acid. **aqueous-** The liquefaction of a substance below 100°C., by solution in its water of crystallization. **false-** Aqueous-. **watery-** Aqueous-. **f. heat.** See *heat* of fusion. **f. mixture.** A mixture of sodium and potassium carbonates; used to fuse insoluble substances of high melting-points and to render them soluble in the form of carbonates. **f. point.** Melting point.

fustic. (1) *old-* Yellow Brazilwood, fustic wood. The wood of *Morus tinctoria*, an Urticaceae of South America; used for making morin and in drying textiles. (2) *young-* The wood of *Rhus cotinus*, an Anacardiaceae. Cf. *osage orange wood, morin*.

fustin. (1) $C_{58}H_{46}O_{23}$ = 1110.4. A glucoside from the wood of *Rhus cotinus*, an Anacardiaceae. Fine silvery needles, m.218, soluble in alcohol or alkalis, hydrolysed to fisetin. (2) The coloring matter of the male fern, *Aspidium filix-mas*. (3) A coloring matter from sumac. (4) The coloring matter of fustic.

fuze. Fuse (3)

G

g. Abbreviation for gram.

g. A mathematical constant expressing the acceleration of a body due to gravitation. It is calculated for any latitude by Helmert's formula. *g* at sea level and equator = 978.038 cm./sec.^{2}; at latitude 45° = 980.624 cm./sec.^{2}

G. (1) The Newtonian constant of gravitation: $G = (6.65786 \pm 0.0017) \times 10^{-8}$ dyne. cm.^{2} g^{-2}. (2) Thermodynamic potential.

γ. The Greek letter gamma. A symbol indicating: (1) the third carbon atom of an aliphatic chain. (2) In the naphthalene ring, the position opposite to the α-position. (3) 10^{-6} gram. (4) 10^{-4} gauss. **γ-rays.** See *gamma rays.*

G. An abbreviation for yellow (gelb) in describing proprietary colors.

G-acid. 2-Naphthol-6.8-disulfonic acid.

G salt. The sodium or potassium salt of G-acid.

Ga. Symbol for gallium.

Gabbet solution. A solution of 2 gm. methylene blue in 25 gm. sulfuric acid and 75 cc. water; used in bacteriology for staining.

gabbro. A group of igneous rocks consisting of plagioclase and pyroxenes.

gabianol. A dark brown, oily liquid from natural shale, used in diseases of the lung and throat.

gadinine. $C_7H_{16}NO_2$ = 146.1. A ptomaine from putrefying fish, *e.g.*, haddock.

gadoleic acid. $C_{20}H_{38}O_2$ = 310.2. A fatty acid, m.20, from codliver oil.

Gadolin, Johann. 1760–1852. A Finnish chemist and mineralogist, noted as discoverer of rare earth minerals.

gadolinite. Principally $4BeO.FeO.Y_2O_3.2SiO_2$. Ytterbite. Yttria. A rare-earth silicate found at Ytterby in black, monoclinic masses, d.4–4.5, hardness 6.5–7. It is a source of Gd, Ho and Re.

gadolinium. Gd = 156.9. Atomic number 64. A rare earth metal discovered 1880 by Marignac in gadolinite, d.1.31. Principal valency 3. On account of its rarity it is of scientific interest only. **g. acetate.** $Gd(C_2H_3O_2)_3.4H_2O$ = 406.4. A colorless crystalline powder, d.1.611, soluble in water. **g. bromide.** $GdBr_3.6H_2O$ = 505.4. Colorless crystals, soluble in water. **g. chloride.** $GdCl_3 6H_2O$ = 371.8. A colorless crystalline powder, soluble in water. **g. oxalate.** $Gd_2(C_2O_4)_3.10H_2O$ = 758.76. Monoclinic crystals, dehydrated at 110°C., slightly soluble in water. **g. oxide.** Gd_2O_3 = 362.6. Colorless crystals or a white powder, insoluble in water, soluble in acids. **g. hydroxide.** $Gd(OH)_3$ = 208.3. An amorphous white powder, insoluble in water, soluble in acids. **g. sulfate.** $Gd_2(SO_4)_3.8H_2O$ = 746.8. Colorless crystals, soluble in water.

gadose. A fat from codliver oil, occurring as a yellow, greasy mass, m.34, soluble in ether, chloroform or benzene, slightly soluble in alcohol. **anhydrous-** Pure, anhydrous gadose. **glycerinated-** G. containing 25 % glycerin. **hydrous-** G. containing 25 % water.

gadusene. An unsaturated hydrocarbon from animal and vegetable oils, chiefly codliver oil.

gagat. A variety of soft coal.

gage. (1) An instrument for measuring the dimension of an object, or the pressure or flow of a liquid. (2) The diameter of a wire, the thickness of a sheet or plate. **high and low-** A g. which registers both, maximum and minimum dimensions. **hot wire-** (1) A resistance wire sealed in a vacuum tube and used to measure very low pressures by determining: (a) change of current at constant voltage; (b) change of total watts at constant temperature (resistance); (c) change of resistance at constant current. (2) A small thermocouple, q.v. **ionization-** A device for measuring low pressures by the ionization produced in a gas by a definite electron current. With a galvanometer the sensitivity is 10^{-7} amps (= 10 milliamp.) **McLeod-** q.v. **resistance-** Hot wire g.

Gahn, Johann Gottlieb. 1745–1818. A Swedish mineralogist, and discoverer of manganese (1780).

gahnite. $ZnAl_2O_4$. Automolite, zinc-spinel. A variously-colored, vitreous zinc aluminate, d.4–4.6, hardness 7.5–8.

gaidic acid. $C_{16}H_{30}O_2$ = 254.3. A monobasic, unsaturated acid, and homolog of elaidic acid. Colorless crystals, m.39.

Gaillard tower. An absorption tower in which a spray of lead chamber sulphuric acid falls through rising furnace gases and is concentrated.

gaine. An intermediate explosive, used to pass on the action of the detonator to the main, less-sensitive explosive charge.

gainic acid. $C_{40}H_{12}O_{14}$ = 716.1. An acid in humus.

gaize. A very friable argillaceous sandstone, which is converted into a pozzolana when heated.

gal. Abbreviation for gallon.

galactagogue. A drug which increases the secretion of milk.

galactan. $(C_6H_{10}O_5)_x$ = $(162.08)_x$. Gelose. The carbohydrate in the cell-wall of algae, *e.g.*, *Irideae*, *Laminarioides*, obtained as a dextrorotatory gum from agar-agar. It yields galactose on hydrolysis, and mucic acid on oxidation; insoluble in cold water, alcohol, acids and alkalis.

galactase. A proteolytic enzyme of milk resembling erepsin.

galactin. $C_{54}H_{78}O_{46}N_4$ = 1510.62. An amorphous substance derived from milk.

galactolipins. Cerebrosides. Lipin substances of animal and vegetable tissues; as, phrenosin, kerasin, nervone.

galactometer. (1) A graduated glass funnel for determining the fat in milk. (2) A hydrometer for determining the specific gravity of milk.

galactonic acid. $C_6H_{12}O_7$ = 196.1. Pentahydroxy-hexoic acid. A monobasic acid, m.97, b.141, derived from galactose. Cf. *lactonic acid.*

galactosamine. $C_6H_{11}(NH_2)O_5$ = 179.11. The amine of galactose.

galactosan. Galactan.

galactosazone. $C_{18}H_{21}O_4N_4$ = 357.21. The phenylosazone of galactose; yellow needles, m.192–195.

galactose. $C_6H_{12}O_6$ = 180.03. Dextrogalactose, pentahydroxy-hexanol, cerebrose. d- A hexose sugar, derived from milk sugar by hydrolysis either by fermentation or mineral acids. Colorless, hexagonal scales, m.168, soluble in water, slightly soluble in alcohol. l- Laevogalactose, m.162–3, soluble in water, very soluble in alcohol.

galactoside. Cerebroside. A group of glycolipins containing nitrogen, galactose and a fatty acid, *e.g.*, phrenosin, cerasin.

galalith. Artificial horn prepared by the action of formaldehyde on casein.

galangal. Galanga, India root, China root, Kaw-liang ginger, kaw liang kiang. The dried rhizome of *Alpinia officinarum*, a Zingiberaceae of Asia, used as an aromatic and carminative. **g. oil.** The essential oil, d.- 0.910–0.940, of g.; it contains d-pinene and cadinene.

galangin. (1) $C_{15}H_{10}O_5$ = 270.1. A glucoside from the root of galangal. Cf. *alpinin, kaempferide.* (2) *3.5.7*-trihydroxy flavanol, q.v.

galbanum. A gum resin from *Ferula galbaniflua.* Whitish, yellowish or reddish tears of wax-like consistency, m.100; used medicinally as an expectorant or antispasmodic, and externally in plasters.

galega. Goats rue. The herb *G. officinalis*, a Leguminosae; used as vermifuge and galactagogue.

galegine. $C_6H_{13}N_3$ = 127.02. *α-2*-isopentenyl guanidine. An alkaloid, $Me_2C{:}CH.CH_2.N{:}C(NH_2)_2$, from *Galega officinalis*, a Leguminosae; used as an insulin substitute.

Galen. (130-circ. 200 A.D.). An iatrochemist who advocated the use of vegetable in place of mineral preparations in medicine. Cf. *galenical.*

galena. PbS. Galenite. A metallic lead-gray, isometric, lead sulfide, d.7.3–7.6, hardness 2.5. **false-, pseudo-** Sphalerite.

galenical. Medicines of vegetable origin, especially the liquid preparations, *e.g.*, decoction, infusion, percolation, fluid extracts, ect. Cf. *Galen.*

galenite. Galena.

galenobismuthite. A sulfobismuthide of lead.

galhumic acid. Metagallic acid, q.v.

Galilei, Galileo. 1564–1642. An Italian physicist and astronomer, who invented the thermometer and telescope.

galipeine. $C_{20}H_{21}O_3N$ = 323.2. An alkaloid from angostura bark; colorless needles, insoluble in water.

galipene. $C_{15}H_{24}$ = 204.19. A sesquiterpene from *Galipia officinalis*, the source of angostura bark.

galipidine. $C_{19}H_{19}O_3N$ = 309.2. An alkaloid from angostura bark. White, silky lustrous plates, m.110.

galipine. $C_{20}H_{21}O_3N$ = 323.2. An alkaloid from angostura bark. Colorless, slender, lustrous needles, m.115.5.

galipol. $C_{15}H_{26}O$ = 222.2. A sesquiterpene alcohol in the oil of the angostura bark. Colorless crystals, m.89.

galipot resin. The exudation of *Pinus maritima*, a Pinaceae; a source of pimaric acid. Cf. *gallipot.*

galiquoid. A proposed name for a dispersed colloidal system consisting of a gaseous phase in a liquid phase (*e.g.*, foams).

galitannic acid. $C_{14}H_{16}O_{10}.H_2O$ = 362.12. A tannin from the bark of *Galium verum*, a Rubiaceae.

gall. (1) Bile. (2) Nutgalls.

gallacetophenone. $C_8H_8O_4$ = 168.1. *2.3.4*-Trihydroxyacetophenone, methyl-keto-trioxybenzene, alizarin yellow C. A pale yellowish or brownish gray powder, m.168, soluble in water, alcohol, or ether; and used medicinally as an antiseptic for skin diseases.

gallal. An aluminum gallate, used medicinally as a dusting powder.

gallamic acid. $C_7H_7O_4N$ = 169.1. The amide of gallic acid.

gallanilide. $C_{13}H_{11}NO_4$ = 245.09. Gallanol, gallinol, *3.4.5*-trihydroxybenzanilide, $PhNHC_6H_2(OH)_3$. Colorless crystals, m.205, soluble in hot water, alcohol or ether; used medicinally as a dusting powder.

gallanol. Gallanilide.

gallate. (1) A salt of gallic acid; $C_6H_2(OH)_3COOM$. (2) A salt of gallic hydroxide; as; $Ga(OH)_3 + NaOH = NaGaO_2 + 2H_2O$.

gallein. $C_{20}H_{10}O_7$ = 362.1. Gallin, pyrogallolphthalein, anthracene violet. A brown powder or greenish lustrous scales, nearly insoluble in water, soluble in alcohol; decomp. when heated. Used as an indicator in alkalimetry, being very sensitive to alkali (alkalis = bright red, acids = pale brown); in the determination of phosphates in urine; in the manufacture of cerulene and other dyes.

gallic. (1) Describing a trivalent gallium compound. (2) Pertaining to nutgalls. **g. acid.** $C_7H_6O_5.H_2O$ = 188.11. 3.4.5-trihydroxybenzoic acid. White or pale yellow, triclinic crystals or a crystalline powder, d_4° = 1.694, m.225, b.253, (decomp.) slightly soluble in water, soluble in alcohol. It is a constituent of nutgalls, mangoes, and other vegetable matter, and is used as a reagent for detecting small amounts of ferric salts and mineral acids. **g. bromide.** Gallium bromide. **g. chloride.** Gallium chloride. **g. compounds.** See *gallium.* **g. hydroxide.** Gallium hydroxide. **g. iodide.** Gallium iodide. **g. nitrate.** Gallium nitrate. **g. oxide.** Gallium trioxide. **g. sulfate.** Gallium sulfate.

gallicin. $C_8H_8O_5$ = 184.1. Methylgallate, methyl gallic ester. Colorless needles or rhombic prisms, m.202, soluble in hot water, alcohol, or ether; used medicinally as a nontoxic antiseptic dusting powder.

gallin. Gallein.

gallinol. Gallanilide.

gallipot. A small glazed earthen-ware jar used by druggists. Cf. *galipot.*

gallitannic. (1) Galitannic. (2) Gallotannic.

gallium. Ga = 69.72. Austrium. A metallic element of the third sub-group of the periodic system, atomic number 31. Bluish or grayish-white octahedric crystals, d.5.94, m.30.15 to a mercury-like liquid. It was discovered in 1875 by Lecoq de Boisbaudran in zinc blende, after its existence had been predicted in 1869 by Mendelejeff from the periodic system (eka-aluminum). The valencies of gallium are 2 and 3, hence it forms gallous and gallic compounds the latter being the stabler. Like aluminum it forms alums of the general formula, $MGa(SO_4)_2.12H_2O$ *e.g.*, $NH_4Ga(SO_4)_2.12H_2O$,

ammonium gallium sulfate. Used for quartz thermometers (500–1000°C.), for brightening optical mirrors, as a substitute amalgam in filling teeth, and for vacuum lamps, instead of mercury. **g. acetate.** $4Ga(C_2H_3O_2)_3 2Ga_2O_3.5H_2O$ = 1312.7. White crystals, decomp. 128, soluble in water. **g. acetylacetonate.** $Ga(C_5H_7O_2)_3$ = 366.88. White monoclinic (α) or rhombic (β) crystals, d.α-1.42; β-1.41; m.194, soluble in water. **g. bromide.** $GaBr_3$ = 309.9. G. tribromide, gallic bromide. Colorless deliquescent crystals, soluble in water. **g. chloride.** See *g. dichloride*, and *g. trichloride*. **g. dibromide.** $GaBr_2$ = 229.9. Gallous bromide. A colorless powder, decomp. by water. **g. dichloride.** $GaCl_2$ = 140.9. Gallous chloride. Colorless crystals, m. 164, b.535, decomp. by water. **g. diiodide.** GaI_2 = 323.7. Gallous iodide. A colorless powder, decomp. by water. **g. hydride.** Ga_2H_6 = 145.4. A gas, m. −21, decomp. 130. **g. hydroxide.** $Ga(OH)_3$ = 120.7. Gallic hydroxide. A white powder, insoluble in water. **g. iodide.** GaI_3 = 450.5. Gallium tribromide, gallic iodide. A white powder, soluble in water. **g. monoxide.** GaO = 86.0. Gallous oxide. A bluish mass obtained by heating Ga_2O_3 in a stream of hydrogen. **g. nitrate.** $Ga(NO_3)_3$ = 256.2. Colorless crystals, soluble in water. **g. oxalate.** $Ga_2(C_2O_4)_3.4H_2O$ = 475.50. A white microcrystalline powder, insoluble in water. **g. sulfate.** $Ga_2(SO_4)_3$ = 428.0. Gallic sulfate. Colorless crystals, soluble in water or alcohol. It forms double salts with alkali sulfates analogous to alums, *e.g.*, gallium ammonium sulfate, $Ga_2(NH_4)_2(SO_4)_4.24H_2O$. **g. sulfide.** Ga_2S_3 = 235.4. A white powder, insoluble in water. **g. tin alloy.** A liquid metal, m.15, consisting of 88 % Ga and 12 % Sn. **g. tribromide.** See *g. bromide*. **g. trichloride.** $GaCl_3$ = 176.35. Gallic chloride. Colorless, deliquescent needles, m.75.5, b.220, very soluble in water or alcohol. **g. trioxide.** Ga_2O_3 = 187.4. Gallic oxide, g. oxide. A colorless, friable mass, insoluble in water and acids.

gallobromol. $C_7H_4O_5Br_2$ = 327.9. Dibromgallic acid. A light brown powder or fine needles, m.205, slightly soluble in cold water, soluble in hot water, alcohol, or ether. Used medicinally for neurasthenia and epilepsy.

gallocyanin. $C_{15}H_{12}O_6N_2$ = 300.3. A bluish-purple dye obtained from nitrosodimethylaniline and gallic acid; used as a dye.

galloflavin. $C_{12}H_8O_8$ = 277.0. A yellow dye.

galloformin. A condensation product of gallic acid and hexamethylene tetramine. Colorless needles, used as an internal antiseptic.

gallogen. $C_{14}H_6O_8$ = 302.1. Anhydrous ellagic acid. A constituent of divi-divi, the pods of *Caesalpinia coriaria* occurring as a yellow, odorless and tasteless powder, insoluble in water or acids, soluble in alkalis; used medicinally as an astringent and antidiarrhetic.

gallol. Gallinol.

gallols. A group of compounds of pyrogallol, resorcinol and chrysarobin with various acids, as:

eugallol..... pyrogallol monoacetate
lenigallol..... pyrogallol triacetate

gallon. A measure of liquids. The U. S. gallon has a volume of 231 cubic inches, the Imperial or English gallon 277.274 cubic inches. 1 U. S. gallon = 3.785332 liters = 4 quarts = 8 pints = 0.833 imp. gallons.

1 Imperial gallon = 4.54596 liters = 277.420 cubic inches = 1.20032 U. S. gallons = the volume occupied by 10 lbs. of distilled water at 62°F., bar. 30 in.

gallotannic acid. $C_{76}H_{52}O_{46}$ = 1700.3. A glucoside from Chinese gall nuts, sumac, tea, etc., which hydrolyses to glucose and digallic acid. Cf. *tannin*.

gallotannin. Tannic acid.

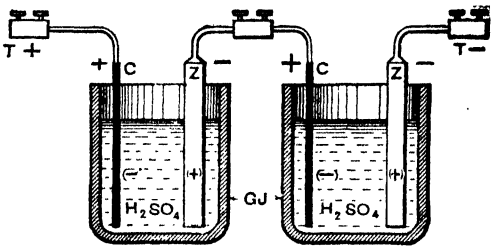
gallous. Any divalent gallium compound. **g. bromide.** Gallium dibromide. **g. chloride.** Gallium dichloride. **g. iodide.** Gallium diiodide. **g. oxide.** Gallium monoxide.

galloyl. The radical $(HO)_3C_6H_2CO$— from tannin, q.v.

gallulmic acid. Metagallic acid.

Galvani, Luigi. 1737–1798. An Italian physician and anatomist, who accidentally discovered the galvanic current.

galvanic. Voltaic. Pertaining to an electric current produced by chemical action. **g. battery.** A series of voltaic cells. **g. current.** A stream of electrons produced by a displacement reaction as in an electric or voltaic cell. Cf. *cell*. **g. element.** Voltaic cell. **g. pile.** A series of disks of two different metals, placed alternately over each other and separated by moistened paper; formerly used for producing a galvanic current.



Galvanic battery of carbon: zinc cells.

galvanism. A branch of physics which deals with electric currents produced by chemical action, as opposed to those produced by heat, friction, or induction.

galvanize; -ise. To protect a metal with a layer of a less oxidizable metal by electric means.

galvanized iron. (1) Iron coated with tin by electrolysis, and then immersed in a zinc bath. (2) Iron immersed in molten zinc and so coated by that metal without the aid of electricity.

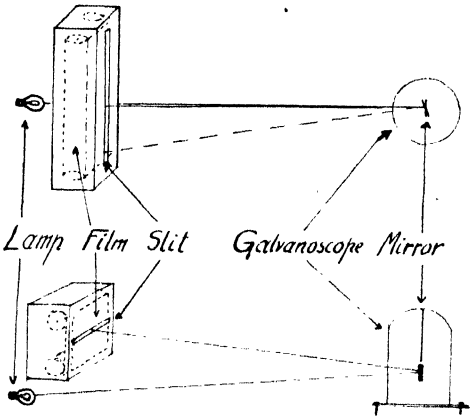
galvanograph. The photographic record of a sensitive galvanometer arranged so that its mirror deflects a beam of light on to a moving film or paper (see figure).

galvanolysis. An obsolete term for electrolysis.

galvanomagnetic effect. (1) A galvanomagnetic difference in potential, see *Hall effect*. (2) A galvanomagnetic difference in temperature, see *Ettinghausen effect*.

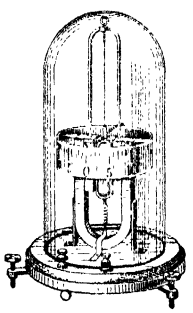
galvanometer. An instrument for detecting and measuring the strength of an electric current. It consists essentially of a magnetic needle suspended in a wire coil. The slightest deflection of the needle produced by a current through the coil is measured by some optical system, *e.g.*, reflection of a beam of light from a mirror attached to the needle, and observation of the reflected beam on a scale. The coil

may be fixed and the magnet moveable, or vice versa. Cf. *potentiometer, polarograph.* **absolute-** An instrument directly measuring current by means of two equally strong electromagnets. **astatic-** An instrument in which two magnetic needles of equal magnetic moment are



Galvanograph arrangement.

suspended parallel to one other, but with their poles in opposite directions. Terrestrial magnetism is thus eliminated and the needles swing freely under the influence of the current. **ballistic-** A galvanometer for the determination of the capacity or energy produced in the discharge of a condenser. **differential-** An instrument with two equal coils through which two separate currents are sent and their comparative strengths thus determined. **D'Arsonval-** A delicate g. in which a magnet and mirror is suspended inside a coil and the deflection of the mirror is read by means of a reflected light beam on a scale, or the scale may be read in the mirror by means of a telescope. Cf. *galvanograph* and figure. **Einthoven-** String-, or thread-. A delicate instrument for detecting minute electric currents, consisting of a silvered quartz thread or platinum thread stretched between the poles of a strong magnet. The shadow of the thread, magnified by a microscope, is read on a screen. **Kelvin-** q.v. **mirror-** Reflecting-. **photo-** Galvanograph, q.v. **reflecting-** Mirror-. A small mirror attached to the galvanic needle. Its deflection is read on a scale by reflected light. **sine-** An obsolete type of g. in which the current passing is proportional to the sine of the angle of deflection. **string-** Einthoven g. **tangent-** The strength of the current through a tangent g. is proportional to the tangent of the angle of deflection. **thread-** Einthoven g.



D'Arsonval galvanometer.

galvanometry. The branch of physics dealing with the measurement of the strength of electric currents.

galvanoscope. Quadrant electrometer. An instrument indicating the presence and direction of an electric current, but not its strength. It consists essentially of a magnetic needle inside a wire coil.

galvanostegy. (1) Galvanotropism. (2) Electrolytic tinning as a protection against hardening by the nitrite process.

galvanotaxis. The response of a living organism or single cell to a galvanic current.

galvanotropism. Galvanostegy. The orientation or motion of living cells in a galvanic current.

galyl. $C_{24}H_{22}O_8N_4P_2As_4$ = 856.5. Tetroxy diphospho-amino-diarseno-benzene. An antisyphilitic preparation, said to be less toxic than salvarsan.

gama wax. Candelilla wax.

gambin. $C_{10}H_7O_2N$ = 173.1. *R.* or g. Reddish, β-nitroso-α-naphthol. A nitroso dye. *Y.* or g. Yellowish, nitrosonaphthol, α-nitroso-β-naphthol. A nitroso dye.

gambir. Pale catechu. The dried extract from a decoction of the leaves and twigs of *Ourouparia* or *Uncaria gambir*, a Rubiaceae of Asia. An odorless brown powder, insoluble in water, soluble in alcohol; used, as tincture or fluid extract, as an astringent and tanning material. **g. catechol carboxylic acid.** $C_{16}H_{14}O_8$ = 334.11. A white solid from gambir, *d*-β- m.259; *l*-β- m.261, *dl*-β- m.252.

gamboge. Camboge, cambogia, gummi guttae. A gum resin from *Garcinia hanburii* and other species of Guttiferae. Grayish or orange brown cylindrical pieces, insoluble in water forming a colloidal solution, soluble in alcohol; used medicinally as a hydragogue and cathartic; also as pigment.

gamete. A sexual cell capable of uniting with another sexual cell to form a zygote, or fertilized cell.

gamma. (1) The third letter of the Greek alphabet, γ or Γ. (2) A unit of weight, γ = the one-millionth part of a gram, microgram, 0.001 mg. or 0.000,000,353 ounce. (3) A unit of magnetic field intensity, γ = 0.000,01 gauss. (4) The g. position. **g. acid.** γ-acid. 2.5-Naphthylamine sulfonic acid. An intermediate in dyestuff manufacture. **g. iron.** An allotropic, non-magnetic variety of iron existing above 860°C., and crystallizing in the cubic system. **g. particles.** A misnomer for g. rays. **g. position.** (1) The third carbon atom in an aliphatic chain; as, γ-chloro-hexane. (2) The third atom of a pentacyclic, or the fourth atom of a hexacyclic compound, as γ-naphthalene substitution, *i.e.*, the position following the β-position and opposite the α-position. **g. rays.** γ-rays. Radiations similar to x-rays, (q.v.), but having shorter wavelengths, emitted by radioactive substances (q.v.), as secondary radiation caused by β-rays striking matter.

gammagraph. A radiograph obtained by the use of γ-rays.

gangaleodine. $C_{18}H_{14}O_7Cl_2$ = 413.0. A depsidone which occurs in lichens of the *Lecanora* species.

ganglion. A nerve cell.

gangue. The earthy portion of an ore (calcite, quartz, barites, fluorspar). It forms a fusible slag which flows away from the metallic portion on reduction. Cf. *flotation.*

ganister. A fine, compact, hard sandstone, used for grinding and for furnace hearths.

ganja; ganjah. The rounded, compressed masses of cannabis as exported from Calcutta.

ganomalite. $(Ca,Mn)Pb_3Si_3O_{11}$. A rare lead-manganese silicate.

ganomatite. $(Fe,As,Sb)_2O_3$. A grayish, reddish, or brownish mineral, d.2.3.

ganophyllite. $Mn_7Al_2Si_8O_{26}.6H_2O$. A brown, monoclinic aluminum-manganese silicate.

garage poison. Petromortis. A mixture of carbon monoxide and air from the exhaust of combustion engines, occurring in garages or tunnels and subways with automobile traffic.

garancin. A preparation made from madder, containing the coloring matter of madder in readily available form. One part garancin has the same dyeing powers as 3–4 parts of madder.

garantose. A brand of saccharin, q.v.

garbage. Waste and refuse from kitchens and households. **g. tankage.** The dried and ground product obtained by steaming and degreasing g.; used as fertilizer.

garcinin. A pigment isolated from fukugi; used as a dye for silk. Cf. *fugugetin.*

garden celandine. The dried herb of *Chelidonium majus*, used medicinally as a cathartic, diuretic and diaphoretic.

gardenic acid. $C_{14}H_{10}O_6 = 274.1$. A quinone split-product of gardenin.

gardenin. $C_{14}H_{12}O_6 = 276.1$. A yellowish crystalline principle from the resin of *Gardenia lucida*, a tree of Southern Asia.

gardinol. A detergent made by reduction of sulfonated fatty acids to the corresponding alcohols, *e.g.*, $HO.R.HSO_3$.

gargle. (1) A solution containing disinfecting substances for rinsing the mouth and throat. (2) To wash the throat.

garlic. Allium. The fresh bulb of *Allium sativum*, a Liliaceae; used medicinally as an irritant and expectorant, and as a condiment. **g. oil.** The essential oil of g., d.1.046–1.057. It contains allyl-propyl disulfide, diallyl-disulfide and the compounds $C_6H_{10}S_3$ and $C_6H_{10}S_4$.

garnet. A dark red, yellowish, or greenish, transparent silicate of the general type $A_3B_2Si_3O_{12}$, in which B is a trivalent metal (Al, Fe, or Cr) and A a divalent metal (Ca, Mg, Fe, Mn). Many of the garnet varieties are used as gems; the common garnet is usually almandite. **g. rock.** A metamorphic rock containing garnet as an accessory mineral, *e.g.*, garnet-mica schists, garnet gneiss, garnet-olivine rock, and garnet hornfels.

aluminum- $R_3Al_2Si_3O_{12}$: 1. *grossularite*, $Ca_3Al_2Si_3O_{12}$ occurring in the following varieties: hessonite = yellowish brown, succinite = amber colored, romanzovite = brown, wiluite = pale green. 2. *pyrope*, $Mg_3Al_2Si_3O_{12}$, deep red to black crystals, d.3.7. 3. *almandite*, $Fe_3Al_2Si_3O_{12}$, red to dark red, d.3.9–4.2, and cut into gems. 4. *spessartite*, $Mn_3Al_2Si_3O_{12}$, red to brown, d.4.2. **calcium-** Essonite. **chromium-** $R_3Cr_2Si_3O_{12}$: 5. *uvarovite*, $Ca_3Cr_2Si_3O_{12}$, emerald green, d.3.5. **iron-** $R_3Fe_2Si_3O_{12}$: 6. *andradite*, $Ca_3Fe_2Si_3O_{12}$, occurring in the varieties: topazolite = yellowish green, colophonite = amber, melanite = black, pyreneite = grayish black, jelleteite = green, dematoid = light green. 7. *manganese garnet*, $Mn_3Fe_2Si_3O_{12}$, occurring in the varieties: rothoffite = yellowish brown, allochroite = light green to black, polyadelphite = brownish yellow to green, aplome = yellowish green. 8. *sodium garnet*, $Na_6Fe_2Si_3O_{12}$ lagoriolite. **manganese-** See *iron g.* (7). **sodium-** See *iron g.* (8). **titanium-** $R_3Fe_2(Si,Ti)_3O_{12}$; *e.g.*, *schorlomite*, $Ca_3(Fe,Ti)_2(Si,Ti)_3O_{12}$.

garnierite. $(Ni,Mg)SiO_3.xH_2O$. Noumeite, numeite. A bright green, amorphous nickel-magnesium silicate, d.2.5–4, hardness 7.5–8.

garryine. An alkaloid from the leaves of *Garrya fremontii* or skunk bush, a Cornaceae of California and Oregon.

gas. (1) The vaporous or air-like state of matter, defined as a non-elastic fluid, in which the molecules are in free movement, and their mean positions far apart. Gases are characterized by their tendency to expand indefinitely, to diffuse and mix readily with other gases, to have definite relations of volume, temperature and pressure and to condense or liquefy at low temperatures, or under sufficient pressure. One cubic centimeter of any gas contains under standard conditions 27×10^{18} molecules. Cf. *Avogadro's, Charles'* and *Boyle's law.* (2) Illuminating or fuel **gas. air-** An illuminating and fuel gas made by blowing air through hydrocarbons. **anesthetic-** The vapors of a volatile anesthetic; as ether or chloroform or an anesthetic gas (nitrous oxide, ethylene or acetylene). **atmospheric-** The gaseous constituents of the atmosphere. Cf. *atmosphere, abundance of elements.* **Blau-** q.v. **chlorine-** Chlorine. **coal-** An illuminating and fuel gas distilled from coal, consisting of aliphatic hydrocarbons, methane, ethane, etc. **coercible-** Liquefiable-. **combustible-** An inflammable gas produced by incomplete combustion, and containing chiefly carbon monoxide, *e.g.*, coke gas, coke oven gas. **compound-** A gaseous compound, *e.g.*, methane, carbon dioxide. **compressed-** See *compressed gases.* **electrolytic-** A mixture of 2 vols of H_2 and 1 vol of O_2. **elementary-** A gaseous element; an element which is gaseous under ordinary conditions, *e.g.*, chlorine, fluorine, hydrogen, nitrogen, oxygen and the noble gases. **fluorine-** Fluorine. **forest-** Producer gas obtained from wood and wood-charcoal; used as a fuel. **fuel-** A gas used as fuel, *i.e.*, for the production of heat by combustion. **full-** An inflammable gas consisting of saturated hydrocarbons, *e.g.*, water gas. **hydrogen-** Hydrogen. **ideal-** Perfect-. **illuminating-** A gas used for the production of light, *e.g.*, Common gas (coal gas), natural gas, water gas, or oil gas. **inflammable-** A gas which is able to burn in air, *e.g.*, hydrogen. **industrial-** G. produced commercially and used in trades, and industries. **inert-** (1) Noble gases. (2) A gas which does not react chemically, *e.g.*, nitrogen is an inert gas towards living organisms. **intestinal-** The gases produced during digestion, consisting of nitrogen, hydrogen sulfide, etc. **lachrymatory-** Any gas which produces a profuse secretion of tears. **laughing-** Nitrous oxide. **lighting-** Illuminating-. **marsh-** Methane. **natural-** (1) The inflammable gases from oil wells, used in certain communities as an illuminating and fuel gas; they consist mainly of paraffins (methane, etc.), small amounts of hydrogen, ethylene, carbon dioxide, and carbon monoxide. (2) Helium. **noble-** The members of the zero group of the periodic system consisting of entirely inert elements: He, Ne, Ar, Kr, X, and Nt. **oil-** An illuminating and fuel gas distilled from crude petroleum. **noxious-** Any poisonous g. or a g. with a strong odor. **oil-** Natural g. **olefiant-** Ethylene. **oxygen-** Oxygen. **perfect-** A fluid

INDUSTRIAL GASES

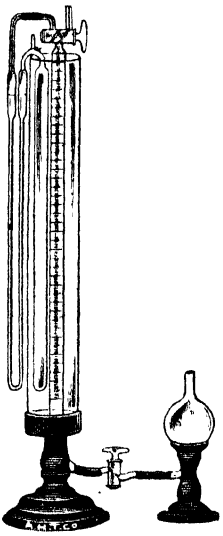
Name (1)	Formula (2)	B.P. (3)	T_c (4)	P_c (5)	C_p/C_v (6)	Use (7)	Pressure (8)
helium	He	−268.8	−267.9	2.26	—	L.B.	1500
hydrogen	H_2	−252.5	−239.9	12.8	1.510	W.B.	1800
neon	Ne	−243	−228.8	26.9	—	L.	
nitrogen	N_2	−195	−147.1	33.5	1.404	.....	1500
air, compressed	.....	.....	−140	39	1.5	R.	1500
argon	A	−186	−122.4	48.9	1.67	L.	1800
oxygen	O_2	−182	−118.8	49.7	1.401	.....	1500
methane	CH_4	−164	− 95.5	50	1.31	I.	1500
krypton	Kr	−152	− 62.5	54.2	—	L.	
xenon	Xe	−109	14.7	57.2	—	L.	
ethylene	C_2H_4	−102.7	9.7	50.5	1.255	A.	1250
nitrous oxide	N_2O	− 90	38.8	77.5	1.303	A.	800
ethane	C_2H_6	− 86	35	50	1.22	I.	525
carbon dioxide	CO_2	− 85	31	73	1.304	R.C.	800
acetylene	C_2H_2	− 83	36.5	61.6	1.26	W.A.	
hydrogen sulfide	H_2S	− 61.8	100	88.7	1.32	C.	260
propane	C_3H_8	− 39	95.6	44	1.13	I.	110
propylene	C_3H_6	− 37	92.3	45	—	A.	125
ammonia	NH_3	− 38	130	115	1.31	R.C.	115
cyclopropane	C_3H_6	− 35	.....	.....	.....	A.	75
chlorine	Cl_2	− 33.6	144	76	1.35	C.	70
freon	CCl_2F_2	− 29.8	111	39	1.138	R.	
methylchloride	CH_3Cl	− 23.5	143	66	1.28	R.	80
butylene	C_4H_8	− 18	.....	.....	.....	I.	40
sulfur dioxide	SO_2	− 10	155.4	78.9	1.29	C.R.F.	35
butane	C_4H_{10}	1	153	36	1.1	I.	22
phosgene	$COCl_2$	8.2	182	56	—	F.	30
ethylene oxide	C_2H_4O	14	192	—	1.1	F.	
methylenechloride	CH_2Cl_2	40	216	102	1.22	R.	
dichloroethylene	$C_2H_2Cl_2$	50	243	55	1.15	R.	

(3) Boiling point in °C.
(4) Critical temperature in °C.
(5) Critical pressure in atmospheres
(6) Ratio of specific heat capacity at constant temp. and pressure (15°C).
(7) Principal uses: A, anesthetic; B, airships; C, chemical reactions; F, fumigant; I, illuminant and fuel; L, lamps; R, refrigerant; W, welding.
(8) Pressure in shipping cylinder (pounds per square inch).

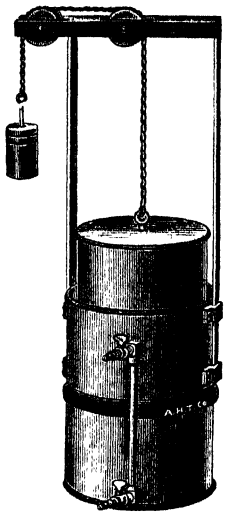
which obeys the gas laws. None is known, but it is assumed that as the pressure on a gas becomes infinitely small, the gas approaches nearer and nearer to the ideal state, where there is no viscosity or internal resistance to molecular motion. **permanent-** An obsolete term for gases which are not liquefyable; with sufficiently low temperature and high pressure all gases condense to liquids, hence this term has only a relative meaning. **petroleum-** Oil. **poison-** A harmful gas, used in chemical warfare. Classification: (a) Lung irritants (chlorine, phosgene, diphosgene, chloropicrin). (b) Lacrimators (bromoacetone, ethyliodoacetate, bromobenzyl cyanide, chloracetophenone). (c) Sternutators (diphenyl cyanarsine, diphenylamine chlorarsine). (d) Vesicants (mustard gas, lewisite). **rich-** Full-. **rock-** Natural-. **sewer-** The gaseous products from a sewer, containing the vapors resulting from the decay of organic material. **sternutatory-** A gas which produces sneezing. **suffocating-** Any gas which is non-respirative, causes smothering and finally stops respiration. **sun-** The gaseous constituents of the sun, *e.g.*, hydrogen, helium, carbon dioxide, etc. **toxic-** A gas which causes poisoning. **two dimensional-** A layer of adsorbed atoms; cf. *adatom*. **vesicant-** A gas which produces blisters of the skin; used in chemical warfare. **volcanic-** A group of gases issuing from volcanoes, which consist of carbon dioxide, nitrogen, hydrogen, sulfur-dioxide, hydrogen sulfide, etc., in varying quantities. **war-** Poison-. **water-** An illuminating and fuel gas prepared by passing steam over glowing coal, and enriching the hydrogen thus produced by hydrocarbons, and carbon monoxide. There are many varieties, which differ according to the conditions of manufacture, (Mond gas, blue gas, water gas, etc.).

g. analysis. Gasometric analysis. The qualitative and quantitative detection and determination of gases. **g. analysis apparatus.** Devices used in gasometric analysis, see *Allen, Burrell, Haldane, Orsat, Petersen, etc. apparatus*. **g. bag.** An oval rubber container for holding gases. **g. balance.** A balance for determining the specific gravity of gases. **g. ballons.** A blown spherical glass container with one or more necks, used for weighing gases. **g. bath.** Air bath. **g. battery.** G. cell. **g. black.** Lamp black. **g. bleaching.** Bleaching by sulfur dioxide or chlorine. **g. buret.** A graduated glass tube with stopcocks on both ends; used in gasometric analysis (see figure). **g. burner.** A burner using gas as fuel. **g. calorimeter.** An

analytical apparatus for determining the heat value, dust, moisture and tar contents of inflammable gas. **g. carbon.** The amorphous, compact residual carbon remaining in the retorts after distillation of gas from coal; used for electrodes in cells and arc lamps. **g. cell.** An electrolytic cell formed by the combination of two gas electrodes, *e.g.*, the E.M.F. of polarization in the electrolysis of water. **g. collecting tube.** An elongated cylinder or bulb closed at each end by a stop-cock. **g. constant.** The



Gas buret.



Gasholder.

constant, R, in the gas-law equation $pv = RT$. This constant, is independent of the chemical nature of a gas, but depends on the units of measurement chosen: $R = p_0v_0/T_0$, where p, v, and T are the pressure, volume, and temperature under the conditions of an ideal gas respectively.

When p is expressed in gm./cm.^{2}, and v in cm^3: R = 84.780 gm.cm./T.

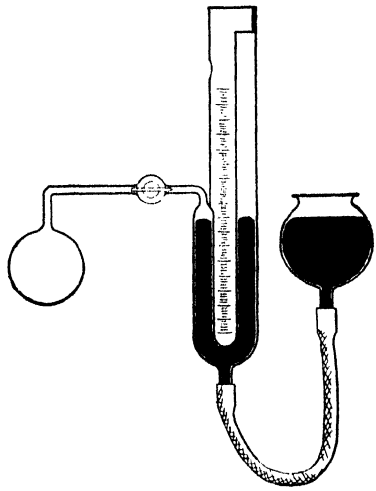
If p is in atmospheres, v in liters: R = 0.08204 l.atm./T.

If p in dynes, v in cm.^{3}: $R = 8.315 \times 10^7$ ergs/g.mol. (or = 1.98 calories).

If p in kg./m.^{2}, and v in cm.^{3}: $R = 8.48 \times 10^5$ kg.m.^{2}/T.

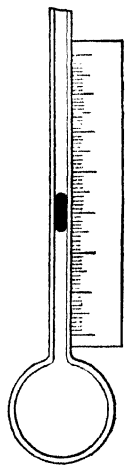
To derive R for 1 gram of gas, it should be divided by the molecular weight (O = 16).

See also *equations of state.* **g. cylinder.** A long steel tank or iron bottle used in shipping liquefied gases, such as carbon dioxide, oxygen, hydrogen, ammonia, chlorine, etc. See *compressed gases.* **g. distributor.** A three-, or four-way stop-cock. **g. electrode.** An electrode, usually of a finely-divided metal, which, by virtue of its power to dissolve or hold a gas on its surface, behaves as a reversible electrode when placed in a solution. See *hydrogen electrode.* **g. engine.** An engine in which the motive power is obtained by the combustion of a gas or gas-mixture in the cylinder. **g. filter.** A device for removing solid or liquid particles from gases. **g. generating bottles.** A device for generating gases in the laboratory, as a Kipp generator. **g. generators.** A machine for the manufacture of gases, *e.g.*, the retort of a gas plant. **g. holder.** A storage tank for holding gases at atmospheric pressure; it consists of two overlapping halves expanding



Constant volume gas thermometer.

within each other and sealed by a liquid (see figure); or, the gas may be displaced from a gas-tight container by allowing water to flow in. **g. laws.** The combination of Boyle's, Gay-Lussac's, and Charles' laws in the equation PV = RT, where V is the volume occupied by the molecular weight in grams, under a pressure P and at temperature T, and R is the g. constant, q.v. See *equation of state.* **g. liquor.** The watery liquor which results from the washing of gas obtained in the distillation of coal. It is a source of ammonia, and also contains sulfides and carbonates. **g. manometer.** A steam gage, q.v. **g. mask.** Respirator. **g. meter.** Gasometer. **g. pipet.** A series of glass bulbs mounted on a frame; used in gasometric analysis. **g. regulator.** (1) A device for regulating the pressure of the gas taken from a cylinder in which it is compressed. (2) A device for regulating the temperature of a gasheated incubator or water-bath by controlling the gas supply. **g. thermometer.** An apparatus for measuring temperature by the variation in pressure or volume of a gas, generally hydrogen. *constant volume-* designed to observe the variation in the pressure of a gas confined at constant or nearly constant volume. *constant pressure-* designed to demonstrate the change in volume of a gas confined at constant pressure, generally air-pressure (see figures).



Constant pressure gas thermometer.

gaseous. The third state of matter, as opposed to the solid and liquid state.

gasogene. Charcoal gas used as fuel.

gasolene, gasoline. Petroleum ether. The third fraction obtained on distillation of petroleum or crude oil, b.75, consisting chiefly of paraffins, *e.g.*, hexane, heptane. Used as a fuel in

combustion engines, as a solvent and cleaning agent. Cf. *oronite*. **ethyl-** See *ethyl*.

gasoloid. A proposed name for a dispersed system which consists of a gaseous dispersed phase in a solid surrounding phase; *e.g.*, gas of occlusion (see *colloids*).

gasometer. (1) An instrument for measuring the quantity of gas flowing through it. (2) A gas-holder.

gasometric. Pertaining to the analysis of gases.

gasometry. Gasometric analysis, gas analysis. The examination and qualitative and quantitative analysis of gases.

gassed. Overcome by noxious gas.

gassing. (1) In agriculture the gassing of plants, *e.g.*, the use of carbon dioxide as a fertilizer, or of a poison gas for destroying animal pests or weed eradication. (2) In warfare, the use of poison gas (q.v.) as a measure of attack or defense.

Gassner cell. A voltaic dry cell (1.3 volt), consisting of a zinc and carbon electrode in a mixture of 1 pt. zinc oxide, 1 part ammonium chloride, 3 parts calcium sulfate, 2 parts zinc chloride moistened with water to form a paste.

gastric. Pertaining to the stomach. **g. content.** Semi-digested food mixed with digestive enzymes. Analysis: (1) Macroscopic: Amount, color, odor, appearance, food-remnants. (2) Microscopic: Blood cells, pus cells, starch cells, mucus shreds and sarcinae. (3) Chemical: Total acidity, free hydrochloric acid, free organic acids, total free acids, combined hydrochloric acid, combined organic acids, lactic acid, pepsin, peptone, occult blood. **g. digestion.** The decomposition of food-materials in the stomach; chiefly the hydrolysis of proteins by pepsin with hydrochloric acid as activator. **g. juice.** The secretions of the stomach glands, containing the digestive ferments and enzymes. **g. tonic.** A drug which improves or stimulates digestion.

gastrin. A gastric hormone, *i.e.*, a substance in the gastric mucous membrane which excites the secretion of gastric juice.

Gattermann, Ludwig. 1860–1920. A German organic chemist, noted for laboratory methods.

gauchamacine. *Guachamacine.*

gauge. Gage.

gaultheria. The dried leaves of *Gaultheria procumbens*, wintergreen, partridge berry or checker berry, an Ericaceae of North America; used as a stimulating tea. **g. oil.** Wintergreen oil.

gaultheric acid. Methylsalicylate.

gaultherilene. $C_{10}H_{16}$ = 136.2. A terpene in wintergreen oil.

gaultherin. $C_{14}H_8O_8$ = 314.4. Monotropitoside. A glucoside from the bark of *Betula lenta* or black birch. It hydrolyses to methyl salicylate and glucose.

gaultherolin. Methyl salicylate.

Gauss, Karl Friedrich. 1777–1855. A German mathematician who developed the conception of the three fundamental units: length, mass and time.

gauss. H. The unit of intensity of a magnetic field (field strength): A magnetic field which exerts a force of one dyne on a unit magnetic pole: 1 gauss (E.M.U.) = $\frac{1}{3} \times 10^{-10}$ e.s.u. For small measurements: 1 γ = 0.00001 gauss.

Gautier receiver. A glass apparatus for collecting different samples from the same condenser during distillation (q.v.) in a vacuum.

gauze. A light, loosely-woven fabric, or fine wire netting. **g. top.** A piece of g. attached to the top of a bunsen burner to prevent the flame from striking back.

Gay-Lussac, Joseph Louis. 1778–1850. A French chemist and physicist noted for the formulation of the gas laws; inventing volumetric methods, and many scientific and industrial devices; isolating boron. **G. hydrometer.** A hydrometer used for alcoholic liquids and graduated in percentages. **G. law.** When gases intereact the volumes of the reacting gases and the volume of the reaction product are in simple proportions, and can be expressed by whole numbers. **G. tower.** A tower used in the chamber process for the manufacture of sulphuric acid to absorb the oxides of nitrogen in the crude acid produced.

Joseph Louis Gay-Lussac.

(From McPherson and Henderson "First Course in Chemistry." Courtesy of Ginn & Co.)

gaylussite. $Na_2Ca(CO_3)_2.H_2O$ = 224 03. A natural sodium-calcium carbonate.

gazogene. A fuel gas made by burning charcoal.

Gd. The symbol for gadolinium.

Ge. The symbol for germanium.

Geber. Abu Abdallah Jaber. An Arabian alchemist and writer living in about the 9th century, noted as the discoverer of sulfuric and nitric acid. The Latin writings attributed to him (which may be of a later date), also contain speculations on the alchemical "elements."

gedanite. A fossil resin resembling amber.

gedrite. A variety of anthophyllite containing alumina.

gee-lb. Slug.

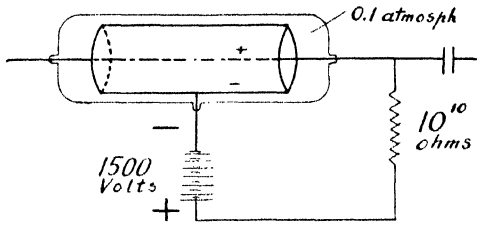
gehlenite. $Ca_2Al_2Si_2O_{10}$. A greenish, resinous, tetragonal calcium aluminum silicate, d.2.9–3, hardness 5.5–6.

geic acid. Ulmic acid.

Geiger counter tube. A fine wire, axially placed in a metallic cylinder under a gas pressure of about 5 cm Hg; used for detecting and counting electrons.

Geiger-Müller counter. A metallic cylinder, charged negatively, in a vacuum tube (0.1 atm.), having in its center a fine wire positively charged. A radiation producing a negative ion will cause it to move towards the wire, and by encountering and colliding with gas molecules it will successively ionize them, thus causing an avalanche

of ions on the wire which can be detected by electrical amplification (see figure).



Geiger-Müller counter.

geikielite. Ilmenite.

geissine. $C_{19}H_{24}O_2N_2.H_2O$ = 330.3. Geissospermine. An alkaloid from the bark of *Geissospermium laeve* or pereira bark, an Apocynaceae of Brazil.

Geissler, Heinrich. 1814–1879. A German physicist who determined the coefficient of expansion of water and experimented with tubes, now called Geissler tubes. **g. bulb.** A potash bulb. **G. tube.** A sealed and partly evacuated glass tube of varied shape, used in the study of electric discharges through gases and for spectroscopic examinations

geissospermine. Geissine.

gel. (1) Jel. A jelly, or the solid phase of a colloids' solution, as opposed to sol, the liquid phase. It consists of a colloidal solution of a liquid in a solid. (2) To form a gel or jelly. Cf. *coagel, swelling, thixotropy, zone.* **alco-** A solid colloidal solution in alcohol. **hydro-** A solid colloidal solution in water. **irreversible-** A gel that cannot be converted into a sol. **reversible-** A gel that becomes a liquid sol on heating or by other treatment, and gels or solidifies again on cooling. **silica-** See *silica.*

gelate. Gelatinise. To cause the solidification of a colloidal solution.

gelatification. Conversion into gelatin.

gelatin. An albumin from animal tissues (bones, ligaments and skin), obtained by boiling them under pressure with water. It occurs as white or yellowish films, insoluble in cold water but which soften and swell when immersed in it; insoluble in alcohol or chloroform, soluble in hot water, acetic acid, or glycerin, and coagulated by tannin, chlorine, bromine, or mercury salts, and hardened by formaldehyde. Composition:

	C	H	N
Commercial gelatin.	49.38 %	6.81 %	17.97 %
ligament gelatin....	50.49 %	6.71 %	17.90 %
tendon gelatin.....	50.11 %	6.56 %	17.81 %
		S	O
Commercial gelatin.....		0.71 %	25.13 %
ligament gelatin.....		0.57 %	24.33 %
tendon gelatin.....		0.26 %	25.24 %

The formulae $C_{76}H_{124}O_{29}N_{24}S$ and $C_{102}H_{151}O_{31}N_{39}$ have been proposed. G. is an amphoteric compound which combines with cations to form "gelatinates," and with anions to form "gelatin-salts":

1. nonionized (iso-electric)..... pH 4.7
2. ionized: (*e.g.* with sodium chloride)
   - A. Metal-gelatinate (*e.g.* sodium gelatinate)..... pH < 4.7
   - B. Gelatin-salt (*e.g.* gelatin chloride)..... pH > 4.7

Gelatin is used as a nutrient; medicinally as a hemostatic; pharmaceutically as an excipient; in bacteriology as a culture medium; technically for photographic papers, films and plates, and in glues, as a clarifying agent in many processes (brewing, etc.), as adhesive, sizing or stiffening agent and colloidal protector. Cf. *isinglass, agar, glue.* **ana-** One of the two constituents of gelatin, soluble or insoluble ana-gelatin, which, when present in the correct proportions produce a gel. **animal-** Gelatin. **bone-** Gelatin prepared from bones. **chinese-** Vegetable-. **chromatized-** A mixture of 5 parts of a 10 % gelatin solution and one part potassium dichromate. **formalin-** Glutolin. **glycerinated-** A mixture of equal parts of glycerol and gelatin. **Japanese-** Agar-agar. **nitro-** A mixture of nitroglycerin and nitrocellulose. Cf. *dynamite, gelignite.* **plain-** A culture medium which consists of 100 gm. gelatin, 10 gm. peptone, and 5 gm. sodium chloride in 1000 cc. bouillon stock solution and neutralized with NaOH. **silk-** Sericin. **vegetable-** A gelatinous substance obtained from various vegetable tissues; as, agar.

g. culture. A bacterial culture grown on a medium containing gelatin; as, pure g., glucose g. **g. discs.** A small disc of medicated gelatin used for the application of drugs to the eye. **g. sugar.** Glycocoll.

gelatinate. A compound of gelatin, (q.v.), with a positive ion or radical.

gelatinize. (1) To gelate. (2) To convert into gelatin.

gelatinous. Jelly-like or resembling gelatin.

gelation. The formation of a gel, q.v. **con-** See *congelation.* **re-** See *regelation.*

gelignite. Blasting gelatin, gelatin dynamite. An explosive consisting of nitroglycerin, nitrocellulose, potassium nitrate and wood-meal. Cf. nitro*gelatin.*

gelling point. The setting point (concentration and temperature) at which semi-liquids or pastes become solid.

gelose. Galactan.

gelsemic acid. Scopoletin.

gelsemin. $C_{49}H_{63}N_5O_{14}$ = 945.9. A resinous substance from the rhizome of *Gelsemium sempervirens.* A yellowish-brown powder, insoluble in water, soluble in alcohol; used medicinally as an antipyretic.

gelsemine. $C_{22}H_{26}O_3N_2$ = 366.22. An alkaloid from the roots of *Gelsemium sempervirens.* A white, amorphous powder, m.160, insoluble in water, soluble in alcohol, ether, or chloroform; used medicinally as an analgesic and antispasmodic.

gelseminic acid. Scopoletin. $C_{10}H_8O_4$ = 192.1. The monomethylether of esculetin: 4-methoxy-5-hydroxycoumarin, m.204.

gelseminine. $C_{42}H_{47}O_{14}N_3$ = 819.6. An alkaloid from the roots of *Gelsemium sempervirens,* yellow jassamine or Carolina jasmine, a Loganiaceae of North America. Colorless crystals, insoluble in water, soluble in alcohol, ether or chloroform; used medicinally as an antipyretic, antineuralgic, and antispasmodic. **g. hydrobromide.** $C_{42}H_{47}O_{14}N_3.HBr$ = 900.53. Colorless crystals, soluble in water or alcohol; used as gelseminine. **g. hydrochloride.** $C_{42}H_{47}O_{14}N_3.HCl$ = 856.07. Colorless crystals, soluble in water or alcohol. **g. nitrate.** $C_{42}H_{47}O_{14}N_3.HNO_3$ = 881.61. Colorless crystals, soluble in water or alcohol.

Gelsemium. (1) A genus of loganiaceous (de Candolle), apocynaceous (Decaisne) or rubia-

ceous (Chapman) plants. (2) Yellow jasmine root. The dried rhizome and roots of *Gelsemium sempervirens*, a Loganiaceae, used medicinally as a nerve sedative, antispasmodic and antineuralgic.

gelsemoid. The combined principles from the root of *Gelsemium sempervirens;* used medicinally as an antispasmodic.

gem. (1) A precious stone. (2) *gem-* A prefix indicating in a disubstituted compound that the radicals, R', are both on the same carbon atom; $R.CR_2'$. **artificial-, synthetic-** A precious stone made by a chemical process, *e.g.*, ruby.

gemmatin. $C_{17}H_{12}O_7$ = 328.08. A coloring matter from the fungus, *Lycoperdon gemmatum.*

-gen. A suffix meaning to produce or bear; as, hydrogen, oxygen.

genalkaloids. An alkaloid in which the amino group has been converted into an amino-oxy group. They have the same therapeutic effect but are less toxic than the parent alkaloid.

gene. A supermolecule or micelle of proteins, considered to be the unit of heredity, which surrounded by colloidal matter, forms the chromomere, the latter, banded together, being the chromosome. (In the tiger lily there are 2200 genes per chromosome.)

genease. Maltase.

generate. To produce or make a gas or an electric current.

generator. An apparatus for manufacturing gases; as, Kipp's g.

generator gas. A fuel gas obtained by blowing air through layers of heated coal or coke. It consists chiefly of CO and CO_2.

generic test. The reactions of organic compounds which determines their place in Mulliken's classification of organic compounds.

Geneva nomenclature. A system of naming carbon compounds recommended by the Geneva Convention for general and international use. See *organic compounds, nomenclature.*

genistein. $C_{15}H_{10}O_5$ = 270.08. Prunetol, 4'.5.7-trihydroxyisoflavone. A flavone (q.v.) from various plants; the aglucone of genistin.

genistin. $C_{21}H_{20}O_{10}$ = 432.15. A glucoside, m.-254, from soy-bean meal. Cf. *plant-pigments.*

genoline oil. Linseed oil polymerised by boiling; used as a lithographic varnish.

gentaric acid. $C_7H_{10}O_6$ = 190.08. Methane triacetic acid. $CH(CH_2COOH)_3$.

genthite. Nickel gymnite.

gentian. Gentian root. The dried rhizome and roots of *Gentiana lutea*, a Gentianaceae; used medicinally as a bitter tonic and stomachic. See *aromatin.*

gentianviolet. The hydrochloride, sulfate, or nitrate of triphenyl-rosaniline and triphenyl-pararosaniline. Grayish-green or bluish powder, soluble in water or alcohol. Used as a stain, and as a disinfectant in tonsillitis.

Gentianaceæ. Gentian family, a group of herbs with a colorless, bitter juice, containing little or no tannin. The following are drugs:

roots:	
Gentiana lutea	gentian
Frasera walteri	American calumba
Tachia guianensis	tachia
herbs:	
Swertia chirayita	chirata
Centaurium centaurea	centaury
Sabbatia paniculata	sabbatia
Menyanthes trifoliata	menyanthe

gentianic acid. Gentisinic acid.

gentianin. (1) An extract containing the bitter principle of the root of *Gentiana* species. (2) Gentisin.

gentianite. $C_{16}H_{32}O_{16}$ = 480.3. A carbohydrate found in the root of *Gentiana* species.

gentianose. $C_{18}H_{32}O_{16}$ = 504.25. A trisaccharide, $[\alpha]_D$ +31°, from gentian, which yields 2 molecules glucose and one molecule fructose.

gentienin. $C_{14}H_{10}O_5$ = 258.1. An isomer of gentisin, m.225.

gentiin. $C_{25}H_{28}O_{14}$ = 552.2. A glucoside from *Gentiana* species, m.274.

gentiobiose. $C_{12}H_{22}O_{11}$ = 342.17. A disaccharide, $[\alpha]_D$ +9.6°, from the hydrolysis of starch. Isomaltose, glucose-β-glucoside.

gentiogenin. $C_{14}H_{16}O_5$ = 264.2. A split-product of gentiopicrin.

gentiopicrin. $C_{16}H_{20}O_9$ = 356.2. A glucoside from the root of *Gentiana* species. Yellowish crystals, m.191°, soluble in water.

gentisaldehyde. $C_7H_6O_3$ = 138.05. *2.5*-Dihydroxybenzene carbonal*, *2.5*-dihydroxybenzaldehyde. $(HO_2)C_6H_3CHO$. Cf. *protocatechualdehyde, resorcylaldehyde.*

gentisein. $C_{13}H_8O_5$ = 244.1. 1.3.7-trihydroxyxanthone. Colorless crystals, m.315.

gentisic acid. $C_7H_6O_4$ = 154.1. Hydroquinone carboxylic acid, 2.5-dihydroxybenzoic acid, gentisinic acid, gentianic acid, 5-hydroxysalicylic acid. Colorless crystals, m.200, soluble in water or alcohol.

gentisin. $C_{14}H_{10}O_5$ = 258.1. Gentianin, 1-methoxy-3.7-dihydroxyxanthone. The yellow pigment of the root of *Gentiana* species. Yellow needles, m.267, sublimes and decomp. at 400°C., slightly soluble in water, soluble in alcohol or ether. **iso-** 7-Methoxy-1.3.dihydroxyxanthone.

gentisin alcohol. $C_7H_8O_3$ = 140.1. 2.5-dihydroxytoluyl-alcohol. A colorless liquid. **dimethyl-** $C_9H_{12}O_3$ = 168.1 2.5-dimethoxytoluyl alcohol. A colorless liquid, b.278.

gentisinic acid. Gentisic acid.

genus. (1) A group of related organic compounds in Mulliken's classification. (2) A group of related species of plants or animals.

geocerinic acid. $C_{28}H_{56}O_2$ = 424.5. An unsaturated aliphatic acid obtained from lignite.

geocerinone. $C_{27}H_{57}.CO.C_{27}H_{57}$ = 791.1. An unsaturated, aliphatic ketone obtained from lignite. Colorless crystals, soluble in water or alcohol.

geochemistry. A branch of geology which deals with the chemical changes occurring on the earth's crust, by which its composition is altered.

geocoronium. A hypothetical element assumed to exist in the upper layers of the atmosphere.

geocronite. $Pb_5Sb_2S_8$ or $5PbS.Sb_2S_3$. A grayish, metallic, rhombic lead antimony sulfide, d.6.4–6.5, hardness 2–3.

geodesy. The science of the form and dimensions of the earth and its surroundings.

geodynamics. The active phase of geology, or a study of the forces and causes which change the earth surface. Cf. *geomorphology.*

geoffrayin. Rhatanin.

Geoffroy, Claude Joseph. 1685–1752. A French apothecary who determined the constitution of borax, salmiac and other salts. **G., Etienne Francois** 1672–1731. A French physician and teacher of chemistry, noted for his theory of affinity.

geologic. Pertaining to geology.

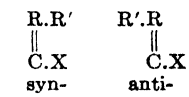
GEOLOGIC ERA

ERA PERIOD AND SYSTEM EPOCH AND SERIES	*Time*, estimated in millions of years			*Rock-types;* Maximum known thickness in 1000 ft.		
	era	period	epoch	era	system	series
CENOZOIC ERA	60	.....	.....	70	..	..
Quaternary period and system	...	1–1.5	.....	...	4	..
Tertiary period and system	...	54–63	.....	...	66	..
Pliocene epoch and series	...	.....	6 –7.5	...	..	10
Miocene epoch and series	...	.....	12–14	...	..	21
Oligocene epoch and series	...	.....	16	...	..	12
Eocene epoch and series	...	.....	20–26	...	..	23
MESOZOIC ERA	150	.....	.....	75	..	..
Cretaceous period and system	...	65–85	.....	...	46	..
Upper cretaceous epoch and series	...	.....	40–50	...	..	20
Lower cretaceous epoch and series	...	.....	25–35	...	..	26
Jurassic period and system	...	35–45	.....	...	15	..
Triassic period and system	...	35–45	.....	...	13	..
PALEOZOIC ERA	420	.....	.....	161	.	..
Carboniferous period and system	...	100–140	.....	...	52	..
Permian epoch and series	...	.....	25–40	...	..	13
Pennsylvanian epoch and series	...	.....	35–50	...	..	24
Mississippian epoch and series	...	.....	40–50	...	..	15
Devonian period and system	...	50	.....	...	37	..
Silurian period and system	...	40	.....	...	15	..
Ordovician period and system	...	90–130	.....	...	13	..
Cambrian period and system	...	70–110	.....	...	40	..
PROTEROZOIC ERA	850	.....	.....	180	..	..
Algonkian period and system	...	?	.....	...	82	..
Keweenawan epoch and series	...	.....	?	...	..	50
Huronian epoch and series	...	.....	?	...	..	32
Archean period and system	...	?	.....	...	94	..

geologic era. The periods during which certain rock strata were formed on the earth's surface. Accordingly the earth's physical history is divided into *eras*, subdivided into *periods* and again divided into still smaller units called *epochs*. The rocks formed during a period constitute a geologic *system*, those formed during an epoch constitute a *series* which are again subdivided into *formations*, many of them characterized by the remains of vegetable and animal life. Hence we speak of the quaternary period and the quaternary system, but the pliocene epoch and the pliocene series. (See table, adapted from Bulletin No. 769, U. S. Geologic Survey, Washington, 1926.)

geology. The science of the physical history of the earth and the structure of the earth surface. **dynamic-** The study of the agencies which cause geological changes. **economic-** The study of the occurrence and formation of economically important minerals, ores, or stones. **eolic-** The study of the changes produced by wind. **historical-** The study of the successive development of rock formations. **palaeantologic-** The study of the remains of animal and vegetable life and their relation to rock formations. **stratigraphic-** Historical-. **structural-** The study of the formation, arrangement, and aggregation of rocks on the earth surface.

geometric(al). Pertaining to or determined by the principles of geometry. **g. conversion.** The change from one g. isomer to another; as elaic acid to oleic acid, or maleic acid to fumaric acid. **g. isomer.** An optically inactive compound which exists in two or more geometrically different atomic arrangements; as, cis- and trans-form, syn- and anti-form. **g. isomerism.** Describing isomeric organic compounds characterized by a double bond, in which the molecules differ by a geometrically different spacial arrangement of the atoms, but which are optically inactive; as,



g. progression. A series of numbers related by a constant ratio between successive terms. For instance the number of possible peptides from 1,2,3 . . . amino acids are:

1 amino acid	1 compound
2 a.a. = 2 × 1 or	2 compounds
3 a.a. = 3 × 2	6 compounds
4 a.a. = 4 × 6	24 compounds
5 a.a. = 5 × 24	120 compounds
6 a.a. = 6 × 120	720 compounds

geomorphology. The passive phase of geology, or a study of the form of the earth surface. Cf. *geodynamics*.

georhetinic acid. $C_{28}H_{40}O_{31}$ = 836.4. A resin from lignite.

geosote. Guaiacol valerate. A compound of guaiacol and valeric acid, used as an antiseptic.

geranene. $C_{10}H_{16}$ = 136.2. A liquid hydrocarbon derived from geraniol.

geranial. Citral.

geranic acid. $C_{10}H_{16}O_2$ = 168.2. *3.7*-Dimethyl-*2.6*-octadienoic acid*. A monobasic acid and the oxidation product of citral or geraniol. An oily liquid, d.0.952, b_{20mm}.119. **iso-** Colorless crystals, m.103, b_{11mm}.138.

geraniol. $C_{10}H_{18}O$ = 154.20. An unsaturated alcohol $Me_2C{=}CH.CH_2.CH_2.CMe{=}CH.CH_2OH$, a constituent of the oils of geranium, roses, eucalyptus, citronella, lavender, and ylang. A colorless liquid, d.0.881, b.231, insoluble in water, miscible with alcohol, or ether; used as insect bait. Cf. *ylangol*, *geranyl*. **dihydro-** Citronellol.

geranium. Cranesbill. The dried rhizome of *Geranium maculatum*, used medicinally as an intestinal astringent. **g. oil.** The essential oil from the leaves of *Pelargonium* species occurring in many grades, d.0.889–0.906, and containing geranial, citronellol, phellandrene and tiglates. *Turkish-* Palmarosa oil. The essential oil of *Andropogon* (*Cymbogen*) *martini*, a Geraniaceae, containing 70 % geraniol.

geranyl. The monovalent $C_{10}H_{17}$— radical derived from geraniol. **g. acetate.** $CH_3.COO\text{-}C_{10}H_{17}$ = 196.22. Geraniol acetate. A colorless liquid, d.0.915, decomp. 245, slightly soluble in water or alcohol, miscible with ether. **g. chloride.** $C_{10}H_{17}Cl$ = 172.6. A colorless liquid, soluble in alcohol.

Gerhardt, Charles Friederich. 1816–1856. A French chemist who formulated the concept of homologous and heterologous series among organic compounds. **G. test.** A test for diacetic acid in urine by means of ferric chloride solution.

gerhardtite. A native, basic copper nitrate.

germ. (1) A primitive embryo or embryonic cell. (2) A bacterium, microbe or spore.

german silver. Nickel silver. A white alloy of copper (60), nickel (30) and zinc (30); used in resistance coils and for cutlery.

germane. GeH_4 = 76.63. Germanium hydride. A colorless gas, burning with a blue flame, $d_{-142°}$,1.523, m.−165, b.−90. **di-** Ge_2H_6 = 150.81. Germanoethane. A gas, $d_{-109°}$1.98, m.−109, b.29. Cf. *germanium ethide*. **tri-** Ge_3H_8 = 225.20. Germanopropane. A liquid d.2.20, m.−105, b.110.

germanate. A salt of the type M_2GeO_3, derived from germanium dioxide. **thio-** A salt of the type M_2GeS_3 derived from germanium disulfide.

germander. Chasse fièvre. The herb of *Teucrium chamaedris*, a Labiatae, used as tonic, diuretic and for gout. **water-** Wood garlic, English treacle. The herb of *T. scordium*, used as antiseptic and stimulant.

germanic. A compound of tetravalent germanium, Ge≡. **g. chloride.** Germanium tetrachloride. **g. oxide.** Germanium dioxide.

germanin. Bayer 205, naganol, suramin. The sodium salt of 3,3′-ureidobis [8-(3-benzamido-p-toluido)-1,2,5-naphthalenetrisulfonic acid]. A colorless, readily soluble substance, used as a specific in the treatment of sleeping sickness in man or animals.

germanite. A copper mineral from Tsumeb, S. W. Africa, which contains 6–8 % Ge and 1 % Ga.

germanium. Ge = 72.60. Atomic number 32. A metallic element of the carbon family, d.5.496, m.958, b.1300, insoluble in water, acids or alkalis. It was discovered in 1886 by Winkler in argyrodite, after being previously predicted in 1871 by Mendeleeff (ekasilicon). Germanium is a very rare metal, occurring in any quantity only in argyrodite, euxenite and germanite. Its valency is two or four, hence it gives rise to the compounds:

+2: germanous	Ge^{++}
+4: germanic	Ge^{++++}

Ge is at present little used, but it has great possibilities: it gives strength to aluminum alloys, greater hardness to magnesium alloys, and higher refractive power to glass.

g. alkyls. A group of organo-metallic compounds in which tetravalent germanium replaces carbon, *e.g.*, germanium ethide. **g. chloride.** See *g. tetrachloride*, or *g. dichloride*. **g. chloroform.** $GeHCl_3$ = 179.4. A colorless liquid, b.72, decomp. by water, soluble in hydrochloric acid. **g. dichloride.** $GeCl_2$ = 143.4. Germanous chloride. A colorless liquid. **g. dibromide.** $GeBr_2$ = 232.46. Germanous bromide. Colorless crystals, decomp. on heating. **g. diiodide.** GeI_2 = 326.46. Yellow crystals. **g. dioxide.** GeO_2 = 104.5. G. oxide, germanic oxide. A white powder, $d_{18°}$4.703, m.1025, slightly soluble in water, soluble in acids; used in the treatment of pernicious anemia. **g. disulfide.** GeS_2 = 136.6. G. sulfide, germanic sulfide. A white powder, decomp. on heating or by water, soluble in alkalis. **g. ethide.** $GeEt_4$ or $C_8H_{20}Ge$ = 188.5. Germanium tetra-ethyl. A colorless liquid, b.160. **g. hydride.** Germane. **g. hydroxide.** $Ge(OH)_2$ = 106.6. A yellow powder, insoluble in water, soluble in alkalis. Cf. *germanoformic acid*. **g. iodide.** See *g. tetraiodide*. **g. monosulfide.** GeS = 104.5. Germanous sulfide. Dark brown, thin plates of metallic luster, soluble in alkalis. **g. monoxide.** GeO = 88.5. Germanous oxide. A dark gray volatile powder, soluble in HCl. **g. oxide.** See *g. dioxide* or *g. monoxide*. **g. sulfide.** See *g. disulfide*, or *g. monosulfide*. **g. tetrabromide.** $GeBr_4$ = 392.31. Germanic bromide. A colorless fuming liquid, d.3.13, m.26.1, b.185.9. **g. tetrachloride.** $GeCl_4$ = 214.4. G. chloride, germanic chloride. A colorless fuming liquid, $d_{18°}$.1.887, m.−49.5, b.86, decomp. by water to a hydrated germanium dioxide. **g. tetraethyl.** G. ethide. **g. tetrafluoride** GeF_4 = 148.6. Germanic fluoride. Colorless hygroscopic crystals, $GeF_4.3H_2O$, readily soluble in water. **g. tetraiodide.** GeI_4 = 580.2. G. iodide, germanic iodide. A red, crystalline powder, d.4.32, m.144, b.355, decomp. by water, soluble in dilute acids.

germanoformic acid. H.GeOOH. A tautomer of germanium hydroxide obtained by heating $Ge(OH)_2$ with alkali. It is a red powder and a reducing agent.

germanous. The compounds of divalent germanium, Ge=, which are generally less stable than the germanic compounds. **g. chloride.** Germanium dichloride. **g. oxide.** Germanium monoxide. **g. sulfide.** Germanium monosulfide.

germicidal. Destructive to microorganisms or germs.

germicide. An agent that destroys microorganisms; applied especially to agents that kill disease germs, cf. *disinfectant*. Their strength is measured by the Salle index, the ratio a/b, where a is the germ-killing power and b the tissue destroying effect. Values:

iodine trichloride	0.04
iodine	0.09
hexylresorcinol	3.0
metaphen	12.7
phenol	12.9
pot. merc. iodide	13.3
merthiolate	35.3
mercurochrome	262.0

Cf. *Rideal-Walker test.*

germination. The sprouting of a seed or spore.

germinator. A device to determine the germinating power of barley or other seeds; it consists of a perforated disc holding a certain number of seeds, supported over water, and kept at a definite temperature.

geronic acid. $C_9H_{16}O_3$ = 172.10. *2*-Dimethyl-*6*-ketoheptoic acid. An oxidation product of β-carotene and β-ionone.

gerontin. $C_6H_{14}N_2$ = 102.1. A leukomaine from dog's liver.

gerontology. The study of diseases of the aged.

gersdorffite. (Ni,Fe)AsS or NiS_2,$NiAs_2$. Plessite. A native, metallic, grayish nickel-iron sulfarsenide, d.5.2–6.3, hardness 5.5, soluble in nitric acid.

Geryk pump. A vacuum pump. Cf. *Guericke.*

gesarol. See DDT.

gesnerin. The *5*-glucoside of *4'.5.7*-trihydroxyflavylium chloride. An anthocyanin from the orange flowers of *Gesneria* species.

gesso. A plaster made of whiting and glue, and found on objects from ancient Egyptian monuments.

gestalt. Showing properties other than can be derived from the individual constituents by summation.

getter. (1) A substance which "cleans" gases, such as, O, N, H_2O etc., from vacuum tubes, such as, radio valves, transmitting tubes, rectifiers. **absorptive-** or **chemical-** A g. which reacts with the gas; as, Li, Mg and Ca. **adsorptive-** or **physical-** A g. which binds gases on its surface, as zirconium. (2) A metal, e.g., thallium, used to coat the filament of a tungsten lamp and so to prolong its life.

geyserite. A sinter produced near geysers, consisting essentially of hydrous silicic acid.

ghatti gum. Indian gum.

ghee. Indian butter fat. A butter-like substance from the seeds of *Bassia butyraceae*, used for soap making and edible purposes. **Phalka-** An oil from the seeds of various *Bassia* species, used to adulterate ghee.

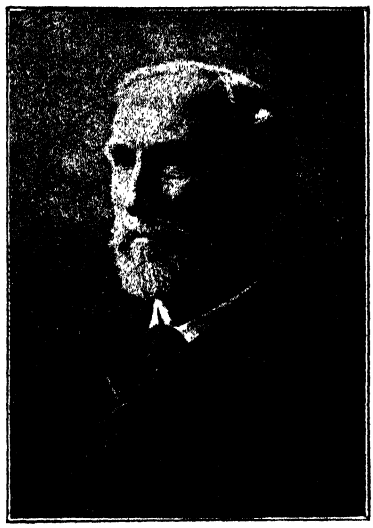
ghetta acid. $C_{24}H_{48}O_2$ = 508.54. A fatty acid from ghedda, an East Indian wax.

giallioline. Lead antimoniate.

Gibbs, Josiah Willard. 1839–1903. An American mathematician and physicist noted for the development of the phase rule (q.v.) and thermodynamics. **G. function.** Thermodynamic potential. **G.-Helmholtz equation.** The relationship between the chemical energy transformed and the maximum energy obtainable electrically in a reversible galvanic element.

$$E = \frac{Q}{nF} + T\frac{dE}{dT}$$

where E is the E.M.F. of the cell, Q the heat equivalent of the chemical change for molar quantities, expressed in electrical units, F 96,540 coulombs, T the absolute temperature at which the cell is working, and n the valency, or the number of charges carried by a mol of the substances undergoing change; dE/dT is the rate of change in E.M.F. of the cell with temperature. **G. paradox.** Work is obtainable when 2 gases of thermodynamically identical physical properties (*e.g.*, N_2 and CO) are mixed,



Josiah Willard Gibbs.

but not when 2 portions of the same gas are mixed. **G. phase rule.** See *phase rule.*

Gibbs, Oliver Wolcott. 1822–1908. An American chemist noted for his work on cobaltammines, complex acids and platinum compounds.

gibbsite. $Al_2O_3(H_2O)_3$. A native aluminum hydroxide.

Giemsa, Gustav. 1867– . A German chemotherapist noted for laboratory methods. **G. stain.** A microscope staining solution for white blood corpuscles, consisting of 0.3 gm. azur II eosin, 0.8 gm. azur II, 250 gm. glycerin, and 250 cc. methanol. **G. ultra filter.** A device for sterilizing and filtering small quantities of biological liquids through a collodion membrane.

gigantic acid. An antibacterial substance produced by a species of *Aspergillus giganteus;* it may be identical with flavacidin.

gigantolite. A pseudomorphic alteration of iolite.

Gilbert, Sir Joseph Henry. 1817–1901. An English chemist noted for agricultural research, and the formulation of the nitrogen theory. **G., Ludwig Wilhelm.** 1769–1824. A German chemist, and editor of *Annalen der Physik.* **G., William.** 1540–1603. An English natural philosopher, physician to Queen Elizabeth and a pioneer in magnetism and electricity.

gilbert. An obsolete unit of magnetic quantity. 1 gilbert = 0.7956 ampère-turn. 1 International gilbert = 0.99991 absolute gilberts. 1 absolute gilbert = 1.00009 international gilberts.

Gilead balm. Balm of Gilead, Mecca balsam. An oleoresin from *Balsamodendron gileadense*, a Burseraceae. Cf. *poplar buds.*

Giles flask. A volumetric flask with long neck, graduated at x and at $\left(x + \frac{x}{10}\right)$ of its volume; *e.g.*, at 500 cc. and 550 cc. Used in preparing normal solutions.

gill. A liquid measure: 1 gill = 4 fluid ounces = 118.29 cc. = 0.25 pint.

gillenia. Indian physic, American ipecac. The root bark of *G. trifoliata* or *G. stipulacea*, a Rosaceae; used as an emetic and cathartic.

gilsonite. Uintaite. A black, brittle, lustrous mineral consisting of hydrocarbons.

Giltner tube. A tube for anaerobic cultures.

gin. An alcoholic beverage made by distillation of a fermented extract of grain in the presence of Juniper leaves. **artificial-** Fancy g. to which flavoring essences have been added. **fancy-** A mixture of g. and neutral alcohol.

ginger. Zingiber. The dried rhizome of *Zingiber officinalis*, a Scitaminaceae of Asia, West Indies, and Africa, used medicinally as an aromatic and stimulant. **black-** The crude drug having a black skin. **jamaica-** The yellowish white roots, from which the skin has been removed. **wild-** Asarum.

g. oil. The essential oil of g., d.0.882–0.900, b.155–300, containing phellandrene and zingiberene.

gingerin. An oleoresin derived from ginger.

gingerol. An essential oil derived from ginger.

ginkgoic acid. $C_{24}H_{48}O_2$ = 368.5. An unsaturated acid from the fruit of *Ginkgo biloba*.

ginning. The removal of the larger seed hairs from the cotton plant. Cf. *cotton, linter.*

ginseng. Panax. The dried roots of *Panax quinquefolium*, an Aralia species, used medicinally as a tonic and demulcent.

Girard reagents. Quaternary ammonium compounds of the type $Me_3N(Cl).CH_2CONH.NH_2$, which form soluble compounds with substances containing CO groups; these may subsequently be regenerated. Used to separate sex hormones from urine.

gismondine. Gismondite.

gismondite. $CaAl_2Si_4O_{12}$. Gismondine, abrazite. A white or grayish, hydrated lustrous, monoclinic zeolite, d.2.4, hardness 5–5.5.

gitalin. $C_{28}H_{48}O_{10}$ = 544.37. A glucoside, m.-253, from digitalis leaves.

githagenin. $C_{28}H_{44}O_4$ = 444.4. The aglycone of **githagin.** A saponin from corn cockle, *Agrostemma githago*, which hydrolyses to githagenin and glucuronic acid.

gitogenic. Having a digitalis-like effect, or the structure of digitalis aglucones. See *cholane derivatives.*

gitoxigenin. $C_{24}H_{36}O_5$ = 404.3. A split-product of gitoxin.

gitoxin. A glucoside from the leaves of digitalis; it hydrolyses to 1 mol. gitoxigenin and 3 mol. digitoxose.

glacial. Describing a compound of ice-like, crystalline appearance, especially the solid form of a liquid compound, as glacial acetic acid.

Gladstone, John Hall. 1827–1902. An English chemist who investigated the optical constants of compounds, and electrical storage batteries.

gladwin. The root of *Iris foetidissima*, used as an antispasmodic.

glance. The general term for minerals with a glassy luster, *e.g.*, lead glance, galena.

gland. An organ that separates a specific substance (waste product) from the blood, or which secretes specific substances (*e.g.*, enzymes).

glandula. A group of therapeutic preparations consisting of dried glands.

glanzstoff. See *rayon.*

Glaser furnace. A combustion furnace used for organic elementary analysis.

glaserite. $Na_2SO_4.3K_2SO_4$. Aphthitalite, arcanite. A colorless, vitreous potassium-sodium sulfate, d.2.6, hardness 3–3.5, occurring at Stassfurt.

glass. An amorphous, hard, brittle, often transparent material consisting of a mixture of the silicates of the alkali and alkaline earth or heavy metals. It is obtained by the solidification of a fused mass containing:

A. SiO_2 as quartz, flint pebbles or siliceous sand; this can be replaced by B_2O_3, Al_2O_3, or Mn_2O_3.

B. Na_2O or K_2O as carbonate or sulfate, and coal.

C. CaO as limestone or marble; this may be replaced by PbO, MgO, ZnO, or BaO.

The constituents, A, B, and C, are finely powdered, well mixed and heated to 1000–1100°C.; on cooling to 890°C. the pasty glass is worked by blowing, drawing, casting, or fusing piece to piece, and then annealed by slow cooling or by reheating and cooling. The composition of glass varies between $(K,Na)_2O,(Ca,Pb)O,6SiO_2$ and $5(K,Na)_2O,7(Ca,Pb)O,36SiO_2$, and the following formula has been ascribed to it: $(K, Na)O—Si_nO_{2n-1}O(Ca, Pb)O\text{-}Si_nO_{2n-1}—O(K, Na)$. According to the predominating constituents glass is classified into:

(1) Potash-lime glass—hard, not soluble and resistant to water and acids, d.2.4, generally used for chemical glassware.

(2) Soda-lime glass—more fusible and less resistant, d.2.65, used for ordinary window glass or venetian glass. Average composition: 18.58 % Na_2O, 5.06 % CaO, 73.4 % SiO_2.

(3) Potash-lead glass—readily fusible and highly refractive; as crystal glass, d.2.9–3.6, flint glass, d.3.3–3.6, consisting of 13.88 % K_2O, 32.95 % PbO, and 53.17 % SiO_2, paste for artificial gems and lenses, crown glass (containing BaO) d.1.5–1.56.

(4) Bottle glass consisting of Na, K, Ca, and Al silicates, d.2.73.

(5) Opaque glass—a glass made opaque by the addition of $BaSO_4$, smalts, or bone-ash.

(6) Colored glass—a glass colored by the addition of metallic oxides, as

yellow—antimony, iron, silver or uranium;
red—gold chloride, ochre, cuprous oxide or selenium;
green—ferrous sulfate, copper or chromium oxide;
blue—cobalt oxide or traces of copper;
iridescent—the vapors of metallic chlorides on the hot glass;
nacreous—by the addition of scales of mica.

	Window (%)	Flint (%)	Bottle (%)	Pyrex (%)
(A) SiO_2	71.5	54	74	80.6
Al_2O_3	1.5	..	0.5	2.6
B_2O_3	....	..	....	11.9
(B) Na_2O	14.0	..	17	4.4
K_2O	....	10	....	....
(C) CaO	13.0	..	5	1.1
PbO	....	36	....	....
MgO	....	..	3.5	....

blown- A glass which is blown into shape. **Bohemian-** Potash glass. **borax-** A glass with a low expansion coefficient, which contains borax. **boro-silicate-** An optical glass containing lead boro-silicate. **bottle-** A glass which is blown into shape in a mold. **bullet-proof-** A series of plate-glass sheets cemented together in layers by a transparent medium. **canary-** Uranium-. **cast-** Plate-. **chemical-** An acid- or alkali-resistant glass used for chemical apparatus. **chromium-** A glass colored yellow by chromium compounds. **clock-** A circular piece of glass similar in shape to that used for covering clock faces; used to cover beakers etc., and may contain a hole to take a rod. **cobalt-** A glass colored purple-blue by cobalt compounds; used as a light filter in analytical chemistry. **copper-** A glass colored blue or red by copper compounds. **cover-** A thin glass square used to cover microscope specimens on the slide. **crown-** A hard optical glass consisting of a silicate of sodium with calcium and aluminum oxides. **cryolite-** Milk-. **crystal-** Flint-. **electric bulb-** A lime glass used for electric bulbs. **flint-** A soft optical glass consisting of potassium and lead silicates. **frosted-** A glass having a roughened surface. **iron-** A glass colored yellow, olive-green, or pale blue by iron compounds. **jena-** A group of optical and heat-resisting glasses made at Jena. **laminated-** Safety g. G. made by cementing thin sheets of g. together with a plastic at 200–260°F. and 250–350 pounds pressure per square inch. It may crack but will not splinter or shatter under impact. **lead-** A soft glass with a low melting point, containing lead oxide, *e.g.*, flint glass. **lime-** A glass containing calcium oxide, *e.g.*, venetian-. **manganese-** A glass colored violet by manganese compounds. **milk-** An opaque glass colored milky-white by cryolite. **opal-** An opaque glass colored milky-white by calcium phosphate or bone ash. **organic-** A term used for certain synthetic resins which have the appearance of glass, *e.g.*, perspex. **muscovy-** Muscovite. **normal-** A g. of definite chemical composition. **optical-** A glass used for optical purposes, *e.g.*, crown, flint, jena glass etc. **plate-** A thick sheet of glass manufactured by pouring the molten glass on iron tables, then rolling and polishing it. Used for mirrors or windows. **potash-** Bohemian glass. A glass containing more potassium than sodium, *e.g.*, crown, flint, etc. **pyrex-** A heat-resisting glass, d.2.25, m.750, used extensively for chemical glass-ware and household dishes. It contains a high proportion of silica. **rolled-** An inferior quality of plate glass. **ruby-** A dark-red glass containing copper compounds or colloidal gold. **safety-** Laminated g. **silica-** Though not a true glass, fused silica is often used where a transparent, resistant glass is required. **silicate-flint-** A jena glass used for optical purposes containing SiO_2 (29–53 %), PbO (67–36 %), K_2O (3–8 %), Na_2O (0–1 %), Mn_2O_3 (0.04–0.06 %), and As_2O_3 (0.2–0.3 %). **soda-** A glass containing more sodium than potassium, *e.g.*, venetian glass. **soluble-** Waterglass. **spun-** G. wool. **synthetic-** A glass-like, transparent plastic made (e.g.) by the condensation of urea and formaldehyde; as, pollopas, perspex. **thallium-** A g. containing Tl in place of Pb. **toughened-** Plate glass which has been specially heat-treated to prevent splintering under impact. Cf. *bullet-proof g. laminated g.* **uranium-** A dichroic greenish-yellow glass containing uranium compounds, used for light filters. **watch-** A small concave-convex glass used for watches, and in laboratories. **water-** An aqueous solution of sodium or potassium tetrasilicate. **window-** Ordinary glass plates manufactured by blowing the molten glass into cylinders, then slitting and flattening them out on tables. **zinc-crown-** An optical glass consisting of 65.4 % SiO_2, 15 % K_2O, 5 % Na_2O, 9.6 % BaO, 2.0 % ZnO, 0.4 % As_2O_3, 0.1 % Mn_2O_3, and 2.5 % B_2O_3.

g.-beads. Solid or hollow glass spheres; used to prevent excessive ebullition of heated liquids or, when properly calibrated, to determine the specific gravity of liquids. **g. colors.** A metal or oxide used to give color to a glass; cf. *glass* (6). **g. cullet.** (1) Broken g. waste. (2) The waste g. left over in g. manufacture, which is powdered and used as abrasive in matches, primers, polishes, soaps and cements. **g.-cutter.** Small mounted diamond fragments or a steel knife used for cutting glass plates or tubing. **g.-drops.** Prince Rupert drops. **g.-gage.** A circular metal disc with round holes, used for measuring the outside diameter of glass tubing. **g. marking.** Ceramic ink. **g. of antimony.** The fused mass which results from the incomplete oxidation of stibnite. **g.-paper.** Calico or paper covered with thin glue and sprinkled with powdered glass; used for levelling and polishing wood and metal. **g.-rods.** A solid stick of glass. **g.-stirrer.** A glass rod, either straight or suitably shaped. **g.-tubing.** A hollow glass rod, used in making chemical and physical apparatus, having various diameters, heavy or thin walls. (*barometer-*) Capillary. (*capillary-*) A thick-walled glass tube having a bore less than one millimeter in diameter. **g. tank.** The container in which g. is melted; it is lined with aluminum silicate. **g.-wool.** Fine thin glass threads used for filtering, or in place of cotton wool.

glassine. A thin, hard and almost transparent paper made from well beaten chemical wood pulp.

Glauber, Johann Rudolf. 1603–1668. A Dutch iatrochemist who prepared sodium sulfate, hydrochloric acid and many metallic salts, and suggested improvements in industrial chemistry. **g. salt.** Crystalline sodium sulfate.

glauberite. $CaSO_4.Na_2SO_4$. A calcium sodium sulfate found at Stassfurt.

glaucine. $C_{21}H_{25}O_4N$ = 355.3. An alkaloid from the sap of *Glaucium flavum* or yellow horned poppy, a Papaveraceae. Yellow rhombic prisms, m.119. It is related to dicentrine and laurotetanine.

glaucinic acid. An acid from certain lichens.

glaucochroite. $CaMnSiO_4$. A rare calcium manganese silicate of the olivine group.

glaucodot. $(Fe,Co)S_2$, $(Fe,Co)As_2$. A cobalt iron sulfarsenide. Cf. *alloclasite.*

glaucomelænic acid. $C_{12}H_2O_8$ = 242.0. A black compound derived from ellagic acid.

glauconite. Bravaisite. An amorphous, olive green, granular iron, potassium, aluminum, magnesium, calcium silicate formed from oceanic sediments, and occurring in the rocks of all ages.

glaucophane. $NaAlSi_2O_6.(Fe,Mg)SiO_3$. A rock-forming mineral of the amphibole series, occur-

ring in monoclinic, bluish-gray masses, d.3–3.1.

glaucopicrine. An alkaloid from the roots of *Glaucium flavum* and *Chelidonium majus*.

glaze. A glassy coating. **enamel-** A suspension of metallic oxides in a glass which is burned into pottery or iron ware. **porcelain-** A mixture of feldspar, lime and quartz fused into ware. **salt-** A glassy covering of a silicate of sodium and aluminum produced on earthenware by adding salt to the kiln during firing. **transparent-** A glass covering for earthenware.

glazed. Having a glassy or glossy appearance. **g. paper.** A paper with a glossy surface, used in the laboratory for transferring precipitates, or for obtaining curves from delicate instruments, *e.g.*, from the kymograph, in which case the paper is previously smoked with carbon.

gleditschine. Stenocarpine. An alkaloid from the leaves of *Gleditschia triacanthos*, three-thorned acacia or honey locust tree, a Leguminosae of the United States.

glendonite. A pseudomorphous variety of calcite found in Australia.

gliadin. Prolamin, vegetable protein. A group of simple proteins or globulins derived from gluten, the protein of wheat, rye, durum, spelt, etc. Wheat gliadin has the composition: 52.72 % C, 6.86 % H, 17.66 % N, 1.03 % S, 21.73 % O, corresponding with the empirical formula $C_{688}H_{1068}O_{211}N_{186}S_5$ = 15,578.0.

glidin. An albuminous preparation from wheat flour, used as nutrient. **arsenic-** Arsan. **bromo-** G. containing bromides. **ferro-** G. containing iron salts. **iodo-** G. containing iodides.

gliotoxin. An antibiotic substance isolated from cultures of various fungi; its formula is $C_{13}H_{14}N_2O_4S_2$.

globin. An animal protein in hemoglobin. It is a stone-like body, insoluble in water, soluble in acids and alkalis, coagulated by heat, but redissolved by acids. Proposed formula: $C_{700}H_{1098}O_{196}N_{184}S_2$ = 15,283. **hemo-** See *hemoglobin*. **oxyhemo-** See *hemoglobin*.

globularesin. $C_{22}H_{36}O_8$ = 404.4. A resin-like substance from *Globularia alypum*, the wild senna of Southern Europe.

globularetin. C_9H_6O = 130.0. A split-product of globularin.

globularin. $C_{15}H_{20}O_8$ = 328.2. An amorphous glucoside from the leaves of *Globularia alypium*, a Globulariaceae of Southern Europe.

globulin. A simple protein, coagulated by heat, insoluble in water, soluble in dilute solutions of salts. **acid-** Syntonin. **crystalline-** A g. derived from the lens of the eye. **serum-** A simple protein occurring in the blood. That of the horse has the proposed formula $C_{628}H_{1002}O_{209}N_{160}S_5$.

globulins. A group of simple proteins (q.v.), as serum globulin, edestin, etc., in vegetable and animal tissues (blood, wheat, cotton seed, squash seed).

globulol. $C_{15}H_{26}O$ = 222.20. A sesquiterpene alcohol from eucalyptus oil.

globulose. A split-product of globulins produced by peptic digestion.

globulus. A small sphere; *e.g.*, a button or drop of metal.

glonoin. Nitroglycerin.

Glover tower. A tower in sulfuric acid plants. See *sulfuric acid manufacture*.

glucal. $C_6H_8O_3$ = 128.1. An unstable and toxic aldehyde derivative of glucose

glucase. An obsolete term for maltase.

glucic acid. $C_3H_4O_3$ = 88.0. Acrolactic acid, β-hydroxyacrylic acid, 3-hydroxypropenoic acid*. A colorless liquid, soluble in water.

glucide. A group-term including carbohydrates and glucosides, q.v.

glucin. Sodium aminotriazinesulfonate. A sweetening agent resembling saccharin.

glucinic acid. $C_{12}H_{16}O_9.3H_2O$ = 358.2. A hexabasic acid formed in the decomposition of glucose by acids or alkalis. Colorless crystals.

glucinum. Gl. An obsolete name for beryllium, q.v.

gluco- See also *glyco-*.

glucochloral. Chloralose.

glucocholic acid. $C_{24}H_{39}O_4.NHCH_2COOH$ = 465.52. Colorless needles, m.134, slightly soluble in water, soluble in alcohol or ether.

glucofurone. $C_6H_{10}O_6$ = 178.07. The γ-lactone of gluconic acid. Cf. *glucopyrone*.

glucogen. Glycogen.

glucohydrazones. A group of intermediate compounds formed during the ozasone reaction of carbohydrates by heating aromatic hydrazines and hexoses, *e.g.*, phenyl hydrazine and glucose: $PhNHNH_2 + C_6H_{12}O_6 = C_6H_{11}O_5{:}N.NHPh + H_2O$.

glucokinin. Insulin.

gluconate. A salt of gluconic acid containing the $HOCH_2(CHOH)_5COO—$ radical; usually a homogeneous paste. **aluminum-** A salt of varying composition, partly a colloidal suspension of $Al(OH)_3$ in gluconic acid; used in tanning. **calcium-** $[CH_2OH(CHOH)_5COO]_2Ca$. A white powder, used medicinally to obtain a calcium effect.

gluconic acid. $C_6H_{12}O_7$ = 196.1. Pentahydroxyhexoic acid*, dextronic acid, glycogenic acid, *2.3.4.5.6*-hexapentol acid. An isomer of mannonic acid, derived from glucose by oxidation. Two optically-active isomers: **dextro-** (Dextronic acid, maltonic acid). A white powder, m.125, of pleasant sour taste. In 65 % solution it forms lactones and becomes plastic. Used for fruit jellies, baking powders, etc. **levo-** $C_5H_6(OH)_5COOH$. A white crystalline solid, soluble in water, insoluble in alcohol.

glucophore. A group of atoms which form sweet compounds with atoms or radicals (auxoglucs). (Analogous to chromophore and auxochrome); *e.g.* —CHOH.CH_2OH, —NH_2-CH.COOH, and —CH_2I.

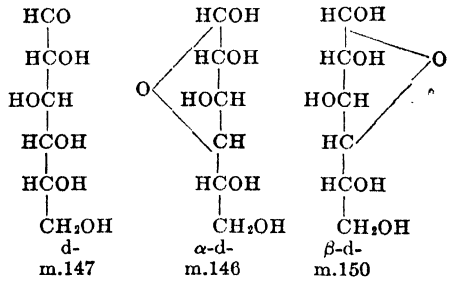
glucopyrone. $C_6H_{10}O_6$ = 176.07. The δ-lactone of gluconic acid. Cf. *glucofurone*.

glucosamine. $C_6H_{13}O_5N$ = 179.2. An amino sugar, $CH_2OH(CHOH)_3CHNH_2CHO$. The amine of glucose and a split-product of chitin, b.110 (decomp.).

glucosazone. $C_{18}H_{22}O_4N_4$ = 358.31. A reaction product of monosaccharides and aryl hydrazines $C_6H_{12}O_6 + 3PhNHNH_2 = C_4H_9O_4C{:}NNHPh$ —$CH{:}NNHPh + PhNH_2$ (phenylglucosazone) + $NH_3 + 2H_2O$. Their characteristic crystalline forms and melting points are used to separate, identify and distinguish monosaccharides.

glucose. $C_6H_{12}O_6$ = 180.15. Dextrose, phlorose, grape sugar, saccharum amylaceum. A monosaccharide or carbohydrate constituent of many animal and vegetable fluids (blood, sweet fruits, etc.), formed by hydrolysis of starch, cane sugar, and glucosides. **dextro-** Colorless needles, d.1.562, m.147, soluble in alcohol or water. Used as a reagent for

detecting carbon dioxide in blood, tellurous acid, etc., and in the form of glucose liquid or syrup, as a nutrient in pharmacy; industrially, in the manufacture of confectionery and the production of beer and alcoholic liquors, curing of tobacco, tanning; and as reducing agent. The following structures are ascribed to its isomers:



Instead of the 1,4-oxygen bridge (furanose) there is also the 1,5-linkage (pyranose). Cf. *furanoside, pyranoside.*

g. agar-agar. A culture medium containing 10 pts. glucose, 15 pts. agar, 10 pts. peptone, 5 pts. sodium chloride, and 1000 pts. bouillon stock, neutralized with NaOH. **g. amine.** $C_6H_{13}O_5N$ = 179.11. $C_5H_{11}O_5.NH_2$; decomp. 110. **g. bouillon.** A culture medium containing 10 pts. glucose, 10 pts. peptone, 5 pts. salt, and 1000 pts. bouillon stock, neutralized with NaOH. **g. evolué.** A bacteriological medium having high reducing properties. Prepared by heating a 10 % solution of g. in 0.1 *N.* NaOH at 110°C. for 15 mins. **g. gelatin.** A culture medium containing 10 pts. glucose, 100 pts. gelatin, 10 pts, peptone, 5 pts. salt, and 1000 pts. bouillon stock, neutralized with NaOH. **g. imine.** $C_6H_{13}O_5N$ = 179.11. $C_6H_{12}O_5$:NH. A solid, m.128. **g. liquid.** Glucosum, syrup. A thick liquid made by the incomplete hydrolysis of starch, and containing glucose and dextrins. Used pharmaceutically as a nutrient. **g. oxime.** $C_6H_{12}O_5$:NOH = 195.14. A reaction product of hydroxylamine and glucose, m.138.

glucosene. $C_6H_{10}O_5$ = 162.08. An unsaturated anhydroglucose of the type

$$CH_2{:}C.CHOH.CHOH.CHOH.CHO$$

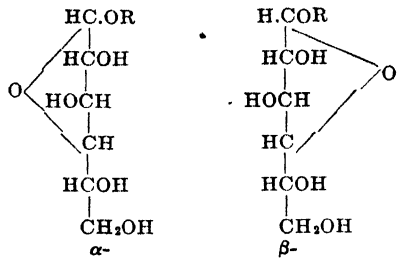
glucosenide. A group of compounds derived from the glucosenes. General formula:

$$CH_2{:}C(CHOR)_4.O$$

where R is Ac, Me, etc.; they may occur in both α- and β-forms.

glucosidase. A hydrolytic enzyme which decomposes glucosides.

glucoside. (1) A compound of glucose; as, glucose-α-glucoside or maltose. (2) See *glycosides.* A neutral, non-nitrogenous, vegetable constituent decomposed by heat, dilute acids, alkalis, enzymes, bacteria or fungi to form a sugar (glucose) and another compound, (*e.g.*, salicin,strophanthin, amygdalin etc.). Chemically they are the ethers of monosaccharides, and may occur in two types, **alpha-** and **beta-glucosides.**



thus: **methyl-** $C_7H_{14}O_6$ = 194.11; where R is CH_3. α-. Long needles, m.168, [a] + 157°. β-. Rectangular prisms, m.104, [a] −33°. In its derivatives the oxygen bridge may be between other carbon atoms, and is then indicated by numerals:

$$\langle 1, 3\rangle; \qquad \langle 1, 4\rangle; \qquad \text{or } \langle 1, 5\rangle.$$

Natural glucosides have the suffix *-in* and are classified as:

1. Ethylene derivatives: jalapin, sinapin, sinalbin, sinigrin.
2. Benzene derivatives: arbutin, populin salicin.
3. Styrolene derivatives: coniferin, phlorhizin, naringin, hesperidin, esculin, daphnin.
4. Anthracene derivatives: emodin, chrysophanic acid, frangulin, digitoxin.
5. Cyanogen derivatives: amygdalin.

glucosimine. Obsolete term for amino sugar.

glucosin. A group of ptomaine bases obtained by the action of ammonia on carbohydrates.

glucosone. $C_6H_{10}O_6$ = 178.1. An osone of glucose and aldehyde ketone formed as a reaction-product from glucosazone. CH_2OH-$(CHOH)_3COCHO$.

glucosophosphoric acid. $C_6H_{13}O_9P$ = 260.1. The dibasic acid $(C_6H_{11}O_6)H_2PO_3$.

glucothionic acid. A substance obtained from nucleoproteins.

glucotin. A cement; a mixture of isinglass, gelatin and acetic acid.

glucuronic acid. $CHO(CHOH)_4COOH$ = 194.11. Glycuronic acid. An aldehyde-hydroxy acid in urine, m.175, soluble in alcohol.

glue. Colla. An impure gelatin obtained from animal organs by boiling with water, straining and drying; thin, hard and brittle cakes, used as a cement and adhesive. **albumen-** G. obtained from flour in starch manufacture. **bone-** Artificial isinglass; a glue made from hides and bones. **cartilage-** Chondrin. **casein-** A solution of casein and borax, used as bookbinder's glue. **elastic-** G. containing glycerin and used for printer's rollers and flexible molds. **fish-** Isinglass. **liquid-** G. acidified with acetic or nitric acid. **marine-** A waterproof g. or cement made of caoutchouc or shellac in turpentine, benzene, or other. **skin-** G. made from hides. **vegetable-** Acacia. **waterproof-** A fish glue dissolved in hot milk.

glukagon. An insulin-like albumin from the pancreas.

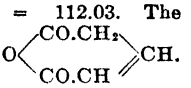
Glumiflorae. An order of monocotyledonous plants, comprising the families of Cyperaceae and Gramineae.

gluside, glusidum. The official name for saccharin.

glutaconic acid. $C_5H_6O_4$ = 130.1. Propene dicarboxylic acid, pentenedioic acid*. The dibasic, unsaturated acid,

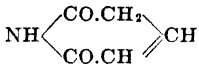
$HOOC.CH_2.CH:CH.COOH.$
$\alpha \quad \beta \quad \gamma$

Colorless crystals, m.134. Cf. *fumaric acid. glutaric acid.* **oxymethylene-** $C_6H_6O_5$ = 158.1. A dibasic, unsaturated acid.

g. anhydride. $C_5H_4O_3$ = 112.03. The heterocyclic compound  .

Colorless crystals, m.87; b.$_{15mm}$152. An isomer of pyronone.

glutaconimide. $C_5H_5O_2N$ = 111.1. 1.5-dioxypyridine. The heterocyclic compound



Colorless crystals, m.182.

glutamic acid. $C_5H_9O_4N$ = 147.14. α-Aminoglutaric acid, glutaminic acid, glutanic acid, $NH_2.CH(COOH)CH_2.CH_2.COOH$. A colorless crystalline acid, decomp. 208, soluble in water or alcohol. It is a constituent of proteins and occurs chiefly in seeds and beets, also in the Japanese flavoring, ajinimoto. **g. a. hydrochloride.** A white powder which yields HCl with water; used medicinally.

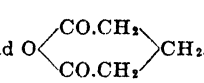
glutamine. $C_5H_{10}O_3N_2$ = 146.13. The optically inactive amino acid $C_3H_5.NH_2CONH_2.COOH$; slightly soluble in water, insoluble in ether or alcohol.

glutaminic acid. Glutamic acid.

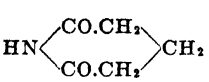
glutamyl. The bivalent radical —OC.CHNH$_2$.$CH_2.CH_2.CO$—

glutanic acid. Glutamic acid.

glutaric acid. $C_5H_8O_4$ = 132.09. n-pyrotartaric acid, pentane-diacid, deoxyglutaric acid, pentanedioic acid*, $COOH(CH_2)_3COOH$. A dibasic acid in sheep wool. Colorless monoclinic crystals, soluble in water, alcohol, or ether, m.97, b.290; a constituent of the grease of sheep wool, pus, etc. **amino-** Glutamic acid. **dimethyl-** $C_7H_{12}O_4$ = 160.1. Colorless crystals, m.127. **α-ethyl-** $C_7H_{12}O_4$ = 160.1. Colorless crystals, m.60, **β-ethyl-** Propidene diacetic acid. Colorless crystals, m.67. **α-methyl-** $C_6H_{10}O_4$ = 146.1. Colorless crystals, m.76. **β-methyl-** Ethidene diacetic acid, colorless crystals, m.86.

g. anhydride. $C_5H_6O_3$ = 114.1. The heterocyclic compound  .

glutarimide. $C_5H_7O_2N$ = 113.1. 2,6-Piperidinedione. The heterocyclic compound



Colorless crystals, m.152.

glutaronitrile. $C_5H_6N_2$ = 94.2. Trimethylenecyanide, pentane dinitrile*, $CN(CH_2)_3CN$. A colorless liquid, b.286.

glutaryl. The bivalent radical, —$OC(CH_2)_3$-CO—.

glutathione. $(NH_2)_2(C_4H_5O)CONH(C_2H_4S)CO-NHCH_2.COOH$. γ-glutamyl cysteyl glycine. A tripeptide occurring in blood and many animal organs, in embryos and germinating plants, etc. Cf. *thioneine.* It is a hydrogen acceptor,

$$2RSH \rightleftharpoons RS.SR + 2H,$$

and plays an important part in metabolism.

glutazine. $C_5H_6O_2N_2$ = 126.2. Betaimidoglutarimide. Colorless crystals, m.300.

glutelins. A group of simple vegetable proteins, coagulated by heat and insoluble in water or dilute salts, soluble in very dilute acids or alkalis: as glutenin, oryzenin.

gluten. A mixture of proteins occurring in the seeds of cereals; a grayish brown, sticky and tough mass remaining after washing the starch out of wheat flour with water. It confers the property of toughness on dough. The amino acids of glutens are:

	Wheat	*Oats*	*Maize*
glutamic acid.....	24.0	18.4	12.7
leucine.....	4.1	15.0	6.2
proline.....	4.0	5.4	5.0
arginine.....	4.4	....	7.1
other amino acids...	10.2	14.0	14.7
total amino acids....	46.7 %	52.8 %	45.7 %

animal- *Fibrin.*

glutenin. A protein of wheat, soluble in dilute alkalis.

glutin. $C_{192}H_{294}N_{60}SO_{70}(?)$ A protein in gelatin.

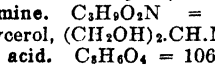
glutinic acid. $C_5H_4O_4$ = 128.09. Pentinedioic acid, propine-1.3-dicarboxylic acid, HOOC.C:-C.CH_2.COOH. A white solid, m.146.

glutol. A reaction product of starch and formaldehyde. Cf. *amyloform.*

glutolin. $C_{204}H_{336}N_{60}SO_{70}$. Formalin gelatin. A protein derived from gelatin.

glutose. The principal product formed by the action of alkali on invert sugar; probably a 3-ketohexose.

glycals. A group of derivatives of sugars obtained by removing H_2O_2; as



glucal, from glucose.

glyceraldehyde. $C_3H_6O_3$ = 90.1. Glyceric aldehyde, glyceryl aldehyde, *2.3*-dihydroxypropanal* $CH_2OH.CHOH.CHO$. A colorless solid, m.132, soluble in water, alcohol or ether.

glycerals. A group of compounds derived from glycerol and aldehydes, similar to the acetals.

glyceramine. $C_3H_9O_2N$ = 91.1. The amine of glycerol, $(CH_2OH)_2.CH.NH_2$.

glyceric acid. $C_3H_6O_4$ = 106.1. *1.2*-Dihydroxypropionic acid, *2.3*-dihydroxypropanoic acid*, the hydroxyacid $CH_2OH.CHOH.COOH$, which occurs in two stereoisomeric forms as *d-* and *l-* acids. A colorless syrup-like liquid, soluble in water, alcohol or ether. It is formed during alcoholic fermentation. **α-phenyl-** Atroglyceric acid.

glyceric aldehyde. Glyceraldehyde.

glyceride. A group of ethers or esters derived from glycerol; *e.g.*, (R = fatty acid radical):

CH_2O—R	CH_2O—R	CH_2O—R
|	|	|
CHOH	CHO—R	CHO—R
|	|	|
CH_2OH	CH_2OH	CH_2O—R
mono-	di-	tri-

The fats and oils are mainly triglycerides of fatty-acids, *e.g.*, tripalmitin, tristearin, etc.

glycerin. Glycerol. **g. agar-agar.** A culture media containing 60 cc. glycerol, 15 gm. agar,

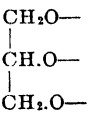
10 gm. peptone, 5 gm. sodium chloride, and 1000 cc. bouillon stock, neutralized with NaOH.

glycerinate. A salt of glyceric acid indicated by the $C_3H_5O_4$— radical.

glycerino- Glycero-.

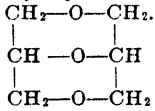
glycerinum. Glycerol.

glycero. (1) Same as glyceryl. (2) The trivalent radical from glycerol:



glycerol. $C_3H_8O_3$ = 92.08. Glycerin, glycerinum *1.2.3*-propanetriol*, propenyl hydrate $(CH_2OH)_2CHOH$. A clear, colorless, syrupy, sweet liquid, d.1.260, m.17, (but solidifies at much lower temperature), b.290, soluble in water or alcohol, insoluble in ether, chloroform, benzene, or carbon disulfide. It is obtained by the saponification of fats in the soap industry; used as a solvent and reagent, technically in the manufacture of printer's ink and rolls, and in medicine for application to the skin. It is the basis of many explosives, and is used as a mordant, and with boric acid, as a preservative. **absolute-** A glycerol entirely free from water. **amyl-** Quintenyl glycerin, $C_5H_9(OH)_3$. **diethyl-** Diethylglycerol. **mesitylene-** Mesicerin.

g. diacetate. Diacetin. **g. dilaurate.** Dilaurin. **g. dinitrate.** Dinitroglycerin. **g. diphenylether.** $C_{15}H_{16}O_3$ = 244.2. *1.3*-diphenoxy-*2*-propanol*. A white crystalline solid, m.80, b_{2mm}.175; used as plasticizer for nitrocellulose. **g. distearate.** Distearin. **g. ether.** $C_6H_{10}O_3$ = 130.2. Glyceryl ether. The heterocyclic compound



liquid, d.0.091, b.169. Cf. *glycerides, ethylin, allylin, protosal.* **g. monochlorhydrin.** $C_3H_7O_2Cl$ = 110.51. **α-** or 3-chloro-1.2-dihydroxypropane, *3*-chloro-*1.2*-propanediol*. A colorless liquid, d.1.322, n_D^{25}.1.4811, $b_{.5mm}$81, miscible with water, alcohol or ether; used in the synthesis of glycidol. **β-** or 2-chloro-1.3-dihydroxy propane. A liquid, d.1.321, $b_{.14mm}$-124. **g. monophenylether.** $C_9H_{12}O_3$ = 168.1. *1*-phenoxy-*2.3*-propanediol*, autodyne. A white solid m.53, $b_{.6mm}$145; used as a plasticizer in lacquers, and medicinally in nervous diseases. **g. phosphoric acid.** $C_3H_5(OH)_2H_2PO_4$ = 172.1. A dibasic acid. An oily liquid and constituent of lecithins and nerve tissues; used in medicinal preparations. **g. sulfuric acid.** $C_3H_5(OH)_2$-HSO_4. **g. tributyrate.** Tributyrin. **g. trilaurate.** Laurin. **g. trinitrate.** Nitroglycerin. **g. tripalmitate.** Palmitin. **g. tristearate.** Stearin.

glycerophosphate. Lecithin. A salt of glycerol phosphoric acid containing the bivalent = $PO_4.C_3H_5(OH)_2$ radical.

glycerophosphoric acid. See *glycerol phosphoric acid.*

glycerose. $C_3H_6O_3$ = 90.1. A triose derived from glycerol; a mixture of glyceraldehyde and dioxyacetone, obtained by oxidation of glycerol. It changes to acrose when treated with dilute NaOH.

glycerosulfate. A salt of glycerol sulfuric acid containing the monovalent —SO_4—$C_3H_5(OH)_2$ radical.

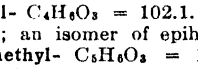
glycerosulfuric acid. Glycerol sulfuric acid.

glyceryl. Propenyl. The trivalent ≡C_3H_5 radical, —$CH_2.\overset{|}{C}H.CH_2$— derived from glycerol. Cf. *propenyl allyl.* **g. aldehyde.** Glyceraldehyde. **g. chloride.** Trichlorhydrin. **g. ether.** Glycerol ether. **g. hydroxide.** Glycerol. **g. laurate.** Trilaurin. **g. lineolate.** Trilinolein. **g. nitrate.** Nitroglycerin.

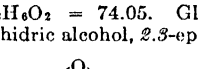
glycide. Glycidol.

glycides. A compound containing the atomic group —CH$\overset{O}{\diagdown\!\diagup}$CH—

glycidic acid. $C_3H_4O_3$ = 88.0. Epihydrinic acid, epoxypropionic acid.

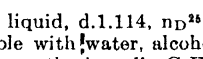


alphamethyl- $C_4H_6O_3$ = 102.1.

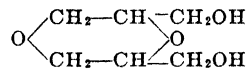


betamethyl- $C_4H_6O_3$ = 102.1. Colorless crystals, m.84; an isomer of epihydrinecarboxylic acid. **dimethyl-** $C_5H_8O_3$ = 114.1. Colorless crystals, m.62.

glycidol. $C_3H_6O_2$ = 74.05. Glycide, epihydrin alcohol, ephidric alcohol, *2.3*-epoxy-1-propanol*.



A colorless liquid, d.1.114, n_D^{25}. 1.4032, $b_{.761mm}$ 162, miscible with water, alcohol or ether; used in organic synthesis. **di-** $C_6H_{12}O_4$ = 148.96. The heterocyclic compound



glycin. (1) Glycine. (2) p-Hydroxyphenyl aminoacetic acid (a developer). (3) Mannite. (4) Beryllium. (5) Glycyrrhiza.

glycinaldehyde. C_2H_5ON = 59.05. Aminoacetaldehyde. NH_2CH_2CHO. Cf. *aminoacetal.*

glycine. $C_2H_5O_2N$ = 75.09. Glycocoll, aminoacetic acid, aminoethanoic acid*, glycocin, gelatin sugar, $NH_2.CH_2.COOH$. Colorless monoclinic crystals, d.1.575, m.232, slightly soluble in water, alcohol or ether. It is a constituent of many proteins, and has a sweet taste. **acetyl-** q.v. **benzoyl-** Hippuric acid. **carbamyl-** Hydantoic acid. **glycyl-** The simplest peptide, $NH_2CH_2CONHCH_2COOH$. **guanylmethyl-** Creatine. **N-methyl-** Sarcosine. **α-methyl-** Alanine. **trimethyl-** Betaine.

g. anhydride. 2.5-Piperazinedione. **g. betaine.** $C_5H_{11}O_2N$ = 117.08. $Me_3.N.CH_2.CO$ (—O—)

occurs in crustaceans, *Palinurus Japanicus*, the cephalopod, *Loligo breekeri*, and in the octopus.

glycine anhydride. 2.5-Piperazinedione.

glycinin. The principal protein of the soya bean.

glycirrhiza. Glycyrrhiza.

glycocholate. A salt of glycocholic acid.

glycocholeate. A salt of glycocholeic acid.

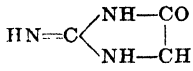
glycocholeic acid. $C_{27}H_{45}O_5N$ = 465.3. A bile acid; a combination of glycogen and choleic acid. Colorless, thick prisms, m.175, slightly soluble in hot water.

glycocholic acid. $C_{26}H_{43}O_6N$ = 465.4. A bile acid consisting of glycine and cholic acid. Colorless crystalline needles, m.134, soluble in water, alcohol, or ether, insoluble in benzene or chloroform.

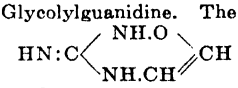
glycoclastic. Glycolytic.

glycocoll. Glycine. **g. betaine.** Glycine betaine.

glycocyamidine. $C_3H_5ON_3$ = 99.1. A colorless crystalline compound formed on dehydration of glycocyamine.



iso- Glycolylguanidine. The heterocyclic system.



methyl- Creatinine.

glycocyamine. $C_3H_7O_2N_3$ = 117.2. Guanido acetic acid. A colorless crystalline compound obtained from cyanamide and glycine. $HN{=}C(NH_2).NH.CH_2.COOH$. **methyl-** Creatine.

glycogen. $(C_6H_{10}O_5)_x$. Animal starch, glucogen, liver sugar, hepatin. A carbohydrate occurring in large amounts in the animal organism, especially liver (600 gm. in human body). A colorless tasteless powder, readily hydrolysed to glucose, and giving a deep red color with iodine. Acids hydrolyse it to dextrose, and enzymes to maltose.

glycogenase. An enzyme of the liver, which hydrolyses glycogen to maltose and dextrin.

glycogenolysis. The successive breaking down of glycogen in animal tissues (cf. *staircase reaction*), including the final splitting and oxidation of glucose. In *normal* tissue one glucose splits into lactic acid and one is oxidized; in *cancer* tissue thirteen split into lactic acid and one is oxidized.

glycol. (1) A member of the glycols, q.v. (2) $C_2H_6O_2$ = 62.06. The simplest diatomic alcohol $CH_2OH.CH_2OH$. Ethylene glycol, 1.2-ethane-diol*, dihydroxyethane. A colorless liquid, d.1.115, m. −17.4, b_{20mm}.197.5, insoluble in ether, miscible with water or alcohol. Used in antifreeze solutions for automobiles:

60 % in water freezes at −49°C (−56°F)
35 % in water freezes at −20.6°C (−5°F);

as a solvent for cellulose esters in lacquers, and in the manufacture of low-freezing dynamites. **benzylene-** Hydrobenzoin. **butylene-** Butanediol. **diethylene-** Carbitol. **diphenyl-** Hydrobenzoin. **ethylidene-** $MeCH(OH)_2$, known only in derivatives; as, acetals, chloral hydrate. **mesitylene-** Mesitylene glycol. **phenyl-** Cinnamic alcohol. **propylene-** Propanediol. **tetramethylene-** Butanediol. **thiodi-** Dioxyethylene sulfide. **tetramethylethylene-** Pinacone. **tetraphenyl-** Benzopinacol. **trimethylene-** Propanediol.

g. acetate. See *g. monoacetate, g. diacetate.* **g. aldehyde.** $C_2H_4O_2$ = 60.04. Hydroxyaldehyde, hydroxyacetaldehyde, glycolal, hydroxyethanal*. The simplest alcohol-aldehyde, $CH_2OH.CHO$. Colorless plates, m.96, soluble in water or alcohol, slightly soluble in ether. **g. amide.** $C_2H_5O_2N$ = 75.09. *2*-Hydroxyethaneamide*, *α*-hydroxyacetamide. The simplest alcohol-amide, $CH_2OH.CONH_2$. A colorless solid, m.120, b.147, soluble in water or alcohol. **g. bromohydrin.** C_2H_5OBr = 124.97. Ethylene bromhydrin, 2-bromo-1-hydroxyethane, $CH_2OH.CH_2Br$. A colorless liquid, b.147, soluble in water. **g. chlorohydrin.** C_2H_5OCl = 80.51. Ethylene chlorhydrin, 2-chloro-1-hydroxyethane $CH_2OH.CH_2Cl$. A colorless liquid, d.1.223, b.128, miscible with water. **g. cyanohydrin.** C_3H_5ON = 71.07. Ethylene cyanhydrin, 2-cyano-1-hydroxyethane, $CH_2OH.CH_2CN$. A colorless liquid, $d_0°$.1.059, b.222, miscible with water, alcohol, or ether. **g. diacetate.** Ethylene acetate. **g. dibromide.** Ethylene bromide. **g. dichloride.** Ethylene chloride. **g. dicyanide.** Ethylene cyanide. **g. diiodide.** Ethylene iodide. **g. dinitrate.** Ethylene nitrate. **g. dinitrite.** Ethylene nitrite. **g. ethers.** A group of compounds used as lacquer solvents, as:

g. butylether..... see *butylcellosolve.*
g. dimethylether..... see *dimethoxyethane.*
g. ethylether..... see *cellosolve.*
g. methylether..... see *methylcellosolve.*

g. leucine. Norleucine. **g. monoacetate.** Ethylene monacetate. **g. mercaptan.** $C_2H_6S_2$ = 94.1. Dithioethylene glycol, $(CH_2SH)_2$. A colorless liquid, d.1.120, b.146, slightly soluble in water. **g. salicylate.** Spirosal. **g. sulfhydrate.** Ethylene mercaptan. **g. thiourea.** $C_3H_4ON_2S$ = 116.13. A solid, soluble in water, alcohol or ether, m.200 (decomp).

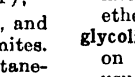
glycolal. Glycol aldehyde.

glycoleucine. Norleucine.

glycollic acid. $C_2H_4O_3$ = 76.04. Glycolic acid. Hydroxyacetic acid, hydroxyethanoic acid*, the simplest hydroxy-acid, $CH_2OH.COOH$. Colorless leaflets, m.78, decomp. on heating; soluble in water, alcohol, or ether. **diphenyl-** Benzilic acid. **phenyl-** See *mandelic* and *amygdalic acids.*

g. aldehyde. Glycol aldehyde. **g. amide.** Glycol amide. **g. anhydride.** $C_4H_6O_5$ = 134.07. $(CH_2OH.CO)_2O$. A colorless powder, m.129, insoluble in water, alcohol or ether.

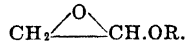
glycolide. $C_4H_4O_4$ = 116.0. $(C_2H_2O_2)_x$ = $(58.0)_x$. Glycollide. The anhydride of glycollic acid.



Colorless leaflets, m.86, insoluble in water, soluble in alcohol, ether or acetic acid.

glycolipins. A group of fatty substances, yielding, on hydrolysis fatty acids and a carbohydrate, usually glucose. They contain no phosphorus; *e.g.*, cerebron, phrenosin, kerasin.

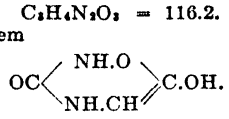
glycolocide. A compound of the type



glycols. Diols. A group of diatomic alcohols of the aliphatic series, *e.g.*, aliphatic compounds containing two —OH groups, as *e.g.*, ethandiol (glycol), propandiol, butandiol, etc. Analogous to alcohols there are:

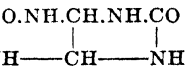
diprimary..... two $—CH_2OH$ groups
disecondary..... two $=CHOH$ groups
ditertiary..... two $\equiv C.OH$ groups
primary-secondary..... one CH_2OH and CHOH groups
primary-tertiary..... one CH_2OH and C.OH groups
secondary-tertiary..... one CHOH and C.OH groups

glycolureine. $C_3H_4N_2O_3$ = 116.2. The heterocyclic system



glycoluric acid. Hydantoic acid.

glycoluril. $C_4H_6O_2N_4$ = 142.10. Acetylene diureine.



White needles, soluble in water or alcohol.

glycolyl. (1) The monovalent radical, $HOCH_2.CO$—. (2) The bivalent $=C_2H_2O$ radical.

g. guanidine. Glycocyamidine.

glycolysis. The decomposition of glucose and other sugars by enzymes.

glycolytic. Glycoclastic. The degradation of sugars to lactic acid, alcohol, carbon dioxide, etc., by the enzymes of animal tissues or blood.

glycophospholipin. A group of fatty substances which yield a fatty acid, a carbohydrate and phosphoric acid on hydrolysis.

glycoproteins. Glucoproteins. A group of conjugated proteins containing a carbohydrate radical and a simple protein; *e.g.*, ichthulin, mucin, mucoids.

glycosal. Glycerol salicylate.

glycosamine. $C_6H_{11}O_5NH_2$ = 179.2. A decomposition product of chitin. A colorless crystalline powder, slightly soluble in water.

glycoside. A compound of a sugar with some other substance, which occurs in nature and hydrolyses to the carbohydrate and some other substance; there are *glucosides* yielding glucose, *fructosides* yielding fructose, *galactosides* yielding galactose, etc. Many pigments (as anthoxanthins and anthocyanins), saponins and tannins are glycosides.

(ar) = arabinoside. (di) = digitoxoside.
(ga) = galactoside. (gl) = glucoside.
(ri) = riboside. (rh) = rhammoside

1. ethylene derivatives:

sinigrin, $C_{10}H_{16}NO_9S_2K$ (gl).... black mustard
sinalbin, $C_{30}H_{44}N_2O_{16}S_2$ (gl).... white mustard
jalapin, $C_{34}H_{56}O_{16}$ (gl)..... jalap

2. benzene derivatives:

arbutin, $C_{12}H_{16}O_7$ (gl)..... bearberry
helicin, $C_{13}H_{16}O_7$ (gl)..... willow bark
salicin, $C_{13}H_{18}O_7$ (gl)..... willow bark
populin, $C_{20}H_{22}O_8$..... aspen
gallotannic acid, $C_{76}H_{52}O_{46}$..... tea, sumac
gaultherin, $C_{14}H_{18}O_8$ (gl)..... gaultheria

3. styrolene derivatives:

esculin, $C_{15}H_{16}O_9$..... horse chestnut
daphnin, $C_{15}H_{16}O_9$..... laurel
coniferin, $C_{16}H_{22}O_8$ (gl)..... conifers
datiscin, $C_{21}H_{22}O_{12}$..... datisca
phlorizin, $C_{21}H_{24}O_{10}$ (gl)..... cherry bark
naringin, $C_{21}H_{26}O_{11}$..... grapefruits
hesperidin, $C_{22}H_{26}O_{12}$..... oranges

4. flavone derivatives: (anthoxanthins)

quercitrin, $C_{21}H_{22}O_{12}$ (rh)..... oak bark

(anthocyanins)

cyanin $C_{27}H_{30}O_{16}$..... cornflowers
delphinin, $C_{51}H_{38}O_{21}Cl$..... larkspur

5. anthracene derivatives:

frangulin, $C_{21}H_{20}O_9$ (rh)..... buckthorn
saponin, $C_{32}H_{54}O_{18}$..... soapwort
rubianic acid, $C_{26}H_{28}O_{14}$..... madder
caulosaponin, $C_{55}H_{88}O_{17}$..... caulophyllum
caulophyllosapogenin, $C_{55}H_{88}O_9$. caulophyllum

6. cyanogen derivatives:

gynocardine, $C_{13}H_{19}NO_9$ (gl)... gynocardia oil
sambunigrin, $C_{14}H_{17}NO_6$..... elder
prulaurasin, $C_{14}H_{17}NO_6$..... cherry laurel
prunosin, $C_{14}H_{17}NO_6$..... prunes
phaseolunatin, $C_{14}H_{17}NO_6$..... lima beans
dhurrin, $C_{14}H_{17}NO_7$..... sorghum
amygdalin, $C_{20}H_{27}NO_{11}$ (gl).... almonds
lotusin, $C_{28}H_{31}NO_{16}$..... lotus

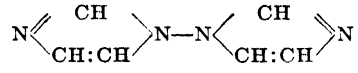
7. indoxyl derivatives:

indican, $C_{14}H_{17}NO_6$ (gl)..... indigo

8. cholane derivatives:

digitalin, $C_{35}H_{56}O_{14}$ (gl)..... digitalis
digitonin, $C_{54}H_{92}O_{28}$ (gl)..... digitalis
digitoxin, $C_{34}H_{54}O_{11}$ (di)..... digitalis

glycosine. $C_6H_6N_4$ = 134.3. Bisglyoxaline. The heterocyclic system:



glycotropin. A hormone similar in effect to prolactin, q.v.

glycuronate. A salt of glucuronic acid.

glycuronic acid. Glucuronic acid.

glycyl. The monovalent $NH_2.CH_2COO$—, or bivalent —$NH.CH_2.COO$— radical derived from glycine (aminoacetic acid); it occurs in peptides; as, glycyl-alanine, glycyl-glycine, glycyl-alanyl-glycine, etc.

glycyrrhetin. $C_{18}H_{26}O_4$ = 306.3. An amorphous bitter substance derived from licorice root.

glycyrrhiza. (1) Licorice. The dried aqueous extract of licorice root. A lustrous, black, brittle mass, soluble in water. (2) The rhizome and roots of *G. glabra typicat* (Spanish licorice), or *G. glabra glandulifera* (Russian licorice), a Leguminosae.

glycyrrhizic acid. $C_{44}H_{64}O_{19}N$ = 910.50. A crystalline acid, m.220, derived from licorice.

glycyrrhizin. $C_{44}H_{64}O_{19}$ (?). A sweet principle from the roots of licorice. Dark-brown scales, soluble in water or alcohol, m.205 (decomp.), optically inactive.

glyoxal. $C_2H_2O_2$ = 58.03. Oxalaldehyde, ethanedial*, diformyl, oxal, $(CHO)_2$. A colorless, amorphous and deliquescent powder or liquid, d.1.14, m.15, b.50.5, soluble in water, alcohol, or ether. **difuryl-** Furil. **dimethyl-** Biacetyl. **diphenyl-** Benzil. **methyl-** Pyruvaldehyde. **phenyl-** Benzoyl formaldehyde.

glyoxalase. An enzyme which occurs in all animal tissues, except pancreas and lymph-glands. It converts glyoxal or its substitution compounds into glycollic acid or its substitution compounds:

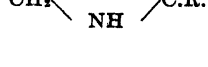
$$R—COCHO + H_2O = R.CHOHCOOH$$

glyoxalcarbonic acid. $C_3H_2O_4$ = 102.0. H.CO.CO.COOH.

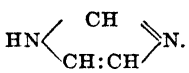
glyoxalene. Imidazole.

glyoxalic acid. (1) $C_2H_2O_3$ = 74.0. Glyoxylic acid, ethanal acid, oxoethanoic acid*, oxaldehydic acid, the simplest aldehyde acid: HCO.COOH. Colorless rhombic crystals, soluble in water, forming the hydrated acid $(HO)_2$-CH.COOH. Cf. *glyoxylic acid.* **g. hydrate.** Glyoxylic acid.

glyoxalidine. A compound of the type



glyoxaline. $C_3H_4N_2$ = 68.13. The azole



Imideazole, 1.3-diazole. Colorless prisms, m.-88°, b.255, very soluble in water, alcohol or ether. **bis-** Glycosine. **triphenyldihydro-** Amarine. **g. alkaloids.** A group of alkaloids containing the imidazole nucleus, *e.g.*, pilocarpine, pilocarpidine.

glyoxime. $C_2H_4O_2N_2$ = 88.12. The diimide $(CH:NOH)_2$. Colorless, rhombic tablets, m.-178, soluble in water, alcohol or ether. Cf. *dimethylglyoxime, Tschugajew's reaction.*

glyoxyl. The monovalent CHO.CO— radical, derived from glyoxal. **g. carboxylic acid.** Glyoxal carbonic acid.

glyoxylase. Glyoxalase.

glyoxylic acid. $C_2H_4O_3$ = 92.04. Glyoxalic acid hydrate, dihydro-acetic acid, *1.1*-dihydroxyethanoic acid*, $(HO)_2CHCOOH$. The hydrated and crystalline form of glyoxalic acid, q.v. It occurs in unripe fruit. **amino-** Oxamic acid. **aminophenyl-** Isatic acid. **carboxyphenyl-, o-.** Phthalonic acid. **p-.** Terephthalic acid. **methyl-** Pyruvic acid. **phenyl-** Benzoyl formic acid.

glyoxylic aldehyde. Glyoxal.

glyptal. A trade name for synthetic resins prepared from a polyhydric alcohol and phthalic anhydride.

gm. An abbreviation for grams. (Gm. in U.S. Phar. XI.)

Gmelin, Christian Gottlieb. 1792–1860. A German chemist noted for making artificial ultramarine. **G., Johann Friedrich.** 1748–1804. German physician and writer on chemistry and pharmacy. **G., Leopold.** 1788–1853. A German chemist noted as a discoverer of potassium ferricyanide and a prolific author. **G. test.** The detection of bile acids in urine by means of nitric acid, which is dropped on filter paper saturated with urine; a series of concentric rings of various colors appears.

gmelinite. $(Ca,Na_2)Al_2Si_3O_{12}$. A native chabazite.

gneiss. A group of crystalline metamorphic rocks, which consist typically of quartz or feldspar.

gnoscopine. $C_{24}H_{26}O_{11}N_2$ = 648.4. *dl*-Narcotine. An opium alkaloid, m.229. Found in the mother liquor of narceine and synthesized by dehydration of a molecular mixture of meconine and cotarnine.

goa. Araroba, crude chrysarobin, goa powder, Brazil powder. A light yellow powder from the cavities in the trunks of *Andira araroba*, a Leguminosae of Brazil. It contains 80 % chrysarobin, and resin, gum, etc., and is used in skin diseases (taenifuge) and as a source of chrysarobin. Cf. *yaba bark, andirin.*

Göckel condenser. A condenser, similar to Liebig's, in which the inside tube is U-shaped; one arm is connected to the distilling flask, the other to a hood, etc., while at the base the tube may be connected with an air-tight receiver.

goethite. FeO.OH. Ruby mica. A hydrated oxide of iron (cf. *göthite*).

Goethlin. See *Göthlin.*

gold. Au = 197.2. Aurum. An element of atomic number 79. A yellow ductile, noble metal, $d_{17.5°}$.19.32, m.1065, b.2500, insoluble in acids or alkali, soluble in aqua regia. It occurs in nature as an uncombined metal, has valencies of 1 and 3, and tends to form complex compounds:

aurous	Au^+
auric	Au^{+++}
dicyano aurate	$Au(CN)_2^-$
tetroxy aurate	$Au(OH)_4^-$
tetrachlor-aurate	$AuCl_4^-$
disulfo aurate	AuS_2^-

The world's gold production (in million fine ounces) was:

	1933	1934	1935	1939
South Africa	11.0	10.5	10.7	12.8
Russia	2.8	4.2	5.3	5.0
U. S. A.	2.5	2.9	3.4	4.3
Canada	2.9	2.9	3.3	5.1

coinage- An alloy of 90 % Au and 10 % Cu. **fulminating-** Aurodiamine. **hall-marked.** Standard g. **liquid-** A mixture of a solution of a complex organic g. compound in an essential oil with an adhesive. It is brushed on to pottery, and burned in to form a pattern. **mosaic-** q.v. **rhodium-** Rhodite. A native alloy of 57–66 % Au and 34–43 % Rh. **standard-** Pure gold (24 karats) and 4 alloys of 22, 18, 14 and 9 karats are legal standards in England. Four alloys are used in the U.S.A.— 22, 18, 14 and 10 karats. **white-** An alloy of g. with 20 % of Pd, used in jewelry. **g. alloys.** An alloy of gold and another metal; see *coinage metal, gold plate, standard gold.* The melting points of the principal alloys are:

Gold with	21.6 90 % 10 %	19.2 80 % 20 %	16.8 70 % 30 %	14.4 60 % 40 %	12 karats 50 % 50 %
Ag	1062°	1061°	1058°	1054°	1049°
Al	675	1055	1025	970	915
Cu	910	890	895	905	925
Pt	1125	1190	1250	1320	1380

The gold content of alloys is indicated (1) in "karats" (q.v.), or parts in twenty-four. (2) By the fineness (parts per 1,000). **g. amalgam.** A fusible crumbling amalgam of gold (40 %), silver, and mercury. **g. bromide.** See *auric* or *aurous bromide.* **g. chloride.** See *auric chloride.* **g. cyanide.** See *auric*, or *aurous cyanide.* **g. dichloride.** $AuCl_2$ = 267.9. A reddish crystalline powder, decomp. by water. **g. foil.** Thin leaves of hammered gold, used for gilding, lettering, or in dental work. **g. iodide.** See *auric iodide* or *aurous iodide.* **g. leaf.** G. foil. **g. monobromide.** Aurous bromide. **g. monochloride.** Aurous chloride. **g. monoiodide.** Aurous iodide. **g. number.** A measure of the protecting action of a colloid. The weight (in mgms.) which, when added to 10 cc. of a 0.005–0.006 % red g. sol., just prevents the color change to blue (due to coagulation) on addition of 1 cc. of 10 % sodium chloride

solution. **g. perchloride.** Auric chloride. **g. plate.** An alloy of gold, silver and copper. *E.g.*, 18 karats: 18 pt. Au, 2 pt. Ag, and 4 pt. Cu. 20 karats: 20 pt. Au, 2 pt. Ag, and 2 pt. Cu. **g. plating.** The electrodeposition of gold from a solution of gold cyanide in potassium cyanide. **g. salt.** G. sodium chloride. **g. size.** A solution of white and red lead and yellow ochre in linseed oil, used to seal permanent microscopical preparations. **g. sodium bromide.** $NaAuBr_4$, $2H_2O$, sodium aurobromide. A yellow, water-soluble salt used in photography. **g. sodium chloride.** $NaAuCl_4.2H_2O$ = 398.1. Sodium aurochloride. A yellow hygroscopic crystalline mass, soluble in water; used in photography for toning. **g. sponge.** A porous spongy form of metallic gold obtained by precipitating gold solution with oxalic acid, and drying and heating the precipitate. **g. terchloride.** Auric chloride. **g. tribromide.** Auric bromide. **g. trichloride.** Auric chloride. **g. tricyanide.** Auric cyanide. **g. triodide.** Auric iodide. **g. trioxide.** Auric oxide. **g. trisulfide.** Auric sulfide.

golden. g. rod. Solidago. **g. seal.** Hydrastis. **g. yellow.** Naphthalene yellow.

Goldschmidt's process. Thermite process.

Golo process. A process of bleaching flour with nitrosyl chloride.

gomabrea. An exudation from a Chilean tree, used as a substitute for gum arabic.

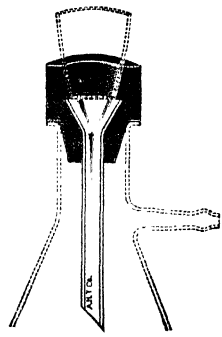
Gomberg, Moses. 1866– . An American chemist, noted as pioneer in the study of free radicals.

gonan. The luteinsing sex hormone of pregnancy urine.

gondoic acid. $C_{20}H_{38}O_2$ = 310.31. An eicosenoic acid from the oil of the pilot whale.

goniometer. An optical device for measuring angles, especially of crystals.

Gooch, Frank Austin. 1852– . An American chemist, noted for analytical methods. **G. crucible.** A crucible with a perforated bottom. It is used in analytical work for filtering through glass or asbestos. The precipitate is then dried and weighed (see figure).



Gooch crucible with funnel and holder.

goose foot. Chenopodium.

Gordon, Neil Elbridge. 1886– . An American chemist noted for his work in chemical education.

Gore phenomenon. The recalescence of an alloy or steel on cooling, due to transition into another crystalline form.

gorgonin. A scleroprotein from the skeletal tissue of the coral. *Gorgonia cavollisa* (sea fans), which contain 9 % di-iodo-tyrosine.

gorli oil. The fixed oil of *Oucoba echinata*, a Flacourtiaceae of South Africa, which resembles chaulmoogra oil.

gosio gas. C_3H_9As = 119.91. Trimethyl arsine, $AsMe_3$. A gas of garlic odor generated by certain molds growing in media containing carbohydrates and arsenic compounds.

goslarite. $ZnSO_4,7H_2O$. A mineral zinc sulfate.

gossypetin. $C_{15}H_{10}O_8$ = 318.08. 3.5.7.8.3′.4′-hexahydroflavone. A flavone (q.v.) of gossypium, m.230.

gossypiin. Gossypoid.

gossypin. The cellulose of cotton.

Gossypium. (1) The cotton plant, a genus of Malvaceae. (2) Cotton, or the hairs of the seeds of *G. herbaceum.*

gossypoid. The combined principles from the bark of the root of *Gossypium herbaceum* (cotton root bark), used as an emmenagogue.

gossypol. The toxic principle of cotton seeds. **bound-** An ether-insoluble product formed from g. in the commercial manufacture of cottonseed meal.

göthite. Fe_2O_3,H_2O. Pyrrhosiderite. A crystalline hydrated ferric oxide, (cf. *goethite*).

Göthlin solution. An artificial serum consisting of 6.5 gm. NaCl, 1 gm. $NaHCO_3$, 0.1 gm. KCl, 0.13 g. $CaCl_2$ per liter water.

Göttling, Johann Friedrich August. 1755–1809. A German apothecary, and the first in Germany to accept Lavoisier's theory.

Göulard's extract. A solution of basic lead acetate, $Pb(OH)_2.Pb(OAc)_2$, used as a reagent for phenols.

goutine. Citarin.

gr. An abbreviation for grain.

Gräbe. See *Graebe.*

grade. The ratio of the rise of a slope to its length; the sine of the angle of slope.

graded. Differentiated. **g. potential.** A method of analysis by electro-deposition in which various metals are separated at specific voltages.

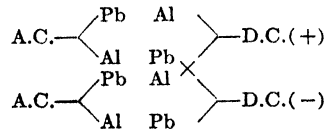
grading. The sorting of materials on the commercial scale according to size, quality, rank, etc. by gravity action (air separators), centrifugal force (cyclone separators), or mechanical action (screening).

graduate. (1) A measuring device for liquids, generally a cone-shaped or cylindrical vessel marked with lines showing the volume. (2) One who has earned a degree from a college or university.

graduated. Divided into units by a series of lines, as a vessel which is marked for measuring liquids. *E.g.*, cylinders, thermometers, rulers etc.

Graebe, Carl. 1841–1927. A German organic chemist who established the constitution of naphthalene, anthracene and phthalic acid, etc. Co-synthesizer (with Liebermann) of alizarin.

Graetz rectifier. A device for converting alternating current to direct current, consisting essentially of four electric cells with lead and aluminum plates in a solution of sodium bicarbonate, and connected as follows:



Graham, Thomas. 1805–1869. A Scottish chemist, and pioneer in the study of colloids, the diffusion of gases and dialysis. He introduced bronze coinage. **G. law.** The velocities of diffusion of any two gases are inversely proportional to the square roots of their densities, hence $\frac{v_1}{v_2} = \frac{\sqrt{d_2}}{\sqrt{d_1}}$. Cf. *diffusion law.* **G. salt**

Soluble sodium hexametaphosphate. Prepared by strongly heating monosodium dihydrogen orthophosphate, and rapidly cooling the molten mass.

grain. (1) A unit of the apothecaries, avoirdupois, and troy weights (originally that of an average wheat grain):
1 gr. = 64.798918 mg. = 0.064798918 gm.;
1 gr. = $\frac{1}{20}$ scruple = $\frac{1}{60}$ dram = $\frac{1}{480}$ ounce = $\frac{1}{5760}$ pd.
(2) The seeds of Gramineae or the cereals. (3) The appearance of a heterogeneous surface, *e.g.* the size of particles in a photographic plate or alloy. **g. alcohol.** Ethanol. **g. germinator.** Germinator. **g. oil.** Fusel oil. **g. tester.** (1) Germinator. (2) A device for sectioning grains.

graininess. The lack of homogenity of deposits due to aggregations of particles, as shown in photomicrographs.

gram. (1) As suffix: a mechanical record; as, photogram, spectrogram. Cf. *graph.* (2) Gramme, g., gm., (Gm., U.S.P.XI.). A unit of weight in the C.G.S. system: the mass of 1.000027 cc. water at 4°C. See *liter.*
1 g. = 1000 mg. = 1000000γ = $\frac{1}{1000}$ kg.
1 g. = 15.43248 gr. = 0.03527 av. oz. = 0.03215 ap. oz.
kilo- One thousand grams = 1 kg.
micro- The one-millionth part of a gram, 1μg or 1γ.
milli- The one-thousandth part of a gram, 1 mg.
g.-atom-. The atomic weight of an element expressed in grams. **g. calorie.** Small *calorie.* **g. centimeter.** The gravitational unit of work, g. ergs. **g. equivalent.** The equivalent weight of a substance expressed in grams, or n grams of a substance, where n is atomic weight/valency. **g. molecular solution.** Molar solution. **g. molecular volume.** The volume at 0°C. and 760 mm. pressure occupied by 1 mol of an element. For a gas it equals the volume of 2 gm. hydrogen at N.T.P./limiting density = 22.242 liters. **g. molecular weight.** G. molecule. **g. molecule.** The molecular weight of a substance expressed in grams; or one mol.

Gram, Hans C. J. 1853–1938. A Danish bacteriologist noted for his methods of identifying bacteria. **G.-negative.** Gram-negative. Bacteria which are decolorized by G. method of staining. **G.-positive.** Gram-positive. Bacteria which retain the Gram stain. **G.'s iodine solution.** A solution of 1 pt. iodine, 2 pts. potassium iodide in 200 pts. water; used for staining microscopical sections and bacteria. **G.'s stain.** A solution of 15 cc. aniline, 7 cc. saturated alcoholic solution of methylviolet, 10 cc. absolute alcohol in 100 cc. water. Used as a test stain in bacteriological work.

gramicidin. A compound isolated from cultures of certain bacteria in phosphate-enriched soils, which is toxic to all Gram-positive organisms.

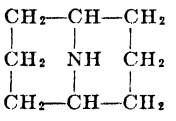
Graminaceae, Gramineae. The grass family, a group of plants that yield cereals, sugar, starch and essential oils.

Saccharum officinarum....	cane sugar
Agropyron repens.....	triticum
Zea mays.....	Zea or Indian corn maize oil corn starch dextrin
Avena sativa.....	oatmeal
Triticum vulgare.....	wheat flour
Lolium temulentum.....	temulentine
Cf. *ergot, andropogon, bamboo, esparto.*	
Metroxylon sagu.....	pearl sago
Colocasia esculenta.....	taro flour or poi
Oryza sativa.....	rice rice starch
Hordeum distichum.....	barley malt malt extract

gramine. A protein, m.133, from barley.

gramme. Gram. Used in the B.P.

granatanine. $C_8H_{15}N$ = 125.2. *1.5*-Imino-cyclo-öctane. The heterocyclic compound



granatine. An alkaloid from pomegranate.

granatonine. Pseudo-*pelletierine.*

granatotannic acid. $C_{20}H_{16}O_{13}$ = 464.1. An amorphous substance from the root-bark of *Punica granatum* or pomegranate.

granatum. Pomegranate.

grandiflorine. An alkaloid from the fruit of *Solanum grandiflorum.*

granite. A crystalline, igneous rock, consisting of quartz, orthoclase with both muscovite and biotite, which has cooled slowly under great pressure.

granular. Grain-like.

granulated. Made of small particles.

granulation. The process of converting a substance into granules or grain-like particles; *e.g.*, by rubbing the moist substance through a sieve, or by rapidly quenching drops of a molten metal (as with granulated zinc).

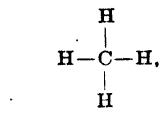
granule. (1) A small grain (2) A medicinal substance in the form of small pellets.

granulose. (1) β-amylose. A sugar of starch found in plants, enclosed by an envelope of starch cellulose. It gives the blue color with iodine solution. (2) The product obtained when cotton wool is charred.

grape. (1) Vine. The plant *Vitis vinifera.* (2) The edible fruit of *Vitis* species. **mountain-** The root of *Berberis aquifolium,* a Berberidaceae, used as an alterative and tonic. **Oregon-** Mountain.
g. fruit. The edible fruit of *Citrus maxima,* rich in vitamin C. **g. juice.** The expressed and sterilized, unfermented juice of g. used as beverage. **g. pomace.** A fertilizer consisting of the dried cake remaining after pressing the juice from grapes. It contains about 1.2 % N, small amounts of P and K. **g. seed oil.** An oil expressed from g. seeds, and used as lubricant for watches and for coating raisins; d.0.923, n_D.1.477, acid value 4–5, sapon. no. 182. **g. sugar.** Glucose.

graph. As suffix: (1) a pictorial record; *e.g.*, photograph. Cf. *gram, diagram.* (2) An instrument to make mechanical records, (gram), as, spectrograph, telegraph.
As noun: (1) A record obtained by physical means, as, electrochemical spectrum. (2) A line drawing showing the frequency or periodicity of a phenomenon or relating 2 variables.

graphic. Pertaining to diagrams. **g. formula.** A spacial structure formula, *e.g.*,



or a geometrical drawing indicating the isomeric forms of certain carbon compounds. **g. symbol.** See *structure symbol, molecular diagram.*

graphite. Black lead, plumbago. A native or artificially-made allotropic carbon; shining amorphous masses or hexagonal lamellae, d.1.9–2.3, hardness 0.5–1.0. Used as pigment, as material for crucibles, retorts, electrodes and pencils, and as a lubricant. **colloidal-** Deflocculated suspensions of graphite in oil (oildag) or in water (aquadag), used as lubricants. Cf. *dag.*

graphitic acid. $C_{11}H_4O_5$ = 216.0. An acid produced from native graphite by the action of potassium chlorate and nitric acid, as a yellow-green powder. **pyro-** See *pyrographitic acid.*

graphon sulfate. The black substance produced by the slow action on graphite of potassium chlorate and concentrated sulfuric acid.

grappa. A brandy prepared by fermenting pressed pomace, adding grape residues etc., and distilling.

grasses. See *Graminaceae.* **g. time factor.** A supposed vitamin (q.v.) in grass juice, the absence of which affects the optimum growth-rates of rats and guinea pigs.

grating. A lattice work or screen composed of lines, *e.g.*, a glass, metal, or film with minute fine rulings (often 20,000 per centimeter) and producing a series of spectra by the dispersion of a ray of light. Cf. *diffraction.* **concave-** A slightly concave piece of speculum metal on which the lines are ruled; it focuses the light and no collimator is needed. **plane-** A g. which requires parallel rays of light, hence a slit, collimator and telescope. **g. spectroscope.** A spectroscope in which the spectrum is produced by diffraction (by means of a grating), and not by refraction (prisms).

gratiolin. $C_{20}H_{34}O_7$ = 386.3. A glucoside from *Gratiola officinalis* or hedge hyssop, a Scrophulariaceae; yellow silky needles.

gratiolirhetin. $C_{17}H_{28}O_{31}$ = 728.3. A resinous decomposition product of gratiolin.

gratioloic acid. $C_{28}H_{56}O_4$ = 456.5. An acid from *Gratiola officinalis;* pearly white scales.

gratiosoletin. $C_{20}H_{38}O_{17}$ = 586.7. A decomposition product of gratiosolin.

gratiosolin. $C_{46}H_{84}O_{25}$ = 1036.8. A glucoside from *Gratiola officinalis,* hydrolysed by water to gratiosoletin.

graukalk. Technical calcium acetate.

gravimetric. Measurement by weight. **g. analysis.** Quantitative analysis by weighing precipitates.

gravimetry. The science of measurement by weight.

gravitation. (1) The universal attraction between material bodies. Its intensity varies directly as the product of the two masses. (2) The tendency of substances to move toward the center of the earth, as measured by the gravitation constant, *g.* **g. constant.** A measure of the attractive force of the earth. $g = 666.07 \times 10^{-10}$ cm./²gs.² = 980.665 cm./sec.² **g. formula.** The force, f, of gravitational attraction between two masses, m and m_1, separated by the distance $r = G\frac{mm_1}{r_2}$, where G is the gravitation constant = 6.658×10^{-8} dynes cm.²/gs.²

gravitational. Pertaining to gravitation. **g. constant.** Gravitation constant. **g. effect.** Westling effect. The loss of weight of body A weighed underneath body B on a beam balance. The effect is specific for those pairs of elements whose atomic numbers are related by $B^2/A^2 = n$, where n is an integer. **g. force.** Gravitation formula.

gravity. (1) The tendency of substances to move toward the center of the earth, *e.g.*, the attractive force of the earth for bodies, measured by the gravitation constant. (2) Specific gravity. Cf. *Helmert's equation.* **distillation-.** The specific gravity of 200 cc. of distillate from 200 cc. of an alcoholic liquor. **original-.** O.G. The specific gravity of a wort before fermentation as determined from the amount of alcohol in the fermented liquor. It is given by the residual gravity plus the gravity lost according to the spirit indication (q.v.). **present-.** The actual specific gravity of a fermented liquor. **residual-.** The specific gravity of the liquid remaining after all the alcohol has been removed by distillation from 200 cc. of a fermented liquor, and the residue made up to 200 cc. **specific-** See *density* and *specific gravity.*

gravure. A process of printing from an inked metal surface which has been etched with acid in such a way that the darker the shade the deeper the etch and the more ink it holds available for transfer to the paper.

gray, grey. Ash color, a mixture of white and black pigments. See **grey.**

grease. (1) Any soft, butter-like fat. (2) Any low-grade waste products containing lard, tallow, bone, horse or fish fat, stearins etc. Greases usually have an unpleasant odor, high unsaponifiable matter and free fatty acids, and are dark colored. They are used as lubricants. **black-.** A dark fatty matter obtained from cotton-seed oil, and used in candle manufacture. **cup-.** An emulsion of mineral oil (80 %), lime soaps, water (1 %) used as a lubricant. **Yorkshire-** Lanolin.

Greek alphabet *

A	α	alpha (*al'-fah*)	a	1
B	β ($\mathcal{B}$)	beta (*be'-tah*)	b	2
Γ	γ	gamma (*gam'-ah*)	g (hard)	3
Δ	δ (∂)	delta (*del'-tah*)	d	4
E	ϵ (ε)	epsilon (*ep-sī'-lon*)	e (short)	5
Z	ζ	zeta (*ze'-tah*)	z	6
H	η	eta (*e'-tah*)	e (long)	7
Θ	θ (ϑ)	theta (*the'-tah*)	th	8
I	ι	iota (*i-o'-tah*)	i	9
K	$\varkappa$ (κ)	kappa (*kap'-ah*)	k	10
Λ	λ	lambda (*lam'-dah*)	l	11
M	μ	mu (*mū*)	m	12
N	ν	nu (*nū*)	n	13
Ξ	ξ	xi (*ksī*)	x	14
O	o	omicron (*om-i'-kron*)	o (short)	15
Π	π	pi (*pī*)	p	16
P	ρ (ϱ)	rho (*ro*)	r	17
Σ	σ s	sigma (*sig'-mah*)	s	18
T	τ	tov, tau (*taw*)	t	19
Υ	υ	upsilon (*up-sī'-lon*)	u	20
Φ	φ (ϕ)	phi (*fī*)	ph (f)	21
X	χ	chi (*kī*)	ch (hard)	22
Ψ	ψ	psi (*psī; sī*)	ps	23
Ω	ω	omega (*o'-me-gah*)	o (long)	24

* In chemical names the Greek letters are used to indicate the carbon atoms, thus "λ-hydroxy" means a hydroxyl radical on the eleventh carbon atom.

Greek numerals (as used in chemistry)

1 hen (mono)	18 octadeka
2 duo (bi)	19 nonadeka
3 tria	20 eicosa
4 tetra	21 heneicosa
5 penta	22 docosa
6 hexa	23 tricosa
7 hepta	30 triakonta
8 octo	40 tetrakonta
9 nona	50 pentekonta
10 deka	60 hexekonta
11 hendeka	70 heptakonta
12 dodeka	80 octokonta
13 trideka	90 nonakonta
14 tetradeka	100 hekaton (hekta)
15 pentadeka	1000 chilioi (kilo)
16 hexadeka	10,000 myria
17 heptadeka	

green. (1) Grass color, a hue obtained by mixing yellow and blue pigments. (2) Unused or raw; untreated or incompletely treated. **g. pigments.** See *arsenic green, brunswick green, chrome green, copper green, Guignet green, ultramarine green, Rinman green, etc.* **g. vitriol.** Ferrous sulfate.

greenockite. CdS. A rare mineral cadmium sulfide.

greensalt. A wood preserving solution containing potassium dichromate, copper sulfate and arsenic acid.

greensand. (1) A sandy deposit containing glauconite. (2) Natural sand dampened for molding.

greenstone. A variety of jade.

greisen. A granite in which feldspar is replaced by quartz.

Grenacher stain. Three solutions (alum-, borax- and hydrochloric acid-carmines), used for staining the nucleic and muscle tissues.

Grenet battery. An electrolytic cell of the carbon-zinc type.

grenz rays. Infra-röntgen rays, Bucky rays, long-wave x-rays. Very soft x-rays produced at low voltages and absorbable by glass; used in skin diseases. Cf. *radiations.*

Grethen weighing bottle. A small glass tube with a ground glass stopper holding a glass tube and stopcock, used for weighing corrosive and fuming liquids.

grey oil. Gray oil. A mixture of 40–50% finely-divided mercury in an oil base, used as an ointment and in hypodermic medication. **g. powder.** A dried finely-divided mixture of 38% mercury, 57% chalk with 10% honey.

Griess, Peter. 1829–1888. A German-born English chemist, noted for his work on diazo-compounds. **G. reaction.** The substitution of amino radicals by hydroxyl, halogen, or cyan radicals. The amine is diazotized, and treated with water or a solution of a cuprous halide. **G.-Ilosva reagent.** A solution of sulfanilic acid and α-naphthylamine in acetic acid, used as a reagent for nitrites.

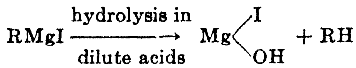
grifa. Lithium acetyl salicylate.

Griffith white. Lithopone.

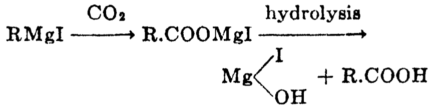
Grignard, Victor. 1871–1935. A French chemist and Nobel Prize winner (1912), noted for organic syntheses. **G.'s reaction.** Magnesium alkyl-condensation. A synthetic reaction, by which a carbon atom is introduced into the hydrocarbon radical of a compound by G.'s reagent. It offers a ready means of passing from a lower member of a homologous series to a higher member, and has become one of the most valuable methods of organic synthesis. **G.'s reagent.** Any one of a group of organic magnesium compounds of the general type R.Mg.X, where R is an organic radical and X a halogen.

Typical Grignard reactions:

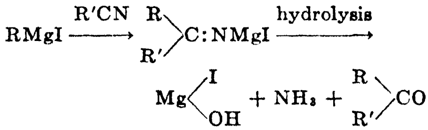
1. Formation of a *hydrocarbon:*



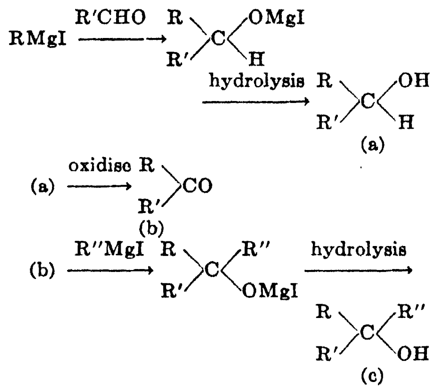
2. Preparation of an *acid:*



3. Preparation of a *ketone:*



4. Preparation of a *secondary alcohol* (a), *ketone* (b), or *tertiary alcohol* (c) Polaises reaction:



grindelia. Gum plant, tar weed. The dried leaves and flowering tops of *Grindelia* species, a Compositae used as an antispasmodic and anticatarrhal.

grindeline. An alkaloid from *Grindelia robusta;* colorless crystals.

grindeloid. The combined principles of *Grindelia* species, containing an alkaloid resin and oily substance.

grinder. A power-operated device for pulverizing materials by grinding. Cf. *crusher, mill.*

grinding. The process of powdering a substance by lateral motion, as opposed to perpendicular motion (crushing).

grinding *crushing*

g. apparatus. A grinder.

griphite. $8[(NaAlCaFe)_3Mn(PO_4)_2.5(OH)_2]$. A native hydrophosphate of the garnet type.

griserin. Sodium lorinate.

grm. An abbreviation for gram.

grog. Broken bricks, or burnt ground fireclay, used as a refractory.

Grossmann reagent. An ammoniacal solution of dicyandiamidine sulfate, $(C_2H_6ON_4)_2H_2SO_4$.

which gives a yellow precipitate with traces of nickel.

grossularite. A pale green calcium aluminum garnet.

Grotthus' law. Radiation must be absorbed in order to produce a reaction.

ground. Powdered or pulverized. **g. cherry.** Physalis. **g. nut.** Arachis. **g. wood.** Mechanical pulp.

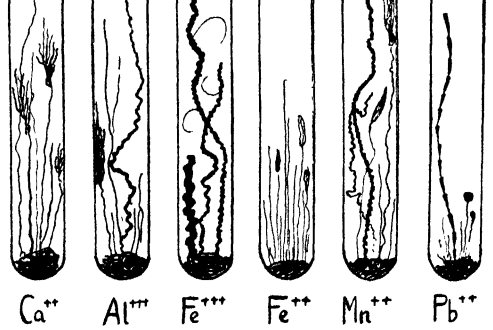
ground-nut oil. Arachis oil.

group. (1) A number of elements having similar properties, *e.g.*, the alkali metals. See *periodic system.* (2) A number of atoms that pass through a series of reactions unseparated. See *radical.* (3) A number of elements with similar reactions. See qualitative *analysis.* **functioning-** A g. which has a replaceable hydrogen; as, —OH, —CHO, —NH_2, —SO_3H. Cf. *Beilstein, derivative.* **negative-** A negatively-ionised atom of an acid radical, *e.g.*, SO_4. **nonfunctioning-** A g. which has no replaceable hydrogen. Beilstein mentions seven: —F, —Cl, —Br, —I, —NO, —NO_2, —N_3. Cf. *derivative.* **positive-** A positively-ionised atom of a metal or radical, *e.g.*, NH_4.

g. precipitant. A reagent which precipitates elements of the same group, *e.g.*, H_2S, NH_4OH. **g. properties.** The properties of elements belonging to the same group, *e.g.*, those characteristic of a vertical division of the periodic system as opposed to period properties. **g. reaction.** The precipitation of elements in a definite analytical group, *e.g.*, salts of Ag, Hg, Pb, by HCl, etc. **g. relation.** The relation among elements of a group (vertical division) of the periodic system.

Grove, Sir William Robert. (1811–1896). British scientist, noted principally for the Grove voltaic cell. **G. cell.** A voltaic cell consisting of amalgamated zinc in sulfuric acid (d.1.136) and platinum in concentrated nitric acid (potential, 1.91 volts).

growth. An increase in size. **bacterial-** The appearance of a bacterial colony after incubation; see *arborescent, beaded, brittle, bullate, butyrous, coriaceous, cretaceous, curled, echinulate, effuse, erose, filamentous, filiform, floccose, fimbriate, lobate, membranous, mycelioid, napiform, pulvinate, punctiform, raised, rhizoid, rim, ring.* **colloidal-** A phenomenon observed when a few crystals of any soluble metallic salt (whose silicate is insoluble) is placed in a 50% solution of waterglass. Each metallic salt produces within a few minutes its characteristic structure as a result of osmotic pressure and the breaking of the insoluble membrane of metal silicate. Previous addition of small amounts of sodium carbonate or phosphate to the waterglass effects a change of structure. Most active are the salts of Fe, Ni, Co, Mn, Al, Mg, Ca, Ba, etc.; least active are Cu, Pb, U. See figure. **inorganic-** The aggregation of solid particles, either by (1) crystallization, (2) periodic precipitation, or (3) colloidal growth.



Colloidal growth, about ½ natural size.

g. factor. A supposed vitamin (q.v.), the absence of which hinders the growth of *Lactobacillus* casei.

grumose. Clotted.

grundy. Granulated pig iron.

grunerite. $Fe_7H_2(SiO_3)_8$. The mineral found in Massachusetts.

guachamacine. Gauchamacine. An alkaloid from *guachamaca,* the bark of *Malouetia nitida,* an Apocynaceae of Venezuela. It is said to have properties like curarine, and is used by the natives as a virulent arrow poison.

guacin. A resin extracted from the leaves of *Mikania guaco;* said to be isomeric with eupatorin. The leaves are used by South American natives to cure snake bites.

guaethol. Thanatol.

guaiac. The resin from the wood of *Guaiacum officinale,* a Zygophyllaceae of South America and the West Indies. **g. resinic acid.** $C_{20}H_{26}O_4$ = 330.3. Yellow crystals. An acid of guaiac. **g. wood.** Lignum vitae, guaiaci lignum. The heartwood of *Guaiacum* species, used as a dye. **g. wood oil.** The essential oil of g. d.0.965–0.975, soluble in alcohol. It contains tiglic aldehyde. **g. yellow.** The coloring matter of guaiac wood; pale yellow crystals.

guaiacene. C_5H_8O = 84.0. Tiglic aldehyde. A clear, oily liquid obtained by distillation of guaiac wood.

guaiacic acid. $C_6H_8O_3$ = 128.1. An acid of guaiac.

guaiaci lignum. Guaiac wood.

guaiacin. $C_{14}H_{24}O$ = 208.3. An alcohol, the odorous principle of balsam wood. Colorless crystals, m.91, soluble in alcohol; used in perfumery.

guaiacol. $C_7H_8O_2$ = 124.1. Methylpyrocatechin, o-methoxyphenol, o-hydroxyanisole, *1*-hydroxy-*2*-methoxybenzene. A phenol ether, $C_6H_4(OH)OMe$, in wood tar. Colorless prisms, $d_{15°}$.1.140, m.32, b.205, soluble in water, alcohol, or ether. Used as a reagent in detecting lignin, narceine, chelidonine, nitrous acid and acacia; and medicinally, as an antiseptic. **allyl-** *4-* Eugenol. *5-* Chavibetol. **cinnamyl-** Styracol. **methyl-** Creosol. **methylenedi-** Pulmoform. **propenyl-** Isoeugenol. **vinyl-** Hesperetol.

g. acetate. $C_9H_{10}O_3$ = 166.1. Eucol. A colorless fluid, d.1.138, b.238. **g. benzoate.** Benzosol. **g. benzylic ether.** Benzeain. **g. biniodide.** $C_7H_6O_2I_2$ = 374.7. A reddish-brown powder, used medicinally in tuberculosis. **g. cacodylate.** Cacodiliacol. A reddish-brown crystalline compound, used medicinally. **g. carbonate.** $(C_7H_7O)_2CO_3$ = 274.1. A white crystalline powder, m.87, soluble in ether, slightly soluble in alcohol, insoluble in water. Used as a tasteless and non-irritant substitute for g. oleate. **Oleoguaiacol.** A mixture of g. and oleic acid in ether. **g. valerate.** Creosote.

guaiaconic acid. $C_{20}H_{24}O_5$ = 344.2. A resinous acid, derived from guaiac. An amorphous brown powder, used in the guaiac test for blood.

guaiacum. Guaiac.

guaiacyl. (1) o-Anisyl. (2) $[C_6H_3(OH)(OCH_3)\text{-}SO_3]_2Ca$. Calcium-o-guaiacolsulfonate, gujacyl. A bluish-gray powder, soluble in water or alcohol; used medicinally as a local anesthetic.

guaiaretic acid. $C_{20}H_{26}O_4$ = 330.22. An acid from guaiac.

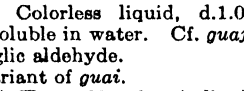
guaiene. $C_{12}H_{12}$ = 156.09. *2.3*-Dimethylnaphthalene*. Colorless liquid, d.1.008, m.−20, b.266, insoluble in water. Cf. *guajene*.

guaiol. Tiglic aldehyde.

guaj. A variant of *guai*.

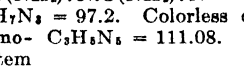
guajene. $C_{15}H_{24}$ = 204.19. A liquid hydrocarbon, d.0.8954, b.124, from guaiac. Cf. *guaiene*.

guanamine. A compound containing the trivalent =N.C(NH$_2$):N.C(NH$_2$):N— group; as **acet-** $C_4H_7N_3$ = 97.2. Colorless crystals, m.265. **formo-** $C_3H_5N_5$ = 111.08. The heterocyclic system



guanase. An enzyme converting guanine into xanthine; found in thymus, adrenals and pancreas.

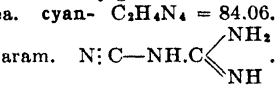
guanazole. $C_2H_5N_5$ = 99.3. The heterocyclic compound



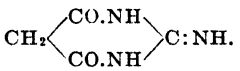
Colorless crystals, m.206.

guanazyl. The bivalent —N:NC(:N.NH.CNH.NH$_2$)— radical. **g. benzene.** $Ph_2C_2H_4N_6$ = 266.3. Colorless crystals, m.199.

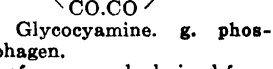
guanidine. CH_5N_3 = 59.17. Carbamidine, aminomethanamidine*, carbondiamide imide, uramine, $(NH_2)_2C(:NH)$. Colorless crystals, soluble in water or alcohol. It is an isolog of urea. Cf. *synthalin*. **amidophenol-** See *amidophenolguanidine*. **aminobutyl-** Agmatine. **benzoylene-** q.v. **bi-** Guanylguanidine. **carbamyl-** Guanylurea. **cyan-** $C_2H_4N_4$ = 84.06. Dicyandiamide, param.



Colorless crystals, m.205. **decamethylenebis-** Synthalin. **diphenyl-** q.v. **guanyl-** Biguanidine. **isopentenyl-** Galegine. **lactyl-** Alacreatine. **malonyl-** $C_4H_5O_2N_3$ = 127.2. The heterocyclic system,



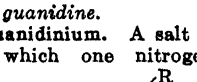
nitro-* $CH_4O_2N_4$ = 104.2. Colorless crystals, m.240. **nitroso-** CH_4ON_4 = 88.2. $NH_2.C(:NH).NH.NO$. **oxalyl-** $C_3H_3O_2N_3$ = 113.2. The heterocyclic system



g. acetic acid. Glycocyamine. **g. phosphoric acid.** Phosphagen.

guanidines. A group of compounds derived from guanidine, *e.g.*, compounds containing the =N.C(NH).N= radical; as methylguanidine, $NH_2.CNH.NHMe$. See *creatine*, *glycocyamine*, *guanidine*.

guanidinium. A salt derived from guanidine, in which one nitrogen atom is pentavalent:



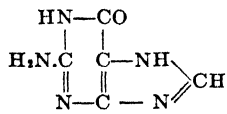
guanidino phosphoric acid. Phosphagen.

guanido. The monovalent —NH.C(:NH)NH radical.

guanidoacetic acid. Glycocyamine. **methyl-** Creatine.

guanidopropionic acid. Alacreatine.

guanine. $C_5H_5ON_5$ = 151.27. Imidoxanthine, 2-amino-6-oxypurine, 2-aminohypoxanthine,



A leucomain found in guano, excrements of spiders, scales of fishes, swine, human liver, pancreas and spleen, and formed as a decomposition product of nucleins. Colorless needles, decomp. above 360, insoluble in water, soluble in alcohol, ether, or alkalis.

guano. Bird manure. The partly decomposed excrements of sea birds found on the islands off the Western Coast of South America, especially Peru. It is an excellent fertilizer and a source of guanine.

guanoline. $C_4H_9O_2N_3$ = 131.1. Guanidocarbonic ethylester. Colorless crystals, m.114.

guanosin. $C_{10}H_{13}N_5O_5$ = 283.4. A pentoside in the pancreas. **g. phosphoric acid.** Guanylic acid.

guanyl. The monovalent radical, —C(:NH)NH$_2$. **g. guanidine.** $C_2H_7N_5$ = 101.3. Biguanide. $NH_2.C(:NH).NH.C(:NH).NH_2$. **g. urea** $C_2H_6ON_4$ = 100.3. Dicyandiamidine, carbamylguanidine, $NH_2.CO.NH.C(:NH).NH_2$. An isolog of guanylguanidine.

guanylic acid. $C_{10}H_{13}O_8N_5P$ = 362.4. A nucleic acid consisting of guanosine, phosphoric acid and a pentose, $H_3PO_4.C_5H_7O_3.C_5H_4ON_5$, occurring in pancreas, ox liver, and yeast.

guarana. Brazilian cocoa. A dried paste from the ground seeds of *Paullinia sorbilis*, a Sapindaceae; used for migraine. **g. tannin.** Paullinio tannin.

guaranine. $C_8H_{10}O_2N_4$ = 194.3. An alkaloid resembling caffeine, from guarana.

guard tube. A tube which usually contains calcium chloride, and is used to prevent access of atmospheric moisture to gas absorption bulbs while they are being weighed. Cf. *witness*.

guavacine. Guvacine.

guayule. The shrub, *Parthenium argentatum*, a Compositae of the Chihuahuan Desert (Mexico), which is cultivated in Central California. **g. rubber.** A commercial rubber made from g. by a mechanical process.

Guericke, Otto von. 1602–1688. A German philosopher noted for experiments with the air pump, vacuum (Magdeburg hemispheres), and hydrometer.

Guignet's green. $3CrO_3,B_2O_3,4H_2O$(?). A green pigment resulting from the fusion of potassium dichromate and crystalline boric acid.

guinea green. $C_{37}H_{35}N_2O_6S_2Na$. A dye used as food color and hydrogen ion indicator, changing at pH 6.0 from magenta (acid) to green (alkaline).

Guldberg, Cato. 1836–1902. A Norwegian chemist. **G. rule.** The boiling point of a liquid is $\frac{2}{3}$ the critical temperature (°A.) of the gas. **G. and Waage law.** Mass law, law of mass action, law of chemical kinetics. The velocity of a reaction is proportional to the active masses of reacting substances; velocity =

amount transformed/time. See *mass law.* **G. Guye rule.** The critical temperature of a substance is about 3/2 of the absolute boiling point: $T_c/T_b = 1.5$ (varying from 1.4 to 1.9).

gulonic acid. $C_6H_{12}O_7 = 202.1$. A monobasic acid derived from gulose.

gulose. $C_6H_{12}O_6 = 180.2$. A hexose, isomeric with glucose.

gum. A thick, mucilaginous excretion from various plants, consisting of complex carbohydrates which yield sugars on hydrolysis. They are the products of disintegration of internal tissues, and exude from the stems; they dissolve or swell in water, and are insoluble in and precipitated by alcohol.

Classification:

A. Arabin-type: completely soluble in water.

Acacia senegal	gum arabic
Piptadenia rigida	angico gum
Piptadenia cebil	cebil gum
Prosopsis juliflora	mesquite gum
Cedrela australis	cedar gum
Anogeissus latifolia	Indian gum

B. Bassorin type: slightly soluble in water.

Astragalus gummifer	tragacanth
Sterculia species	sterculia
Sterculia urens	hog gum
Feronia elephantum	amrad gum
Chloroxylon swietenia	satinwood gum

C. Cerasin type: swelling in water.

Prunus cerasus	cherry gum
Covillea tridentata	sonora gum
Albizzia fastigiata	sassa gum

acacia- See *acacia.* **acaroid-** See *acaroid.* **ammoniacum-** See *ammoniac.* **angico-** See *angico.* **arabic-** See *acacia.* **benjamin-** Benzoin g. (2). **benzoin-** See *benzoin* (2). **blue-** See *eucalyptus.* **british-** Dextrin. **cebil-** See *cebil.* **cedar-** See *cedar.* **chewing-** Chicle. **chicle-** See *chicle.* **doctor-** Hog gum. **dragon-** Tragacanth. **elastic-** Caoutchouc. **gettania-** Guttapercha. **guiac-** Guaiac. **hog-** See *hog.* **Indian-** See *Indian.* **kauri-** See *kauri.* **ladanum.** See *labdanum.* **mango-** See *mango.* **mesquite-** See *mesquite.* **red-** See *gum-tree.* **sassa-** See *sassa.* **sonora-** See *sonora.* **starch-** Dextrin. **sweet-** Storax.

G. arabic. Acacia. **G. benjamin.** See *benzoin* (2). **G. cistus.** See *labdanum.* **G. copal.** Copal. **G. dragon.** Tragacanth. **G. elastic.** Caoutchouc-. **G. galbanum.** See *galbanum.* **G. kino.** See *kino.* **G. lac.** See *lac.* **G. olibanum.** See *olibanum.* **G. plant.** Grindelia. **G. resin.** See *gum-resins.* **g. running.** The process of melting gums in varnish manufacture. **G. sandarach.** See *sandarac.* **g. sugar.** Arabinose. **G. thus.** Olibanum. **G. tragacanth.** Tragacanth. **g. tree.** See *gum-tree.*

gummeline. Dextrin.

gummon. Trade name for an insulating material of tar and asbestos.

gummy. Sticky or resembling gum.

gum-resins. Oleoresina. A group of aromatic exudations of plants which consist of a mixture of various substances (as essential oils) with the gum. The following are official (U.S.P.): ammoniac, asafetida, gamboge, myrrh, and scammony. *Cf. resins.*

gums. The dried gummy exudations of plants, formed by conversion of the cell walls; soluble in water, insoluble in alcohol. Acacia, and tragacanth are official (U.S.P.).

gum-tree. Red gum, sweet gum. A large tree, *Liquidambar styraciflua,* which grows in the swamps of the Mississippi, and yield valuable lumber. **blue-** Eucalyptus. **cotton-** A tree, *Nyssa sylvatica,* of Asia, which yields timber and an edible fruit.

guncotton. $C_{12}H_{14}O_4(NO_3)_6 = 594.17$. Cellulose hexanitrate. A highly nitrated and sparingly soluble cellulose; used as an explosive. **soluble g-.** Pyroxylin.

gunmetal. Bronze. An alloy consisting of 90 % copper and approximately 10 % Sn, 2 % Zn, and 1 % Pb, Ni, Sb, Fe, Al, etc.

Gunning reagent. A 10 % solution of iodine in alcohol, used for detecting acetone in urine. **G. test.** The formation of iodoform by adding Gunning reagent and ammonia to urine; it indicates the presence of acetone.

gunny. A jute bagging cloth.

gunpowder. A granulated explosive mixture of about 2 pts. charcoal, 3 pts. sulfur and 15 pts. potassium nitrate. Its character depends largely on the size and shape of the grains, their density and hardness, glazing, and moisture-content.

Gunter's chain. A measurement of length = 20.1168 meters.

Günzberg reagent. A solution of 1 pt. phloroglucinol, 1 pt. vanillin in 30 pts. alcohol; or two solutions: (a) phloroglucinol 1:15, (b) vanillin 1:15, mixed shortly before applying the test. Used for detecting free mineral acids. **G. test.** A drop of Günzberg reagent is carefully evaporated on white porcelain plate; after adding the unknown solution and again evaporating, a pink color indicates the presence of hydrochloric acid.

guoethol. Thanatol.

gur. Jaggery. A crude Indian sugar obtained by evaporating unclarified cane juice in open pans over fires.

gurjun. A balsam obtained from several *Dipterocarpus* species of India; used as a varnish. **g. oil.** The essential oil of g., d.0.915–0.925, b.255, containing sesquiterpenes.

gutta (pl. guttae). The Latin for "drop."

guttameter. A device for measuring surface tension by the number of drops formed.

guttapercha. Gummi plasticum. $(C_{10}H_{16})_2$. A group of hydrocarbons consisting of the purified and coagulated milky exudate of various trees of *Palaquium* species, (Sapotaceae). Colorless masses, sticks, or sheets, usually yellowish with red streaks, insoluble in water, partly soluble in chloroform, benzene, oil of turpentine. It consists of hydrocarbons, fluavil, alban and a volatile oil. It softens at 65°C., and burns with a bright flame. Used for insulating purposes, in dentistry, and as a rubber substitute.

Gutzeit, Heinrich Wilhelm. 1845–1888. A German chemist noted for analyses of vegetable products. **G. test.** A test for arsenic performed by adding zinc and dilute sulfuric acid to the substance in a test tube, covering the tube with a filter paper moistened with mercuric chloride solution and observing the formation of a yellowish spot on the filter paper, due to $AsH(HgCl)_2$. This turns black with the formation of $As(HgCl)_3$, and then As_2Hg_3.

G.w.a. Grams of water in air. See Mohr *liter.*

guvacine. $C_6H_9O_2N = 127.1$. An alkaloid, m.-271, from the betel nut, the fruit of *Areca catechu,* an East Indian palm; used medicinally as an anthelminthic.

Guyton de Morveau, Louis Bernard. 1737–1816. A French lawyer who made chemistry a hobby, and introduced the first nomenclature, promoted the antiphlogiston theory and translated many books.

gymnemic acid. $C_{32}H_{56}O_{12}$ = 631.4. The active constituent of *Gymnema sylvestre*, an Asclepiadaceae of Australia, India and Africa.

gymnosperm. A large group of plants in which the seeds are not enclosed in an ovary: *e.g.*, the conifers. Cf. *angiosperm.*

gynergen. $C_{70}H_{76}N_{10}O_{16}$ = 1313.13. Ergotamine tartrate. Colorless crystals, decomp. 180, soluble in water or alcohol. A constituent of ergot; increases the blood pressure.

gynesin. $C_{19}H_{23}O_3N_3$ = 341.4. A basic substance isolated from urine from females.

gynocardic acid. (1) $C_{18}H_{34}O_2$ = 282.2. An acid from the oils of *Gynocardia odorata* and *G. Prainii*, m.67, insoluble in water. (2) A mixture of unsaturated acids from gynocardia and chaulmoogra oils, containing hydnocarpic, taraktogenic and gadoleic acids.

gynocardine. $C_{13}H_{19}O_9N$ = 333.15. A glucoside, m.162, from the seeds of *Gynocardia odorata.* It yields on hydrolysis glucose, HCN and $C_6H_8O_4$. Cf. *chaulmoogra oil.*

gynoval. $C_{15}H_{26}O_2$ = 238.3. The isovaleric ester of isoborneol. $MeCHMeCH_2COOC_{10}H_{17}$. A colorless neutral liquid of peculiar aromatic odor, d.0.952–0.957, b.135; used medicinally as a hypnotic and sedative.

gypsum. Selenite. A native hydrated calcium sulfate (q.v.) or plaster of Paris (q.v.). Cf. *anhydrite.*

gyration. Revolving in a circle.

gyrophoric acid. $C_{16}H_{14}O_7$ = 318.11. An acid from the lichen, *Gyrophora vellea.*

H

H. (1) The symbol for hydrogen, H^+ hydrogen ion, H^* excited hydrogen atom, H_2 hydrogen molecule, H_2^+ ionized hydrogen molecule, H_2^* excited hydrogen molecule. H^1 or H^a hydrogen isotope of mass 1, protium. H^2 or H^b hydrogen isotope of mass 2, deuterium. H^3 or H^c hydrogen isotope of mass 3, tritium. (2) The symbol for the unit of strength of a magnetic field (gauss). (3) Henry, the unit of inductance. (4) The symbol for enthalpy (q.v.). **H acid.** 8-Amino-1-naphthol-3,6-disulfonic acid. **H ion.** See *hydrogen-ion.* **H line.** (1) The spectrum lines due to hydrogen; as,

Hα or Fraunhofer line C.....	λ 6573	(red)
Hβ or Fraunhofer line F.....	λ 4861	(blue)
Hγ or Fraunhofer line G.....	λ 4340	(blue)
Hδ or Fraunhofer line h.....	λ 4101	(violet)

(2) The Fraunhofer line H, λ 3968, due to calcium. **H.M.** Abbreviation for heavy metals. **H. rays.** A stream of hydrogen nuclei; they can be detected by electrometer or photographic plate. **H. salt.** The sodium salt of H-acid.

h. An abbreviation for (1) hour, (2) height, (3) hundred, (4) hetero-.

h. Planck's constant (q.v.), or $(6.559 \pm 0.008) \times 10^{-27}$ erg-seconds.

H. and D. Abbreviation for Hurter and Driffield curve, the basis of measurement of the sensitiveness of photographic materials. It is obtained by plotting log (exposure time) against the density of the photographic negative produced by the exposure.

ha. Abbreviation for hectare.

Haber, Fritz. 1868–1934. A German chemist and Nobel prize winner. **H. process.** A method of producing ammonia synthetically from nitrogen and hydrogen in presence of a catalyzer. Cf. *nitrogen fixation.*

habitat. The abode or region in which a living organism, either plant or animal, is located or found. **abyssal-** A h. in the deep sea. **alpine-** A h. in high mountains. **fossorial-** A h. in burrows and caves. **littoral-** A h. near the shores. **pelagic-** A h. in the open sea.

Hackh symbols. Structure symbols. **H.'s table.** See *periodic table.* **H. theory.** The atomic nucleus consists of I neutrons, and A positrons, where I is the isotopic mass and A the atomic number.

Hadfield, Sir Robert. 1859–1940. A British metallurgical chemist, noted for the development of stainless steels. **H. process.** A metal oxide is reduced by heating with granulated aluminum and fluorspar in a crucible.

hadromal. Ferulaldehyde.

hæ- See *hae-, he-.*

haem. $C_{34}H_{33}O_3N_4Fe$. The essential unit of the group of cellular and blood pigments, related to aetioporphyrin.

haema-, haemo- A prefix indicating a relationship to blood; see *hema-, hemo-.*

haemanthine. $C_{18}H_{23}O_7N$ = 365.19. An alkaloid from buphane.

haematoxylin. Hematoxylin.

haematoxylon, hematoxylon. (a) A genus of leguminous trees of Central America, specifically *H. campechianum.* (b) The heart-wood of *H. campechianum,* log-wood or campeachy wood, which contains a purple-red coloring material, hematoxylon, also used as an astringent.

Haeser's coefficient. The number 2.33, with which the last two figures of the specific gravity of urine are multiplied in order to obtain the amount of solids in 1000 cc. of urine. Cf. *Haine's coefficient.*

haeterolite. The mineral $ZnO.Mn_2O_3$.

hafnium. Hf = 178.6. Celtium, Ct. Oceanum. An element of the carbon group, atomic number 72, discovered in 1924 by Coster and Hevesy in zirconium minerals. It has a valency of 4, d.13.31, m.2500, and occurs in thortveitite, zircon and baddeleyite. **h. carbide.** HfC = 190.6. A gray powder, m.3887. A mixture of 25 % HfC and 75 % TaC has the highest known melting point of 4200°C. **h. hydroxide.** $Hf(OH)_4$ = 246.6. A white powder, insoluble in water. **h. oxide.** HfO_2 = 210.6. A white powder, m.3025, insoluble in water, soluble in acids. **h. oxychloride.** $HfOCl_2$ = 265.6. A white powder, insoluble in water, soluble in hydrochloric acid. **h. sulfate.** $Hf(SO_4)_2$ = 370.6. A white crystalline powder, soluble in water.

Hahn, Otto. 1879– . A German physical chemist, noted for his work on radium.

Hahnemann's mercury. Soluble mercury.

Haine's coefficient. The number 1.1, which when multiplied by the last two figures of the specific gravity of urine, gives the amount of solids in grains for each fluid ounce. Cf. *Haeser's coefficient.*

hairari root. The roots of *Lonchocarpus* species containing rotenone. Cf. *cubé root.*

halazone. $C_7H_5O_4NSCl_2$ = 269.9. p-dichloramidobenzo-sulfonic acid, $C_6H_4(SO_2NCl_2)$-COOH. A white powder with a strong chlorine odor, m.213, soluble in water or chloroform; used as an antiseptic.

half period. The period in which the activity of a radioactive substance decreases to half of its initial value. It varies from 3×10^{10} years (thorium) to 0.002 sec. (AcA).

half-stuff. A pulp intended for paper-making, before it goes to the paper-making machine.

halide. A binary compound of the general type MX, MX_2, or MX_3, in which M is a metal, X a halogen (F, Cl, Br, I). **acid-** A compound of the type R.COX. **alkylaryl-** A compound of the type RX, where R is an alkyl or aryl radical. **magnesium-** A compound of the type RMgX; *e.g.* Grignard's reagent.

h. lamp. An alcohol torch with copper tube, which ordinarily burns colorless but gives a green flame in presence of organic halides; used to detect leaks in refrigerators using halides as refrigerants.

halite. A native sodium chloride.

haliver oil. Halibut liver oil, which is rich in vitamins A and D.

Hall, Arthur Daniel, Sir. 1864–1942. A British agricultural chemist. **H., Carl von.** 1819–1880. An Austrian chemist, noted for work on vanadium compounds. **H., Charles M.** 1863–1914. An American chemist noted as inventor of the electrolytic aluminum process.

H. effect. Galvanomagnetic difference of potential. A difference of potential is produced in a metal plate placed transversely between two magnetic poles; when the electric current passes from left to right, and the upper edge of the metal plate becomes positive, the effect is called positive. **H. formula.** If E is the difference of potential between the lower and upper edge of the metal plate of thickness t, then $E = R(Hi/t)$, where R is a constant specific for different metals, H the magnetic field strength in gausses, and i the electric current in C.G.S. units.

Hall purinometer. A graduated glass tube of special construction, used for the determination of purine bodies in urine.

Hallwachs effect. Photoelectric effect.

halloylite. Halloysite.

halloysite. $Al_2O_3.2SiO_2.nH_2O$. Halloylite. A refringent, micaceous silicate constituent of clay.

halo. (1) A series of luminous concentric circles around a source of illumination caused by the refraction of light in passing through solid or liquid particles suspended in the atmosphere. (2) A circular photographic image produced when x-rays pass through an *amorphous* substance. Cf. *x-ray crystallogram.*

halo- A prefix indicating the presence of a halogen, as haloplatinates.

halochromism. (1) The formation of colored salts from colorless organic bases by the addition of acids. Cf. *solvatochromism.* (2) The production of colorless solutions in some solvents and colored solutions in others.

haloform. A compound of the type CHX_3; as, chloroform. **h. reaction.** The reaction analogous to that by which iodoform is made from alcohol or acetone.

halogen. The non-metallic elements of the seventh group of the periodic system: F, Cl, Br, and I. Halogens are multivalent and have a valence number of −1 (*e.g.*, chlorides), 1 (*e.g.*, hypochlorites), 3 (*e.g.*, chlorites), 5 (*e.g.*, chlorates), and 7 (*e.g.*, perchlorates). **h. acids.** The hydrogen compounds of the halogens: HF, HCl, HBr, and HI.

halogenide. A compound containing a halogen.

halophile. A bacterium which can grow in saline media.

halogenation. The introduction of a halogen into an organic compound, either by addition or substitution; as chlorination or bromination.

halohydrin. An organic compound of the type X—R—OH, as $Cl—CH_2.CH_2.OH$, where X is a halogen.

haloid. Resembling or derived from halogens; as, chlorohydrin, bromohydrin. **h. acid.** An inorganic acid, HX, containing a halogen but no oxygen. **h. elements.** The halogens.

halowax. $C_{10}H_7Cl = 762.51$. β-chloronaphthalene. Colorless solid, m.56, b.264, used in gasoline to lubricate valve-stems in internal combustion engines.

Halphen reagent. A solution of sulfur (1 %) in carbon disulfide, used for the H. test for cottonseed oil. **H. test.** To 1 cc. of oil add 1 cc. of H. reagent and 1 cc. of amyl alcohol and heat in a brine bath for 30 mins.; 1 % of cottonseed oil gives a red color.

hamamelidin. An extract from *Hamamelis virginiana*, witch-hazel, used as a tonic.

Hamamelidaceae. Witch-hazel family, a group of trees or shrubs which yield the following drugs:

Hamamelis virginiana	witch-hazel
Liquidambar orientalis	storax
Liquidambar styraciflua	sweet gum

hamamelin. A precipitate from the extract of the bark of *Hamamelis virginiana*, used as a tonic and astringent.

Hamamelis. A genus of trees or shrubs, *e.g.*, witch-hazel, whose leaves or barks are used as tonic and sedative.

hamamelitannin. $C_{20}H_{20}O_{14}.6H_2O$. A tannic acid from the bark of witch-hazel. Fine white needles, m.115, soluble in hot water, alcohol or acetone.

hamartite. Bastnasite.

hamathionic acid. Euxanthic acid.

hand. An obsolete unit of length: 1 hand = 4 inches = 10.16 cm.

hanfangchine. $C_{36}H_{40}N_2O_6 = 596.4$. An alkaloid from the Chinese plant han-fang-chin, *Cocculus japonicus*, the root of which is used for cholera and pulmonary diseases.

Hanovia lamp. An evacuated quartz tube with two mercury reservoir electrodes, used to produce mercury vapor radiations rich in ultraviolet light.

Hantzsch, Arthur. 1857–1935. A German organic chemist noted for studies of the stereochemistry of nitrogen compounds.

Hanus solution. A solution of iodine monobromide in glacial acetic acid, used in the determination of iodine values of fats and other materials containing unsaturated organic compounds.

haptaphore. The chemical group which unites with the amboceptor.

hapten(e). An alcohol-soluble substance present in the organs of various animal species, capable of producing anti-bodies *in vitro* but devoid of antigenic properties.

haptin. A receptor in Ehrlich's side chain theory (q.v.).

haptogen. The protein substance constituting the membrane surrounding the globules of fat in milk.

hard. (a) Firm or resistant. (b) A condition of water, due to the presence of calcium and magnesium salts (see *hardness*). **h. salt.** Hartsalz.

Harden, Sir Arthur. 1865–1940. A British biochemist, noted for his work on yeast and fermentation. **H.-Young ester.** Fructose diphosphate, produced in the fermentation of sugar by yeast.

hardening. A process which makes a material more resistant to cutting, breaking or bending. **-of fats.** Hydrogenation. **-of steel.** Tempering.

hardness. (1) The state or quality of being hard. The resistance in differing degrees to cutting, bruising, scratching or grinding. Cf. *penetrometer, sclerometer, Keen tester.* (2) The presence of calcium and magnesium salts in water (usually carbonates and bicarbonates), which causes incrustations in boilers, and im-

pairs the lathering qualities of soap. These salts combine with the fatty acids of the soap, and form insoluble soap salts. **Brinnell-** See *Brinnell hardness.* **Moh's-** See *h. scale.* **Shore-** See *Shore.*

h. scale. Moh's scale. An empirical scale of minerals arranged so that each substance will scratch the preceding one in the list:

1. talc, kaolin	6. feldspar, augite
2. rocksalt, alum	7. quartz, agate, flint
3. calcite, serpentine	8. topaz, beryl
4. fluorite, marble	9. corundum
5. apatite, asbestos	10. diamond.

N.B. finger nail—2.5 penknife—6.5

Extended or new Moh's scale

6. orthoclase, periclase	*12. fused alumina, tungsten carbide*
7. vitreous pure silica	*13. silicon carbide*
8. quartz, stellite	*14. boron carbide*
9. topaz	*15. diamond.*
10. garnet	
11. fused zirconia, tantalum carbide	

h. of water. A measure of the calcium and magnesium content of water, as: *permanent-* The presence of magnesium or calcium sulfate or carbonate or other calcium salts (except bicarbonates) in water. These salts cannot be removed by simple boiling and must be removed by chemical treatment (see *permutite*). *temporary-* The presence of magnesium or calcium bicarbonate in water; the water is softened by boiling, as insoluble calcium carbonate is formed: $Ca(HCO_3)_2 = CaCO_3 + CO_2 + H_2O$. *total-* The total amount of calcium and magnesium salts in water, expressed in degrees of hardness:

English degree of hardness = 1 grain $CaCO_3$ in 1 gallon H_2O, or 1 mg. $CaCO_3$ in 70 gram water = 1 Clark degree.

German degree of hardness = 1 pt. CaO or MgO in 100,000 pt. H_2O, or 1 mg. CaO in 100 gm. water.

French degree of hardness = 1 pt. $CaCO_3$ in 100,000 pts. H_2O, or 1 mg. $CaCO_3$ in 100 gm. water.

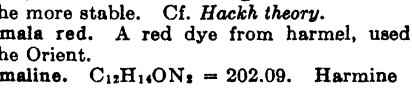
Hare, Robert. 1781–1858. An American chemist noted for work on the oxy-hydrogen flame, colorimeter, gas analysis and artificial graphite.

Hargreaves-Bird cell. An electrolytic cell for the manufacture of chlorine and caustic soda from brine. The cathode is copper gauze, and the anode gas carbon on a lead core.

Harkins, William Draper. 1873– . An American chemist noted for research on isotopic weights and atomic structure. **H. theory.** The atomic nucleus consists of He and H kernels, and those containing even numbers are the more stable. Cf. *Hackh theory.*

harmala red. A red dye from harmel, used in the Orient.

harmaline. $C_{12}H_{14}ON_2 = 202.09$. Harmine dihydride. 3,4-dihydroharmine. An alkaloid from the seeds of *Peganum harmala*, a Rutaceae of the steppes of Southern Russia and Turkey. Trimetric, octahedric, colorless crystals, m.238,



slightly soluble in water, soluble in alcohol or ether; used as an anthelmintic and stimulant. Cf. *turkey red.*

harman. Aribine.

harmel. The wild rue, *Peganum harmala*, the commonest weed of the Russian and Turkish steppes; used as a vermifuge. Its seeds contain the alkaloids harmaline, harmine and aribine. Cf. *harmala red.*

harmine. $C_{13}H_{12}ON_2 = 212.0$. Yajeine. An alkaloid from the seeds of *Peganum harmala.* **3,4-dihydro-** Harmaline. **h. dihydride.** See *harmaline, banisterine, yajenine.*

harminic acid. $C_{10}H_8O_4N_2 = 220.1$. A crystalline acid obtained by the oxidation of harmine or harmaline.

harmonic progression. A series whose terms are the reciprocals of an arithmetic progression.

harmony. The adaptation of component parts to a state of equilibrium; or a joining or fitting together; as, the harmony of milk.

Harrison Narcotic Act (U. S. A.). An Internal Revenue regulation to govern the production, importation, manufacturing, compounding, dispensing, selling, or giving away of opium or coca leaves, their salts, derivatives or preparations.

hartin. $C_{20}H_{34}O_4 = 338.3$. A substance found in fossil wood or in lignite. Cf. *hartite.*

hartite. $(C_6H_{10})_x$. A hydrocarbon found with hartine in lignite and fossil wood.

Hartman's solution. A solution of 12.5 gm. thymol, 10 gm. ethyl alcohol and 20 gm. sulfuric ether. Used to desensitize dentin selectively; it burns the flesh.

hartsalz. A mixture of sylvinite and kainite, used as a fertilizer (16 % K.).

hartshorn. Spirit of hartshorn. A popular name for ammonia water. **h. salt.** A popular name for ammonium carbonate, q.v.

harvel coating. A paint made with cashew nut oil; used for waterproofing materials, *e.g.*, cement, wood, etc.

hashish. The dried leaves and stalks of *Cannabis indica* (q.v.), used as a narcotic by the races of India.

hatchettenine. Rock tallow. A white or yellow native waxy hydrocarbon of the type C_nH_{2n+2}. It is amorphous, and is soluble in ether.

hausmannite. A native manganese oxide, Mn_3O_4, or mangano-manganite, Mn_2MnO_4; dark brown masses

hawthorn. The fruits of *Crataegus oxycantha*, a Rosaceae used as a cardiac and tonic.

hay fever extract. Pollen extract.

Hayem solution. A solution consisting of 5 pts. sodium sulfate, 1 pt. sodium chloride, 0.5 pt. mercuric chloride and 200 pts. water; used in the microscopical analysis of blood.

hazard. The danger to life or property caused by improper or neglectful handling of chemicals. Hazards fall into two groups;

LIFE HAZARDS

1. Materials which are corrosive or caustic. (Acids, bases.)
2. Materials which are poisonous. (Alkaloids, etc.)
3. Materials which emit suffocating vapors. (Bromine.)
4. Materials which form irritating gases.
5. Materials which produce toxic fumes when heated.
6. Materials which are highly explosive.

FIRE HAZARDS

1. Substances which are combustible or inflammable.
2. Substances which are explosive.
3. Substances which form inflammable vapors.
4. Substances which form inflammable dusts.
5. Substances which ignite by friction.
6. Substances which ignite with water.
7. Substances which produce a combustible gas with water.
8. Substances which produce explosive mixtures with water.
9. Substances which are oxidizing agents, and which may ignite or explode in contact with organic substances.
10. Substances which may cause spontaneous combustion.

hazardous chemicals. A group of materials which may cause loss of life or property by improper handling, shipping, or storing. Cf. *explosives, poisons, compressed gases, storage, shipping, label* and the following tables.

hb. An abbreviation for hemoglobin.

H.C. A mixture of Zn and herachloroethane used to produce artificial smokes in warfare.

HCN discoids. Wood-pulp or filter paper disks impregnated with liquid hydrocyanic acid and used in fumigation. Cf. *zyklon.*

He. The symbol for helium.

heart sugar. Inositol.

heat. A form of energy which can be transmitted from one body to another by: (a) radiation; *e.g.*, vibrations or waves in the ether which, when stopped by a substance, cause the molecules of that substance to vibrate faster, and so produce the effect of heat. (b) By contact, where the molecular vibrations are transmitted directly by conduction and convection. It is supposed that all bodies possess molecular vibrations to varying extents at ordinary temperatures, and that at −273°C., the absolute zero, these vibrations cease. **animal-** The heat evolved during the life processes of an animal by oxidation of carbonaceous materials to carbon dioxide. **atomic-** The amount of heat required to raise the temperature of a gram-atom of substance from 0°C. to 1°C. **latent-** The heat absorbed by a substance which does not cause a rise in its temperature; as h. of fusion, h. of evaporation. The heat is used to produce a change of state, *e.g.*, liquid to vapor. **mechanical equivalent of-.** See *h. equivalent.* **molecular-** The amount of heat required to raise the temperature of one mole of a substance by one degree centigrade, *i.e.*, the specific h. of a substance multiplied by its molecular weight. Cf. *Kopp's law.* **radiant-** Heat waves transmitted through space. **radioactive-** Heat evolved during radioactive decomposition. **specific-** The amount of heat required to raise one gram of a substance through one degree centigrade under specific conditions (see *calorie*).

h. capacity. The amount of heat required to raise the temperature of a body 1°C.; usually expressed in calories. *atomic-* Specific heat. Cf. *Dulong and Petit law. molecular-* Cf. *Kopp's law.* The molecular heat capacity is the sum of the atomic heat capacities. **h. conductivity.** The number of calories transmitted per second through a plate one centimeter thick across an area of one square centimeter when the temperature difference is one degree centigrade. If Q is the conductivity, $Q = k\frac{(t_2 - t_1)aT}{d}$ where k is a constant, depending on the nature of the substance, t_1 and t_2 the temperatures of the two bodies, a the area, and d the thickness of the conductor, and T the time in seconds. *specific-* The constant k in the above equation. **h. degree.** The intensity of heat (see *thermometer scale*). The entire absence of h. is considered the "absolute zero" or "zero-degree," which equals −273.13°C., −459.60°R. or 0°K. **h. effect.** Joule effect. The number of calories developed by an electric current in a metallic circuit. It is proportional to the quantity of electricity (in coulombs) multiplied by the fall in potential (volts), thus

$$H = \frac{(\text{Coulombs} \times \text{Volts})}{4.181 \text{ small cal.}} = \frac{\text{Watts}}{4.181}$$

where H is expressed in small calories; or $H = ri^2t/4.181 = Eit/4.181$, where r is the internal resistance, i the electric current equal to E/R, or the electromotive force divided by the total resistance ($i = E/R + r$), and t the time in seconds, (cf. *Peltier effect*). **h. engine.** An arrangement for converting heat into work. **h. equivalent.** A factor used to convert heat into energy units: 1 mean calorie = 4.1816×10^7 ergs; 1 calorie (15°C.) = 4.1809×10^7 ergs. The conversion factors for the gas constant, (q.v.) are

R = 82.07 cc. atm. per degree
= 1.9885 calories per degree
= 8.316 joules per degree.

h. function. When a system passes from one state to another the heat absorbed is the difference of a function (known as the heat function, W) for the initial and final states. At constant pressure, $W = U + pu$, where U is the intrinsic energy, p the pressure and u the volume. **h. index.** Maumené number. The rise in temperature produced by mixing 50 cc. of an oil with 10 cc. of conc. sulfuric acid. It is expressed in degrees centigrade and used to evaluate oils. **h. number.** H. index. **h. of activation.** H. involved in catalytic processes. **h. of absorption.** The quantity of heat consumed or liberated when a gaseous substance is dissolved. **h. of adhesion.** The quantity of h. consumed or liberated in the formation of heterogeneous mixtures; *e.g.*, rubber with filler. **h. of admixture.** H. of mixing. **h. of adsorption.** The quantity of heat liberated when a substance is adsorbed or condensed on the surface of a solid; as hydrogen gas on platinum sponge. **h. of aggregation.** The h. involved in the formation of aggregates; as *h. of condensation, h. of cooling, h. of crystallization.* **h. of association.** The quantity of h. needed to form co-ordinate compounds. **h. of combination.** *H. of formation* or *h. of hydration.* **h. of combustion.** The number of calories liberated per gram-atom or gram-molecule when an element or compound, respectively, is completely oxidized. **h. of compression.** The heat produced when a gas is compressed. **h. of condensation.** The reverse of h. of evaporation(q.v.). **h. of cooling.** The h. liberated at a certain temperature during cooling; it indicates the existence of an allotropic rearrangement. **h. of crystallization.** The number of calories liberated or absorbed per

COMMON HAZARDOUS CHEMICALS

(Condensed from Reports by the Committees of National Fire Protection Association U. S. A., and the American Chemical Society)

	Life hazard	Fire hazard	Storage	Shipping container	I.C.C.* label
Acetic acid	..	3	Away from Ox. M.	Carboys, barrels	w
Aluminum dust	..	4	Dry	Barrels, boxes	
Ammonium perchlorate	..	2	Away from acids	Barrels, bottles	y
Barium chlorate	p	9	Isolate	Boxes, barrels	y
Barium peroxide	p	8	Away from Comb. M.	Metal containers	y
Borneol	..	3	Ventilated	Barrels, tins	
Bromine	s	9	Isolate	Glass, earthenware	w
Butane	..	3	Cool	Steel cylinders	r
Caesium nitrate	p	9	Dry	Kegs, bottles	y
Calcium carbide	..	7	Dry	Kegs, drums	
Calcium chlorate	..	9	Away from Comb. M.	Iron or glass	
Camphor, camphene	..	3	Cool, ventilated	Tins	y
Charcoal	..	10	Isolate	Boxes, barrels	y
Chinese wax	..	1	.....	Burlap, barrels	
Chromic acid	p	9	Isolate	Metal or glass	y
Cobaltous nitrate	..	9	.....	Barrels	y
Colophony	..	1	Cool, ventilated	Barrels	
Copper nitrate	p	9	Isolate	Barrels, kegs	y
Ferric nitrate	..	9	Isolate	Barrels	y
Formic acid	c	3	.....	Barrels, carboys	w
Fulminates	..	2	Highly explosive		
Hydrochloric acid	c	..	Away from chlorates	Tank cars, glass	w
Hydrofluoric acid	c	..	.....	Lead or paraffin	w
Lead nitrate	p	9	Isolate	Barrels	y
Magnesium, powder	..	4	Dry, avoid dust	Metal containers	y
Magnesium nitrate	..	9	Isolate	Boxes	y
Naphthalene	..	3	Cool, ventilated	Barrels	
Nickel nitrate	p	9	.....	Kegs	y
Nitric acid	c	9	Away from Comb. M.	Glass containers	w
Nitroaniline	p	8	Dry	Kegs	
Nitrochlorobenzene	p	3	In the open	Kegs	
Phenol	p	3	.....	Glass	
Phosphorus, red	..	1	Isolate	Tin cans	y
Phosphorus, white	p	5	In water	Tins (in water)	y
Phosphorous sulfide	..	5	Isolate	Drums, bottles	
Picric acid	c	9	Isolate	Wood or glass	
Potassium	c	6	In kerosene, dry	Glass (in oil)	y
Potassium chlorate	..	9	Away from Comb. M.	Barrels, kegs	y
Potassium hydroxide	c	..	Dry	Barrels, glass	
Potassium nitrate	..	9	Dry	Tins, bottles	y
Potassium permanganate	..	9	Isolate	Tins, bottles	y
Potassium peroxide	c	8	Dry	Tins	y
Potassium persulfate	..	9	Dry	Glass or stoneware	y
Potassium sulfide	..	3	.....	Drums, bottles	
Silver nitrate	c	9	Cool and dark	Brown glass bottles	y
Sodium	c	6	In kerosene	Metal or glass	y
Sodium chlorate	..	9	Away from Comb. M.	Barrels, bottles	y
Sodium hydroxide	c	..	Dry	Barrels, drums	y
Sodium nitrate	..	9	Dry	Tins, bottles	y
Sodium perchlorate	e	9	Isolate	Iron or glass	y
Sodium peroxide	c	8	Dry	Tins	y
Sodium sulfide	..	3	.....	Drums, bottles,	y
Strontium nitrate	..	9	Isolate	Barrels, boxes	y
Sulfur	..	1	Ventilated	Box cars, barrels	
Sulfuric acid	c		Away from Ox. and Comb. M.	Tank cars, drums	w
Thorium nitrate	..	9	Dry	Kegs	y
Uranium nitrate	p	9	Dry	Glass bottles	y
Zinc chlorate	..	9	Away from Comb. M.	Bottles, drums	y

* Interstate Commerce Commission (I.C.C.) label: r–red, w–white, y–yellow.
Life Hazard: c–corrosive or caustic, e–explosive, p–poisonous, s–suffocating vapors.
Fire Hazard: The numbers refer to the types of hazard, q.v.
Storage: Comb. M. = combustible materials. Ox. M. = oxidizing materials.

mol when a substance passes into the crystalline state. **h. of decomposition.** The number of calories liberated or absorbed during the complete decomposition of a mol of substance. **h. of dilution.** The quantity of heat consumed or liberated when a liquid or solution is diluted. **h. of dissociation.** The h. involved in the disruption of certain bonds. **h. of dissolution.** H. of solution. **h. of evaporation.** H. of vaporization. The quantity of heat required to convert a definite amount of a liquid at its boiling point into the gaseous state; *e.g.*,

H_2O (liquid) $\rightarrow$ H_2O(steam)—9720 calories.

Such equations refer to moles, and hence must be divided by the molecular weight in order to find the number of calories per gram; *e.g.*, 9720/18 = 540 calories per gram water at 100°C. Cf. *latent heat.* **h. of explosion.** The calories liberated from a mole of explosive. **h. of foods.** See *h. value.* **h. of formation.** The quantity of heat liberated or consumed when a compound is formed from its component elements. The quantity of h. depends on the physical condition (solid, liquid or gaseous) of the reacting mblecules; thus,

$2H_2$ (g) + O_2 (g) = $2H_2O$ (l) −136,000 calories
$2H_2$ (g) + O_2 (g) = $2H_2O$ (g) −118,000 calories

as well as on their crystalline forms:
S (rhombic) = S · (monoclinic) + 77 calories.
h. of fuels. See *h. value.* **h. of fusion.** H. of melting. The quantity of heat required to convert a definite amount of a solid at its melting point into the liquid state: as,

H_2O (ice) $\rightarrow$ H_2O (liquid)—1438 calories;

hence 1438/18 = 79.8 cal. per gram of water at 0°C. **h. of hydration.** The amount of heat consumed or liberated when a substance takes up water; *e.g.*,

$CdCl_2 + H_2O$ (l) $\rightarrow$ $CdCl_2.H_2O$—1320 cal.
$CaCl_2 + 6H_2O$ (l) $\rightarrow$ $CaCl_2.6H_2O$ + 21,750 cal.

h. of ionization. The number of calories consumed or liberated when a gram-equivalent of a molecule ionizes. **h. of isomerization.** The h. involved in the formation of isomers. **h. of linkage.** The amount of h. required to form or disrupt certain atomic bonds. **h. of mixing.** For solid and liquid, see *h. of solution;* for liquid and liquid see *h. of dilution,* for gas and liquid see *h. of absorption.* **h. of neutralization.** The number of calories liberated on neutralization, or $H^+ + OH^- \rightarrow H_2O$ + 13,700 calories (at 18°C). **h. of oxidation.** See *h. of combustion.* **h. of racemization.** The quantity of heat consumed or liberated during the change from one stereoisomer to the other. **h. of reaction.** The quantity of heat consumed or liberated in a chemical reaction, as *h. of combustion, h. of neutralization, h. of formation,* etc. The condition of the reacting substance as well as of the reaction product is an important factor in the amount of heat produced or consumed, hence it is generally indicated in the equation by the abbreviations: (s) for solid, (l) for liquid, (g) for gas. **h. regenerators.** Stoves used in the blast furnace process for iron, which are heated up by waste hot gases, and then cooled by heating up cold gases for the blast. (See *Cowper stoves.*) **h. shocking.** A process similar to pasteurisation, in which a preliminary heat treatment is used to ensure that only the most virile and heat-resistant organisms in a culture are surviving. The resulting culture has thus increased virility. **h. of solidification.** The quantity of heat liberated on freezing or solidifying. **h. of solution.** H. of dissolution. The quantity of heat liberated or consumed when a solid is dissolved in a liquid. Cf. *h. of hydration* and *h. of ionization.* **h. of sublimation.** The number of calories required to convert a solid into a gas at constant temperature. **h. of swelling.** The heat evolved when a colloid (*e.g.*, gelatin) is placed in water and absorbs the latter. **h. of transition.** The quantity of heat liberated or consumed at the transition temperature, when a substance passes from one into another allotropic form. **h. of vaporization.** See *h. of evaporation.* **h. quantity.** The amount of heat energy expressed in calories. **h. rays.** See *infrared, radiation.* **h. summation.** See *Hess law.* **h. units.** Heat (H) may be expressed in dynamical units (ML^2T^2), in thermal units ($M\theta$) or thermometric units ($L^3\theta$); to the last two types belong respectively the practical units:

heat quantity..... calories,
heat intensity..... degree centigrade.

h. value. The number of calories obtained by the complete combustion of a substance: *E.g., Foods:* The heat liberated on oxidation of 100 grams of food is:

$$4.1C + 4.1P + 9.3F = \text{calories per 100 gms.}$$

where C, P, and F are the number of grams or the percentage of carbohydrates, proteins and fats, respectively. *Fuels:* The heat obtained on the complete combustion of fuels is given approximately by:

$$8149C + 34{,}500H—3000(O-N)/100 \text{ cals.}$$

where C, H, O and N are, respectively, the percentage of carbon, hydrogen, oxygen and nitrogen in the fuel. The A.S.M.E. formula for coals approximates to this heat value:

$$\text{B.t.u. per pound} = 14{,}600C + 62{,}000\left(H - \frac{O}{8}\right) + 4000S$$

where C, H, O and N are the respective weights of carbon, hydrogen, oxygen and sulfur in one pound of fuel.

heater. A device by which the temperature of a body can be raised. Cf. *furnace.* **direct-** An open fire or flame, *e.g.*, burners, lamps, ovens. **indirect-** A water-bath, steam-bath, air-bath, oil-bath, etc. or an electric heater.

Heaviside layer. See *Kennelly-Heaviside.*

heavy. (1) Not light. (2) Large in quantity. **h. acids.** Those which are used in large quantities; as, sulfuric, hydrochloric and nitric acids. **h. chemicals.** Those which were formerly manufactured in ton lots; as, sodium carbonate, potassium cyanide, oxalic acid, etc. **h. hydrogen.** Deuterium. **h. metal.** A metal whose specific gravity is greater than four. The heavy metals are all located in the lower half of the new periodic table; they have complex spectra, form colored salts and double-salts, have a low electrode potential, are mainly amphoteric, and yield weak bases and weak acids. They have usually more than one valency forming more than one series of compounds, and therefore behaving as oxidizing or reducing agents. *E.g.*,

valence number:	Fe 0 metallic iron	Fe^{++} 2 ferrous compounds	Fe^{+++} 3 ferric compounds	FeO_4^{--} 6 ferrates

OXIDATION →
← REDUCTION

h. spar. Barite. **h. water.** See *water, deuterium.*

hectare. A unit of area in the metric system. 1 hectare = 100 acres = 2.471 acres.

hecto- A prefix indicating "hundred." In the metric system it indicates one hundred units.

hectogram. In the C.G.S. system 1 hgm. = 100 gm. = 3 oz. 230.7 grains (seldom used).

hectoliter. In the C.G.S. system 1 hl. = 100 liters = 2.8378 bushels = 22 Imperial gallons = 26.4 U. S. gallons.

hectometer. In the C.G.S. system 1 hm. = 0.1 km. = 100 m. = 328 ft. 1 inch.

Hector's base. $C_{14}H_{12}N_4S$. An oxidation product of phenyl thiocarbamide.

hedenbergite. $CaO.FeO.2SiO_2$. A silica mineral (q.v.) of the pyroxene group, q.v.

hedeoma. The dried leaves and tops of *H. pulegioides*, American pennyroyal, an annual herb of U. S. and Canada; used as stimulant, carminative and emmenagogue. **h. oil.** The essential oil of *Hedeoma pulegioides*. A colorless or yellowish liquid of pungent odor, used to drive off mosquitos and fleas.

hedeomol. $C_{10}H_{18}O$ = 154.2. The ketone of the oil from hedeoma. A colorless liquid, b.217. Cf. *pulegone.*

hedera. Ivy.

hederagenin. $C_{31}H_{50}O_4$ = 486.5. A glucoside from the seeds of *Hedera* species (ivy), a genus of araliaceous plants. Cf. *hederaglucoside.*

hederaglucoside. $C_{32}H_{54}O_{11}$ = 614.43. Helexin. A glucoside from *Hedera helix*, ivy, a common Araliaceae. White powder, m.233, soluble in alcohol.

hederic acid. $C_{15}H_{26}O_4$ = 270.2. A crystalline acid from the seeds of ivy, *Hedera helix.*

hederine. $C_{42}H_{66}O_{11}$ = 746.7. An organic principle from the seeds of ivy, *Hedera helix.*

hedgehog crystals. Crystals of ammonium urate found in urinary deposits.

hedonal. $C_6H_{13}O_2N$ = 131.1. Methyl-propyl-carbinol-urethane, pentan-2-ol-urethane. $NH_2.CO.OCH(Me)Pr$. A white crystalline powder, m.74, b.215, soluble in 120 pts. water; used as a hypnotic and diuretic. Cf. *aponal.*

Heerwagen pipette. A glass tube with outlet tube and piston for delivering small quantities of mercury.

Hefner lamp. A device for burning amyl acetate and regulating and measuring the height of the flame, which should be 4 cm. high. Used as a standard for photometric measurements in Germany. **H. unit.** The horizontal illuminating intensity of the Hefner lamp burning at a pressure of 760 mm. in an atmosphere containing 8.8 % of water vapor. 1 Hefner unit corresponds with 0.9 candle power.

Hehner Number. A measure of the percentage of water-insoluble fatty acids and unsaponifiable matter in a fat or oil.

Heidenhain thermometer. A delicate thermometer ranging from −2.5°C. to 5°C. and graduated in 1/100°C., used in cryoscopes (q.v.) for molecular weight determination from the depression of the freezing point of solutions.

Heim's cage. A metal box with a wire screen and two compartments for breeding mice and other small rodents for experimental purposes.

Heisenberg, Werner. 1901– . A German physical chemist. **H. principle.** The uncertainty or indeterminism principle. Within the atom it is meaningless to define both position and velocity of the electrons, because Δx, the error in specifying velocity x, multiplied by Δp, the error in specifying position p, is always of the order of magnitude of Planck's constant, h; *i.e.*,

$$\Delta x \Delta p \sim h.$$

Hence, assuming a definite velocity, only an approximate position is calculable; likewise, assuming a definite position, only an approximate velocity can be calculated: Cf. *wave mechanics.* In simple language: The limit to observational experiments is reached when the observational or determining factors begin to interfere with normal happenings in the experiment under observation.

Heitler, Walter. 1904– . A German theoretical physicist. **H. and London bond.** A pair of electrons in opposite spin. Cf. *bond.*

helcosol. Bismuth pyrogallate.

helenene. $C_{19}H_{26}$ = 254.2. A hydrocarbon obtained by distilling crude helenin with phosphoric acid.

helenin. (1) C_6H_8O = 96.1. Inula camphor. True helenin. Odorless, colorless crystals, m.72, b.150, from the roots of *Inula helenium.* (2) $C_{21}H_{28}O_{31}$ = 776.3. Crude helenin. A principle from the root of *Inula helenium* consisting of alantol, alant camphor and alantic anhydride. (3) Inulin. (4) $C_{20}H_{26}O_5$ = 345.3. A bitter, crystalline substance from the leaves of *Helenium autumnale*, sneezewort, a Compositae. It differs from the true or crude helenin obtained from inula. (5) Helenene.

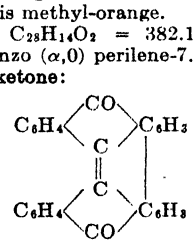
helenite. Mineral caoutchouc.

helexin. Hederaglucoside.

helianthic acid. $C_{14}H_9O_8$ = 305.1. An acid from the seeds of *Helianthus annuus*, sunflower, a Compositae.

helianthin. Dimethyl amido azo benzene sulfonic acid. $Me_2N—C_6H_4—N:N—C_6H_4SO_3H$. A dye occurring in lustrous red crystals. Its sodium salt is methyl-orange.

helianthrone. $C_{28}H_{14}O_2$ = 382.17. Benzodianthrone, dibenzo (α,0) perilene-7.16-dione. The homocyclic ketone:



helianthus. Sunflower.

helicin. $C_{13}H_{16}O_7.\frac{1}{4}H_2O$ = 297.71. Salicyl-aldehyde glucose. An oxidation product of salicin. Colorless crystals, m.170–175, soluble in water or alcohol.

helicoprotein. A glucoprotein from the snail, *Helix.*

helictite. A stalactite or stalagmite of irregular shape.

helide. A supposed compound of helium, *e.g.*, mercury helide, $HgHe_{10}$.

heliolamp. An electric lamp containing a silicon-coated carbon filament; used for the production of artificial sunlight.

heliotrope. A variety of quartz with a greenish tint and red specks, used as a semiprecious stone.

heliotropic acid. Piperonylic acid.

heliotropin. (1) Piperonal. (2) A purple diazo dye. (3) The odorous principle of *Heliotropium* species; cf. *piperonal.*

heliotropine. An alkaloid from *Heliotropium europaeum*, a Boraginaceae.

helisterol. $C_{26}H_{44}O_2$ = 388.4. A colorless sterol from plant carotenoids.

helium. He = 4.003. A chemically-inert gas and element, atomic number 2. It is a constituent of the atmosphere, of radioactive minerals and of natural gases. Discovered in 1895 by Ramsay and Cleve, after its presence in the sun was indicated spectroscopically by Lockyer and Frankland in 1869. A colorless gas, $d._{(air-1)}0.137$, m. −272, b. −268.8. Used in America for filling balloons and airships; also for filling incandescent lamps. It is transported in steel cylinders. **h. atom.** The h. atom is assumed to consist of a nucleus having two positive charges, around which two electrons move in orbits whose planes are inclined at 120°. **h. compounds.** H. has a valency of zero; hence it forms no ordinary compounds. Excited He molecules however, give compounds, helides, q.v. **h. nucleus.** The atomic nucleus of He (mass nearly four times that of hydrogen) is assumed to be a constituent of all other elements (Harkin's theory), and is itself composed of hydrogen nuclei. Cf. *packing effect.* In radioactive disintegration (q.v.) He nuclei (alpha rays) are thrown off at a high speed. Their positive charge is neutralized by attracting two electrons, thus forming the He gas which is always associated with radioactive minerals. Cf. *petalon, piezoelectron, Hackh theory.*

helix. (1) The coil of wire in an electromagnet. (2) A spiral arrangement of the periodic system, q.v. (3) A snail.

hellebore. A genus of ranunculaceous plants. **American-** *Veratrum viride.* **black-** The root of *Helleborus niger.* **false-** American-. **green-** The root of *H. viride.* **white-** *Veratrum album.*

helleborein. $C_{37}H_{56}O_{18}$ = 788.6 or $C_{21}H_{34}O_{10}$ = 446.26. A glucoside from the roots and leaves of *Helleborus niger* and *H. viridis.* Soluble in water or alcohol. Used as a local anesthetic and heart stimulant.

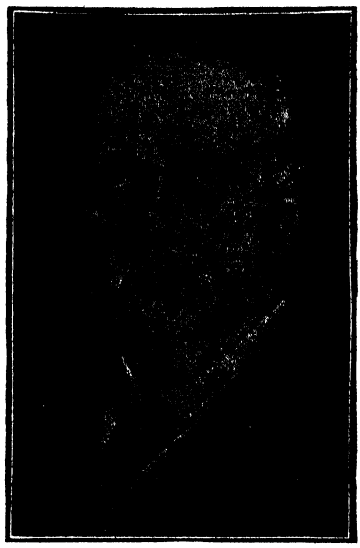
helleboresin. $C_{30}H_{38}O_4$ = 462.29. A decomposition product of helleborin.

helleboretin. $C_{14}H_{20}O_3$ = 236.2. A deep violet decomposition product of helleborein.

helleborin. $C_{36}H_{42}O_6$ = 570.4. A crystalline glucoside from the roots of *Helleborus niger.* Slightly soluble in water, soluble in ether or alcohol. Used as a narcotic.

Helmert's equation. The acceleration due to gravity at sealevel is $g = 978.038\ (1 + 0.005302\ \sin^2 H - 0.000007\ \sin^2 2I)$ where I is the latitude. Subtract 0.000192 for each meter of height (H) from the value of g.

Helmholtz, Herman Ludwig Ferdinand von. (1821–1894). A German scientist noted for his generalizations on the conservation of force, physiological optics, electrodynamics, theories of electricity, and his discovery of nerve cells. **H. equation** of inductance: $I = \frac{E}{R}\left(1 - e^{-\frac{R}{T}.t}\right)$, where E is the electromotive force, R the resistance, I the coefficient of self-inductance, and e the base of Naperian logarithms. **Gibbs-H. equation.** See *Gibbs.*



von Helmholtz.

helminth. A worm or intestinal parasite.

helminthic. Anthelminthic.

helmitol. $C_7H_8O_7(CH_2)_6N_4$ = 344.26. Hexamethylenetetramine anhydromethylene citrate. Colorless crystals, m.163, used as urinary antiseptic. Cf. *cystopurin.*

Helmont, Johann Baptist van. 1577–1644. A Belgian alchemist whose work represents the transition from speculative to experimental chemistry. He originated the term "gas" (chaos).

helonias. False unicorn root, starwort. The root of *H. dioica* (*Chamaelirium luteum*), a Liliaceae, used as tonic and diuretic.

helonoid. The combined principles from the root of *Chamaelirium luteum*, false unicorn; used medicinally as a tonic, diuretic, and vermifuge. Cf. *chamaelirin.*

Helvella. A family of cryptogams.

helvellic acid. $C_{12}H_{20}O_7$ = 276.2. A dibasic, poisonous acid from *Helvella esculenta*, which causes hemoglobinuria.

helvetium. An element, atomic number 85. Discovered in 1940, by Minder of Berne, in the decomposition products of actinium.

helvite. $(BeMoFe)_7Si_6O_{12}S$. A brittle, lustrous, yellowish to greenish colored mineral.

helvolic acid. An antibiotic substance, now known to be identical with fumigacin.

hema- A prefix denoting blood. See *haemo-.*

hemachate. Blood agate. A yellow variety of agate.

hemacyanin. Hematocyanin. A blue coloring matter found in bile; cf. *hemocyanin.*

hemacytometer. Hemocytometer.

hemaglobinometer. Hemoglobinometer, q.v.

hemaglutination. Hemoglutination.

hemaglutinins. Substances (agglutinins) which cause the clumping of red blood corpuscles.

hemagog. An agent that promotes the menstrual or hemorrhoidal discharge of blood.

hemanthine. An alkaloid of *Haemanthus toxicarus*, an Amaryllidaceae; constituent of Aus-

tralian arrow poisons, resembling scopolamine in its effect.

hemase. A catalase (q.v.) derived from blood.

hematein. $C_{16}H_{12}O_6$ = 300.1. An oxidation product of hematoxylin. A brownish powder, insoluble in water, slightly soluble in alcohol, soluble in ether; used as indicator in alkalimetry.

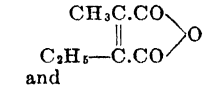
hematic acid. Δ^3-1,3,4-pentene tricarboxylic acid. A tribasic acid obtained from hematin; $HOOC\text{-}(CH_2)_2C(COOH):C(OOH)Me$.

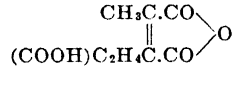
hematin. $C_{34}H_{32}N_4O_6Fe$ = 648.5. Phenodin, haematin. The prosthetic group of the hemoglobin of blood. A brownish-black powder, soluble in alkalis. **oxy-** $C_{34}H_{32}N_4O_7Fe$ = 664.5. The coloring matter of oxyhemoglobin. It yields on strong oxidation hematinic acid, on strong reduction hematoporphyrin, and on heating pyrrole and pyrrole derivatives. Cf. *porphin*.

hematine crystals. Hematoxylin. **h. extract, h. paste.** Hematoxylin paste; more strictly applied to its oxidation product.

hematinic. An agent that increases the hematin content of blood.

hematinic acids. A group of di- and tribasic acids obtained by the strong oxidation of hematin; the anhydrides and imides have the formulae:





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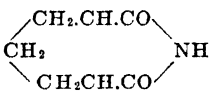
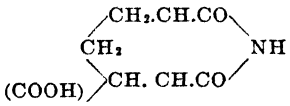




Cf. *hematic acid*.

hematite, haematite. Fe_2O_3. Red iron ore. Raddle. The most common iron ore used in metallurgy for the manufacture of iron and steel. **brown-** The hydrated variety or limonite. **red-** Kidney ore. Rhombic or reniform native Fe_2O_3. **spicular-** Specularite.

hematocrit. A small centrifuge, used to separate blood corpuscles in clinical analysis.

hematocrystallin. Oxy*hemoglobin*.

hematocyanin. Hemocyanin.

hematoglobulin. Oxy*hemoglobin*.

hematoidin. Bilirubin.

hematology. The science of the properties and diagnostic indications of blood.

hematolysis. Hemolysis.

hematoporphyrin. (1) $C_{16}H_{18}N_2O_3$ = 286.16. Porporino. A decomposition-product of hematin, occurring with hemoporphyrin in urine; m. below 100 (decomp.). (2) $C_{34}H_{38}N_4O_6$. Cruentine. A dark violet powder obtained by adding hemin to glacial acetic acid saturated with HBr, and neutralizing after some time with NaOH. It is insoluble in water, soluble in alcohol. Cf. *porphin*.

hematoxylic acid. Hematoxylin.

hematoxylin. $C_{16}H_{14}O_6.3H_2O$ = 356.2. Haematoxylic acid, haematine, hematine crystals, logwood crystals, campeachy wood, Jamaica wood, steam black. The coloring principle of *Haematoxylon campechianum* (logwood). Colorless or slightly yellow crystals, soluble in water, alcohol, or glycerin, slightly soluble in ether or carbon disulfide. Soluble in alkalis (ammonia, borax, etc.) producing a purple color; with acids the color changes to yellow. On exposure it turns black with the formation of hematoxylin. Used as a mordant dye, as an indicator in the titration of alkaloids, as a stain in microscopy, and as reagent for copper and iron. **h. paste.** Logwood paste, hematin extract, logwood extract. A technical grade of hematoxylin used as coloring material in the textile and leather industries.

hematoxylon. Haematoxylon.

heme compounds. Derivatives of hemoglobin and chlorophyll; as, porphyrins and hemins. For their structure, see *porphin*.

hemellitic acid. *2.3*-xylic acid.

hemellitol. Hemimellitene.

hemerythrin. A relatively rare iron-protein compound in living tissues.

hemi- A prefix derived from Greek meaning "half." See also "*semi-*" (Latin) and "*demi-*" (French).

hemialbumose. Propeptone. A decomposition product of albumin, related to peptone.

hemicellulose. (1) A constituent of the cell wall of bacteria. (2) Pseudocellulose. A group of gummy substances intermediate in composition between cellulose and the sugars. (3) A constituent of starch. Cf. *xylan*.

hemicolloid. A colloidal particle having a chain length up to 250 Å.U. and a polymerization of 20 to 100 molecules. Cf. *mesocolloid*.

hemihedral. Describing a crystal which has only half the number of faces that the symmetry of the system requires, Cf. *holohedral*.

hemimellitene. C_9H_{12} = 120.1. Hemimellitol, 1.2.3-trimethylbenzene, $C_6H_3Me_3$. A colorless liquid, b.175.

hemimellitic acid. $C_9H_6O_6$ = 210.05. Benzene-1.2.3-tricarboxylic acid, v-tricarboxybenzene, $C_6H_3(COOH)_3$. Colorless needles, m.196 (decomp.), slightly soluble in water, soluble in alcohol or ether. Cf. *hemellitic acid*.

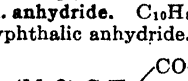
hemimellitol. (1) $HO.C_6H_2Me_3$. (2) Hemimellitene.

hemimorphite. Calamine (British usage).

hemin. $C_{34}H_{32}O_4N_4FeCl$ = 658.0. Teichmann's crystals, hematin chloride. The characteristic microcrystals obtained by heating a crystal of sodium chloride, a drop of glacial acetic acid, and blood on a microscope slide. It is an identification test for blood of different species (see figure).

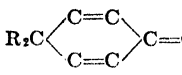
hemipic acid. Hemipinic acid.

hemipinic acid. $C_{10}H_{10}O_6$ = 226.1. Hemipic acid. Dimethoxybenzene-dicarboxylic acid, 3.4-dimethoxyphthalic acid, $C_6H_2(OMe)_2(COOH)_2$. Colorless crystals, slightly soluble in water, soluble in alcohol. It is a split-product of nicotine, and occurs in the following isomeric forms, where the first two numbers indicate the position of the methoxy groups, the last two numbers the carboxyl groups: **3.4.1.2-** m.185, (decomp.). **4.5.1.2-** m.178. **5.6.1.2-** m.180. **h. anhydride.** $C_{10}H_8O_5$ = 208.1. 3.4-dimethoxyphthalic anhydride.



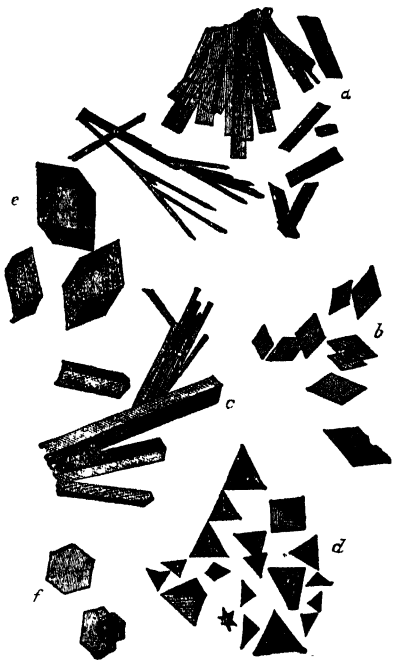
hemipyocyanin. An antibiotic pigment derived from pyocyanin.

hemiquinoid. The structural arrangement



Cf. *quinoid.*

hemisotonic. Having an osmotic pressure equal to that of blood. Cf. *isotonic.*



Hemin crystals,

from the blood of man (a, b), cat (c), guinea pig (d), marmot (e), and squirrel (f). (Gautier.)

hemit. A trade name for molded tar and asbestos products used for electrical insulation.

hemiterpenes. A group of hydrocarbons of the general formula C_5H_8, related to the terpenes (q.v.); as, isoprene.

hemlock. (1) The fir tree *Tsuga canadensis* of Western and Northern America. (2) The poisonous plants and shrubs of the *Conium* species, Umbelliferae. **poison-, spotted-** Conium. **water-** Cicuta. **h. alkaloids.** Alkaloids from the seeds and bark of *Conium* species: coniine, conhydrine, conicine. **h. bark.** The bark of the hemlock fir, used in tanning. **h. fir.** The tree, *Tsuga canadensis* of W. and N. America. **h. spruce.** H. fir. **h. tannin.** $C_{26}H_{16}O_{10}$ (?). A tannin from the bark of *Tsuga* species.

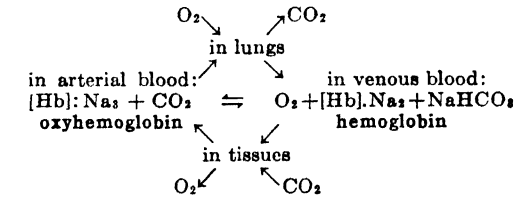
hemocuprein. A blue copper-protein compound in the red blood corpuscles and livers of mammals.

hemocyanin. Haemocyanin. A blue coloring matter from the blood of mollusks. It is related to hematin, but contains copper instead of iron. *Cf. hemacyanin, chromoprotein.*

hemocytometer. Hemacytometer, hemameter, etc. A microscope slide with square rulings; used for counting the number of blood corpuscles in a preparation.

hemodyn. See *periston.*

hemoglobin. Haemoglobin. Hb. A chromoprotein and coloring matter of red blood corpuscles of mammals. Brownish-red powder, soluble in water. It consists of hematin combined with the histon; *globin*, is the oxygen carrier of the blood of mammals and is related chemically to chlorophyll. Molecular weight, 68,000 ± 1000. **kat-** A compound of denatured globin and hematoxylin, produced by the action of chloroform on methemoglobin. **met-** An oxidation product of h. formed when blood is left standing. It contains trivalent iron. **oxy-** The hemoglobin of arterial blood, containing divalent iron. **reduced-** The hemoglobin of venous blood. Its reactions and changes in the blood stream are:



Cf. *cytochromes, respiration, porphin, hemocyanin.*

hemoglobinometer. An instrument for determining the amount of hemoglobin in the blood.

hemoglutination. The clumping together or agglutination of the red blood corpuscles.

hemolysin. A substance that causes hemolysis, such as saponin, venoms; or the proteins formed in the body by the introduction of red blood corpuscles from another species, which are capable of dissolving the red blood corpuscles of the host species. **h-** H. made from *Helix pomatia.* **l-** H. made from *Limulus polyphemus.* **o-** H. from *Octopus vulgaris;* molecular weight, 2,050,000.

hemolysis. Hematolysis. (1) In the living organism: The abnormal loss of hemoglobin of the blood corpuscles, causing the blood to become brighter and clearer; it finally results in death. (2) The dissolving of red blood corpuscles by chemicals, heating, freezing, or biological agents, which causes the blood to become transparent and clear. Used in certain diagnostic reactions to determine the presence or absence of antibodies. See *Wassermann reaction, Ehrlich side-chain theory, heterolysis.*

hemolytic. An agent that causes the destruction of red blood corpuscles.

hemolyzate. The product of hemolysis.

hemoporphyrin. $C_{16}H_{18}O_3N$ = 272.2. A decomposition product of hematin, closely allied to the phylloporphyrin, decomposition product of chlorophyll; both split to hemopyrrole. Cf. *porphin.*

hemopyrrole. $C_8H_{13}N$ = 123.2. A pyrrole derivative and decomposition-product of both, hemoglobin (hemoporphyrin) and chlorophyll (phylloporphyrin).

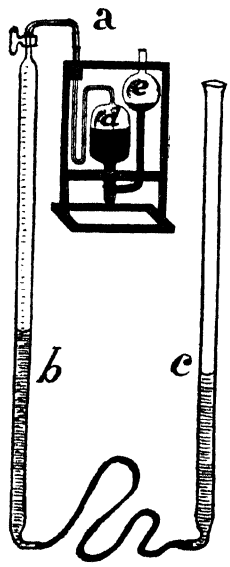
hemostatic. An agent which when applied externally checks the flow of blood; as tannin, Monsel's solution, ferric chloride. Cf. *styptic.*

hemp. The plant *Cannabis indica* or *C. sativa*, an Urticaceae, of which: (a) the flowering tops are the drug cannabis and yield a resin (cannabin; (b) the leaves and stalks are hashish; (c) the seeds yield h. seed oil; and (d) the

stems a fiber used for ropes or paper. **bowstring-** A tough fiber from *Sanseviera Zeylanica*, a Liliaceae of Ceylon. **Bombay-** Sunn-. **Canadian-** *Apocynum cannabinum*. The roots are used medicinally. **China-** See China *jute*. **Deccan-** The fiber from *Hibiscus cannabinus*, a Malvaceae of India. **Manila-** Abaca. **Mauritius-** The fiber *Furcraea gigantea*, an Amaryllidaceae. **New Zealand-** N. Z. flax. The fiber from *Phormium tenax*. **sisal-** See *sisal*. **sunn-** Bombay h. A fiber obtained from the stems of *Crotalaria juncea*, a Leguminosae of India and Australia.

h. seed. The seeds of Cannabis species. **h. seed oil.** A light-green, non-drying oil, expressed from hemp seeds. Its chief constituent is linolein; d_{15} 0.925–0.932, m. −15 to 23. Used for soap, paints and varnishes.

Hempel, Walther. 1851–1916. A German analytical chemist. **H. gas buret.** A glass apparatus used frequently in gas analysis for the absorption of gases by solid or liquid reagents. The gas is measured in the buret b and on raising the leveling tube c it enters the absorption bulb, d (of which there may be one or more), through the capillary tube "a," and pushes the absorbing liquid partly into the levelling bulbs, e, the whole being mounted compactly upon a metal frame. After absorption of the residual gas is pulled back into the buret and measured. **H. palladium tube.** A U-shaped glass tube filled with palladium sponge for use in gas analysis to absorb hydrogen.



Hempel gas buret.

henbane. Hyoscyamus.

hendecanal*. $C_{11}H_{22}O$ = 170.17. Undecylic aldehyde, undecanal*, $Me(CH_2)_9CHO$. A colorless liquid, d.0.825, m. −4, b.117.

hendecane*. Undecane. **h. carboxylic acid.** Lauric acid. **h. dicarboxylic acid.** Brassylic acid.

hendecanoic*. Undecylic.

hendecanol. Hendecyl alcohol.

hendecanone*. $C_{11}H_{22}O$ = 170.17. Undecanone. **1-** Hendecanal. **2-** Methyl-*n*-nonyl-ketone, $MeCOC_9H_{17}$. A colorless liquid, d.0.826, m.121.1, b.228, in oils of rue and lime. **6-** Diamyl ketone, amyl ketone, $C_5H_{11}COC_5H_{11}$. A colorless liquid, d.0.826, m.14.6, b.226.3.

hendecene*. $C_{11}H_{22}$ = 154.17. Undecylene, undecene*. A group of unsaturated hydrocarbons; as, **α-** or **1-** $CH_2{:}CH(CH_2)_8Me$. A colorless liquid, d.0.763, b.188. **β-** or **2-** $MeCH{:}CH(CH_2)_7Me$. A liquid, d.0.774, b.193; both are insoluble in water, soluble in alcohol or ether.

hendecoic acid. Undecylic acid.

hendecyl. Undecyl. The monovalent radical, $Me(CH_2)_{10}$— or $C_{11}H_{23}$—. **h. alcohol.** $C_{11}H_{24}O$ = 172.19. **1-** 1-hendecanol*, *n*-undecyl alcohol, undecan-1-ol. A colorless liquid, d.0.883, m.19, $b._{30mm}$ 146. **6-** 6-hendecanol*, n-undecan-6-ol. A colorless liquid, d.0.833, m.16, b.235. **h. amine*.** $C_{11}H_{25}N$ = 171.20. *n*-undecylamine, 1-amino-undecane. A colorless liquid, m.16.5, b.234.

Henderson, George Gerald. 1862–1942. A British chemist, noted for his work on terpene chemistry. **H. process.** Roasting copper ores with salt, subsequent leaching of the chlorides, and precipitation of the metals.

heneicosane. $C_{21}H_{44}$ = 296.4. A saturated hydrocarbon, m.40.5, of the methane series. **h. dicarboxylic acid.** $C_{23}H_{44}O_4$ = 384.3. Colorless crystals, m.124, in Japan wax (3 %).

heneicosanic acid. $C_{21}H_{42}O_2$ = 326.3. White needles, m.74, in fats.

henequen. The fiber of *Agave fourcroydes*, a Mexican plant and the West Indies; used for ropes. Cf. *sisal*.

henna. The powdered leaves of *Lawsonia inermis*, A Lythraceae of Asia Minor, Egypt and Persia. Used as a brown dye, especially for hair.

Henry, Joseph. 1797–1878. An American physicist noted for his research in magnetism. Cf. *henry*. **H., William** 1775–1836. An English chemist and co-worker of Dalton. **H.'s law.** The amount of gas dissolved in a liquid is proportional to the pressure of the gas; hence, the ratio of the concentrations of the gas in gaseous and soluble form is a constant, provided the temperature is constant.

henry. H. The unit of induction. If the e.m.f. induced is 1 volt, and the inducing current varies at the rate of 1 amp. per second, a henry, or quadrant, or secohm is = 10^9 e.m.u. or $\frac{1}{9} \times 10^{-11}$ e.s.u.
1 international henry = 1.00052 absolute henry
1 absolute henry = 0.99948 international henry
= 1.1124×10^{-12} c.g.s. e.s.u. = 10^9 c.g.s. e.m.u.
= 1 practical henry.

hentriacontane*. $C_{31}H_{64}$ = 436.6. A hydrocarbon of the methane series, m.69, obtained from the roots of *Oenanthe crocata*, an Umbelliferae; also found in beeswax.

hepar. The Greek term for "liver." **h. antimoni.** Sodium or potassium antimoniate. **h. calcis.** Calcium sulfide. **h. reaction.** A test for sulfur. The compound is reduced with soda and carbon, and the mass moistened on a silver coin. A black stain indicates sulfur. **h. siccum.** The powdered dried liver of animals used as food in diabetes. **h. sulfuris.** Liver of *sulfur*.

heparin. A blood anti-coagulant of the liver; a conjugated glucuronic acid glucoside.

hepatic gas. Hydrogen sulfide.

hepatica. The dried plant *Hepatica triloba*, liverwort. Used as a mild mucilaginous astringent.

hepatin. Glycogen.

hepatocuprein. A blue compound containing copper, in mammalian red blood corpuscles and liver.

hepatoflavin. Vitamin B_2.

hepotic acid. Oenanthic acid.

heptacosane*. $C_{27}H_{56}$ = 380.5. A hydrocarbon of the methane series, m.59; found in beeswax.

heptad. An element or radical having a valency of seven.

heptadecane*. $C_{17}H_{36}$ = 240.3. Dioctyl-methane. A hydrocarbon of the methane series. **h. carboxylic acid*.** Stearic acid. **h. nitrile*.** Margaronitrile.

heptadecanoic acid*. Margaric acid.
heptadecanone*. Pelargone.
heptadecoic acid. Margaric acid.
heptadecylic acid. Margaric acid.
heptadiene*. C_7H_{12} = 96.09. **2.4-** $MeCH{:}CH.CH{:}CH.CH_2Me$. Colorless liquid, b.107. **h. one.** Phorone.
heptaldehyde. Heptyl aldehyde.
heptamethylene. Suberane.
heptanal*. Heptyl aldehyde.
heptane*. C_7H_{16} = 100.2. (a) Normal, heptane, methyl hexane, dipropylmethane, hexylmethane, heptyl hydride, dimethylpentane $Me(CH_2)_5Me$. A colorless liquid, d.0.690, b.95, insoluble in water, soluble in alcohol or ether, highly inflammable. Used as a solvent and an anesthetic, and occurs in the needles of *Pinus sabiana*. (b) Dimethylisopentane, $(CH_3)_2CH(CH_2)_3CH_3$. A colorless liquid, d.0.680, b.90, soluble in alcohol or ether. (c) Triethylmethane $(C_2H_5)_3CH$. A colorless liquid, d.689, b.96, soluble in alcohol or ether. (d) Diethyldimethylmethane $(C_2H_5)_2C(CH_3)_2$. A colorless liquid, d.0.711, b.86, insoluble in water, soluble in alcohol or ether. **bicyclo-** See *carane, fenchane*. **heptahydroxy-**. Volemitol.
heptane-1,7-dicarboxylic acid. Azelaic acid.
heptanedioic acid*. Pimelic acid.
heptanoic acid*. Heptoic acid.
heptanol*. Heptyl alcohol.
heptanone*. **4-** Butyrone. **3-** Ethylbutylketone. **2-** Methylamyl ketone.
heptatomic. (1) Heptavalent. (2) A molecule consisting of seven atoms.
heptavalent. (1) A molecule containing seven replaceable hydrogen atoms or seven hydroxyl groups. (2) Septavalent. An atom which has seven valence electrons; as, Mn or Cl.
heptene*. C_7H_{14} = 98.2. Heptylene, pentylethylene, $CH_2{:}CH(CH_2)_4Me$. A colorless liquid, d.0.703, b.98, soluble in alcohol or ether.
heptenyl. The monovalent C_7H_{13}— radical, derived from heptene. **h. methyl carbonate.** Heptine methyl carbonate.
heptenylene. Heptine.
heptine. C_7H_{12} = 96.1. Heptenylene, heptyne*, oenanthine, pentyl-acetylene. The unsaturated hydrocarbon; $HC{:}C(CH_2)_4Me$. A colorless liquid d.0.831, b.104, soluble in alcohol or ether. **h. methyl carbonate.** $C_9H_{14}O_2$ = 154.11. Heptenyl methyl carbonate. An ester, $Me(CH_2)_4C{:}C.COOMe$, from the ricinoleic acid of castor oil; d.0.930, insoluble in water, used in perfumery.
heptitol. A group of pentatomic alcohols derived from heptoses.
heptoic acid. $C_7H_{14}O_2$ = 130.2. n-heptylic acid, amylacetic acid, oenanthic acid, oenanthylic acid, heptanoic acid*, enanthic acid, $Me(CH_2)_5COOH$. A colorless oily liquid with an unpleasant odor, d.0.9345, m. −10, b.223, insoluble in water, soluble in alcohol, ether or chloroform. Used in organic synthesis. **iso-** $Me_2CH(CH_2)_3COOH$. iso-heptylic acid, isooenanthic acid. Colorless liquid, b.210, soluble in alcohol. **h. alcohol.** Heptyl alcohol. **h. aldehyde.** Heptyl aldehyde.
heptose. A sugar having seven carbon atoms. See *carbohydrates*.
hepturonic acid. Any pentahydroxy aldehyde acid derived from heptoses, of the general formula $CHO.(CHOH)_5COOH$. Cf. *uronic acids*.
heptyl. The monovalent radical C_7H_{15}— or $Me(CH_2)_6$— derived from heptane. **h. acetate.** $C_9H_{18}O_2$ = 158.2. The ester $AcOC_7H_{15}$. A colorless odorous liquid, d.0.874, b.190, insoluble in water, soluble in alcohol; used in artificial flavoring extracts. **h. alcohol.** $C_7H_{16}O$ = 116.2. (1) $C_7H_{15}OH$. Oenanthol, heptylic alcohol, *1*-heptanol*, normal hexyl carbinol. A colorless, odorous liquid, d.0.830, m. −36, b.176, soluble in water, alcohol, or ether. Used in organic synthesis. (2) $Me(CH_2)_2CHOH(CH_2)_2Me$. Iso-hexyl carbinol, dipropylcarbinol, *4*-heptanol*. A colorless liquid, d.0.814, m. −41.5, b.149, soluble in alcohol or ether. (3) $Me_2CH.CHOH.CH.Me_2$. Diisopropylcarbinol, *1.5*-dimethyl-*3*-pentanol*. A colorless liquid, d.0.832, b.131, slightly soluble in water, soluble in alcohol or ether. (4) Et_3COH. Triethylcarbinol, *1.1*-diethyl-1-propanol*. A colorless liquid, d.0.860, b.140, slightly soluble in water, soluble in alcohol or ether. (5) $Me_2COH.CH_2.CHMe_2$. Dimethylisobutylcarbinol, *2.5*-dimethyl-*2*-pentanol*. A colorless liquid, b.130, soluble in alcohol or ether. (6) $Me_3C.COHMe_2$. Pentamethylethanol, *2.3.3*-trimethyl-2-butanol*. A colorless liquid, b.132, soluble in alcohol or ether. **h. aldehyde.** $C_7H_{14}O$ = 114.1. Oenanthal, enanthaldehyde*, oenanthylic aldehyde, heptoic aldehyde, normal heptylic aldehyde, heptanal. $Me(CH_2)_5CHO$. An aldehyde obtained from castor oil. A colorless, refractive, fragrant liquid, d.0.850, m. −45, b.155, slightly soluble in water, soluble in alcohol, ether or chloroform. Used in organic synthesis. **h. amine***. $C_7H_{17}N$ = 115.2. 1-Aminoheptane. $Me(CH_2)_6NH_2$. A colorless liquid, d.0.78, b.155, slightly soluble in water, soluble in alcohol or ether. **h. ether.** $(C_7H_{15})_2O$ = 214.3. Heptylic ether, enanthylic ether, cognac oil, heptyloxyheptane*. A colorless liquid, d.0.815, b.265, insoluble in water, soluble in alcohol or ether. **h. ethyl ether.** $C_9H_{20}O$ = 144.2. Oenanthic ether, oenanthylic ether, cognac oil, heptylethyloxide, ethoxyheptane*. $Me(CH_2)_6OEt$. A colorless, fragrant, oily liquid, d.0.840, b.166, insoluble in water, soluble in alcohol or ether. Used in flavoring extracts and in organic synthesis. **h. formate.** $C_8H_{16}O_2$ = 114.2. The formic acid ester $HCOOC_7H_{15}$. A colorless, aromatic liquid d.0.894, b.176, insoluble in water, soluble in alcohol or ether. Used in organic synthesis. **h. resorcinol.** Dihydranol.
heptylene. Heptene.
heptylic acid. Heptoic acid.
heptyne*. Heptine.
Heraeus hot plate. An electrically-heated plate or table used to replace gas burners.
herapathite. $4Qu.3H_2SO_4.2HI_4.6H_2O$. Artificial tourmaline. Quinine sulfate periodide. It is produced as optically-active crystals when iodine vapor is passed into a solution of quinine sulfate; used for polaroids, q.v.
herb. A drug that consists of the leafy, flowering, or fruiting stems of the smaller plants. Many are used in the form of teas (infusions), others in the manufacture of essential oils. The following are official (U.S.P.):

Absinthium	Grindelia
Cetraria	Hedeoma
Chelidonium	Indian cannabis
Chirata	Lobelia
Eupatorium	Marrubium

Melissa	Scutellaria
Peppermint	Spearmint
Pulsatilla	Tansy
Scoparius	

bitter- Snakehead. The leaves of *Chelone glabra*, a Scrophulaceae, used as anthelminthic. Cf. *chelonin*. **blanket-** Mullein. **felon-** Mugwort. **Fuller's-** Saponaria.

Hercules stone. Magnetite.

hercynite. $FeAl_2O_4$. Iron spinel. A fine, granular black mineral, d.3.92, hardness 7.5–8.

herderite. $Be(OH,F)CaPO_4$. A beryllium calcium phosphate mineral, d.3.0, hardness 5.

heretine. An alkaloid from *Heritiera javanica*, a Sterculiaceae of the Dutch Indies.

hermetic. Air-tight. **h. art.** Magic or alchemy. **h. casing.** A water-tight casing.

Hermite process. The manufacture of hypochlorite liquor for bleaching by the electrolysis of a solution containing 0.5 % NaCl and 0.05 % $MgCl_2$.

herniarin. $C_{10}H_8O_3$ = 176.1. Methylumbelliferone, 7-methoxycoumarin. A ketone from *Herniaria glabra*, a Caryophyllaceae. Cf. *resocyanin*.

heroine. $C_{21}H_{23}O_5N$ = 369.2. Diacetylmorphine. A white, odorless, powder, m.170, slightly soluble in water, soluble in alcohol, chloroform or ether. It is a very toxic narcotic and considered to be the most habit-forming drug; its manufacture in the United States is prohibited. **h. hydrochloride.** $C_{21}H_{23}O_5N.HCl$ = 405.7. Diacetylmorphine hydrochloride. A more soluble form of heroine is used in hypodermic tablets.

herpatite. Herapathite.

herrerite. $(Zn,Cu)CO_3$. A cupriferous smithsonite.

Hertz, Heinrich Rudolf. 1857–1894. A German physicist noted for his research in theoretical physics.

hertzian waves. A group of electromagnetic oscillations, resembling light waves but much longer (0.2 cm. to 1000 meters). Cf. *radiations, diffraction*.

herudin. (1) A constituent of leeches which prevents the coagulation of blood. (2) A preparation made from leeches.

Herzberg's stain. (1) A solution of I, KI and $ZnCl_2$ in water, used to stain rag fibers *red;* chemically treated paper pulp *blue;* and mechanical woodpulp or lignin *yellow*. (2) A solution of potassium iodide in sulfuric acid.

hesperetic acid. Hesperitinic acid.

hesperetin. $C_{16}H_{14}O_6$ = 302.2. A split-product of hesperidin. Yellow crystals, decomp. 220, soluble in alcohol or ether. It is a chalcone of phloroglucinol.

hesperetol. $C_9H_{10}O_2$ = 150.08. *5*-Vinylguaiacol, *3*-hydroxy-*4*-methoxystyrene, $CH_2:CH.C_6H_4(OMe)OH$. Colorless crystals, m.57.

hesperidene. d-Limonene.

hesperidin. $C_{22}H_{26}O_{12}$ = 482.2. Citrin, vitamin P. A glucoside from the unripe fruits of *Citrus aurantium*. A yellowish powder, or small needles, decomp. 251, slightly soluble in water or alcohol, insoluble in ether. It splits on hydrolysis to hesperitinic acid, glucose and phloroglucinol. Cf. *naringin*.

hesperidine. An alkaloid from the leaves of *Peucedanum galbanum*, wild celery, (Umbelliferae).

hesperitinic acid. $C_{10}H_{11}O_4$ = 195.1. Isoferulic acid, m-oxy-p-methoxy cinnamic acid, 4-oxy-3-methoxy-cinnamic acid. Yellow needles, m.228.

Hess, Germain Henri. (1802–1850). A German-born Russian chemist, and a founder (1840) of thermochemistry. **H., Victor Franz** 1883– . A German physicist and Nobel prize winner (1936), noted for pioneer work in cosmic radiations. **H.'s law.** The law of constants heat summation. The amount of heat liberated or absorbed in a chemical reaction remains the same, whether the reaction is performed in one or successive steps; hence the heat change of a chemical reaction is independent of its course and depends on the initial and final states of the substances involved. **H. photometer.** Hess-Ives tint photometer. A colorimeter for matching the colors of solutions with a number of colored glasses. **H. rays.** Ultra-γ-rays. Cosmic rays. **H. viscosimeter.** A graduated capillary tube with a rubber bulb, used for determining the viscosity of blood and other biological or colloidal solutions.

hessian. Cuttings from jute cloth, used for paper manufacture; cf. *botany*. **h. crucible.** (1) A sand crucible. (2) A large clay crucible.

hessite. Ag_2Te. Silver telluride. A black mineral, d.8.3–9, hardness 2.5–3.

hessonite. $Al_2(Ca,Fe)_2Si_3O_{16}$. Cinnamon stone. A variety of garnet, d.3.5, hardness 6.5–7.

hetero- A prefix derived from Greek, indicating unlikeness or difference.

hetero-albumose. A form of albumose, insoluble in water, soluble in salt solutions, and precipitated by saturation with sodium chloride.

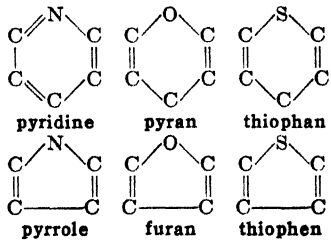
hetero-artose. A protein, $C_{74}H_{130}N_{20}O_{24}S$.

hetero-atom. A heterocyclic atom.

heterobaric. Possessing different atomic weights; as isotopes and heterotopes.

heterocycle. A ring consisting of different types of atoms. Antonym: homocycle. Cf. *heterocyclic compound*.

heterocyclic. Pertaining to dissimilar atoms in a ring. **h. atom.** Any atom, other than carbon, that is a member of an atomic ring; the more common atoms are N, O, S, Se, P, As, and others. **h. compound.** A ring compound containing in its nucleus, besides carbon atoms, one or more other types of atoms. Antonym, homocylic. The more important heterocycles are:



See also *ring compounds*.

heterogeneity. The condition or state of being composed of particles or aggregates of different substances; hence, matter which is of dissimilar composition or has different properties along any dissecting line or plane. Antonym, homogeneity.

heterogeneous. Heterogeneous. Opposed to homogeneous (q.v.). Describes a substance which consists of more than one phase, and therefore is not uniform; as, granite, colloids,

suspensions, emulsions. It has different properties in different parts. **h. reaction.** A reaction in which two or more reactions take place simultaneously.

heteroion. An adsorption complex ion whose charge is due to an adsorbed simple ion; *e.g.*, a protein complex with adsorbed OH^-.

heterolysis. (1) The dissolution of a cell by an external agent; as opposed to autolysis. (2) The hemolytic action of the blood serum of one animal species on the blood-corpuscles of another species.

heterolyzate. The filtered liquid portion of the products of heterolysis.

heterophase. Forming two or more states of aggregation. Cf. *phase.*

heteropolar. An unequal distribution of electric charges in a bond (q.v.), so that one atom is more positive or negative than the other. Cf. *homopolar.*

heteropolyacids. The complex acids of heavy metals with phosphoric acids; as, phosphomolybdic a., phosphotungstic a.

heterosugars. *h*-sugars. The structural isomers of the α- and β-mutarotation forms of a sugar; *e.g.*, the γ-sugars.

heterotopes. Elements which have different atomic numbers and therefore, occur in different parts of the periodic table. Antonym: Isotopes. **heterobaric-** H having different atomic weights. **isobaric-** H. having the same atomic weight. Cf. *isobars.*

heterotypes. A compound which differs in its properties from compounds of a similar type.

hetoform. Bismuth cinnamate.

hetol. Sodium cinnamate.

hetralin. $C_6H_{12}N_6.C_6H_6O_2$ = 278.20. Dioxybenzolhexamethylentetramine. Colorless needles, decomp. 155, soluble in water. Used as a substitute for hexamethylenetetramine.

heulandite. A zeolite, $CaAl_2Si_6O_{15}$.

Heusler alloys. A group of strongly ferromagnetic alloys containing no iron but a mixture of manganese, copper, and aluminum. They do not show the Kerr-effect.

hevea. See *rubber.*

Hevesy, George von. 1885- . A German chemist, and codiscoverer of hafnium.

hex. Hexamethylenetetramine.

hexa- A prefix derived from Greek, denoting "six."

hexa-atomic. (1) Hexavalent. (2) A molecule consisting of six atoms.

hexabasic. An acid or compound in which six hydrogens can be replaced by basic radicals.

hexabiose. Hexobiose.

hexaborane. B_6H_{10} = 71.31. A boron hydride, q.v.

hexabromide number. An analytical value of fats, indicating their content of acids with three (or more) double bonds; is the number of mg. Br needed to brominate 100 gm. fat.

hexabromo- A prefix indicating the presence of six bromine atoms. **h. ethane.** C_2Br_6 = 403.8. Yellowish rhombic needles, decomp. 210; slightly soluble in water or alcohol. **h. silico ethane.** Silicon tribromide.

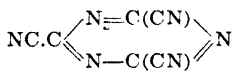
hexachloro- A prefix indicating the presence of six chlorine atoms. **h. benzene.** C_6Cl_6 = 284.7. Colorless rhombic needles, d.2.044, m.229, b.326; insoluble in water or alcohol. Used in organic synthesis, in airfield flares and in waterproofing dopes. **h. ethane.** C_2C_6 = 236.8. Carbontrichloride, hexoram. White rhombic crystals, d.2.011, m.184, insoluble in water, soluble in alcohol or ether. Used in organic synthesis, in the manufacture of explosives and fireworks, smoke-screens and disinfectants. Cf. *H.C.*

hexacontane. $C_{60}H_{122}$ = 843.3. A saturated hydrocarbon of the methane series. Colorless crystals, m.102.

hexacosane. $C_{26}H_{54}$ = 366.42. A saturated hydrocarbon of the methane series. Colorless crystals, m.57, $b._{40mm}296$.

hexacosanic acid. $C_{26}H_{52}O_2$ = 396.4. White solid, m.83, which occurs in peanut oil and in the wax from tubercle bacilli.

hexacyan. C_6N_6 = 180.5. A polymer of cyan having the structure



hexad. (1) An element or radical having a valency of six. (2) In crystallography: showing six similar faces on rotation of the crystal around its axis of symmetry.

hexadecane. $C_{16}H_{34}$ = 226.3. Dioctyl, cetane. A saturated hydrocarbon of the methane series. White leaflets, d.0.775, m.18, b.287; insoluble in water, soluble in alcohol or ether.

hexadecanoic acid*. Palmitic acid. *11*-**hydroxy-*** Jalapinolic acid. *16*-**hydroxy-*** Juniperic acid.

hexadecanol*. Cetyl alcohol.

hexadecene. Cetene.

hexadecenoic acid*. Zoomaric acid.

hexadecine. $C_{16}H_{30}$ = 222.2. Hexadecyne*. An isomer of cetenylene, m. − 25, b.280.

hexadecoic acid. Palmitic acid.

hexadecyl. Cetyl. The monovalent radical, $-C_{16}H_{33}$, derived from hexadecane. **h. alcohol.** Cetyl alcohol. **h. amine.** Cetylamine.

hexadecylene. Cetene.

hexadiene*. C_6H_{10} = 82.1. An unsaturated hydrocarbon with two double bonds. **1.4-** $CH_2{:}CH.CH_2.CH{:}CHMe$ **1.5-** Diallyl. **2.4-** $(MeCH{:}CH{-})_2$. Bipropenyl, dipropylene. A colorless liquid, d.0.7108, b.82. *2.5*-**dimethyl-** $(Me_2C{:}CH{-})_2$ = 101.11 Diisocrotyl. A colorless liquid, d.0.7158, m. −91, b.102.5.

hexadienedioic acid*, *2.4*-. Muconic acid.

hexadienic acid. Sorbic acid.

hexadienoic acid*, *2.4*-. Sorbic acid.

hexadiine. Bipropargyl.

hexadiyne*. Bipropargyl.

hexaethylbenzene. $C_{18}H_{30}$ = 246.3. C_6Et_6. Colorless monoclinic crystals, d.0.831, m.129, b.298, insoluble in water, soluble in alcohol or ether.

hexafluorodisilane. Disilane.

hexagalloyl mannite. $C_{48}H_{38}O_{30}$ = 1094.45. A tannin occurring as a brown powder, soluble in water.

hexagon. A plane figure bounded by six sides, and having six angles. **h. tester.** An electrically-heated device for determining the flash- and fire-points of oils.

hexagonal crystal system. A crystal system made up of four axes; 3 equal and intersecting in one plane at 60°, and one of a different length in a plane at right angles.

hexahydrate. Containing six molecules of water.

hexahydric. Containing six atoms of replaceable hydrogen.

hexahydro- A prefix indicating that a compound contains six more hydrogen atoms than are

normally present. **h. anthracene.** $C_{14}H_{16}$ = 184.2. White leaflets, m.63, b.290, insoluble in water, soluble in alcohol, ether or benzene. **h. anthraquinone.** Rufigallol. **h. benzene.** C_6H_{12} = 84.1. Cyclohexane hexamethylene. Saturated benzene. A hydrocarbon occurring in Austrian and Caucasian petroleum. A colorless liquid, b.79, d.0.76, insoluble in water. **h. benzodipyrazolone.** Dipyrazolone. **h. benzoic acid.** Naphthenic acid. **h. cumene.** C_9H_{18} = 126.2. Trimethylcyclohexane. A colorless liquid, d.0.787, b.139, insoluble in water, very soluble in alcohol or ether. **h. cymene.** $C_{10}H_{20}$ = 140.3. p-hexahydrocymol. A colorless liquid, d.0.802, b.156, insoluble in water, soluble in alcohol or ether. **h. hematoporphyrin.** $C_{32}H_{32}O_5N_4$ = 552.5. A reduction product of hematin. **h. mellitic acid.** $C_{12}H_{12}O_{12}$ = 348.2. $C_6H_6(COOH)_6$. Colorless crystals, decomp. on heating, soluble in water, alcohol or ether. **h. mesitylene.** C_9H_{18} = 126.2. $C_6H_9Me_3$. 1.3-5-trimethylhexahydrobenzene. Colorless liquid, b.136. **h. naphthalene.** $C_{10}H_{14}$ = 134.2. A colorless liquid, d.0.924, b.208. **h. naphthinoline.** $C_{16}H_{16}N_2$ = 236.2. Colorless crystals, m. 128. **h. phenol.** Cyclohexanol. **h. pyridine.** Piperidine. **h. pyrazine.** Piperazine. **h. salicylic acid.** $C_7H_{12}O_3$ = 144.1. $C_6H_{10}OH(COOH)$. Colorless crystals, m.110, very soluble in water, alcohol or ether. **h. thymol.** Menthol. **h. toluene.** C_7H_{14} = 98.2. $C_6H_{11}Me$. Colorless liquid, d.0.769, b.101, insoluble in water, miscible with alcohol or ether. **h. xylene.** C_8H_{16} = 112.2. *meta-* Colorless liquid, d.0.771, b.118, insoluble in water, soluble in alcohol or ether. *para-* Colorless liquid, d.0.769, b.121, insoluble in water, soluble in alcohol or ether.

hexahydroxy- A prefix indicating the presence of six hydroxy groups. **h. benzene.** Triquinoyl. **h. hexahydrobenzene.** Inositol. $C_6H_6(OH)_6$. **h. lene.** Hexahydro-xylene.

hexaiodo- A prefix indicating the presence of six iodine atoms in a molecule. **h. benzene.** C_6I_6 = 833.6. Reddish-brown needles.

hexakontane. Hexacontane.

hexal. Hexamethylenamine sulfosalicylate; a compound of salicylic acid and urotropine used as a sedative.

hexalet. Trade name for hexamethylenetetramine salicylsulfonic acid.

hexalin. Cyclohexanol*.

hexamethylated. Describing an organic compound containing six methyl groups.

hexamethylbenzene. $C_{12}H_{18}$ = 162.2. C_6Me_6. Colorless rhombic crystals m.164, b.264, slightly soluble in alcohol.

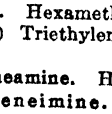
hexamethyldisilicane. $Si_2(CH_3)_6$ = 146.26. A white solid or colorless liquid, m.13, b.112.5.

hexamethylenamine. Hexamethylenetetramine.

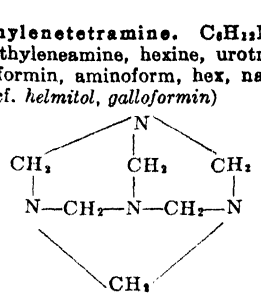
hexamethylene. Cyclohexane*. **amido-** $C_6H_{11}NH_2$ = 99.11. Aminohexahydrobenzene A colorless liquid, b.133. **diketo-, triketo-** q.v. **h. amine.** Hexamethylenetetramine. **h. diamine.** (1) Triethylenediamine. (2) See *diamine.*

hexamethyleneamine. Hexamethylenamine.

hexamethyleneimine. $C_6H_{13}N$ = 99.1. The heterocyclic ring-compound.



hexamethylenetetramine. $C_6H_{12}N_4$ = 140.2. Hexamethyleneamine, hexine, urotropine, hexamine, formin, aminoform, hex, naphthamine, uriton (cf. *helmitol, galloformin*)



Colorless rhombic crystals, m.280, slightly soluble in alcohol or ether, soluble in water. Used extensively in medicine as a urinary antiseptic, as a reagent for metals and alkaloids, as a rubber accelerator, in the manufacture of synthetic resins, and as an absorbent for phosgene in gas masks.

h. alliodide. A condensation product of h. and allyl iodide, used as a reagent for cadmium. **h. bromethylene.** Bromalin. **h. camphorate.** Amphotropine, hexamethylenetetramine camphorate, $(CH_2)_6N_4.C_8H_{14}(COOH)_2$. A molecular combination of camphoric acid and hexamethylenamine. A colorless, light crystalline powder, soluble in water or alcohol. **h. methylenecitrate.** $C_7H_6O_7(CH_2)_6N_4$ = 342.3. Helmitol. A white crystalline powder, m.165. Used on account of its agreeable acidic taste instead of hexamethylenamine. **h. quinate.** Quinotropine. **h. salicylate.** Saliformin. **h. salicylsulfonic acid.** Hexalet. A white, odorless crystalline powder, soluble in water; used as a diuretic. **h. sulfosalicylate.** Hexal. **h. tannin.** Tannopin. **h. tetraiodide.** $(CH_2)_6N_4I_4$ = 647.6. Siomine. A red powder, decomp. 138; used therapeutically in place of iodides.

hexamethylparafuchsin. Crystal violet.

hexamethylviolet. Crystal violet.

hexamine. The B.P. name for hexamethylenetetramine.

hexanal*. Caproaldehyde.

hexanamide*. Caproamide.

hexanaphthene. Cyclohexene.

hexane*. C_6H_{14} = 86.14. (1) Normal hexane, caproyl hydride, hexyl hydride. $Me_2(CH_2)_4$. A colorless liquid, d.0.658, m. −94, b.69, highly inflammable, insoluble in water, soluble in alcohol or ether; used as a solvent. (2) $Me(CH_2)_2CHMe_2$. Ethylisobutane. A colorless liquid, d.0.701, b.62, soluble in alcohol or ether. (3) $Me_2(CH_3)_2Me_2$. Diisopropane. A colorless liquid, d.0.67, b.58, soluble in alcohol or ether. (4) Me_3CEt. Trimethylethylmethane. A colorless liquid, b.44, soluble in alcohol or ether. **amino-** Hexylamine. **bromo-*** Hexylbromide. **chloro-*** Hexylchloride.

h. carboxylic acid. Heptoic acid. **h. dial*.** Adipaldehyde. **h. diamide*.** Adipamide. **h. dicarboxylic acid.** Suberic acid. **h. dioic acid*.** Adipic acid. **h. diol*.** Hexamethylene glycol. **h. dioyl chloride*.** Adipyl chloride.

hexanitrin. Mannitol nitrate.

hexanitro- A prefix indicating the presence of six nitro groups. **h. diphenylamine.** $C_{12}H_7N_7O_{12}$ = 439.10. Dipicrylamine, $[2.4.6\text{-}(NO_2)_3C_6H_2]_2NH$. Yellow crystals, used as high explosive. **h. mannitol.** A misnomer for mannitol nitrate. **h. phenyl sulfide.** $C_{12}H_4N_6O_{12}S$ = 466.0. The compound $[C_6H_2(NO_2)_3]_2S$; used as high explosive.

hexanoic acid. Caproic acid.

hexanol*. (1) Hexylalcohol. (2) Hexan-3-ol. See *hexyl alcohol* (3).

hexanone*. Ethyl propyl ketone.

hexaphenyl. (1) Sexiphenyl. (2) Six phenyl radicals. **h. ethane.** $C_{38}H_{30}$ = 486.24. The hydrocarbon $Ph_3C—CPh_3$, which is the dimer of a free radical, q.v. **h. tin.** $Ph_3Sn.SnPh_3$ = 699.62. White crystals, m.232.5.

hexasaccharose. A polysaccharide of the general type $(C_6H_{10}O_5)_6.H_2O$.

hexatomic. (1) Consisting of six atoms. (2) Hexavalent.

hexatriene. C_6H_8 = 80.1. The unsaturated hydrocarbon, $CH_2{:}CH.CH{:}CH.CH{:}CH_2$.

hexavalent. (1) Sexavalent. An element or radical having six valence electrons, as Os. (2) A compound containing six replaceable hydrogen atoms or hydroxyl groups.

hexecontane. Hexacontane.

hexenal*. $C_6H_{10}O$ = 98.08. α,β-hexenic aldehyde, propyl acrolein, $PrCH{:}CH.CHO$. An oil, $b._{17mm}48$; constituent of green leaves.

hexene*. (1) C_6H_{10} = 82.1. Tetrahydrobenzene. Colorless crystals, m.83. (2) Hexylene.

hexenic*. See *hexenoic**.

hexenoic acid. $C_6H_{10}O_2$ = 114.08. Hexenic acid. **α- or 1.2-** Prophylacrylic acid, $MeCh_2CH_2CH{:}CH.COOH$. A white solid, d.0.965, m.32, b.217. **β- or 2.3-** Hydrosorbic acid, $MeCH_2{-}CH{:}CHCH_2COOH$. A white solid, d.0962, b.208. Cf. *pyroterebic acid.*

hexenoic aldehyde. Hexenal*.

hexenyl. The monovalent unsaturated radical C_6H_{10}— derived from hexylene. **h. alcohol.** $C_6H_{12}O$ = 100.1. The saturated alcohol, $C_6H_{11}OH$. A colorless liquid, d.0.891, b.137, soluble in water, alcohol, or ether.

hexestrol. Hexoestrol. Dihydrodiethylstilbestrol, $HO.C_6H_4(C_2H_5)CH.CH(C_2H_5).C_6H_4.OH$. Used where estrogenic hormones are indicated.

hexine. (1) Hexyne*. (2) Hexadiene. (3) Hexamethylenetetramine.

hexinic acid. $C_6H_{10}O_3$ = 130.1. α-propyltetronic acid. Colorless crystals, m.126.

hexitols. $C_6H_{14}O_6$ = 182.11. A group of hexatomic alcohols, as dulcitol, mannitol, sorbitol, derived from hexoses.

hexobarbitone. Evipal, evipan, cyclural, hexobarbital; the 5-Δ^1-cyclohexenyl-5-methyl-N-methylbarbituric acid, a sedative and anesthetic.

hexobiose. A carbohydrate (disaccharide) consisting of two hexoses, *e.g.*, sucrose, lactose, maltose.

hexodiose. Hexobiose.

hexogen. Trimethylene trinitramine. A constituent of high explosives.

hexoic. The monovalent radical $—CO(CH_2)_4Me$. **h. acid.** Caproic acid. *pentahydroxy-* Galactonic acid. **h. aldehyde.** Caproaldehyde.

hexon(e). $C_6H_{12}O$ = 100.08. Methylisobutyl ketone, $Me_2CH.CH_2.COMe$. Colorless liquid, b.118, insoluble in water; used as solvent for gums, resins, nitrocellulose. **h. bases.** Histon bases. A group of organic bases which contain six carbon atoms and are formed by hydrolysis of proteins and histons; *e.g.*, lysine, histidine, arginine.

hexonic acids. A group of acids obtained by the oxidation of hexoses: $C_5H_5(OH)_6.COOH$. Cf. *galactonic, gluconic, mannoic acids.*

hexoran. Hexachloroethane.

hexosans. A group of hemicelluloses (q.v.) which are hydrolysed to hexoses. Cf. *glucosans, fructosans.*

hexose. A carbohydrate (monosaccharide) containing six carbon atoms: dextrose, fructose, glucose. They are widely distributed in plants and animals and each occurs in three optical isomers (d-, l-, and i-).

hexotriose. A carbohydrate (trisaccharide) consisting of three hexoses; *e.g.*, raffinose.

hexoylene. *2*-Hexyne*.

hexuronic acid. A tetrahydroxy aldehyde acid obtained by oxidation of hexoses; $CHO(CHOH)_4COOH$, as, glucuronic galacturonic, ascorbic acid.

hexyl. Enanthyl. The monovalent radical C_6H_{13}— or $Me(CH_2)_5$—, derived from n-hexane. **h. acetate.** $C_8H_{16}O_2$ = 144.2. $AcOC_6H_{13}$. A colorless liquid, d.0.890, b.169, insoluble in water, miscible with alcohol or ether. **h. acetylene.** Caprylidene. **h. alcohol.** $C_6H_{14}O$ = 102.2. Hexanol*, capryl alcohol. (1) Normal hexylalcohol, amylcarbinol, hexan-1-ol. $Me(CH_2)_5OH$. A colorless liquid, d.0.820, b.158, slightly soluble in water, soluble in alcohol or ether. (2) $MeCH(OH)(CH_2)_3Me$. Methylbutylcarbinol, hexan-2-ol. A colorless liquid, d.0.833, b.137, slightly soluble in water, soluble in alcohol or ether. (3) $Et(CHOH)(CH_2)_2Me$. Ethylpropylcarbinol, hexan-3-ol. A colorless liquid, d.0.834, b.134, slightly soluble in water, soluble in alcohol or ether. (4) $Me_2C(OH)(CH_2)_2Me$. Dimethylpropylcarbinol. A colorless liquid, d.0.830, b.115, soluble in alcohol. (5) $Me_2C(OH)CHMe_2$. Dimethylisopropylcarbinol. A colorless liquid, d.0.836, m.−35, b.112, soluble in water, alcohol or ether. (6) $Et_2C(OH)Me$. Diethylmethylcarbinol. A colorless liquid, b.120, soluble in alcohol or ether. (7) $Me_3C.CH(OH)Me$. Pinacolylalcohol, tetramethylethanol. A colorless liquid, d.0.835, m.4, b.120, soluble in alcohol. **h. aldehyde.** Caproaldehyde. **h. amine***. $C_6H_{15}N$ = 101.2. Aminohexane. A poisonous (ptomaine) base obtained by autolysis of protoplasm. **h. bromide.** $C_6H_{13}Br$ = 165.02. *1*-Bromohexane*, $Me(CH_2)_4CH_2Br$. Colorless liquid, d.1.1705, m.−85, b.156. **h. chloride.** $C_6H_{13}Cl$ = 120.56. *1*-Chlorohexane*, $Me(CH_2)_5Cl$. Colorless liquid, d.0.8741, m.−83, b.132.4. **h. formate.** $C_7H_{14}O_2$ = 130.2. The ester, $HCOOC_6H_{13}$. A colorless liquid, d.0.898, b.153, miscible with alcohol or ether. **h. iodide.** $C_6H_{13}I$ = 212.1. Iodohexane*. A colorless liquid, d.1.453, b.70. **h. methylketone.** $C_6H_{16}O$ = 128.12. 2-octanone. A liquid, d.0.818, m.−21.6, b.172.7. **h. resorcinol.** $C_{12}H_{18}O_2$ = 194.2. n-hexyl.2.4-dihydroxybenzene, caprokol. $C_6H_{13}.C_6H_3(OH)_2$. A colorless crystalline powder, soluble in alcohol. Used as a urinary antiseptic being more powerful than phenol and less toxic. (Phenol coefficient 45.0–55.0.) Cf. *dihydranol.*

hexylene. C_6H_{12} = 84.1. (1) n-hexylene, Δ^1 hexylene, hexene*, $CH_2{:}CH(CH_2)_3Me$. Colorless liquid, d.0.683, m.−98, b.68, insoluble in water, soluble in alcohol or ether. (2) Δ^2-hexylene. $MeCH{:}CH(CH_2)_3Me$. (3) Δ^3-hexylene, diethylethylene. $MeCH_2CH{:}CHCH_2Me$.

hexylenglycol. Pinacone.

hexyleniodide. $C_6H_{12}I_2$ = 337.8. Diiodohexane. A yellowish liquid, decomp. on heating, d.2.024.

hexylic acid. Caproic acid.

hexyne*. C_6H_{11} = 82.08. **1-** *n*-Butylacetylene, 1-hexine, $Me(CH_2)_3C{:}CH$. Colorless liquid, d.0.712, m.−150, b.71.5. **2-** Methyl propyl acetylene, 2-hexine hexoylene, $MeC{:}CPr$. A colorless liquid, d.0.7377, b.84.

Heyrovsky Jaroslav. 1890– . A Czechoslovak chemist, co-discoverer of rhenium (1925), and inventor of the polarograph, q.v.

Hf. The symbol for hafnium.

h.f. Abbreviation for high-frequency.

Hg. The symbol for mercury (hydrargyrum).

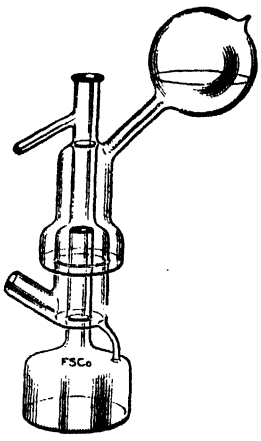
hg. An abbreviation for hectogram (100 grams).

Hi. The symbol for hibernium.

hibernium. Thorium-Ω. A supposed new radioactive element of atomic number approximately 40, occurring in the black mica of Ytterby. It has a half-life period of 10^{16} years. (Joly, 1922.)

hibiscus. Musk-seed.

Hickman pump. A diffusion pump for producing high vacua made of pyrex glass and butyl phthalate instead of mercury. Cf. *vacuum pump*, and see figure.



Hickman pump.

hiddenite. An emerald-green variety of spodumene, used as gem.

hiding power. The opacity of a paint.

hidrotic. A substance that causes sweating, as a diaphoretic or sudorific.

hielmite. Hjelmite. A Ca, Fe, Mn, and Yt tantalate and stannate found in Sweden as black rhombic crystals, d.5.8, hardness 5.

hierro. Spanish for iron.

hiflash. An oil having a high flash point.

high. Above the average; great. **h. cranberry.** Cramp bark. **h. explosive.** A class of unstable chemicals or mixtures which detonate by a blasting cap, *e.g.*, dynamite, picric acid, picrates, chlorates, nitrotoluenes, nitrocellulose, nitrostarch, tetranitroaniline, tetranitromethylaniline. **h. flash point.** A substance, generally a lubricating oil, that ignites at high temperatures only. **h. frequency.** Describing a rapidly-alternating electric current. **h.f. spectrum.** An x-ray spectrum, produced by a high-frequency current. **h. furnace.** A blast furnace. **h. grade.** (1) A pure substance. (2) A concentrated substance. (3) A rich ore. **h. speed steel.** A steel rich in carbon, used for tools. Cf. *ferrotungsten*.

Hildebrand, Joel Henry. 1881– . An American chemist noted for his theory of solubility. **H. electrode.** (a) A modified calomel electrode (q.v.) and cell. (b) A platinum electrode in a bell-shaped tube, through which hydrogen passes; used as a hydrogen electrode, being partly immersed in the solution and partly exposed to the gas. Cf. *hydrogen-ion determination*. **H. rule.** The molal entropy of vaporization, $M\lambda/T$, is a function of the molal concentration of the vapor involved. Cf. *Trouton's rule*, *Dieterici rule*.

Hill bottle. A weighing bottle with ground-in bulb and pipet. **H. filter.** An apparatus for filtering by hydraulic pressure through a diatomaceous cylinder.

Hillebrand, William Francis. 1853–1925. An American chemist noted for his development of mineralogical analysis.

Hilt's law. In any single vertical section (*e.g.*, of coal seams) the deeper seams are of higher rank than the upper seams.

hindered settling. The resistance, other than that due to specific gravity, which a liquid offers to the passage and settling of crushed ores in jigging.

hindrance. A lag or retarding factor. **steric-** See *steric hindrance*.

Hinds-Doremus ureometer. A graduated glass apparatus for determining urea in urine.

Hinman tube. A glass apparatus for determining ammonia in illuminating gas.

hinokitol. $C_{12}H_{12}O_2$(?). A constituent of the coloring matter of certain Japanese woods.

H-ion. Hydrogen-ion. **H-ion concentration.** Hydrogen-ion concentration.

hippocastanum. The horse-chestnut, the seed and bark of *Aesculus hippocastanum*, a Sapindaceae, used as a tonic, narcotic and febrifuge.

hippol. $C_{10}H_9O_3N$ = 191.1. Methylene hippuric acid. Colorless prisms, m.151, soluble in water; used as an antiseptic.

hippurate. A salt of hippuric acid, containing the monovalent $PhCONHCH_2COO$— radical.

hippuric acid. $C_9H_9O_3N$ = 179.1. Benzoylglycine, urobenzoic acid, benzaminoacetic acid, $PhCONHCH_2COOH$. Colorless crystals, d.-1.371, m.188, decomp. on further heating, soluble in hot water, alcohol or ether; used as an antirheumatic and in organic synthesis. **h. aldehyde.** $C_9H_9O_3N$ = 178.1. The aldehyde of hippuric acid; $PhCONHCH_2CHO$.

hippuryl. The monovalent radical $PhCONHCH_2$-C:O— derived from hippuric acid. **h. hydrazine.** $C_9H_{11}O_2N_3$ = 193.1 or $Ph.CO.NH.CH_2$-$CO.NHNH_2$. Colorless crystals, m.162; used in organic synthesis.

hiptagin. $C_{10}H_{14}O_9N_2$ = 306.2. A glucoside from *Hiptage madablota*. Colorless silky needles, m.110.

hiragashira oil. An oil from the livers of *Scoliodon lacticaudus*, d.0.9170, n_D.1.4752, containing scoliodinic acid.

hiragonic acid. $C_{16}H_{20}O_2$ = 244.2. A liquid, unsaturated fatty acid from sardine oil.

hirathiol. Ammonium sulfoichthyolate. A synthetic sulfoichthyolate forming a brownish-black syrup of empyreumatic odor, soluble in water; used as a mild antiseptic.

hircine. (1) A strongly odorous fossil resin. (2) The odorous principle in the suet of goats.

Hirsch funnel. A porcelain filter funnel, with a fixed perforated porcelain plate.

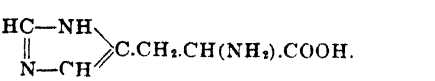
hirudine. The active principle of a secretion from the buccal glands of leeches. It prevents the coagulation of blood.

hirudo. The leech, *Sanguisuga medicinalis*.

histamine. $C_5H_9N_3$ = 111.1. Ergamine, β-iminazolylethylamine, 4-imidazolylethylamine. $C_3H_3N_2.CH_2.CH_2.NH_2$. An amine derived from histidine, in ergot. A powerful uterine stimulant, which lowers the blood pressure. **h. hydrochloride.** The hydrochloride of histamine, which is more readily soluble than histamine.

histazarin. 2.3-Dihydroxy anthraquinone.

histidine. $C_6H_9O_2N_3$ = 155.2. An amino acid derived from the protamin of fishes, or by the action of sulfuric acid on ptomaines.



dl- Tetragonal prisms, m.285, soluble in water. *d-* White scales, m.288, soluble in water. *l-* Colorless leaflets, m.277. **thiol-** A constituent of proteins.

histo- A prefix derived from the Greek denoting *tissue.*

histochemistry. The chemistry of the histological structures of the body.

histogram. Frequency curve.

histology. The branch of anatomy dealing with the structure of tissues. **normal-** The study of healthy tissues. **pathological-** The study of diseased tissues. **phyto-** The science of plant-tissues. **zoo-** The science of animal tissues.

histolysis. The disintegration or liquefaction of tissues.

histon. (1) Hexon bases. (2) A protein from cell nuclei, soluble in water, insoluble in dilute ammonia, and coagulated by heat.

Hitschen syringe. A Y-shaped glass tube with rubber bulb and needle, used for injecting liquids and subsequently rinsing with salt solution without withdrawing the needle from the tissue.

Hittorf, Johan Wilhelm. 1824–1914. A German physicist and discoverer of the cathode rays. **H. cell.** Transference cell. **H. numbers.** Transport numbers. **H. tube.** A modified Crookes' tube.

hjelmite. Hielmite.

hl. An abbreviation for hectoliter, or 100 liters.

hm. An abbreviation for hectometer, or 100 meters. **hm²**. An abbreviation for square hectometer, or 10,000 square meters. **hm³**. An abbreviation for cubic hectometer, or 1,000,000 cubic meters.

HMT. Hexamethylenetetramine.

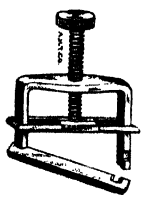
Ho. The symbol for holmium.

hoangnan. The bark of *Strychnos malaccensis*, a Loganiaceae, used as arrow poison.

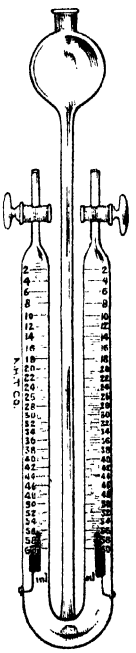
hoarhound. Horehound.

Hoff, Jacobus Hendricus van't. See *van't Hoff.*

Hoffman, Friedrich. 1660–1742. A German physician and professor of chemistry, noted for analytical methods. Cf. *Hofmann.* **H. clamp.** A clamp with one V-shaped and one flat jaw (see figure). **H. drops.**



Hoffman clamp.



Hoffman electrolytic apparatus.

A mixture of alcohol and ether. **H. electrolytic apparatus.** A device for demonstrating the decomposition of water. Two inverted burettes with platinum electrodes, with an overflow tube and bulb (see figure).

Hofmann, August Wilhelm von. 1818–1892. A German chemist and founder of the coal tar industry. **H. reaction.** The shortening of carbon chains by eliminating CO. In general bromine is added to the alkaline solution of an acid amine, whereby the amine of the shorter carbon chain is formed according to the general reactions,

(a) $R.CONH_2 + Br_2 = R.CONHBr + HBr.$

(b) $R.CONHBr + 3NaOH = R.NH_2 + Na_2CO_3 + NaBr + H_2O.$

H. sodium press. An iron barrel, piston, and screw used for making sodium wire or ribbon.

Hofmeister schaelchen. A bell-shaped form of thin glass dishes, used in organic analysis. **H. series.** For every emulsoid the anions and cations may be arranged in a definite order according to their powers of coagulation in neutral, acid or alkaline solutions. Cf. *lyotropic series.*

hog bane. Hyoscyamus.

hog gum. Kuteera gum, gum hogg. A variety of Bassora gum from *Sterculia urens*, used in marbling paper.

hog weed. Scoparius.

hogshead. (1) A measure (h.h.d.) containing 52.5 imperial gallons or 238.5 liters. (2) A cask of varying capacity (100–140 gallons, U.S.A.; 50–100 gallons, British). **Irish-** 52 gallons. **United Kingdom-** 54 gallons.

holadin. An extract of the pancreas containing its enzymes. A grayish-white hygroscopic powder which slowly dissolves in water leaving an insoluble residue; used in medicine. Cf. *pancreatic* juice.

holarsol. Dichlorophenarsine hydrochloride (q.v.).

Holborn-Kurlbaum pyrometer. An instrument for determining high temperatures in furnaces.

holder. A device for retaining or holding objects in a definite position. **animal-** A wire net or metal tube, used for keeping small animals in position while inoculating or taking their temperatures. **buret-** A clamp to hold burets. **clamp-** Boss. Two iron screws used to attach clamps to supports. **crucible-** A wire clamp or frame for holding crucibles. **culture dish-** A wire frame for holding Petri dishes together while in the sterilizer. **gas-** Gasometer. **plate-** A light-tight box for holding photographic plates. **specimen-** (1) A steel plate with notches to hold metallic samples on the microscope stage. (2) A sample-bottle or museum jar. **watch-glass-** A pair of circular wire springs for holding two watch glasses together.

Hollow prism.

hollander. An early form of beater (q.v.).

hollow prism. Three glass plates forming a hollowed glass prism, used to test the refractivity of liquids, or to obtain a longer (dispersed) spectrum when filled with a highly refractive liquid, *e.g.*, carbon disulfide.

hollyhock. (1) Althaea. (2) The flowers of *Althaea rosea*, a Malvaceae, used as an emollient.

holmia. (1) A mixture of the oxides of holmium and dysprosium. (2) Holmic oxide.

holmic. A compound of the trivalent Ho atom. **h. oxide.** Ho_2O_3 = 375.0. A grayish-white powder, insoluble in water.

holmium. Ho = 164.94. At. No. 67. A rare earth metal occurring in gadolinite, discovered by Soret in 1878. Its valency is three, and its salts are slightly yellow. **h. chloride.** $HoCl_3$ = 269.8. Holmic chloride. A colorless powder, soluble in water. **h. oxalate.** $Ho_2(C_2O_4)_3$ = 591.0. A colorless powder, insoluble in water. **h. oxide.** Holmic oxide.

holo- A Greek prefix indicating "the whole" or entirety.

holocaine. $C_{18}H_{22}O_2N_2$ = 298.3. Ethenyl-*p*-diethoxydiphenyl amidine, phenacaine. Small, odorless, colorless crystals, m.189, slightly soluble in water or alcohol; used as a local anesthetic. **h. hydrochloride.** Phenacaine chloride. The soluble or commercial form of holocaine, MeC:$(NC_6H_4OEt)(NHC_6H_4OEt)$.HCl.

holocellulose. The total carbohydrate constituents of wood.

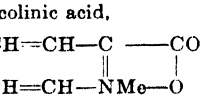
holohedral. A crystal which has the full number of faces required for the maximum and complete symmetry of the system. Cf. *hemihedral.*

holopon. A trade-name of a preparation said to contain all the alkaloids of opium.

holosiderite. Meteoric iron.

Holtz, Wilhelm. 1836–1913. A German physicist. **H. machine.** An induction machine.

homarine. $C_7H_7NO_2$ = 137.1. The methylbetaine of picolinic acid,



found in mussels, lobster muscles and *Arbatia pustulosa.* Cf. *trigonelline.*

homatropine. $C_{16}H_{21}O_3N$ = 275.2. A condensation product of tropine and mandelic acid: tropinemandelate. An alkaloid, colorless prisms, m.97, slightly soluble in water, soluble in ether or alcohol. **h. hydrobromide.** $C_{16}H_{21}O_3N.HBr$ = 356.2. Homotropine hydrobromide. A more soluble form of homotropine occurring in colorless prisms, m.213, soluble in water, alcohol or ether. Used in ophthalmology. **h. hydrochloride.** $C_{16}H_{21}O_3N.HCl$ = 311.2. Homotropine hydrochloride. A more soluble form of homatropine occurring in small white crystals, m.216, soluble in water, alcohol or ether. Used in ophthalmology.

homeopathic. Pertaining to homeopathy. **h. dose.** An extremely small amount. **h. vial.** An elongated bottle used for homeopathic tablets.

homeopathy. A system of medicine employing extremely small doses of agents, which if administered in health, would produce symptoms similar to those for the relief of which they are given.

homilite. $FeCa_2B_2Si_2O_{10}$. A borosilicate of calcium and iron. d.3.0–3.28, hardness 5.5, soluble in HCl.

homo- (1) A prefix derived from Greek indicating "similarity." (2) In names of organic compounds it indicates a difference of $—CH_2—$, but an otherwise similar structure.

homoantipyrine. $C_{12}H_{14}ON_2$ = 202.2. 1.2.3-phenylethylmethylpyrazolone. Colorless crystals, m.73.

homoarecoline. $C_9H_{15}O_2N$ = 169.2. Ethoxyarecaidine. A yellow liquid, soluble in water, alcohol, ether, or chloroform. **h. hydrobromide.** $C_7H_{10}EtO_2N.HBr$. Colorless crystals, m.118, soluble in water or alcohol; used as an anthelmintic.

homoatomic ring. Homocycle.

homoatropine. Homatropine.

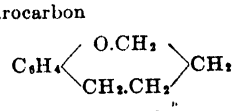
homocamphoric acid. $C_{11}H_{18}O_4$ = 214.1. An acid, similar to camphoric acid, but having a $—CH_2—$ bridge. Distillation of its calcium salts yields camphor.

homocentric. Having the same center. **h. rays.** Light rays that are parallel or have a common focus.

homochelidonine. $C_{21}H_{21}O_5N$ = 347.2. An alkaloid from the seeds of *Chelidonium majus* and sanguinaria. Colorless crystals, slightly soluble in alcohol or ether, soluble in chloroform.

homochemical. A compound or molecule which consists of two types of atoms only, as a binary compound.

homochroman. $C_{10}H_{12}O$ = 148.1. The heterocyclic hydrocarbon



homochromic. Possessing the same color, but a different molecular composition.

homochromoisomers. Substances having similar absorption spectra, but different molecular compositions.

homocycle. A ring compound or closed chain composed of the same type of atoms, generally carbon atoms. Cf. *heterocycle.*

homocyclic. Pertaining to a compound which contains a closed chain or to a ring consisting of atoms of the same type, usually carbon atoms; *e.g.*, benzene.

homogeneity. Matter which is uniform throughout, or has at all points the same property or composition. Cf. *heterogeneity.*

homogeneous. Of uniform or similar nature throughout. Antonym: heterogeneous.

homogentisic acid. $C_8H_8O_4$ = 168.06. 2.5-dihydroxytoluic acid, $(HO)_2C_6H_3.CH_2COOH$. Colorless crystals, m.147. It is formed as an intermediate in the oxidation of tyrosine and phenylalanine, and occurs in urine during alkaptonuria.

homoisohydric. Having the same ions always present in the solution, and a constant hydrogen ion concentration.

homolevulinic acid. $C_6H_{10}O_3$ = 130.08. δ-methyl levulinic acid, γ-ketocaproic acid. $EtCOCH_2CH_2COOH$.

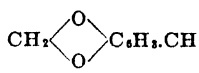
homolog, homologue. Member of a series of compounds whose structure differs regularly by some radical (*e.g.*, $=CH_2$) from that of its adjacent neighbours in the series.

homologous. Of similar structure. **h. lines.** A pair of spectrum lines, the relative intensities of which are independent of variations in the conditions of the electrical discharge producing them. In quantitative spectroscopy one may be due to the main component, the other to the impurity to be determined by the logarithmic sector method, q.v. **h. series.** A series of organic compounds which differ by CH_2 or some other multiple. These series are not limited to hydrocarbons, but refer also to alcohols, ethers, etc. Cf. *methane series, alcohols, acids, phenols, amines, benzene series, etc.*

homologue. Homolog.

homology. The similarity of organic compounds and their gradation of properties, as shown by the homologous series obtained when they are arranged in order of the number of carbon atoms they contain.

homometric. Having the same x-ray pattern.
homophase. Forming a single and similar state of aggregation. Cf. *phase.*
homophthalic acid. $C_9H_8O_4$ = 180.11. $C_6H_4(CH_2COOH)(COOH)$. (ortho-.)
homophthalimide. $C_6H_4\begin{<}CH_2CO\\CO\end{>}NH$, derived from homophthalic acid.
homophthalonitrile. Cyanbenzylcyanide.
homopiperonyl. The monovalent radical



(3, 4-)

homopolar. (1) An equal distribution of electric charges between two atoms (generally carbon atoms), neither of which becomes negative or positive; hence, a bond, q.v., in which both atoms share equally the electron pair. (2) Covalent.
homopyrocatechol. $C_7H_8O_2$ = 124.1. *3.4*-Dihydroxytoluene, *4*-methylpyrocatechol. (1.3.-4) $Me.C_6H_3.(OH)_2$. Colorless prisms, m.51, b.251, very soluble in water, alcohol or ether; used in organic synthesis. Cf. *orcinol.*
homopyrrole. Methyl pyrrole.
homoquinine. $C_{19}H_{22}N_2O_2.2H_2O$. A crystalline alkaloid from cinchona bark.
homorenon. $C_{19}H_{11}NO_3$ = 301.1. Ethylamino acetocatechol, $(HO)_2C_6H_3CO.CH_2.NHMe$. A white powder.
homosalicylic acid. $C_8H_8O_3$ = 152.1. Cresotic acid. A compound containing a —COOH, —OH, and CH_3— group attached to the benzene ring. There are the following ten possibilities:

Position of (COOH)	(OH)	(CH_3)	
1	2	3	= 3-methyl-o-oxybenzoic acid, m.163
1	2	4	= 4-methyl-o-oxybenzoic acid, m.177
1	2	5	= 5-methyl-o-oxybenzoic acid, m.151
1	2	6	= 6-methyl-o-oxybenzoic acid, m.168
1	3	2	= 2-methyl-m-oxybenzoic acid, m.183
1	3	4	= 4-methyl-m-oxybenzoic acid, m.206
1	3	5	= 5-methyl-m-oxybenzoic acid, m.208
1	3	6	= 6-methyl-m-oxybenzoic acid, m.172
1	4	2	= 2-methyl-p-oxybenzoic acid, m.177
1	4	3	= 3-methyl-p-oxybenzoic acid, m.172

homosaligenin. Salicyl alcohol.
homotaraxasterol. $C_{26}H_{40}O$ = 356.31. A sterol, m.164, from dandelion.
homotope. Any one of the elements in a vertical group of the periodic system; thus Br is a h. of Cl, Tl a h. of Ga.
homotropine. Homatropine.
homozyme. Vitagon.
Honduras bark. Cascara amarga.
hone. A mounted stone used for sharpening razors and dissecting knives.
honey. Mel.
honeystone. $Al_2C_{12}O_{18}.18H_2O$. Aluminum mellate, mellite. A yellowish or reddish, soft, resin-like mineral, d.1.6, hardness 2, soluble in nitric acid or sodium hydroxide.
Hönigschmid, Otto. 1878– . A German chemist noted for inorganic work.
honing guide. A device for keeping the dissecting knife at the proper angle while honing.
hood. A glass-enclosed ventilator shaft or flue in the laboratory which carries away the acid or poisonous fumes that arise from chemicals manipulated in it, by the worker who stands outside the hood.
hoof and horn meal. A fertilizer made by processing, drying and grinding hoofs and horns. It contains 11–15 % N, but is not readily available as plant food.
Hooke, Robert. 1635–1703. An English philosopher and pioneer in scientific experimentation. **H.'s law.** The stress applied to stretch or compress a body is proportional to the strain, or alteration in length, so produced. This is true so long as the limit of elasticity is not exceeded.
hoolamite. A mixture of pumice, iodine pentoxide and fuming H_2SO_4 used as absorbing agent and reagent for carbon monoxide, which changes in color from white through blue-green to violet-brown.
hopcalite. (1) A mixture of cobalt, copper, silver, and manganese oxides, used in gas-masks as a catalyst to oxidize carbon monoxide. (2) A mixture of manganese dioxide and cupric oxide (3:2), prepared by heating hydrated manganese oxide and copper carbonate.
Höpfner process. A method of recovering copper by electrolysis.
hopogan. A trade name of magnesium peroxide.
hop oil. A green, odorous, oil distilled from hops. Its chief constituents are terpenes, humulene and geraniol; used in flavoring extracts. Cf. *humulene.* **Spanish-** Origanum oil.
hopper. A funnel-shaped trough or trap.
Hoppe-Seyler, Ernst Felix Immanuel. 1825–1895. A German physiologist noted for the development of biochemical analysis.
hopred. $C_{38}H_{26}O_{16}$ = 722.2. A hydrolytic split-product of the coloring matter, phlobabene, from hops.
hops. Humulus. The dried spikes or strobiles of *Humulus lupulus*, an Urticaceae (Moraceae). They contain tannin, humulon, and lupulin (q.v.) and have a bitter aromatic taste. Used, as the extract, as aromatic bitter and stomachic, and in beer as a flavoring and preservative. **h. oil.** See *hop oil.* **h. substitutes.** Bitter principles, such as quassia or camomile.
horbachite. A native sulfide of gold, iron and nickel.
hordein. A protein of barley, the seeds of *Hordeum salivum.*
hordeine. Hordenine.
hordenine. $C_{10}H_{15}ON$ = 165.2. Hordeine, ephedrine, p-oxyphenyl-dimethylethylamine. An alkaloid, m.117.8, from malted barley, which is used to cure diarrhea and dysentery.
hordeum. Barley.
horehound. The dried leaves and flowering tops of *Marrubium vulgare*, used as a fluid extract as an expectorant and stimulant. Cf. *marrubiin.*
horismascope. An albuminometer used in clinical analysis. It consists of a U-tube with arms of unequal diameters, with which it is possible to perform ring-reactions.
hormone. One of a group of substances produced by the internal secretion of glands, which acts as an accelerating or retarding catalyst in metabolism and other internal reactions. They are specific directive substances of the organism, and considered to be "chemical mes-

sengers," which by circulation in the blood-stream coordinate the functions of organs by exciting the latter to activity. **food-** Vitamin. **plant-** H. which promote growth of plants; *e.g.* auxin; they especially favor the formation of roots; as, indole butyric acid, naphthalene acetic acid and phenyl acetic acid.

HORMONES

*Class**	*Name and formula*	*Source*
	1. Isolated and synthesized	
1	adrenalin, $C_9H_{13}NO_2$	suprarenal medulla
1	thyroxin, $C_{15}H_{11}NO_4I_4$	thyroid gland
3	progestin, $C_{21}H_{30}O_2$	corpus luteum
3	oestrone, $C_{18}N_{22}O_2$, m. 257	ovarian follicles
3	oestriol, $C_{18}H_{24}O_3$	ovarian follicles
3	androstenedione, $C_{19}H_{26}O_2$	testicular extract
	2. Isolated and crystallised	
2	insulin, $C_{45}H_{69}N_{11}O_{14}$	pancreas
2	oxytocin	posterior pituitary
2	vasopressin (α,β-hypophamin)	posterior pituitary
	3. Concentrated in form of extracts	
3	relaxin	corpus luteum
3	cortin	suprarenal cortex
2	elityran	anterior pituitary
2	prolan	anterior pituitary
2	rho 1	anterior pituitary
2	rho 2	anterior pituitary
	callicrein	pancreas
	4. Present in organs, but not concentrated	
	secretin	intestines
	sympathin	supposed hormone
	placental hormone	
	thymus hormone	
	pineal hormone	
	mammary hormone	

* *1* = Amino acid. *2* = Peptide. *3* = Lipoid, or cholane derivative.

horn. A substance composed mostly of keratin and containing insoluble mineral salts, particularly calcium phosphate. **h. fiber.** See *fiber, vulcanized.* **h. scoop.** A small shovel made of horn, for handling chemicals, especially in weighing and filling bottles. **h. spatula.** A flattened stick made of horn, used for handling chemicals. **h. spoon.** A spoon made of horn, used for handling chemicals.

hornblende. $Ca(MgFe_3),(SiO_3)_4$. A variety of amphibole occurring in colors ranging from black through green and olive to white.

hornlead. Phosgenite.

hornquicksilver. A native mercurous chloride.

hornsilver. Argentum cornu.

horsechestnut. The seeds of *Aesculus hippocastanum,* used (as fluid extract) as a tonic, astringent, and febrifuge. **h. bark.** The bark of *Aesculus hippocastanum;* used medicinally as a fluid extract. **h. tannin.** $C_{26}H_{24}O_{11}$ = 528.2. A tannin from the wood, leaves and bark of the h. and the root of the apple tree, used in tanning.

horsehair. The hair from the mane or tail of horses; used for mattresses and fabrics. **vegetable-** Spanish moss. The fibers of *Tillandsia usneoides,* a Bromeliaceae of America; used for pillows and mattresses.

horsemint oil. Monarda oil. A reddish-brown essential oil, obtained by distilling the leaves and stems of *Monarda punctata:* used in pharmacy in the preparation of liniments. Cf. *monarda.*

horsenettle. See *solanum.* **h. berries.** Solanum.

horse oil. A yellowish-brown oil from horse fat; used in soap manufacture.

horsepower. A unit of power, or the rate of doing work. 1 HP = 33000 ft. pd. per minute = 550 ft. pd. per second = 76 kg. m. per sec. = 745.8 watts = 2.545 B.T.U. **American-** 1 HP = 746 watts. **Continental-** 1 HP = 736 watts.

horseradish. The root of *Cochlearia armoracia,* a cruciferous plant used as a condiment or, as a fluid extract, as a stomachic, stimulant, and diuretic. It contains potassium myronate.

horseshoe magnet. A magnetized iron bar bent U-shape.

horsetail. See *aconitic acid, Equisetum.*

horsfordite. Cu_5Sb. A native copper-antimony ore.

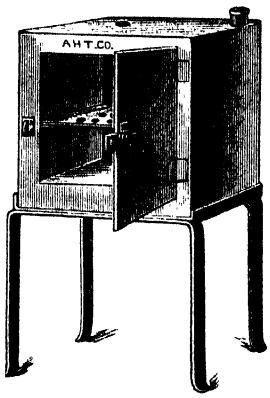
Hortvet cryoscope. An apparatus for the determination of the freezing point of milk, sugar solutions or oils. **H. tube.** A graduated glass tube used in a centrifuge for determining the volume of a precipitate or sediment.

Horwood process. A method of flotation of partly-roasted sulfides of Fe, Cu, Pb, and Zn, and separation of the zinc.

hose connector. A metal tube with outside concentric ribs or corrugations, by which the ends of rubber tubes are joined together.

Hoskin furnace. An electric heating device for obtaining high temperatures. Used in metallurgical and dental laboratories.

hot. Having or producing the sensation of heat. **h. air sterilizer.** A metal-box with a double door, heated by gas or electricity, used to sterilize glass ware and instruments. **h. bed.** A mass of fermenting material, whose heat is used to accelerate the growth of plants. **h. plate.** A metal plate, heated electrically, used in laboratories for distillation, crystallization, evaporation, etc. **h. water funnel.** A double-walled metal funnel. By circulating a hot liquid through the walls the solution to be filtered is kept at the desired temperature. Used *e.g.,* in filtering gelatin and agar solutions. **h. wire gage.** Gage.



Hot air sterilizer.

hour. The unit of time, 60 minutes, 3600 sec., $\frac{1}{24}$ of a civil day.

Howard chamber. A microscope slide with a small counting chamber, used for counting yeast cells, molds, etc. **H. pan.** A jacket and coil type of vacuum evaporating kettle, used to concentrate sugar juice.

Howe, Harrison Estell. 1881–1942. An American chemist, noted for his development of industrial chemistry.

howler. A microphone hummer or audio-oscillator used as an end-point detector for Wheatstone bridges.

HP. or **h. p.** An abbreviation for horse-power.

huantajayit. A native sodium-silver chloride.

huanuco bark. Cinchona bark.

Hübl number. Iodine number.

H. solution. A solution of iodine and mercuric chloride used to determine iodine numbers of unsaturated compounds.

hübnerite. $MnWO_4$. A native manganese tungstate occurring in the Western part of the United States, as a dark red crystalline mineral, d.7.17, soluble in HCl. It contains less than 20 % of iron tungstate. Cf. *ferberite.*

Hudson, Claude Silbert. 1881– . An American chemist, noted for work on enzymes and carbohydrates. **H. rule.** To assign α and β to a sugar in comparison with their molecular rotation, R_α and R_β, select names so that $R_\alpha - R_\beta$ is equal to and of the same sign as the difference for the two corresponding forms of glucose.

hue. A property of color, q.v.

Huff separator. An electrostatic concentrator for crushed ores. The ore travels over a charged belt, and falls through an electric field whereby the charged ore particles are separated.

huile. French for "oil."

Hulett, George Augustus. 1867– . An American physical chemist. **H. still.** A device for distilling mercury.

hülsneride. $FeWO_4$. A native ferrous tungstate.

humboldite. A variety of melilith, an aluminum iron silicate.

Humbold penetrometer. A device for testing asphalt by measuring its resistance to the pressure of a needle.

humic acid. A general term for the acids derived from humus.

humidity. Dampness, hygrometric state. The amount of water vapor in the air. **absolute-** The actual moisture content of air, in grams per cubic meter. **relative-** The weight of water vapor (expressed as a percentage) contained in a given volume of air divided by the weight which would be contained in the same volume of saturated air at the same temperature. See *dew-point, hygrometer.*

humidor. A compartment in which the atmosphere is kept saturated with water vapor.

huminite. A native hydrocarbon from Sweden.

humite. Chondrodite. A basic magnesium fluosilicate.

hummer. A microphone used in conductivity measurements, to determine a point at which no current is passing by the absence of the humming.

humoceric acid. $C_{19}H_{34}O_2$ = 294.26. An acid from peat wax.

humulene. $C_{15}H_{24}$ = 204.19. A sesquiterpene from the hop oil. A colorless liquid d.0.9001, b.265.

humulic acid. $C_{15}H_{22}O_4$ = 266.2. A compound formed by the action of alkali on humulon.

humulin. Lupulin.

humulon. $C_{21}H_{30}O_5$ = 362.2. A bitter constituent, m.66, of the soft resin of hop lupulin (cf. *lupulon*).

humulo tannin. $C_{26}H_{24}O_{13}$ = 532.2. A white amphoteric powder obtained from hops. It loses water at 130°C, and forms a phlobabene.

humulus. Hops.

humus. (a) The top-layer of the soil containing the organic decomposition products of vegetation (leafmold, rotten wood, etc.). (b) The decayed products of plant life. Cf. *gainic acid.*

Hünefeld solution. A reagent for the detection of blood: 25 cc. alcohol, 1.5 cc. glacial acetic acid, 5 cc. chloroform, 15 cc. old turpentine.

Huntington mill. An ore crusher in which steel rollers are pressed by centrifugal force against a heavy encasing steel ring.

Huppert's reagent. A 10 % aqueous solution of calcium chloride, used in urine analysis for the detection of biliary pigments.

hurricane drier. An air-drying chamber used for textiles, especially wool.

Huyghenian ocular. Negative ocular. A magnifying lens used as an eyepiece on a microscope or telescope. It consists of two convex lenses mounted convex sides down, whereby the field of the microscope is enlarged. Cf. Ramsden *ocular.*

Huyghens, Christiaan. 1629–1695. A Dutch physicist noted for the development of optical instruments, and for his wave theory of light.

Christiaan Huyghens.

hyacinth. A transparent red variety of zircon, used as a gem. The term is erroneously applied to light-colored garnet, to yellowish-red spinel from Brazil, and to red quartz. **Ceylon-** Garnet. **false-** Garnet. **oriental-** Corundum (rose-colored).

hyacinthozontes. A sapphire-blue beryl used as a gem.

hyaenasic acid. Hyenic acid.

hyaline. Resembling glass.

hyalite. A clear, colorless opal used as a gem.

hyalophane. $(K_2,Ba)Al_2(SiO_3)_4$. A barium feldspar.

hyalosiderite. A deep olive-green olivine, used as a gem.

hyaluronic acid. A viscous mucopolysaccharide (q.v.) in skin.

hybrid. An organism, usually a plant, obtained by cross-breeding.

hycar OR. Trade name for an oil-resistant synthetic rubber.

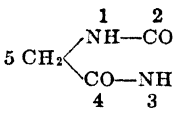
hychlorite. Antiformin.

hycoloid. Trade name for a cellulose nitrate plastic.

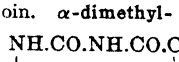
hydantoic acid. $C_3H_6O_3N_2$ = 118.1. Carbamido acetic acid, carbamyl glycine, glycoluric acid, $NH_2CONHCH_2COOH$. Colorless prisms, m.-171, slightly soluble in water, alcohol, or ether.

iso- $NH_2.C(:NH).O.CH_2.COOH$. **phenylthio-** $C_9H_{10}N_2O_2S$ = 210.07. (1) *ϕ*-iminocarbimin thio glycolic acid, $NH_2.C(:NPh)S.CH_2.COOH$. White needles, m.150, insoluble in water. (2) *ortho*- $PhNH.C(:NH).S.CH_2.COOH$. White crystals.

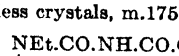
hydantoin. $C_3H_4O_2N_2$ = 100.1. Glycolylurea, imidazoledione. The pentatomic ring compound:



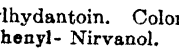
Colorless needles, m.216, soluble in hot water or alcohol. Cf. *barbituric acid*. **5-carbamido-** Allantoin. **α-dimethyl-** Acetonyl-urea.

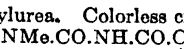


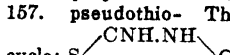
Colorless crystals, m.175. **β-ethyl-**

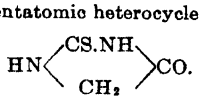


1-ethylhydantoin. Colorless crystals, m.100. **ethylphenyl-** Nirvanol. **α-methyl-**

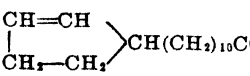


5-methylhydantoin, lactylurea. Colorless crystals, m.140. **β-methyl-** 

1-methylhydantoin. Colorless needles, m.157. **pseudothio-** The pentatomic heterocycle:  **sulfo-** Pseudothiothio- The pentatomic heterocycle:



hydnocarpic acid. $C_{16}H_{28}O_2$ = 252.22. *κ*-Δ^2-cyclopentenyl undecylic acid,



White crystals, m.60, from the seeds and oil of *Hydnocarpus* species; used in the treatment of leprosy. Cf. *chaulmoogric acid*.

Hydnocarpus. A genus of trees, Bixaceae, whose seeds yield oils used in leprosy; as, kavatel oil, maroti oil. Cf. *arabin, avenyl, chaulmoogra oil*. **h. oil.** An oil of *H. wightiana*. d.0.947, m.20.5–24.0.

hydr- A prefix derived from Greek indicating water or hydrogen.

hydracetamide. $C_6H_{12}N_2$ = 112.2. $(MeCH)_2N_2$. A yellow powder, soluble in water or alcohol.

hydracetin. Pyrodin.

hydracid. An acid without oxygen atoms, as HCl or HCN.

hydracrylic acid. $C_3H_6O_3$ = 90.1. *β*-Hydroxypropionic acid, ethylene lactic acid, *3*-hydroxypropanoic acid*. CH_2OHCH_2COOH. A colorless crystalline mass, decomp. on heating. **amino-** Serine. **phenyl-** Tropic acid.

hydracrylo. The trivalent radical $HOCH_2.CH_2.C\equiv$. **h. nitrile.** C_3H_5NO = 71.05. *3*-Hydroxypropanenitrile*, ethylene cyanohydrin. $HO(CH_2)CN$. A colorless liquid, d.1.059, b.221, soluble in water or alcohol

hydragog(ue). A cathartic producing a profuse and watery stool, *e.g.*, elaterine, jalap, colocynth, magnesium citrate, sodium sulfate.

hydramine. A hydroxyalkylamine or glycol in which a hydroxyl group is replaced by an amine radical, $HO.R.NH_2$ or $HO.R.NR_2$.

hydramyl. Pentane.

hydrangea. Seven barks. The dried roots of *Hydrangea arborescens*, a saxifragaceous shrub. Used in a fluid extract, as a cathartic and diuretic.

hydrangin. $C_{34}H_{25}O_{11}$ = 609.39. A glucoside from hydrangea.

hydranthranol. Hydroanthranol.

hydrargillit. $Al(OH)_3$. A native aluminum hydroxide; colorless needles.

hydrargotin. Mercurous tannate.

hydrargyrol. $C_6H_4OH.SO_3Hg$ = 373.7. p-Phenyl mercury thionate. An antiseptic.

hydrargyrum. The Latin for mercury.

hydrastin. A concentrate containing the principles of golden seal.

hydrastine. $C_{21}H_{21}O_6N$ = 383.3. An alkaloid from *Hydrastis canadensis*, goldon seal. White prisms, m.132, slightly soluble in water, alcohol or ether; used as an alterative and uterine hemostatic. **h. hydrochloride.** $C_{21}H_{21}O_6N.HCl$ = 419.77. The more soluble hydrochloride of hydrastine. A colorless, hygroscopic powder, soluble in water or alcohol.

hydrastinine. $C_{11}H_{13}O_2N$ = 207.1. A decomposition product of hydrastine. Colorless crystals, m.116, slightly soluble in water. **h. hydrochloride.** $C_{11}H_{12}O_2.N\,HCl$ = 242.6. A yellowish crystalline powder, m.210, soluble in water or alcohol; used as an astringent and hemostatic.

hydrastis. Golden seal, yellow pucoon, orange root, turmeric root. The dried roots of *H. canadensis*, a ranunculaceous plant. The fluid extract is used medicinally as a bitter tonic and astringent. **h. alkaloids.** Compounds of the isoquinoline group; as, berberine, canadine, hydrastine, hydrastinine, xanthopuccine.

hydratated. Combined with water in the form of a hydrate. Cf. *hydrated*.

hydrate. (1) A substance containing water combined in the molecular form, as $H_2SO_4.H_2O$. (2) Aqua compound. A crystalline substance containing water of crystallization. They are classified according to the number of molecules of water which crystallize with one molecule of substance:

monohydrate	$1H_2O$
dihydrate	$2H_2O$
trihydrate	$3H_2O$
tetrahydrate	$4H_2O$
pentahydrate	$5H_2O$
hexahydrate	$6H_2O$
heptahydrate	$7H_2O$

etc. (3) Hydroxide. (4) A solvate, q.v. **carbo-** See *carbohydrate*.

hydrated. Combined with water. Cf. *hydrate, solvate*. **h. ion.** An ion surrounded by oriented water molecules; cf. *aquation, micelle, solvation, zone*. **h. lime.** Dry calcium hydroxide.

hydration. Combination with water, but not necessarily in the form of a hydrate. Cf. *aquation, solvation*. **heat of-** The energy difference between anhydrous and hydrous compounds, expressed in calories.

hydratisomery. An isomerism that depends upon the structure of hydrated crystals. Thus,

$CrCl_3.6H_2O$, chromic chloride hexahydrate, occurs in the following three forms:

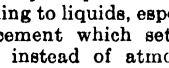
grayish-blue	$[Cr(H_2O)_6]Cl_3$
grayish-green	$[Cr(H_2O)_5Cl]Cl_2.H_2O$
green	$[Cr(H_2O)_4Cl_2]Cl.2H_2O$

hydratropic acid. $C_9H_{10}O_2$ = 150.1. α-phenyl-propionic acid, α-methyl-α-toluic acid, Ph.CH-MeCOOH. Colorless crystals, m.265, slightly soluble in water. **hydroxy-** Atrolactic acid.

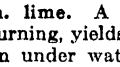
hydraulic. Pertaining to liquids, especially water. **h. cement.** A cement which sets under the action of water, instead of atmospheric CO_2 and moisture. **h. lime.** A variety of limestone which, on burning, yields a quicklime that will set or harden under water. Cf. *hydrated* lime. **h. mining.** Excavating by means of a strong jet of water. **h. mortar.** A mortar which will harden under water. **h. press.** An extraction press of great force using water to transmit the pressure; used in bacteriology and chemical work.

hydraulics. Hydro mechanics. A branch of physics which deals with the mechanical properties of liquids.

hydrazi- A prefix indicating the presence of the bivalent.  group, where both valencies belong to the same atom (indicated by a dot)

e.g. hydrazibenzyl 

Cf. *hydrazo, hydrazono, hydrazimethylene.*

hydraziacetic acid.  , which is hydrolyzed by acids to hydrazine and glyoxylic acid.

hydrazide. An acyl hydrazine, an organic compound of the type $R.CO.NH.NH_2$; as $C_3H_7.CONH.NH_2$, butyrohydrazide* or propane carbohydrazide. They are metamers of diureides. Cf. *malein hydrazide.* **acet-** See *acethydrazide.* **carbo-** See *carbohydrazide.* **oxy-** See *oxyhydrazide.*

hydrazidine. (1) A compound containing the bivalent $—NH.N:C.NH_2$ group. Cf. *amidrazones.* (2) The theoretical compound, $NH_2.N:CH.NH_2$. **ethylphenyl-** $PhNH.N:CEt.NH_2$ methylamidrazone.

hydrazido mesoxalamide. $C_3H_6O_2N_4$ = 130.2. $NH_2.N:C(CONH_2)CONH_2$. Colorless crystals, m.175.

hydrazimethylene. The theoretical compound  from which the hydrazi compounds are derived. **benzoylphenyl-** NH.NH.CPh-(COPh). Colorless crystals, m.151. **diphenyl-** $(NH.NH.CPh)_2$. Colorless crystals, m.147.

hydrazine. N_2H_4 = 32.1. Diamine, diamidogen, $H_2N—NH_2$. A colorless liquid, d.1.08, m.1.4, b.113, soluble in water or alcohol. Used extensively as a reducing agent in organic synthesis. In liquid ammonia solution it acts as nitridizing agent, analogously to the oxidizing action of H_2O_2 in aqueous solution. It gives the following radicals:

$H_2N.NH—$	hydrazino, hydrazyl
$H_2N.H=$	hydrazono
$—HN.NH—$	hydrazo, hydrazi
$=N.N=$	azo, diazo

Cf. *hydrazinium, hydrazidine.* **h. carbamide.** Diurea. **h. carboxamide.** Semicarbazide. **h. carboxylic acid.** Carbazic acid. **h. dicarbamide.** Biurea. **h. chloride, h. dihydrochloride.** $N_2H_4.2HCl$ = 105.5. Colorless crystals, m.198, soluble in alcohol or ether; used in organic synthesis. **h. formate.** $N_2H_4.2HCOOH$ = 124.08. Cubic crystals, m.128, soluble in water. **h. hydrate.** $N_2H_4.H_2O$ = 50.07. A colorless solid, m. −40, $b._{40mm.}$118.5. **h. nitrate.** $NH_2.NH_2.NO_3$. White crystals, used as a high explosive. **h. sulfate.** $N_2H_4.H_2SO_4$ = 130.1. Colorless scales, m.254, soluble in water, insoluble in alcohol or ether; used as a reagent in separating copper, and in organic synthesis.

hydrazines. A series of compounds derived from hydrazine: $H_2N—NH_2$; as *methylhydrazine,* $MeNH.NH_2$; or *phenylhydrazine,* $PhNH.NH_2$. They are analogous to peroxides. **acyl-** Hydrazides. **alkyl-** A compound of the type $RNH.NH_2$, $R_2N.NH_2$, or RNH.NHR, in which the hydrogen is replaced by an alkyl radical. **aryl-** An organic compound derived from hydrazine, in which the hydrogen is replaced by an aryl radical.

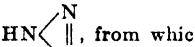
hydrazinium. Hydrazonium. The monovalent radical $H_2N.NH_3—$, or the bivalent radical $—NH_3.NH_3—$, which is derived from hydrazine and contains respectively, one and two pentavalent nitrogen atoms. **h. salt.** A compound of hydrazine and an acid, analogous to the ammonium salts derived from ammonia. Thus, there are $N_2H_4.HCl$, *i.e.*, $H_2N.NH_3Cl$, h. chloride; and $N_2H_4.2HCl$, *i.e.*, $ClNH_3.NH_3Cl$, h. dichloride.

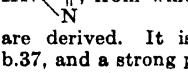
hydrazino. The monovalent $H_2N.NH—$ group derived from hydrazine. **h. acids.** A group of organic compounds, derived from hydrazine, of the general type $H_2N.NH.R.COOH$; as, α-hydrazino-propionic acid, $H_2N.NH.CHMe.COOH$, or amidoalanine.

hydrazo- A prefix indicating the presence of the bivalent $—NH.NH—$, or the tetravalent $=N.N=$ group. (The latter is properly called the azo-group.) Cf. *hydrazi, hydrazono.* **h. amine.** Triazane. **h. benzene.** $C_{12}H_{12}N_2$ = 184.2. **1.1-** See *1.1-diphenylhydrazine**. **1.2-** *1.2-* Diphenylhydrazine*, *N*-bianiline, $PhNH.NHPh$. Colorless scales, d.1.158, m.132, slightly soluble in water or alcohol, soluble in ether. It is an intermediate in the manufacture of benzidine. **h. benzoic acid.** See *benzoic acid.* **h. compounds.** A group of organic compounds of the general formula RNH.NHR. **h. dicarbonamide.** $C_2H_6O_2N_4$ = 118.3. Hydrazoformamide, $NH_2.CO.NHNH.CO.NH_2$. Colorless leaflets, m.245, slightly soluble in water. **h. dicarbonimide.** Urazole. **h. formamide.** H. dicarbonamide. **h. naphthalene.** $C_{20}H_{16}N_2$ = 284.2. Dinaphthylhydrazine. $C_{10}H_7NH.NHC_{10}H_7$. **1.1-** (alpha-). Colorless leaflets, m.275, insoluble in water, soluble in alcohol or ether; used in organic synthesis. **2.2-** (beta-). White flakes, m.163, insoluble in water, soluble in alcohol or ether. **h. toluene.** $C_{14}H_{16}N_2$ = 212.2. Ditoluylhydrazine, $MeC_6H_4NH.NHC_6H_4Me$. **1.2-** (ortho-). Colorless leaflets, m.156, slightly soluble in water, soluble in alcohol or ether; decomp. by heat. **1.3-** (meta-). Colorless crystals, soluble in alcohol. **1.4-** (para-). Monoclinic, colorless crystals, m.130, insoluble in water, soluble in alcohol; used in organic synthesis.

hydrazoate. A compound derived from hydrazoic acid, NH.N:N; as sodium hydrazoate, NaN_3.

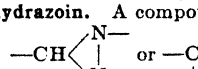
hydrazoic acid. HN_3 = 43.03. Hydronitric acid, azoimide, diazoimide, NH—N = N or





, from which the unstable hydrazoates are derived. It is highly explosive m. −80, b.37, and a strong protoplasmic poison.

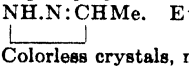
hydrazoin. A compound containing the trivalent



or —CH.N.N— group; as benzhydrazoin, PhCH

hydrazone. (1) A condensation product containing the trivalent —NH.N:C— group,

resulting from the action of compounds containing $—N.NH_2$ (*hydrazines*) with compounds containing —CO (*aldehydes* or *ketones*). (2) A phenylhydrazone (q.v.). **acetaldehyde-** Ph-NH.N:CHMe. Ethidenephenylhydrazine.



Colorless crystals, m.64. **diacetyl-**

Colorless crystals, m.133. **diphenyl-** Osazone. **monoacetyl-** PhNH.N:CHCOMe. Colorless

crystals, m.148.

hydrazonic acid. A compound of the general type R.C(OH):N.NH, metameric with amidoximes and tautomeric with acethydrazides.

hydrazonium. Hydrazinium.

hydrazono. The bivalent radical $=N.NH_2$, from hydrazine. Cf. *hydrazido.*

hydrazyl. A free radical of the type $R_2N.NAc—$, derived from the hydrazino group. The nitrogen atom bound to the acyl radical is designated as alpha-, and that with the hydrocarbon radical, as beta; as, α-benzoyl-β-diphenylhydrazyl, $Ph_2N.NOCPh$.

β α

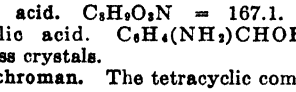
hydride. A compound of hydrogen with (a) a more positive element; as sodium hydride, NaH; or (b) a member of the phosphorus group. (c) A radical, RH; as, methylhydride (methane). **antimony-** Stibine. **arsenic-** Arsine. **phosphorus-** Phosphine.

hydrin. The hydrogen acid ester of a polyatomic alcohol, as, glycol, glycerol. They are of the type HO—R—X, as $HO.CH_2.CH_2.Cl$, glycolchlorohydrin; or $HO.CH_2.CHOH.CH_2Cl$, glycerol α-monochlorohydrin.

hydrindene. C_9H_{10} = 118.1. Indan.

hydrindic acid. $C_8H_9O_2N$ = 167.1. o-aminomandelic acid. $C_6H_4(NH_2)CHOH.COOH$. Colorless crystals.

hydrindochroman. The tetracyclic compound



hydrindone. Indone.

hydrine. Hydrin.

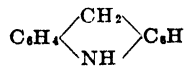
hydriodic acid. HI = 127.9. A 57 % solution of hydrogen iodide in water, d.1.700. Used as a reagent for detecting nitrites, determining methoxyl, and as a general reducing agent.

hydriodide. A compound (usually an alkaloid) combined with hydrogen iodide.

hydrion. (1) Hydrogen ion. (2) A proton, or the positive nucleus of an atom (Soddy).

hydro- (1) A prefix derived from Greek indicating "water" or "hydrogen." (2) Abbreviation for hydroextractor.

hydroacridine. $C_{13}H_{11}N$ = 181.16. The heterocyclic compound



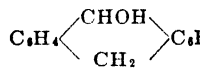
Colorless crystals, m.169, insoluble in water, soluble in hot alcohol or ether.

hydroalium. An aluminum alloy resistant to alkalis, containing 7–9 % Mg and 0.2–0.6 % silicon and manganese.

hydroangelic acid. α-Methyl butyric acid.

hydroanthracene. Dihydroanthracene.

hydroanthranol. $C_{14}H_{12}O$ = 196.1. Hydranthranol.



Colorless needles, m.76, soluble in hot water, alcohol, or ether. Cf. *oxanthrol.*

hydroatropic acid. $C_9H_{10}O_2$ = 150.1. α-phenylpropionic acid, hydratropic acid, α-methyl-α-toluic acid, MeCHPhCOOH. A colorless liquid b.264, slightly soluble in water; an isomer of hydrocinnamic acid.

hydrobenzamide. $C_{21}H_{18}N_2$ = 298.2. Tribenzaldiamine, tribenzilidendiamine. Colorless prisms, m.101, insoluble in water, soluble in alcohol or ether.

hydrobenzoin. $C_{14}H_{14}O_2$ = 214.2. Benzylene glycol, diphenyl dihydroxyethane PhCHOH.-CHOHPh. Colorless leaflets, m.136, b.300, slightly soluble in water, soluble in alcohol or ether.

hydroberberine. $C_{20}H_{21}NO_4$ = 339.17. White crystals, m.167, insoluble in water.

hydrobilirubin. Urobilin.

hydroboron. See *boron hydrides.*

hydrobromic acid. HBr = 80.9. A 40 % solution of hydrogen bromide in water. A colorless liquid, d.1.38, used as a reagent.

hydrobromide. Hydrogen-bromide. An organic salt of hydrobromic acid and an alkaloid. Cf. *bromide.*

hydrocaffeic acid. See *caffeic acid.*

hydrocarbobase. See *base.*

hydrocarbon. A compound consisting of carbon and hydrogen. The number of hydrocarbons is very large, and they are classified into several series, q.v. **aliphatic-** A compound in which the principal molecules are carbon atoms arranged in chains. **aromatic-** A compound in which the principal molecules are carbon atoms arranged in a ring. **cyclic-** Aromatic. **normal-** A h. without side-chains. **saturated-** A hydrocarbon in which all four valencies of the carbon atom are satisfied. **unsaturated-** A hydrocarbon in which there is one or more double or triple bonds between the carbon atoms.

h. black. Lampblack. **h. burner.** An oil stove in which vaporized kerosene is used as fuel. **h. radical.** A group of atoms of C and H, with one or more free bonds. Cf. *organic radicals, structure symbols.* **h. series.** One of the groups of hydrocarbons in which the

compounds are arranged as homologs, which generally differ by :CH_2. Cf. *hydronitrogen.* The general formulas of some series, and of some of their members are:

C_nH_{2n+2}—ALKANES, paraffins or methane series (for members of this series, see *methane* series)

C_nH_{2n}—ALKENES, olefines, or ethylene series (see *ethylene* series, *cyclo-paraffins*)

C_nH_{2n-2}—ALKINES, acetylenes or ethine series (see *acetylene series, cyclo-olefines, diolefines*)

C_nH_{2n-4}—ALKONES or terpenes

C_4H_4 butone, vinylacetylene
C_5H_6 pentone, valylene
C_6H_8 hexone, diallylene
$C_{10}H_{16}$ decone or terpenes, q.v.; as camphene, citrene, dipentene, pinene, sylvestrene, terpinene
$C_{18}H_{32}$ octodecone, fichtelite

C_nH_{2n-6}—BENZENES and diacetylenes

C_4H_2 diacetylene, q.v.
C_6H_6 benzene (see *benzene* series), dipropargyl
$C_{15}H_{24}$ sesquiterpenes, q.v.; as calamene, cadinene, cedrene, etc.

C_nH_{2n-8} Phenylene series

C_6H_4 phenylene
C_8H_8 cinnamene, styrolene
C_9H_{10} allylbenzene, phenylpropene
$C_{10}H_{12}$ butylenebenzene, phenylbutene and tetrahydro naphthalene

C_nH_{2n-10} Indene series

C_8H_6 ethinylbenzene, acetylenebenzene
C_9H_8 indene
$C_{10}H_{10}$ dihydronaphthalene, phenylcrotonylene
$C_{26}H_{42}$ cholesterene
$C_{30}H_{50}$ squalene

C_nH_{2n-12} Naphthalene series

$C_{10}H_8$ naphthalene
$C_{11}H_{10}$ methylnaphthalene
$C_{12}H_{12}$ ethylnaphthalene
$C_{14}H_{16}$ hexahydroanthracene

C_nH_{2n-14} Diphenyl series

$C_{12}H_{10}$ diphenyl and acenaphthene
$C_{13}H_{12}$ diphenylmethane
$C_{14}H_{14}$ diphenylethane, dibenzyl, ditolyl
$C_{15}H_{16}$ diphenylpropane, benzylethylbenzene, benzylxylene

C_nH_{2n-16} Stilbene series

$C_{13}H_{10}$ fluorene
$C_{14}H_{12}$ stilbene, diphenylethene, dihydroanthracene
$C_{15}H_{14}$ diphenylpropene
$C_{16}H_{18}$ diphenylbutene, hexahydropyrene

C_nH_{2n-18} Anthracene series

$C_{14}H_{10}$ anthracene, phenanthrene, tolane, diphenylthine, dimethylanthracene
$C_{15}H_{12}$ methylanthracene
$C_{16}H_{14}$ dimethylanthracene, ethylanthracene, distyrene
$C_{17}H_{16}$ trimethylanthracene
$C_{18}H_{18}$ tetramethylanthracene or retene

C_nH_{2n-20}

$C_{16}H_{10}$ fluoranthene
$C_{17}H_{14}$ naphthylphenylmethane, benzylnaphthene

C_nH_{2n-22}

$C_{16}H_{10}$ pyrene, diphenyldiethine, 1 diacetenylbenzene
$C_{18}H_{14}$ diphenylbenzene
$C_{19}H_{16}$ triphenylmethane
$C_{64}H_{106}$ illipene

C_nH_{2n-24}

$C_{18}H_{12}$ chrysene

C_nH_{2n-26}

$C_{20}H_{14}$ dinaphthyl, phenylanthracene
$C_{21}H_{16}$ dinaphthylmethane

C_nH_{2n-28}

$C_{20}H_{12}$ perylene

C_nH_{2n-30}

$C_{22}H_{14}$ idrialene, picene pentacene
$C_{23}H_{16}$ methylidrialene
$C_{24}H_{18}$ triphenylbenzene
$C_{25}H_{20}$ tetraphenylmethane

C_nH_{2n-32}

$C_{24}H_{16}$ crackene
$C_{26}H_{20}$ tetraphenylethylene
$C_{27}H_{22}$ tetraphenylpropene

C_nH_{2n-36}

$C_{26}H_{16}$ anthanthrene

C_nH_{2n-38}

$C_{25}H_{14}$ rubicene
$C_{28}H_{18}$ dianthryl
$C_{30}H_{22}$ tetraphenyl benzene

C_nH_{2n-54}

$C_{42}H_{30}$ hexaphenylhexadiine

hydrocarbostyril. C_9H_9ON = 147.2. Colorless prisms, m.163, slightly soluble in water, soluble in alcohol or ether.

hydrocarpic. Misnomer for hydnocarpic.

hydrocellulose. $C_{12}H_{22}O_{11}$ = 342.2. A compound obtained from cellulose by prolonged treatment with concentrated acids.

hydrocerulignone. $C_{16}H_{18}O_4$ = 274.22. A solid, m.190, soluble in alcohol, ether or water.

hydrochelidonic acid. $C_7H_{10}O_5$ = 174.12. Acetone diacetic acid, 4-ketopimelic acid, 4-oxoheptanedioic acid*, CO:$(CH_2.CH_2COOH)_2$. A crystalline solid, m.142, soluble in alcohol, slightly soluble in water or ether.

hydrochinone. Hydroquinone.

hydrochlorate. An incorrect term for hydrochlorides.

hydrochloric acid. HCl = 36.5. Muriatic acid. A solution of hydrogen chloride gas in water. **conc.-** Not less than 35 % HCl. A clear, colorless fuming liquid, d.1.18, used extensively as a reagent and in organic synthesis. **dilute-** A solution of about 20 % HCl. **fuming-** A solution of about 37 % HCl, d.1.19. **nitro-** Aqua regia.

hydrochloride. (Cf. *hydrochlorate, chlorhydrate.*) A salt of hydrochloric acid and an organic base, especially an alkaloid, it differs from chlorides in retaining the hydrogen atom, as *Alk* HCl. Such a salt is usually more soluble than the base.

hydrocinnamide. $C_9H_{11}ON$ = 149.09. α-benzylacetamide. $PhCH_2CH_2CONH_2$.

hydrocinnamic acid. $C_9H_{10}O_2$ = 150.1. β-phenylpropionic acid. Colorless needles, d.-1.071, m.49, b.280, slightly soluble in water, soluble in alcohol or ether. **amino-** Phenylalanine. **aminohydroxy-** Tyrosine. **hydroxy-**, (*alpha-*) Phenyllactic acid. (*ortho-*) Melilotic

acid. (*para-*) Phloretic acid. **methylene-** Benzylacrylic acid.

hydrocinnamic aldehyde. $C_9H_{10}O_2$ = 134.1. β-phenylpropionic aldehyde. A colorless liquid, b.208, insoluble in water, soluble in alcohol or ether. Used in organic synthesis.

hydrocollidine. A ptomaine from putrefying fish.

hydrocoridine. $C_{10}H_{17}N$ = 151.2. A ptomaine produced by *Bacillus allii* or *Bacterium album* in agar cultures.

hydrocotarnine. $C_{12}H_{15}O_3N$ = 221.12. An alkaloid derived from opium. Colorless crystals, m.53, insoluble in water, soluble in alcohol or ether; used as a hypnotic.

hydrocotoin. See *cotoin.*

hydrocoumaric acid. $C_9H_{10}O_3$ = 166.1. β-phenylpropionic acid. **para-** Monoclinic colorless crystals, m.128, soluble in water, alcohol or ether. **ortho-** Melilotic acid.

hydrocoumarone. C_8H_8O = 120.1. A colorless fragrant liquid, b.188.

hydrocupreine. $C_{19}H_{24}N_2O_2$ = 312.2. An alkaloid from cuprea bark, q.v. **ethyl-** Optochine. **methyl-** Hydroquinine.

hydrocyanic acid. HCN = 27.06. Prussic acid, hydrogen cyanide, formonitrile. A colorless gas, very poisonous with an almond odor; d.0.697, m. −14, b.25, soluble in water, alcohol or ether. Used as a poison gas, disinfectant, in metallurgy and mining (Cyanide process), agriculture (insecticide and fumigation) and in organic synthesis. Cf. *HCN discoids, zyklon, cyanogas.* **h. cyanogen chloride.** Soffitume. A mixture of NaCN and $NaClO_3$, used for fumigation by adding to 50 % HCl solution.

hydrocyanide. The salt of an organic base with hydrocyanic acid, containing the HCN molecule.

hydrodiffusion. Diffusion into water.

hydrodynamics. A branch of physics dealing with the mechanical properties of liquids, especially water.

hydrodynamometer. An instrument for measuring the velocity of a fluid in motion.

hydroextractor. Hydro. A rapid centrifuge for drying or dehydrating crystals, textiles, etc.

hydrofermentation. Destructive hydrogenation, *e.g.*, as applied to hydrocarbons.

hydroferricyanic acid. Ferricyanic acid.

hydrofluogermanic acid. Fluogermanic acid.

hydrofluoric acid. HF = 20.0. Phthoric acid. A solution of hydrogen fluoride in water. A colorless liquid which must be kept in paraffin, rubber or bakelite bottles as it attacks glass. Used to etch glass; and as a reagent. Its salts are the fluorides.

hydrofluoride. A salt of hydrogen fluoride and an organic base, usually an alkaloid. Cf. *fluoride.*

hydrofluosilicic acid. Fluosilicic acid.

hydrofranklinite. Chalcophanite.

hydrogel. A gel produced by the coagulation of a colloid with the inclusion of water; *e.g.*, coagulated silicic acid.

hydrogen. (A) **History:** H. was probably first discovered in the 16th century by Paracelsus, and first investigated in 1766 by H. Cavendish in connection with the action of acids on metals ("inflammable air"). Later he showed that water is produced when this gas burns (Greek ὕδωρ, water and γεννάω, to produce). Liquid and solid H were first prepared by Dewar in 1898. (B) H_2 = 2.0160. The simplest **element,** atomic number 1. Hydrogen gas is a colorless, inflammable gas, m. −256.5, b. −252.5, slightly soluble in water, alcohol or ether. Used in filling balloons, as fuel in torches for cutting metals, welding and melting, the production of synthetic stones or gems, annealing of steel, in the "lime-light," in the hydrogenation of oils, the cracking of hydrocarbons, and the production of synthetic ammonia. (C) H = 1.0080. Hydrogen **atom,** the basis of the valence system, being taken as unity; elements combining directly with hydrogen atoms have a negative valence number, *e.g.*, Cl −1, O −2, N −3; elements replacing hydrogen have a positive valence number, *e.g.*, Na +1, Ca +2, Al +3. (D) **constants** of hydrogen atom and molecule:

mass of atom = 1.662×10^{-24} gram
radius of molecule = 10^{-8} cm.
mean free path of molecules at 760 mm. pressure and 0°C. = 1.6×10^{-5} cm./sec.
average velocity at 760 mm. and 0°C. = 1.70×10^{-6} cm./sec.
1 cubic meter weighs 89.87 grams (Regnault value)
1 liter at 760 mm. and 0°C. weighs 0.08987 gm.

(E) **Isotopes** of H. are protium, H^1 or H^a, mass 1.00756; deuterium (diplogen), H^2, H^b or D, mass 2.0136; tritium, H^3, H^c or T, mass 3.0221. These form six possible molecules with molecular weights from 2.015 to 6.04. Cf. *h. molecule.* (F) **Compounds** of hydrogen: Three types: (1) Nonmetallic *e.g.* SbH_3, PH_3, NH_3, in which hydrogen is the positive part. These compounds are usually gaseous and volatile; As_2H_4 and Sb_2H_2 are solids. (2) Salts, or hydrides *e.g.*, NaH, CaH_2, in which the hydrogen is the negative part. These are crystalline, transparent substances. (3) Metallic (hydrogen alloys), *e.g.*, PdH_x in which the hydrogen is alloyed with, occluded on or absorbed in the metal. For other types of h. compounds see:

hydrocarbons	C_xH_y
hydronitrogens	N_xH_y
silanes	Si_xH_y
stannanes	Sn_xH_y
boron hydrides	B_xH_y

activated- Atomic-. **arseniuretted-** Arsine. **atomic-** Hydrogen gas which has been subjected to a strong electromagnetic field, and whose molecules are thought to be torn apart. Used in certain blowpipes for obtaining extremely high temperatures. **excited-** Hydrogen gas subjected to a high potential at low pressure. It is thought that the electrons move in less stable energy levels, and on falling back, emit the characteristic radiations. **heavy-** The h. isotope of mass 2; deuterium or diplogen. **labelled-** Deuterium. **nascent-** Freshly generated H, which is supposed to owe its greater chemical activity to being in the atomic form. **ortho-, para-.** See *h. molecule.* **phosporetted-.** Phosphine. **proto-** See *protohydrogen.* **sulfuretted-** Hydrogen sulfide. **telluretted-** H. telluride. **triatomic-** H_3 = 3.02. A modification of h. obtained by exposure of H to (1) α-rays, (2) vacuum discharge, (3) corona discharge, (4) a glass-tube ozonizer, (5) high-frequency Tesla discharge. It is very unstable, reduces, S, As, Hg and N, can be condensed by liquid air, and decomposed (to H_2) by Pt, Ni, Co, etc. **trivalent-** Misnomer for triatomic.

h. acid. Hydracid. An acid containing no oxygen; as HX. **h. bromide.** HBr = 80.9.

(1) Hydrobromic acid gas. A colorless gas, $d._{(air-1)}$ 2.71, m. −87, b. −68.7; soluble in water, alcohol, or ether. Used as a reagent, in organic synthesis, and forms salts, the bromides. (2) Same as hydrobromide cf. *bromide*. **h. calomel cell.** An electrolytic cell comprising a hydrogen gas- and calomel-electrode; used for conductivity and pH measurements. **h. cell.** An electrolytic cell in which hydrogen gas electrodes are used. **h. chloride.** HCl = 36.46. (a) Hydrogen chloride gas, hydrochloric acid gas. A colorless gas, $d._{(air-1)}$.269, m. −112.5, b. −83.1, very soluble in water, alcohol or ether. The aqueous solution is hydrochloric acid. Used as a reagent and in organic synthesis. (b) A compound of an organic base (alkaloid) with HCl; it is usually more soluble in water than the base. **h. cyanide.** Hydrocyanic acid. **h. dioxide.** Hydrogen peroxide. **h. electrode.** A gas electrode in which action depends on the potential set up between an electrode of finely-divided metal saturated with hydrogen, and the hydrogen ions of the solution in which it is placed. It is used in potentiometric and pH measurements, since its potential depends on the pH value of the solution. **h. equivalent.** The number of replaceable H atoms in a molecule of an acid; or the number of replaceable OH groups in the molecule of a base. **h. fluoride.** HF = 20.0. Hydrofluoric acid gas, phthoric acid. A colorless poisonous gas, $d._{(air-1)}$0.713, m. −83.5, b.19.4, soluble in water or alcohol; used as an aqueous solution or as gas (liberated from CaF_2 with H_2SO_4) for etching glass. **h. iodide.** HI = 127.9. Hydroiodic acid gas. A colorless gas, $d._{(air-1)}$-4.38, m. −51, b.34, soluble in water or alcohol. The aqueous solution (hydriodic acid) is used as a reagent and in organic synthesis. **h. ions.** The electrically charged particles consisting of a h. nucleus, H^- or H^+. They are present in all acids, Cf. *hydrogen-ion*. **h. line.** The spectrum lines due to hydrogen; as, H_α, H_β, H_γ, etc. Cf. *Bohr atom, quantum theory, atomic structure*. **h. molecule.** The simplest molecule, consisting of two hydrogen atoms. With three isotopes, H, D and T, the following six molecules are possible:

HH, DD, TT, HD, HT, DT.

Of these the simplest, H_2, consists of two types: **ortho-** and **para-** which differ slightly in physical properties; as, specific heat; vapor pressure. They are explained by the different spins of the two nuclei, which may be:

in ortho- ⇄ and in para- ↑↑, ⇉, ↓↓.

Hydrogen consists of:

	ortho-	para-
At −235°C (liq. H_2)	= 99.7 %	0.3 %
At −140°C (liq. air)	= 50 %	50 %
At 20°C (room temp.)	= 25 %	75 %

ortho- (symmetrical- or alpha-) has even rotation quantum numbers, 0,2,4 . . . ; para (antisymmetrical- or beta-) has odd numbers, 1,3,5 . . . **h. nitrate.** Nitric acid. **h. nitride.** Ammonia. **h. overvoltage.** The electrical charge needed to liberate hydrogen, $2H \rightarrow H_2$, at a metallic surface forming one of a pair of electrodes in a solution; *e.g.*,

Pt 0	Ni 0.29	Sn 0.44	
Pd 0	Ag 0.33	Pb 0.45	
Al 0.18	Cu 0.33	Tl 0.55	
Co 0.23	C 0.34	Mn 0.58	
Fe 0.24	Sb 0.38	Hg 0.61	
W 0.28	Cr 0.41	Zn 0.70	

h. oxide. Water. **h. peroxide.** H_2O_2 = 34.016. H. dioxide, oxygen, auricome, perhydrol, peroxide of h. A clear colorless liquid with a faint odor of nitric acid, d.1.458, m. −2, b.85, soluble in water in all proportions; marketed usually as a 3 or 6 % solution, which are designated according to the number of volumes of oxygen they evolve, viz. as "10 volumes" and "20 volumes," respectively (cf. *perhydrol*). It is acid to litmus, but neutral in dilute solutions. In the solid state it is explosive, in solution it decomposes into water and oxygen; this action is accelerated by alkalis, and retarded by acids. It can act as a reducing or oxidizing agent. Used as a reagent, disinfectant, antiseptic, antichlor, and for bleaching. It occurs in traces in natural waters that are exposed to the sun. **h. peroxide hydrates.** $H_2O_2.H_2O$, $H_2O_2.2H_2O$. They are stable if pure, but otherwise decompose explosively. **h. peroxide of crystallization.** A series of compounds which crystallize with one or more molecules of H_2O_2, analogous to water of crystallization. **h. persulfide.** H_2S_2, H_2S_5, or S—H_2S_2—H_2S_3. A yellow oily liquid, d.1.7, soluble in benzene. Decomp. by alcohol into sulfur and hydrogen sulfide, and bleaches litmus. **h. phosphide.** Phosphine. **h. selenide.** H_2Se = 81.2. A colorless poisonous gas, m. −64, b. −42; very soluble in water. Aqueous solutions react with metallic salts, similarly to hydrogen sulfide. **h. sulfate.** Sulfuric acid. **h. sulfide.** H_2S = 34.1. Sulfuretted h., hydrosulfuric acid, hepatic gas. A colorless gas having the odor of rotten eggs, $d._{(air-1)}$1.189, m. −85.5, b. −61.8; very soluble in water or alcohol. Used as a reagent for the precipitation of metals; shipped in steel cylinders. **h. sulfide water.** An aqueous solution of H_2S; a colorless liquid of strong characteristic odor, used extensively as a reagent in qualitative analysis, for the purification of chemicals by precipitation of heavy metals, and as an antichlorinating agent. **h. telluride.** H_2Te = 129.52. A combustible gas or liquid, m. −48, b.9; soluble in water with decomposition. **h. thermometer.** An instrument for measuring temperatures from the pressure exerted by a certain volume of confined H gas.

hydrogenate. (1) To combine with hydrogen or to introduce H into a molecule; as, the saturation of unsaturated compounds. (2) To reduce, cf. *oxidation*.

hydrogenated. Treated or saturated with hydrogen; as, an oil which has been solidified by transforming unsaturated into saturated compounds; as, olein to palmitin.

hydrogenation. The process of combining with hydrogen. *E.g.*, (1) saturation of aliphatic unsaturated compounds with H in the presence of nickel or palladium as catalyst; or (2) cracking higher hydrocarbons to gasoline by H under pressure. Cf. *Sabatier, Bergius process*. **h. apparatus.** A heavy copper retort with stirrer, used to transform liquid fats into solid fats by h.

HYDROGEN ION CONCENTRATION

	pH	pOH	Hydrogen ion concentration in mols per liter (or n gm. H^+ per liter)	Hydroxyl ion concentration in mols per liter (or $10^{-14}/n$ gm. OH^- per liter)
Acid reaction	0.00	14.0	1.0 normal	0.000,000,000,000,01 normal
	1.0	13.0	0.1 normal	0.000,000,000,0001 normal
	2.0	12.0	0.01 normal	0.000,000,000,001 normal
	3.0	11.0	0.001 normal	0.000,000,000,01 normal
	4.0	10.0	0.0001 normal	0.000,000,0001 normal
	5.0	9.0	0.000,01 normal	0.000,000,001 normal
	6.0	8.0	0.000,001 normal	0.000,000,01 normal
	6.3	7.7	0.000,0005 normal	0.000,000,02 normal
	6.7	7.3	0.000,0002 normal	0.000,000,05 normal
Neutral	7.0	7.0	0.000,0001 normal	0.000,0001 normal
Alkaline reaction	7.3	6.7	0.000,000,05 normal	0.000,0002 normal
	7.7	6.3	0.000,000,02 normal	0.000,0005 normal
	8.0	6.0	0.000,000,01 normal	0.000,001 normal
	9.0	5.0	0.000,000,001 normal	0.000,01 normal
	10.0	4.0	0.000,000,000,1 normal	0.0001 normal
	11.0	3.0	0.000,000,000,01 normal	0.001 normal
	12.0	2.0	0.000,000,000,001 normal	0.01 normal
	13.0	1.0	0.000,000,000,0001 normal	0.1 normal
	14.0	0.0	0,000,000,000,000,01 normal	1.0 normal

hydrogen-ion: H^- or H^+. A constituent present in aqueous solutions of acids consisting of positively charged hydrogen atoms. All acids dissociate, more or less into this ion, $HCl = H^+ + Cl^-$, and the strength or "acid" character of the acid is denoted by the sour taste, change of color of indicator, reaction with metals, etc., according to the extent of this dissociation. Cf. *hydronium ion.* The degree of dissociation varies inversely with the concentration of the acid within certain limits. **h.i. concentration.** pH, P_H or p_H. Potential of hydrogen, "momentary," true, actual or active acidity. The amount of H^+ per unit volume (moles per liter, $[H^+]$ or $C_H{}^+$) of an aqueous solution. It denotes the true acidity or alkalinity of such solutions, and is expressed by the pH value (potential of hydrogen) which is the concentration of H^+ in terms of the reciprocal logarithm of the number of gram-ions of hydrogen per liter, $p_H = \log_{10} 1/C_H$. Pure water dissociates very slightly, so that in one liter there are one-ten-millionth gram-ion (10^{-7} gm.), or in other words:

1 gram-ion of hydrogen is in ten million liters (10^7 l.) of water; naturally, there is an equal number of OH^- ions. Hence,

$$[H_2O] = [H^+] + [OH^-]$$
$$1 \text{ liter} \quad 10^{-7} \text{ gm.} \quad 10^{-7} \text{ gm.},$$

and

$$pH = pOH = \text{constant.}$$
$$7.0 + 7.0 = 14.00.$$

Accordingly p_H values from 0 to 7 indicate an acid solution; p_H7 neutrality; and p_H7 to p_H14 an alkaline solution. See tables. **h.i. conversion.** Owing to the different methods of measurement the h.i. concentration can be expressed, for 0.1 N-HCl in the following terms:

$[sH^+]$ and $ps_H2.038$, based on the dissociation of HCl = 0.9165 (Sörensen)

$[H^+]$ and p_H2 000, assuming complete dissociation (actual acidity)

$[aH^+]$ and pa_H 2.075, activity coefficient (q.v.), from e.m.f. measurements.

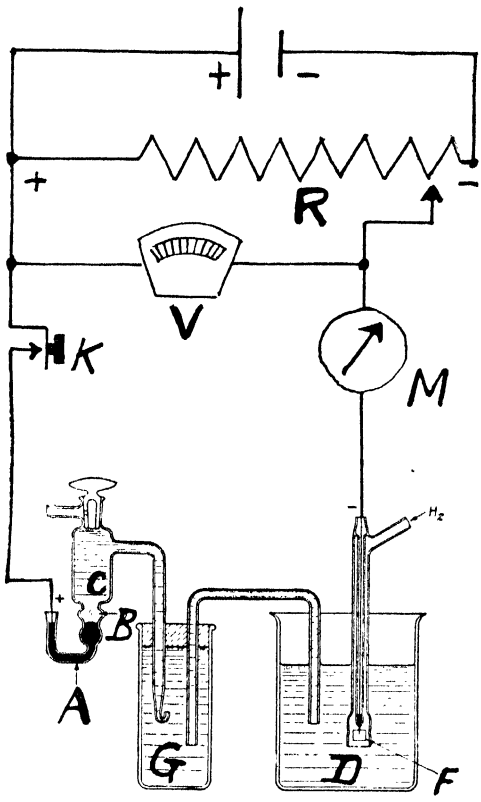
Conversion Table of p_H and C_H

$n.00 = 1.00 \times 10^{-n}$	$n.50 = 3.1 \times 10^{-(n+1)}$
$n.05 = 8.9 \times 10^{-(n+1)}$	$n.55 = 2.8 \times 10^{-(n+1)}$
$n.10 = 7.9 \times 10^{-(n+1)}$	$n.60 = 2.5 \times 10^{-(n+1)}$
$n.15 = 7.1 \times 10^{-(n+1)}$	$n.65 = 2.2 \times 10^{-(n+1)}$
$n.20 = 6.3 \times 10^{-(n+1)}$	$n.70 = 2.0 \times 10^{-(n+1)}$
$n.25 = 5.6 \times 10^{-(n+1)}$	$n.75 = 1.8 \times 10^{-(n+1)}$
$n.30 = 5.0 \times 10^{-(n+1)}$	$n.80 = 1.6 \times 10^{-(n+1)}$
$n.35 = 4.5 \times 10^{-(n+1)}$	$n.85 = 1.4 \times 10^{-(n+1)}$
$n.40 = 4.0 \times 10^{-(n+1)}$	$n.90 = 1.26 \times 10^{-(n+1)}$
$n.45 = 3.5 \times 10^{-(n+1)}$	$n.95 = 1.1 \times 10^{-(n+1)}$

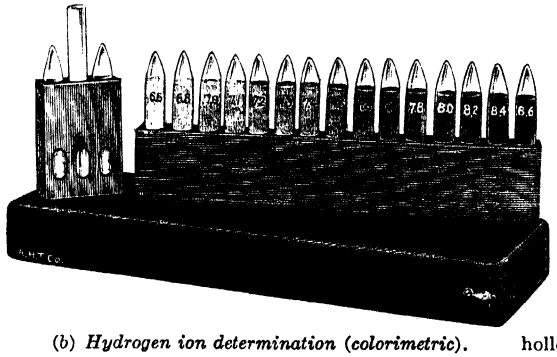
Examples: P_H 7.0 equals 1.0×10^{-7} gm. H^+ per liter; p_H 7.5 equals 3.1×10^{-8} gm. per liter; p_H 5.5 equals 3.1×10^{-6} gm. per liter.

h.i. determination apparatus. A device to measure or determine the p_H value. It may be either: (a) *electrometric,*—measures the potential of a hydrogen electrode (which depends on the p_H of the solution) against a standard calomel electrode; or, (b) *colorimetric,*—compares the color of an indicator added to the solution with its color in a solution of known p_H. See figures. **h.i. indicator.** A vegetable or synthetic dye which has definite colors at different p_H values. See *indicators.* **h.i. recorder.** An automatic potentiometer for measuring and recording the acidity and alkalinity of solutions. Such devices are used in various industrial processes, and for controlling p_H values.

hydrogenite. A mixture of 25 % Si, 60 % NaOH and 15 % slaked lime which ignites o burnin to give 270–3 70 liters of hydrogen gas per



(a) *Hydrogen-ion determination (electrometric).*
A = Calomel electrode consisting of mercury (A), calomel (B) and saturated KCl solution (C).
D = Hydrogen electrode with platinum foil (F) in hydrogen gas and the unknown solution (D).
G = Connecting vessel with salt bridge.
K = Key. V = Voltmeter. R = Rheostat. M = Galvanometer.



(b) *Hydrogen ion determination (colorimetric).*

hydrogenium. The volatile metallic element of which hydrogen is the supposed vapor; the metallic modification of hydrogen.
hydrogenize. Hydrogenate.
hydrogenolysis. The cleavage of a C—C or C—O bond accompanied by the addition of H_2; as, $R.R' + H_2 \rightarrow RH + R'H$. Cf. *hydrogenation, hydrolysis.*
hydrogenomonas. The first genus of bacteria, occurring in the soil and oxidizing H_2 to form water by catalytically reducing CO_2:

$$CO_2 + H_2 \rightarrow HCHO + O$$
$$HCHO + O_2 \rightarrow H_2O + CO_2.$$

hydrogenylase. An enzyme which promotes liberation of molecular hydrogen.
hydrohaeterolite. The mineral, $2ZnO.2Mn_2O_3.H_2O$.
hydrohalic. Composed of hydrogen and halogens.
hydrohematite. $2Fe_2O_3.H_2O$. A crystalline, hydrated ferric oxide.
hydrohydrastine. $C_{11}H_{13}O_2N$ = 191.1. An alkaloid derived from hydrastine, m.66, soluble in alcohol or ether.
hydrokinetics. The science of the motion of fluids under a force.
hydrol. See *hydrone theory.*
hydrolase. Any enzyme or ferment that causes hydrolysis.
hydrolith. Calcium hydride.
hydrolysis. A decomposition reaction caused by water. In general, a reaction of the type

$$AB + H_2O = AOH + HB,$$

which, in its ionic form, $H_2O = H^+ + OH^-$, is the reverse reaction of neutralization. *Eg.:*

In inorganic chemistry—
$CuSO_4 + H_2O = Cu(OH)_2 + H_2SO_4$
In organic chemistry—
$RCOOR' + H_2O = RCOOH + R'OH$
In biochemistry (by enzymes)—
$R.CONH.R' + H_2O = R.COOH + NH_2R'$
$C_{22}H_{22}O_{11} + H_2O = 2C_6H_{12}O_6$

Cf. *hydrogenolysis.*
hydrolyst. A catalyst causing hydrolysis; as a hydrolase.
hydrolyte. A substance which undergoes hydrolysis.
hydrolytic. Pertaining to hydrolysis. **h. condensation.** An erroneous term applied to condensations in which water is eliminated. **h. dissociation.** (1) Ionization. (2) Hydrolysis. **h. enzymes.** See *enzymes* A.
hydrolyze. To produce hydrolysis.
hydromagnesite. A white, chalk-like variety of magnesium carbonate.
hydromechanics. Hydraulics.
hydromel. A fermented (mead) or unfermented mixture of water and honey.
hydrometallurgy. The reduction of ores by leaching (wet processes).
hydrometer. Aerometer. A device for measuring the specific gravity of liquids. It consists usually of a graduated hollow weighted glass tube which sinks in the liquid to a certain depth; this depth read on the scale indicates the density of the liquid. See figure. **Sikes-** A hydrometer in which 1 degree equals a mean density-interval of 0.002. **h. scales.** Any one of the conventional graduations on a hydrometer; as, Béaume.


Hydrometer.

HYDROMETER SCALES. CONVERSION TABLE

°Tw	°Bé	Sp. gr.	°Tw	°Bé	Sp. gr.	°Tw	°Bé	Sp. gr.	°Tw	°Bé	Sp. gr.	°Tw	°Bé	Sp. gr.	°Tw	°Bé	Sp. gr.	°Tw	°Bé	Sp. gr.
0	0	1.000	29	18.3	1.145	58	32.4	1.290	87	43.8	1.435	116	53.0	1.580	145	60.6	1.725
1	0.7	1.005	30	18.8	1.150	59	32.8	1.295	88	44.1	1.440	117	53.3	1.585	146	60.9	1.730
2	1.4	1.010	31	19.3	1.155	60	33.3	1.300	89	44.4	1.445	118	53.6	1.590	147	61.1	1.735
3	2.1	1.015	32	19.8	1.160	61	33.7	1.305	90	44.8	1.450	119	53.9	1.595	148	61.4	1.740
4	2.7	1.020	33	20.3	1.165	62	34.2	1.310	91	45.1	1.455	120	54.1	1.600	149	61.6	1.745
5	3.4	1.025	34	20.9	1.170	63	34.6	1.315	92	45.4	1.460	121	54.4	1.605	150	61.8	1.750
6	4.1	1.030	35	21.4	1.175	64	35.0	1.320	93	45.8	1.465	122	54.7	1.610	151	62.1	1.755
7	4.7	1.035	36	22.0	1.180	65	35.4	1.325	94	46.1	1.470	123	55.0	1.615	152	62.3	1.760
8	5.4	1.040	37	22.5	1.185	66	35.8	1.330	95	46.4	1.475	124	55.2	1.620	153	62.5	1.765
9	6.0	1.045	38	23.0	1.190	67	36.2	1.335	96	46.8	1.480	125	55.5	1.625	154	62.8	1.770
10	6.7	1.050	39	23.5	1.195	68	36.6	1.340	97	47.1	1.485	126	55.8	1.630	155	63.0	1.775
11	7.4	1.055	40	24.0	1.200	69	37.0	1.345	98	47.4	1.490	127	56.0	1.635	156	63.2	1.780
12	8.0	1.060	41	24.5	1.205	70	37.4	1.350	99	47.8	1.495	128	56.3	1.640	157	63.5	1.785
13	8.7	1.065	42	25.0	1.210	71	37.8	1.355	100	48.1	1.500	129	56.6	1.645	158	63.7	1.790
14	9.4	1.070	43	25.5	1.215	72	38.2	1.360	101	48.4	1.505	130	56.9	1.650	159	64.0	1.795
15	10.0	1.075	44	26.0	1.220	73	38.6	1.365	102	48.7	1.510	131	57.1	1.655	160	64.2	1.800
16	10.6	1.080	45	26.4	1.225	74	39.0	1.370	103	49.0	1.515	132	57.4	1.660	161	64.4	1.805
17	11.2	1.085	46	26.9	1.230	75	39.4	1.375	104	49.4	1.520	133	57.7	1.665	162	64.6	1.810
18	11.9	1.090	47	27.4	1.235	76	39.8	1.380	105	49.7	1.525	134	57.9	1.670	163	64.8	1.815
19	12.4	1.095	48	27.9	1.240	77	40.1	1.385	106	50.0	1.530	135	58.2	1.675	164	65.0	1.820
20	13.0	1.100	49	28.4	1.245	78	40.5	1.390	107	50.3	1.535	136	58.4	1.680	165	65.2	1.825
21	13.6	1.105	50	28.8	1.250	79	40.8	1.395	108	50.6	1.540	137	58.7	1.685	166	65.5	1.830
22	14.2	1.110	51	29.3	1.255	80	41.2	1.400	109	50.9	1.545	138	58.9	1.690	167	65.7	1.835
23	14.9	1.115	52	29.7	1.260	81	41.6	1.405	110	51.2	1.550	139	59.2	1.695	168	65.9	1.840
24	15.4	1.120	53	30.2	1.265	82	42.0	1.410	111	51.5	1.555	140	59.5	1.700	169	66.1	1.845
25	16.0	1.125	54	30.6	1.270	83	42.3	1.415	112	51.8	1.560	141	59.7	1.705	170	66.3	1.850
26	16.5	1.130	55	31.1	1.275	84	42.7	1.420	113	52.1	3.565	142	60.0	1.710	171	66.5	1.855
27	17.1	1.135	56	31.5	1.280	85	43.1	1.425	114	52.4	1.570	143	60.2	1.715	172	66.7	1.865
28	17.7	1.140	57	32.0	1.285	86	43.4	1.430	115	52.7	1.575	144	60.4	1.720	173	67.0	1.860

Twaddle, Beck, Brix, Balling and Sikes. See conversion table. Conversion of °Bé to *D* (density):

$$D = \frac{144.3}{144.3 - Bé}$$

°*Tw* to *D*: $D = 1 + \frac{Tw}{200} = 1 + 0.005T$

°*Brix* to *D*: $D = 1 \pm \frac{400}{Brix}$ at 12.5°R.

°*Balling* to *D*: $D = 1 \pm \frac{200}{Balling}$ at 17.5°C.

hydronal. Polychloral, viferral. A polymerised product of pyridine and chloral, used as a hypnotic.

hydronaphthoquinone. $C_{10}H_6O_2$ = 160.1. **1.2-** Colorless leaflets, m.60, soluble in water. **1.4-** Colorless needles, m.175, soluble in water, alcohol or ether.

hydrone. (1) An alloy of 35 % sodium and 65 % lead, used for making small quantities of hydrogen gas by the action of water (hydrogen cubes). (2) The active molecule H_2O. **h. theory.** Water is a complex mixture of active molecules: *hydrone*, H_2O, *hydrol*, H_4O_2, and inactive or associated molecules, *polyhydrones*, $H_{2n}O_n$. Cf. *liquids*, *bonds*.

hydronitric acid. Hydrazoic acid.

hydronitrogen. A compound of hydrogen and nitrogen in which the H is generally replaceable by a hydrocarbon radical. **h. series.** A group of homologous compounds differing by NH (Audrieth), many of which exist only as derivatives.

Saturated Hydronitrogens:

N_nH_{2n+2}

NH_3	ammonia
N_2H_4	hydrazine
N_3H_5	triazane
N_4H_6	bihydrazine

Unsaturated Hydronitrogens:

N_nH_{2n}

N_2H_2	diimide
N_3H_3	triazene
N_4H_4	tetrazone, buzylene
N_5N_5	hydrazineazide

N_nH_{2n-2}

N_3H	hydrazoic acid
N_4H_2	diiminohydrazide
N_5H_3	bisdiazoamine
N_6H_4	bisdiazohydrazine

N_nH_{2n-4}

N_8H_4	octazone

hydronitrous acid. Nitroxylic acid.

hydronium ion. The solvated hydrogen ion, $H^+(H_2O)$ or H_3O^+, which is considered to be present in all acids:

$$HCl + H_2O \rightarrow H_3O^+ + Cl^-.$$

Cf. *protophilia*.

hydrophane. A transparent variety of opal.

hydrophil(e). Lyophile. A substance, usually in the colloidal state or an emulsion, which is wetted by water, that is: attracts water or water adheres to it.

hydrophilic. (1) Lyophilic. Describing a substance which absorbs or adsorbs water. Antonym, hydrophobic. (2) Protophilia. **h. colloid.** Finely-divided particles which form

stable suspensions in water. Antonym, hydrophobic colloid.

hydrophilite. Native calcium chloride or chlorocalcite, $CaCl_2$, occurring as white incrustations at Vesuvius.

hydrophilous. Hygroscopic or hydrophilic.

hydrophobe. Lyophobe. A substance, usually in the colloidal state, which is not wetted by water.

hydrophobic. Describing a substance which does not absorb or absorb water. Antonym, hydrophilic. **h. colloid.** Finely-divided particles which form unstable suspension in water and precipitate readily.

hydropirin. Sodium acetylsalicylate.

hydroponics. Tank culture. The cultivation of plants in aqueous solutions of inorganic salts, free from soil.

hydropyrine. Lithium acetysalicylate.

hydroquinine. $C_{20}H_{26}O_{22}.2H_2O$ = 362.3. Methylhydrocupreine. A white crystalline powder, used as a quinine substitute in malaria, as a developer in photography and reducer in chemical analysis.

hydroquinol. $C_6H_6O_2$ = 110.1. Hydrochinone, p-dioxybenzene, $C_6H_4(OH)_2$, p-dihydroxyphenol. Cf. *quinol*. Shining white leaflets, m.169, b.285, soluble in water, alcohol or ether; used as an antiseptic, and in photography as a developer. **ethyl-** H. ethylether. **hydroxy-** *1.2.4*-Trihydroxybenzene. **tetrachloro-** Chloranol.

h. carboxylic acid. Gentisic acid. **h. dimethylether.** $C_8H_{10}O_2$ = 138.1. Dimethylhydrochinone, p-dimethoxybenzene, $C_6H_4(OMe)_2$. Colorless leaflets, m.55, b.217, insoluble in water, soluble in benzene; used as an antiseptic. **h. ethylether.** $C_8H_{10}O_2$ = 138.1. Ethylhydrochinone, p-ethoxyphenol, 1-oxy-4-ethoxybenzene, HOC_6H_4OEt. Colorless leaflets, m.66, b.246, soluble in water, alcohol or ether. Used as an antiseptic and reducing agent.

hydroquinone. Hydroquinol.

hydroscopic. Hygroscopic.

hydrosilicon. See *silanes*.

hydrosilicofluoric acid. Fluosilicic acid.

hydrosorbic acid. Hexenic acid.

hydrosol. A colloidal suspension in water.

hydrosphere. The liquid portion of the earth's surface, as the oceans, lakes, rivers, etc. Cf. *lithosphere*, *atmosphere*. Its estimated *composition* is (F. W. Clarke):

O	85.79 %
H	10.67 %
C	2.07 %
Na	1.14 %
Mg	0.14 %
Ca	0.05 %
S	0.05 %
K	0.04 %
N	0.02 %
Br	0.01 %
C	0.01 %
I	0.006 %
Fe	0.002 %
Remainder	0.002 %

Its *quantity* is distributed as follows (Krümmel):

oceans	1330	Million cb. km.
lakes	0.25	Million cb. km.
swamps	0.006	Million cb. km.
rivers	0.02	Million cb. km.
ground-water	0.25	Million cb. km.
ice	4.00	Million cb. km.
atmospheric vapor	0.012	Million cb. km.

hydrostatics. The branch of physics which deals with liquids in equilibrium.

hydrosulfate. A combination of an organic base, usually an alkaloid, with sulfuric acid. It differs from a sulfate in that the hydrogen of the acid is not replaced, *e.g.*, *Alk*.H_2SO_4 or *Alk*-hydrosulfate.

hydrosulfides. Sulfhydrates, sulfhydryls, thioalcohols, thiols, sulfur alcohols, mercaptans. (1) A compound containing the monovalent SH^- radical and analogous to hydroxides in that the oxygen is replaced by sulfur. (2) An erroneous term for sulfide.

hydrosulfite. (1) Hyposulfite. A salt containing the bivalent—S_2O_4 radical. (2) An erroneous term for sodium hyposulfite.

hydrosulfuric acid. (1) Hydrogen sulfide. (2) Dithionic acid.

hydrosulfurous acid. Hyposulfurous acid.

hydrotaxis. The motion of organisms or cells (protozoa, etc.) towards water.

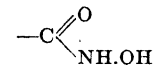
hydrotetrazone. An aromatic compound containing four consecutive nitrogen atoms in the molecule, *e.g.*, dibenzaldiphenyldihydrotetrazone, PhCH:N.NPh.NPh.N:CHPh. Cf. *tetrazone*.

hydrotherapy. The treatment of disease by water.

hydroumbellic acid. β-2.4-Dioxyphenylpropionic acid.

hydrous. Containing water, as opposed to anhydrous. **h. salt.** A salt containing water of crystallization.

hydroxamic acid. An organic compound containing the monovalent



radical; isomeric with hydroximic acid. **iso-** Hydroximic acid.

hydroxamino. The monovalent radical—NH.OH. Cf. *hydroxylamine*.

hydroxide. A compound containing the monovalent hydroxyl OH^- group. In general the hydroxides of metals are bases; those of nonmetal are acids.

MOH	bases
NOH	acids
ROH	alcohols, phenols
RCO.OH	organic acids.

aryl- Phenols. **alkyl-** Alcohols. **inorganic-** Bases.

hydroxidion. Hydroxyl ion. The monovalent ion OH^-, possessing alkaline or basic properties.

hydroximic acid. An organic compound of the type $R.C(NOH)OH$, isomeric with hydroxamic acids. **acet-** $CH_3C(OH):NOH$. Colorless crystals, m.59. **di-** HON:C(OH)—C(OH):NOH.

hydroximino. Isonitroso.

hydroxonium. Hydronium.

hydroxy. Hydroxyl. A prefix indicating the presence of the monovalent OH group in an organic compound analogous to acids of the lactic series. It is preferable to oxy-. **h. acetic acid.** Glycollic acid. **h. acetophenone.** $C_8H_8O_2$ = 136.10. $C_6H_4(OH)COMe$. *ortho-* A

liquid b.$_{10mm}$96–97. *meta-* A solid, m.95. *para-* A solid, m.110. **h. acetophenone carboxylic acid.** Acetyl hydroxybenzoic acid. **h. acid.** An organic compound containing both the hydroxyl and carboxyl radicals, or HO.R.COOH. *E.g.*,

monobasic, monohydroxy..... HO.R.COOH
dibasic, monohydroxy..... HO.R.$(COOH)_2$
monobasic, dihydroxy..... $(HO)_2$.R.COOH

etc. See *lactic acid series.* **h. amides.** Oxyamides. **h. aminobenzoic acid.** $C_7H_7NO_3$ = 153.0. Amino salicylic acid $NH_2.C_6H_3(OH)$-COOH. **3-** or *1.2.3-* Colorless crystals, m.235. **4-** or *1.2.4-* m.220. **5-** or *1.2.5-* m.283, soluble in water, alcohol or ether. **h. anthraquinone.** $C_{14}H_8O_3$ = 224.1. 1- or *α-* m.190. 2- or *β-* Yellow leaflets, m.302, very slightly soluble in water, soluble in alcohol or ether. **h. azobenzene.** $C_{12}H_{10}ON_2$ = 198.2. (*ortho-*) Colorless needles, m.83, slightly soluble in water, soluble in alcohol or ether. (*para-*) Colorless prisms, m.152, very slightly soluble in water, soluble in alcohol or ether; used in organic synthesis. **h. benzaldehyde.** $C_7H_6O_2$ = 122.2. (*ortho-*) A colorless liquid, d.1.159, m. −20, b.197, slightly soluble in water, soluble in alcohol or ether. (*meta-*) Colorless needles, m.104, b.240, soluble in water, alcohol or ether. (*para-*) Colorless needles, m.116, soluble in alcohol, ether, or water. **h. benzamide.** $C_7H_7O_2N$ = 137.1. (*ortho-*) Yellow leaflets, m.140, decomp. 270, soluble in water. (*meta-*) Colorless leaflets, m.167, soluble in water, alcohol or ether. (*para-*) Colorless needles, m.162, soluble in water alcohol or ether. **h. benzene.** Phenol. **h. benzoic acid.** $C_7H_6O_3$ = 138.1. (*ortho-*) Colorless needles, m.158, slightly soluble in water, soluble in alcohol or ether. (*meta-*) Rhombic crystals, m.200, slightly soluble in water, soluble in alcohol or ether. (*para-*) Colorless monoclinic crystals, d.1.404, m.201, slightly soluble in water, soluble in alcohol or ether. **h. benzylalcohol.** $C_7H_8O_2$ = 124.1. (*ortho-*) Saligenin. Colorless rhombic crystals, d.1.61, m.85, (sublimes), slightly soluble in water, soluble in alcohol or ether; used as an antiseptic. (*meta-*) Colorless needles, m.67, slightly soluble in water, soluble in alcohol or ether. (*para-*) Colorless needles, m.120, soluble in water, alcohol, or ether. **h. butyric acid.** $C_4H_8O_3$ = 104.1. (*alpha-*) 1-hydroxybutyric acid. Colorless crystals, m.43, decomp. 255, soluble in water, alcohol, or ether. (*beta-*) 2-hydroxybutyric acid, $CH_3CHOHCH_2COOH$. (*gamma-*) 3-hydroxybutyric acid, CH_2OH-$(CH_2)_2COOH$. Acetonic acid. **h. caffeine.** See *caffeine.* **h. caproic acid.** $C_6H_{12}O_2$ = 132.1. (*alpha-*) 1-hydroxycaproic acid, 1-oxycaproic acid. Colorless crystals, m.60, b.100, slightly soluble in water, alcohol, or ether. **h. choline.** Muscarine. **h. cinnamic acid.** Coumaric acid. **h. citric acid.** $C_6H_8O_8$ = 208.2. A colorless liquid, soluble in water, alcohol or ether; found in sugar beets. **h. ethylamine.** C_2H_7NO = 61.06. $NH_2(CH_2)_2OH$. A colorless liquid, d.1.022, b.171, produced by the putrefaction of kephalin and serin. **h. formic acid.** Carbonic acid. **h. glutamic acid.** $C_5H_9NO_5$ = 163.08. $NH_2(OH)C_2H_4(COOH)_2$. *β-* An amino-acid obtained by extraction of protein hydrolysate in butane. **h. isobutyric acid.** Acetonic acid. **h. isophthalic acid.** $C_8H_6O_5$ = 182.1. (*a-*) 2-hydroxy-1.3-isophthalic acid, 2-hydroxy-1.3-carboxylbenzene. Colorless needles, m.243, slightly soluble in water, soluble in ether or alcohol. (*s-*) 5-hydroxy-1.3-isophthalic acid. 5-hydroxy-1.3-carboxylbenzene. Colorless needles, m.288, slightly soluble in water, soluble in alcohol or ether. (*v-*) 4-hydroxy-1.3-isophthalic acid. 4-hydroxy-1.3-carboxyl benzene. Colorless needles m.305, slightly soluble in water, soluble in alcohol or ether. **h. peucedanin.** $C_{16}H_{14}O_5$(?). A lactone, m.142, from *Peucedanum officinale*, and *Imperatoria osthruthium.* **h. phenyl acetic acid.** $C_8H_8O_3$ = 152.06. *p-* $HO.C_6H_4.CH_2COOH$. An acid, m.148, produced from tyrosine by intestinal putrefaction. **h. phthalic acid.** $C_8H_6O_5$ = 182.1. (*a-*) 4-hydroxy (1.2)phthalic acid, 4-hydroxy-1.3-dicarboxylbenzene. Colorless rosettes, decomp. 181, soluble in water, alcohol or ether; used in organic synthesis. (*v-*) 3-hydroxy (1.2) phthalic acid. Colorless prisms, decomp. on heating, soluble in water, alcohol or ether. **h. propanone.** Acetol. **h. propionic acid.** Lactic acid. **h. pyridine.** Pyridone. **h. quinol.** 1.2.4-Trihydroxybenzene. **h. quinoline. 2-** Carbostyril. **4-** Kynurin. **8-** C_9H_7NO = 145.03. A precipitant for aluminum, magnesium and zinc. **h. quinoline carbonic acid.** (4-) Kynurenic acid. **h. succinic acid.** Malic acid. **h. terephthalic acid.** $C_8H_6O_5$ = 182.1. 2-hydroxy-1.4-terephthalic acid, 2-hydroxy-1.4-dicarboxylbenzene. A colorless powder, slightly soluble in water, soluble in alcohol or ether. **h. toluene,** Cresol. **h. toluic acid.** $C_8H_8O_3$ = 152.1. Methyl-hydroxybenzoic acid, methylsalicylic acid, cresotic acids. Ten possibilities, according to the position of:

(CH_3)		(COOH)		(OH)	
1	-	2	-	3	m.168
1	-	2	-	4	m.172
1	-	2	-	5	m.177
1	-	2	-	6	m.145
1	-	3	-	2	m.163
1	-	3	-	4	m.151
1	-	3	-	5	m.208
1	-	3	-	6	m.172
1	-	4	-	2	m.204
1	-	4	-	3	m.177

They are all colorless needles, soluble in alcohol or ether; some are used in organic synthesis. **h. urea.** $CH_4O_2N_2$ = 76.1. $NH_2CONHOH$. Colorless needles, m.130, soluble in water or alcohol. **h. valeric acid.** $C_5H_{10}O_3$ = 118.1. *alpha-* $MeCH_2CH_2CHOHCOOH$. Colorless needles, m.31, soluble in water alcohol or ether.

hydroxyl. The monovalent —OH group. Its hydrogen can be replaced by positive elements (K, Na etc.), while the entire group can be replaced by halogens. **h. group.** The monovalent OH radical. **h. ion.** The monovalent OH^- ion, present in excess in all alkaline or basic solutions; also present in smaller quantities than the hydrogen ion (q.v.) in all aqueous acid solutions.

hydroxylamine. NH_2OH = 33.1. Oxyammonia. Colorless crystals, decomp. 130 (explosive), m.33, b.70, soluble in water, alcohol, or ether. Used as a reducing agent, and in the manufacture of synthetics. **amino-nitroso-phenyl-** Cupferron. **di-** The hypothetical compound HO.-NH.OH. **h. hydrochloride.** $HCl.NH_2OH$ = 69.6. Colorless crystals, soluble in water; used

as reducing agent, for the detection of acetone, sulfonic acids etc.

hydroxylamines. A group of organic compounds containing the monovalent NH_2O— group (alpha-hydroxylamines), or the monovalent —NHOH group (beta-hydroxylamines), *e.g.*,

NH_2OMe—*α*-methylhydroxylamine, methoxylamine, or methoxyamine*.

NHMeOH—*β*-methylhydroxylamine* or methylhydroxylamine*.

NH_2OEt—*α*-ethylhydroxylamine, ethoxylamine, or ethoxyamine*.

NHEtOH—*β*-ethylhydroxylamine or ethylhydroxylamine*.

alpha- An organic compound derived from hydroxylamine by substituting the hydroxyl hydrogen by an aryl or alkyl radical NH_2OAr (aroxyl amine) or NH_2OAk (alkoxyl amine). **beta-** An organic compound derived from hydroxylamine by substituting the hydrogen of the amino group by an alkyl or aryl radical: NHR—OH. **nitroso-** See *nitrosohydroxylamines*.

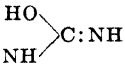
h. hydrochloride. $NH_2OH.HCl$ = 69.5. Oxammonium hydrochloride, hydroxylamine chlorhydrate. Colorless crystals, m.151, decomp. above this temperature, soluble in water or alcohol. Used as a reagent in determining gold, silver, copper, acetone, glucose or colchicine; in organic synthesis; as a reducing agent (developer); and in medicine, as an antiseptic. **h. hydrosulfate.** $(HN_2OH)_2H_2SO_4$ = 164.2. Hydroxylamine sulfate, oxammonium sulfate, hydroxylaminsulfate. Colorless crystals, m.140, soluble in water, alcohol, or ether; used in organic synthesis, as a reagent and reducing agent.

hydroxylamino. The monovalent radical —NH.OH, amidoxyl, derived from hydroxylamine.

hydroxylammonium. See *quaternary amines*.

hydroxylation. An oxidation as opposed to a hydrolytic reaction, by which one or more hydroxy-groups are formed within an organic molecule.

hydroxylimide. An organic compound of the type



metameric with amidoximes. Cf. *isomery*.

hydroxynaphthalene. Naphthol.

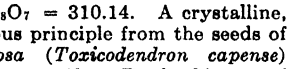
hydroxyphenyl. A prefix indicating the monovalent HOC_6H_4—group.

hydrozincite. $ZnCO_3.2Zn(OH)_2$. Zincbloom. A native hydroxide and carbonate of zinc occurring in massive or fibrous incrustations in zinc mines.

hyenanchin. $C_{15}H_{18}O_7$ = 310.14. A crystalline, extremely poisonous principle from the seeds of *Hyaenanche globosa* (*Toxicodendron capense*) hyena poison, boesmansgif, an Euphorbiaceae of South Africa; decomp. 234. **iso-** Decomp. 299.

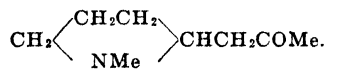
hyenic acid. $C_{25}H_{50}O_2$ = 382.5. Tricosylacetic acid. The saturate fatty acid $Me(CH_2)_{23}COOH$. A solid, m.78.

hygric acid. $C_6H_{11}O_2N$ = 129.09.

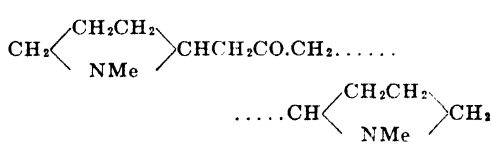


Cf. *nipecotic acid*. **4-hydroxy-** $C_6H_{11}O_3N.H_2O$ = 163.09. A crystalline, toxic principle from *Croton goubuga*, Transvaal croton bark, an Euphorbiaceae of South Africa.

hygrine. $C_8H_{15}ON$ = 141.2. An alkaloid from coca leaves,



A liquid, d.0.935, b.195. **cusco-** $C_{18}H_{24}ON_2$ = 226.19. An alkaloid, $b._{23mm}170$, from coca leaves,



hygrol. Colloidal mercury.

hygrometer. A device for measuring the amount of moisture in the atmosphere. See also *psychrometer*. **chemical-** A hygroscopic mixture of chemicals which indicate the atmospheric moisture by a change of color (cobalt salts) or the formation of crystalline precipitate (camphor solutions). **physical-** A dry- and wet-bulb thermometer. The difference between their readings indicates the humidity by reference to tables. **whirling-** A physical h. which is attached to a handle in such a way that it may be whirled round rapidly, thereby producing rapid circulation of air around the thermometer bulbs.

hygrometric. Pertaining to humidity. **h. paper.** A filter paper impregnated with a solution of 4 pts. $CoCl_2$, 2 pts. NaCl, 1 pt. acacia, 11 pts. H_2O, and 1 pt. glycerin. The amount of moisture is indicated by colors ranging from red (moist) to blue (dry). **h. scale.** An erroneous term for hydrometric scale. **h. state.** Humidity.

hygrometry. The measurement of the humidity or moisture of the atmosphere.

hygroscopic. Becoming moist; as a substance which absorbs water from the atmosphere, *e.g.*, $CaCl_2$, or PCl_5. See *desiccants*, *deliquescence*, *hydrophilic*.

hygroscopy. Hygrometry.

hygrosterol. A dextrorotary phytosterol from the roots of *Hygrophylia spinosa*, m.194.

hylergography. The study of the influence of foreign matter on the working of living cells.

hylogenesis. The theory of the formation of matter (ὕλη = hyle, greek for matter).

hylon. The positive nucleus of the atom.

hylotropic. A substance which can undergo a change in phase (*e.g.*, be melted or distilled), without a change of composition.

hylotropy. The property of a substance of having a constant melting or boiling point. Cf. *azeotropy*.

hymolal salts. The salts of sulfuric esters of monohydric alcohols of high molecular weight; *e.g.*, sodium lauryl sulfate, $CH_3(CH_2)_{10}CH_2O.SO_3Na$; used as detergents.

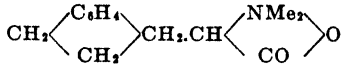
hyoscine. $C_{17}H_{21}O_4N$ = 303.17. Scopolamine. An alkaloid obtained from several Solanaceae. A thick, nearly colorless syrup, soluble in alcohol, ether or chloroform, and optically-active (*levorotatory*). Its salts are used as hypnotics. Cf. *scopoline*, *scopomannite*. **inactive-** Atroscine. **h. hydrobromide.** $C_{17}H_{21}O_4N.HBr.3H_2O$. = 438.2. Atroscin. The tropic ester of scopine. Scopolamine hydrobromide. Colorless crystals, m.194, (anhydrous), soluble in water, or alcohol; used as a hypnotic (twilight sleep). **h. hydro-**

chloride. $C_{17}H_{21}O_4N.HCl.2H_2O$. Scopolamine hydrochloride. Colorless crystals, m.200, soluble in water or alcohol; used as a hypnotic, anodyne and antispasmodic. **h. hydroiodide.** $C_{17}H_{21}O_4N.HI$ = 417.13. Scopolamine hydroiodide. Colorless prisms, soluble in water or alcohol. **h. hydrosulfate.** $(C_{17}H_{21}O_4N)_2.H_2SO_4$ = 676.49. Scopolamine sulfate. Colorless crystals, soluble in water or alcohol. **h. sulfate.** Hyoscine hydrosulfate.

hyoscyamine. $C_{17}H_{23}O_3N$ = 289.3. Daturine. An alkaloid from *Hyoscyamus niger* and other solanaceous plants, isomeric with atropine. Colorless fibrous needles, m.107, slightly soluble in water, soluble in alcohol or ether; used as a hypnotic, sedative and antispasmodic. **h. bromide.** H. hydrobromide. **h. chloride.** H. hydrochloride. **h. hydrobromide.** $C_{17}H_{23}O_3N.HBr$ = 370.2. Colorless prisms, m.152, soluble in water or alcohol; used as a hypnotic. **h. hydrochloride.** $C_{17}H_{23}O_3N.HCl$ = 325.7. Colorless crystals, soluble in water or alcohol; used as a hypnotic. **h. hydroiodide.** $C_{17}H_{23}O_3N.HI$ = 417.3. Colorless crystals, soluble in water or alcohol; used as a hypnotic. **h. hydrosulfate.** $(C_{17}H_{23}O_3N)_2.H_2SO_4$ = 676.6. H. sulfate. Colorless crystals, m.199, soluble in water, alcohol or ether. **h. salicylate.** $C_{17}H_{23}O_3N.C_7H_6O_3$ = 427.3. Colorless crystals, soluble in water or alcohol; used as a hypnotic. **h. sulfate.** H. hydrosulfate.

hyoscyamus. Henbane, poison tobacco, hog bane. The dried leaves and tops of *H. niger*, a solanaceous plant, which should contain not less than 0.065 % alkaloids (hyoscine, hyoscyamine, etc.); used as a sedative, analgesic, and antispasmodic.

hypaphorine. $C_{13}H_{17}O_2N$ = 203.15. Trimethyl tryptophane



An alkaloid from the seeds and bark of *Hypaphorus subrumbrans*, a solanaceous plant. Colorless crystals, soluble in water.

hyper- A prefix from the Greek, indicating an excess or more; *e.g.*, hyperoxide or peroxide.

hyperchromic. Describing a radical which causes an increase in the colour intensity of a coloring material; see *hypsochrome*.

hyperol. Ortizon.

hypersthene. $(FeMg)O,SiO_2$. A brown or green ferruginous, orthorhombic, pyroxene mineral. It resembles enstatite.

hypertensin. Renin.

hypertonic. Describing a solution having a higher osmotic pressure than blood or another solution with which it is compared (as opposed to isotonic and hypotonic).

hypnacetine. $C_{16}H_{15}O_3N$ = 269.2. Hypnoacetine. $PhCO.CH_2OC_6H_4NHCOMe$. Colorless crystals, m.160, slightly soluble in water, alcohol or ether; used as an antiseptic and hypnotic.

hypnal. $C_{13}H_{13}O_2N_2Cl_3$ = 335.5. Chloralhydrateantipyrine, monochloralantipyrine, chloralantipyrine. Colorless crystals, m.67, soluble in water, alcohol or ether; used as a hypnotic, antipyretic and analgesic.

hypnoacetine. Hypnacetine.

hypnone. Acetophenone.

hypnotic. An agent which produces sleep, *e.g.*, chloral, paraldehyde, bromides, sulfonal, semnal. Cf. *soporific, somnifacient*.

hypo- (1) A prefix from the Greek, indicating below or under. (2) Common name for sodium hyposulfite, used as a photographic fixing agent.

hypoborate. A compound of the type MH_2BO, which is readily decomposed and a strong reducing agent.

hypobromite. A compound derived from hypobromous acid containing the monovalent—BrO radical. **h. nitrogen.** The nitrogen which can be liberated from organic compounds by hypobromites.

hypobromous acid. HBrO = 96.93. An unstable compound of monovalent bromine, b.40 (in vacuo).

hypochlorite. (1) A compound containing the monovalent—ClO radical. (2) The hypochlorites of sodium, potassium, calcium or magnesium, used in bleaching.

hypochlorous acid. HClO = 52.5. An oxyacid of chlorine containing monovalent chlorine; it is readily oxidized to chlorous acid or reduced to free chlorine.

hypochlorous ion. The monovalent ClO^- ion.

hypodermic. Beneath the skin; as, an injection.

hypogaeic acid, hypogæic acid. $C_{15}H_{29}COOH$ = 254.3. 7-Hexadecenoic acid*. A fatty acid in tallow and some oils, notably arachis (peanut) oil. Colorless needles, m.33, $b._{15mm}236$, insoluble in water, soluble in alcohol or ether. Cf. *physetoleic acid*.

hypoiodous acid. HIO = 143.9. A hypothetical acid. **ammono-** H_2IN = 142.9. A solution of I in liquid NH_3; used as nitridizing agent.

hypon. A hypothetical noble gas, atomic number 118, assumed to be the radioactive source of stellar energy.

hyponitrite. A compound containing the monovalent NO— or divalent N_2O_2=radical, of the general type MNO or $M_2N_2O_2$; used in synthetic chemistry.

hyponitrous acid. $H_2N_2O_2$ = 62.2. An oxyacid of monovalent nitrogen, isomeric with HNO, decomp. to N_2O; an active reducing and oxidizing agent.

hypophamine. The hormone of the posterior lobe of the pituitary gland. **α-.** Oxytocin, pitocin. The uterus-contracting principle. A white powder, soluble in water and 150 times as potent as the International Standard powdered Pituitary. **β-.** Vasopressin, pitressin. The blood pressure-raising principle. A white stable powder, soluble in water, and 80 times as potent as the International Standard powdered Pituitary.

hypophorine. $C_{14}H_{18}N_2O_2$ = 246.11. Trimethyltryptophane. An amino acid, decomp. 255, from the proteins of the seeds of erythrina; it causes tetanus in frogs.

hypophosphate. A compound containing the trivalent $\equiv PO_2$ radical, or the monovalent acid $—HPO_3$ radical.

hypophosphite. A salt of hypophosphorus acid, containing the $—H_2PO_2$ radical.

hypophosphoric acid. H_3PO_3 = 66.05. An oxyacid of monovalent phosphorus. m.17.4, decomp. on further heating to phosphine and phosphoric acid.

hypophosphorous acid. A 30 % aqueous solution of HPH_2O_2 or $HP(OH)_2$.

hypophysis. Desiccated pituitary body. The cleaned, dried, and powdered posterior lobes of the pituary body of cattle. A yellowish or grayish amorphous powder of characteristic odor, slightly soluble in water; used as a stimulant and hemostatic.

hyposulfate. (1) Dithionate. (2) Thiosulfate.

hyposulfite. (1) A compound containing the divalent $=S_2O_4$ radical. (2) Hypo or antichlor. The sodium thiosulfate used in bleaching and as a photographic fixing bath. **h. process.** A method of extracting silver from roasted ores by leaching with sodium hyposulfite solution and precipitating the silver with sodium sulfide.

hyposulfuric acid. Dithionic acid.

hyposulfurous acid. Hyposulphurous acid. A term no longer used, but formerly applied incorrectly to dithionous acid. It more correctly describes sulfoxylic acid, q.v.

hypothesis. A theory which has not been fully proved by experiment. Cf. *theory, law.*

hypotonic. A solution having a lower osmotic pressure than blood, (less than 6.6 atmospheres), as opposed to hypertonic and isotonic.

hypovitaminosis. Vitaminosis.

hypoxanthine. $C_5H_4ON_4$ = 136.1. Sarkine, 6-oxypurine, xanthoglobulin *6(1)*-purinone. Colorless needles, decomp. 150, insoluble in water. Cf. *purines.*

hypsochrome. A radical which when introduced into a colored compound intensifies the color by shifting it towards the violet. Cf. *hyperchromic, bathochrome, auxochrome.*

hyptolide. $C_{18}H_{26}O_8$ = 370.3. The bitter principle of the leaves of *Hyptis pectinata*, a labiataceous plant. Colorless needles, soluble in hot water, alcohol or ether.

hyraldite. A preparation consisting principally of sodium thiosulfate and formaldehyde, used in bleaching.

hyrax. A synthetic resin used as mounting agent for microscopic work requiring a high refractive index (n. 1.75).

hyrgol. A colloidal solution of mercury, used in syphilis.

hyssop. The dried leaves of *Hyssopus officinalis.* Used as the fluid extract as an aromatic stimulant, carminative and tonic. **wild-** Verbena. Cf. *ysopol.* **hedge-** See *gratiolin.* **h. oil.** A colorless oil distilled from hyssop, d.0.932, soluble in alcohol, ether, or benzene. Used in flavoring extracts.

hystazarin. $C_{14}H_8O_4$ = 240.1. 2,3-dihydroxyanthraquinone. Orange-yellow needles, m.260, soluble in alcohol or ether. Used as a dye.

hystazine. Hystazarin.

hysteresis. (1) The magnetic lag, or retention of the magnetic state of iron in a changing magnetic field, due to the reluctance of the molecules to rotate freely. (2) The retardation of a chemical system in reaching equilibrium.

Hytor compressor. A rotary pump or blower employing a centrifuged liquid to obtain suction or pressure.

hyzone. Triatomic hydrogen. Cf. *ozone*

I

i. (1) An abbreviation for inactive (optically inactive = *dl*). (2) An abbreviation for *iso-* (3) The Van't Hoff factor.

I. The symbol for: (1) iodine; (2) moment of inertia; (3) ionic strength; (4) electric current; (5) light intensity. I^-,I'. Symbols for the iodide ion.

I. A. T. M. International Association for Testing Materials.

I. C. I. Imperial Chemical Industries, Ltd.

I. G. An abbreviation for "Interessen Gemeinschaft" q.v.

I. P. K. International Prototype kilogram.

I. P. M. International Prototype meter.

I. R. Insoluble residue (in analysis).

I. U. International unit.

I. W. An abbreviation for isotopic weight.

iatrochemistry. A 16th century school of medicine based on the principles of Paracelsus.

iatrol. $C_8H_{11}O_3NI_2$ = 423.2. Oxyiodoethylanilide, $PhNH.O_2EtOI_2$. A grayish powder, insoluble in water, soluble in alcohol or ether; used as an antiseptic.

ibit. Bismuth oxyiodotannate. A gray powder, isoluble in alcohol or ether; used as a bactericide and disinfectant.

ibogaine. $C_{26}H_{32}O_2N_2$ = 404.26. An alkaloid, m.152, from the roots of *Tabernanthe iboga;* the latter is used as an arrow poison in the Congo and has a narcotic effect.

-ic. (1) A suffix indicating a higher valency, as compared with -ous. Thus ferrous (2) and ferric (3); sulfurous (4) and sulfuric (6). (2) A termination of acids generally. Cf. *-ate* (the salt).

ice. Frozen or solid water. A transparent colorless solid, d.0.92, m.0. **dry-** Solid carbon dioxide, used as refrigerating packing material. **salt-** Frozen brine, m. −21 (−6°F). A 2.5 lb. eutectic mixture has the same effect as 1 lb. solid carbon dioxide (dry ice). **i. flowers.** Water flowers. Negative ice-crystals produced in a slab of ice by exposure to heat rays. **i. ton.** The theoretical number of heat units required to melt one ton of ice at 0°C. to water of 0°C. For a 2000-pound ton it equals 284,000 B.Th.U. **i. water mixture.** A mixture of pure water and crushed ice; used to maintain a constant temperature of 0°C.

Iceland agate. An obsidian from Iceland. **I. moss.** Cetraria. The dried lichens *Cetraria islandica*, which occur as grayish white, brown or reddish plant bodies. Cf. *cetraric acid, cetrarin, lichen stearic acid, thallochlor.* **I. spar.** A transparent variety of calcite possessing the power of double refraction and used in polariscopes (Nicol prism).

chthalbin. Ichthyol albuminate. A fine grayish-white powder, odorless, tasteless, insoluble in water; used as an antiseptic.

ichthargan. Ichthyol silver, silver sulfoichthyolate. A brown powder containing 30 % silver and 15 % sulfur, soluble in water, dilute alcohol, or glycerin; used as an antiseptic and astringent.

ichthulin. A glycoprotein (q.v.) from the eggs of the carp.

ichthylepidin. A protein of fish scales, intermediate between collagen and keratin.

ichthyocolla. Isinglass.

ichthyoform. Ichthyolformaldehyde. A blackish-brown, odorless powder, insoluble in water or alcohol; used as an intestinal antiseptic.

ichthyol. $C_{28}H_{36}S_3O_6(NH_3)_2.2H_2O$ = 634.40. Ammonium ichthyolsulfonate, anysin, ammonium ichthyolate. A reddish brown to black syrup of characteristic empyreumatic odor and burning taste, obtained by distillation of bituminous shale; is soluble in water, partly soluble in alcohol or ether. Used as an antiseptic, alterative, and astringent. **i. albuminate.** Ichthalbin. **i. formaldehyde.** Ichthyoform. **i. silver.** Ichthyolate. **i. sulfonic acid.** The dibasic acid $C_{28}H_{38}O_6S_3$, derived from ichthyol. Cf. *sulfoichthyolic acid.*

ichthyolate. A compound containing the bivalent $=C_{28}H_{36}S_3O_6$ radical.

ichthyophthalmite. A variety of apophyllite, sometimes used as gem.

iconoscope. Electric eye. An instrument in which invisible radiations (*e.g.*, x-rays, ultraviolet rays) are rendered visible by impact against a luminescent screen. A cathode-ray tube and a screen consisting of a mosaic of tiny photo-electric cells is used as the source of picture modulation signals in television.

icosane. Eicosane.

icosinene. $C_{26}H_{38}$ = 278.4. A liquid hydrocarbon from ozocerite.

-id, -ide. A suffix indicating: (1) a compound derived from a negative or nonmetallic element and usually a binary compound, as chloride, sulfide, phosphide, nitride, carbide, etc.; (2) a glyceride.

-idene. A suffix indicating a bivalent radical with a point of attachment to a single atom; thus:

$R.CH_2.CH_2.R$ and $CH_3.CH.R_2$

R-ethyl*ene* R-ethyl*idene*

idioblast. A hypothetical unit of the living cell, a biophore.

idiosyncrasy. An abnormal, constitutional or personal reaction to the effects of certain substances. Cf. *allergy.*

idite, iditol. $C_6H_{14}O_6$ = 182.1. A hexatomic alcohol occurring in the d- and l- form. Cf. *idonic* and *idosaccharic acids.*

-ido. A suffix which denotes the substitution of an NH_2 group by an acid residue (*e.g.*, an acetyl group).

idocrase. A variety of vesuvianite, used as gem.

idonic acid. $C_6H_{12}O_7$ = 196.1. A monobasic, pentahydroxy acid, derived from idite.

idosaccharic acid. $C_6H_{10}O_8$ = 210.1. A dibasic, tetrahydroxy acid, derived from idite.

idose. $C_6H_{12}O_6$ = 180.1. Pentahydroxyhexanal. A hexose or aldose sugar, isomeric with glucose; osazone m.156.

idrialene. $C_{22}H_{14}$ = 278.11. A hydrocarbon from asphalt. **methyl-** $C_{23}H_{16}$ = 291.11. White solid.

idryl. Fluoranthene.

idoplatinic acid. Platinic acid.

amid. A German trade name for superpolyamide synthetic fibers.

igepon. A. $C_{30}H_{57}O_5SNa$. An ester of sodium isethionate and oleic acid, $C_{17}H_{33}COOCH_2CH_2SO_3Na$, used as detergent. **T.** A substituted amide of oleic acid, $C_{17}H_{33}CONMe.CH_2CH_2SO_3Na$, used as detergent.

ignatia. Saint Ignatius' bean, ignatia bean. The dried ripe seeds of *Strychnos ignatia*, a loganiaceous plant. It contains 2 % alkaloids, mainly strychnine and brucine. **i. alkaloids.** See *strychnine, brucine.* **i. bean.** Ignatia.

igneous. Plutonic. A term applied to rocks formed from a molten state, as opposed to sedimentary rocks.

ignis. A fire.

ignite. (1) To heat a substance at a high temperature until no more loss in weight occurs. (2) To set fire to a reaction mixture, with or without a primer.

ignition. Combustion, burning, or setting on fire. In analysis: (a) the complete oxidation of an organic compound by means of oxygen gas and heat. (b) The heating of an inorganic compound until all volatile matter has been driven off. (c) Placing a flame directly or indirectly in contact with a reaction mixture until the reaction starts and continues, with or without production of a flame, to its completion; as, a mixture of Al and Fe powder. **pre-** See *knock.* **i. point.** Kindling temperature. The temperature at which a substance begins to burn. It is defined as the temperature at which the rate of gain of heat by a volume of vapor balances the rate of loss of heat; the substance then ignites. It usually depends on the fineness of the particles; *e.g.*, powdered zirconium (0.4–8μ) ignites at 210°C. Cf. *flash point.*

ihlenite. A native ferric sulfate, $Fe_2(SO_4)_3.12H_2O$.

ilang-ilang. Ylang-ylang.

iletin. A brand of insulin.

Ilex. A genus of shrubs and trees, Aquifoliaceae, to which the hollies belong. Cf. *bird-lime, maté, ilexanthin.*

ilexanthin. $C_{17}H_{23}O_{11}$ = 403.2. The yellow coloring matter of *Ilex aquifolium*, (holly), an Aquifoliaceae. Yellow needles, m.198, decomp. 214, insoluble in cold water or ether, soluble in hot water or alcohol.

ilicic alcohol. $C_{30}H_{50}O$ = 426.5. α-Amyrin. A substance, m.185, b. exceeds 300, prepared from *Ilex* species; used as a constituent of bird-lime.

ilicin. A bitter principle from holly, *Ilex aquifolium.*

ilicyl alcohol. $C_{22}H_{38}O$ = 318.29. A waxy solid, m.139, b.360.

-ilium. A suffix indicating tetravalent oxygen; as pyrylium. Cf. *-inium.*

illicium. Star *anise.*

illinium. Il = 146–147(?). A rare earth metal and element, atomic number 61, discovered in 1926 by B. S. Hopkins by the fractional crystallizations of samarium and niobium salts. It gives the characteristic x-ray spectrum with a line at 5810Å., and was named in honor of Illinois. With the exception of elements No. 85 and 87 it is the last element which can be discovered, as it completes the series of elements from hydrogen to uranium. It is also called "florentium" by Rolla and Fernandes, who claimed priority in its discovery. It occurs in minute traces in monazite, gadolinite and xenotime.

illinum. An acid-resistant alloy of Ni, Cr, Co, W, Al, Mn, Ti, B and Si for the construction of acid-resistant pumps, calorimetric bombs, etc. invented by S. W. Parr.

illipé. (1) The fat of *Bassia latifolia* or *B. longifolia.* (2) Borneo tallow. This is a misnomer. See *tallow.*

illipene. $C_{64}H_{106}$ = 874.7. An unsaturated hydrocarbon from the unsaponifiable matter of illipé.

illuminant. An agent which produces light; as, a candle, electric bulb or flame.

illuminating gas. A gas mixture used for illuminating purposes, containing approximately H(50 %), CH_4(28 %), C_nH_{2n}(4.5 %), CO(2 %), N(2 %), O(6 %). Cf. *gas, natural gas.*

illumination. (1) The act of lighting up. (2) The quantity of light thrown on an object: I = F/S, where I is the intensity of illumination, F the flux density and S the surface area. It is measured in metercandles, foot-candles, phot, or lux. **axial-** Light passing in the direction of the axis of a microscope. **dark-ground-** Light passing at right angles to the direction of the axis of a microscope. **direct-** Light falling on the object on the stage of a microscope from above without being reflected from the mirror. **indirect-** Dark-ground i. Cf. *ultramicroscope.*

illuminator. A device for producing light; as a lamp for microscopes or other instruments.

illuminometer. (1) A device for measuring the intensity of light. (2) A photometer.

ilmenite. Menacantite, geikielite, $FeTiO_3$. A native, black iron titanate, used as a gem.

ilmenium. A supposed element, which proved to be a mixture of niobium and tantalum.

ilvaite. $CaFe_2Fe(OH)(SiO_4)_2$. Yenite. A hydrous silicate of iron and calcium, sometimes used as a gem.

im- A prefix indicating the divalent >NH group.

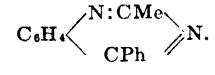
image. (1) The likeness or a reproduction of an object. (2) The picture of an object formed by rays of light after passing through an optical device. **real-** An image formed at the place where the rays of light meet or converge. **virtual-** An apparent image, formed in the direction from which the rays enter the eye. The rays do not converge at the point where the image is seen, but would do so if produced backwards.

image-stone. A variety of pyrophillite, sometimes used as gem.

imasatic acid. Isamic acid.

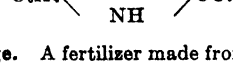
imasatin. The lactam of isamic acid, q.v.

imazine. An organic compound containing the trivalent =C:N.CH:N— radical; as in phen-β-methyl-α-phenylimazine,



Imbibition. The absorption of a liquid by a solid or gel.

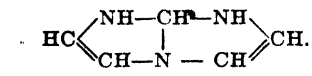
imesatin. $C_9H_6ON_2$ = 146.1. β-amino-isatin, 3-iminoöxindole. The heterocyclic compound



Imhoff sludge. A fertilizer made from sewage run into settling tanks, where the solid matter settles with the aid of anaerobic bacteria. It contains 2–3.3 % N and 1 % P.

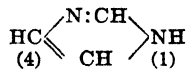
imid. Imide.

imidazimidazole. $C_6H_7N_3$ = 109.07. The bicyclic heteroatomic compound



Its isomers have the N in different positions.

imidazole. $C_3H_4N_2$ = 68.1 1,3-diazole, glyoxaline. The monocyclic heteroatomic ring compound



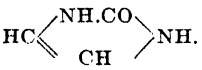
Cf. *glyoxaline.* *2.4.5*-**triphenyl-** Lophine.

imidazoledione. Hydantoin.

imidazoleethylamine. Histamine.

imidazoletrione. Parabanic acid.

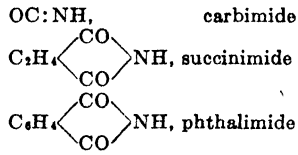
imidazolone. $C_3H_4ON_2$ = 84.1. Iminazolone. The heterocyclic compound

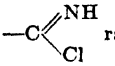


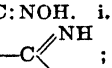
Colorless crystals, m. −105. Cf. *creatinine.*

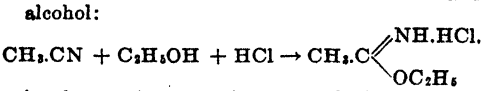
imidazolyl. The monovalent radical, C_3H_3N—, derived from imidazole. There are four isomers. **i. ethylamine.** Histamine. **i. mercaptan.** $C_3H_3N_2SH$ = 100.2. **meta-** Colorless crystals, m.222.

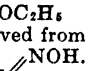
imide. (1) A compound containing the divalent >NH group, or a secondary amine, R_2NH, in which R is an acyl radical. (2) A compound derived from acid anhydrides in which O is replaced by NH; thus:



acid- A compound of the type R.C:NH.OH. Cf. *imino bases.* **cyclic-** A ring formed by replacing two —OH groups by >NH; as, maleinimide, pyrotartrimide. **di-** See *diimide.* **i. chloride.** A compound containing the monovalent  radical, formed by the action of HCl on nitriles: $R.C{:}N + HCl \rightarrow R.C{:}NH.Cl$. **i-group.** Imido.

imido. The divalent radical, >NH. Cf. *imino, imide.* **acet-** The radical MeC(:NH)—. **i. carbamide.** Guanidine. **i. carbonic acid.** $(HO)_2C{:}NOH$. **i. esters.** A compound of the type  ; obtained as hydrochloride by the action of HCl on a mixture of a nitrile and alcohol:



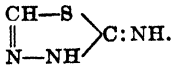
i. ethers. A group of compounds derived from i. carbonic acid; of the general type 

i. hydrogen. The H of the NH-group, which is replaceable by metals, such as Ag, K.

imidodiphenyl. Carbazole.

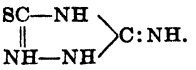
imidogen. Imido group.

imidothiobiazoline. $C_3H_3N_3S$ = 101.2. The heteroatomic ring compound:



Colorless crystals, 191.

imidothiourazole. $C_2H_4N_4S$ = 116.2. The heteroatomic ring compound:



Colorless crystals, m.222.

imidoxanthin. Guanine.

iminazolone. Imidazolone.

imineazole. Glyoxaline.

imino. The bivalent =NH group which may be attached to one or two carbon atoms, as =C:NH or —C.NH.C—. **i. bases.** A group of compounds containing the =C:NH group, such as guanidine, creatine, creatinine, etc. **i. acetic acid.** $C_4H_7O_4N$ = 133.1. $NH(CH_2COOH)_2$. Colorless rhombic crystals, m.225, soluble in water, insoluble in alcohol or ether. **i. acetonitrile.** $C_4H_5N_3$ = 95.1. $NH(CH_2CN)_2$. Colorless leaflets, m.75 soluble in water, alcohol, or ether. **i. ethanol.** $C_4H_{11}O_2N$ = 103.1. $NH(CH_2CH_2OH)_2$ = 105.1. Colorless crystals or liquid m.28, b.270, soluble in water, alcohol, or ether. **i. ethyl alcohol.** Iminoethanol. **i. nitrogen.** See *ammonia nitrogen.* **i. urea.** Guanidine.

immersion. Submerging in a liquid. **oil-** Covering an object and objective of a microscope with oil. **water-** Connecting the object and objective of the microscope with a few drops of water.

i. electrode. An electrode which can be lifted from the liquid and immersed at will. **i. objective.** See *objective.*

immiscible. Describing liquids which will not mix with one another. **i. solvent.** A liquid which dissolves a substance from a solution with which it does not mix; as "shaking out" a dissolved substance with ether, chloroform, etc., from an aqueous solution and separating the two liquids. See *partition coefficient, distribution coefficient, Perrin equation.*

immune. Completely resistant to a disease. **i. body.** An amboceptor, q.v. **i. serum.** The serum from the blood of an actively-immunized animal, containing the antibodies for a certain disease.

immunity. The power of resistance of an organism to withstand infection (opposed to susceptibility). **acquired-** I. acquired by a previous attack of the disease, or by inoculation with bacterial preparations. **active-** I. in which the cells of the organism manufacture antibodies, stimulated by bacterial preparations or a slight attack of the disease. **natural-** I. with which an individual is born. **passive-** I. in which the cells of the organism do not manufacture the antibodies, and which depends entirely on inoculated immunizing sera. **theory of-** See *Ehrlich's side-chain theory.*

immunization. The process of enabling an organism to withstand the harmful effects of microorganisms, to endure the metabolism products of the invader without injury, and finally to be able to destroy the parasite.

immunochemistry. The branch of science which deals with the chemical changes and phenomena of immunity. Cf. *Ehrlich's theory.*

immunology. The science dealing with immunity.

immunotherapy. A system of treatment by the action of vaccines.

impact. A sudden collision. **atomic-** The collisions between electrons and protons; as, in the bombardment of a gas with cathode rays. Cf. *Wilson tracks.* **molecular-** The collisions between molecules which are essential for the progress of a reaction. It is assumed, that without them no chemical change could take place, as molecules must come in contact before their atoms can be exchanged.

imperatorin. $C_{16}H_{16}O_4$ = 272.2. Peucedanin. A tasteless, crystalline principle from masterwort, the root of *Imperatoria ostruthium*, an Umbelliferae. Colorless prisms, m.98; soluble in alkalis, ether, or warm alcohol. Cf. *osthruthin.*

imperial jade. A green aventurine quartz, used in China as a gem. **i. yu stone.** I. jade.

imperialine. $C_{35}H_{60}O_4N$ = 558.6. A colorless crystalline alkaloid, decomp. 254, from *Fritillaria imperialis*, a Liliaceae.

impermeable. Not permitting a passage.

impervious. Impenetrable, non-absorbent.

impinger. An apparatus for sampling dust (q.v.) in air by drawing it at high velocity through a glass tube and letting it strike a wet glass plate; microscopic counts are made on the plate.

impregnate. To saturate or charge with a gas or liquid.

impregnation. Saturation with a protective material; as, waterproofing, fireproofing, etc. Cf. *introfaction.*

improver. (1) A mixture of starch and salts (as, phosphates, chlorides, sulfates of calcium, sodium, or ammonium), added to flour to stimulate the yeast and improve the rising properties of the bread. (2) Bleaching or whitening agents (as, persulfates, iodates, bromates, nitrogen chloride, nitrosyl chloride or chlorine), added to flour to remove or mask the color due to carotene.

I.M.S. Industrial methylated spirit.

in. Abbreviation for inch. q.v. in^2. square inch; in^3. cubic inch. **in-** A prefix indicating: (1) within; (2) not, *e.g.*, *in*organic. **-in.** A suffix indicating: (1) a neutral carbohydrate, as, inulin; (2) glucoside, as, amygdalin; (3) protein, as, albumin; (4) a glyceride, as palmitin. For alkaloids the suffix *-ine* is customary; as, morphine.

In. The symbol for indium.

inactivate. To destroy activity.

inactivation. Destruction of activity (as, of a catalyst or a serum) by chemical or physical means.

inactive. Describing a compound having an asymmetric carbon atom and yet no optical activity. **divisibly-** Able to be resolved into two optically-active substances or racemic compounds. **indivisibly-** Unable to be resolved into its optically-active components.

Inca stone. A pyrite used as a gem.

incandescence. A state of glowing with intense brilliance.

incandescent. Emitting heat or light or both by virtue of being at a high temperature. **i. light.** An electric light bulb which producing light by the passage of an electric current through a fine metallic filament, which becomes heated to a bright glow.

incendiary. An agent that causes combustion. Classes: a. *Spontaneously inflammable solids*, such as P, Na, and liquids such as $ZnEt_2$, PH_3, SiH_4, CrO_2Cl_2, P in CS_2. b. *Metallic powders*, such as thermite, FeO Al, Mg $KClO_4$. c. *Oxidizing combustible mixtures*, such as KNO_3, $Ba(NO_3)_2$, BaO_2, PbO_2 or $KClO_3$ with C, S, Sb, Al or organic compounds. d. *Flammable material* such as petroleum oils, CS_2.

inch. A unit of length in the English system. 1 in = $\frac{1}{12}$ foot; $\frac{1}{36}$ yard; $\frac{1}{63,300}$ mile; $\frac{1}{4}$ of a hand. 1 in. = 2.54 cm = 25.4 mm. = 254,000 Ångstrom Units (= 100 lines = 1000 points). Its fractions and their metrical equivalents are:

$\frac{1}{2}$ in. = 12.70 mm.
$\frac{1}{4}$ in. = 6.35 mm.
$\frac{1}{8}$ in. = 3.175 mm.
$\frac{1}{16}$ in. = 1.588 mm.
$\frac{1}{32}$ in. = 0.794 mm.

cubic- in^3. or cu. in. A unit of volume in the English system. 1 in^3. = 0.0005787 ft^3. = 16.387 cm^3. **square-** in^2. or sq. in. A unit of area in the English system. 1 in^2. = 0.006944 ft^2. = 6.452 mm^2.

inchi grass oil. An oil from *Cymbopogon caesius* containing borneol, terpineol, camphene and limonene; used as a substitute for palmarosa oil.

incidence. The striking contact of one body with another. **angle of-** The angle made with the normal by a beam of light striking a surface.

incineration. Cremation. The process of burning to ashes. **i. dish.** A flat dish of alundum, platinum, or sillimanite, used for reducing substances to ash in analytical work.

incinerator. A laboratory furnace for burning refuse, especially that of dissected and infected animals.

incipient. Beginning. **i. red heat.** Beginning to glow. Cf. *color scale* (2).

inclination. Deviation. The angle of an object above the horizon.

inclinator. A stand in which large bottles or carboys are lodged so that they can easily be tipped for emptying.

inclusion. A state of being enclosed in or surrounded by a substance; as, enclosed gas in a metal, or suspended foreign matter in a crystal. Cf. *colloids.*

incompatibility. Inability to be mixed without impairing the original properties. **chemical-** Describing substances which, when mixed, react with each other. **physical-** The property of repellent substances, as, water and oil. **physiologic-** Describing drugs which have a mutually antagonistic effect. **therapeutic-** Describing drugs which have opposite therapeutic effects.

incompatible. Applied to a substance which for chemical, physical or physiological reasons can not be mixed with another without changing its nature or effect.

incomplete. Not carried to its greatest possible extent. **i. equilibrium.** Equilibrium that has not reached a balanced condition. **i. purification.** A purification process that leaves an impure product. **i. reaction.** Reversible *reaction.*

incompressibility. Not compressible. Ability to resist pressure without change of form or volume.

incompressible volume. That part of a gas which is not uniformly compressed according to the gas

law: the quantity *b* of van der Waal's equation, q.v.

inconel. A corrosion-resisting alloy of 80 % Ni, 14 % Cr and 6 % Fe.

increment. The addition to or augmentation of a substance; *e.g.*, during crystallization or in stalactite formation.

incrustation. The formation of a crust or scale.

incubation. The period elapsing between implanting an infection in a culture medium or an organism, and its first symptoms or growth.

incubator. A chamber or box kept at a definite temperature, usually 37°C., in which bacterial cultures are grown.

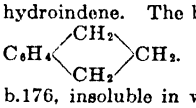
indaconine. $C_{27}H_{47}NO_9$ = 529.37. An alkaloid, m.94, from aconite.

indaconitine. $C_{34}H_{47}NO_{10}$ = 629.37. Acetyl benzoyl-ψ-aconine. An alkaloid from aconite, m.202.

indamine. $C_{12}H_{11}N_3$ = 197.2. Phenylene blue. $HN{:}C_6H_4{:}N.C_6H_4.NH_2$; obtained by the oxidation of p-phenylenediamine and aniline.

indamines. A group of dyestuffs derived from indoaniline and containing the =NH group instead of the quinone oxygen; as in indamine.

indan. C_9H_{10} = 118.1. Hydrindene, 2.3-dihydroindene. The bicyclic hydrocarbon,



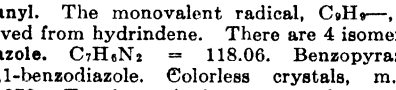
A colorless liquid, d.0.957, b.176, insoluble in water, soluble in alcohol or ether.

indandione. $C_9H_6O_2$ = 146.05. Diketohydrindene. **1.2-** White crystals, m.107. **1.3-** White crystals, m.130.

indanone. Indone.

indanyl. The monovalent radical, C_9H_9—, derived from hydrindene. There are 4 isomers.

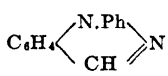
indazole. $C_7H_6N_2$ = 118.06. Benzopyrazole, 2,1-benzodiazole. Colorless crystals, m.146, b.270. Two isomeric ring compounds:

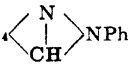
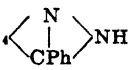


indazole (2,1-) isindazole (1,2-)

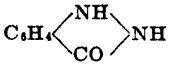
Cf. *benzimidazole, benzodiazole.*

indazole. A compound containing the indazole nucleus; as, **α-phenylisindazole.** Colorless crystals, m.142.

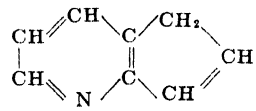


β-phenylindazole. Colorless crystals, m.84, b.345.  **γ-phenylindazole.** Colorless crystals, m.110. 

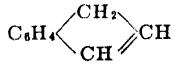
indazolone. $C_7H_7ON_2$ = 135.2. Benzopyrazolon. The bicyclic heteroatomic compound



indenazin. C_8H_7N = 117.1. 4-indenazin, 4-isobenzazol, 4-pyriden. The heterocyclic compound

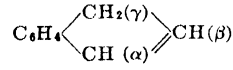


indene. C_9H_8 = 116.1. The hydrocarbon



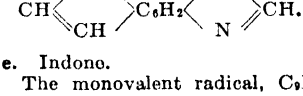
A colorless liquid, d.1.040, m. −2, b.188, soluble in alcohol or ether. **dihydro-** Hydrindene. **iso-** See *isoindene.* ***1*-methylene.** Benzofulvene.

indenes. Compounds derived from indene.



The Greek letters indicate the positions at which substitution may take place.

indenimidazol. $C_{10}H_8N_2$ = 156.2. The tricyclic heteroatomic compound



indenone. Indone.

indenyl. The monovalent radical, C_9H_7—, derived from indene; 7 isomers.

indeterminable. (German: unbestimmbar). That which cannot be determined.

indeterminate. (German: unbestimmt). That which cannot be predicted, but which when it happens, can be determined.

indeterminism. See *Heisenberg's principle.*

index. [pl. **indexes** or **indices**]. (1) Mathematical. The power to which a quantity is raised. (2) Physical. Any numerical ratio of measurement in comparison with a fixed standard; as, the i. of refraction. (3) Bibliographical A classified list; as, authors subjects, formulas, or patent numbers. **i. catalog.** A card catalog containing in alphabetical order the authors and subjects covering the books of a library or the articles of periodicals. **i. compound.** The parent substance under which derivatives are listed.

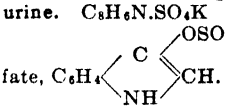
Decennial Index. A collective index published at ten-year intervals by: (1) Chemical Abstracts of the American Chemical Society, and (2) British Chemical and Physiological Abstracts.

Indian. I. agate. A moss agate used as a gem. **I. arrowroot.** Euonymus. **I. balm.** Trillium. **I. balsam.** Peru balsam. **I. barley.** Sabadilla. **I. bel.** Bael. **I. cannabis.** Cannabis. **I. corn.** Maize. **I. fig.** Prickly pear. **I. ginger.** Asarum. **I. gum.** (1) Ghatti gum, gummi indicum. The exudation of *Anogeissus latifolia*, a tree of India. Yellowish-white tears, soluble in water, and used as a mucilage. (2) Sterculia gum. **I. hemp.** Cannabis, **I. hippo.** Gillenia. **I. laburnum.** Cassia. **I licorice.** Abrus root. **I. ocher.** A native ferric oxide used as war paint by North American Indians. **I. physic.** Gillenia. **I. pink.** Spigelia. **I. poke.** Veratrum. **I. red.** (1) A red ocher from the Island of Ormus in the Persian Gulf, used in early times as a coloring material. (2) I. ocher. **I. rubber.** Rubber. **I. saffron.** Turmeric. **I. sage.** Eupatorium. **I. shot.** Cannabin. **I. tobacco.** Lobelia. **I.**

topaz. A saffron-yellow variety of topaz. **I. turnip.** The corm of *Arisaema triphyllum.* Used as an expectorant, and diaphoretic as the fluid extract. **I. yellow.** (1) Purree. A yellow pigment manufactured in India, containing the magnesium salt of purreic acid. (2) Azoflavin. (3) Cobalt and potassium nitrite. (4) Euxanthone.

india-rubber. Rubber.

indican. (1) $C_{14}H_{17}NO_6$ = 295.14. A glucoside from woad, *Isatis tinctoria*, a Cruciferae; also from indigo, *Indigofera* species, or leguminosaceous plants. Colorless leaflets, m.57, hydrolyzing to glucose and indoxyl, soluble in water. It is also formed from the indole present in the intestine during putrefaction. (2) **I. of urine.** $C_8H_6N.SO_4K$ = 251.2. Indoxyl sulfate,



A normal constituent of urine. **i. meter.** A device for estimating the quantity of i. in urine. **i. test.** To 5 cc. urine add a few drops of Obermayer's reagent (q.v.), shake, and add chloroform. After shaking the chloroform separates with a blue color if i. is present.

indicarmine. Indigo carmine.

indicator. (1) A solution of a substance which changes in color on the passage from acidity to alkalinity, or the reverse. The gradation of color changes is a measure of the pH value. (2) A substance which shows the beginning or end of a chemical reaction; as, ferric ammonium sulfate in the titration with KCNS; or starch in iodimetry. **achromatic-** A mixture of two i. or of an i. and dye which produces at the end point a color complementary to that of the i. itself at its transition point. The mixture thus appears colorless or grey at its end point; *e.g.*, methyl red (0.125 %) and methylene blue (0.0825 %). **acid-base-** Hydrogen ion-. **adsorption-** Substances which indicate the end point of a precipitation reaction by being released from the adsorbed state; as, rhodamine on silver chloride. **ammono system-** A substance which indicates the presence of an ammono acid or ammono base in a liquid ammonia solution; thus:

	Am. acid	Am. base
Hydrazobenzene	yellow	reddish
Hydrazotoluene	yellow	brown

aquo system- Hydrogen ion-. **Clark and Lubs-** A series of phthalein i. (q.v.) covering a pH range from 1.0 to 9.0. See table. **compound-** A mixture of indicators; as, universal i. **external-** Outside-. **fluorescent-** A substance which indicates an endpoint or pH value by a change of fluorescence; as quinine sulfate. **hydrogen ion-** A substance which indicates by its color the approximate hydrogen-ion concentration of a solution. **inorganic-** Metallic salts used in titrations; as, potassium chromate and ferrocyanide. **inside-, internal-** An i. added to a liquid to be titrated; as, litmus in neutralisation titrations **one-colour-** An i. which changes from colored to colorless *e.g.*, phenolphthalein. **outside-** External- An i. to which a drop of the titrated liquid is added on a porcelain plate. **oxidation-reduction, redox-** A substance which indicates the state of oxidation by its color; as, compounds of Mn, Cr, Fe etc., or organic compounds. At *p*H 7.0 the potentials are:

indigo disulfonate	−0.121
indigo trisulfonate	−0.081
indigo tetrasulfonate	−0.046
methylene blue	+0.011
toluylene blue	+0.115
Bindschedler's green	+0.224
o-chlorophenol indophenol	+0.233
m-bromophenol indophenol	+0.248
benzoquinone	+0.30
ferrocyanide	+0.40

phthalein- An important group of synthetic dyes derived from the phthaleins, used as indicators; the following are commonly used:

phenolphthalein		60
tetrabromo-		—
phenolsulfonphthalein	Phenol-red	50
dibromo-	Bromphenol-red	43
dichloro-	Chlorphenol-red	41
dibromdichloro-	Bromchlorphenol-blue	29
tetrabromo-	Bromphenol-blue	21
diiodo-		—
nitro-		—
tetranitro-		—
o-cresolphthalein		57
o-cresolsulfonphthalein	Cresol-red	53
dibromo-	Bromcresol-purple	40
m-cresolsulfonphthalein	Cresol-purple	15
tetrabromo-	Bromcresol-green	31
thymolphthalein		61
thymolsulfonphthalein	Thymol-blue 12,	55
dibromo-	Bromthymol-blue	45
nitro-		—
anisolsulfonphthalein		—
naphtholphthalein		52
fluorescein		—
eosin		—

The numbers refer to the classified list of indicators. **redox-** Oxidation-reduction. **screened-** An i. which has been added to another coloring matter (not necessarily an i.) to make the color change more readily detectable or sharper. Cf. *achromatic-*. **Sörensen-** A series of synthetic indicators covering the pH range 0.1–13.0. They are numbered consecutively in the classified list in the column marked S. **turbidity-** A semicolloid which fluocculates at a certain pH value (iso-electric point) and so indicates when this point has been reached in volumetric analysis. **two-color-** An i. which changes from one color to another, *e.g.*, a phthalein i. (see table). **universal-** A mixture of indicators covering a wider pH range than each individual i. *E.g.*, a solution of methyl orange 0.1, methyl red 0.4, bromthymol blue 0.4, α-naphtholphthalein 0.32, phenolphthalein 0.5 and cresolphthalein 1.6 gm. in 100 cc. 70 % alcohol. One drop in 10 cc. of test solution gives colors as follows:

red	3.0	bluish-green	8.5
orange-red	4.0	greenish-blue	9.0
yellow-orange	5.0	blue	10.0
yellow	6.5	violet	11.0
green	8.0	reddish-violet	12.0

vegetable- A coloring matter derived from plants which has different colors in acid and alkaline solutions.

SYNTHETIC INDICATORS

(Classified List)

No.		Acid	pH	Alkali	S.*	C&L**
1	Ethylviolet	yellow	0.0 – 2.0	green		
2	Methylgreen	yellow	0.0 –11.0	green		
3	Fuchsin, basic	yellow	0.0 –12.5	magenta		
4	Methylviolet	yellow	0.5	green	1	
5	Brillantyellow	blue	0.5 – 7.0	yellow		
6	Diphenylaminoazobenzene		1.2 – 2.1		2	
7	Iodine green	yellow	0.5 – 1.5	blue-green		
8	Malachitegreen	yellow	0.5 – 1.5	green		
9	Metanilyellow	red	1.2 – 2.5	yellow	3	
10	Crystalviolet	green	1.5	blue		
11	Erythrosin	orange	1.2 – 2.5	magenta		
12	Thymolblue	pink	1.2 – 2.8	yellow		1
12a	Xylenolblue	pink	1.2 – 2.8	yellow		
13	Methylviolet	green	2.0	blue		
14	Brilliantgreen	yellow	1.0 – 3.0	blue-green		
15	m-Cresolpurple	red	1.5 – 2.5	yellow		
16	Tropeolin OO (Orange IV)	red	1.4 – 2.6	yellow	4	
17	Aminoazobenzene	orange	2.5	yellow		
18	Dinitrophenol	colorless	3.0	yellow		
19	Benzeneazobenzylamine	red	2.3 – 3.5	orange	5	
20	Dimethylaminoazobenzene	magenta	2.9 – 4.0	yellow	6	
21	Bromphenolblue	yellow	3.0 – 4.6	blue		2
22	Congo red	blue	3.0 – 4.6	red		
23	Methylorange	orange	3.1 – 4.4	yellow	7	
24	Benzopurpurin	purple	3.5 – 4.5	scarlet		
25	Methylviolet	blue	4.0	purple		
26	Benzoazo-α-naphthylamine		3.7 – 5.0		8	
27	Ampho-magenta	red	4.0 – 5.0	blue		
28	Naphthylamineazosulfanilic acid		3.5 – 5.7		9	
29	Bromchlorphenolblue	yellow	4.5 – 5.5	blue		
30	Methylred	red	4.4 – 6.0	yellow	10	3
31	Bromcresolgreen	yellow	4.5 – 5.5	blue		
32	Cochineal	orange	5.0 – 6.0	violet		
33	Lacmoid	red	4.4 – 6.4	blue		
34	Propylred	red	4.8 – 6.4	yellow		4
35	Hematoxylon	yellow	5.0 – 6.0	brown		
36	Carminic acid	red	5.0 – 6.0	magenta		
37	Alizarin red	yellow	5.5 – 6.8	magenta		
38	Phenacetolin	brown	5.5 – 6.5	red		
39	p-Nitrophenol	colerless	5 – 7.0	yellow	11	
40	Bromcresolpurple	yellow	5.2 – 6.8	purple		5
41	Chlorphenolred	yellow	5.5 – 6.5	red		
42	Azolitmin	red	5.4 – 7.8	blue	12	
43	Bromphenolred	yellow	6.0 – 7.0	red		
44	Nitrophenolsulfonphthalein	yellow	6.5 – 7.5	purple		
45	Bromthymolblue	yellow	6.0 – 7.6	blue		6
46	Curcumin	yellow	7.4 – 8.6	brown		
47	Aurin	yellow	7.0 – 8.0	magenta		
48	Neutralred	magenta	6.8 – 8.0	orange	13	
49	Nileblue	blue	7.0 – 8.0	magenta		
50	Phenolred	yellow	6.8 – 8.4	red		7
51	Rosolic acid	orange	6.9 – 8.0	yellow	14	
52	α-Naphtholphthalein	pale pink	7.3 – 8.4	green	15	
53	Cresolred	yellow	7.2 – 8.9	red		8
54	Brilliant yellow	yellow	7.5 – 8.5	scarlet		
55	Thymolblue	yellow	8.0 – 9.6	blue		9
56	Bromphenolpurple	colorless	8–12	purple		
57	p-Cresolphthalein	colorless	8.2 – 9.2	red		10
58	Purpurin	orange	8.5 – 9.5	magenta		
59	Tropeolin OOO	orange	7.6 – 8.9	scarlet	16	
60	Phenolphthalein	colorless	8.3 –10.0	magenta	17	
61	Thymolphthalein	colorless	9.3 –10.2	blue	18	
62	Alizarin yellow	yellow	10.1 –12.1	purple	19	
63	Methylblue	blue	10.5 –11.0	red-brown		
63a	Nitramin	colorless	10.8 –13.0	brown		

SYNTHETIC INDICATORS—(*Continued*)

No.		Acid	pH	Alkali	S.*	C&L**
64	Methylgreen	blue-green	11–12	colorless		
65	Benzopurpurin	violet	11–12	orange		
66	Tropeolin O	yellow	11.1 –12.7	brown	20	
67	Poirrier's blue	blue	11.0 –13.0	red		
68	Alkali blue	blue	12–13	red		
69	Fuchsin, basic	magenta	12–13	colorless		
70	Crystalviolet	purple	12–13	colorless		
71	Alizarin blue	green	12–14	blue		
72	Fuchsin, acid	magenta	12–14	colorless		
73	Trinitrobenzene		13–14			

* Sørenson indicators ** Clark and Lubs indicators

VEGETABLE INDICATORS

Source	Family	Acid	Alkali	Active constituent
Lichens				
Roccella tinctoria (litmus)	Parmeliaceae	red	blue	azolitmin
Parmelia parietina	Parmeliaceae	yellow	violet	parietin
Roots, rhizomes etc.				
Alkanna tinctoria	Boraginaceae	red	green	alkannin
Beta vulgaris	Chenopodiaceae	purple	red	
Curcuma long (turmeric)	Zingiberaceae	yellow	brown	curcumin
Perezia adnata	Compositae	yellow	red	pipitzahoin
Raphanus sativus	Cruciferae	red	green	
Woods				
Baphia nitida	Leguminosae	orange	blue	
Pterocarpus santalinus	Leguminosae	red	violet	santalin
Caesalpinia echinata	Leguminosae	yellow	violet	brazilin
Haematoxylon campechianum	Leguminosae	yellow	purple	hematoxylin
Flowers, yellow or white				
Convolvulus species	Convulvulaceae	colorless	yellow	
Geranium species	Geraniaceae	colorless	yellow	
Rose species	Rosaceae	colorless	yellow	
Trifolium repens	Leguminosae	colorless	yellow	
Viola tricolor	Violaceae	colorless	yellow	
Mimosa species	Mimosaceae	colorless	yellow	
Philadelphus coronarius	Saxifragaceae	colorless	yellow	
Flowers, red and blue				
Begonia species	Begoniaceae	red	blue	
Aster species	Compositae	red	bluishgreen	
Dahlia species	Compositae	red	green	
Centaurea cyanus	Compositae	red	blue	cyanidin
Convolvulus arvensis	Convolvulaceae	red	green	
Delphinium species	Ranunculaceae	red	green	delphidin
Dianthus caryophyllus	Caryophyllaceae	red	bluishgreen	
Geranium species	Geraniaceae	red	bluishgreen	pelargonidin
Iris species	Iridaceae	red	green	
Lathyrus species	Leguminosae	red	bluishgreen	
Vicia sativa	Leguminosae	red	green	
Malvae species	Malvaceae	red	green	
Nasturtium species	Cruciferae	orange	green	
Papaver species	Papaveraceae	red	violet	
Portulaca species	Portulacaceae	red	violet	
Phlox drummondi	Polemoniaceae	red	green	
Petunia species	Solanaceae	red	green	
Solanum species	Solanaceae	red	green	
Rose species	Rosaceae	red	green	
Viola tricolor	Violaceae	red	bluishgreen	
Berries and Seeds				
Bixa orellana	Bixaceae	green	yellow	bixin
Morus rubra	Moraceae	red	violet	
Phytolacca decandra	Phytolaccaceae	purple	orange	
Vaccinium myrtillus	Ericaceae	red	blue	myrtillin
Vitis vinifera	Vitaceae	red	blue	enidin

SYNTHETIC INDICATORS

(Alphabetical List)

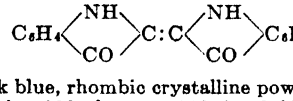
The numbers correspond with the numbers of the following classified list.

	No.
Alizarin blue	71
Alizarin red	37
Alizarin yellow	62
Alkali blue	68
Aminoazobenzene	17
Ampho-magenta	27
Aurin	47
Azolitmin	42
Benzene-azobenzylaniline	19
Benzene-azonaphthylamine	26
Benzopurpurin	24, 65
Brilliantgreen	14
Brilliantyellow	5, 54
Bromchlorphenolblue	29
Bromocresol-green	31
Bromocresol-purple	40
Bromophenol-blue	21
Bromophenol-purple	56
Bromophenol-red	43
Bromothymol-blue	45
Carminic acid	36
Chlorophenol-red	41
Cochineal	32
Congo red	22
o-Cresolphthalein	57
m-Cresol-purple	15
Cresol-red	53
Crystalviolet	10, 70
Curcumin	46
Dimethylaminoazobenzene	20
Dinitrophenol	18
Diphenylaminoazobenzene	6
Erythrosin	11
Ethylviolet	1
Fuchsin, basic	3, 69
Fuchsin, acid	72
Hematoxylin	35
Iodine green	7
Lacmoid	33
Malachite green	8
Metanil yellow	9
Methylblue	63
Methylgreen	2, 64
Methylorange	23
Methylred	30
Methylviolet	4, 13, 25
α-Naphtholphthalein	52
α-Naphthylamine-azo-sulfanilic acid	28
Neutral red	48
Nile blue	49
p-Nitrophenol	39
Nitrophenolsulfophthalein	44
Phenacetolin	38
Phenolphthalein	60
Phenol-red	50
Poirrier's blue	67
Propyl-red	34
Purpurin	58
Rosolic acid	51
Thymolblue	12, 55
Thymolphthalein	61
Trinitrobenzene	73
Tropeolin O	66
Tropeolin OO	16
Tropeolin OOO	59
Xylenolblue	12a

i. exponent. The pH value at which the color change of an i. is most rapid. Theoretically it is the midpoint of the i. range. **i. paper.** A paper impregnated with an i. and dried. See *test paper*. i. **range.** The pH values over which the color of an i. changes (see tables).

indicolite. A blue variety of tourmaline, used as gem.

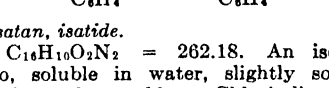
indigo. $C_{16}H_{10}O_2N_2$ = 262.2. Indigo-tin, synthetic indigo, $\Delta^{2,2}$-bis-ψ-indoxyl.



A dark blue, rhombic crystalline powder, d.1.35, subliming 300, decomp. 390, insoluble in water, alcohol, or ether, soluble in hot aniline or hot chloroform. Used in dyeing, and as a reagent. **Chinese green-** A dye prepared from the bark of *Rhamnus chlorophora*, of China, used in dyeing silk. **leuco-** I. white. **natural-** I. blue. **soluble-** I. white or I. carmine.

i. blue. The blue coloring matter obtained by fermentation from various species of *Indigofera* (Leguminosae); used in dyeing and as a constituent of printing inks. **i. carmine.** $C_{16}H_8N_2O_2(SO_3Na)_2$ = 466.3. Soluble indigo, sodium indigotinsulfonate, sodium coerulinsulfate, indigo extract. A blue powder or paste, soluble in water or alcohol. Used as a dye, and clinically in the function test of the kidneys. **i. copper.** $CuSO_3$. Covellite. A blue native copper sulfite. **i. dicarboxylic acid.** $C_{18}H_{10}O_6N_2$ = 350.2. A blue powder, insoluble in water alcohol or ether, soluble in sulfuric acid. **i. disulfonate.** An oxidation-reduction and *p*H indicator changing at 12.5 from blue (acid) to yellow (alkali). **i. red.** Indirubin. **i. extract.** I. carmine. **i. white.** $C_{16}H_{12}O_2N_2$ = 264.2. Biindoxyl, leuco indigo, soluble indigo. A colorless powder which is insoluble in water, soluble in alcohol, ether or alkalis, and oxidized to i. blue; used in the vat-dyeing of textiles with indigo.

indigotin. (1) Indigo. (2) The heterocyclic compound, diindogen or $\Delta^{2,2}$-bis-ψ-indoxyl. Cf. *indigo*. **iso-** $C_{16}H_{10}O_2N$ = 262.2. Bioxindol.



Cf. *isatan*, *isatide*.

indin. $C_{16}H_{10}O_2N_2$ = 262.18. An isomer of indigo, soluble in water, slightly soluble in alcohol or ether. **chloro-** Chlorindin.

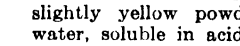
indirubin. $C_{16}H_{10}O_2N_2$ = 262.18. Indigo-red, oxindole-$\Delta^{3,2}$-ψ-indoxyl. An isomer of indigo, occurring as a red coloring matter in urine.

indium. In = 114.76. A ductile, trivalent metal and element of the aluminum subgroup, atomic number 49. Silver-gray crystalline masses, d.7.362, m.115, b.1450, insoluble in water, soluble in acids. It was discovered in 1863 by Reich and Richter, and named in allusion to the indigo-blue lines of its spectrum. It is usually trivalent, but may be di- or monovalent. It is at present not used commercially, but it forms low-melting alloys.

i. bromide. $InBr_3$ = 354.5. **I. tribromide.** A yellow powder, soluble in water. **i. chloride.** There are three chlorides: InCl, I. monochloride; $InCl_2$, I. dichloride; $InCl_3$, I. trichloride. **i.**

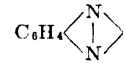
cyanide. $In(CN)_3$ = 192.8. A colorless poisonous powder which is soluble in water. **i. dichloride.** $InCl_2$ = 185.7. A yellow liquid, decomp. by water into the trichloride and metallic indium. **i. hydroxide.** $In(OH)_3$ = 165.8. A colorless powder, insoluble in water. **i. iodide.** InI_3 = 495.8. Yellow hygroscopic crystals, soluble in water. **i. nitrate.** $In(NO_3)_3.3H_2O$ = 354.9. White crystals, soluble in water. **i. oxide.** In_2O_3 = 277.6. A white or slightly yellow powder, d.7.18, insoluble in water, soluble in acids. **i. sulfate.** $In_2(SO_4)_3$ = 517.6. A white or gray powder, hygroscopic, poisonous and soluble in water. **i. sulfhydrate.** $In(SH)_3$ = 213.8. A yellow powder, precipitated from aqueous indium salt solutions by the action of hydrogen sulfide. **i. sulfide.** In_2S_3 = 325.6. A carmine-red powder, insoluble in water. **i. trichloride.** $InCl_3$ = 221.2. I. chloride. White, hygroscopic, poisonous crystals, sublime 500; readily soluble in water, and used as an external antiseptic.

indoaniline. $C_{12}H_{10}N_2O$ = 198.07. *N*-*p*-aminophenyl quinonimine. Colorless crystals



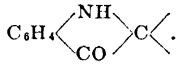
indoanilines. A group of compounds derived from indoaniline, q.v. Cf. *indamines.*

indodiazole. Pseudoazimide. A compound which contains the monovalent radical



indoform. Salicylic acid methylene-acetate. A white powder of acid astringent taste, sparingly soluble in water; used for gout and rheumatism.

indogen. The bivalent radical

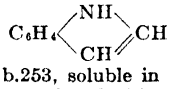


di- *Indigo.* **pseudo-** Isatin.

indogenide. A compound containing the indogen radical.

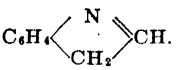
indoldione. ψ-Isatin.

indole. C_8H_7N = 117.11. 1-benzazole, ketole, benzopyrrole.



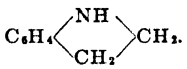
Colorless leaflets, m.52, b.253, soluble in water, alcohol, or ether. It occurs in oil of jasmine, clove oil, and as a product of intestinal putrefaction, and has a peculiar feces-like odor. Used as a microchemical reagent for cellulose and in great dilution in perfumery (orange blossoms). Its radical is indyl. **dihydro-** Indoline. **dihydrodiketo-** Isatin. **dihydroketo-** Oxindole. **hydroxy-** Indoxyl. **iso-** 2-Benzazole. **α-methyl-** C_9H_9N = 130.1. Alpha-methylindole, methylketol. Colorless crystals, m.59, soluble in water. **β-methyl-** Skatole. **n-nitro-** $C_8H_7N_2O_2$ = 163.2. Colorless crystals, m.172. **pseudo-** Indolenine.

indolenine. C_8H_7N = 117.11. Iso-1-benzazole, ψ-indole.



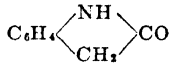
iso- 2-Isobenzazole.

indoline. C_8H_9N = 119.11. 2, 3-dihydroindole.

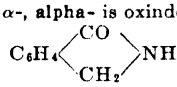


2-keto- Oxindole. **3-keto-** ψ-Indoxyl.

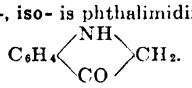
indolinone. C_8H_7ON = 133.06. A group of heterocyclic compounds



1-, or **α-**, **alpha-** is oxindole



2-, or *i-*, **iso-** is phthalimidine

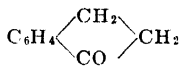


3-, or **β-**, beta- is ψ-indoxyl

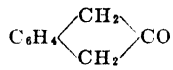
indolol. Indoxyl.

indolone. **1(3)-** Phthalimidine. **2(3)-** Oxindole. **3(2)-** ψ-Indoxyl. Cf. *indolinone.*

indone. C_9H_6O = 132.1. Indanone, hydrindone. **alpha-** Rhombic leaflets, d.1.101, m.41, b.244, slightly soluble in water, soluble in alcohol or ether. **beta-** Colorless crystals, m.61, b.220,



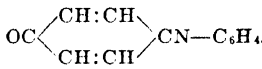
alpha-



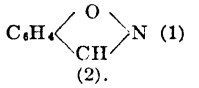
beta-

indophenine. $C_{12}H_7ONS$ = 213.19. A colorless powder, soluble in alcohol or ether, but not in water.

indophenol. $C_{12}H_9O_2N$ = 199.08. Hydroxyphenylimino benzenone. A compound of the type

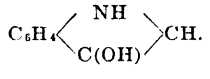


indoxazeine. C_7H_5ON = 119.05. Benzisoxazole. The heterocyclic compound.

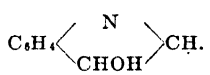


2-phenyl- $C_{13}H_9ON$ = 195.08. Colorless crystals, m.84, b.334.

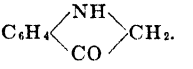
indoxyl. C_8H_7ON = 133.1. **α-. alpha-.** 3-Hydroxyindole,



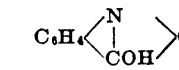
Light yellow crystals, m.85, soluble in water, used in organic synthesis. **β-. beta-.**



ψ-. Pseudo-. 3-Ketoindoline, β-indolinone, 3(2)-indolone, 3-ketoindoline.



An intermediate in the synthesis of indigo. **i-, *i-*, Iso-.** The heterocyclic compound



i. potassium sulfate. Indican (of urine).

indoxylic acid. $C_9H_7O_3N$ = 177.11. An oxidation-product of indoxyl, b.122, (sublimes and decomp.); soluble in water.

induced. Caused or produced indirectly. **i. current.** A high-frequency current produced by an induction coil, q.v. **i. radioactivity.** Artificial radioactivity produced by the bombardment of a substance with neutrons, protons or other particles, q.v. See *radioelements*. **i. reactions.** Sympathetic reactions: (1) If a slow reaction between the substances A and C is hastened by promoting a fast reaction between A and B, at the same time and in the same system, then A is the *actor* or *donor;* usually an oxidizing or reducing agent, B the *inductor*, and C the *acceptor*.

$$A + C \rightarrow AC \text{ (slow)}$$
$$A + B \rightarrow AB \text{ (fast)}$$
$$AB + C \rightarrow AC + B.$$

(2) An enzyme which removes an element from a compound and leaves the remainder free to react, acts as an acceptor in an induced reaction; *e.g.* the water in milk may be split by an enzyme into O and H, which are then able to oxidize and reduce, respectively. Cf. *induction* (*4*).

inducer. Inductor.

inductance. See *dielectric constant*.

induction. (1) A process of inference by which one passes from particular data to general principles. Cf. *deduction*. (2) The production of an electric or magnetic phenomenon by the influence of a neighboring electric or magnetic field; as, electrifying by proximity to a charged body, or magnetizing by proximity to a magnet. It is measured in henrys.

1 International henry = 1.00052 absolute henry
1 Absolute henry = 1 practical e.m.u.
= 10^9 e.m.u.
= 1.1124×10^{-12} e.s.u.

(3) See *induced reaction*. (4) A change in the energy of a molecule produced by interaction with another molecule, which is at a distance from it greater than the diameter of the molecule, by means of radiation. Cf. *collision*. **chemical-** See *induction* (*4*). **electromagnetic-** See *induction* (*2*). **mutual-** See *mutual induction*. **photochemical-** See *photochemical i.* **self-** See *selfinduction*.

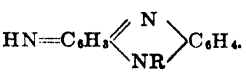
i. coil. Electric transformer. A set of two wire spools, one inside the other, used for obtaining high-frequency alternating currents from a continuous current passed through the primary (inner) coil. **i. furnace.** See *furnace*.

inductive capacity. Di-electric constant.

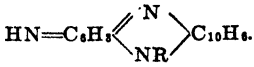
inductivity. Di-electric constant.

inductor. A substance which, when added to a reaction mixture accelerates a slow reaction. See *induced reactions, catalysts, state*.

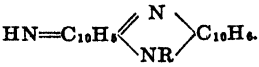
indulines. A group of blue or black dyestuffs derived from the tricyclic ring



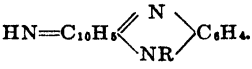
Substitution is usually at the N atom indicated. **benz-** Aposafranine. **isoros-** A group of dyestuffs derived from



naphth- A group of dyestuffs of the type



ros- A group of dyestuffs of the type



indurated. Hardened, as in the firing of clay mixtures, etc.

industrial. Pertaining to large-scale production as opposed to laboratory methods. **i. poisons.** Those chemicals which may lead to respiratory, intestinal, cardiovascular or other disturbance in the worker handling it. The most common are:

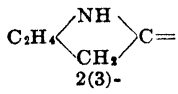
acetaldehyde	lead
acridine	manganese
acrolein	mercury
amylacetate	methanol
aniline	methylbromide
antimony	nitroglycerin
arsenic	nitrous gases
arsine	oxalic acid
benzene	petroleum
brass	phenol
carbon disulfide	phenylhydrazine
carbon monoxide	phosgene
chlorine	phosphorous
chromium	picric acid
copper	pyridine
diazomethane	sulfuric acid
dimethylsulfate	sulfur dioxide
dinitrobenzene	sulfur chloride
ferrosilicon	tar
formaldehyde	turpentine
hydrochloric acid	dust (q.v.)
hydrocyanic acid	

industry. The organization of human and material units for the production of some useful material on an economic basis. Chemistry enters into many industries, which may be classified as follows:

Heavy chemicals, acids, and alkalis.
Coal, coal gas and fuels.
Minerals and metals.
Dyes, explosives, cellulose, textiles and paper.
Synthetics, organic condensation products, plastics.
Rubber.
Leather.
Glass and enamel.
Cement and mortar.
Pottery, ceramics, and porcelain.
Oils, fats, and waxes.
Agriculture, foods and packing industries.
Brewing, fermentation and yeast products.
Tobacco.
Inks and printing inks.
Pharmaceuticals.

indyl. The monovalent radical, C_8H_6N—derived from indole. **iso-** See *isoindyl*.

indylidene. A group of bivalent radicals derived from dihydro-indole; as,



2(3)-

-ine. A suffix indicating: (1) a halogen, as chlorine; (2) a hydrocarbon of the acetylene series, as butine; (3) an alkaloid or nitrogen base, as, morphine. Cf. *-in.*

inert. Sluggish, having no, or only a slight chemical action. **i. elements.** The members of the "zero" group of the periodic system: the noble gases, which have no valency and do not combine with any other element, cf. *noble gases.* **i. substance.** A substance which is resistant to chemical or physical action.

inertia. The tendency of a physical body to remain in an unchanged condition, either in a state of uniform motion if moving, or at rest if resting. **moment of i.** A factor of fundamental importance in the mathematic treatment of the rotation of a body. It is expressed in terms of the mass and squares of the linear dimensions of the body. Cf. *momentum.*

infection. The successful invasion and growth of one or more species of bacteria or parasites in the tissues of an organism (plant, animal or man), and thus the transmission of disease by contact. Cf. *contamination.* **aerial-** I. caused by the dust particles suspended in air. **focal-** Infection in which the bacterial growth is restricted to a small area of the organism. **mixed-** Infection caused by more than one kind of bacteria.

infectious disease. A pathological condition of the organism produced by invasion and growth by one or more microorganisms (bacteria or protozoa).

infiltration. (1) The deposition of minerals from solution in the pores of a rock. (2) The slow diffusion of injected solutions into the tissues of an organism.

infinitesimal. Smaller than any assigned quantity. Negligible.

inflammable. Combustible; able to be set on fire. **i. air.** The original name for hydrogen.

infra. Beyond. **i. phonic.** Vibrations in air too long in wavelength to be audible. **i. photic.** Radiations of a wavelength too long to be visible; as, i. red. **i. red.** Ultra-red. The invisible part of the spectrum from 10^{-4} to 10^{-1} cm. which extends into the portion of the visible spectrum. Cf. *radiations, ultra-violet. far-* or *long-* I.r. rays from 14,000 to 150,000 Å.U. *near-* or *short-* I.r. rays from 7,200 to 14,000 Å.U. Sources:

	Infrared rays	Visible rays
Sunlight	60 %	34 %
Incandescent lamp	95 %	4.8 %
Carbon arc	80 %	15 %
Resistance wire	99 %	0.5 %

i. röntgen rays. Grenz rays. **i. sonic.** Infraphonic.

infundibuliform. A bacterial growth in the shape of a funnel or inverted cone.

infusible. Unable to be fused. **i. white precipitate.** Mercuridiammonium chloride.

infusion. Infusum. An aqueous solution obtained by steeping vegetable drugs in water below its boiling-point, and straining. Cf. *decoction.*

infusoria. A class of protozoa. Sometimes erroneously applied to diatoms (protophyta).

infusorial earth. Diatomaceous earth, tripolite, kieselguhr, q.v. A light, earthy sedimentary rock consisting of the microscopic empty shells of diatoms and other protophyta. Used as a filtration aid, and as an adsorbent.

infusum. Infusion.

ingluvin. An enzyme from hen gizzards used in dyspepsia.

ingredient. Any substance that enters into a mixture. Cf. *constituent, component.*

inhaler. (1) A device for the administration of vapors or gases. (2) A device for filtering dust from the air to be breathed. Cf. *gas-mask, respirator.*

inhibin. The testicular hormone which prevents overdevelopment of the pituitary gland. Soluble in water.

inhibition. A restraint or encumbrance.

inhibitor. A substance which arrests or stops a chemical action.

inhibitory phase. Protective *colloid.*

initiator. Trigger. Cf. *promoter.*

-inium. -ium. **i. compound.** Compounds of organic nitrogen bases with acids in which N is assumed to be pentavalent; as, piperidinium, pyridinium, strychninium. Cf. *-ilium, -onium.*

injection. The administration of a substance into a part of an organism, either intravenously (into the blood stream), intramuscularly (into muscular tissue), or subcutaneously (under the skin). **i. needle.** A hypodermic needle. **i. syringe.** A graduated glass-tube, with piston, used to inject liquid medicines into an organism.

ink. (1) A colored liquid, used for writing. (2) A colored paste or liquid used for printing. **aniline-** A solution of an aniline dye in a volatile solvent or dilute gum; used for printing in bright colors or at high speeds, *e.g.*, by the gravure process. **cancelling-** A suspension of lamp-black in oil, used for stamp pads. **Chinese-** India ink. **copying-** An iron-tannic acid ink. **diamond-** A mixture of barium sulfate and hydrofluoric acid, used for writing on glass. **fugitive-** An i. which disappears on treatment with water or bleaching chemicals. Used for printing checks. **India-** Finely divided lamp-black suspended in water or gum. **invisible-** Secret i., sympathetic i. An i. which is normally invisible to the human eye, but may be rendered visible by heat (*e.g.*, lemon juice), light (*e.g.*, soap solution in ultra-violet light), water (*e.g.*, solutions of cobalt salts), or chemicals (*e.g.*, iodine vapour on a starch ink). Used for sending secret messages. **marking-** A solution of silver nitrate, used to write undelibly on paper, textiles, laundry, etc. **printing-** Three types: (1) A suspension of a pigment (usually C black) in a mineral oil. It dries by absorption of oil into the paper. Used for high-speed letterpress printing. (2) A suspension of a pigment in a drying oil (*e.g.*, linseed oil). It dries by formation of a protective layer of hard linseed oil varnish over the pigment. Used for general lithographic and letter-

press work. (3) An aniline ink, q.v. This dries mainly by evaporation. (4) A warm molten resinous pigment which dries by simple solidification. Used for high-speed printing. **secret-** Invisible i. **sympathetic-** Invisible i. **writing-** (1) Blue-black i. Normally, a slightly acidic solution containing principally an iron salt, a tannin and a blue aniline dye (provisional color). The dye renders the ink visible while it is being used, and in course of time oxidation of the iron-tannin compound produces a very permanent blue-black color. (2) A solution of an aniline dye in a dilute gum. Used for fountain pens, and for colored inks other than black.

ino- A suffix that denoting substitution by one of the groups, NH_2, NHR, NR_2, NH or NR. Cf. *amino, imino.*

inoculation. (1) The insertion of a virus or virulent vaccine into a wound or scratch in the skin. (b) The planting of bacteria on a culture medium.

inoculum. The substance to be inoculated.

innocuous. A harmless substance.

innoxious. Harmless. Antonym: toxic or noxious.

inorganic. (1) Unorganic. Pertaining to chemicals which do not contain carbon (carbonates and cyanides excepted). Cf. *organic.* (2) Devoid of an organized structure. **i. chemistry.** Chemistry which deals with inorganic or polar compounds, generally those compounds which do not contain carbon as a principal element. **i. compound.** A substance containing an electropositive element or radical and an electronegative element or radical. Generally, mineral substances, or those chemicals which do not contain carbon, (compounds of the polar type).

inose. Inositol.

inosin. $C_{10}H_{12}N_4O_8$ = 284.1. Hypoxanthin riboside. White needles, m.218, soluble in hot water.

inosinic acid. $C_{10}H_{13}N_4O_8P$ = 348.13. Inosin phosphoric acid. A nucleotide from adenylic acid of nucleoproteins.

inosite. Inositol.

inositol. $C_6H_{12}O_6.2H_2O$ = 216.2. Muscle sugar, cyclohexanhexanol, *1.2.3.4.5.6*-cyclohexanehexol*, dambose, inose, hexahydroxybenzene, Bios I, nucite, phaseomannite, $C_6H_6(OH)_6$. A cyclic hexahydric alcohol found in the seeds of plants (as barley, peas and beans), also in animal flesh, in the form of its phosphoric acid ester (phytin). Optically inactive. White crystals, m.200 (decomp.), soluble in water, insoluble in alcohol or ether. It is part of the vitamin B complex, q.v. **dextro-** Colorless crystals, m.247. **levo-** Colorless crystals m.-238.

inquartation. Quartation.

insect bait. See *baits.*

insecticide. An agent used to destroy insects, generally by dusting or spraying on plants (cf. *fumigant*). They are conveniently classified: (1) **contact** i., I. which corrode the surface of soft-bodied insects; as, kerosene, soap, tobacco juice, pyrethrum, lime, rotenone. (2) **stomach** i., I. which poison through the intestinal tract, namely: arsenicals (*e.g.*, $Ca_3(AsO_4)_2$, $PbHAsO_4$); fluosilicates (Na_2SiF_6, $BaSiF_6$); fluorides (NaF, CaF_2, AlF_3). (3) **gaseous** i., I. used as fumigants, as, carbonsulfide, hydrocyanic acid and p-dichlorobenzene vapor.

INSECTICIDES

Against	
Aphis	nicotine
Beetles	barium fluosilicate
Codling Moth	beta-naphthol
Crickets	barium fluosilicate
Flea Powder	rotenone, derris
Fly Sprays	pyrethrum
Japanese beetle	carbon disulphide
Leaf Hopper	oil emulsion
Mealy bug	thiocyanates
Mites (ascarides)	derris, selenium
Peach Tree borer	p-dichlorobenzene
Red Spiders	selenium
Scale	manganese arsenate

insect powder. Pyrethrum flowers. The powdered flowerheads of *Chrysanthemum* species, a group of Compositae, used medicinally as a stimulant and local irritant; commercially as an insecticide. **Dalmatian-** A powder obtained from *Chrysanthemum cinerariae folium.* **Persian-** A powder obtained from *Chrysanthemum roseum.*

insect wax. Chinese wax.

insipid. Almost or completely tasteless.

insipin. $(C_{20}H_{23}O_2N_2)OCH_2CO.H_2SO_4.3H_2O$. Quinine diglycolsulfate. A tasteless quinine substitute.

in situ. In the normal, or natural place or position.

insolation. Exposure to the sun's rays, solarization, irradiation.

insolubility. The degree of being immiscible with, or insoluble in a liquid.

insoluble. Incapable of dissolving in a liquid.

inspirator. (1) Respirator. (2) A device for controlling automatically the proportions of the constituents of a mixture of gases; as, gas and air.

inspissation. Thickening a liquid by evaporation.

inspissator. An evaporator.

instrument. A mechanical device, apparatus or appliance.

insuccation. Soaking a material with water.

insulation. The process of mechanically placing apart or separating a physical system. **electrical-** Preventing the escape of electricity. **heat-** Preventing the escape of heat.

insulator. A protective and separating agent, or non-conductor. **electrical-** A device to prevent the passage of electricity from a conductor. **thermal-** A packing that is non-conductive to heat.

INSULATORS

Substances used for both, ELECTRICAL and THERMAL insulation are in CAPITALS

Substances used chiefly for electrical insulation in roman type.

Substances used chiefly for *thermal* insulation in *italic* type.

Gaseous or liquid:

AIR, *water,* hydrocarbons, mineral oil, petrolatum.

Resins and waxes:

Amber, copal, shellac, rosin, beeswax, ceresin, ozokerite, paraffin.

Bituminous:

Asphalt, tar, pitch.

Fibrous materials:

PAPER, Kraft p., Manila p., paraffined p., laminated p., vulcanized p., varnished p., *corrugated p., wood fiber, cardboard, grasses,*

barks, cork, husks, bagasse, peat, PRESSBOARD, COTTON, SILK, *wool, kapok, linen,* varnished cloth, oiled textiles, WOOD, oiled hardwood.

Rubber:

soft r., vulcanised r. GUTTA PERCHA.

Vitreous materials:

GLASS, *glasswool,* porcelain, enamel, *slag.*

Mineral materials:

ASBESTOS, oiled asbestos, varnished asbestos, (Ambrion, Gummon Hemit, Tegit, etc.), mica, marble, SLATE, serpentine, *diatomite, coal, fuller's earth, clay.* Cf. *refractories.*

Plastics:

Nitrocellulose products (pyroxylin), Phenol products (bakelite, redmanol, condensite).

insulin. $C_{45}H_{69}O_{14}N_{11}S.3H_2O$. Iletin, glucokinin. White, *l*-rotatory crystals, m.233. A protein hormone substance. It is secreted by the Islets of Langerhans in the pancreas, and a deficiency of it results in diabetes; it is prepared from beef pancreas for use medicinally as a cure for diabetes. Its aqueous solution is standardized in "units," each unit being one-third of the amount required to lower the blood-sugar in a normal rabbit for a given time. On hydrolysis it yields glutamic acid, cystine, tyrosine and other amino acids. Cf. *synthalin, myrtilin, agmatine.*

intaglio. A process of printing from plates which have been etched slightly in recess; the ink filling these is absorbed by the paper.

intarvin. $C_{54}H_{104}O_6 = 848.7$. Margarin, glycerol trimargarate; $C_3H_5(C_{16}H_{33}COO)_3$. A fat used in diabetes, to cause an increase of sugar, but not of β-hydroxybutyric acid.

integration. (1) Assimilation or synthesis, as opposed to disintegration. (2) Mathematical: the summation of a series of values of a continuously varying quantity. Cf. *calculus.*

intensification. (1) A process of concentrating force. (2) In photography, to increase the density of the silver deposit or activated image.

intensity. The strength or amount of energy per unit space. **acid-** Hydrogen ion concentration. **color-** The (1) brilliance or (2) saturation of a color. Cf. *Beer's law.* **electric-** The electric moment per unit volume. **electric field-** The force exerted on a unit charge; or the electric field which exerts a force of one dyne on a unit positive charge. **heat-** Temperature. **light-** Brightness. **magnetic field-** The force acting on a unit magnetic pole, or the magnetic field which exerts a force of one dyne on unit magnetic pole (Gauss). **magnetization-** The magnetic moment per unit volume. **sound-** Degree of loudness.

i. factor. (*of acidity*) *p*H; (*of redox*) *r*H.

inter- A prefix from the Latin, indicating between.

interenin. A hormone from the suprarenal gland, containing 30 % chlorine.

Interessen Gemeinschaft. I.G. A co-operative organization of large German chemical industries.

interface. Interphase. The boundary between two phases. Cf. *zone.*

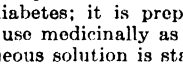
interference. A conflict between two agencies which produces a retardation effect, or a waste of energy. **light-** Two sets of light waves which annul each other and produce darkness. **sound-** Two sets of sound waves which annul each other and produce silence.

i. colors. Complementary *colors.*

interferometer. An instrument to determine the wavelength of light by the production of interference with waves of known lengths. Cf. *fringes.*

intermediate. A chemical used in organic synthesis in the production of pharmaceuticals, dyes, or other artificial products; usually a derivative of the "crudes" or raw materials.

intermolecular. Referring to action between the same or different molecules. Cf. *intramolecular.*

internal. Pertaining to the inside *e.g.*, of a molecule. Synonym: intramolecular. **i. anhydride.** A compound formed by elimination of water from the atoms of a molecule. **i. compensation.** The property of an optically-inactive molecule that contains two asymmetric carbon atoms, one of which is dextro-, the other levo-rotatory. **i. reaction.** A reaction within the molecule of a compound, due to a rearrangement of the atoms. **i. salts.** An organic compound formed by the union of a basic and acid radical within the molecule; *e.g.*,  derived from $NH_2.R.SO_3H$. **i. standard.** The principal line in the spectrum used in spectrum analysis, *e.g.*, by the logarithmic sector method, q.v. Cf. *homologous lines.*

international. Agreed upon between nations; as, i. candle, i. henry, i. ohm. **i. atomic weight.** A value for the atomic weight selected from the literature of the preceding year by a commission consisting of the leading chemists of several nations; 15 years after World War I cooperation had ceased, and each national chemical society published annually its own atomic weights. **i. catalogue.** A reference list and index of the scientific literature of the world. Since World War I the publication has ceased, and the newer literature must be sought in the abstract Journals. **i. tables.** A list of constants selected by an international commission, which embodies the latest values of chemical, physical, biological and other data. **i. unit.** (1) See *unit.* (2) I. U. A measure of the vitamin potency of a substance; see *vitamin units.*

interphase. Interfacial *zone.*

interpolation. The deduction of a value of a varying quantity, from values already known, by arithmetical or graphical methods.

interruptor. A device for breaking an electric current.

interstice. A small space or capillary in a structure or tissue. **atomic-** The distance between the atoms in a molecule.

intertraction. Barophoresis. The increase in density of a colloidal solution (*e.g.*, albumin) placed on a salt-solution of nearly equal density, due to the rapid diffusion of the solute.

interval. The period of time elapsing between two events.

intolerance. The inability to withstand the drastic effects of a drug.

intoxication. The state of being poisoned by a drug.

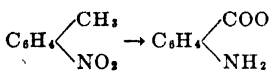
intra-. A prefix from the Latin, indicating within.

intra-annular. Within the ring. **i. tautomerism.** The redistribution of double bonds within a ring. Cf. *intranuclear.*

intra-atomic. Pertaining to atomic structure. **i. matter.** The material from which atoms are assumed to be constructed, *e.g.*, electrons and positive nuclei, or hydrogen and helium nuclei. Cf. *mass-energy cycle, particles.*

intramine. $C_{12}H_{12}N_2S_2$ = 248.1. *o,o'*-Dithiobisaniline, contramine. $[C_6H_4(NH_2)S—]_2$; used as an antiseptic.

intramolecular. Pertaining to the inside of molecules or to molecular structure. Cf. *internal, intermolecular.* **i. action.** A reaction occurring within the individual molecule. **i. condensation.** Ring formation. A reaction of organic compounds, in which the atoms within a molecule combine or rearrange themselves and form a condensation product (usually a ring compound) and another (usually a binary) compound. **i. oxidation and reduction.** The reaction of an organic compound caused by internal oxidation and reduction, as the change from nitrotoluene to anthranilic acid which takes place on heating with alkalis:



intramuscular. Inside muscular tissue; *e.g.*, an injection.

intranuclear. (1) Within an atomic nucleus. (2) Within a molecular ring-system. **i. tautomerism.** The shifting of a double bond within one or more rings; *e.g.*, in sterols.

intravenous. Within or inside the blood vessels, *e.g.*, an injection.

intravital. Within the living organism. **i. microscopy.** The study and examination of vital organs or living cells by fluorescence microscopy, q.v.

introducing. To cause one or more different atoms to combine with an organic molecule, *e.g.*, chlorination.

introduction. The entrance of a different type of atom into an organic molecule; *e.g.*, the combining of chlorine with a hydrocarbon. Cf. *chlorination, bromination.*

introfaction. A change in the fluidity and specific wetting properties of an impregnating material, caused by the addition of an introfier, which alters a colloidal sol to a fluid with slightly associated simple molecules.

introfier. Impregnation accelerator. A substance which speeds up the penetrating power of fluids; as, **sulfur-** Naphthalene or its derivatives which, when added to molten sulfur, effect an increased rate of impregnation of the sulfur into fiberboards, wood, asbestos or concrete.

intrusion. Material forced into the cavities or pores of a substance.

intumescence. (1) The swelling up of a material, especially certain crystals, on heating. (2) Popping, puffing. The violent escape of moisture on heating; as, in poplox, $Na_2O,3.2SiO_2$.

inula. Elecampane, alant root, elfwort, horseheal, helenium. The dried rhizome of *Inula helenium*, a Compositae of U. S., Europe and Central Asia. It contains carbohydrates, possesses an aromatic odor, and is used as an expectorant and stimulant. **i. camphor.** Helenin.

inulase. A hydrolytic enzyme derived from fungi and other plants, which changes inulin to levulose.

inulenin. $(C_6H_{10}O_5)_x.2H_2O$. A carbohydrate associated with inulin. Microscopic colorless needles, slightly soluble in water.

inulic acid. Alantic acid.

inulin. $C_{36}H_{62}O_{31}$ = 990.8. Alant starch, alantin, dahlin, sinistrin. A carbohydrate from the rhizome of *Inula helenium* or *Dahlia variabilis.* A white starch-like powder, soluble in hot water; used in bacteriology as a culture medium, m.160 (decomp.). **pseudo-** $(C_6H_{10}O_5)_6$. A polysaccharide; irregular granules, soluble in hot water. Inulin sources are:

elecampane	*Inula helenium*
dahlia	*Dahlia variabilis*
Jerusalem artichoke	*Helianthus tuberosus*
chicory	*Cichorium intybus*
dandelion	*Taraxacum officinale*
burdock root	*Lappa minor*
goldenrod root	*Solidago*
camas root	*Quamasia quamash*

in vacuo. In a vacuum, q.v.

invar. A ferro-nickel which contains 36 % Ni, and 64 % steel (carbon content 0.2 %), d.8.0, m.1500. It has a low coefficient of heat expansion, and is used for watch parts and precision instruments.

inversion. (1) The turning of a levo- to a dextro-compound, or vice versa. (2) The change of an isomeric compound to its opposite, as a cis- to a trans-compound. (3) The hydrolysis of an optically-active disaccharide to two optically-active monosaccharides; *e.g.*, the hydrolysis of cane sugar to dextrose and levulose by dilute acids, alkalis, or enzymes; the resulting solution shows a change in the rotation of polarized light, both in direction and degree. Cf. *Walden i., Clerget i.* **i. point.** The temperature at which inversion takes place. *E.g.*, above 26°C. a racemic sodium tartrate crystallizes, while below 26°C. the d- and l-sodium tartrate crystallize.

invert sugar. A mixture of approximately 50 % dextrose and 50 % levulose obtained by the acid hydrolysis of cane sugar. It is slightly levo-rotatory, fermentable, reduces Fehling's solution; used in brewing.

invertase. Saccharase, sucrase, raffinase, invertin. A carbohydrase of the pancreatic juice and of yeast, which converts cane sugar into invert sugar.

invertin. Invertase.

inverting. The process of inversion.

in vitro. Describing a biological reaction which occurs outside the living organism, and which can be performed in the test tube. Antonym: *in vivo.*

in vivo. A reaction which takes place within the living organism. Antonym: *in vitro.*

inyoite. $2CaO.3B_2O_3.13H_2O$. A native calcium borate occurring in Southern California (Inyo County).

iod- See *iodo-, iodi-.*

iodacetanilide. C_8H_9INO = 260.9. Iodantifebrin. $C_6H_4INHCOMe$. Colorless crystals, m.182, insoluble in water, soluble in alcohol; used as an antipyretic.

iodacetone. C_3H_5OI = 184.1. Iodoacetone, monoiodoacetone, $CH_2I.CO.CH_3$. A colorless crystalline substance, used in the treatment of carbuncles.

iodagol. A colloidal iodine preparation, used as an antiseptic.

iodal. C_2I_3OH = 421.77. A hypnotic liquid which resembles chloral.

iodalbin. A compound of blood albumen and iodine; a red, tasteless powder of peculiar molasses-like odor.

iodaniline. Iodoaniline.

iodanisole. C_7H_7OI = 234.2. Orthoiodanisole, C_6H_4IOMe. A yellow liquid, d.1.80, b.240, insoluble in water, miscible with alcohol, ether, or

chloroform; used as an antiseptic and local irritant.

iodantifebrin. Iodacetanilide.

iodate. A salt of iodic acid, containing the monovalent IO_3^- radical.

iodeikon. Sodium tetraiodophenolphthalein, used as an x-ray contrast medium.

iodeosin. $C_{20}H_8O_5I_4$ = 835.4. Erythrosin, tetraiodofluorescein. A red powder, soluble in alcohol or ether, and used as indicator in titrating dilute alkalis. Alkalis, rose-red; acids, yellow. **i. solution.** A test solution or indicator containing 0.002 gm. iodeosin in 1000 cc. ether. Of this 10–20 cc. is added to the dilute alkali and titrated until the rose-tint passes from the ether into the aqueous solution.

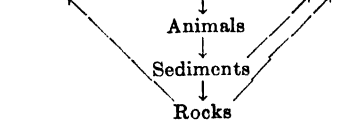
iodi- See *iodo-*.

iodic acid. HIO_3 = 175.93. A colorless rhombic crystalline powder, d.4.629, m.110, decomp. 270, soluble in water, alcohol or ether. Used as an oxidizing agent; reagent for alkaloids, biliary pigments, naphthol, sulfocyanides, and guaiacol; in organic synthesis; and for volumetric solutions. **i. anhydride.** Iodine pentoxide.

iodide. A binary compound of iodine with a metal of the type MI. **i. ion.** The monovalent, negative I^- ion.

iodimetry. Iodometry.

iodine. I_2 = 253.84, or I = 126.92. Iodum. A non-metallic element, atomic number 53, belonging to the halogen group. Rhombic, bluish-black plates or scales of metallic luster, d.4.948, m.114, b.184, slightly soluble in water, soluble in alcohol, ether, or iodide solutions. Iodine was discovered in 1811 by Courtois and named after its purple vapors from the Greek iodes (the violet) and ion (similar). It is obtained from the mother liquor of Chile saltpeter and the ashes of sea weeds, and occurs in small quantities widely diffused through nature.



Iodine cycle.

Its usual valency is one (iodides), but may be three (iodonium) or five (iodates). Used as a reagent in volumetric analysis, in organic synthesis, in the manufacture of iodides, iodates and iodine preparations, and medicinally as an alterative, antiseptic and caustic. **eka-** Eline. **fluoro-** Fluoroiodine. **solution of-** (1) Lugol solution. (2) *colorless.* Lugol solution decolorized with sodium thiosulfate. (3) Iodine water, q.v. **tincture of-** An alcoholic 7 % iodine solution in 5 % potassium iodide solution.

i. acetate. $I(C_2H_3O_2)_3$ = 304.00. A solid prepared from chlorine dioxide and iodine in glacial acetic acid. **i. bromides.** IBr, i. monobromide; IBr_3, i. tribromide; IBr_5, i. pentabromide. **i. chlorides.** ICl, i. monochloride; ICl_3, i. trichloride. **i. cyanide.** ICN = 152.9. Cyanogen iodine. Colorless crystals, m.146, soluble in water or alcohol. An extremely poisonous substance, used as an animal poison and for the preservation of insect and mamma collections, furs, birds, etc. **i. dioxide.** IO_2 = 158.93 or I_2O_4 = 317.86. A lemon-yellow powder, decomposing into its elements at 130°C. **i. disulfide.** Sulfur iodide. **i. green.** A phenolphthalein dye, used as *p*H-indicator, changing at 1.0 from yellow (acid) to blue-green (alkaline); also to stain liquefied xylem in plant tissues. **i. fluoride.** See *i. pentafluoride* and *i. fluoriodide.* **i. monobromide.** IBr = 206.8. A purple crystalline mass, m.36, soluble in water (decomp.). Used in analysis for determining iodine numbers, and in organic synthesis. **i. monochloride.** ICl = 162.4. A reddish-brown oily liquid, d.3.182, m.25, b.101 (decomp.), decomp. by water, soluble in alcohol or ether; used in analysis and organic synthesis. **i. number.** Iodine absorption value, Hübl number, Wijs number. The quantity of iodine (in mg.) absorbed by one gram fat or oil under specified conditions; it indicates the amount of unsaturated acids present. *hydro-* The number of parts of hydrogen (calculated as the equivalent amount of iodine) absorbed by 100 parts of a fat. **i. oxide.** (1) I. dioxide. (2) I. pentoxide. (3) I_4O_9 (?) = 651.73. A green powder, a supposed oxide of iodine. **i. pentabromide.** IBr_5 = 526.7. A brown liquid, decomp. by water; used as a reagent. **i. pentafluoride.** IF_5 = 221.93. A compound of 5-valent iodine, m. −8, b.97. **i. pentoxide.** I_2O_5 = 333.9. Iodic anhydride. A white crystalline powder, soluble in water, insoluble in alcohol; used as an oxidizing reagent and in organic synthesis. **i. perchlorate.** $I(ClO_4)_3,2H_2O$ = 461.34. Yellow-green crystals. **i. sulfate.** $I_2(SO_4)_3$ = 542.07. Yellow crystals, soluble in water. **i. tincture.** See *tincture of i.* **i. tribromide.** IBr_3 = 366.7. Tribromiodine. A brown liquid, soluble in water or alcohol; used as an antiseptic. **i. trichloride.** ICl_3 = 233.3. A yellow deliquescent crystalline powder, decomp. 25, soluble in water, alcohol, or benzene; used as an antiseptic and disinfectant. **i. value.** I. number. **i. water.** An aqueous solution of iodine containing 0.2 gram iodine per liter. Used as a reagent.

iodinin. A purple-bronze antibiotic pigment produced by *Chromobacterium iodinum.*

iodipin. An iodine addition-product of the fatty acids of sesame oil; used as an alterative and as x-ray contrast medium.

iodite. A salt of the hypothetical iodous acid containing the $=IO_2$ radical. **hypo-** A salt of hypoiodous acid of the type MOI.

iodo- A prefix indicating the presence of an iodine atom in an organic compound. Cf. *iodonium, iodoso, iodoxy.*

iodoacetanilide. Iodacetanilide.

iodoacetic acid. CH_2ICOOH = 185.95. Iodacetic acid, carboxymethyliodide. Yellow crystals, m.82, decomp. on further heating, insoluble in water, soluble in alcohol.

iodoaniline. $C_6H_4INH_2$ = 219.0. Amino-iodobenzene. **ortho-** Colorless needles, m.57. **meta-** Colorless leaflets, m.25. **para-** Colorless needles m.63. All are insoluble in water, soluble in alcohol or ether.

iodobenzene. C_6H_5I = 204.0. A colorless liquid, m. −28, b. 188, insoluble in water, soluble in alcohol or ether.

iodocasein. A compound of milk casein and iodine (18 %). A yellow-brown powder, odorless, tasteless, and insoluble in water.

iodocrase. Vesuvianite. The mineral, $Ca_6[Al(OH,F)]$, $Al_2(SiO_4)_3$.

iodocresine, iodocresol. Traumatol.

iodocrol. Carvacrol iodide.

iodoethylene. $CH_2{:}CHI$ = 153.9. Vinyl iodide. A colorless liquid, d.2.08, b.56, slightly soluble in water, soluble in alcohol or ether.

iodoform. CHI_3 = 393.8. Triiodomethane, methenyl iodide, formyl triiodide. Iodoformum (U.S.P.). Small hexagonal, yellow crystals, d.4.08, subliming at 119, slightly soluble in water or alcohol, soluble in ether or chloroform; decomp. on further heating. An antiseptic for wounds, alterative and antituberculant.

iodoformin. A colorless, odorless substitute for iodoform.

iodogorgoic acid. $C_9H_9I_2NO_3$ = 432.92. *3.5*-Diiodotyrosine, $HO.C_6H_2I_2.CH_2CH(NH_2)COOH$. An amino acid from proteins, occurring in two forms: *dl*- Rectangular prisms, m.204. *d*- White needles, m.194.

iodohydromol. Thymol iodide.

iodol. C_4HI_4N = 570.74. Tetraiodopyrrole. An odorless, amorphous brown powder, used as an antiseptic; m.150 (decomp.).

iodoleine. An iodized poppyseed oil, used medicinally.

iodomethane. Methyliodide.

iodometric. Iodimetric. Pertaining to analysis with standard iodine solutions.

i. acid value. Acidity determined in terms of the amount of iodine liberated from an iodide-iodate mixture.

iodometry. Iodimetry. A method of volumetric analysis, by titrating with a standard iodine solution with standard sodium thiosulfate solution, (usually 0.1N). Based on the reaction:

$$I_2 + Na_2S_2O_3 \leftrightarrows 2NaI + Na_2S_4O_6$$

Starch solution is indicator. This method is useful in determining chlorine, bromine, iodine, chlorides, bromides, iodides, hydrogen sulfide, sulfur dioxide and sulfites, arsenous and arsenic acid and their salts, manganese dioxide, ferrous salts, etc.

iodonium. The trivalent iodine atom ≡I, occurring in an organic compound. **i. hydroxide.** The bivalent radical =I—OH, as diphenyliodonium hydroxide Ph_2IOH. **i. iodide.** The bivalent radical =I—I, as in diphenyliodonium iodide $Ph_2I.I$.

iodophen. Nosophen.

iodophosphonium. Phosphonium iodide.

iodopropionic acid. $C_3H_5O_2I$ = 200.0. **alpha-** $MeCH_2ICOOH$. Colorless prisms, m.45, slightly soluble in water. **beta-** CH_2ICH_2COOH. Colorless leaflets, m.82, slightly soluble in water.

iodoso- The monovalent —IO radical derived from iodonium hydroxide. **i. benzene.** C_6H_5IO = 220.0. Colorless amorphous powder, exploding at 210, soluble in water or alcohol, insoluble in ether.

iodosol. Thymol iodide.

iodous acid. The hypothetical acid H_2IO_2, known as its salts. **hypo-** The unstable acid HIO, which decomposes to HI and HIO_3.

iodotannic acid. Iodotannin. A dark brown powder obtained from iodine and tannic acid; used as an alterative and astringent.

iodothyrin. $C_{11}H_{10}O_3NI_3$ = 584.89. The iodine compound of the thyroid glands.

iodotoluene. C_7H_7I = 218.0. Methyliodobenzene. **ortho-** A colorless liquid, d.1.69, b.211. **meta-** A colorless liquid, d.1.70, b.204. **para-** Colorless leaflets, m.35, b.211. All insoluble in water, soluble in alcohol or ether.

iodoxy. The monovalent radical —IO_2. **i. benzene.** $C_6H_5IO_2$ = 236.0. Colorless needles, m.167, exploding at 230, slightly soluble in water, soluble in alcohol, chloroform or benzene.

iodstarin. $Me(CH_2)_{10}.CI_2(CH_2)_4COOH$, *5.5*-diiodoheptadecanoic acid*, decomp. by light to tariric acid, q.v.

iodum. The U.S.P. name for iodine.

iodylin. A bismuth iodosalicylate, used as an iodoform substitute in medicine.

iodyrite. A native silver iodide, AgI.

iolanthite. A jasper from Crooked River, Oregon, used as gem.

iolite. $Mg_4Al_8O_6(SiO_3)_{10}$. Cordierite, dichroite, water sapphire. A blue orthorhombic magnesium aluminum metasilicate, hardness 7, d.2.65; used as gem. Cf. *aspasiolite, gigantolite, praseolite.*

ion. An electrically charged (1) atom, (2) radical, or (3) molecule; if positively charged it is called a *cation* (or *posion*); if negatively charged an *anion* (or *negion*). They travel in solution to the cathode (posode) and anode (negode), respectively. Cf. *ionic theory.* The following suffixes have been proposed:

-ion..... for metals (*e.g.*, sodion for sodium ion)
-idion.... for -ides (chloridion for chloride ion)
-anion... for -ates (chloranion for chlorate ion)
-osion.... for -ites (chlorosion for chlorite ion)
hypo-osion.... for hypo- -ite (hypochlorosion for hypochlorite ion)

Ions may be grouped into:

(1) positively charged atoms—an atom which yields, respectively, one, two, or three electrons and thereby becomes positively charged: $K^{\cdot}$ or K^+ potassium ion.

$Ca^{\cdot\cdot}$ or Ca^{++} calcium ion.
$Al^{\cdot\cdot\cdot}$ or Al^{+++} aluminum ion.

(2) negatively charged atoms—an atom which attracts an additional electron and becomes thereby negatively charged:

Cl' or Cl^- chloride ion
S'' or S^{--} sulfide ion.

(3) positively charged radicals—a group of atoms which loses one or more electrons:

NH_4 or NH_4^+ ammonium ion

(4) negatively charged radicals—a group of atoms which attracts one or more electrons:

NO_3' or NO_3^+ nitrate ion
SO_4'' or SO_4^{++} sulfate ion.

(5) positively charged molecules—a gaseous molecule which has lost one or more electrons:

H_2^+ ionized hydrogen

(6) negatively charged molecules—a gaseous molecule with one or more additional electrons:

N_2^- ionized nitrogen

acid- Anion. **aquated-** An i. surrounded by oriented water molecules. Cf. *solvated.* **amphoteric-** Zwitter. **i. basic-** Cation. **colloidal.** Micelle. **hydrogen-** See *hydrogen.* **hydroxyl-** See *hydroxyl.* **molecular-** A gaseous ion which is either positively or negatively charged; *e.g.*, a molecule which has lost or gained electrons under the influence of electric discharges or radiation. Cf. *activation, excitation.* **negative-** Anion. **positive-** Cation. **solvated-** An i. which is surrounded by oriented molecules of solvent. **zwitter-.** Amphoteric-. An i. containing both, a negative and positive charge; as, $^+NH_3RCOO^-$.

i. product. Solubility product. **i. states.** Matter can exist ionically in all three forms of aggregation; *i.e.*,

(a) **solid i.**—surrounded by oppositely charged ions; as in a polar crystal.

(b) **liquid i.**—surrounded by oriented molecules of the solvent; as in a solution.

(c) **gaseous i.**—with kinetic motion overcoming electrostatic charge; as in an ionized gas.

ionene. $C_{13}H_{18}$ = 174.14. *1.2.3.4*-Tetrahydro-*1.1.6*-trimethyl naphthalene. A hydrocarbon formed on dehydration of ionone (q.v.). Cf. *irene.*

ionic. Pertaining to electrically-charged atoms, radicals, or molecules. **i. charge.** The unit electrical charge carried by the hydrogen ion, e = 4.77×10^{-10} e.s.u. or 1.59×10^{-20} e.m.u. units. **i. conductivity.** The amount of electricity carried by the ions in solution, or the passage of a current by means of ions. **i. migration.** The bodily transfer of ions toward the anode or cathode; as, in electrolysis. **i. mobility.** (1) The motion of ions in a solution, analogous to the motion of molecules in gases. It is expressed numerically by the velocity under a gradient of 1 volt per centimeter, and it is a periodic function of the atomic weight: H^+, 3.25×10^{-4}; OH^-, 1.78×10^{-4}; K^+, 6.5×10^{-4} cm. per sec. (2) The velocity of ions under the influence of an electric current. **i. number.** The number of extra-nuclear electrons of an ion. It equals the atomic number plus or minus the valence electrons. The commoner i.n.*s* and the distribution of their component electrons are:

ionic numbers.

2 = 2
8 = 2.8
18 = 2.8.8
28 = 2.8.18
36 = 2.8.18.8
46 = 2.8.18.18
54 = 2.8.18.18.8
68 = 2.8.18.32.8
78 = 2.8.18.32.18
86 = 2.8.18.32.18.8
K.L.M.N.O.P
valence shells

i. potential. Assuming the ion in a crystal to be a charged sphere of definite extension, then the i.p. = valence/radius of ion. It is a periodic function of the ions (see table). Cf. *ionization potential.* **i. reactions.** The reactions characteristic of an ion; as, the precipitation of Cl^- by Ag^+, or of SO_4^{--} by Ba^{++}. **i. radius.** The distance in Ångström units of the periphery of the effective sphere from the center of a charged atom or group of atoms:

Pb^{4-} 86	Bi^{3-} 86			Nt 86 0		Ra^{2+} 86 1.24	Ac^{3+} 86 1.57	Th^{4+} 86 1.90	IONIC NUMBER: (upper numeral) The number of extra-nuclear electrons of an ion. IONIC POTENTIAL: (lower numeral) The valence divided by the ionic radius. Values given are the square-roots. For the position of an element see PERIODIC TABLE.		
Sn^{4-} 54 −1.17	Sb^{3-} 54 −1.10	Te^{2-} 54 −0.95	I^- 54 −0.68	Xe 54 0	Cs^+ 54 0.77	Ba^{++} 54 1.21	La^{3+} 54 1.61	Ce^{4+} 54 2.00			
Ge^{4-} 36 −1.21	As^{3-} 36 −1.16	Se^{2-} 36 −1.00	Br^- 36 −0.71	Kr 36 0	Rb^+ 36 0.82	Sr^{++} 36 1.33	Y^{3+} 36 1.79	Zr^{4+} 36 2.24			
Si^{4-} 18 −1.22	P^{3-} 18 −1.19	S^{2-} 18 −1.04	Cl^- 18 −0.74	Ar 18 0	K^+ 18 0.87	Ca^{++} 18 1.42	Sc^{3+} 18 1.92	Ti^{4+} 18 2.43			
C^{4-} 10 −1.24	N^{3-} 10 −1.32	O^{2-} 10 −1.19	F^- 10 −0.86	Ne 10 0	Na^+ 10 1.02	Mg^{++} 10 1.86	Al^{3+} 10 2.45	Si^{4+} 10 3.13	P^{5+} 10 3.83	S^{6+} 10 4.55	Cl^{7+} 10 5 20
			H^- 2 −0.69	He 2 0	Li^+ 2 1.29	Be^{++} 2 2.54	B^{3+} 2 3.87	C^{4+} 2 5.16	N^{5+} 2 6.71	O^{6+} 2 8.19	F^{7+} 2 10.0
Negative Ions				Neutral	H^+ 0 3.0	Positive Ions					

Ti^{4+} 18 2.43	V^{5+} 18 2.92	Cr^{6+} 18 3.39	Mn^{7+} 18 3.90	Fe^{6+} 20	Co^{3+} 24	Ni^{++} 26	Cu^+ 28 1.02	Zn^{++} 28 1.64	Ga^{3+} 28 2.20	Ge^{4+} 28 2.74	As^{5+} 28 3.26	Se^{6+} 28 3.78	Br^{7+} 28 4.24
Zr^{4+} 36 2.24	Cb^{5+} 36 2.66	Mo^{6+} 36 3.11	Ma^{7+} 36 3.56	Ru^{6+} 36 4.01	Rh^{6+} 39	Pd^{4+} 42	Ag^+ 46 0.89	Cd^{++} 46 1.44	In^{3+} 46 1.92	Sn^{4+} 46 2.36	Sb^{5+} 46 2.84	Te^{6+} 46 3.27	I^{7+} 46 3.74
Rare Earth Metals: Pr^{+++} to Lu^{+++}													
Hf^{4+} 68 2.25	Ta^{5+} 68 2.65	W^{6+} 68 3.05	Re^{7+} 68 3.45	Os^{8+} 68 3.85	Ir^{6+} 71	Pt^{4+} 74	Au^+ 78 0.85	Hg^{++} 78 1.35	Tl^{3+} 78 1.78	Pb^{4+} 78 2.18	Bi^{5+} 78 2.60	Po^{6+} 78 3.02	
Th^{4+} 86 1.90	Bv^{5+} 86 2.23	U^{6+} 86 2.56											

2−	1−	1+	2+	3+	4+
		Li 0.78	Be 0.34		
O 1.32	F 1.33	Na 0.98	Mg 0.78	Al 0.57	Si 0.39
S 1.74	Cl 1.81	K 1.33	Ca 1.06	Sc 0.83	Ti 0.64
Se 1.91	Br 1.95	Rb 1.49	Sr 1.27	Y 1.06	Zr 0.87
Te 2.11	I 2.20	Cs 1.65	Ba 1.43	La 1.22	Ce 1.02
		NH_4 1.43	Zn 0.83	Cr 0.64	Mo 0.68
		Tl 1.49	Cd 1.03	Mn 0.70	W 0.68
		Ag 1.13	Hg 1.12	Fe 0.67	V 1.05

i. theory. The theory according to which electrolytes split into component ions whenever they are dissolved in water. **i. velocity.** The product of the mobility of an ion and the actual potential gradient. Cf. *migration.*

ionidine. $C_{19}H_{25}O_4N_4$ = 373.5. An alkaloid obtained from the California poppy, *Eschscholtzia californica.*

ionium. Io = 230.5. A radioactive isotope, atomic number 90 (thorium), formed by the disintegration of uranium X. It emits β- and γ-rays and is transformed into radium.

ionise. Ionize.

ionization, ionisation. (1) Electrolytic dissociation. The breaking up of a molecule into two or more negatively- and positively- charged components (ions). It usually occurs when a polar compound is dissolved in water and is expressed by the equations (*e.g.*):

$$NaCl \rightarrow Na^+ + Cl^-$$
$$Al_2(SO_4)_3 \rightarrow 2Al^{+++} + 3\ SO_4^{--}$$

Cf. *solvation, acidity, electromotive force, displacement series.* (2) The removal of one or more outer electrons from an atom or molecule, by which gases become electrically charged under the influence of a strong electro-static field or radioactive rays:

$$H_2 \rightarrow H_2^+ + e$$

Cf. *excitation, i. potential, spectrum, luminescence.* **degree of-** The ratio of the molecules which become ionized at a given temperature and concentration of solution, to those molecules which remain unionized; generally expressed as a percentage. It is given numerically by the ratio of the equivalent conductivity under the conditions concerned to that of the solution at infinite dilution. Most salts and the "strong" or active acids and bases are from 80–95 % ionized in N/10 solution. Cf. *activity coefficient, acidity, hydrogen ion concentration.*

i. constant. The analogue of the dissociation constant, $k = \frac{[H^+][X^-]}{[HX]}$, in the application of the Law of Mass Action to ionisation. **i. gage** See *gage.* **i. potential.** The amount of energy V, in volts, required to remove an electron from an atom in its normal state; it is related to the wavelength of any ray λ, in Ångstroms, by the equation $V = 12.345/\lambda$. Cf. *energy levels, Bohr atom, orbits, quantum.* Thus for sodium the transition (1s − 1p) gives lines λλ 5896, 5890 (D-line), where V is 2.11 volts, as the excitation potential for the 1p state; the transition (1p − 2d) gives λλ 8195, 8184 and 1.51 volts as the excitation potential, and adding 2.11 + 1.51 gives 3.62 as the excitation potential for the 2d state. The sum of the excitation potentials from the 1s state to the limit will be 5.11 volts which is the i. potential of sodium. Cf. *ionic potential.*

ionize. To dissociate into ions or to become electrically charged.

ionized, ionised. (1) Describing a molecule which is separated into oppositely-charged atoms or radicals, the sum of positive and negative charges being zero. (2) Describing a molecule or atom from which electrons have been removed, whereby it becomes positively charged; as, $He \rightarrow He^+$. **non-** or **un-** Remaining in the molecular condition, not dissociated.

ionizing. The process of ionization q.v. **i. potential.** Ionization potential. **i. solvent.** A liquid which facilitates ionization, *e.g.*, water, liquid ammonia (ammonia-system), or liquid sulfur dioxide. Organic liquids are generally non-ionizing.

ionogenic. A little-used term for ionic.

ionone. $C_{13}H_{20}O$ = 192.2. A ketone terpene, $Me_2C_6H_6CH{:}CHCOMe$, and isomer of irone. α- A colorless liquid, d.0.934, b.120. β- A colorless liquid, d.0.949, b.135. Both are slightly soluble in water, soluble in alcohol or ether, and used in perfumery as artificial extract of violets.

ionosphere. The radio-reflecting layer of the upper atmosphere consisting of daily-changing areas of ionized molecules. It is part of the Kennelly-Heaviside layer.

iontophoresis. Migration of ionic medication through unbroken skin under the influence of a direct electrical current.

ionotropy. The existence of tautomeric ions, a positive or negative atom or group becoming detached from an unsaturated molecule thus leaving a − or + charge on the residual ion; the position of this charge may vary, resulting in the presence of two isomeric ions in dynamic equilibrium. When the detached atom is positive (H^+, M^+, NH_4^+) the phenomenon is called *cationotropy;* when it is negative (OH^-, X^-) *anionotropy;* in the special case of H^+, *prototopy* (cf. *pseudo-acid*), and in the case of OH^-, *pseudobasicity* (cf. *pseudo-base*).

iopax. Uroselectan. Sodium-2-oxo-5-iodopyridine-*N*-acetate. Used in pyelography.

iosol. Thymol iodide.

iothion. Diiodohydroxypropane, diiodopropyl alcohol. A yellow, oily liquid, d.2.4, insoluble in water, soluble in alcohol, ether, chloroform or oils; used in external iodine ointments.

Ipatiev reaction. The preparation of alcohols by the catalytic reduction of ketones with nickel oxide under pressure.

Ipatiew. Ipatiev.

ipecac. Ipecacuanha, ipecac root. The dried root of *Cephaelis ipecacuanha* (Rio ipecac) or *Cephaelis acuminata* (Carthagena ipecac), of the

family Rubiaceae. It contains 1.75 % alkaloids (emetine, cepheline, etc.); used as an emetic, anti-amebic, stomachic and expectorant, usually as the fluid extract. **American-** Gillenia. **Goanese-** Naregamine.

ipecacuanhic acid. $C_{14}H_{18}O_7$ = 298.12. A reddish brown powder from the roots of *Psychotria ipecacuanha.*

ipoh. A Malay name for various arrow poisons derived from Strychnos species. Cf. *upas.*

ipomic acid. Sebacic acid.

ipomoea. (1) Mexican scammony root. The dried root of *I. orizabensis*, a Convolvulaceae. (2) A genus of Convolvulaceae, (q.v.), yielding jalap and turpeth; used as a cathartic.

ipomoein. A globulin from the sweet potato, *Ipomoea batatas.*

ipral. $Ca(C_9H_{13}O_3N_2)_2.3H_2O$. Trade name for the calcium salt of ethylisopropyl barbituric acid. Colorless crystals, m.202, soluble in water, insoluble in alcohol; used as a hypnotic.

ipsilene. A gaseous disinfectant made by heating ethyl chloride and iodoform under pressure.

ipuanine. Artificial *emetine.*

Ir. The symbol for iridium.

ipuranol. $C_{23}H_{38}O_2(OH)_2$ = 380.31. An alcohol from buphane, m.290.

iradiation. Irradiation.

iregenone. $C_{13}H_{20}$ = 176.20. A terpene-like hydrocarbon, $MeEtC_6H_3.CMe_3$, in the roots of the Iris species.

irene. $C_{14}H_{20}$ = 188.17. *1.2.3.4*-Tetrahydro-*1.1.2.6*-tetramethylnaphthalene. A hydrocarbon and white solid. Cf. *irone, ionene.*

iretol. $C_7H_8O_4$ = 156.1. 1.2.3-trihydroxy-5-methoxybenzene, *5*-methoxypyrogallol, $MeO.C_6H_2(OH)_3$. Colorless crystals, m.186; used in perfumery.

Iridaceae. A family of plants which yield the following drugs:

Iris florentina	orris
Iris foetidissima	gladwin
Iris pseudacorus	yellow flag
Iris versicolor	iris

iridescence. The display of rainbow colors on the surface of a substance, as, opals or the tarnish on coal and copper pyrites.

iridescent. A surface colored like that of nacre (mother of pearl); is usually due to very thin films or strata of air or other materials which cause interference of light rays. **i. quartz.** A rock crystal filled with fine interstices, containing air films which produce combinations of rainbow colors; used as a gem.

iridic. Describing a compound of tetravalent iridium. **i. bromide.** $IrBr_4$ = 512.9. Iridium tetrabromide. A hygroscopic brownish powder, or bluish crystals, soluble in water or alcohol. **i. chloride.** $IrCl_4$ = 334.9. Dark red crystals, soluble in water. **i. iodide.** IrI_4 = 700.8. Iridium tetraiodide. A hygroscopic black powder, soluble in water. **i. sulfide.** IrS_2 = 257.3. Iridium disulfide. A black powder, insoluble in water or acids, soluble in potassium sulfide solution.

iridin. $C_{24}H_{26}O_{13}$ = 522.3. A glucoside derived from *Iris* species; used as a cholagogue.

iridious. Iridous.

iridium. Ir = 193.1. A metallic element, atomic number 77, of the platinum family; discovered in 1804 by Tennant. A white, hard, brittle, lustrous metal, d.22.42, m.1950, soluble in aqua regia. Used mainly, as alloys of the noble metals, to coat hydrogen electrodes and to harden platinum for jewelry (10 % Ir); also as catalyst, and with Os, for pen tips and compass bearings.

i. compounds. Three series: valency 2: irido-, as, IrO, $IrCl_2$; valency 3: iridous-, as, Ir_2O_3, $IrCl_3$; valency 4: iridic-, as, IrO_2, $IrCl_4$. **i. sodium chloride.** $Na_2IrCl_6.12H_2O$ = 691.02. Sodium iridichloride. Yellow crystals, m.50.

irido. A prefix for divalent iridium, Ir<.

iridosmine. Osmiridium.

iridous. Describing a compound of trivalent iridium, Ir≡. **i. oxide.** Ir_2O_3 = 434.2. Iridium trioxide, iridium black. A black powder, slightly soluble in hydrochloric acid, used in ceramics as a pigment.

iris. (1) An iridescent quartz or other mineral. Sometimes used as a gem. (2) Blue flag. The dried rhizome of *I. versicolor* or *I. caroliana.* Used as purgative, emetic or diuretic. (3) A genus of plants, Iridaceae, q.v.

Irish diamond. A quartz crystal from Ireland, sometimes used as a gem. **I. moss.** Carragheen, *Chondrus crispus*, killeen. The dried thallus of the kelps from the coast of Ireland and North America; used as a demulcent, and as a clarifying agent in brewing.

irisin. An extract from blue flag or *Iris versicolor.*

irisoid. The combined principles from blue flag (*Iris versicolor*), used as a cathartic and alterative.

irium. Trade name for sodium lauryl sulfate, used as detergent.

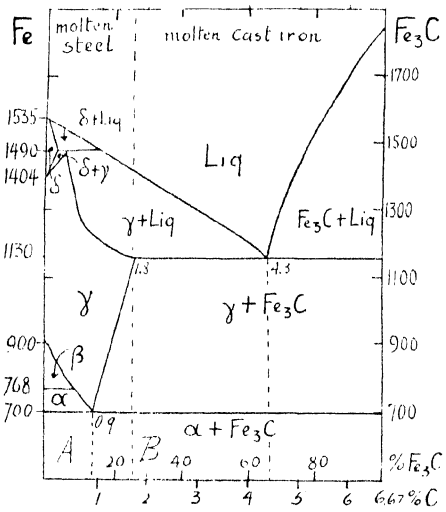
iron. Fe = 55.85. Ferrum. A metallic element, atomic number 26, in the eighth group of the periodic system. A black, lustrous, cubic, magnetic metal, d.7.85, m.1530, b.3200. Iron forms several series of compounds:

Valence	In acid solution	In alkaline solution
2	Fe^{++} ferrous (*green*)	$HFeO_2^-$ hypoferrite
3	Fe^{+++} ferric (*brown* or *yellow*)	FeO_2^- ferrite
4	FeO^{++} ferryl	$HFeO_3^-$ hypoferrate
6	.....	FeO_4^{--} ferrate (*purple*)

The many modifications of metallic iron, (wrought, cast, steel, reduced i.) consist chiefly of its allotropes (see figure). The world output of iron excluding steel (q.v.) in 1941 was 105,000,000 long tons, produced in U.S. > Germany > U.S.S.R. > Gt. Britain > Japan > France > Sweden.

alibated- I. covered with a protective layer of aluminum. **cast-** The molten iron from blast furnaces. Gray metallic masses, d.7.86, m.1275 to 1505. **ingot-** The malleable i. from the Bessemer process. **malleable-** Wrought-. **meteoric-** q.v. **native-** Meteorites. **passive-** I. rendered insoluble in dilute acids by immersion in fuming nitric acid, chloric or perchromic acid, or hydrogen peroxide, or by making it the anode in electrolysis. This property is lost by mechanical shock. **pig-** Cast-. **Quevennes-** Reduced i. **reduced-** Finely powdered metallic i. obtained by heating ferric oxide in a current of hydrogen. **specular-** Specularite. **steel-** A gray metal, d.7.7, m.1375.

See *steel*. **white-** (1) Cast iron containing only combined carbon. (2) Marcasite. **wrought-** A cast iron which has been heated and hammered. A gray metal, d.7.86, m.1505.



Iron-carbon system.

$\alpha \rightleftharpoons \beta \rightleftharpoons \gamma$
760°C 900°C

Pure iron melts at 1535°, and pure cementite, Fe_3C, containing 6.67 % carbon at 1850°C. The different solid solutions and compounds which are formed depend on the carbon content and are: α = ferrite; β = beta-iron; γ = austenite; δ = delta-iron; Fe_3C = cementite; $\alpha + Fe_3C$ = pearlite. During the cooling of molten iron several transformations take place, which below a carbon content of 1.8 % are important in the heat treatment of steel and cause, in section *A*, more or less grained crystals of ferrite in pearlite, and in section *B*, pearlite in cementite. Thus:

α-ferrite. The chief constituent of wrought iron, stable below 760°C., is soft and magnetic; it dissolves little iron carbide. **β-ferrite.** A non-magnetic i. produced at 760°C.; it also dissolves i. carbide. **γ-ferrite.** A non-magnetic i. produced at 900°C.; it forms solid solutions with i. carbide. Cf. *diagram*.

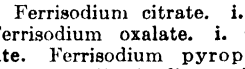
i. acetate. Ferric acetate. **i. alginate.** Ferric alginate. **i. alloys.** See *steel, ferrimanganese, silicon alloys*. **i. alum.** A native ferripotassium sulfate. See *alums*. **i. albuminate.** Ferric albuminate. **i. ammonium bromide.** Ferroammonium bromide. **i. ammonium chromate.** Ferriammonium chromate. **i. ammonium chloride.** Ferriammonium chloride. **i. ammonium citrate.** Ferriammonium citrate. **i. ammonium cyanide.** See *ammonium ferrocyanide, ammonium ferricyanide*. **i. ammonium oxalate.** Ferriammonium oxalate. **i. ammonium sulfate.** (1) Ferroammonium sulfate. (2) Ferriammonium sulfate. **i. ammonium tartrate.** Ferriammonium tartrate. **i. alginate.** Ferric alginate. **i. arsenate.** (1) Ferric arsenate. (2) Ferrous arsenate. **i. benzoate.** Ferric benzoate. **i. black.** Finely-divided antimony. **i. brass.** A brass containing from 1–9 % iron. **i. bromide.** (1) Ferric bromide. (2) Ferrous bromide. **i. buff.** Nanking yellow, or ferric hydroxide. **i. cacodylate.** Ferric cacodylate. **i. camphorate.** Ferric camphorate. **i. carbide.** (1) Fe_3C = 179.52. Regular, gray crystals, d.7.07, insoluble in water. (2) FeC_4 = 103.84. A gray crystalline mass. See figure. **i. carbonate.** (1) Ferric carbonate. (2) Ferrous carbonate. **i. carbonyl.** (1) $Fe(CO)_5$ = 195.84. Iron pentacarbonyl, a pale yellow viscous liquid, freezing at −20; b.102.5, decomp. 180. (2) $Fe_2(CO)_9$ = 363.68. Diferrocarbonyl. Orange crystals, decomp. on heating. (3) $Fe(CO)_4$ = 167.84. Iron tetracarbonyl. Green crystals. **i. chloride.** (1) Ferric chloride. (2) Ferrous chloride. **i. chromate.** Ferric chromate. **i. citrate.** Ferric citrate. **i. citrate green.** Ferriammonium citrate. **i. cyanides.** See *ferric ferricyanide, ferric ferrocyanide, ferrous ferricyanide*, and *ferrous ferrocyanide*. **i. dinitrosothiosulfates.** $M[Fe(NO)_2S_2O_3]H_2O$, where M is K or Rb. **i. disulfide.** FeS_2 = 120.0. Yellow rhombic crystals, d.4.86, m.1171, produced by the precipitation of ferric salts with hydrogen sulfide. **i. flint.** An opaque variety of quartz, containing iron. **i. family.** The elements Cr, Mn, Fe, Co, Ni, all of which form colored salts and two or more series of compounds. Cf. *periodic system*. **i. fluoride.** Ferrous fluoride. **i. formate.** Ferric formate. **i. founding.** Making a facsimile of a pattern by running molten iron into a sand impression or mold of the pattern. **i. froth.** A fine spongy variety of hematite. **i. glycerophosphate.** Ferric glycerophosphate. **i. glance.** Hematite. **i. hydroxide.** (1) Ferric hydroxide. (2) Ferrous hydroxide. **i. hypophosphite.** (1) Ferric hypophosphite. (2) Ferrous hypophosphite. **i. hyposulfite.** Ferrous hyposulfite. **i. iodate.** Ferric iodate. **i. iodide.** (1) Ferrous iodide. (2) Ferric iodide. **i. lactate.** (1) Ferric lactate. (2) Ferrous lactate. **i. liquor.** A solution of ferrous acetate. **i. magnesium citrate.** Ferrimagnesium citrate. **i. magnesium lactate.** Ferromagnesium lactate. **i. magnesium sulfate.** Ferromagnesium sulfate. **i. malate.** Ferric malate. **i. manganese chloride.** Ferromanganous chloride. **i. manganese citrate.** Ferrimanganic citrate. **i. manganese iodide.** Ferromanganous iodide. **i. manganese lactate.** Ferromanganous lactate. **i. manganese sulfate.** Ferromanganous sulfate. **i. manganese tartrate.** Ferrimanganic tartrate. **i. minerals.** Iron is, after aluminum, the most abundant metal, and occurs in practically all rocks and a large number of minerals.

meteorites	Fe
hematite	Fe_2O_3
magnetite	Fe_3O_4
limonite	$Fe(OH)_3$
pyrite	FeS
marcasite	FeS_2
siderite	$FeCO_3$

i. mordant. (1) Ferrous sulfate. (2) Ferric nitrate. **i. nitrate.** (1) Ferrous nitrate. (2) Ferric nitrate. **i. nitride.** Fe_4N. A catalyst for the synthesis of ammonia. **i. nucleinate.** Ferric nucleinate. **i. oleate.** (1) Ferric oleate. (2) Ferrous oleate. **i. oxalate.** Ferric oxalate. **i. oxide.** (1) FeO, ferrous oxide. (2) Fe_2O_3, ferric oxide. (3) Fe_3O_4, ferriferrous oxide. ***black-*** Ferric oxide. ***magnetic-*** Ferrous

oxide. *red-* Ferric subcarbonate **i. paranucleinate.** Triferrin. **i. pentacarbonyl.** See *i. carbonyl.* **i. peptonate.** Ferric peptonate. **i. perchlorate.** Ferric perchlorate. **i. perchloride.** Ferriferrous chloride. **i. persulfate.** Ferriferrous sulfate. **i. phenolate.** Ferric phenate. **i. phosphates.** (1) Ferric phosphate. (2) Ferrous phosphate. **i. phosphide.** FeP = 86.86. A black powder, d.5.2. There are also Fe_2P, Fe_2P_3, Fe_3P, Fe_3P_4. **i. potassium citrate.** Ferripotassium citrate. **i. potassium cyanide.** (1) Potassium ferricyanide. (2) Potassium ferrocyanide. **i. potassium oxalate.** Ferripotassium oxalate. **i. potassium tartrate.** Ferropotassium tartrate. **i. protocarbonate.** Ferrous carbonate. **i. protochloride.** Ferrous chloride. **i. protosulfide.** Ferrous sulfide. **i. putty.** A mixture of ferric oxide and boiled linseed oil, used for making joints in pipe connections. **i. pyrite.** Pyrites. **i. pyrophosphate.** Ferric pyrophosphate. **i. pyrosulfate.** Ferric pyrosulfate. **i. pyrothioarsenate.** (1) Ferric pyrothioarsenate. (2) Ferrous pyrothioarsenate. **i. quinine citrate.** Brown-green, water-soluble scales. An official preparation containing 15 % quinine, and not more than 11 % of water. **i. rhodanate.** Ferric thiocyanate. **i. rust.** Hydrated ferric oxide, $2Fe_2O_3,3H_2O$. **i. salts.** See *ferrous, ferric.* **i. sesquichloride.** Ferric chloride. **i. sesquioxide.** Ferric oxide. **i. sesquisulfate.** Ferric sulfate. **i. sodium benzoate.** Ferrisodium benzoate. **i. sodium citrate.** Ferrisodium citrate. **i. sodium oxalate.** Ferrisodium oxalate. **i. sodium pyrophosphate.** Ferrisodium pyrophosphate. **i. sodium sulfate.** Ferrisodium sulfate. **i. spar.** Siderite. **i. sponge.** Ferric oxide. **i. stearate.** Ferric stearate. **i. stone.** Siderite. **i. subcarbonate.** Ferric subcarbonate. **i. subsulfate.** Ferric subsulfate. **i. succinate.** Ferric succinate. **i. sulfate.** (1) Ferrous sulfate. (2) Ferric sulfate. **i. sulfide.** (1) FeS, iron monosulfide, see *ferrous sulfide.* (2) FeS_2, iron disulfide, see *pyrites.* (3) Fe_2S_3, iron trisulfide, see *ferric sulfide.* (4) Fe_3S_4, iron tetrasulfide, see *ferriferrous sulfide.* **i. sulfite.** Ferrous sulfite. **i. sulfocyanate.** Ferric thiocyanate. **i. tannate.** Ferric tannate. **i. tantalate.** Tantalite. **i. tartrate.** (1) Ferric tartrate. (2) Ferrous tartrate. **i. tersulfate.** Ferric sulfate. **i. thiocyanate.** Ferric thiocyanate. **i. trichloride.** Ferric chloride. **i. trioxide.** Ferric oxide. **i. tungstate.** See *ferberite, reinite, wolframite.* **i. valerianate.** Ferric valerianate. **i. vanadate.** Ferric vanadate.

irone. $C_{14}H_{22}O$ = 206.1. Iron,



A terpene from orris root, and isomer of ionone. A colorless liquid, d.0.939, $b._{16mm.}$ 144, slightly soluble in water, soluble in alcohol or ether. Used in perfumery, for manufacturing violet essence.

ironpentacarbonyl. See *iron carbonyl.*

ironperiod. The central part of the third period in the periodic system, consisting of the elements: Cr, Mn, Fe, Co, Ni, and Cu. All form colored salts and ions, and have two or more series of compounds.

irradiation. Exposure to ultraviolet radiation, either the small fraction of solar rays not absorbed by the atmosphere or those produced by a mercury vapor lamp. The most active rays have a wavelengths of 250–300 mμ. Sterols exposed to these rays become active, and exert a vitamin-like effect; *e.g.* ergosterol exposed for 22.5 seconds to 265 mμ, absorbing a total of 3.2×10^{13} quanta (which corresponds with 3.2×10^{13} activated molecules or 2×10^{-3} gram) forms sufficient vitamin D to affect a rat suffering from rickets (Fosbinder, Daniels and Steenbock). I. is measured by Eder's solution, q.v.

irregular. Not according to rule.

irreversible. Describing a reaction which cannot be reversed, and usually proceeds to completion in one direction.

irritant. (1) An agent which produces inflammation or irritation; as, mustard oil, cantharides, croton oil, phenol. Cf. *lacrimatory gases.* (2) The metals Ni, Mn, Cr, W and Si, which in iron alloys are i. to carbon.

Irvine, Sir James Colquhoun. 1887– . A British chemist noted for research on carbohydrates.

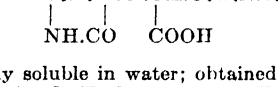
isabellin. An alloy of Al, Mn and Cu; used for standard electrical resistances.

isaconic acid. Itaconic acid.

isaconitic acid. $C_6H_6O_6$ = 174.0. Isoaconitic acid. The tribasic acid $HOOC.CH:CH.CH.(COOH)_2$.

isamatic. Isamic.

isamic acid. $C_{16}H_{13}N_3O_4$ = 311.1. Red prisms, m.164.5.



slightly soluble in water; obtained from isatin.

isanic acid. $C_{14}H_{20}O_2$ = 220.15. The fatty acid, $C_{13}H_{19}COOH$. Colorless crystals, m.41, from the oil of tsano nuts.

isaphenic acid. $C_{17}H_{11}NO_3$ = 277.1. White leaflets, m.295, insoluble in benzene or chloroform, soluble in acetic acid.

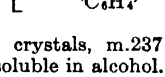
isapiol. An isomer of apiol, $C_{12}H_{14}O_4$.

isarol. Ammonium sulfoichthyolate obtained by distilling bituminous slate, sulfiting the distillate and combining it with ammonia. It forms a dark-brown sticky liquid, soluble in water and used as an antiseptic, analgesic, and antipuretic.

isatan. $C_{16}H_{12}O_3N_2$ = 280.11. Hydroxybioxindol.

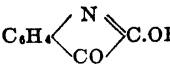
isatic acid. $C_8H_7NO_3$ = 165.1. Isatinic acid, aminophenylglyoxylic acid, amidobenzoyl formic acid. $NH_2.C_6H_4CO.COOH$. A white powder, decomp. on heating, slightly soluble in water or alcohol.

isatide. $C_{16}H_{12}N_2O_4$ = 296.11. Dihydroxybioxindol, isatin-*3.3'*-pinacol.

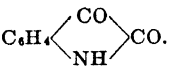


Colorless crystals, m.237; insoluble in water, slightly soluble in alcohol.

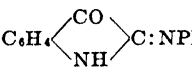
isatin. $C_8H_5O_2N$ = 147.1. 2-hydroxy-3-pseudoindolone, pseudoindogen oxide, o-aminobenzoylformic acid, lactam of isatinic acid.



Red needles, m.198, soluble in hot water or alcohol; used in the manufacture of dyestuffs. **β-imino-** Imesatin. **pseudo-** Indoldione. The lactim form of isatin:

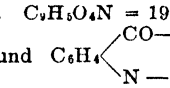


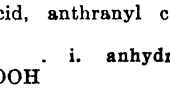
i. anilide. $C_{14}H_{10}N_2$ = 222.17.

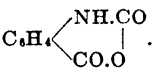


m.120. **i. chloride.** C_8H_4ONCl = 165.5. Brown needles, decomp. 180, insoluble in water, soluble in alcohol; used in the manufacture of dyestuffs.

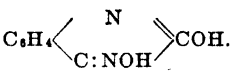
isatinic acid. Isatic acid.

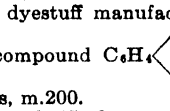
isatogenic acid. $C_9H_5O_4N$ = 191.05. The bicyclic compound  . Cf. *diisatogen.*

isatoic acid. $C_8H_7NO_4$ = 181.09. *N*-carboxyanthranilic acid, anthranyl carboxylic acid:  . **i. anhydride.** $C_8H_5NO_3$ = 163.09. Benzoxazinedione.



isatoxime. $C_8H_6O_2N_2$ = 162.1. Nitrosoindoxyl. The bicyclic compound

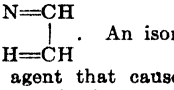


Yellow needles, m.202 (decomp.), slightly soluble in water, soluble in alcohol, ether, or bases; used in dyestuff manufacture. **pseudo-** The bicyclic compound  .

Yellow crystals, m.200.

isatropic acid. $C_{18}H_{16}O_4$ = 296.12. *1.2.3.4*-Tetrahydro-*1*-phenyl-*1.4*-naphthalene dicarboxylic acid. A solid, m.237, insoluble in ether, soluble in water or alcohol. Cf. *atropic acid.*

isatropylcocaine. $C_{19}H_{22}O_4N$ = 328.3. An alkaloid derived from coca leaves.

isazol. C_3H_3ON = 69.1. The heteroatomic pentacycle:  . An isomer of oxazole.

ischidrotic. An agent that causes retention or suppression of perspiration.

isentropic. Involving no change in entropy.

iserite. A sand rich in titanium and iron.

isethionic acid. $C_2H_6O_4S$ = 126.1. Ethylenehydrinsulfonic acid, oxyethylsulfonic acid, *2*-hydroxyethane sulfonic acid. The hydroxy acid, $CH_2OH.CH_2.SO_2OH$, from which taurine is derived. A syrupy liquid. With oleic acid it forms detergents, igepons.

ishkyldite. $H_{20}Mg_{15}Si_{11}O_{47}$. A structural variety of chrysotile found in the Volga district.

isindazole. Isoindazole.

isinglass. (1) Fish glue, ichthyocolla. A pure gelatin derived from the swimming bladders of fishes (*Acipenser* species); used as an adhesive and clarifying agent. (2) Mica in thin sheets, used for windows in ovens and in asbestos goggles. **Japanese-** Agar. **vegetable-** Agar.

Isle of Wight diamond. A quartz crystal from the Isle of Wight, sometimes used as a gem.

Isle Royal greenstone. Chlorastrolite.

iso- A prefix derived from the Greek "equal," which indicates a similarity. In organic compounds it is generally abbreviated to *i-*; listed under the corresponding normal compound. Cf. *isomery.*

isoaconitic. Isaconitic.

isoallyl. Propenyl.

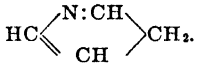
isoamoxy. The monovalent radical, $Me_2CH(CH_2)_2O$—.

isoamyl. The radical $Me_2CH.CH_2.CH_2$—. See *i-amyl.*

isoamylene. Pental.

isoanthraflavic acid. $C_{14}H_8O_4$ = 240.13. 2.7-dihydroxyanthraquinone. A yellow crystalline solid, m.330; soluble in alcohol, insoluble in water.

isoazole. C_4H_5N = 67.1. Isopyrrole. The pentatomic heterocyclic compound



isobar. (1) A line drawn through points of a map or chart which have the same barometric pressure at a given time. (2) Any one of a set of isobars, q.v.

isobaric. Pertaining to atoms having the same weight. Cf. *isobars.* **i. isotopes.** Those atomic species which have the same atomic weights and the same atomic numbers. Cf. *isobars, isotopes.*

isobars. (1) Any two or more atomic species having the same atomic weight; they may or may not have the same atomic number. (2) A line in a diagram or map showing equal barometric pressures.

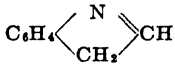
TABLE OF ISOBARS

A. Having different atomic numbers:
- At. Weight 40: 18-A, and 20-Ca.
- At. Weight 70: 30-Zn and 42-Ge.
- At. Weight 74: 32-Ge and 24-Se.
- At. Weight 78: 34-Se and 36-Kr.
- At. Weight 80: 34-Se and 36-Kr.
- At. Weight 82: 34-Se and 36-Kr.
- At. Weight 86: 36-Kr and 38-Sr.
- At. Weight 112: 48-Cd and 50-Sn.
- At. Weight 114: 48-Cd and 50-Sn.
- At. Weight 115: 49-In and 50-Sn.
- At. Weight 116: 48-Cd and 50-Sn.
- At. Weight 121: 50-Sn and 51-Sb.
- At. Weight 124: 50-Sn and 54-Xe.
- At. Weight 126: 52-Te and 54-Xe.
- At. Weight 128: 52-Te and 54-Xe.
- At. Weight 130: 52-Te and 54-Xe.
- At. Weight 136: 54-Xe and 56-Ba.
- At. Weight 142: 58-Ce and 60-Nd.
- At. Weight 206: 81-ActC″, 82-ActPb, and RaG.
- At. Weight 208: 81-ThC″ and 82-ThD.
- At. Weight 210: 81-RaC″, 82-ActB, 82-RaD, 83-ActC, 83-RaE, 84-RaF, and 84-ActC′.
- At. Weight 212: 82-ThB, 83-ThC, and 84-ThC′.

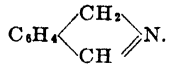
At. Weight 214: 82-RaB, 83-RaC, 84-RaC', and 84-ActA.
At. Weight 218: 84-RaA and 86-ActEm.
At. Weight 222: 86-Rn and 88-ActX.
At. Weight 226: 88-Ra, 89-Act, and 90-RaAc.
At. Weight 228: 88-MsThI, 89-MsThII, and 90-RaTh.
At. Weight 230: 90-Io, 90-Uy, and 91-Pa.
At. Weight 234: 90-Ux_1, 91-Ux_2, 91-Uz, and 92-UII.

B. Having the same atomic number (isobaric isotopes):
At. Wt. 206, At. No. 82: Act.Pb, RaG.
At. Wt. 210, At. No. 82: Act.B, RaD.
At. No. 83: Act. C, RaE.
At. No. 84: RaF, ActC', etc.

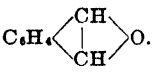
isobenzazole. C_8H_7N = 117.1. **1-** Indolenine, ψ-indole.



2-ψ-isoindole.



isobenzofuran. C_8H_6O = 118.1. Isocoumarone.

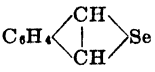


dihydroketo- Phthalide. **i. dione.** Phthalic anhydride.

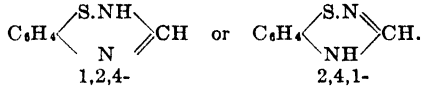
isobenzofurandione. Phthalic anhydride.

isobenzofuranone. Phthalide.

isobenzoselenofuran. C_8H_6Se = 181.2.

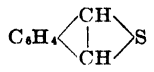


isobenzothiodiazine. The heterocyclic compounds:



1,2,4- 2,4,1-

isobenzothiofuran. C_8H_6S = 134.1.



isobutane. See *i-butane.*

isobutenyl. The monovalent radical, $Me_2C{:}CH—$, from *i*-butylene.

isobutoxy. The monovalent radical, $Me_2.CH.CH_2O—$, from *i*-butyl alcohol.

isobutyl. The monovalent radical, $Me_2.CH.CH_2—$, from *i*-butane.

isobutyryl. The monovalent radical, $Me_2C.CHCO—$, from *i*-butyric acid.

isocarb. A line in a diagram showing equal carbon contents.

iso-catalysis. See isomeric *catalysis.*

isocetic acid. Pentadecanoic acid.*

isocholine. Amantine (2).

isochore. The curve obtained by plotting the pressure and temperature of a gas at constant volume. See *reaction* isochore.

isochromatic. Having the same color throughout.

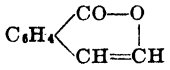
isochrone. A line joining points of equal stability (expressed as log gelation time) on triangular diagrams; used to express the stability of colloids.

isochronism. The characteristic of (1) occurring at the same intervals of time; (2) lasting for equal periods of time.

isochronous. Occurring in the same period of time at equal intervals.

isocorybulbine. $C_{21}H_{21}O_4N$ = 351.3. An alkaloid from *Corydalis cava.*

isocoumarin. $C_9H_6O_2$ = 146.1.



isocrotonic acid. $C_4H_6O_2$ = 86.046. *cis-*α-butenic acid, β-crotonic acid, q.v. A colorless liquid, d.1.0252, m.14.6, decomp. 171.

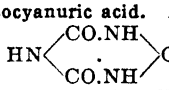
isocyanate. Carbimide. A compound containing the monovalent —N=C=O radical.

isocyanide. Isonitrile, carbylamine. A compound containing the monovalent —N=C or —N≡C radical.

isocyanin. A member of a group of dyes used as photographic sensitizers. Cf. *carbocyanin.*

isocyano. The monovalent radical, C:N—, or C⋮N—. Cf. *isocyanide.*

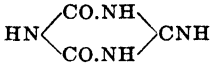
isocyanuric acid. A heterocyclic ring compound:



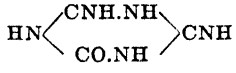
Cf. *cyanuric acid.*

isocyanurimide. The heterocyclic ring compounds:

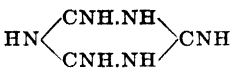
$C_3H_4O_2N_4$ = 128.05. **monoimide** or melanuric acid,



$C_3H_5ON_5$ = 127.08. **diimide** or isoammelidic acid,

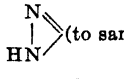


$C_3H_6H_6$ = 126.09. **triimide** or isomelamine,

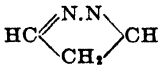


isocyclic. (1) Describing a closed chain compound containing the same number of atoms as the compound with which it is isocyclic, *e.g.*, the benzene ring (6 carbon atoms) is isocyclic with the pyridine ring (5 carbon atoms and 1 nitrogen atom). (2) Sometimes incorrectly used for homocyclic.

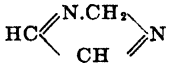
isodiazo. The trivalent radical,



isodiazole. $C_3H_4N_2$ = 68.2. **1.2-** Isopyrazol. The pentacyclic compound



1.3- Isoimidazol. The pentacyclic compound



isodigitoxigenin. $C_{23}H_{34}O_4$ = 374.2. Lustrous, white crystals, m.271, from digitalis.

isodimorphism. Isomorphs which have two crystalline forms in common. Cf. (*isomorphism*).

isodisperse. Dispersable in solutions having the same pH value.

isodulcite. Rhamnose.

isodurene. $C_{10}H_{14}$ = 134.11. *1.2.3.5*-Tetramethyl benzene, $C_6H_2Me_4$. A colorless liquid, d.0.896, m. −24, b.197. **amino-** Isoduridine.

isodurenol. $C_{10}H_{14}O$ = 150.1. *2.3.4.6*-Tetramethyl phenol, C_6HMe_4OH. White crystals, m.80, b.240.

isoduridine. $C_{10}H_{15}N$ = 149.13. *2.3.4.6*-Tetramethyl aniline, $Me_4C_6H.NH_2$. White crystals, d.0.978, m.23, b.255.

isodurylic acid. $C_{10}H_{12}O_2$ = 164.09. Trimethylbenzoic acid. α- or *3.4.5*-. Needles, m.215. β- or *2.4.6*-. White scales, m.152. γ- or *2.3.5*-. White plates, m.147; all are very slightly soluble in water.

isodynamic. (1) Having equal force. (2) Generating or liberating the same amount of energy (expressed in calories); *e.g.*, a group of isodynamic food materials.

isoelectric point. The point of electric neutrality or zero potential; hence the *p*H value at which a substance (protein, etc.) is neutral. Below or above this *p*H-value it acts either as a base or acid, respectively. In the case of colloids, coagulation occurs at or near this hydrogen ion concentration. Cf. *gelation*, *casein*. Typical values:

pH	*Protein*
4.4....	serum globulin
4.6....	ovalbumin
4.7....	gelatin, casein, serum albumin
5.3....	fibrinogen
5.5....	edestin, serum albumin pseudo globulin
6.8....	hemoglobin, oxyhemoglobin
8.1....	globin

isoelectronic. Describing atoms which resemble one another in all but mass and nuclear charge. The spectra of such atoms are thus simply related. Cf. *isostere*, *ionic number*.

isoerucic acid. Brassidic acid.

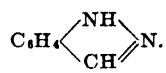
isoferulic acid. Hesperitinic acid.

isogamous. Having male and female gametes which are morphologically identical.

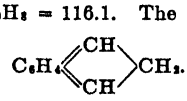
isohexane. See *i-hexane*.

isohydric. Describing a neutralization, during which the pH value does not change. Cf. *buffer*. Hence a set of solutions of similar H^+ concentration. **homo-** See *homoisohydric*.

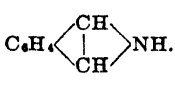
isoindazole. $C_7H_6N_2$ = 117.1. 1.2-benzodiazole, benzopyrazole.



isoindene. C_9H_8 = 116.1. The hydrocarbon:



isoindole. C_8H_7N = 117.1. 2-Benzazole.



dihydro- Xylenimine. **pseudo-** *2*-Isobenzazole. **i. dione.** Phthalimide.

isoindoledione. Phthalimide.

isoindyl. The monovalent radical, C_8H_6N—, derived from isoindole. There are four isomers.

isokom. A line drawn through a diagram to connect points of equal viscosity.

isolate. To separate or prepare an element or a compound in a pure condition.

isoleucine. $C_6H_{13}NO_2$ = 131.11. β-methylethyl-α-aminopropionic acid, *2*-amino-*3*-methylpentanoic acid*. The amino acid $NH_2.CH(CHEtMe)COOH$. *dl*- Rhombic or monoclinic plates, m.292, slightly soluble in water. *d*- Greasy leaflets, m.283.

isoleucyl. The monovalent radical, $MeCH_2.CHMe.CHNH_2.CO$—.

isologue, isolog. A member of a series of compounds of similar structure, but having different atoms of the same valency and usually of the same periodic group.

isologous series. A set of isologs; *e.g.*, the pentacyclic compounds fall into three isologous types, namely:

furan type, as C_4H_4O, C_4H_4S, C_4H_4Se.
pyrrole type, as C_4H_5N, C_4H_5P, C_4H_5As.
pentamethylene type, as C_5H_5, C_4H_5Si.

Other examples of isologous series are:
Water: H_2O, M_2O, R_2O, M_2S, M_2Se, M_2Te.
Ammonia: NH_3, NR_3, PR_3, AsR_3, BiR_3.
Hydroxylamine: R_2NOH, R_2POH, R_2IOH, R_2TlOH.
Methane: CH_4, CR_4, SiR_4, SnR_4, PbR_4.
Carbinol: $R_3C.OH$, R_3SiOH, R_3SnOH, R_3SOH.
Ammonium hydroxide: R_4NOH, R_4POH, R_4AsOH, R_4WOH.
Formaldehyde: H_2CO, R_2CO, R_2SiO, R_2SO, R_2TeO.
Formic acid: H.CO.OH, R.CO.OH, R.SiO.OH, R.SO.OH, R.SnO.OH.

isomalic acid. See *malic acid*.

isomer. One of a pair of or more compounds having the same composition, but different properties. Cf. See *metamers*, *dimers*, *polymers*.

isomeric. Pertaining to isomerism.

isomeride. One of a set of compounds which have similar structural groups but not necessarily the same number of atoms; thus, anabasine is an *isomer* of nicotine, but nornicotine is an *isomeride*.

isomerism. The phenomenon shown by a compound which has the same percentage composition as another compound, yet differs in the relative position of the atoms within the molecule, from which result different physical and chemical properties. There are three types of simple isomerisms:

(a) Structural isomerism; as, *chain*-isomerism (propane and isopropane), *place* isomerism (1-chloropropane and 2-chloropropane), *meta*-isomerism (Δ^1-butylene and Δ^2-butylene), *ring*-isomerism (o-, m-, p-, v-, s-, and a-position).

(b) Geometrical isomerism; as, *cis-trans*-isomerism, *syn-anti*-isomerism.

(c) Stereo-isomerism: or isomerism due to the presence of an asymmetric carbon atom which gives optically active d-, and l-compounds. **dynamic-** Tautomerism.

isomery. Isometry. The general phenomena of isomerism, tautomerism, and pseudomerism of organic compounds. See *coordination theory* and *Werner's theory*. Four factors determine the types of isomery, namely:

P = the position, or arrangement of the atom within the molecule.
T = the type of the resulting compound.
V = the valency of the principal atom.

L = the linkage or connection between the atoms.

Accordingly an organic molecule may show the following differences, (d), or similarities, (—),:

P	T	V	L	
d	—	—	—	= isomerism and stereoisomerism.
d	d	—	—	= metamerism } dynamic
—	d	—	d	= desmotropism } isomerism.
d	d	—	d	= tautomerism }
—	—	d	—	= pseudomerism.

Classification and examples:

1. Isomerism
   (a) structural isomerism

$CH_3.CH_2.CH_2.CH_3$ and $CH_3.CH(CH_3).CH_3$

nuclear or chain-isomerism

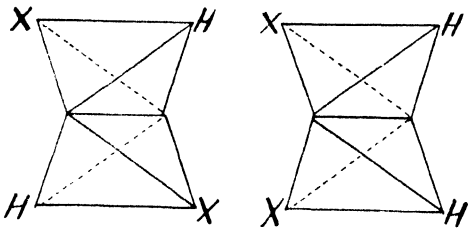
$CH_3.CH_2.CH_2Cl$ and $CH_3CHCl.CH_3$

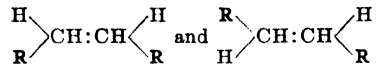
position or place-isomerism

$CH_3.CH_2.CH:CH_2$ and $CH_3.CH:CH.CH_3$

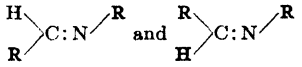
metamerism or meta-isomerism

   (b) geometrical isomerism



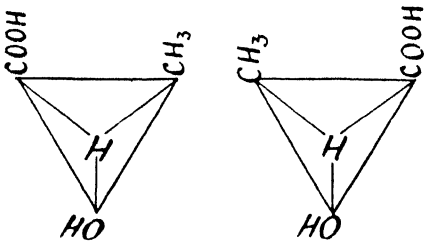


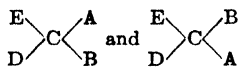
(cis-isomerism and trans-isomerism)



(anti- and syn-isomerism)

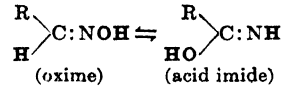
   (c) stereo- or optical-isomerism:



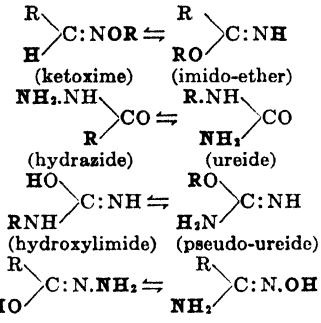


(A, B, D, and E are different atoms or radicals)

2. Metamerism: The type of compound and the position of the atoms change, but the linkage and valency remain the same.



(oxime) (acid imide)



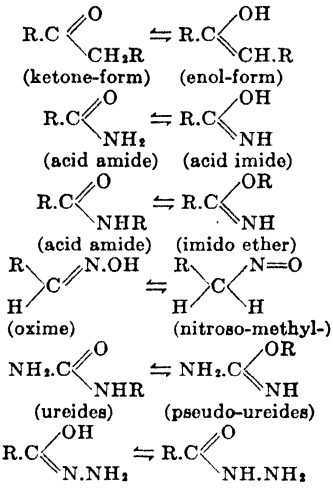
(ketoxime) (imido-ether)

(hydrazide) (ureide)

(hydroxylimide) (pseudo-ureide)

(hydrazonic acid) (amidoximes)

3. Desmotropism: Linkage of atoms and type of compound change, but position and valency remain the same.



(ketone-form) (enol-form)

(acid amide) (acid imide)

(acid amide) (imido ether)

(oxime) (nitroso-methyl-)

(ureides) (pseudo-ureides)

(hydrazonic acid) (acid hydrazide)

4. Tautomerism: Linkage and position of atoms, as well as the type of compound changes, but valency remains the same.

$R.O.N:O \rightleftharpoons R.NO_2$
(nitrite) (nitro-compound)

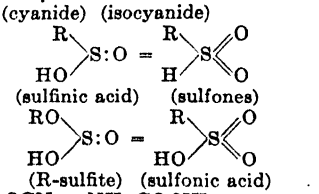
$R.O.C{:}N \rightleftharpoons R.N:C:O$
(cyanate) (tauto-cyanate)

$R.O.N{:}C \rightleftharpoons R.C:N:O$
(fulminate) (iso-cyanate)

5. Pseudomerism: The valency of one atom changes:

$R.OC{:}N$ $R.C{:}N.O$
(cyanate) (isocyanate)

$R.C{:}N = R.N{:}C$
(cyanide) (isocyanide)



(sulfinic acid) (sulfones)

(R-sulfite) (sulfonic acid)

$NH_4.OCN = NH_2.CO.NH_2$
(ammonium carbamate) (urea)

6. Coordination isomerism: The different arrangement of radicals around the two nuclei in combination; as,

$[Cr(NH_3)_6].[Cr(SCN)_6]$ and
$[Cr(NH_3)_4(SCN)_2].[Cr(NH_3)_2(SCN)_4]$

7. Hydration isomerism: The formation of aquo compounds from ionisable halides in the nucleus; as,

$$\left[\begin{matrix}H_2O. & .H_2O\\ H_2O.\ Cr & .H_2O\\ H_2O. & .Cl\end{matrix}\right]Cl_2.H_2O$$

and

$$\left[\begin{matrix}H_2O. & .H_2O\\ H_2O.\ Cr & .Cl\\ H_2O. & .Cl\end{matrix}\right]Cl.2H_2O$$

8. Coordination polymerism; as, $[Cr(NH_3)_3(SCN)_3]$ and $[Cr(NH_3)_6(SCN)_3]_3.[Cr(SCN)_6]_2$, its polymer

isometric. Of the same dimension. i-crystal. See *crystal systems.*

isometry. Isometry.

isomorph. One of a set of similarly-shaped crystals, having different compositions, *e.g.*, Na_2SO_4, Na_2SeO_4.

isomorphic. Pertaining to similar crystalline forms.

isomorphism. The crystallization of different compounds in the same form. These elements and radicals can replace one other without causing any essential alteration in crystalline form. On this basis the elements are classified into eleven groups of *isomorphs*, q.v.

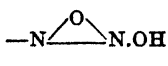
isomorphous mixture. A mixture of isomorphs usually found in minerals and represented in the formula in parenthesis; as, $(Fe,Mn)CO_3$, which indicates that Mn and Fe are interchangeable and behave as the equivalent weight of either element.

isomorphs. The elements arranged in the order of periodic groups and according to their isomorphism:

1. Cl, Br, I, F, Mn; as $KMnO_4$ and $KClO_4$.
2. S, Se, Te, as sulfides and tellurides; Cr, Mn, Te, as K_2RO_4; As, Sb, as MR_2 (glances).
3. As, Sb, Bi; Te (as element), P, V, (in salts); N, P (in organic compounds).
4. K, Na, Rb, Cs, Li; Tl, Ag.
5. Ca, Sr, Ba, Pb; Fe, Mn, Zn, Mg; Ni, Co, Cu; Ce, La, Pr, Nd, Er, Y, with Ca; Cu, Hg, with Pb. Cd, Be, In, with Zn; Tl, with Pb.
6. Al, Fe, Cr, Mn; Ce, U, in oxides M_2O_3.
7. Cu, Ag (as monovalent compounds), Au.
8. Pt, Ir, Pd, Rh, Ru, Os; Au, Fe, Ni; Sn, Te.
9. Cd, Si, Ti, Zr, Th, Sn; Fe, Ti.
10. Ta, Nb.
11. Cr, Mo, W.

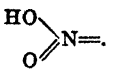
On the basis that i. have similar formulas in their compounds, some atomic weights (as, of vanadium) have been determined. Cf. *isodimorphism.*

isonitramine. The monovalent radical,



isonitrile*. Isocyanide.

isonitro. The divalent group



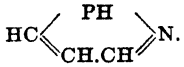
Cf. *acinitro compound.*

isonitroso. Oximido. The divalent group >N.OH.

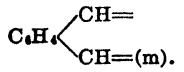
isontic. Being equal. Applied or relating to any line or surface points that are equal in some respects; as, isobar, isotherm.

isopentane. See *i-pentane.*

isophophazol. C_3H_4NP = 85.1. The heterocyclic compound



isophthalal. The tetravalent group



isophthalidene. Isophthalal.

isopral. $C_2H_3OCl_3$ = 163.44. Trichloro-*i*-propanol, $CCl_3.CMeH.OH$. White prisms, m.49, soluble in water, alcohol or ether; a hypnotic.

isoprene. C_5H_8 = 68.1. 2-methylbutadiene (1,3). $CH_2:CMe.CH:CH_2$. A distillation-product of india rubber, d.0.679, m. −120, b.34. It is the unit structure of terpenes, carotenoids, phytol and rubber. Cf. *duprene.* **di-** The geraniol and linalool chain. **tri-** The farnesol and nerolidol chain. Cf. *vinyl compounds.*

isopropanol. C_3H_8O = 60.1. Isopropyl alcohol, 1-methyl ethanol, $Me_2CH.OH$. A colorless liquid, d.0.780, b.82, soluble in water, alcohol or ether; used as germicide, denaturant and in perfumery.

isopropenyl. The monovalent radical, $CH_2:-CMe-$ from isoprene.

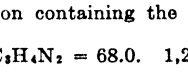
isopropoxy. The monovalent radical, $Me_2CH.O-$ from *i*-propyl-alcohol.

isopropyl. The monovalent radical, Me_2CH-. From *i*-propane. **i. alcohol.** Isopropanol. **i. benzene.** Cumene. **i. carbinol.** Butanol-2. **i. ether.** $C_6H_{14}O$ = 102.11. $(Me_2CH)_2O$. Colorless liquid, d.0.7247, b.68.7, used as solvent for waxes, fats and resins. **i. metacresol.** Thymol. **i. toluene.** Cymene.

isopropylidene. The bivalent radical, $Me_2C=$ from *i*-propane.

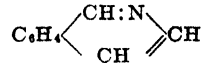
isopyknoscopy. Determination of the end-point of a volumetric reaction from the specific gravity of the solution containing the reactants. Cf. *pyknometer.*

isopyrazole. $C_3H_4N_2$ = 68.0. 1,2-isodiazole.



isopyre. An impure variety of opal, sometimes used as a gem.

isoquinoline. C_9H_7N = 129.1. Leucoline, 2-benzazine.

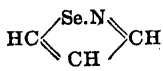


i. alkaloids. Alkaloids (q.v.) derived from 1-benzyl-N-methyl-tetra-hydroisoquinoline; *e.g.*, those of the papaverine, corydine, corydaline, morphine, dicentrine, hydrastine, cryptopine, berberine and protopine groups.

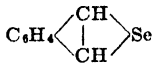
isorhamnetin. A glucoside from the pollen of ragweed and bulrush.

isorheic. A set of liquids which have equal viscosity or fluidity. Compare *rhe.*

isoselenoazol. C_3H_3NSe = 132.3. The pentacyclic compound



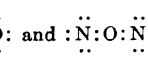
isoselenonaphthene. C_8H_6Se = 181.0. The heterocyclic compound



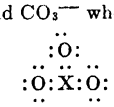
isosmotic. Isotonic; having the same osmotic pressure.

isostere. One of 2 or more atoms or atomic groups having an analogous arrangement of electrons and similar physical properties. Thus:

(a) molecules: CO_2 and N_2O in which the electrons are arranged in two octets:



(b) ions or radicals: NO_3^- and CO_3^{--} where the electrons form the octets



(c) atoms and ions: Na and Mg+ with one electron, Ne, Na+ and Mg++ with no electron in the valence shell. Cf. *ionic number, isoelectronic.*

isosteric. Pertaining to similar electronic arrangements. **i. properties.** The physical properties due to electronic arrangements; see *isosterism.*

isosterism. A similarity in the physical properties of elements, ions, or compounds, due to similar electron arrangements. *E.g., isosteres* have:

(a) similar crystalline form; as $NaNO_3$ and $MgCO_3$.

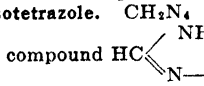
(b) similar boiling point, etc.; as N_2 and CO, or CO_2 and N_2O.

(c) similar spectra; as, Na, Mg+ and Al++; or Ne, Na+ and Mg++.

isotachiol. Silver silicofluoride.

isoteniscope. An instrument for the static determination of vapor pressure from the change in level of a liquid in a U-tube.

isotetrazole. CH_2N_4 = 70.3. The pentatomic compound



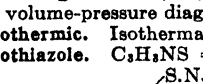
isotherm. An expression of equal temperature for a number of points, systems, or phases. Cf. *reaction isotherm.*

isothermal. Having a uniform or constant temperature. **i. change.** The change of volume of a gas which takes place under such conditions that the temperature remains constant. Cf. *adiabatic.* Thus any heat gained passes out of the system. **i. line.** Isotherm.

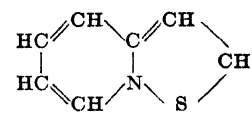
isothermals. A group of curves which pass through regions having the same temperature at a given time; as, on a climatic chart or a volume-pressure diagram. See figure.

isothermic. Isothermal.

isothiazole. C_3H_3NS = 85.1. The pentacyclic compound



isothiazolopyridine. C_7H_7NS = 137.1.



isothiocyanate. Sulfocarbimide. A compound of the type R.SNC. Cf. *mustard oil.*

isothyanic acid. HSNC = 59.1. Sulfocarbimide. HS.N≡C. It yields isothiocyanates.

isothiocyano. The monovalent radical, —N:C:S.

isotoma. The dried herb *Isotoma longiflora*, a Lobeliaceae of the East and West Indies.

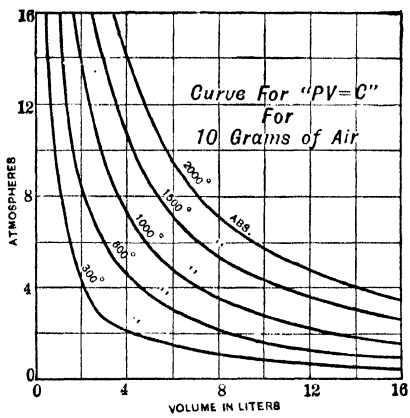
isotomine. An alkaloid from isotoma.

isotonic. (1) Isosmotic. (2) Describing a solution which has the same osmotic pressure as blood serum. Cf. *hypertonic, hypotonic.* **i. salt solution.** Normal *saline.* **i. water.** A natural water: the sum of its mineral constituents amounts to about 300 millimols per liter, which corresponds with an osmotic pressure of 7.7 atm., and a freezing point depression of −0.57°C. If lower, the water is *hypotonic;* if higher, *hypertonic.*

isotope. Any one of a number of atomic species differing in atomic weight, but having the same atomic number. (1) Originally it indicated radioactive disintegration-products which occupied an identical place in the periodic system; thus the isotopes of lead (atomic number 82) and their weights are:

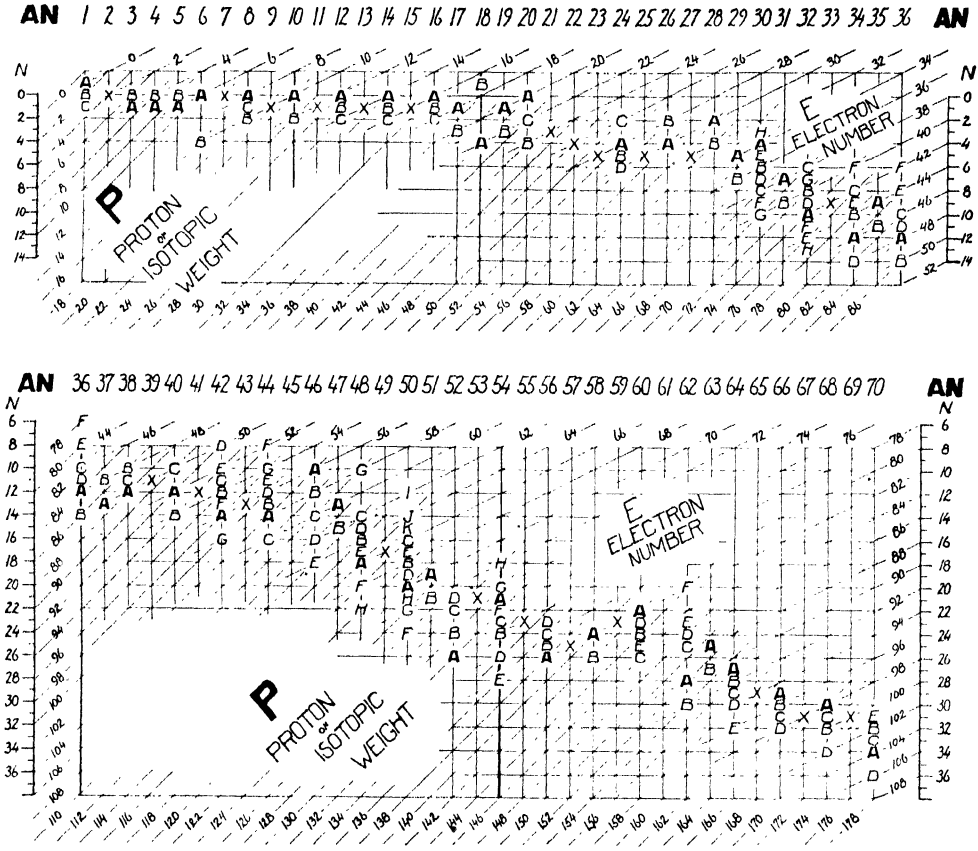
lead from actinium	206
lead from radium	206
lead from thorium	208
actinium B	210
radium D	210
thorium B	212
radium B	214

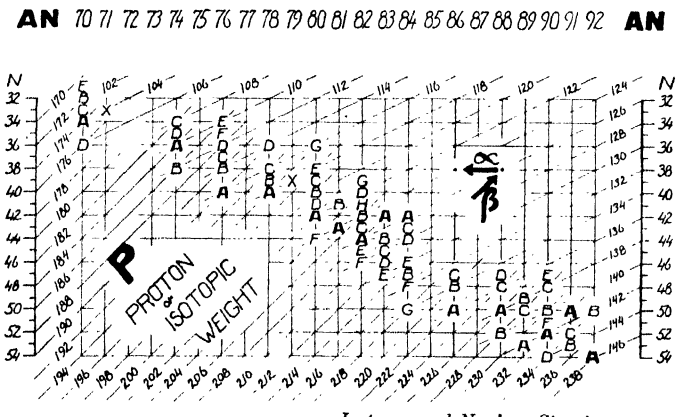
(2) The term now applies to all other elements which consist of two or more atomic species as



Isothermals.

revealed by their high-frequency or mass spectra; *e.g.*, chlorine as we know it is made up of the isotopes Cl^{35} and Cl^{37}, and its atomic weight of 35.5 is the resultant of the isotopic weights 35 and 37. I. are determined from (a) mass spectrum, q.v. or (b) the band heads of molecular spectra. **heterobaric- I.** of different atomic





The order of abundance of isotopes is shown by the letters A, B, C, etc. X indicates that no isotopes are known.

Nuclear composition is shown by

AN = atomic number or number of positive charges.
P = isotopic weight or number of protons.
E = electron number or number of negative charges.
N = neutron number or number of neutrons.

The following relations exist:

$AN = P - E$ and $N = P - 2AN$.

ISOTOPES

Atomic number		*Isotopic weight**
1	hydrogen	1, 2 (3)
3	lithium	7, 6.
4	beryllium	9, 8
5	boron	11, 10
6	carbon	12, 13
7	nitrogen	14, 15 (16)
8	oxygen	16, 18, 17
10	neon	20, 22, 21
12	magnesium	24, 25, 26
14	silicon	28, 29, 30
16	sulfur	32, 33, 34
17	chlorine	35, 37
18	argon	40, 36
19	potassium	39, 41
20	calcium	40, 44, 42
22	titanium	48, 50
24	chromium	52, 53, 50, 54
26	iron	56, 54
28	nickel	58, 60
29	copper	63, 65
30	zinc	64, 66, 68, 69, 65, 70, 63
31	gallium	69, 71
32	germanium	74, 72, 70, 73, 75, 76, 71, 77
34	selenium	80, 78, 76, 82, 77, 74
35	bromine	79, 81
36	krypton	84, 86, 82, 83, 80, 78
37	rubidium	87, 85
38	strontium	88, 86, 87
40	zirconium	90, 94, 92, 96
42	molybdenum	90, 96, 95, 92, 94, 97, 100
44	ruthenium	102, 101, 104, 100, 99, 96, 98
46	palladium°	102, 104, 106, 108, 110
47	silver	107, 109
48	cadmium	114, 112, 110, 113, 111, 116
50	tin	120, 118, 116, 124, 119, 117, 122, 121, 112, 114, 115
51	antimony	121, 123
52	tellurium	130, 128, 126
54	xenon	129, 132, 131, 134, 136, 128, 130
56	barium	138, 137, 136, 135
58	cerium	140, 142
60	neodymium	142, 144, 146
62	samarium	152, 154, 149, 148, 147, 144
63	europium	151, 153
64	gadolinium°	155, 156, 157, 158, 160
66	dysprosium	161, 162, 163, 164
68	erbium	166, 168, 167, 170
70	ytterbium	174, 172, 173, 176, 171
74	tungsten	184, 186, 182, 183
76	osmium	192, 190, 189, 188, 186, 187
78	platinum	196, 195, 194, 192
80	mercury	202, 200, 199, 198, 201, 204, 196
82	lead	208, 206, 207, 204, 209, 210, 203, 205

81–92 See radioactive series.

*Arranged in the order of the intensities of the mass-spectrum line, which indicates the order of abundance. Those in parenthesis are uncertain; ° indicates order unknown. See figure, also.

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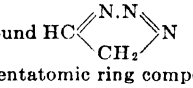
weights: as, the products of different disintegration series. Cf. *radioactive elements.* **isobaric-** I. of the same atomic weight, produced by expulsion successively of an alpha- and a beta-particle in a different order; as RaD and RaC_2. Cf. *heterotopes, isobars, packing fraction.*

isotopic. Pertaining to an element which occurs as more than one atomic species. **i. number.** The number, N, which probably indicates the number of neutrons in the atomic nucleus: N = (AW) − 2(AN) or IW − 2(AN) where AW is the atomic weight, IW the isotopic weight and AN the atomic number. **i. reaction.** Chemical change which involves isotopes; as,

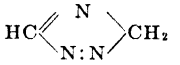
$$H^1H^2O + NH^1_3 \rightleftharpoons H^1_2O + NH^1_2H^2$$

i. weight. I.W. The atomic weight of an isotope. This was considered to be an integer, but more accurate measurements with the mass spectrograph indicate small deviations from whole numbers. See *packing fraction.*

isotriazole. $C_2H_3N_3$ = 69.2. **1.2.3-** The pentatomic compound



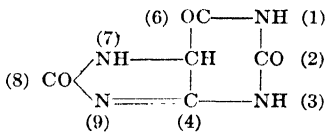
1.2.4- The pentatomic ring compound



isotropic. Having similar properties in every direction. Cf. *anisotropic.*

isourea. Pseudo-*urea.*

isouric acid. (1.3.7)-purine-2.6.8-trione.



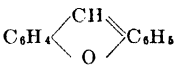
isovaleric acid. See *i-valeric acid.* **amino-** Valine.

isovaleryl. The monovalent radical, $Me_2CH.CH_2.CO$— from *i*-valeric acid.

isovaline. $C_5H_{11}O_2N$ = 117.09. Amino-*i*-valeric acid, α-amino-α-methyl butyric acid. An amino acid (q.v.), m.217.

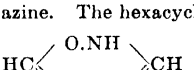
isovanillin. $C_8H_8O_3$ = 152.1. 3-hydroxy-4-methoxybenzaldehyde, 3-hydroxy-anisaldehyde. Colorless crystals of aromatic odor, m.116.

isoxanthene.

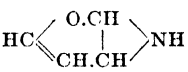


isoxazine. C_4H_5ON = 83.05.

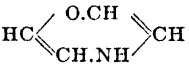
1.2- 1.2[2]-oxazine. The hexacyclic compound



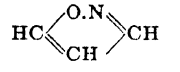
1.3- 1.3.[3]-oxazine. The hexacyclic compound



1.4- 1.4.[4]-oxazine. The hexacyclic compound

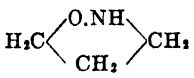


isoxazole. C_3H_3ON = 69.1 Furo(a)-monazole. The pentacyclic compound:

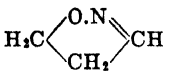


dihydro- Isoxazoline. **tetrahydro-** Isoxazolidine.

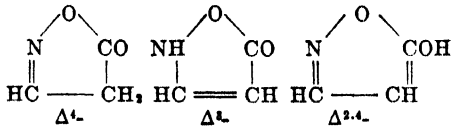
isoxazolidine. C_3H_7ON = 73.1. The pentacyclic compound



isoxazoline. C_3H_5ON = 71.1. The pentacyclic compound



isoxazolone. $C_3H_3O_2N$ = 85.1. The pentacyclic compounds:



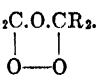
isoxazolyl. The monovalent radical, C_3H_2ON—, derived from isoxazole; five isomers.

isozonide. A more stable rearrangement-product of an ozonide, with the typical formula $R_2C.O.OC.R_2$. Cf. *isozonide, ozozonide.*

isoxylic acid. $C_9H_{10}O_2$ = 150.07. *p*-Xylic acid, *2.5*-dimethyl benzoic acid, $Me_2C_6H_3.COOH$. White needles, m.132, b.268, soluble in alcohol.

isozingiberene. $C_{15}H_{24}$ = 204.15. *1.7*-Dimethyl-*4*-propenyl octahydronaphthalene. An isomer of zingiberene.

isozonide. A stable rearrangement-product of an ozonide, having the formula



Cf. *isozozonide, ozonide.*

Issoglio test. A test for water-soluble or steam volatile substances characteristic of rancid fats.

itaconic acid. $C_5H_6O_4$ = 130.1. 2, 3-dicarboxypropene, methylenebutanedioic acid*, methylenesuccinic acid. $CH_2:C(COOH)CH_2COOH$, m.161; decomp. on further heating. Cf. *fumaric acid, citraconic acid.*

itakolumite. An elastic sandstone from Brazil; used in refractories to minimize thermal fracture.

itamalic acid. $C_5H_8O_5$ = 148.09. $CH_2OH.CH.COOH.CH_2COOH$. A colorless deliquescent solid, m.64 (decomp.), soluble in alcohol or ether. Cf. *citramalic acid.*

-ite. (1) A suffix indicating the salt of an *-ous* acid; *e.g.*, sulfite (sulfurous acid), chlorite (chlorous acid). (2) A common ending to indicate a mineral.

itrol. Silver citrate.

I.U. See *vitamin units.*

-ium. A suffix denoting: (1) the presence of a metal or nonmetal in a salt-forming capacity, cf. *-onium;* (2) a Latin derivation. Cf. *-ilium, -inium;* (3) many elements, generally metals; as, sodium, vanadium.

iva oil. A greenish oil, distilled from the flowering tops of *Achillea* species; used in flavoring extracts.

ivaine. $C_{24}H_{42}O_5$ = 410.2. An alkaloid obtained from *Achillea moschata*, a Compositae.

ivaol. $C_{10}H_{20}O$ = 156.1. An alcohol found in iva oil. A pale, yellow oily liquid of bitter taste, but pleasant odor.

ivory. The bone-like substance from the tusks of animals. **vegetable-** Corajo.

i. **black.** An animal charcoal prepared by calcining the refuse from ivory working; used as a decolorizing agent and filtering medium.

ivy. The climbing plant *Hedera helix*, an Araliaceae; the leaves and berries are used as a stimulant and diaphoretic. **American-** Virginia creeper, woodvine. The bark and twigs of *Vitis hederacea*, a Vitaceae, used as a tonic and astringent. **ground-** Gill-go-over-the-ground. The herb of *Glechoma hederacea*, a Labiatae, used as diuretic and tonic. **poison-** *Rhus toxicodendron.*

iztac chalchihuitl. A white or green variety of Mexican onyx, sometimes used as a gem.

J

J. (1) Abbreviation for joule. (2) Yellow (French = jaune). Cf. *colors*. (3) Abbreviation for gram-equivalent weight.

J-acid. 6-Amino-1-naphthol-3-sulfonic acid. 2, 5-Aminonaphthol-7-sulfonic acid. **J-phenomenon.** The absorption of x-rays by a substance varies discontinuously with a change in wavelength, λ; thus certain λ correspond with the frequency required to excite the characteristic radiation of the adsorber.

jaborandi. See *Pilocarpus*. **j. oil.** A yellowish essential oil distilled from jaborandi leaves, d.0.865, b.220, insoluble in water, soluble in alcohol or ether; used in pharmacy. It contains pilocarpene and ketones.

jaboridine. $C_{10}H_{12}O_3N_2$ = 208.2. An akaloid from jaborandi leaves.

jaborine. $C_{22}H_{32}O_4N_4$ = 416.6. An alkaloid from jaborandi leaves. A yellow syrupy paste, insoluble in water, soluble in alcohol or ether; used as an atropine substitute in ophthalmology.

jaboty fat. A white tallow obtained in Brazil from the kernels of *Erisma calcaratum* and *E. uncinatum*, a Vochysiaceae, m.42; used as a substitute for cacao butter.

jacinth. Hyacinth.

jack. Sphalerite.

jacket. (1) The false wall of a container by which it may be cooled or heated. (2) The iron sheath of a furnace. (3) The brick covering of a boiler.

Jackson, Sir Herbert. 1863–1936. A British chemist noted for his work on chemical research as applied to industry.

jacobine. $C_{18}H_{23}O_5N$ = 333.3. An alkaloid from *Senecio jacobaea*, ragwort, a Compositae. It is considered to be the cause of Winton's disease of grazing animals.

jaconecic acid. $C_{10}H_{16}O_6$ (?). The acid product of the hydrolysis of jacobine.

jade. (1) True j., nephrite, $3MgO.CaO.2SiO_2$. A silica mineral (q.v.) of the amphibole group. A fusible green or flaked gem material from China and Siberia, d.3.0, hardness 6.0; used as an ornament. See *imperial j.* (2) Jadeite, greenstone, $NaAlO_2.2SiO_2$. A silica mineral, (q.v.) of the pyroxene group resembling j.

jadeite. Jade (2).

jaggery sugar. A crude sugar from the date palm. Cf. *gur*.

jaipurite. A native cobaltous sulfite, CoS.

jalap. The dried root of *Exogonium* or *Ipomoea purga*, a Convolvulaceae of Mexico and the West Indies. It should contain not less than 7 % of resins. It is a hydragogue cathartic.

jalapic acid. $C_{17}H_{30}O_9$ = 378.23. An acid, m.120, from jalap.

jalapin. $C_{34}H_{56}O_{16}$ = 700.3. Orizabin. A resinous glucoside, m.150, from jalap. Cf. *convulvulin*.

jalapinolic acid. $C_{16}H_{32}O_3$ = 272.25. *d-11*-Hydroxyhexadecanoic acid*, $Me(CH_2)_5CHOH(CH_2)_{10}COOH$. A hydroxy acid from jalap resin.

jalapoid. The combined principles from extracted jalap. A cathartic and diuretic.

Jamaica dogwood. The bark of *Ichthyomethia piscipula* or *Piscidia erythrina*. Used as the fluid extract, as an anodyne and hypnotic. **j. wood.** Haematoxylon.

jamaicine. A bitter principle from the bark of the cabbage tree, *Andira inermis*, a Leguminosae of Jamaica. It resembles berberine, and is probably an alkaloid.

jamboo. (1) Jambu. The seeds of *Piper jaborandi*, a Piperaceae. (2) Jambul.

jambosine. $C_{10}H_{15}O_3N$ = 197.2. A crystalline alkaloid from the root of *Jambosa vulgaris*, a Myrtaceae, or the rose apple of the Tropics. Used medicinally in the treatment of dysentery and leucorrhea.

jambul. The bark of *Eugenia jambolanum*, the Java plum tree, a Myrtaceae, of the East Indies; used as the fluid-extract, as a stomachic astringent. **j. seeds.** The seeds of *Eugenia jambolanum*, used as the fluid extract, as a carminative and stomachic. Cf. *antimellin*.

jambulol. $C_{16}H_8O_9$ = 344.1. A dibasic, pentahydroxy acid found in the seeds of *Eugenia jambolanum*, a Myrtaceae of Java. It resembles ellagic acid.

James powder. Pulvis antimonialis. Antimoniated calcium phosphate. **J. tea.** Labrador tea.

jamesonite. $Pb_2Sb_2S_5$. Feather ore. A native lead antimony sulfide.

Jamin effect. A capillary tube filled with alternate air and water bubbles sustains a finite pressure. This is due to oily contamination on the glass surface, which prevents complete wetting.

Janus green. A green dye, used as an intravital stain.

japaconine. $C_{26}H_{41}O_{10}N$ = 527.4. An amorphous alkaloid, m.97, derived from Japanese aconite.

japaconitine. $C_{34}H_{49}NO_{11}$ = 647.39. Acetylbenzoyljapaconine. An alkaloid, m.204, from Japanese aconite.

japan. A varnish for metallic and wooden articles. **j. camphor.** Camphor. **j. tallow.** Japan wax. **j. wax.** A glyceride containing chiefly palmitic acid and small amounts of eicosanic and heneicosanic acids; obtained from the berries of *Rhus succedanea* and other species of sumach tree. A yellow solid wax, d.0.970, m.53, soluble in benzene; used in the manufacture of candles, wax, and leather dressing.

japanic acid. $C_{22}H_{44}O_4$ = 372.34. A dibasic acid from japan wax, m.117; probably a mixture of eicosanic and heneicosanic dicarboxylic acids.

japanning. A process of varnishing, by successive applications of a lacquer and heating in an oven.

japonic acid. A tannic acid from catechu.

japopinic acid. $C_{14}H_{22}O_2$ = 222.17. A monobasic acid from Japanese turpentine.

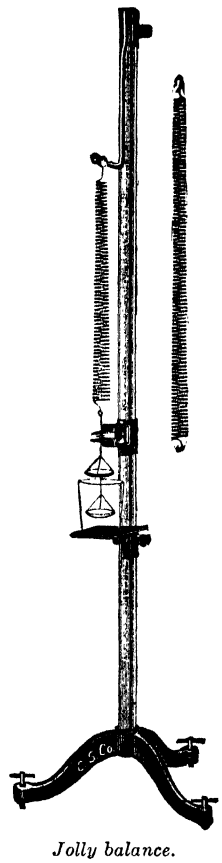
jar. A small earthen vessel, without spout or handle. **bell-** Bell glass. **Leyden j.** An electric condenser consisting of a glass-vessel lined internally and externally with tinfoil. **Naples-** See *Naples*.

jara jara. β-Naphthylmethylether.

jargon, jargoon. Zircon.
jargonia. Zirconia.
jargonium. An alleged element, discovered by Sorby in 1869 and probably impure hafnium.
jasmine oil. A colorless essential oil, distilled or extracted from the flowers of *Jasminum grandiflorum*, an Oleaceae. It contains benzyl acetate, linalol, linalyl acetate and indole, d.1.008, soluble in alcohol or ether; used in perfumery.
jasmone. $C_{11}H_{16}O$ = 164.12. A ketone derived from jasmine oil.

$$CO.(CH_2)_2CMe{:}C.CH_2.CH{:}CH.CH_2Me.$$

jasper. Touchstone, Indian stone, bloodstone. A variety of chalcedony sometimes used as a gem, *e.g.*, iolanthite. **porcelain-** Porcellanite.
jateorhiza. Calumba.
jatrophine. $C_{14}H_{20}O_6N$ = 298.17. An alkaloid from the *Jatropha gossipifolia*. A light yellow powder, soluble in cold water or alcohol, insoluble in ether; acid solutions are fluorescent. Used for stomach disorders.
jaune. The French for yellow. **j. brillant.** Cadmium sulfide. **j. d'or.** Martius yellow.
Java pepper. Cubeb. **J. plum.** Jambul. **J. tea.** Orthosiphonin.
javelle. Eau de javelle.
javellization. The sterilization of water supplies by hypochlorites.
jaw oil. An oil from the jaws of the black fish, *Globicephalus melas*, used as a lubricant for fine machinery.
jecolein. A glyceride from codliver oil.
jecorin. A protein in the liver, spleen and brain; it has the composition $C_{103}H_{186}O_{46}N_5SP_3$.
jel. See *gel*.
jelletite. A green variety of andradite. See *garnet*.
jelly. A soft, usually transparent, substance, which consists of the colloidal system (q.v.): liquid suspended in a solid; as, water in gelatin. **mineral-** or **petroleum-.** See *vaselin*.
jellying power. The capacity of substances to solidify in solution, as gelatin, agar-agar etc.
jelutong. The exudate from *Dyzra costulata*, an Apocynaceae, used for chewing gum and insulating cables. Cf. *pontianac*.
jena ware. Very heat-resistant glass-ware, made in Jena, Germany.
jenkolic acid. $C_7H_{14}O_4S_2$ = 226.2. Djenkolic acid. An amino acid, $CH_2[SCH_2CH(NH_2)\text{-}COOH]_2$ from djenkol beans, *Pithecalobium lobatum*, a Leguminosae.
Jenner' stain. A microscope stain for white blood corpuscles. It consists of two solutions: (A) 0.5 % eosin in methanol. (B) 0.5 % methylene blue in methanol.
jeppel oil. Bone oil.
jequiritin Abrin.
Jersey tea. The dried roots of *Ceanothus americanus*, a Rhamnaceae, used as the fluid extract, as an astringent, sedative and expectorant.
jervine. $C_{26}H_{37}O_3N$ = 411.1. An alkaloid from *Veratrum* species (Liliaceae). Long, white prisms, m.240, insoluble in water.
jesaconitine. $C_{40}H_{51}NO_{12}$ = 735.35. An aconite alkaloid, q.v.
jesuits balsam. Copaiba balsam. **j. bark.** Cinchona bark.
jet. A dense black lignite (or cannel coal rendered black by fossilization) of varying hardness and taking a good polish. Sometimes used as jewelry.
jews pitch. Asphalt.
jig. A device for ore concentration consisting of a vibrating screen submerged in water.
jigger. Jig.
Jimson weed. Stramonium.
johannite. Uranvitriol.
johimbine. $C_{23}H_{32}O_4N_2$ = 400.4. An alkaloid from the bark of *Corynanthe yohimbehe*, a tree of Africa. Cf. *quebrachine, yohimbine*.
jojoba. The shrub *Simmondsia Californica*, a Buxaceae of California and Mexico. **j. oil.** The oil from the nuts of j. containing unsaturated fatty acids, resembling the sperm oil of the whale.
Joliot, Frédéric. 1900– , and his wife J., **Irène Curie,** 1897– , daughter of Pierre and Marie Curie. French physical chemists and Nobel prize winners (1935) for their work in induced radioactivity.
Jolly balance. A spring balance for determining the specific gravity of a solid by weighing it alternately in air and water.



Jolly balance.

Jones' reagent. A bath of molten zinc in which a metal to be etched is immersed. **J. reductor.** A glass tube filled with amalgamated, granulated zinc or zinc wire spirals, used for reducing solutions of Fe, Ti, Mo, V, Cr and U, prior to their volumetric determination by oxidation reduction methods.
jordanite. A native arsenic and lead sulfide, $AsS_3.4PbS$.
joseite. A bismuth tellurite, Bi_3Te.
josephinite. A native iron and nickel alloy from Oregon.
Joule, James Prescott. 1818–1889. An English physicist and experimenter on energy transformations. Cf. *joule*. **J. effect.** Heat effect. **J. equivalent.** The mechanical equivalent of heat; or the quantity of energy which, when transformed into heat, is equal to unit quantity of heat: 4.185×10^7 ergs = 1 Calorie (20°). In absolute units (q.v.): $J = L^2T^{-2}\theta^{-1}$, or $JH = JM\theta = ML^2T^{-2}$. **J.-Kelvin effect.** The fall in temperature of a gas forced at high pressure through a small orifice. It is proportional to the difference in pressure on the two sides, and is used in the Linde-Hampson process of liquefying gases. **J.-Thomson effect.** J.-Kelvin effect. **J.'s law.** (1) The heat, H, produced by a current (I) is proportional to the square of the current, multiplied by the time (t) during which it flows: $H = RI^2t$. (2) The internal energy of a volume of gas does not vary with temperature, if the volume remains constant. (3) The molecular heat of a solid compound is the sum

of the atomic heats of its constituents. **J. unit.** Joule.

James Prescott Joule.

joule. The unit of work. One joule equals 10^7 units of work (ergs) in the C.G.S. system, and is practically equivalent to the energy expended in one second by one ampere passing through one ohm of resistance. Hence:

Joule = amp.^{2} × ohm × sec. = watt × sec. = (volt^2 × sec.)/ohms = 10^7 ergs.

Conversion factors:

1 joule = 1 volt-coulomb = 0.24 calorie = 0.1020 kg.-m. = 0.7376 ft.-pds.

1 calorie = 4.1850 joules = 0.04337 volt-electrons.

3600 joules = 1 kelvin = 1 watt-hour.

juar. Sorghum.

Juerst ebullioscope. A device for determining small percentages of alcohol by observing the boiling point of the liquid, which varies directly with the percentage of alcohol.

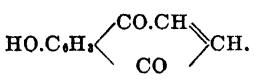
juglandin. A resinoid from the root-bark of juglans. A grayish-brown powder, slightly soluble in alcohol; used as a cathartic.

juglandoid. The combined principles from the root-bark of juglans, or butternut.

juglans. Butternut bark, white walnut. The dried inner bark from the roots of *Juglans cinerea*, a Juglandaceae; used as the fluid extract, as a cathartic and antiperiodic. Cf. *nucite*.

juglansin. A globulin from walnuts and butter nuts.

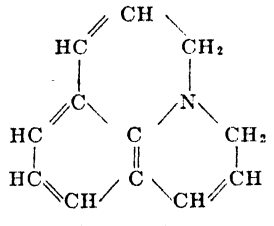
juglone. $C_{10}H_6O_3$ = 174.1. 5-hydroxy-naphthoquinone, nucin.



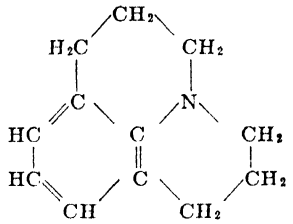
Reddish-brown prisms, m.153, insoluble in water. It occurs in the bark of the European walnut, *Juglans regia*.

juice. (1) Any fluid from a vegetable or animal tissue; usually however, fruit juice. (2) A colloquial term for an electric current.

julol. $C_{12}H_{11}N$ = 169.1. The theoretical compound:



julolidine. $C_{12}H_{15}N$ = 173.2. 1,2,5,6-tetrahydrojulol.



jumble beads. Abrus.

Jungius, Ioachim. 1587–1657. A German alchemist, and forerunner of Boyle in claiming that observation and experiments alone give information as to the nature of matter.

juniper. The juniper tree, *Juniperus communis*, a Coniferae of temperate zones. **gum-** Sandarac. **j. berries.** The dried ripe fruits of juniper, used as a diuretic and tea, or as the fluid extract. **j. berry oil.** An essential oil distilled from juniper berries. Colorless or yellow liquid, d.0.865, b.120, soluble in alcohol or ether. Used as stimulant diuretic, or in flavoring extracts. It contains pinene, cadinene and j. camphor. **j. tar.** Cade oil.

juniperic acid. $C_{16}H_{32}O_3$ = 272.25. Dihydroambrettolic acid, *o*-hydroxypalmitic acid, *16*-hydroxyhexadecanoic acid*. A monobasic acid, m.95, from savin, *Juniperus sabina*, and arbor vitae.

juniperin. A bitter principle from juniper, *Juniperus communis*.

juniperus. (1) The dried tops, with wood and berries, of juniper; used for distillation of an essential oil, and in fumigation. (2) A genus of Coniferae yielding berries, oils and wood: *J. communis*, juniper; *J. sabina*, savin.

junket. Curds and whey, a food prepared by coagulating milk with rennet.

jurubeba. *Solanum insidiosum*.

jute. The bast fiber of *Corchorus* species, a Tiliaceae of the East Indies and South America; used extensively in the manufacture of gunny sacks, bags, and twine. **China-** The fiber of *Abutilon avicenna*, a Malvaceae cultivated in China. **medical-** the fibers of *Corchorus olitorius*, used in surgical dressings.

juvenile water. A water of magmatic or deep-seated origin, supposed to come for the first time to the earth surface; *e.g.*, the waters of certain hot springs, volcanic geysers and artesian wells. Antonym: vadose water.

K

(See also under C)

K. (1) The symbol for potassium (kalium), K^+, K· potassium ion; K* excited potassium atom, K_2^+ ionized potassium molecule, K_2^* excited potassium molecule. (2) An abbreviation for Kelvin, °K degree on the absolute temperature scale. **K acid.** 1-Amino-8-naphthol-4.6-disulfonic acid. **K electrons.** The two electrons in the innermost shell or orbit of the atom. **K line.** (1) Any one of a group of lines having the shortest wavelength which are visible when K radiations pass through an x-ray spectrograph. The separated lines are termed, respectively, $K\alpha_1$, $K\alpha_2$, $K\beta_1$, $K\beta_4$ etc. (2) The Fraunhofer line, λ3933.7, due to calcium. (3) Symbol for chemical equilibrium constant (see *law of mass action*). (4) Symbol for Kelvin. **K_S.** Symbol for solubility product. **K orbit.** The innermost path of electrons around the atomic nucleus. Cf. *atom, Bohr's theory, orbit.* **K radiation.** The homogeneous x-rays emitted by metals when used as an anticathode in an x-ray tube; their origin is assumed to be due to the excitation of the K electrons. Cf. *energy levels.* **K series.** The spectral lines produced by K radiations. Cf. *Moseley spectrum.* **K spectrum.** The spectrum produced by K radiations. The frequency of any line is approximately proportional to $A(N - b)^2$, where N is the atomic number, A and b are constants. The atomic number $N = Q_K + 1 = Q_L + 7.4$, where Q_K and Q_L are quantities expressing the frequencies of the K and L series of radiations, respectively.

k. (1) Abbreviation for a constant. Symbol for: (2) Boltzmann's constant; (3) thermal conductivity; (4) velocity constant of chemical reactions.

κ. The Greek letter *kappa.* See *Greek* alphabet.

K.A. An aluminum alloy similar to duraluminum.

kabaite. A native hydrocarbon found in meteorites.

kæ- See *kae-, ke-.*

kaempferide. $C_{16}H_{12}O_6$ = 300.1. Kaempferyl-4-methyl ether. A constituent of galangal, m.225, soluble in sulfuric acid (blue fluorescence) and in alkali (yellow color).

kaempferol. $C_{15}H_{10}O_6$ = 286.08. A cyclic alcohol, m.274, from *Indigofera erecta.*

kafir. Sorghum. **k. corn.** Durra.

kafirin. A protein derived from sorghum.

Kahle's solution. See *fixative.*

kahweol. $C_{19}H_{26}O_2$ = 302.2. A highly-unsaturated alcohol, m.143, from coffee bean oil.

kainite. $MgSO_4.K_2SO_4.MgCl_2.6H_2O$. A native potassium magnesium sulfate from Strassfurt (Germany) and made synthetically; used as a potash fertilizer, and in water treatment. The A.O.A.C. defines it as potassium and sodium chloride sometimes with magnesium sulfate, containing not less than 12 % K_2O.

kairine. $C_{10}H_{13}ON$ = 163.2. Methyloxytetrahydroquinoline. A quinine substitute, usually marketed as the hydrochloride. **k. hydrochloride.** $C_{10}H_{13}ON.HCl$ = 199.6. A grayish-white crystalline powder, soluble in water; used as an antipyretic and quinine substitute. Cf. *thalline.*

kairoline. $C_{10}H_{13}N$ = 147.2. Methyltetrahydroquinoline. A colorless liquid, $b._{720mm}245$, soluble in alcohol; used as an antipyretic.

Kaiserling solution. A solution for preserving tissues, consisting of 3 gm. CH_3COOK, 1 gm. KNO_3, 75 cc. water and 30 cc. formaldehyde.

kakodyl. Cacodyl.

kakoxene. The mineral $2Fe_2O_3,P_2O_5,12H_2O$.

kaladana. The dried seeds of *Ipomoea hederacea;* used as a purgative and anthelminthic. **k. resin.** A resin obtained from kaladana; used as purgative.

kalaite. A form of turquoise which contains copper and iron. Cf. *callaite.*

kali. The German term for potassium hydroxide. **k. ammonsalpeter.** A mixture of KCl and NH_4NO_3 used as fertilizer (16 % N, 27 % K_2O).

kalicrete. A modification of Portland cement, containing iron, which is resistant to alkali soils.

kalimeter. Alkalimeter.

kalinite. A native potassium aluminum sulfate, $K_2Al_2(SO_4)_4.24H_2O$.

kaliophylite. $KAlSiO_4$. A silica mineral (q.v.) of the nephelite group.

kalium. The Latin and German for potassium.

kalk. The German for lime. **k. ammon.** A mixture of NH_4Cl and $CaCO_3$ used as fertilizer. **k. ammon salpeter.** Calnitro.

kallaite. Kalaite.

Kalle acid. *1*-Naphthylamine-*2.7*-disulfonic acid.

kallekrein. Padutin. A circulatory hormone, which regulates the capillaries and small vessels.

kalmia. Mountain laurel, sheep laurel, lambkill. The leaves of *K. latifolia,* a Ericaceae; used as cardiac sedative and astringent. They contain asebotin and andromedotoxin.

kalsilite. $2KAlSiO_4$. A polymorph mineral resembling nepheline, occurring as minute grains in volcanic rocks of high K_2O-content from Uganda.

kamacite. A component of meteoric iron-nickel alloys, which is present only when the nickel-content is less than 6.5 %.

kamala. Glandulae Rottlerae. A light, fine granular powder which consists of the glands and hairs from the capsules of *Mallotus philippinensis,* an Euphorbiaceae; used as the fluid extract, as a purgative.

kamalin. $C_{23}H_{30}O_6$ = 380.1. Rottlerin. The bitter principle of kamala. A yellowish-brown powder, m.200, soluble in alcohol or ether; used as an anthelminthic.

kamarezite. A native basic copper sulfate, occurring in grass-green compact masses.

kambi. An aromatic gum, resembling elemi, from *Gardenai lucida,* a Rubiaceae of India.

Kamerlingh-Onnes, Heika. 1853–1926. A Dutch physicist and Nobel prizewinner, noted for experiments at very low temperatures.

kampometer. An instrument for measuring heat radiations. Cf. *kapnometer.*

kanerol. $C_{30}H_{50}O$ = 426.5. An alcohol from the roots of *Kanher nerium*, a plant of India. Colorless crystals, m.185, insoluble in water.

kanirin. Trimethylamine oxide.

kanyl alcohol. $C_{10}H_{18}O_2$ = 170.14. An alcohol from the liver oil of tarabakani, *Paralithodes camtschatica*, of the Japan Sea.

kaoliang oil. Koryan oil.

kaolin. $Al_2O_3.2H_2O.2SiO_2$. China clay, porcelain clay, bolus alba, terra alba, white bole, argilla. A native aluminum silicate, $H_2Al_2Si_2O_8$. A grayish-yellow, fine, inert powder which is used in ceramics, as filler for paper and textiles, and for pencils. It occurs in three distinct types produced as shown:

1. kaolinite (by weathering).
2. dickite (by moderate heating).
3. nakrite (by hypogene processes).

Cf. *atalpo, fuller's earth, kaolinite, montmorillonite.*

kaolinite. The chief constituent of kaolin or clay, $Al_2O_3.2SiO_2.2H_2O$; if heated above 1100°C. it breaks down to mullite and cristobalite. A soft white, fine powder, used medicinally as an absorbent and dusting powder, as a clarifying agent and in pharmacy.

kaolinization. Natural rock-disintegration and formation of clay from the feldspars of decomposed granite (orthoclase).

kapnometer. An instrument for measuring the density of smokes. Cf. *kampometer.*

kapok. The Malay name for the cotton-like down from the seed-pods of *Eriodendron anfractuosum*, a Sterculiaceae, used in making mattresses and life-saving jackets. **k. oil.** A yellowish-green oil, expressed from k. seeds, d.0.923, soluble in alcohol or ether; used in the manufacture of soap and edible fats.

kappa. κ. The tenth letter of the Greek alphabet. A symbol for: (1) kata position. (2) The tenth carbon atom.

karabin. $C_{21}H_{40}O_6$ = 397.5. A resinous substance from *Nerium oleander*, an Apocynaceae.

karat. See *carat.*

karaya gum. An Indian gum similar to tragacanth, used in tooth-pastes.

karitene. $C_{32}H_{56}$ = 440.4. A solid hydrocarbon, m.64, from shea fat.

karpholite. The mineral $(Mn,Fe)O.(Fe,Al)_2O_3.SiO_2.2H_2O$.

karyokinesis. The phenomena of cell-division or mitosis, during which the protoplasm of the cell and its nucleus undergo a series of changes which are subdivided into a number of phases merging from one into the other (see figure).

kata- cata. A prefix derived from the Greek, indicating down or below. **k. position.** κ- (1) The *1.7*-substitution in naphthalene, q.v. (2) On the tenth carbon atom of a chain. **k. thermometer.** An instrument which measures the cooling effect of air flow as distinct from the temperature of the air: used to evaluate working conditions in terms of ventilation.

katabolism. Catabolism.

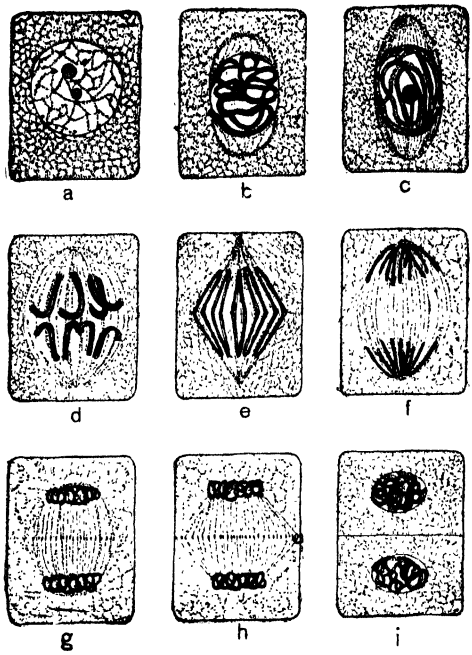
katalase. See *catalase.*

katalysis. Catalysis.

kataphoresis. Cataphoresis.

katchung. Chinese for peanuts. [Kachang = Malay.] **oil of-** Peanut oil.

katharometer. An instrument for the analysis of a gas mixture by the changes in its therma conductivity.



KARYOKINESIS

(*Semidiagrammatic and highly-magnified. After Stevens'* "Plant Anatomy")

a. Resting cell ready to divide.

b. Nuclear reticulum forming a thickened thread; the cytoplasm at opposite poles becoming thread-like, to form the spindle fibers.

c. Nuclear thread divided longitudinally; spindle fibers more definite.

d. Nuclear membrane and nucleolus disappear; the nuclear thread is segmented into chromosomes assembled at the equator of the cell. Phases a. to d. are *prophases.*

e. The *metaphase.* The longitudinal halves of the chromosomes are being drawn apart prior to their journey to the opposite poles.

f. The *anaphase*, or movement of the chromosomes toward the poles, is complete; connecting fibers extend from pole to pole.

g. The *telophase.* The chromosomes begin to spin out as a nuclear reticulum. The connecting fibers thicken in the equatorial plane.

h. The connecting fibers spread out and touch the wall of the mother cell in the equatorial plane; the thickening of the fibers throughout this plane has made a complete cell plate, within which the dividing wall will be produced.

i. A nuclear membrane is formed about each daughter nucleus; the dividing cell-wall is completed. The two daughter cells are now ready to grow to the size of the parent cell; the daughter nuclei will appear as the nucleus in a.

kathode. Cathode.

katine. $C_{10}H_{15}ON_3$ = 182.2. An alkaloid from the leaves of *Catha edulis* or African tea, a Celastraceae. Cf. *celastrine, cathine.*

kation. Cation.

katode. Cathode.

kauri. Kauri gum, kauri resin. A resin exuded from the kauri tree, *Agathis australis*, a conifer of New Zealand, and dug from the soil in large masses. A yellow amber-like resin, d.1.05, m.180–230, insoluble in water, soluble in alcohol, turpentine or benzene; used in varnishes. **k. gum.** Kauri. **k. oil.** An oil obtained by distilling the peat which remains from prehistoric kauri forests.

kaurinic acid. $C_{10}H_{16}O_2$ = 168.2. An acid constituent (about 1.5 %) of kauri.

kaurinolic acid. $C_{17}H_{34}O_2$ = 270.3. An acid constituent (about 15 %) of kauri.

kaurolic acid. $C_{12}H_{20}O_2$ = 196.2. The principal constituent (50 %) of kauri.

kauronolic acid. $C_{12}H_{34}O_2$ = 200.2. A constituent of kauri (10 %).

kautchin. Terpene.

kava. Kava kava. Ava. The dried rhizome of *Piper methysticum*, a Piperaceae of the Polynesian islands, used as the fluid extract as a mild diuretic and stimulant. **k. resin.** A resin derived from kava, containing kavaic acid.

kavaic acid. $C_{13}H_{12}O_3$ = 216.1. An acid derived from kava. A yellow crystalline powder, m.165.

kavain. $C_{16}H_{18}O_5$ = 290.2. Methysticin. A principle derived from kava. White crystalline needles, m.137, soluble in alcohol or ether.

kavatel oil. An oil obtained from the seeds of *Hydnocarpus Wightiana*, used in place of chaulmoogra oil.

kawa. Kava.

Keen tester. An instrument for determining the hardness of metals by the impact ball method.

kefir. Kephir, kephyr. A fermentation product of goat's milk produced by the *Bacillus caucasicus;* used as a nutritious and restorative food. Cf. *koumiss.* **k. milk.** A beverage made from cow's milk and kefir powder. **k. powder.** White irregular bodies containing a yeast fungus and several bacteria; used to make kefir and kefir milk.

keilhauite. A native titanate and silicate of aluminum, calcium, iron and the rare earths metals, similar to sphene, q.v.

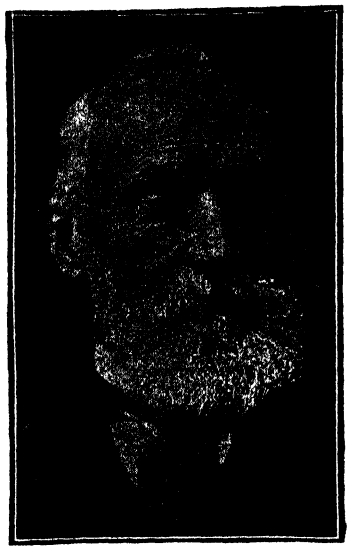
Kekulé, Friedrich August. 1829–1896. A German chemist and a pioneer in the theories of the constitution of carbon compounds. **K. ring.** See *benzene ring.*

kelene. A trade name of ethyl chloride.

kellin. A glucoside from the fruit of *Ammi visnaga.*

kelp. (1) Varec. The large seaweeds, *Laminaria* species, floating near the shores of the Pacific and Atlantic. (2) Kelp ashes. **dried-** A fertilizer containing 1.6–3.3 % N, 1–2 % P_2O_5 and 15–20 % K_2O. Cf. *algin.* **k. ashes.** Kelp. The ashes of kelp, formerly used for the preparation of potassium salts and iodine.

Kelvin, William Thompson (Lord Kelvin). 1824–1907. A British physicist and pioneer in electrical and magnetic experimentation; noted for his work on thermodynamics, the compression of gases, the absolute temperature scale and the Atlantic cable. **k. bridge.** A set of coils by which highly accurate resistance measurements may be made. **k. galvanometer.** An elliptical coil surrounding a magnetic needle suspended on a fine wire with mirror attached, by which small electric currents are detectable. **k. scale.** °K. An absolute temperature scale (q.v.) assumed to be a measure of kinetic energy. The freezing point of water is 273.13°K, the boiling point of water 373.13°K, hence (°K) = (°C) + 273.13, (if above 0°C); and (°K) = 273.13 − (°C), (if below 0°C).



William Thompson Kelvin.

kemfert. Trona potash. A potassium chloride from the waters of Searles Lake in California.

Kendall, Edward, Calvin. 1886– . An American chemist, noted principally for the isolation of thyroxin from the thyroid gland. **K., James.** 1889– . A British chemist, noted for his work in inorganic and physical chemistry.

Kennelly-Heaviside layer. A stratum of electrons, 100-200 miles above the earth's surface, created by solar rays. It is supposed to form a layer impenetrable by radio waves, and is the seat of the aurora, q.v. Cf. *ionosphere.*

kepayang oil. An oil resembling chaulmoogra oil, from the seeds of Pokok kepayang.

kephalin. (1) Cephalin, brain lipoid. A lecithin phosphatid from spinal and brain tissue of the ox or other mammals. It is an amorphous yellow substance of characteristic odor, slightly soluble in alcohol or acetone, soluble in ether or chloroform. Cf. *cuorin.* (2) A group of phosphatides from white brain substance resembling lecithin (q.v.) in structure, but with aminoethyl alcohol in place of the choline residue. They are white, brittle, very hygroscopic solids, forming colloidal solutions in water, soluble in fat solvents (except acetone); hydrolysed slowly to stearic acid and a mixture of unsaturated fatty acids by acids and alkalis.

kephaloidin. A constituent of the buttery substance of brain, q.v.

kephyr. Kefir.

ker. A Polish synthetic rubber, made from alcohol.

kerasol. $C_{20}H_{10}O_4I_4$ = 821.8. Tetraiodophenolphthalein. The soluble sodium salt is used to render the gall bladder visible in x-rays. It is administered in small gelatin capsules (nosophen, antinosin).

kerasin. $C_{48}H_{93}O_8N$ = 881.7. A cerebroside associated with phrenosin in the brain tissue. A white amorphous powder, m.180 (decomp.), soluble in hot alcohol, insoluble in water or ether.

keratin. $C_{41}H_{71}O_{14}N_{13}S$. A protein from horns, feathers, hoofs, shells or finger nails; sometimes used for coating pills. It is resistant to digestion by pepsin and trypsin and insoluble in water, dilute acids or alkalis. On acid hydrolysis it yields arginine, lysine and histidine in the ratio 12:4:1. It is believed to exist in a straight chain and folded chain form; the latter is converted into the former by simultaneous steaming and stretching.

keratoelastin. A protein from the egg shells of fishes, reptiles and monotremes.

kerenes. That portion of kerotenes which is insoluble in organic solvents.

kerites. The naturally-occurring bitumens and protobitumens, which consist of kerotenes.

kermes. The dried insects, *Coccus ilicis*, found on the leaves of various oak species in the Orient; used since ancient times as a red dye for textiles.

k. mineral. Kermesite.

kermesite. Sb_2S_2O. Lyrostibnite. A native, red antimony sulfide. Used as pigment.

kern. The German for "ring" and "nucleus," especially the benzene ring.

kernel. An atom stripped of its valence electrons; it consists of the atomic nucleus surrounded by its proper number of electrons in their respective orbits or shells (cf. *periodic system, isostere*) with the exception of the outermost series of valence electrons. Atomic kernels fall into eight groups, according to the number of electrons missing. The k. are always positively charged and those having a charge of from one to four correspond with the respective ions, Na^+, Mg^{++}, Al^{+++}, and Sn^{++++}. The k. differs from the nucleus, q.v. (See figure.)

kernite. $Na_2B_4O_7.4H_2O$. A natural borate, from Kern County, California.

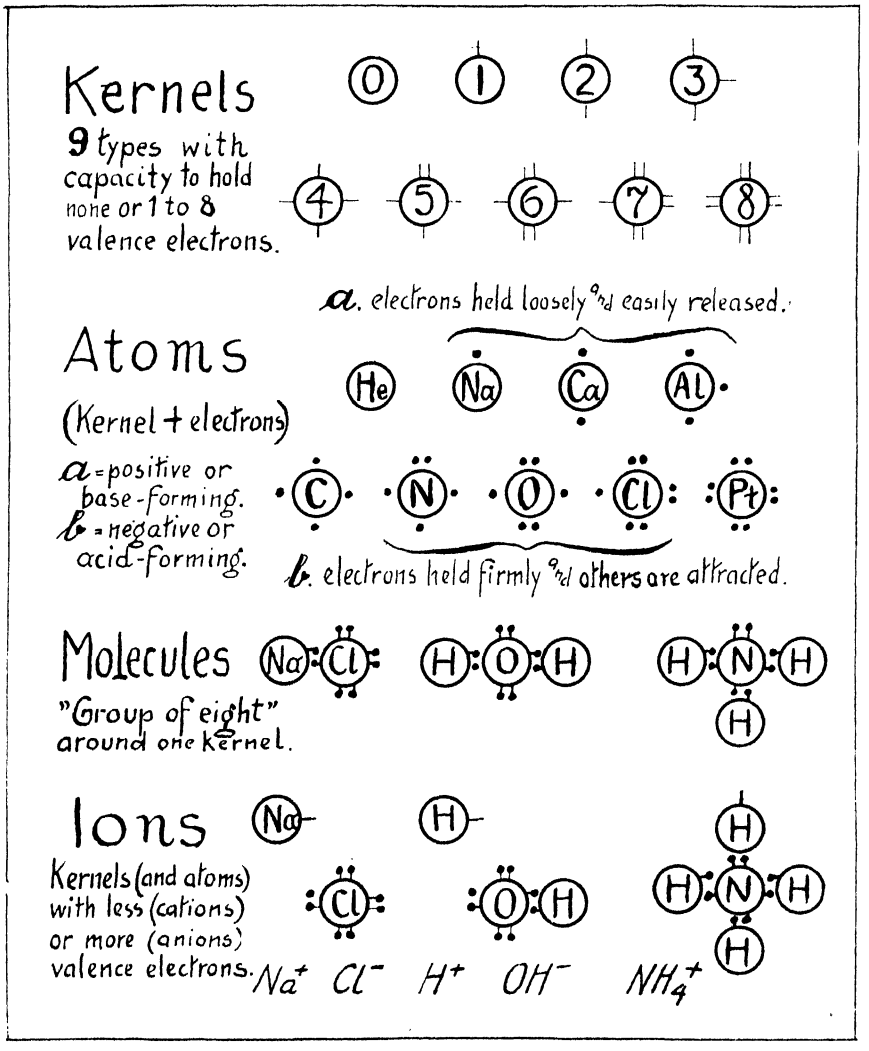
kerogen. $(C_6H_8O)_n$. A resinous substance and the chief organic constituent of shale oils; insoluble in most solvents. Cf. *oil shale*.

kerokaine. Procaine.

keroles. That portion of kerotenes which is soluble in pyridine, but insoluble in chloroform.

kerols. That portion of kerotenes which is soluble in both, chloroform and pyridine.

kerones. Those portions of kerotenes which are insoluble in organic solvents.



kerosene. Coal oil, astral oil, paraffin (British usage). A mixture of hydrocarbons b.150–280°C.; the fifth fraction in the distillation of petroleum (after the gasoline and before the oils). Used as a fuel illuminant and cleaning agent.

kerotenes. That portion of bitumen which is insoluble in carbon disulfide. Cf. *carboids, kerenes, kerites, keroles, kerols, asphaltenes.*

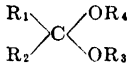
Kerr constant. If L is the difference in wavelength between the ordinary and extraordinary rays, λ the wavelength of the light, v the potential, and d the distance between the poles; $L = k\lambda v^2/d^2$, where k is the Kerr constant which is characteristic for a liquid. **K. effect.** Electrical birefringence, or the polarizing effect of an electro-magnet. The elliptical double refraction of light by liquids in an electric field.

kesso oil. Japanese valerian oil. An essential oil distilled from the roots of *Valeriana officinalis.* A thick, green, liquid, d.0.996, insoluble in water, soluble in alcohol, ether, chloroform or benzene; used in pharmacy.

kessyl alcohol. $C_{14}H_{24}O_2$ = 224.19. Wrongly called kersyl alcohol. An alcohol, m.85, $b._{11mm}$156, from kesso oil.

Kestner, Paul. 1864– . A Swiss chemist, noted for work on refractories and filtering materials.

ketal. (1) An obsolete term for the >CO group; as, dimethyl ketal (= acetone). (2) Ketone acetates prepared by condensation of alkyl orthoformates with ketones in presence of alcohols. General formula,



ketazin. $C_6H_{12}N_2$ = 112.2. A colorless liquid, d.0.836, b.131; soluble in water.

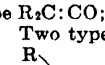
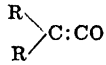
ketazine. Bisazimethylene. A compound containing the radical >C:N—N:C<; as,

$Me_2CN.NCMe_2$..... dimethyl-ketazine or bisdimethylazimethylene.

$Et_2CN.NCMe_2$..... diethyl-ketazine, or bisdiethylazimethylene.

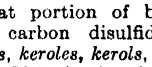
MeEtCN.NCEtMe... methylethyl-ketazine or bismethylethylazimethylene.

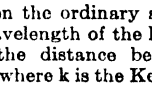
ketene. C_2H_2O = 42.0. Keto-ethylene, ethenone, carbomethene, CH_2:CO. The simplest possible ketone. A colorless gas of penetrating odor, b.−56, decomposed by water, soluble in alcohol or ether. It may be considered as an anhydride of acetic acid; used for acetylation in the manufacture of cellulose acetate. **k. diacetal.** $C_6H_{12}O_2$ = 116.0. Ethoxyethylene, CH_2:C(OEt)$_2$. A colorless liquid, b.125, which reacts with water to form ethylacetate. It polymerizes to a white solid on standing.

ketenes. A group of very reactive organic compounds of the general type R_2C:CO; as, $(CH_3)_2$-C:CO, dimethylketene*. Two types: **aldo- K.** having the general formula  ; colorless, polymerized by pyridine, and incapable of auto-oxidation. Cf. *aldo-ketens.* **keto- K.** having the general formula  ; colored, readily auto-oxidized and forming additive compounds. Both aldo- and keto-ketenes are homologs of ketene. Cf. *ketoketenes, ketines.*

ketimide. An organic compound of the general type R_2:C:NX, where X is an acyl radical. Cf. *ketimine, amide.*

ketimine. An organic compound containing the bivalent >C:NH group. Cf. *ketone, imine.*

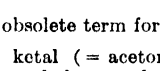
ketine. $C_6H_8N_2$ = 108.2. *2.5*-Dimethyl-pyrazine,  . A colorless liquid, d.0.990, m.15, b.153, slightly soluble in water.

ketines. A group of organic compounds of the general type  , derived from ketine. Cf. *ketenes, pyrazine.*

ketipic acid. $C_6H_8O_6$ = 174.1. Oxalodiacetic acid, hexane-3.4-diondiacid. The dibasic acid, HOOC.CH_2.CO.CO.CH_2.COOH.

keto- Oxo-. A prefix indicating the presence of the keto or carbonyl group, >C:O, in an organic compound. Cf. *ketone.* **k. acid.** See *ketone acid.* **k. enol.** See *tautomerism, desmotropism, ketonic ester type.*

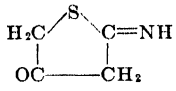
ketoamine. An organic compound containing both, the keto and amino group; as, R:CNH$_2$-CO.R, formed by the action of ammonia on ketones. Cf. *polypeptide.*

ketocoumaran. $C_8H_6O_2$ = 134.1. Ketodihydrocoumarone,  . Colorless crystals, m.97.

ketohexose. A monosaccharide with six carbon atoms, with a keto-group instead of the usual aldehyde group, *e.g.*, fructose and sorbose.

ketohydroxyestrin. $C_{18}H_{22}O_2$ = 270.1. A hormone isolated from the urine of pregnant women and mares. It is an anhydride of trihydroxyestrin. Cf. *sterols, cholane derivatives.*

ketoimine. A compound containing an imino and keto group as *e.g.*, in ketoimidotetrahydrothiazole:



ketoindole. Oxindole.

ketoketenes. The dialkylated homologs of keten, R_2C:CO. They are colored, readily auto-oxidized and form additive compounds with tertiary amines. Cf. *aldoketens.*

ketol. Ketone alcohols. A compound containing a keto and hydroxy group. **alpha-** A compound containing the R—CO.CH_2OH group. **beta-** A compound containing the R—CO.CH_2.-CH_2OH group. **saturated-** Either an alpha- or beta-ketone alcohol. **unsaturated-** Acivinyl alcohols. A compound containing the unsaturated R—CO.CH:CHOH group.

ketole. Indole.

ketone. An organic compound R.CO.R, containing the bivalent ketone group, >C:O. The nomenclature is either the naming of the two radicals before the term *ketone* (as dimethylketone), or attaching the suffix *-one* to the hydrocarbon: CH_3.CO.CH_3 is dimethylketone or propanone* (acetone); C_2H_5.CO.C_2H_5, diethylketone, or 3-pentanone*; CH_3.CO.CH_2.CH_2-CH_3, methylpropylketone, or 2-pentanone.* **acid-** Ketone acid. **aldehyde-** A compound containing the =CO and —CHO groups. **amino-** Ketoamine. **amylethyl-** *3*-Octanone*

KETONES

a. aliphatic, saturated:

acetone, propanone*.. $Me.CO.Me$
butanone*..... $Me.CO.Et$
3-pentanone*..... $Et.CO.Et$
2-pentanone*..... $Me.CO(CH_2)_2Me$
3-hexanone*..... $Et.CO(CH_2)_2Me$
2-hexanone*..... $Me.CO(CH_2)_3Me$
pinacolin..... $Me_3C.CO.Me$
palmitone..... $Me(CH_2)_{14}CO(CH_2)_{14}Me$

b. aliphatic, unsaturated:

Δ^3-2-butenone..... $MeCOCH:CH_2$
Δ^3-2-pentanone..... $MeCOCH:CH_2Me$
phorone..... $Me_2C:CH.CO.CH:CMe_2$

c. aliphatic, diketones:

biacetyl, *2.3*-butanedione*..... $MeCOCOMe$
2.4-pentanedione..... $MeCOCH_2COMe$
2.3-pentanedione..... $MeCOCOEt$

d. cyclic:

cyclobutanone*..... $CO.CH_2.CH_2.CH_2$
cyclopentanone*..... $CO.CH_2.CH_2.CH_2.CH_2$

e. aromatic:

acetophenone..... $Ph.CO.Me$
propiophenone..... $Ph.CO.Et$
butyrophenone..... $Ph.CO(CH_2)_2Me$
1-phenyl-2-propanone. $Ph.CH_2.CO.Me$
benzophenone..... $Ph.CO.Ph$
1.3-diphenyl-2-propanone..... $(PhCH_2)_2.CO$
benzil..... $Ph.CO.CO.Ph$

f. quinones:

quinone..... $CO.CH_2.CH_2.CO.CH_2.CH_2$. See also *indone*, *naphthoquinone*, *anthraquinone*, *phenanthrenequinone*, etc.

amylmethyl- *2*-Heptanone*. **butylmethyl-** *2*-Hexanone*. **di-** A compound containing two ketone groups, *e.g.*, di-alpha-ketones of the type R.CO.CO.R; di-beta-ketones of the type $R.CO.CH_2.CO.R$; di-gamma-ketones of the type $R.CO.CH_2.CH_2.CO.R$. **dibutyl-** *5*-Nonanone*. **diethyl-** *3*-Pentanone*. **diheptyl-** *8*-Pentadecanone*. **dimethyl-** Acetone. **dipropyl-** *4*-Heptanone*. **ethylmethyl-** *2*-butanone*. **ethylpropyl-** *3*-Hexanone*. **methylpropyl-** *2*-Pentanone*. **mixed-** A compound in which two different radicals are attached to the ketone group, *e.g.*, Me.CO.Et (methyl ethyl ketone). **nitroso-** A compound containing the ketone and nitroso groups. **olefine-** A ketone of the olefine series. **paraffin-** A ketone of the paraffin series. **simple-** A compound in which two similar radicals are attached to the ketone group, *e.g.*, Me.CO.Me (dimethylketone). **tri-** A compound containing three ketone groups, of the type R.CO.CO.CO.R.

k. acid. A compound containing both the >CO and —COOH radicals. *alpha-* A compound containing the monovalent —CO.COOH radical, *e.g.*,

$CH_3.CO.COOH$—Propanone-acid or pyruvic acid.

$CH_3.CH_2.CO.COOH$—propyonyl-carboxylic acid.

$HOOC.C_6H_4CO.COOH$—phthalonic acid.

beta- A compound containing the monovalent —$CO.CH_2.COOH$ radical, *e.g.*,

$CH_3.CO.CH_2.COOH$—Butanone-acid, acetoacetic acid.

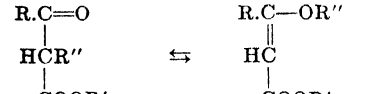
gamma- A compound containing the monovalent —$CO.CH_2.CH_2.COOH$ radical, *e.g.*

$CH_3.CO.CH_2.CH_2.COOH$—laevulinic acid.

delta- A compound containing the monovalent —$CO.CH_2.CH_2.CH_2.COOH$, radical, *e.g.*, $CH_3.CO.CH_2.CH_2.CH_2.COOH$—acetobutyric acid.

k. alcohol. See *ketol*. **k. base.** Tetramethyldiaminobenzophenone. **k. color.** An artificial coloring material containing the ketone group, *e.g.*, alizarin, chrysophanic acid. **k. form.** See *ketonic ester type*. **k. group.** The bivalent >C:O group. Its presence usually confers reducing powers.

ketonic. Pertaining to a ketone. **k. ester type.** An isomer of an enolic ester type compound:



ketonic ester type enolic ester type

The radical R'' has changed place, and the double bond of the ketone group has swung to a carbon-carbon double bond. Cf. *acetoacetic ester*, *desmotropism*.

ketose. A sugar containing a ketone group, as opposed to an aldose (containing the aldehyde group). Cf. *ketohexose*, *fructose*.

ketoside. A glucoside which yields a ketose when hydrolyzed.

ketosis. The excretion of acetone bodies.

ketotriazole. Triazolone.

ketoxime. (1) Acetoxime. A compound containing the bivalent =C:NOH group. *E.g.*, $Me_2C:N.OH$, acetoxime or dimethyl ketoxime; $Et \diagdown C:N.OH$, methylethyl ketoxime. (2) $Me \diagup$ Compounds containing the divalent —HC.NO— group. Cf. *Beckmann rearrangement*. (3) See *dioximes*. **tetra-** See *diphenyl t.k.*

kettle. A cylindrical vessel for boiling or evaporating a liquid or digesting it with a solid.

key. A mechanical device for establishing electrical contact, or reversing or switching on an electrical current. **three-way-, two-way-.** K. for switching a current three or two ways, respectively.

k. atom. (1) An atom in a chain whose alteration of electronic structure (or number of shared or free valences) induces corresponding changes in the other atoms of the chain. (2) An atom in a ring whose oscillations cause a shift of bonds; as, the metallic atom in the porphin ring, q.v.

kg. An abbreviation for kilogram.

kharsivan. British-made salvarsan.

khat. Cafta, Arabian tea. The dried leaves of *Catha edulis*, used as a tea.

Khotinsky, Achilles de. 1850–1933. A Russian-born American designer of instruments, diffraction-gratings, etc. **de K. cement.** A laboratory c. for glass and porcelain, insulating, covering and connecting electric wires, glass, rubber, wood, etc. It is not attacked by ordinary solvents.

kibbled. Broken up into small lumps of about 1 cm. diameter.

kidney. A mammalian organ which eliminates urea, chlorides, and creatinine from the blood. It also filters, through the capsule, the noncolloidal material from the blood plasma.

kidney ore. Red *hematite.*

kies. A general term for sulfide ores.

kieselguhr. Diatomite. Tripoli powder. A diatomaceous or infusorial earth (q.v.). Used as an absorbent for nitroglycerin (dynamite); also for filtering, insulating, and as an abrasive in soaps.

kieserite. $MgSO_4.H_2O$. A native magnesium sulfate, occurring in white compact masses in the Stassfurt salt beds.

Kikuchi lines. The black and white lines which appear when a stream of electrons is directed on a crystal surface; they are due to the scattering of electrons by the row of atoms. Cf. electron *microscope.*

killeen. Irish moss.

Kiliani, Heinrich. A German chemist. **K. reaction.** The synthesis of a higher homolog by forming a nitrile, followed by hydrolysis; *e.g.*, pentose to hexose:

$$\text{R.CHO} \xrightarrow{HCN} \text{R.CHOH.CN} \xrightarrow{2H_2O} \text{R.CHOH.COOH} \xrightarrow{NaHg} \text{R.CHOH.CHO}$$

kiln. (1) A potter's oven for baking bricks. (2) A furnace for calcining or drying coarsely-broken ore or stone.

kilo- (1) A prefix derived from the Greek, indicating one thousand units. (2) Kilogram.

kilocalorie. Cal. A great (or large) calorie: 1 Cal. = 1000 calories.

kilocycle. A frequency of 1000 vibrational cycles per second. Radio ranges principally from 550–1500 k.c. (545–200 meters), and the ultra short wave 60,000 k.c. (5 meters).

kilodyne. 1000 dynes (0.9806 gram).

kilogram. A unit of weight in the metric system, equal to 1000 grams. It was intended to be the mass of 1 cubic decimeter of water at 4°C. 1 kg. = 1000 grams = 15,432.25 grains = 2.2046 pounds av. = 35.27 oz. av. = 32.1507 ounces troy = 2.679 pounds apoth. Cf. *liter, cubic centimeter.* **International prototype-** I. P. Kg. A cylinder of platinum-iridium alloy, which is the standard k. weight.

kilogrammeter. A unit of energy in the metric system. The energy required to raise one kilogram one meter. 1 kg.m. = 7.233 ft.-pd.

kilojoule. A unit of heat: A large joule, J; 1000 joules = 239.1 gram-calories.

kiloliter. Stere, kl. = 1000 liter = 35.371 cubic feet = 2641.7 U. S. liquid gallons.

kilometer. A unit of length in the metric system: 1 km. = 1000 m. = 3280.83 feet = 1093.61 yards = 0.62137 mile. (1 mile = 1.609 km.)

kilonem. A unit of nutrition equivalent to 667 calories; supplied by a liter of milk.

kilostere. A unit of volume; equivalent to one thousand cubic meters = 1000 kiloliters (steres).

kilowatt. A unit of electrical power: 1 KW = 1000 watts = 1000 joules per second = 1.341 horse power = 238.7 calories per second. (1 horsepower = 746 KW.) **k. hour-** A commercial unit of electrical energy: 1 K.W.H. = 1000 watt-hours = 3,600,000 joules per second = 1 B.Th.U.

kilurane. A unit of radio-activity: 1 ku. = 1000 uranium units (uranes).

kinase. Zymoexcitor. A substance existing in various tissues of a living organism, which activates or transforms a zymogen into an active enzyme. **entero-** See *enterokinase.*

kinematics. The science of motion and types of motion, apart from the forces which produce it.

kinetic. (1) Pertaining to motion. (2) The branch of dynamics which deals with the action of forces in causing or influencing the motion of bodies. **k. chemicals.** Gases used as refrigerants. **k. energy.** The force possessed by a body due to its motion; it is proportional to one-half of its mass, m, multiplied by the square of its velocity, v: KE = $mv^2/2$; or (in ergs) = $\text{gm.} \times \frac{(\text{cm./sec.})^2}{2}$. **k. theory.** The hypothesis that all molecules are in motion: this motion is most rapid in gases, less rapid in liquids and very slow in solids, and is a function of the temperature. It is related to the gas-laws by the equation $PV = \frac{1}{3} nmv^2 = RT$, where n is the number of molecules. Evidence of this motion of the molecules is found in evaporation, diffusion, Brownian motion, expansion, the gas laws.

kineurine. Quinine glycerophosphate.

kings yellow. Orpiment.

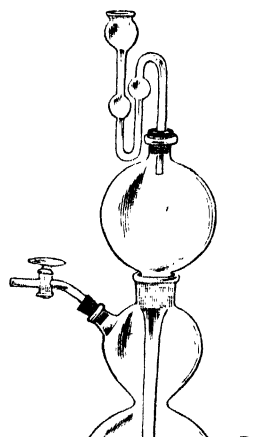
kinic acid. Quinic acid.

kino. Kino gum. The dried juice of *Pterocarpus marsupium,* a leguminous tree of tropical Africa. Reddish-brown, brittle, odorless fragments, slightly soluble in water, soluble in alcohol. Used as the tincture, as an intestinal astringent; also in tanning and textile industries. **African-** Kino. **American-** The dried juice of *Coccoloba uvifera,* used as a k. substitute. **Marri-** A red gum from *Eucalyptus calophylla,* a Myrtaceae.

kinoin. $C_{14}H_{12}O_6$ = 276.1. A resin from kino.

kinovin. Quinovin.

Kipp generator. A glass apparatus consisting of three compartments, used in the laboratory for generating gases, generally hydrogen sulfide, from solid and liquid reagents.



Kipp generator.

Kirchhoff, Gustav Robert. 1824–1887. A German physical chemist noted for the development of the spectroscope, spectrum analysis, electrical subjects. **K. equation.** $\log p = A + B/t + C \log t$, where p is the vapor-pressure of a gas at the absolute temperature t, and A, B, and C are constants.

kish. Crystalline graphite deposited in iron furnaces from molten iron.

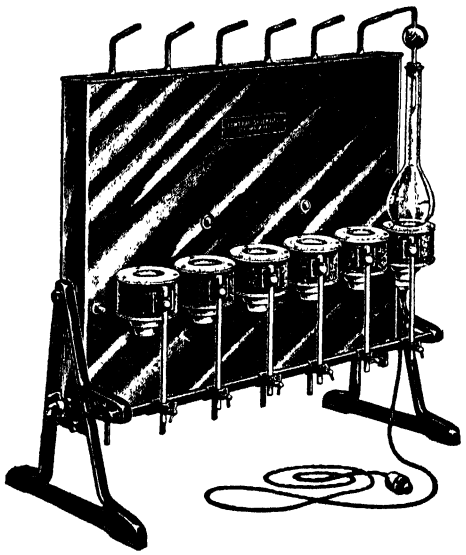
kisidwe oil. A hard, white, solid fat obtained from the nuts of *Allanblackia* species, from the Gold Coast of Africa; used in soap manufacture.

kittool fiber. Kittul. A fiber obtained from the leaves of a Ceylon palm, *Caryota urens;* used in the manufacture of brushes.

kittul. Kittool.

Kjeldahl, J. 1849–1900. A Danish chemist noted for analytical methods. **K. apparatus.** An arrangement for distilling ammonia from an

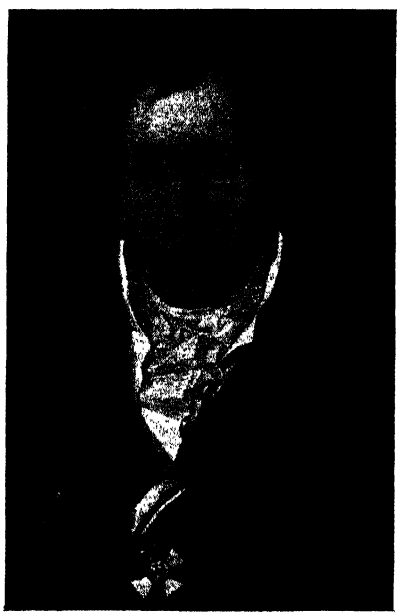
organic compound. **K. flask.** A pear-shaped flask of heat- and acid-resistant glass with a long neck. **K. method.** A method of determining the nitrogen in an organic compound by digesting the substance with concentrated sulfuric acid and distilling the ammonia from the ammonium sulfate formed into a measured quantity of standard sulfuric acid (see figure).



Kjeldahl apparatus showing one K. flask and six heaters.

kl. An abbreviation for kiloliter = 1000 liters.

Klaproth, Martin Heinrich. 1743–1817. A German chemist, who discovered uranium, titanium, and zirconium.



Martin Heinrich Klaproth.

klaprotholite. A copper bismuth sulfide, $Cu_6Bi_4S_9$.

Kleinenberg mixture. A mixture of cacao butter, spermaceti, and castor oil, used in microscopy as an imbedding material.

kleinite. A native mercury oxide and chloride, $HgCl_2.3HgO$.

Klein's liquid. A saturated solution of cadmium borotungstate, d.3.28, used in mineralogy for the separation of minerals.

klydonograph. A device to record automatically a temporary excess voltage, which causes a spark to pass through a moving film. The resulting Lichtenberg figures indicate the nature of the current.

km. An abbreviation for kilometer = 1000 meters.

knap. To break up, *e.g.*, lumps of ore.

knead. To work or press a number of ingredients into one mass, usually with the hands.

knock. The nearly instantaneous and very high-pressure explosion of a compressed mixture of fuel and air in an internal combustion engine. In this explosion a large proportion of the energy is given out as radiant energy and absorbed by the walls of the cylinder, thus reducing the available mechanical energy. It is usually identified with pinking and preignition, but these are considered by some to be distinct phenomena. **anti-** A substance added to a liquid fuel, as gasoline, which slightly retards the explosion and thereby reduces the wasted energy. *Antiknock gasoline* contains 0.05 % of tetraethyl lead. See *ethyl* gasoline, *motalin.*

knock-compound. Antiknock. A substance which when added to gasoline, reduces the knock and thereby increases the efficiency of the combustion engine.

Knop, Johann Ludwig Wilhelm. 1817–1871. A German agricultural chemist and founder of the "Chemisches Centralblatt." **K.'s solution.** A nutrient for plants: 1 pt. KNO_3, 1 pt. KH_2PO_4, 1 pt. $MgSO_4$, 4 pts. $Ca(NO_3)_2$ and a trace of ferric phosphate in 1000 pts. H_2O.

knoppern. Galls. A tannin material produced on various oaks by insects.

Knorr, Ludwig. 1859– . A German chemist noted as discoverer of antipyrine. **K. alkalimeter.** A device for determining carbon dioxide, used extensively in agricultural laboratories.

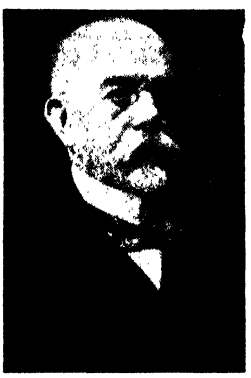
knot. The speed of 1 nautical mile (6082.66 ft. per hour).

knotgrass. English- The herb of *Polygonum aviculare*, a Polygonaceae; used as an astringent. **Russian-** The herb of *P. erectum;* used as an astringent.

knoxvillite. A native chromous sulfate, $CrSO_4$.

kobold. An early name for cobalt.

Koch, Robert. 1843–1910. A German bacteriologist and discoverer of the tubercle bacillus.



Robert Koch.

K.'s acid. Naphthylamine-*3.6.8*-trisulfonic acid. **K. bacillus.** The tuberculosis bacillus. **K. flask.** A pear-shaped flask used for growing bacterial cultures. **K. grinder.** A grinding apparatus for powdering bacteria.

koechlinite. A native bismuth molybdenum oxide, $Bi_2O_3.MoO_3$.

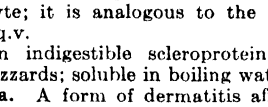
kogi. An enzyme used in the production of miso, q.v.

Kohlrausch, Friedrich. 1840–1910. A German physicist. **K. law.** The conductivity of an electrolyte is the sum of the conductivities of its component ions, provided complete ionization has taken place. **K. bridge.** An instrument for measuring the conductivity of an electrolyte; it is analogous to the Wheatsone bridge, q.v.

koilin. An indigestible scleroprotein lining of birds' gizzards; soluble in boiling water.

koilonychia. A form of dermatitis affecting the fingers of workers with alkaline cements.

kojic acid. $C_6H_6O_4$ = 142.05. *3*-hydroxy-*5*-hydroxymethyl-γ-pyrone. A hydroxy acid formed from glucose, m.153, by certain molds, *e.g.*, *Aspergillus oryzae*.



Cf. *ascorbic acid*.

kok-sagyz. Russian dandelion, the roots of which yield a rubber.

kola. Cola, kola nuts. The dried seeds of several *Cola* species, a Sterculiaceae of Africa; it contains 2–3 % caffeine. Used medicinally, as a nervine and cardiac stimulant; commercially, in the manufacture of beverages.

kolanin. $C_{40}H_{56}O_{21}N_4$ = 928.7. A glucoside from kola, which hydrolyses to caffeine, glucose and kolared.

kolared. $C_{14}H_{12}(OH)_6$ = 266.2. A red coloring matter from kola nuts.

Kolbe, Adolph Wilhelm Hermann. 1818–1884. A German organic chemist and prolific writer, who made the second organic synthesis (chloroacetic acid). Cf. *Wöhler*.

kolm. A radioactive asphaltic mineral containing 0.45 to 0.027 % Pb.

komanic acid. Pyrone-α-carboxylic acid.

konel. An alloy of 8 % ferrotitanium, 17 % cobalt and 73 % nickel, used as platinum substitute for radio-tube filaments.

koniogravimeter. An instrument for the determination of the amount of dust in air.

kontrastin. Zirconium oxide used as a contrast medium in x-ray examinations.

Kopp, Hermann. 1817–1892. A German physical-chemist. **K.'s law.** Every element has the same specific heat in its solid free state, and in its solid compounds. Thus, the molecular heat is the sum of the atomic heats of the component atoms.

Koppeschaar solution. A 0.1 N. bromine solution. Cf. *potassium bromate*.

koppite. A vitreous brown mineral, (Ca,Ce,Fe, Hg,Na_2)O,NbO_2,H_2O.

koprosterol. Coprosterol.

koroseal. Trade name for a vinylchloride plastic.

koryan oil. Kaoliang oil. An oil from *Andropogon sorghum*, koryan corn, from Manchukuo, d.0.926, n_D^{20}1.4655, sap. no. 187, iodine no. 121.

kosam seeds. The fruits of *Brucea sumatrana*, a Simarubaceae of China; used for dysentery and diarrhea.

kosin. Koussin.

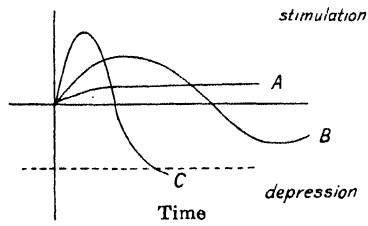
koso. Kousso.

kosotoxin. $C_{28}H_{44}O_{10}$ = 506.3. A yellow, amorphous principle from kousso.

Kossel press. A metal syringe, used for making sodium wire.

kotoin. Cotoin.

Kötschau hypothesis. The effect of small (A), moderate (B) and large (C) doses of drugs is expressed by the following curves where "*degree of stimulation*" is plotted against *duration* of effect:



Cf. *Arndt Schulz rule*.

Köttstorfer number. Saponification number.

koumiss. A drink prepared from mare's milk by fermentation with kefir yeast.

kounidine. $C_{21}H_{24}N_2O_5$ = 384.18. An alkaloid from the stem and leaves of Chinese *Gelsemium* species, which produces muscular and respiratory weakness.

Kourbatoff's reagent. An etching agent in the microanalysis of steel: A. 4 % HNO_3 in isoamyl alcohol. B. Equal parts of 20 % HCl in isoamyl alcohol and a saturated solution of nitroaniline in alcohol. C. Equal parts of 4 % HNO_3 in acetic acid, methanol, ethanol and isoamyl-alcohol. D. 3 pts. of saturated nitro-phenol in alcohol and 1 pt. 4 % HNO_3 in alcohol.

koussein. A yellowish, amorphous principle from kousso; used as an anthelmintic.

koussin. $C_{31}H_{38}O_{10}$ = 570.4. Kosin. Kussin. A resinous substance from kousso; used as an anthelmintic.

kousso. Cusso, brayera. The dried flowers of *Brayera anthelmintica*, (*Hagenia Abyssinica*), a Rosaceae; used as a fluid extract, as an anthelmintic. Cf. *brayerin*.

kovar. A group of alloys of Fe, Ni, and Co which show a sharp change in the coefficient of expansion at certain temperatures; used for all-metal radio tubes and thermostats.

Kr. The symbol for krypton.

K-radiation. See *K*-radiation.

kraft paper. A strong (German: kraft = force) wrapping paper made from wood pulp prepared by the sulfate process.

krameria. Rhatany root, payta. The dried root of *K. triandra* (Peru) or *K. argentia* (Brazil) a genus of polygalaceous shrubs of South America. Used as the fluid extract, as a powerful astringent and tonic.

krantzite. A variety of retinite.

Kraut's reagent. A microchemical reagent for ephedrine made by mixing *A* and *B* and diluting to 100 cc. *A* is 8 gm. bismuth nitrate in 20 cc. conc. HNO_3. *B* is 27.2 gm. potassium iodide in 50 cc. H_2O.

kreatine, kreatinine. See *creatine, creatinine*.

Krebs cycle. See *citric* acid cycle.

Kreis test. A test for three-carbon chain unsaturated aldehydes, characteristic of rancid fats. A red color develops in the aqueous layer after an ethereal solution of fat has been treated with HCl and phloroglucinol solution.

kremersite. A native potassium, ammonium and iron chloride, KCl.NH_4Cl.$FeCl_3$.1½H_2O.

krennerite. (1) A native telluride of gold and silver, (Ag, Au)Te_2. (2) Bunsenite.

kreosol. Cresol.

kreotoxin. A meat-poison or ptomaine formed by bacteria.

kresatin. $C_9H_{10}O_3$ = 166.2. m-cresylacetate, $MeCOOCH_2C_6H_4OH$. A colorless oily liquid; used medicinally as an antiseptic for diseases of the eye, ear, nose and throat.

krinosin. $C_{38}H_{70}O_5N$(?). A lipin isolated from the brain substance.

krith. Crith. The weight of one liter of hydrogen, at 0°C. and 760 mm. 1 krith = 0.0896 gram. A term used in the statement of density of a gas with reference to hydrogen; thus the density of hydrogen is one krith, the density of chlorine 35.5 kriths.

krocodylite. Crocidolite.

krügite. A native potassium and magnesium sulfate, $MgSO_4.K_2SO_4.4CaSO_4.2H_2O$.

Krupp's disease. The special type of fragility shown by steels after tempering and reheating.

kryofine. $C_{11}H_{15}O_3N$ = 209.12. Cryofine, methoxyacet-p-phenetidine, methylglycocoll-phenetidine, $EtO.C_6H_4.NHCO.CH_2OMe$. Colorless needles, m.98; soluble in water, alcohol, ether, or chloroform. Used as an antipyretic.

kryogenin. (1) See *cryogenin*. (2) $C_8H_{10}O_2N_4$ = 194.1. m-benzaminosemicarbazide, $NH_2CO.C_6H_4.NH.NH.CONH_2$. An odorless, colorless, slightly bitter powder, soluble in water; used as an antipyretic and antiseptic.

kryoscopy. (1) The methods of determining the molecular weight of a substance by observing the lowering of the freezing point of its solutions. See *cryoscopy*. (2) In general, the production of low temperatures. (3) That branch of metallurgy which deals with the phenomena occurring during the cooling of molten alloys.

kryptidine. $C_{11}H_{11}N$ = 157.1. *2.4*-dimethyl quinoline. A homolog of quinoline.

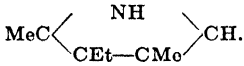
krypto- See *crypto-*.

kryptocyanin. $C_{25}H_{25}N_2I$ = 480.0. *1.1'*-diethyl-*4.4'*-carbocyanin iodide. A photographic sensitizer for the infra-red; used to photograph through haze.

kryptol. A granular mixture of graphite, carborundum and clay; used as a resistance in electric furnaces.

krypton. Kr = 82.7. A colorless, inert, noble gas and element, atomic number 36, which occurs in the atmosphere (1 per 1,000,000); $d._{(air=1)}$3.708, m. −169, b. −152.9. It forms no known chemical compound, and appears to consist of six isotopes of atomic weights 84, 86, 82, 83, 80, and 78.

kyptopyrrole. $C_8H_{13}N$ = 123.1. $\alpha.\beta'$-dimethyl-β-ethyl-pyrrole, 2.4-dimethyl-3-ethyl-pyrrole.



A split-product of chromoproteins.

kryptoxanthin. $C_{40}H_{55}OH$ = 552.4. Caricaxanthin. A yellow, carotinoid pigment from the pods of *Physalis* species, *Carica papaya* and yellow corn. Cf. *carotene*.

K.S.K. Ethyl iodoacetate.

kuh-seng. A Chinese drug consisting of the dried roots of *Sophora flavescens*, a Leguminosae. Its chief alkaloid is matrine.

kukersite. An Esthonian shale oil containing 43 % of organic matter (kerogen).

kukoline. An alkaloid obtained from *Cucullus diversifolius*, an Asclepiadaceae.

kumyss. Lac fermentatum. A sweetened cow's milk, fermented with yeast and used as a nutrient. Cf. *koumiss*.

Kundt. 1839–1894. A German physicist. **K.'s constant.** (1) See *K.'s rule*. (2) A value obtained by dividing Verdet's constant by the magnetic susceptibility of the substance. Values: Fe = 2.63, Ni = 3.15, Co = 3.99. **K. effect.** The rotation of the plane of polarised light in certain vapours and gases under the influence of magnetic forces. **K.'s rule.** In the absorption of light by a solution, an increase in refractive index of the latter produces a shift in the absorption bands towards the red to an extent defined by K.'s constant. **K.'s tube.** A horizontal tube containing a light powder, in which the gas or air is made to vibrate, by sounding a note at the open end. The sand sets itself in heaps whose distance apart is a measure of the velocity of sound in the gas and hence of its specific heat.

Kunkel, Johann. 1638–1703. A German alchemist who published, under the pseudonym "Baron von Lowenstjern," a chemical textbook "Laboratorium Chymicum." He also developed glass manufacture and prepared phosphorus.

kunzite. A native lithium aluminum silicate, $LiAl(SiO_3)_2$; a pink variety of spodumen.

kupfernickel. Niccolite.

kupferron. Cupferron.

kupramite. A preparation used in gas-masks as an absorbent for ammonia.

kurchi. The bark from the root of *Holarrhena antidysenterica*, an Apocynaceae; used as a fluid extract, as a febrifuge and antidysenteric.

kurchine. An alkaloid obtained from kurchi, q.v.

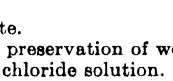
kurrajong oil. A thick, red oil from the seeds of *Brachychiton populenum*.

kusamba. A liquid opium solution obtained by macerating opium with rose-water.

kussin. Koussin.

kuteera gum. Hog gum.

kyanidine. $C_3H_3N_3$ = 81.2. *1.3.5*-triazine. The heterocyclic compound



Cf. *cyanidine*.

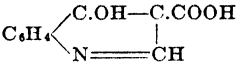
kyanite. Cyanite.

kyanizing. The preservation of wood by steeping it in mercuric chloride solution.

kyanol. An early name for aniline.

kymograph. An instrument for recording variations of blood pressure.

kynurenic acid. $C_{10}H_7O_3N$ = 189.09. 4- or γ-hydroxy quinoline carboxylic acid, 4-hydroxyquinaldic acid. The cyclic compound



A decomposition-product of tryptophane occurring in dog's urine, as prisms, m.289, soluble in hot water.

kynurenine. $C_{11}H_{12}N_2O_4$ = 236.08. A dibasic amino-acid from urine, $NH_2.C_6H_4.C(COOH):CH.CH(NH_2)COOH$.

kynuric acid. $C_9H_7O_3N$ = 209.1. Oxalylanthranilic acid, carbostyrilic acid. Colorless crystals, m.288.

kynurin. C_9H_7ON = 145.06. 4- or gamma-hydroxyquinoline, *4*-quinolinol. Colorless crystals, m.201, b.300, soluble in water or alcohol.

kyrine. A basic substance resulting from the hydrolysis of proteins.

kytoplasm. Cytoplasm.

L

l. An abbreviation for: (1) liter; (2) latent heat per gram; (3) length, (4) ionic mobility; (5) mean free molecular path.

l- Abbreviation for levo- or levorotary; *l(d)*- levo- (or dextro-); *ld-* levo- and dextro- (= meso).

L. An abbreviation for: (1) the abstract unit of length; L^2. abstract unit of area; L^3. abstract unit of volume; (2) latent heat per mol.; (3) solubility product. **L acid.** Same as *1*-Naphthol-*5*-sulfonic acid. **L electron.** The electrons located in the second shell or orbit of the atom; their maximum number is eight, and they are built up in the period from Li = 1, Be = 2, to O = 6, F = 7, and completed by Ne = 8. **L lines.** (1) The group of lines following the K lines, q.v. (2) The Fraunhofer lines λ 3820 to λ 3858, due to iron. **L orbit.** The second series of paths of electrons around the atomic nucleus, and outside the innermost K orbit. **L radiations.** The second series of homogeneous x-rays characteristic of the metal used as anticathode, and analogous to the K radiations, q.v. **L shell.** The second layer of electrons in the static atom (Lewis-Langmuir), which correspond with the L-orbit of the dynamic atom (Bohr-Sommerfeld). **L. spectrum.** The spectrum due to L radiations. Cf. *K spectrum, Moseley spectra.*

λ The Greek letter "lambda," q.v.

Λ The Greek capital letter "lambda," q.v. The symbol for equivalent conductivity.

La. The symbol for lanthanum.

lab. Lab ferment, rennase. The ferment of rennet, which causes the coagulation of milk.

Labarraque Antoine Germaine. 1777–1850. A French apothecary. **L. solution.** A solution of sodium hypochlorite, used as a disinfectant and deodorant; contains not less than 2.4 % available chlorine.

labdanum. A resin from *Cistus* species; used as stimulant and expectorant.

label. A square, colored paper tag, prescribed for shipping chemicals in the U. S. by the Railroad Commissioners.

white—for corroding liquids, acids, etc.

yellow—for oxidizing materials and inflammable solids.

red—for inflammable liquids and inflammable compressed gases.

green—for non-inflammable compressed gases. Cf. *hazard, compressed gases, storage.*

LaBel tube. A distilling tube with two or more bulbs and return tubes, used for fractional distillation.

Labiate. Mint family, a group of aromatic herbs that yield several important essential oils:

herbs:

Mentha piperita	peppermint
Mentha spicata	spearmint
Hedeoma pulegioides	pennyroyal
Marrubium vulgare	horehound
Melissa officinalis	balm
Scutellaria lateriflora	skullcap
Cunila mariana	dittany
Glechoma hederacea	ground ivy
Lycopus virginicus	bugle
Lavandula spica	lavender oil
Origanum majorana	sweet majoram
Origanum vulgare	wild marjoram
Thymus serpyllum	wild thyme
Leonurus cardiaca	motherwort
Monarda punctata	horsemint
Monarda fistulosa	wild bergamot
Hyssopus officinalis	hyssop
Teucrium chamaedrys	germander
Teucrium scordium	water germander
Teucrium marum	teucrium
Lamium album	lamine
Nepcta cataria	catnip

leaves:

Salvia officinalis	sage
Rosmarinus officinalis	rosemary
Thymus vulgaris	thyme
Orthosiphon stamineus	Java tea
Pycnanthemum montanum	mountain mint
Satureia hortensis	summer savory
Micromeria douglasii	yerba buena
Ocimum basilicum	sweet basil
Stachys betonica	betonica

flowers:

Lavandula vera	lavender

rhizomes:

Collinsonia canadensis	stone root.

labile. Unstable. **l. acid.** See *acid.* **l. state.** Temporary stability.

laboratory. The chemical working place.

Modern laboratory.

Labrador tea. James tea, marsh tea, wild rosemary. The leaves of *Ledum palustre*, an Ericaceae, used as tea in Labrador, and as an expectorant. It contains ledum camphor, ericinol and ericulin.

labradorite. Saussurite. An irridescent lime-soda feldspar.

laburnine. An alkaloid from *Cytisus laburnum*, a Leguminosae. Cf. *cytisine.*

lac. (1) Lacca, resina lacca, lacca gum, lakh. A resin exuding around twigs of *Croton* species, a Euphorbiaceae, and *Fiscus* species, a Moraceae of the East Indies, caused by the bite of the female insect, *Coccus lacca.* (2) The bodies of *Coccus lacca*, used as a red dye. (3) Milk;

as *lac sulfuris* = milk of sulfur. **α-lac.** A suggested name for the insoluble portion of shellac. **stick-** The crude l. as taken from the tree, still impure with twigs; a deep reddish-brown resin. **seed-** L. broken from the twigs; minute irregular fragments. **shel-** Shellac. Prepared from the above by melting and straining. Cf. *shellac.*

lacca. See *lac, shellac.* **l. coerula.** Litmus.

laccaic acid. $C_{16}H_{12}O_8$ = 332.1. Laccainic acid. A red crystalline constituent of lac; decomp. 180.

laccase. (1) An oxidizing enzyme of the sap of plants (lac tree, etc.). (2) A class of oxidases which act on phenols.

lacceroic acid. $C_{31}H_{63}COOH$ = 480.29. Dotriakontanic acid. A fatty acid, m.95, in some waxes. Cf. *psyllic acid.*

lacerate. To cut or tear a margin into irregular segments.

lachry- See *lacri-.*

lacmoid. $C_{12}H_9O_4N$ = 231.1. Resorcinol blue. Lustrous, dark violet scales, slightly soluble in water, soluble in alcohol or acetone; used as an indicator in titrating mineral acids, bases, and alkaloids: blue (pH 6.4) in alkaline, red (pH 4.4) in acid solution. **l. tincture.** A solution of 0.5 % gm. lacmoid in 100 cc. water and 100 cc. alcohol. Used as indicator.

lacmus. Litmus.

lacquer. (1) A varnish, natural or containing shellac. (2) The solution of a resinous body which applied to an object (by dipping, spraying or brushing), dries by evaporation of the solvent, and leaves a protective covering. (3) A solution of a cellulose ester in a solvent; *e.g.*,

cellulose nitrate	15 parts
plasticizer	5–10 parts
resin	5 parts
solvent	70–75 parts.

acetate- A relatively uninflammable solution of cellulose acetate in carbon tetrachloride. **bronzing-** A solution of nitrocellulose in amyl acetate with suspended aluminum or bronze powder. **brush-** A l. applied with brushes. **Burmese-** A natural l. exuding from the stems of *Melanorrhea usitata*, an Anacardiaceae, which turns black on exposure. **cellulose-** Lacquer (3). **Chinese-** Japanese- **collodion-** See *collodion.* **dip-** A l. used for the dipping or immersion of objects. **glyptal-** A solution of the synthetic resins made from glycerol and organic acids. **Japanese-** The resinous sap of *Rhus vernicifera*, an Anacardiaceae of Japan and China. It is often colored by pigments and thinned with camphor oil or turpentine. **nitrocellulose-** The commonest form of l., containing cellulose nitrate in an organic solvent.

l. solvent. A group of organic liquids which dissolve resins, gums or nitrocellulose, and are used in the manufacture of lacquers, varnishes, and rayon. They are classified according to (1) boiling point (see solvents); or (2) type:

One-type solvents, such as:

1. Alcohols *e.g.*, ethanol.
2. Ethers *e.g.*, ethyl ether.
3. Ketones *e.g.*, acetone.
4. Esters *e.g.*, ethyl acetate.

Two-type solvents, which may be either a mixture of two or more of the above compounds, or a single compound that contains two or more of the characteristic groups, such as

1. Alcohol-esters, *e.g.*, ethyl glycollate.
2. Alcohol-ethers, *e.g.*, diethylglycerol.
3. Alcohol-ketones, *e.g.*, diacetone alcohol.
4. Ketone-esters, *e.g.*, ethyl pyruvate.
5. Ketone-ethers, *e.g.*, ethoxy acetone.
6. Ester-ethers, *e.g.*, ethoxy ethyl lactate.

lacri- A prefix indicating tears.

lacrimation. An excessive secretion of tears.

lacrimator. A tear-producing substance; as, ethyl iodoacetate.

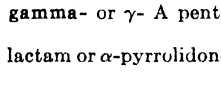
lacrimatory. An agent which produces excessive secretion of tears. Cf. *dacryagogue.* **l. gas.** A poison gas used in warfare which produces tears, as benzyl bromide, dichlorophenylcarbylamine.

lacry- Lacri-.

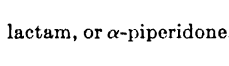
lactalbumin. The albumin of milk; of high biological value. Cf. *proteins.*

lactam. Lactan. An organic ring-compound containing in its ring the —NH—CO— group. The ring is formed by the elimination of water from the —COOH and $—NH_2$ group. Cf. *lactims, lactoxime.* The more common are:

gamma- or γ- A pentatomic ring; as γ-butyrolactam or α-pyrrolidone,



delta- or δ- A hexatomic ring; as δ-valerolactam, or α-piperidone,



lactamic acid. Alanine.

lactamide. $C_3H_7O_2N$ = 89.1. α-hydroxypropionamide, lactic acid amide, 2-hydroxypropanamide*, Me.CHOH.$CONH_2$. Colorless crystals, d.1.138, m.74; slightly soluble in water or alcohol.

lactamine. Alanine.

lactan. Lactam.

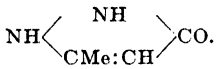
lactase. An enzyme occurring in the intestinal juice, which hydrolyzes lactose to dextrose and galactose.

lactasidase. A zymase which converts lactose to lactic acid.

lactate. (1) A salt of lactic acid, a compound containing the monovalent Me.CHOH.COO— radical. (2) To produce milk.

lactation. The secretion of milk.

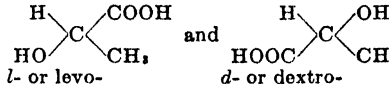
lactazam. A ring compound containing the —NH.NH.CO—group in its ring, as butyrolactazam or 3-methylpyrazolon



Cf. *pyrazolone, phenyllactazam.*

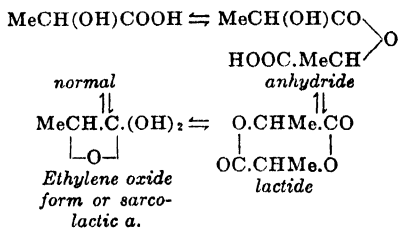
lactazone. Lactoxime.

lactic acid. $C_3H_6O_3$ = 90.1. α-hydroxypropionic acid, 2-hydroxypropanoic acid*, ethilidenelactic acid, acid of milk, fermentation lactic acid. A fermentation acid from milk or carbohydrates. A colorless and odorless liquid, d.1.240, m.18, $b._{12mm}$.119, soluble in water, alcohol, or ether. Used as a reagent in detecting glucose and pyrogallol; also in organic synthesis; in leather, textile, and tanning industries; and in pharmacy. Also used as to substitute citric and tartaric acids. There are two tautomeric varieties of which the above is the *dl-* form, produced by fermentation of carbohydrates.



l- or levo- and *d-* or dextro-

d- l. produced in muscle tissues by splitting glucose, or by the action of *Micrococcus acidi paralactici*. A solid, m.25. **l-** L. formed by the action of *Bacillus acidi levolactica*. **p-** Para- See *d-*. **sarco-** *d-*. The aqueous solution of l. consists of an equilibrium of four forms:



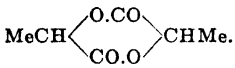
Ethylene oxide form or sarcolactic a. *lactide*

l. acid series. A group of monobasic hydroxy acids of the general type HO.R.COOH, and the general formula $C_nH_{2n}O_3$ or $C_nH_{2n}(OH)COOH$.

carbonic (hydroxyformic) acid	HO.COOH
glycollic acid, hydroxyacetic acid	$HO.CH_2.COOH$
lactic acid, hydroxypropionic acid	$HO.C_2H_4.COOH$
hydroxybutyric acid	$HO.C_3H_6.COOH$
hydroxyvaleric acid	$HO.C_4H_8.COOH$
hydroxycaproic (leucinic) acid	$HO.C_5H_{10}.COOH$

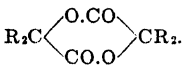
lactic anhydride. $C_6H_{10}O_5$ = 162.1.. Lactic acid anhydride, *2*-hydroxypropanoic anhydride*, $(MeCHOHCO)_2O$. An amorphous white powder, m.250, slightly soluble in water, soluble in alcohol or ether.

lactide. $C_6H_8O_4$ = 144.1. *3.6*-Dimethyl-*2.5-p*-dioxandione. A condensation-product of lactic anhydride:

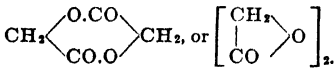


Monoclinic crystals, d.0.862, m.128, b.255; slightly soluble in water or alcohol. Cf. *lactides*.

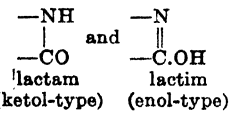
lactides. Compounds formed by the condensation of two *α*-hydroxyacids or their anhydrides. They are of the general type:



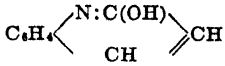
The simplest is glycollide,



lactim. Lactin. An organic ring compound containing the bivalent —N:COH— group in its ring. They are isomeric with lactams, and differ in that they are formed by the elimination (as water) of the two H of the NH_2 group and the O of the CO group:



Thus, carbostyryl,



is the lactam of o-aminocinammic acid. The H of the OH group is replaceable. Cf. *peptide*.

lactin. (1) Lactose. (2) Lactim.

lactobacillus. A bacillus which causes lactic acid fermentation of milk.

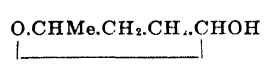
lactobiose. Lactose.

lactochrome. $C_6H_{13}O_6N$ = 200.2. A coloring matter isolated from milk.

lactocrit. Lactokrit. An instrument for determining the amount of fat in milk.

lactoflavin. $C_{17}H_{20}N_4O_6$ = 376.15. *6.7*-Dimethyl-*9*-isoalloxazine. A flavin (q.v.) pigment, m.287, from milk, alfalfa, clover and green leaves identical with vitamin B_2, q.v. Orange-red needles, giving, in water, a yellow solution with green fluorescence.

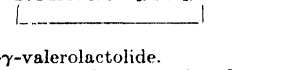
lactol. (1) $C_{13}H_{12}O_2$ = 216.1. Lactonaphthol, naphthyl lactate, $MeCHOHCOOC_{10}H_7$. Colorless crystals, insoluble in water, soluble in alcohol; used as an intestinal antiseptic. (2) The cyclic form of hydroxy aldehydes (aldolactols) and hydroxy ketones (ketolactols); as,



γ-valerolactol or pentanol-*3*-al-*1*.

lactolactic acid. Dilactic acid.

lactolide. The ether of a lactol; as,

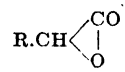


methyl-*γ*-valerolactolide.

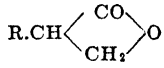
lactometer. A hydrometer for determining the specific gravity of milk.

lactonaphthol. Lactol.

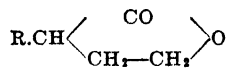
lactone. An anhydro-ring compound produced by intramolecular condensation of an oxyacid with the elimination of water, *e.g.*, *α*- or **alpha-** (*The least common type*). The triatomic ring



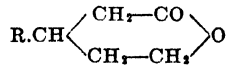
β- or **beta-** (*A less uncommon type.*) The tetratomic ring:



γ- or **gamma-** (*The commonest and most stable type.*) The pentatomic ring:



δ- or **delta-** The hexatomic ring:



The nomenclature of lactones is derived by either (a) adding -olid to the hydrocarbon, or (b) lactone to the acid; as

(gamma lactones)

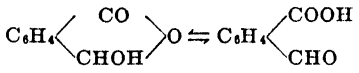
$CH_2.CH_2.CH_2.CO.O$ = *γ*-butyrolactone or butanolid

$CHMe.CH_2.CH_2.CO.O$ = *γ*-valerolactone or 1.4-pentanolid

$CHEt.CH_2.CH_2.CO.O$ = *γ*-caprolactone or 1.4-hexanolid

(delta lactones)
$CH_2.CH_2.CH_2.CH_2.CO.O$ = δ-valerolactone or 1.5-pentalolid
$CHMe.CH_2.CH_2.CH_2.CO.O$ = δ-caprolactone or 1.5-hexanolid

l. isomerism. The shift from lactone to aldehyde-acid; as,



lactonic acid. Galactonic acid.

lactonitrile. C_3H_5NO = 71.05. 2-Hydroxypropanenitrile*, Me.CHOH.CN. A colorless liquid, d.0.992, m. −40, b.183.

lactose. $C_{12}H_{22}O_{11}.H_2O$ = 360.2. Milk-sugar, sugar of milk, lactobiose, glucose-galactoside. A disaccharide occurring in milk. Colorless rhombic, crystalline powder, d.1.525, m.203 (decomp.), slightly soluble in water, insoluble in alcohol or ether. Used extensively in pharmacy (for tablets), medicine (as nutrient), and industry. **l.-litmus-agar.** A culture medium for growing certain bacteria, consisting of

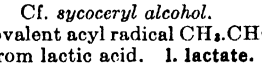
10 gm. lactose
15 gm. agar-agar
10 gm. peptone
1000 cc. boullion stock

to which is added azolitmin solution and the whole neutralized with sodium hydroxide to a pale blue color.

lactoxime. Lactazone. An unsaturated lactam, or a compound containing the —CH=N—O—CO— group in the ring.

lactucarium. The dried milky juice of *Lactuca virosa*, wild lettuce, a Compositae. It is a mild narcotic and sedative.

lactucerol. $C_{18}H_{30}O$ = 262.23. An alcohol from *Lactuca* species. Cf. *sycoceryl alcohol.*

lactyl. The monovalent acyl radical $CH_3.CHOH.CO$— derived from lactic acid. **l. lactate.** Dilactic acid. **l. urea.** $C_4H_6O_2N_2,H_2O$ = 132.11. The heterocyclic compound:  .
Colorless rhombic crystals, m.145, soluble in water, alcohol, or ether.

ladanum. Labdanum. **l. oil.** An essential oil distilled from the resin of *Cistus creticus*, a Cistaceae of the Mediterranean Islands. A yellow oil, d.1.01, insoluble in water, soluble in alcohol, ether or chloroform; used in perfumery.

Ladenburg, Albert. 1842–1911. A German chemist noted for research on alkaloids and organic compounds of silicon. **L. flask.** A distilling flask, with several bulbs in its long neck, used for fractional distillation. **L. formula.** See *benzene structure.* **L. law.** The velocity of a photoelectron is proportional to the square root of the voltage exciting it.

ladle. A vessel or pot for holding, transporting and pouring molten metal.

lady's slipper. Cypripedium.

læ- See *lae-, le-.*

laevo- Levo-.

laevulinic acid. Levulinic acid.

laevulose. Fructose.

Lafayette mixture. Mixture copaiba.

lag. (1) To drag or follow behind. (2) To bind a pipe conducting steam with a non-conducting material (as asbestos), to keep it hot and prevent the steam condensing. **magnetic-** See *hysteresis.* **nitrogen-** See *nitrogen.*

lagam balsam. A thick yellow liquid resembling copaiba balsam.

lagoriolite. $3Na_2O.Al_2O_3.3SiO_2$. A silica mineral (q.v.) of the garnet group.

lake. An adsorption compound of a vegetable or animal coloring material with aluminum oxide or other metallic oxide, produced by coprecipitating the color with the corresponding metallic salts (mordants). Lakes are usually bright in color and insoluble, but the same dye can give different shades with different mordants, *e.g.*, alizarin produces with

aluminum and tin—reddish shades
calcium or barium—bluish shades
ferric salts—purplish shades
chromium—violet-brownish shades.

lakh. (1) Lac. (2) In India = 100,000.

laking. Hemolysis.

lamb. An abbreviation for lambert.

Lamb, Arthur Becket 1880– . An American chemist, noted for research in inorganic chemistry.

lambda. The Greek letter Λ or λ (L, l). The symbol for: (1) microliter; (2) latent heat of reaction; (3) wavelength; (4) lithium nucleus; (5) equivalent conductivity.

lambert. Lamb. A unit of brightness of a perfectly diffusing surface, which radiates or reflects one lumen per square centimeter. 1 lamb = 1 phot = 1 lumen per $cm.^2$ = 0.3183 candles per $cm.^2$ = 2.054 candles per in^2.

Lambert's law. Each layer of an absorbing medium of equal thickness absorbs an equal fraction of the radiation which traverses it, provided the medium is homogeneous. $I = I_0 e^{-al}$, where I_0 and I are the intensities of the incident and emergent radiations, respectively, of rays of light of a wave-length λ, e the thickness of the transmitting medium in cm., and a the absorption coefficient (q.v.) of the medium for the wave-length λ.

Lambrecht's polymeter. A meteorological measuring instrument, consisting of a hygrometer and thermometer with humidity conversion scales.

lamella. (1) A medicated disk or wafer. (2) Lamina.

lamina. A thin flat plate or scale; as mica.

Laminaria. Tangle, seagirdle. A genus of *Phaeophyaceae* or algae of the brown sea-weed type, order Laminariaceae. Cf. *kelp.*

laminated. Split, or arranged in thin layers.

lamine. An alkaloid obtained from the blossoms of *Lamium album*, dead-nettle, a Labiatae.

lamp. A device for obtaining light or heat. **alcohol-** A small vessel with wick, for burning alcohol. **arc-** See *arc.* **blast-** See *burner.* **carcel-** See *carcel unit.* **electric-** A device for transforming an electric current into light. Three types: arc l., filament l., and vacuum l. **filament-** A device for heating a thread of carbon, tantalum, or tungsten to incandescence in an evacuated glass bulb. The temperature and brightness of some filament l. are:

50 Watt carbon.....	1840°C,	3.3 lumens per watt
50 Watt tantalum....	1885°C,	4.9 lumens per watt
50 Watt tungsten (gas-filled).....	2425°C,	11.1 lumens per watt

gas-filled- (1) Vacuum l. (2) A filament l. which contains a small quantity of gas *e.g.*, N_2 or A. **halide-** See *halide lamp*. **Harcourt-** A standardized device for burning a definite quantity of pentane at a definite rate; used as standard of illumination in measuring brightness. **Hefner-** A standard lamp used in photometry. **Kromayer's-** A mercury arc in a quartz container, which produces actinic rays. **mercury-** An evacuated glass or quartz container containing mercury vapor; on the passage of an electric current it emits an intense bluish light, which is rich in ultraviolet or actinic rays. It is used in spectroscopy and photography. **microscope-** An electrical illuminating device for microscopes. **mignon-** A small electric lamp for examining tissues, or organs. **miner's-** q.v. **neon-** A vacuum type lamp containing a trace of neon. **Nernst-** An electric lamp with metal oxide filament, which becomes a conductor when heated. **pentane-** A lamp burning pentane, used as photometric standard. **quartz-** A mercury vapor lamp made of quartz. **spectrum-** A device for coloring a non-luminous flame with vapors, sprays or solid particles; used for the production of spectra of metals. **vacuum-** An illuminating device consisting of a vacuum tube, variously shaped in form of letters or ornaments, through which passes an electric current. Different gases, used as the residual gas in the tubes, produce different colors.

lampblack. Carbon black. Paris black. Finely-divided carbon obtained by burning gas or oil under a slowly rotating metal cylinder. Used as a paint, printer's ink, and paper pigment, after removal of the oily impurities. Cf. *soot*.

lamprobolite. A basaltic hornblende.

lana. Wool. Flannel.

lanain, lanalin. Lanolin.

lanarkite. A native, basic lead sulfate, $PbSO_4.PbCO_3$, derived from $PbSO_4.PbO$.

lanatoside. A newer term for digilanid (q.v.).

lancet. A small pointed knife with two edges.

land plaster. Gypsum.

Landmark process. The synthesis of ammonia by passing steam over TiN_2 and carbon, and the recovery of TiN_2:

(1) $2TiN_2 + 2C + H_2O \rightarrow 2TiN + CO + 2NH_3$.
(2) $N_2 + 2TiN \rightarrow 2TiN_2$.

Landolt, Hans Heinrich. 1831–1910. A Swiss physical chemist, noted for his work on optical refractivity.

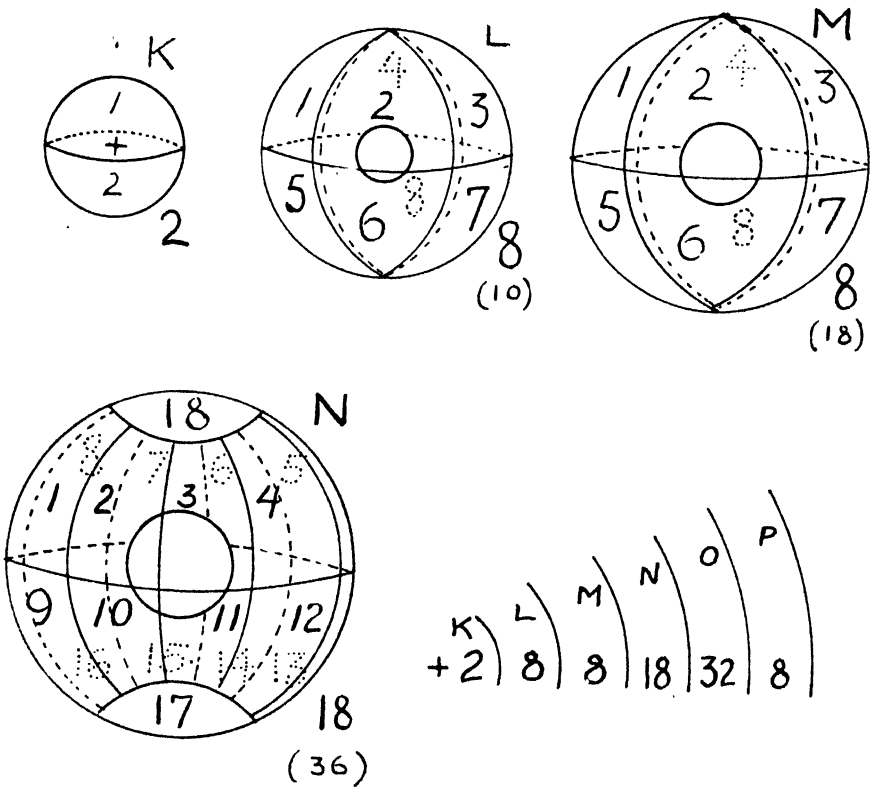
Landsberger apparatus. An apparatus for the determination of molecular weights from the rise in boiling-point of a solution.

langbeinite. A native potassium-magnesium sulfate, $K_2SO_4.2MgSO_4$.

Lange solution. A colloidal solution of gold.

Langevin formula. The activity coefficient, α, of ions or the coefficient of combination of ions is: $\alpha = \Lambda_0/\kappa$, where Λ_0 is the equivalent conductivity and κ the dielectric constant per volt.

Langmuir, Irving. 1881– . An American physical chemist noted for experiments on atomic hydrogen, low pressure and high vacuum reactions and development of theories of isosterism and atomic structure. Cf. *Lewis-Langmuir theory*. **L. theory.** (1) An extension of Lewis' atomic theory: Electrons occupy



Langmuir theory.

positions in the imaginary shells around the atom (see original figure). The white central disk represents the shell, and the numbers indicate the electrons added when passing from one element to the other. See *periodic system*. (2) In the solid state secondary valencies supplant the effect of primary valences.

lanital. An artificial wool produced in Italy from casein. Cf. *aralac*.

lanoceric acid. $C_{30}H_{60}O_4$ = 484.46. A dibasic fatty acid, m.105, from lanolin; constituent of wool grease.

lanolin. Lanum, lanain, lanalin, lanesin, lanichol, laniol, adeps lanae hydrous, hydrous wool fat. A purified and hydrated wool fat; used as an excipient for external use, and in cosmetics. **anhydrous-** Adeps lanae, wool fat. A yellowish semi-solid fat from sheep's wool, consisting of cholesterol esters of higher fatty acids, m.38–42, soluble in alcohol, ether or benzene.

lanopalmic acid $C_{16}H_{30}O_3$ = 358.2. A fatty acid from wool grease.

lanosterol. $C_{30}H_{50}O$ (?). Isocholesterol. An unsaturated sterol closely related to cholesterol, m.139–140, comprising approximately 25 % of wool wax, q.v.

lantanine. An alkaloid from *Lantana brasiliensis*, a Verbenaceae of Brazil; used as an antiperiodic, antipyretic and quinine substitute. Cf. *yerba sagrada*.

lanthanite. The dull, infusible mineral $La_2(CO_3)_3.9H_2O$.

lanthanum. La = 138.92. A rare earth metal, atomic number 57, discovered in 1839 by Mosander. A lead-gray lustrous metal, d.6.15, m.810, found in the rare earth minerals cerite, samarskite, lanthanite and gadolinite. It decomposes water slowly, and has a valency of three; not at present used in industry or medicine, but forms pyrophoric alloys and can be used as a catalyst in ashing biological material. **l. acetate.** $La(CH_3COO)_3.1\frac{1}{2}H_2O$ = 343.01. White crystals, soluble in water. **l. carbonate.** $La_2(CO_3)_3.8H_2O$ = 602.1. A white crystalline powder, insoluble in water, soluble in dilute acids. **l. chloride.** $LaCl_3.7H_2O$ = 371.4. White transparent triclinic crystals, soluble in water or alcohol. **l. nitrate.** $La(NO_3)_3.6H_2O$ = 433.1. White transparent, deliquescent crystals, m.40, b.126, soluble in water or alcohol. Used as an antiseptic, and for incandescent gas mantles. **l. oxalate.** $La_2(C_2O_4)_3$ = 451.8. A white crystalline powder, insoluble in water. **l. oxide.** La_2O_3 = 325.8. An amorphous, infusible, white powder, d.6.41, insoluble in water, soluble in acids and ammonium chloride solutions. Used in incandescent gas mantles, and for "lime-lights." **l. sulfate.** $La_2(SO_4)_3.9H_2O$ = 727.9. Colorless, hexagonal needles, d.2.81, slightly soluble in water, decomp. when heated. **l. sulfide.** La_2S_3 = 374.02. A yellow powder, d.4.997, m.2300–2350, insoluble in water.

lanthopine. $C_{20}H_{25}O_4N$ = 343.20. Lantol. A colorless crystalline alkaloid of opium, m.200.

lantol. Lanthopine.

lanum. Lanolin.

lapacho bark. The bark of *Avicennia nitida*, black mangrove, used for tanning. **l. wood.** The heart wood of *Avicennia tomentosa*, a Verbenaceae of the tropics.

lapachoic acid. Lapachol.

lapachol. $C_{15}H_{14}O_3$ = 242.11. Lapachoic acid, targusic acid, 2-hydroxy-3-amylene-α-naphthoquinone. A constituent of lapacho wood m.141.

lapis. (1) The Latin term for stone. (2) An alchemical term applied to any non-volatile substance. **l. albus.** A native calcium silicofluoride. **l. amiridis.** Emery. **l. calaminaris.** Calamine. **l. causticus.** Fused sodium or potassium hydroxide. **l. divinus.** Cuprammonium. **l. imperalis.** Silver nitrate. **l. lazuli.** (1) A mixture of minerals, usually calcite, pyrite, lazulite, sodalite and häyenite (blue Na, Al silicates), which were the source of the ancient ultramarine. (2) A native copper silicate; translucent deep blue, green, or purple compact masses. Used as semi-precious stone for ornaments, vases, or jewelry. **l. lunaris.** Fused silver nitrate.

lappa. Burdock, clotbur, bardana. The dried roots of *Arctium lappa*, a Compositae; used as the fluid extract, as a diuretic and diaphoretic.

lappaconitine. (1) $C_{32}H_{44}O_8N_2$ = 584.32. An alkaloid of *Aconitum septentrionale*, a Ranunculaceae, m.205. (2) $C_{32}H_{42}N_2O_9$ = 598.34. An alkaloid, m.223.

larch. The bark of *Larix Europaea* (*Pinus larix*), a Coniferae, used as astringent and diuretic; it contains larixine. **American-** or **black-** Tamarac. **European-** Larch. **l. agaric.** Agaric. **l. extract.** An extract obtained by leaching the bark of *Pinus larix;* it is rich in tannin and is used in the tanning industry.

lard. Adeps. The purified abdominal fat from the hog. A white, granular mass, insoluble in water, soluble in alcohol, ether or chloroform. Used in cooking and pharmaceutical preparations. **l. benzoinated.** Adeps benzoinatus. Lard containing 1 % of benzoin. Used as mild antiseptic and ointment base. **l. oil.** A colorless oil, chiefly triglycerides of oleic acid, pressed from lard, d.0.915, soluble in alcohol, ether or chloroform. Used as lubricant, and illuminant.

lardacein. A wax, d.0.6969, m.55, from the scale of *Ceroplastens rubens*, an insect living on tea and citrus trees.

lardine. A substitute for lard prepared by hydrogenating cottonseed oil.

large calorie. Great calorie. The amount of heat required to raise the temperature of 1 kg. water from 14.5°C. to 15.5°C. 1 large calorie (Cal.) equals 1000 small calories (cal.). See *calorie*.

Larix. A genus of Coniferae yielding timber, oils, and resin:

L. Americana	tamarac
L. cedrus	cedrus
L. Europaea	larch

larixine. $C_{10}H_{10}O_5$ = 210.1. Larixinic acid. A principle obtained from larch bark, *Larix europaea*, a Coniferae. Long, white lustrous crystals of empyreumatic odor and bitter astringent taste, m.153, soluble in water, alcohol or ether.

larkspur. Delphinium. A ranunculaceous plant. **l. seeds.** The dried seeds of *Delphinium* species, used as a fluid extract, as an antiparasitic and diuretic

Larmor, Sir Joseph. 1857–1942. A British physicist, noted for his work on the electrical structure of matter.

larodon. A registered trade-mark for 1-phenyl-2,-3-dimethyl-4-isopropyl pyrazolone, $C_{14}H_{18}N_2O$. Used as an analgesic.

larosan. A trade-mark for a calcium caseinate preparation, used as an addition to infants' milk.

larvicide. An agent that destroys larva, the first stage of development of insects after hatching.

latent. Not manifest or readily obtainable. Lying hidden. **l. energy, l. force.** Potential energy. **l. heat.** The amount of heat required to change the state of a body from solid to liquid at its melting point, or from liquid to gas at its boiling point. Likewise the quantity of heat liberated if a gas changes to a liquid, or a liquid to a solid, at its condensation or freezing point, respectively. **l. h. of fusion.** The number of gram-calories required to convert 1 gram of a substance from solid into liquid, without a change of temperature. **l. h. of vaporization.** The number of gram calories required to convert 1 gram of substance from liquid into vapor without a change of temperature. **l. image.** The invisible change produced on a photographic plate by exposure to light. It is made visible by exposure, and is due to the effect of light on AgBr, which is changed to excited molecules, Ag^*Br^* or Ag_2Br.

lateral chain. See *chain.*

laterite. A hydrated oxide of iron and aluminum, and sometimes titanium (cf. bauxite), which occurs as a brown surface earth.

latex. The milky juice of plants, or the exudation of trees, shrubs or vines obtained by tapping the trunk. **rubber-** A colloidal emulsion of 33 % rubber (q.v.), d.0.983, p_H 7.0–7.2.

lather. A foam or froth of soap and water.

lathering power. The relative amount of froth formation of soap solutions. Sodium oleate promotes, sodium palmitate retards the foam production.

lattice. See *space lattice.*

laucaniline. Paraleucoaniline.

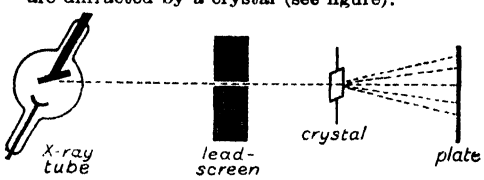
laudanidine. $C_{20}H_{25}NO_4$ = 343.3. Tritopine, *l*-laudanine. An alkaloid from opium. Hexagonal prisms, m.166.

laudanine. $C_{20}H_{25}O_4N$ = 343.3. An alkaloid from opium. dl- Small colorless prisms, m.166, insoluble in water, soluble in alcohol, ether or benzene; used as a strychnine substitute. l- Laudanidine.

laudanosine. $C_{21}H_{27}O_4N$ = 357.3. N-methyltetrahydro-papaverine. An alkaloid from opium. A yellow-white crystalline powder, m.89, insoluble in water, soluble in alcohol, ether, or benzene.

laudanum. Tincture of opium. A brown solution of opium in alcohol; used as a powerful anodyne.

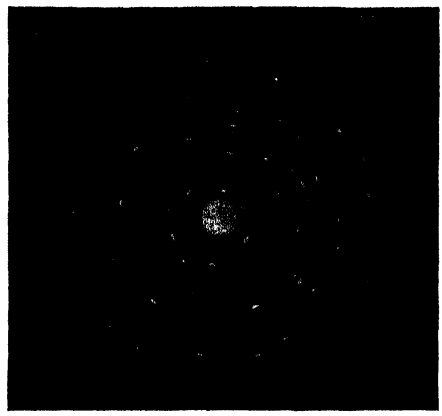
Laue, Max von. A German physicist, noted for research on subatomic phenomena. **L. diagram.** L. pattern. **L. method.** The diffraction of x-rays by means of a crystal. **L. pattern.** The photographic record produced when x-rays are diffracted by a crystal (see figure).



Laue method.

laughing gas. Nitrous oxide.

laumonite. The vitreous mineral $CaO,Al_2O_3,4SiO_2,2H_2O$ (cf. *lawsonite*).



Laue pattern.

Showing the high temperature (hexagonal) form of Al_2O_3, taken with the X-ray beam nearly normal to the (0001) planes (Huggins).

Lauraceae. Laurel family, a group of aromatic shrubs or trees, all parts of which yield an essential oil.

Cinnamomum camphora.....	camphor
	camphor oil
	camphor wood oil
Cinnamomum zeylanicum....	Ceylon cinnamon
	cinnamon oil
Cinnamomum cassia.....	cassia bark
	cassia oil
Sassafras variifolium.....	sassafras bark
	sassafras oil
	sassafras wood
Nectandra rodiaci.....	bebeeru bark
Nectandra puchuri.....	pichurim beans
Lindera benzoin.....	spice bush
Laurus nobilis.....	sweet bay
	laurel oil
Umbellularia californica.....	California laurel

lauraldehyde. Lauric aldehyde.

laurane. $C_{20}H_{42}$ = 282.32. An isomer of eicosane in laurel fat, m.69.

laurel. Laurus, sweet bay, bayberry, noble berry. The dried leaves and berries of *Laurus nobilis*, used for making laurel oil. **cherry-** See *prune.* **ground-** Arbutus. **mountain-** Kalmia. **New Zealand.** See *pukateine.*

l. berries oil. An essential oil from the fruits of l., soluble in alcohol, and containing pinene, cineol, eugenol and methylchavicol. **l. camphor.** Camphor. **l. fat.** Bay oil, l. oil. A soft, buttery fat, m.32–36, obtained by pressing l. leaves. It contains trilaurin, olein, laurane, etc. and is used in veterinary work. **l. leaves oil.** Bay leaves oil. A bright yellow essential oil distilled from laurel, d.0.924, insoluble in water, soluble in alcohol or ether. Used in medicine and in flavoring extracts. **l. oil.** (1) L. fat. (2) L. leaves oil. **l. tallow.** Undung. **l. wax.** (1) Myristin. (2) Bayberry wax.

laureline. $C_{17}H_{17}NO_3$ = 283.1. An apomorphine alkaloid from *Laurelia Novae Zealandicae*, a Monimiaceae. Cf. *pukateine, corytuberine.*

laurene. Pinene.

Laurent, Auguste. 1807–1853. A French organic chemist, discoverer of phthalic acid, aniline, caffeine, naphthalene and their derivatives. Noted for his theory of types and

radicals. **L. acid.** 1.5-Nitronaphthalene sulfonic acid.

lauric acid. $C_{12}H_{24}O_2$ = 200.3. Nonylacetic acid, dodecanoic acid*, 1-hendecanecarboxylic acid, $Me(CH_2)_{10}COOH$. A fatty acid derived from laurel and spermaceti. Colorless needles, d.0.864, m. 47, b.$_{100mm}$.225, insoluble in water, soluble in alcohol or ether. **hydroxy-** Sabinic acid.

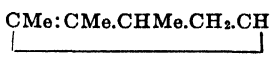
lauric aldehyde. $C_{12}H_{24}O$ = 184.3. Dodecanal*, lauraldehyde. The aldehyde of lauric acid. Colorless leaflets, m.44.5, b.$_{100mm}$185, insoluble in water, soluble in alcohol or ether.

laurin. $C_{39}H_{74}O_6$ = 638.57. Trilaurin. $C_3H_5(C_{12}H_{23}O_2)_3$, laurostearin, glyceryl laurate. A glyceride of lauric acid in the seeds of laurel, palms, coconuts; white needles, d.0.891, m.46.5; used to prepare medicinal soaps.

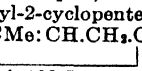
laurite. A native sulfide of ruthenium, RuS_2.

lauroleic acid. $C_{12}H_{22}O_2$ = 198.2. Dodecenoic acid*. An unsaturated acid, b.$_{2mm}$90, from the head oil of the sperm whale.

laurolene. C_8H_{14} = 110.11. 1.2.3.-trimethyl-1-cyclopentene. The hydrocarbon



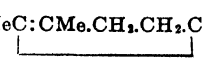
A colorless liquid, d.0.800, b.120.5. **iso-** 1.1.2-trimethyl-2-cyclopentene. The hydrocarbon,



A colorless liquid, d.0.791, b.108.5.

laurone. $C_{23}H_{46}O$ = 338.35. *12*-Tricosanone*. The ketone, $(C_{11}H_{23})_2CO$. Colorless crystals, d.0.789, m.69.

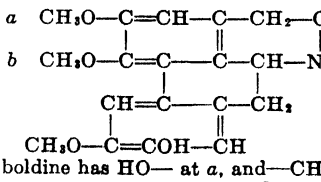
lauronolic acid. $C_9H_{14}O_2$ = 154.11. Laurolene-3-carboxylic acid.



A colorless liquid, d.1.016, m.6, b.$_{14mm}$135.

laurostearin. Laurin.

laurotetanine. $C_{19}H_{21}O_4N$ = 345.2. A strychnine-like alkaloid from the bark of *Litsea latifolia* a Lauraceae of southern Asia. Cf. *glaucine*.



boldine has HO— at *a*, and —CH_3 at *c*

actinodaphnine has CH_2  at *a*, *b*, and —CH_3 at *c*

lauroyl. See *lauryl* (2).

laurus. Laurel.

lauryl. (1) The monovalent radical $C_{12}H_{25}$—, derived from dodecane. (2) The group $Me(CH_2)_{10}CO$—, drived from lauric acid, more properly termed lauroyl. **l. alcohol.** $C_{12}H_{26}O$ = 186.20. *1*-Dodecanol*, *n*-dodecyl alcohol. $Me(CH_2)_{11}OH$. White leaflets, d.0.8309, m.-22.6, b.255, insoluble in water. **l. bromide.** $C_{12}H_{25}Br$ = 249.11. *1*-Bromododecane*, dodecyl bromide, $Me(CH_2)_{11}Br$. A colorless liquid, b.$_{45mm}$177. **l. chloride.** $C_{12}H_{25}Cl$ = 218.64. *1*-Chlorododecane*, dodecyl chloride, $Me(CH_2)_{11}Cl$. A colorless liquid, m.−17, b.$_{18mm}$145.

laurylene. (1) $C_{12}H_{24}$ = 168.2. An unsaturated hydrocarbon in mineral oils. (2) $C_{10}H_{16}$ = 136.12. A terpene from laurel oil.

lautal. A hard aluminum alloy containing 4–5 % Cu, 1.5–2 % Si and 0.4–0.7 % Fe.

Lauth's violet. Thionine.

lava. The molten and solidified magma ejected from volcanoes.

lavandula. Lavender.

lavender. The dried flowering tops of *Lavandula latifolia;* used as a tincture or fluid extract as a tonic, carminative and stimulant. **l. flower oil.** A colorless essential oil distilled from lavender flowers, d.0.885, insoluble in water, soluble in alcohol, ether, or benzene and used in perfumery. **l. spike oil.** An essential oil distilled from the herb *Lavandula officinalis.* A colorless liquid, d.0.905; insoluble in water, soluble in alcohol, ether, or chloroform. Used in liniments and pharmaceutical preparations.

Lavoisier, Antoine Laurent. 1743–1794. A French chemist, regarded as the founder of modern chemistry by virtue of his study of combustion and the role of oxygen. He formulated the theory of the conservation of matter, and laid the basis for chemical nomenclature. He was unjustly accused and executed during the French revolution.

Antoine Laurent Lavoisier.

(From Brownlee, Fuller and Hancock "Elementary Chemistry." Courtesy of Allyn & Bacon.)

law. A generalized statement of facts or principles. **empirical-** A l. which is the result of experience without theoretical considerations. **natural-** The formulation of systematized experience as to the workings of nature. Science concerns itself mainly with the effects caused by varying conditions, and therefrom deduces theories of the "modus operandi." **periodic-** (1) A l. which expresses a periodic variation. (2) See *periodic system.*

Law cell. An electric cell (1.37 volt) consisting of a zinc anode, and carbon cathode in a 15 % solution of ammonium chloride.

lawang oil. An oil from the bark of an East Indian plant, resembling mace oil.

lawsone. $C_{10}H_6O_3$ = 174.1. Hydroxynaphthoquinone. The coloring matter of henna leaves,

Lawsonia alba. Fine red needles, m.194, used as a hair dye; it is a constituent of henna, q.v.

lawsonite. A vitreous, colorless mineral, $CaO.Al_2O_3,2SiO_2.2H_2O$. Cf. *laumonite.*

laxative. A mild cathartic, such as petrolatum or milk of magnesia.

layer. A mass of uniform thickness covering an area. **molecular-** A film of single molecules alongside each other over the surface of a liquid or solid. Cf. *zone.*

lazulite. $(MgFeCa),(AlOH)_2P_2O_8$. A blue, vitreous mineral.

lb. An abbreviation for pound or pounds; *lbs.* is incorrect. **lb. ap.** An abbreviation for apothecary's pound. **lb. av.** An abbreviation for avoirdupois pound. **lb. t.** An abbreviation for troy pound.

leaching. The process of washing or extracting the soluble constituents from insoluble material; as of sodium nitrate from caliche, or the extraction of coloring matter or tanning materials from plant tissues.

lead. (1) Pb = 207.21. Plumbum. A metallic element, atomic number 82. A gray, soft, monoclinic or regular crystalline metal, d.11.34, m.327, b.1470, insoluble in water, soluble in nitric acid. Its principal ore is galena. Lead was known to the Romans under the name of plumbum nigrum. It is used for chemical apparatus and machinery (lining acid tanks, water pipes), in electrotechnics, as a solder, and in low melting point alloys. Lead forms three series of compounds, and has two valencies:

+2	+4	+4
plumbous	plumbic	plumbate
Pb^{++}	Pb^{++++}	PbO_3^{--}

ISOTOPIC COMPOSITION OF LEAD

	1.	*2.*	*3.*	*4.*
A.W.	207.17	206.02	207.85	206.08
I.W.	%	%	%	%
203	0.04			
204	1.50			
205	0.03			
206	27.75	93.3	4.6	89.9
207	20.20	6.7	1.3	7.9
208	49.55	0.02	94.1	2.3
209	0.85			
210	0.08			

1. Common lead of atomic weight 207.17.

2. Lead from Katanga pitchblende and Morogoro uranite, A.W. 206.02 (RaG is 206)

3. Lead from Norwegian thorite, A.W. 207.85 (ThD is 208)

4. Lead from Great Bear Lake pitchblende, A.W. 206.08 (AcD is 207)

Lead salts are all poisonous. Metallic lead consists of several isotopes of different atomic weights (see *isotopes, radioactive elements* and table). **actinium-** Actinium D. **antimonial-** See *antimonial.* **argentiferous.** (1) A lead ore, PbAgS. (2) An alloy of silver and lead obtained in the cupellation process. **black-** Graphite. **brown-** Vanadinite. **horn-** Phosgenite. **pyrophoric-** Lead in a finely-divided state, which oxidizes spontaneously with a glow on exposure to air. **radio-** The natural radioactive mixture of lead isotopes. **red-** L. tetroxide. **secondary-** Lead recovered from scrap. **thorium-** Thorium D. **white-** L. carbonate. **uranium-** Radium G. (2) A conduit or vein which is being followed; cf. l. wire.

l. accumulator. A reversible voltaic storage cell (2.2 volts) consisting of an anode of lead and a cathode of lead dioxide, suspended in sulfuric acid of d.1.1. **l. acetate.** $Pb(C_2H_3O_2)_2.3H_2O$ = 379.3. Lead sugar, sugar of lead, plumbous acetate. Colorless efflorescent crystals, d.2.50, m.75, b.280, soluble in water. Used as a reagent for chromic and molybdic acids, tannin, oxalic, and malic acids, detection of hydrogen sulfide, manufacture of lead salts, as a mordant in dyeing, in the tanning industry and in the preparation of white lead paints. **l. acetate, basic.** L. subacetate. **l. acetotartrate.** Colorless crystals, soluble in water; used as an astringent and antiseptic. **l. alkyles.** Organic compounds of tetravalent lead and alkyl-radicals; as

lead tetramethide: $PbMe_4$
lead tetraethide: $PbEt_4$
dilead triethide: $PbEt_3—PbEt_3$
lead triethylhydroxide: Et_3PbOH

Some are used as anti-knock compounds. **l. alloys.** Alloys containing lead; they usually have low melting points:

	Lead				
	90 %	80 %	70 %	60 %	50 %
with	10 %	20 %	30 %	40 %	50 %
Sn	295°C	276°C	262°C	240°C	220°C
Bi	290°C	.....	.....	179°C	145°C
Te	710°C	790°C	880°C	917°C	760°C
Sb	250°C	275°C	330°C	393°C	440°C
Cu	870°C	920°C	925°C	945°C	950°C
Ag	460°C	545°C	590°C	620°C	650°C
Na	360°C	420°C	400°C	370°C	330°C

Other important lead alloys are:
type metal: 82 % Pb, 15 % Sb, 3 % Sn.
solder: 67 % Pb, 33 % Sn.
carbox metal; 84 % Pb, 14 % Sb, 0.6 % Fe, 0.7 % Zn, 0.6 % Sn.
Cf. *pewter, linotype metal, solder.*

l. antimoniate. $Pb_3(SbO_4)_2$ = 993.1. Plumbous antimoniate, Naples yellow, plumbous stibnate, giallioline. An orange-yellow powder, insoluble in water; used as a pigment in oil paint, ceramic, crockery and glass industries. **l. arsenate.** $Pb_3(AsO_4)_2$ = 899.6. Plumbous arsenate. Colorless, very poisonous crystals, insoluble in water, soluble in nitric acid; used as an insecticide. **l. aryles.** An organic compound of tetravalent lead and an aryl radical, *e.g.*, lead tetraphenyl: $PbPh_4$. **l. azoimide.** L. nitride. **l. benzoate.** $Pb(C_7H_5O_2)_2$ = 449.3. Plumbous benzoate. Colorless crystals, slightly soluble in water. **l. bichromate.** $PbCr_2O_7$ = 423.2. Plumbous bichromate. A brick-red powder, insoluble in water; used as pigment. **l. bioxide.** L. peroxide. **l. bitannate.** L. tannate. **l. black.** Graphite. **l. borate.** $Pb(BO_2)_2.H_2O$ = 311.2. Plumbous borate, lead drier. A white powder, d.5.59, insoluble in

water, soluble in nitric acid; used as a drier in paints and pigments. l. **borosilicate.** A mixture of the borate and silicate of lead; a constituent of optical glass. l. **bromate.** $Pb(BrO_3)_2$ = 463.2. Plumbous bromate. Colorless crystals, slightly soluble in hot water. l. **bromide.** $PbBr_2$ = 367.0. A colorless, rhombic crystalline powder, d.6.57, m.380, decomp. 448, insoluble in water or alcohol. l. **butyrate.** $Pb(C_4H_7O_2)_2$ = 381.2. Plumbous butyrate. Colorless scales, m.90, insoluble in water. l. **carbolate.** L. phenate. l. **carbonate.** $PbCO_3$ = 267.2. Plumbous carbonate. A white powder, d.6.47, decomp. on heating, insoluble in water; used as a pigment. Native as cerrusite. Cf. *Dutch process.* l. **carbonate, basic.** $2PbCO_3.Pb(OH)_2$ = 775.6. Plumbous subcarbonate, basic l. carbonate, white lead, ceruse, cerussa, lead flakes. A white, heavy powder, decomp. on heating, insoluble in water. Used as a pigment and in putty; medicinally, as constituent of ointments for burns and inflamed surfaces. l. **chamber.** See *sulfuric acid manufacture.* l. **chlorate.** $Pb(ClO_3)_2$ = 374.1. Plumbous chlorate, d.4.037. White monoclinic crystals, soluble in water, decomp. 230. Cf. *Thiel*-Stoll solution. l. **chloride.** $PbCl_2$ = 278.1. Plumbous chloride. Colorless rhombic crystals, d.5.80, m.501, b.861, insoluble in water; used as a reagent for silver, alkaloids and carbonates, and mixed with lead oxides, as pigment. l. **chromate.** $PbCrO_5$ = 323.2. Plumbous chromate, Leipzig yellow, Paris yellow, "chrome" yellow. Fusible, yellow monoclinic crystals, d.6.123, insoluble in water; used as a reagent in organic analysis, as a pigment, and in the textile industry. l. **chromate basic.** $PbCrO_4.PbO$ = 546.4. Plumbous subchromate, basic l. chromate. Red crystals, insoluble in water, used as a pigment. l. **citrate.** $Pb_3(C_6H_6O_7)_2$ = 1001.76. Plumbous citrate. A colorless crystalline powder, soluble in water. l. **cyanate.** $Pb(CNO)_2$ = 291.24. Plumbous cyanate. A colorless crystalline powder, insoluble in water, decomp. on heating. l. **cyanide.** $Pb(CN)_2$ = 259.2. Plumbous cyanide. A colorless crystalline powder, insoluble in water, soluble in potassium cyanide solution; used as an insecticide and in metallurgy. l. **dichromate.** L. bichromate. l. **dioxide.** L. peroxide. l. **dish.** A container made of metallic lead, used for corrosive liquids and hydrofluoric acid; as, in glass etching. l. **dithiofuroate.** $(C_4H_3O.CS_2)_2Pb$. Furac III. A red powder, used as accelerator in vulcanization. l. **drier.** L. borate. l. **dust.** Finely powdered metallic lead. l. **ethylsulfate.** $Pb(C_2H_5SO_4)_2.H_2O$ = 475.46. A colorless liquid, soluble in water, used in organic synthesis. l. **ferrocyanide.** $Pb_2Fe(CN)_6$ = 626.5. Plumbous ferrocyanide. A yellowish powder, insoluble in water. l. **flake.** L. carbonate basic. l. **fluoride.** PbF_2 = 245.2. Plumbous fluoride d.8.241. A fusible white powder, insoluble in water. l. **fluosilicate.** $PbSiF_6$ = 349.28. L. silicofluoride. *dihydrate* .$2H_2O$. White monoclinic prisms, soluble in water. *tetrahydrate* .$4H_2O$. Monoclinic crystals, soluble in water. l. **flux.** A reducing and desulfurizing agent used in the assay of gold and silver, and consisting of: 16 pts. $NaHCO_3$, 16 pts. K_2CO_3, 8 pts. flour, 4 pts. borax glass. l. **formate.** $Pb(CHO_2)_2$ = 297.2. Plumbous formate. Lustrous rhombic needles, d.4.63, decomp. 190, soluble in water: used as a reagent. l. **hydrate.** See *l. hydroxide.* l. **hydroxide** (1) $Pb(OH)_2$ = 241.2. Plumbous hydroxide, l. hydrate. A white powder, d.7.59, m.145 (decomp.), slightly soluble in water, soluble in acids or alkalis. (2) $3PbO, H_2O$ = 687.6. White cubic crystals. l. **hypophosphite.** $Pb(H_2PO_2)_2$ = 337.2. A hygroscopic, white powder, soluble in water. l. **hyposulfate.** PbS_2O_6 = 367.2. Plumbous hyposulfate. Colorless crystals, soluble in water. l. **hyposulfite.** PbS_2O_3 = 319.2. Plumbous hyposulfite, plumbous thiosulfate, l. thiosulfate. White crystals, which darken with age due to the formation of PbS, insoluble in water, soluble in alkali thiosulfate solutions; used in inorganic synthesis. l. **iodate.** $Pb(IO_3)_2$ = 557.0. Plumbous iodate. A colorless crystalline powder, insoluble in water. l. **iodide.** PbI_2 = 461.0. Plumbous iodide, plumbi iodidium. Yellow, hexagonal crystals, d.6.16, m.375, b.861, insoluble in water, soluble in hydroxides or iodide solutions. Used in medicine as an astringent and resolvent; and technically, for bronzes, mosaic gold, printing and photography. l. **isotopes.** See *radioactive elements.* l. **lactate.** $Pb(C_3H_5O_3)_2$ = 385.2. Plumbous lactate. A white powder, soluble in water. l. **laurate.** $(C_{12}H_{23}O_2)_2Pb$ = 605.58. White powder, m.104.7, insoluble in water. l. **linoleate.** $Pb(C_{18}H_{31}O_2)_2$ = 765.7. Plumbous linoleate. A yellowish paste, insoluble in water, used in ointments and varnishes. l. **malate.** $Pb(C_4H_4O_5).3H_2O$ = 393.3. Plumbous malate. A white powder, slightly soluble in water. l. **minerals.**

galena	PbS
clausthalite	PbSe
altaite	PbTe
massicot	PbO
minium	Pb_3O_4
plattnerite	PbO_2
cerussite	$PbCO_3$
phosgenite	$Pb_2Cl_2CO_3$
cotunnite	$PbCl_2$
anglesite	$PbSO_4$
crocoite	$PbCrO_4$
wulfenite	$PbMoO_4$
stolzite	$PbWO_4$

Cf. *brongniardite, carminite, caryinite, lanarkite, plagionite, zinkenite.*

l. **molybdate.** $PbMoO_4$ = 367.2. Plumbous molybdate. A yellow powder, insoluble in water, soluble in hot nitric acid; used as a reagent in analysis. l. **monosulfide.** L. sulfide. l. **monoxide.** L. oxide (yellow). See also *massicot.* l. **myristate.** $(C_{14}H_{27}O_2)_2Pb$ = 661.64. White powder, m.108.6, insoluble in water. l. **naphthalene sulfonate.** $Pb(C_{10}H_7SO_3)_2$ = 621.45. White crystals, insoluble in water, soluble in alcohol. l. **nitrate.** $Pb(NO_3)_2$ = 331.2. Plumbous nitrate. Colorless octahedral crystals, d.4.531, decomp. 223, soluble in water or alcohol. Used as a reagent, as an astringent, deodorant and detergent in medicine; technically, in the manufacture of lead salts, as a mordant in the dye and textile industries, as oxidizing agent in organic synthesis, in the manufacture of matches, as a sensitizer in photography and in the manufacture of pyrotechnic toys. l. **nitride.** PbN_6 = 291.27. L. azoimide. Colorless crystals, exploding at 350. l. **nitrite.** $Pb(NO_2)_2$ = 299.2. Plumbous nitrite. Yellowish crystals, soluble in acids.

l. oleate. $Pb(C_{18}H_{33}O_2)_2$ = 769.8. Plumbous oleate. White fatty granules, insoluble in water, soluble in alcohol or ether; used in medicine for ointments, and in commerce for varnishes. **l. oxalate.** PbC_2O_4 = 295.2. Plumbous oxalate. A white, crystalline powder, d.5.03, decomp. 300, insoluble in water. **l. oxide.** (1) *L. suboxide*, Pb_2O = 430.4. A black, amorphous powder, d.8.34, insoluble in water, decomp. if heated. (2) *Yellow monoxide*, PbO = 223.2. Plumbous oxide, litharge, massicot, lead protoxide. A yellowish rhombic crystalline powder, d.9.37, m.888, insoluble in water, soluble in acids or alkalis. Used as reagent, in ointments, in manufacture of glass and pottery, for acid-resisting cements and putty, as pigment, and as filler in the rubber industry. (3) *Red monoxide*, PbO = 223.2, plumbous oxide. A hexagonal red crystalline modification of the yellow lead monoxide. d.8.74, insoluble in water. (4) *L. sesquioxide*, Pb_2O_3 = 462.4. L. trioxide, plumbous plumbite, l. metaplumbate, $PbO.PbO_2$. An amorphous reddish-yellow powder, used as a pigment. It is probably lead meta-plumbate, PbO, PbO_2, since it is decomposed by acids into these oxides. (5) *L. oxide red*, Pb_3O_4 = 685.6. Plumbous plumbate, l. orthoplumbate, Pb_2PbO_4, red lead oxide, minium, sandix, lead orthoplumbate, lead tetroxide, plumbous-plumbic oxide, ($2PbO.PbO_2$). A heavy, orange-red powder, d.9.07 decomp. 500, insoluble in water, soluble in nitric acid. Used as a reagent, for ointments, for cements, in ceramics, and as a pigment. It is probably lead orthoplumbate, $2PbO,PbO_2$. (6) *L. peroxide*, PbO_2 = 239.2. Plumbous peroxide, lead dioxide, brown lead oxide, lead superoxide. A brown, hexagonal crystalline powder, d.8.91, decomp. on heating, insoluble in water, soluble in acetic acid. Used as an oxidizing agent in organic synthesis. It has both basic and acidic properties, and forms salts (PbX_4) and plumbates (X_2PbO_3). **l. oxychloride.** (1) $PbCl_2.PbO$ = 501.3. Plumbous oxychloride. White, tetragonal crystals, d.7.21, insoluble in water, soluble in alkalis, decomp. 541. (2) $PbCl_2.2PbO$ = 724.5. A brown solid, d.7.08, m.693. **l. palmitate.** $(C_{16}H_{31}O_2)_2Pb$ = 717.70. White powder, m.112.3, insoluble in water. **l. pentasulfide.** See *l. sulfide*. **l. pernitrate.** Colorless hygroscopic crystals, soluble in water. **l. peroxide.** L. oxide (6). **l. phenate.** Pb(OH)OPh = 317.2. Plumbous phenate, l. phenolate, lead carbolate. A yellowish or grayish-white powder, insoluble in water, soluble in nitric acid; used in medicinal ointments. **l. phenolate.** L. phenate. **l. phenolsulfonate.** $Pb(C_6H_4(OH)SO_3)_2.5H_2O$ = 643.52. White lustrous needles, soluble in water or alcohol, used as an astringent or antiseptic. **l. phosphate.** (1) $Pb_3(PO_4)_2$ = 811.7. Plumbous phosphate. Lead orthophosphate. A white powder, d.6.9, insoluble in water, soluble in nitric acid. (2) $Pb(PO_3)_2$ = 365.27. Lead metaphosphate. White crystals. (3) $Pb_2P_2O_7$. Lead pyrophosphate (q.v.). (4) $PbHPO_4$ = 303.26. Lead acid phosphate. White crystals. **l. phosphite.** $PbHPO_3$ = 287.2. Plumbous phosphite. A white powder, decomp. on heating, insoluble in water, soluble in nitric acid. **l. plaster.** A medicinal plaster containing chiefly lead linoleate and glycerol. Often used as a standard solution for the determination of the hardness of water by the soap method. **l. plumbate.** *ortho-* L. oxide (5). *meta-* L. oxide (4). **l. poisoning.** Plumbism, saturnism. A form of anemia, and colic produced as a result of frequent contact with lead. **l. propionate.** $Pb(C_3H_5O_2)_2$ = 353.2. Plumbous propionate. A colorless, crystalline powder soluble in water. **l. protoxide.** L. oxide (1). **l. pyrophosphate.** $Pb_2P_2O_7.H_2O$ = 606.5. Plumbous pyrophosphate. A colorless, rhombic, crystalline powder, decomp. on heating; insoluble in water, soluble in alkalis or nitric acid. **l. resinate.** $Pb(C_{20}H_{29}O_2)_2$ = 809.2. Plumbous resinate. A yellowish paste, insoluble in water or alcohol, used as a paint drier. **l. rhodanate.** L. thiocyanate. **l. saccharate.** A compound of saccharose with l. oxide; a white powder, insoluble in water, used in medicine. **l. salicylate.** $Pb(C_7H_5O_3)_2.H_2O$ = 499.3. Plumbous salicylate. White crystals, soluble in water or alcohol. **l. selenate.** $PbSeO_4$ = 350.4. Plumbous selenate. A white powder, insoluble in water. **l. selenide.** PbSe = 286.18. A brown powder. *colloidal-* A suspension used in cancer therapy. **l. sesquioxide.** Pb_2O_3. Lead oxide (5). **l. silicate.** $PbSiO_3$ = 283.3. Plumbous silicate. A white crystalline powder, insoluble in water or alcohol; used in ceramics, in the manufacture of lead glass, in flukes, for porcelain and glass paints, for enamels, and for fireproofing fabrics. **l. silicofluoride.** $PbSiF_6.H_2O$ = 367.3. Plumbous silicofluoride. A colorless crystalline powder, soluble in water. **l. stearate.** $Pb(C_{18}H_{35}O_2)_2$ = 773.8. Plumbous stearate. A yellowish, granular, fatty powder, m.115.7, insoluble in water, soluble in alcohol; used as a paint drier and constituent of varnishes. **l. stibnate.** L. antimoniate. **l. subacetate.** $2Pb(C_2H_3O_2)_2.Pb(OH)_2$ = 891.77. Plumbous subacetate, basic acetate of lead, monobasic lead acetate. A white powder, soluble in water, used for preparing lead acetate solutions. **l. subacetate solution.** A clear, colorless liquid, containing 189.5 gm. per liter, d.1.24; used as a reagent and clarifier. Cf. *l. water, Goulard's extract.* **l. subcarbonate.** L. carbonate, basic. **l. suboxide.** L. oxide (1). **l. sugar.** L. acetate. **l. sulfate.** $PbSO_4$ = 303.3. Plumbous sulfate. A white rhombic crystalline powder, d.6.23, m.1170, insoluble in water, soluble in hot acids or ammonium acetate solution; used as a pigment, paint drier, and in accumulators. **l. sulfate acidic.** $Pb(HSO_4)_2.H_2O$ = 419.4. A crystalline solid, decomp. if heated. **l. sulfate basic.** $PbSO_4.PbO$ = 526.5. A white powder, insoluble in water, decomp. if heated. **l. sulfide.** (1) PbS = 239.3. Plumbous sulfide, galena, galenite. A regular, crystalline black powder, or silvery-gray crystals, d.7.48, m.1120, insoluble in water, soluble in nitric acid; used in ceramics and as a decolorizer. Decomp. if heated. (2) PbS_5 = 367.57. Lead pentasulfide. An unstable yellow powder. **l. sulfite.** $PbSO_3$ = 287.3. Plumbous sulfite. A granular white powder, insoluble in water, used as an antiseptic and astringent. **l. sulfocyanide.** L. thiocyanate. **l. superoxide.** L. oxide (6). **l. tannate.** A compound of tannin and lead. A brown powder, slightly soluble in water or alcohol; used as an astringent and antiseptic in dusting powders. **l. tartrate.** $PbC_4H_4O_6$ = 355.3. Plumbous tartrate. A white powder, insoluble in water.

l. tetrachloride. $PbCl_4$ = 349.0. Plumbic chloride. A yellow oily liquid, d_0.3.18, m. −15, decomp. by water and at 105; used in inorganic synthesis. **l. tetraethide, l. tetraethyl.** Tetraethyl *plumbane*. **l. thiocyanate.** $Pb(CNS)_2$ = 323.4. Plumbous sulfocyanide, l. rhodanate. A yellow monoclinic crystalline powder, d.3.82, slightly soluble in water, soluble in thiocyanate solutions. **l. thiosulfate.** PbS_2O_3 = 319.2. Plumbous thiosulfate, lead hyposulfite. A white amorphous powder, decomp. with age, insoluble in water, soluble in acids and thiosulfate solutions. Used in inorganic synthesis, and medicinally, as a dusting powder for rhus poisoning. **l. tree.** The branching crystalline growth of lead which is precipitated from its solution by more positive metals. **l. tungstate.** $PbWO_4$ = 455.2. Plumbous tungstate, l. wolframate, raspite, stolzite. A yellow powder, d.8.23 insoluble in water, soluble in acids; used as a pigment. **l. vanadate.** $Pb(VO_3)_2$ = 405.1. Plumbous vanadate. A yellow powder, insoluble in water; used as a pigment. **l. water.** A 1 % solution of lead subacetate. **l. white.** L. carbonate, basic. **l. wire.** (1) A wire made from l. (2) A chromel-alum or other alloy wire of a thermocouple of a pyrometer. **l. wolframate.** L. tungstate. **l. yellow.** L. chromate.

leadate. Trade name for dimethyl dithiocarbamate, a rubber accelerator.

leadhillite. A native basic sulfate of lead.

leaf. (1) See *leaves*. (2) A thin sheet or foil of metal; as, gold l., palladium l., used for lettering and ornamenting.

lean. Deficient. Cf. *fat*. **l. clay.** A clay of poor plasticity. **l. coal.** A low gas content coal. **l. ore.** A low grade ore; *i.e.*, with a small metal content.

leather. A tanned skin. **l. tankage.** A fertilizer made from l. scraps by digestion with steam, drying and grinding.

leatheroid. Vulcanized *fiber*.

leaves. The stem appendages of a plant, containing chlorophyll and possessing respiratory openings. The following dried leaves are official (U.S.P.):

Belladonna	Hyoscyamus
Buchu	Matico
Chestnut	Pilocarpus
Chimaphila	Rhus toxicodendron
Coca	Sage
Digitalis	Senna
Eriodictyon	Stramonium
Eucalyptus	Tobacco
Hamamelis	Uva-ursi

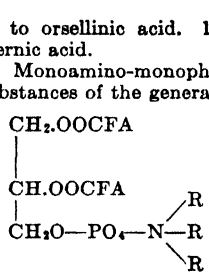
LeBel, Jules Achille. 1847–1930. An Alsatian capitalist who, using chemistry as a hobby, discovered the asymmetric carbon atom, (independently of van't Hoff) in 1874; in 1891 he prepared the first optically-active compound of asymmetric nitrogen.

LeBlanc, Nicolas. 1742–1806. A French chemist, and founder of the alkali industry. **L. soda process.** The manufacture of sodium carbonate by treatment of the salt-cake (Na_2SO_4) obtained from sulfuric acid and salt with carbon and limestone.

LeChatelier, Henry Louis. 1850–1936. A French chemist noted for the law of chemical equilibrium and work on metallurgical instruments.

lecanoric acid. $C_{16}H_{14}O_7$ = 318.1. Diorsellinic acid. Colorless crystals, decomp. on heating with water to orsellinic acid. **l. monomethyl ether.** Evernic acid.

lecithin. (1) Monoamino-monophosphatide. A group of substances of the general composition:



in which FA indicates a fatty acid, R an alkyl radical. They are the esters of oleic, stearic, palmitic or other fatty acids with glycerophosphoric acid and choline. Cf. *kephalin*. (2) $C_{42}H_{84}NPO_9$ = 777.93. A yellowish-brown waxy solid occurring in various animal and vegetable tissues and egg yolk; insoluble in water, soluble in alcohol, ether or chloroform, decomp. by heat. Used as a tonic and nutrient.

lecithoprotein. A compound of lecithin and protein in man and animals. Cf. *conjugate proteins*.

Leclanché cell. A voltaic cell consisting of an anode of amalgamated zinc, and a cathode of carbon suspended in a solution of ammonium chloride, with manganese dioxide as a depolarizing agent. It has an intermittent potential of about 1.46 volts.

leditannic acid. $C_{15}H_{20}O_8$ = 328.2. A tannin from *Ledum* species, Ericaceae.

ledixanthin. $C_{33}H_{34}O_{13}$ = 602.3. A yellowish-red coloring matter from *Ledum* species.

Leduc effect. Thermomagnetic difference of temperature, or the effect of a magnetic field on the distribution of heat. The effect is considered positive when the upper edge of a metal plate placed transversely between two magnetic poles has the higher temperature, the heat current flowing from left to right.

ledum camphor. A stearoptene from *Ledum palustre*, wild rosemary, an Ericaceae. Cf. *Labrador tea*.

lees. The sediment which accumulates in fermented liquids (*e.g.*, wine) on standing; mainly albuminoid in character.

Leeuwenhoek, Anton van. 1632–1723. A lens maker of Delft, Holland, who discovered bacteria by means of a crudely-constructed microscope in 1675.

Lefébre, Nicolas. 1620–1674. A French apothecary, noted for his textbook of chemistry, 1660.

legume. The pod of a leguminous plant.

legumelin. An albumin from peas and beans.

legumin. A globulin from leguminous plants. Cf. *avenin*.

Leguminosae. Pulse family; a group of herbs, shrubs or trees whose seeds are used as food (q.v.), and from which many important commodities and drugs are obtained:

roots:

Glycyrrhiza glabra...	Spanish licorice
Abrus precatorius....	Indian licorice
Baptisia tinctoria....	wild indigo
Derris elliptica.....	cube
Derris Lour.....	deguela
Ononis spinosa.....	ononin

barks:

Erythrophloeum guineense	sassy bark, muavin
Acacia mimosa.....	mimosa bark
Andira inermis.....	jamaiciin
Robinia pseudacacia.	robin

Cercis canadensis.... redbud bark
Saraca indica..... saraca bark
Piscidia erythrina.... Jamaica dogwood
woods:
Caesalpinia sappan.. sappan
Haematoxylon campechianum logwood
Pterocarpus santalinus red sandalwood
leaves:
Cassia acutifolia..... senna
Cassia marilandica.. American senna
Theophrosia virginiana theophrosia
herbs:
Medicago sativa..... alfalfa
Melilotus officinalis.. sweet clover, melilot
Melilotus coeruleus... melan
Lonchocarpus species. nicoline
Trifolium pratense... red clover, trifolium
Trifolium repens..... white clover
Stylosanthes elatior... pencil flower
Galega officinalis..... goats rue, galega
Cytisus scoparius.... broom, scoparius
fruits:
Cassia fistula..... purging cassia
Ceratonia siliqua..... St. John's bread
Tamarindus indica.. tamarind
Dipteryx odorata..... tonka bean
seeds:
Abrus precatorius.... prayer beads, jequirity
Arachis hypogoea.... peanut
Coronilla scorpioides. coronillin
Erythrina species.... erythrine
Ormosia dasycarpa... ormosine
Sophora species..... sophora
Trigonella foenum graecum fenugreek
Ulex Europaeus..... ulexine
Physostigma venenosum calabar beans
plant products:
Acacia catechu..... catechu
Acacia senegal..... gum arabic
Astragalus gummifer. tragacanth
Andira araroba..... goa powder
Albizzia anthelmintica musennin
Pterocarpus marsupium kino
Copaifera langsdorffii. copaiba balsam
Pongamia glabra..... kurung oil
Soja hispida..... soybean
Toluifera pereirae.... Peru balsam
Toluifera balsamum.. tolu balsam

Cf. *brazilwood, calliandrein, camwood, indican, lupine, Mackay bean, robinin, syringin.*

Lehman cardiograph. A specially constructed sphygmomanometer, or device for recording heart beats.

lehrbachite. A mercury ore, HgPbSe.

Leibnitz, Gottfried Wilhelm Freiherr von. 1646–1716. A German mathematician and philosopher. Founder of the Berlin Academy of Science (1701).

Leipzig yellow. Lead chromate.

lemco. A commercial meat extract, used in the preparation of beef-broth media.

Lémery, Nicolas. 1645–1715. A French physician and chemist, noted for his chemical textbook and experimental work.

lemon. The ripe fruit of *Citrus limonum*, a Rutaceae, of which fruit, rind and juice are used. Cf. *lime.* **l. balm.** Melissa. **l. chrome.** Barium chromate. **l. grass.** See *lemongrass.* **l. juice.** Lime juice. **l. oil.** Oleum limonis, oil of lemon. A pale yellow essential oil of fragrant odor, expressed from fresh lemon peels, d.0.849–0.855, $[\alpha]_D$ + 57–65, insoluble in water, soluble in alcohol or ether. Used extensively in flavoring extracts, lemonades, etc. **l. peel.** Cortex limonis. The outer rind of fresh ripe fruits of *Citrus medica*, lemon, a Rutaceae. Used medicinally, as a tincture or fluid-extract, as a tonic; industrially, in flavoring essences for cooking and baking. **l. yellow.** (1) Lead chromate. (2) Barium chromate.

lemonbalm. Melissa.

lemongrass oil. Indian melissa oil. A colorless or slightly yellow essential oil distilled from *Cymbopogon* or *Andropogon citratus*, a grass of the East Indies; d.0.89, insoluble in water, soluble in alcohol or ether. Used in flavoring extracts, for cooking and confectionery, and in perfumery. It contains citral, geranial and methyl heptenone. Cf. *citronella oil, melissa oil.*

Lenard, Phillipp. 1862– . A German physicist. **L. rays.** Cathode rays penetrate thin sheets of metal (aluminum or gold), and give rise to long blue streamers, called Lenard rays after their discoverer.

length. The shortest distance between two points. Length is measured in the C.G.S. system by the meter (q.v.), which was supposed to be the $\frac{1}{10{,}000{,}000}$ part of the distance from the equator to the pole. Some magnitudes are:

Einstein universe	2,000,000,000 light yrs.	1.9×10^{25} m.
Farthest spiral nebula	140,000,000 " "	1.3×10^{24} "
Galaxy to galaxy	1,800,000 " "	1.7×10^{22} "
Andromeda nebula	900,000 " "	8.5×10^{21} "
Milky Way diameter	50,000 " "	4.7×10^{20} "
Sirius from sun	8.9 " "	8.4×10^{16} "
1 parsec. = 3.08 × 10^{13} km.		**3.1×10^{16}** "
1 light year = 9,462,700,000,000 km.		**9.5×10^{15}** "
Solar system diameter	10,000,000,000 km.	1×10^{13} "
Neptune from sun	4,400,000,000 km.	4.4×10^{12} "
Earth from sun	149,000,000 km.	1.5×10^{11} "
Sun radius	692,000 km.	6.9×10^{8} "
Moon from earth	384,000 km.	3.8×10^{8} "
Jupiter radius	72,000 km.	7.2×10^{7} "
Earth equator	40,070 km.	4×10^{7} "
Earth radius	6,377 km.	6.4×10^{6} "
N.Y. to San Francisco (highway)	5,230 km.	5.2×10^{6} "
" " " (air-line)	4,451 km.	4.4×10^{6} "
Moon radius	1,740 km.	1.7×10^{6} "
1 kilometer = 1000 m. = 1,000,000 mm.		**10^{3}** "
Denver above sea-level	1,638 m.	1.6×10^{3} "
Steamer Queen Mary, length	310 m.	3.1×10^{2} "
Lowest sound wave	16 m.	1.6×10^{1} "
Man, average height	172 cm.	1.72 "
1 meter = 1000 mm. = 1,000,000μ = 10^{-3} km.		**1**
Longest sound wave	17 mm.	1.7×10^{-2} "
1 millimeter = 1000μ = 1,000,000 mμ = 10^{-6} km.		**10^{-3}** "
Smallest visible particle	50 μ....	5×10^{-5} "
Cells of Drosophillum	7–25 μ....	2.5×10^{-5} "
Nucleus of Drosophillum	5–15 μ....	1.5×10^{-5} "

Chromosomes of Drosophillum	0.2–3 μ....	3 × 10^{-6} "
Coccus bacteria	2 μ....	2 × 10^{-6} "
1 micron (μ) = 1000 mμ = 1,000,000 μμ...		10^{-6} "
Red blood corpuscle	800 mμ..	8 × 10^{-7} "
Red light wave	770 mμ..	7.7 × 10^{-7} "
Smallest microscopic particle	300 mμ..	3 × 10^{-7} "
Average path of hydrogen	170 mμ..	1.7 × 10^{-7} "
Large colloidal particle	100 mμ..	1 × 10^{-7} "
Shortest ultra-violet wave	13 mμ..	1.3 × 10^{-8} "
Thickness of oilfilm	5 mμ..	5 × 10^{-9} "
Ultramicroscopic particle	4 mμ..	4 × 10^{-9} "
Molecules	0.2 to 5 mμ..	5 × 10^{-9} "
Gas molecule, distance	1 mμ..	1 × 10^{-9} "
1 millimicron (mμ) = 1000 micromicrons (μμ) =		10^{-9} "
Sulfur atoms, distance	900 μμ...	9 × 10^{-10} "
Atoms	100–600 μμ...	6 × 10^{-10} "
Silver atoms, distance	400 μμ...	4 × 10^{-10} "
Soft x-ray wave	136 μμ...	1.4 × 10^{-10} "
1 Ångström = 100 μμ = 1000 milliångström (må.) =		10^{-10} "
Electron orbit in hydrogen	53 μμ...	5.3 × 10^{-11} "
Hard x-ray wave	19 μμ...	1.9 × 10^{-11} "
1 micromicron (μμ) = 10 x-units (λ) or må. =		10^{-12} "
Shortest gamma ray	2 μμ...	2 × 10^{-12} "
Longest cosmic ray	0.6 μμ...	6 × 10^{-13} "
Shortest cosmic ray	0.04 μμ...	4 × 10^{-14} "
Electron diameter	0.038 μμ...	3.8 × 10^{-15} "
Nucleus of gold atom	0.0004 μμ...	4 × 10^{-17} "
Nucleus of hydrogen atom	0.00002 μμ...	2 × 10^{-18} "

The smallest accurate determination of length is 0.000,03 mm. (Fizeau's interference method). The largest accurate measurement of length (for the purpose of determining the velocity of light) is the distance between Mt. Wilson and Mt. San Antonio, Calif. = 35,426.3 meters.

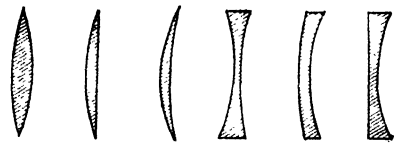
lenigallol. Pyrogallol triacetate.

lenirobin. Chrysarobin tetracetate. A yellowish powder, used medicinally for skin diseases.

lens. A piece of glass or other transparent material, with one or both faces curved, which converges, or diffuses light. The principal focus F of a lens is related to the radii of curvature of the surfaces r_1 and r_2 and the index of refraction n by the equation:

$$\frac{1}{F} = (n-1)\left(\frac{1}{r_1}+\frac{1}{r_2}\right) = \frac{1}{f_1}+\frac{1}{f_2}$$

where f_1 and f_2 are conjugate focal distances, or the distances of the object and of the image. **achromatic-** A lens which has been corrected for chromatic aberration so as to bring different spectral rays to one focus. **aplanatic-** A system of lenses corrected for spherical aberration so as to bring rays into focus in the same plane. **apochromatic-** A system of lenses which correct for chromatic and spherical aberration by bringing three spectral rays to one focus. **biconcave-** A lens which has a concave surface on both sides:) (. **biconvex-** A lens which has a convex surface on each side: (). **bifocal-** A double lens, especially used in eyeglasses, each portion of which has its own different focus. **compound-** Two or more lenses combined in effect, one behind the other. **concave-** A lens in which the center is thinner than the periphery:) |. **convex-** A lens in which the center is thicker than the periphery: (|. **convex-concave-** A lens with both a concave and a convex surface:)). **electron-** See electron optics. **plano-concave-** A lens with both a plane and concave surface. **plano-convex-** A lens with both a plane and convex surface. **quartz-** A lens made of quartz, used in experiments with ultraviolet rays, to which glass is relatively opaque. **rocksalt-** A lens made of salt, which permits the passage of many ultraviolet rays to which glass and quartz are opaque.



Lenses.

1. Biconvex; 2. plano-convex; 3. concavo-convex or convergent meniscus; 4. biconcave; 5. convexo-concave or divergent meniscus; 6. plano-concave.

lenticular. Having the shape of a lentil or lens.

lentine. $C_6H_4(NH_2)_2.2HCl$ = 181.0. m-diaminobenzene hydrochloride. A colorless crystalline powder, which turns pink with age. Used in organic synthesis, as a reagent for nitrites in water, and medicinally for diarrhea.

leometer. Dynamic *meter*.

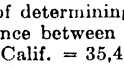
leonite. A Stassfurt salt, $MgSO_4.K_2SO_4.4H_2O$.

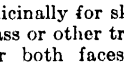
leontin. Caulosaponin.

leonurus. Motherwort.

lepargylic acid. Azelaic acid.

lepathinic acid. $C_{20}H_{18}O_{14}$ = 482.2. A crystalline principle from the roots of *Rumex* species, Polygoniaceae.

lepidene. $C_{28}H_{20}O$ = 372.2. Tetraphenylfurfurane,  O. Colorless crystals, m.175.

lepidine. $C_{10}H_9N$ = 143.2. γ-methyl-quinoline, cincholepidine,  . An alkaloid from cinchona bark. A colorless oily liquid, d.1.086, b.266, slightly soluble in water, soluble in alcohol or ether; used in organic synthesis. **aminophenyl-** Flavaniline. **oxy-** Dibenzoyl*stilbene*.

lepidolite. $(Li,Na,K)_2Al_2(SiO_3)_3(F,OH)_2$. Lithium mica. A slightly colored, lithium-bearing variety of mica (aluminum silicate).

lepidone. $C_{10}H_9ON$ = 159.1. Hydroxylepidine, γ-methyl-α-oxyquinoline, γ-methylcarbostyril. Colorless crystals, m.223, b_{17mm}.270, slightly soluble in water, alcohol or ether.

lepinine. 4-Methyl quinine.

leprotin. $C_{40}H_{54}$ = 534.4. A carotenoid red pigment isolated from chromo mycobacteria, m.198–200. It is a provitamin A.

leptandra. Culver's root. The dried rhizomes and roots of *Veronica* (*Leptandra*) *virginica*, a Scrophylariaceae, used as a fluid extract, as a cathartic and tonic.

leptandrin. A yellow crystalline glucoside from the roots of *Veronica* (*Leptandra*) *virginica;* used as an alterative and purgative.

leptandroid. An extract containing the combined principles of *Leptandra;* used as a tonic laxative, and alterative stimulant.

leptometer. A device for comparing the viscosity of two liquids simultaneously and under equal conditions.

leptynol. Palladous hydroxide suspended in water; used medicinally.

lerp. A kind of manna found on the Australian shrub, mallee, or *Eucalyptus dumosa*.

Lessing ring. Contact ring. A ¼" metal tube, split and bent, used as packing material in gas absorption towers or fractionating columns.

lethal. Fatal or deadly. **l. dose.** The quantity of a substance which causes death. **l. gas.** Hydrocyanic acid.

letterpress. Printing by direct impression from inked type.

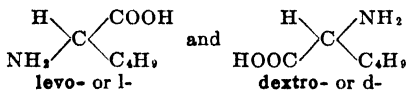
leucacene. $C_{64}H_{32}$ = 680.2. A pyrolytic product of acenaphthene containing 12 hexa-atomic and four penta-atomic rings. Silky crystals, m.250, insoluble in water.

leucaniline. $C_{19}H_{19}N_3$ = 289.3. Triaminotriphenylmethane, methenyltrianiline, $CH(C_6H_5NH_2)_3$. According to the position of the amino group there are: **p₃**-leucaniline, in which all three amino groups are in para position to the methyl carbon; **o,p₂-**, in which one is in ortho position and two are in the para position; **m,p₂-** or pseudo-, in which one is in the meta, and two are in the para position. **para-** Colorless leaflets, m.148, insoluble in water, soluble in alcohol or ether; used in organic synthesis. Cf. *leucoaniline*. **tetramethyl-** See *tetramethyl*.

leucaurine. $C_{19}H_{16}O_3$ = 292.2. Trihydroxytriphenylmethane, triphenylolmethane, **p₃**-trioxytriphenylmethane, $CH(C_6H_4OH)_3$, derived from aurine. **o-methyl-** Leucorosolic acid.

leucic acid. Leucinic acid.

leucine. $C_2H_{13}O_2N$ = 131.1. Aminoisocaproic acid, *α*-aminocaproic acid. An aminoacid and constituent of many proteins (27 % in zein). Colorless leaflets, d.1.293, decomp. 283, slightly soluble in water, alcohol or ether; used in organic synthesis. Two optically-active isomers:

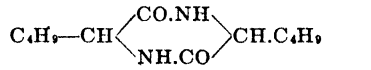


levo- or l- **dextro-** or d-

Cf. *leucyl*. **iso-** See *isoleucine*. **nor-** See *norleucine*.

leucinic acid. $C_6H_{12}O_3$ = 132.13. *2*-Hydroxy-*4*-methyl-pentanoic acid*, *α*-hydroxyisocaproic acid, $C_5H_{10}(OH)COOH$, soluble in alcohol, ether or water, m.77 (racemic), 82 (active).

leucinimide. $C_{12}H_{22}O_2N_2$ = 226.2. The imide of leucyl-leucine; or anhydride of *3.6*-di-isobutyl-*2.5*-diacipiperazine. A dipeptide formed by reaction of the amino and carboxyl groups of two leucine molecules:



Leucippos of Elea. A contemporary of Zeno, Empedocles and Anaxagoras (about 450 B.C.); the founder of the Ancient Greek atomistic theory, later developed by Democritos.

leucite. $K_2O,Al_2O_3,4SiO_2$. A vitreous, white or gray crystalline mineral in lava. Cf. *lucite*.

leuco- A prefix meaning white, and indicating in names of compounds the presence of a triphenylmethane group.

leuco bases. Leuko bases. A group of colorless derivatives of triphenylmethane produced by the reduction of dyes, which on oxidation, are reconverted into the dye.

leucoaniline. $C_{20}H_{21}N_3$ = 303.4. Triaminodiphenyltolylmethane, **triaminotriphenylmethane.** $(NH_2C_6H_4)_2.CH.C_6H_3(NH_2)Me$. Colorless crystals, m.100, insoluble in water, soluble in alcohol or ether; used in organic synthesis. Cf. *leucaniline*. **para-** See *para-*.

leucocyte. Leukocyte, white blood corpuscle. A colorless, ameba-like cell-mass wandering through the tissues. **l. extract.** An extract of leucocytes obtained from exudates produced in the pleural cavities of rabbits or other animals by the injection of an irritant. Cf. *aleuronate*.

leucocytosis. The dissolution of leucocytes.

leucodendron. Kienabossie, langbeen. The plant *L. concinnum*, a Proteaceae of South Africa, used as malaria remedy.

leucodrin. $C_{15}H_{16}O_8$ = 324.12. Proteacin. A crystalline bitter principle, m.212, from leucodendron.

leucoglycodrin. $C_{27}H_{44}O_{10}$ = 528.32. An amorphous white glucoside from leucodendron.

leucoindigo. Indigo white.

leucoline. Quinoline.

leucomaines. A group of poisonous nitrogen compounds, formed in animal tissues by metabolic activities (Cf. *ptomaines*). They are generally compounds of the uric acid type, as adenine, guanine, xanthine, or of the creatinine type.

leucomalachite green. $C_{23}H_{26}N_2$ = 330.3. Didimethylaminophenyl-phenylmethane. $PhCH(C_6H_4NMe_2)_2$.**p₂**-tetramethyldiaminotriphenylmethane. Colorless crystals, m.93, insoluble in water, soluble in alcohol or ether, which give malachite green on oxidation.

leucone. $SiH(OH)_3$ = 80.09. Orthosilicoformic acid.

leuconic acid. C_5H_5 = 140.0. Pentaketocyclopentane. The pentatomic ring compound

Small colorless needles, produced by strong oxidation of croconic acid.

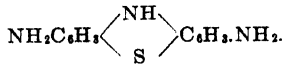
leucopyrites. The silvery mineral $FeAs_2$.

leucorosolic acid. $C_{20}H_{19}O_3$ = 307.2. o-methylleucaurine, **p₃**-trioxy-o-methyl-triphenylmethane. Colorless crystals derived from rosolic acid, used in organic synthesis.

leucoscope. (1) An optical pyrometer for determination of the temperature of an object. The light is separated by polarization into two complementary parts. (2) A photometer for the study of colored rays of light.

leucosin. An albumin from wheat, rye and barley embryos.

leucothionine. $C_{12}H_{11}N_3S$ = 229.1. Diamidothiodiphenylamine.



Cf. *thionine*.

leucotrope. Phenyldimethyl benzylammonium chloride.

leucyl. (1) The bivalent group —NH.CH(C₄H₉).CO— derived from the aminoacid leucine. (2) The monovalent group $NH_2.C_5H_{10}CO$—. **l. leucine.** The dipedtide: $NH_2.CH(C_4H_9).CO$—NH.CH(C₄H₉).COOH.

leuko- Leuco-.

leukomaines. Leucomaines.

leukonic acid. Leuconic acid.

leukonin. A commercial name for sodium antimoniate, used in enamels.

leukotine. $C_{21}H_{20}O_6$ = 368.2. A crystalline substance found in paracoto bark.

leunaphos. A fertilizer consisting of diammonium phosphate and ammonium sulfate (20 % N; 15 % P_2O_5).

leunaphoska. A fertilizer consisting of diammonium phosphate, ammonium sulfate and potassium chloride (13 % N, 10 % P_2O_5, 13 % K_2O).

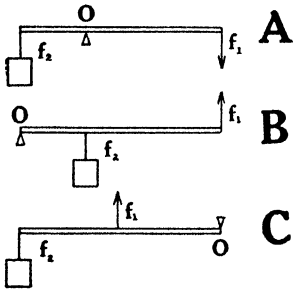
leuna saltpeter. A fertilizer from Leuna, Germany, consisting of 165 pts. ammonium sulfate and 100 pts. ammonium nitrate.

levan. A soluble polysaccharide found in the leaves of certain grasses and made up of repeating units of fructo-furanose.

Levant wormseed. Santonica.

leveler. A liquid which is added to a lacquer solvent to adjust volatility and/or viscosity.

levelling bulb. A glass vessel connected by rubber tubing to a burette, and used in gas analysis to level a liquid to the same height in both, so that the pressure in both containers is the same.



Levers.

O = *fulcrum*, f_1 = *power*, f_2 = *load*. A = *first order*, B = *second order*, C = *third order*.

lever. A mechanical device for increasing the speed or force of an agent source of power (see figure).

leverierite. $Al_2O_3.2SiO_2.nH_2O$. A pearly, light brown clay, resembling kaolin.

levigation. The reduction of a substance to a powder by grinding in water, followed by fractional sedimentation, in order to separate the coarser from the finer particles.

levo-, lævo- A prefix indicating that a substance rotates the plane of polarized light to the left (counter-clockwise); abbreviation: *l-* *e.g.*, *l*-leucine.

levogyric. Levorotatory.

Levol's alloy. An alloy of 71.9 % silver and 28.1 % copper.

levorotatory. Rotating the plane of polarized light from right to left (counter-clockwise). Cf. *polariscope, optical activity.*

levulic acid. Levulinic acid.

levulin. Synanthrose.

levulinamide. $C_5H_9O_2N$ = 115.1. $MeCOCH_2CH_2CONH_2$. Colorless crystals, m.107.

levulinic acid. $C_5H_8O_3$ = 116.1. Levulic acid. β-acetopropionic acid, γ-ketopentanoic acid, oxopentanoic acid*. The keto acid, $MeCOCH_2CH_2COOH$. Colorless leaflets, d.1.137, m.33, b.245, soluble in water, alcohol or ether. **dimethyl-** Mesitonic acid. **methyl-** Homolevulinic acid. **phenylhydrazine-** Antithermin.

l. **aldehyde** $C_5H_8O_2$ = 100.1. b-Acetopropionaldehyde. A colorless liquid, d.1.016, decomp. 187, soluble in water, alcohol, or ether.

l. **hydrazide.** $C_5H_{11}O_2N_2$ = 131.2. $MeCO.CH_2.CH_2.CO.NHNH_2$. Colorless crystals, m.82.

l. **oxime.** $C_5H_9O_2N$ = 115.1. $MeC:NH.CH_2.CH_2.COOH$. Colorless crystals, m.95.

levulosans. See *fructosans.*

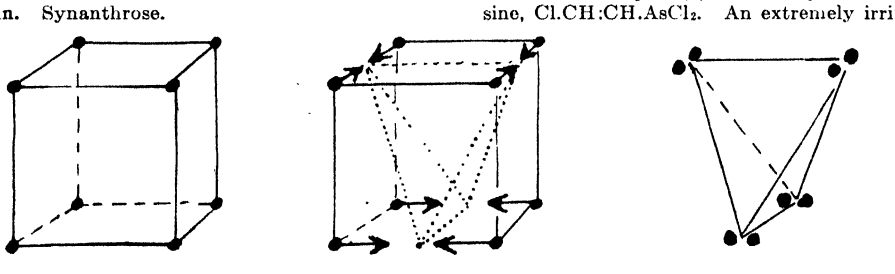
levulose. Fructose.

Lewis, Gilbert Newton. 1875– . An American chemist, noted for thermodynamic theories and their application to chemistry, and theories of atomic structure, valence, and photons. **L.-Adams formula.** An expression which relates the fundamental constants, *h*, *c*, and *e*. (Cf. *constants, Bohr's formula for Rydberg's constant*):

$$\frac{hc}{2\pi e^2} = 8\pi\left(\frac{8\pi^6}{15}\right)^{\frac{1}{4}}$$

The numerical values are 137.29 and 137.348. **L.'s atom.** The static concept of the atom, based upon the facts of crystallography and chemical combinations; as opposed to the dynamic Bohr atom, based upon ionized gases and spectroscopy. The electrons are thought to oscillate or vibrate around definite centers located at the corners of a cube (**cubical atom**) or in pairs at the corners of a tetrahedron (**tetrahedral atom**). See figure, and cf. *kernel, octet, valence.* **L. color theory.** Color is produced by the absorption of certain rays by those electrons of a molecule which vibrate with the same frequency. **L.-Langmuir theory.** The atom is built up of successive shells which hold 2, 8, 18, 32, 18 and 8 electrons as their maximum capacities. **L. symbols.** A method of illustrating bonds by indicating electrons with dots. One electron of each atom will pair with another electron of another atom to form a bond; thus $2H\cdot$ and $\cdot\ddot{O}\cdot$ give $H:\ddot{O}:H$. See also *octet, formula, bond, polar compounds.* **L. theory.** A chemical bond is *polar* when an electron passes from one atom to another; *non-polar* when two atoms share a pair of electrons equally.

lewisite. $C_2H_2AsCl_3$ = 207.28. *1*-Dichloroarsino-*2*-chloroethylene, β-chlorovinyl dichloroarsine, $Cl.CH:CH.AsCl_2$. An extremely irritant,



Lewis atom.

liquid, d.1.89, m. −5, b.190 (decomp.); used as vesicant poison gas.

ley. (1) The mixture of salt and glycerol formed during the saponification of crude fats by sodium hydroxide in soap manufacture. It contains 6–8% glycerol, 10–20% salts, less than 0.4% Na_2O (as carbonate), organic impurities and 0.2–0.3% fatty acids. (2) Describing a system of farming of crops in rotation, interspersed with ploughing. Cf. *lye.*

Leyden jar. See *jar.*

li. An abbreviation for link.

Li. The symbol for lithium.

liatris. Deers' tongue. The dried leaves of *Liatris odoratissima*, a Compositae, used for flavoring tobacco and in flavoring extracts.

Libavius, Andreas. 1540–1616. A German alchemical writer and pioneer in blowpipe analysis.

liberation. The act of setting free, as the formation of a gas from a compound.

lichen. Algae and fungi which live symbiotically, that is: two primitive plants, one with, the other without chlorophyll, which live together; *e.g.*, Iceland moss. They yield coloring matter (litmus, orchil, zearin), numerous acids (*e.g.*, orsellic acid), carbohydrates and depsides. **l. sugar.** Erythrite. **l. starch.** Lichenin. **l. stearic acid.** $C_{14}H_{14}O_3$ = 230.1. A crystalline dibasic acid derived from Iceland moss, m.120, insoluble in water.

lichenin. $(C_6H_{10}O_5)_n$ = (162.11)$_n$. [n = 80–160]. Lichen starch, moss starch. A β-gluco-pyranose carbohydrate derived from Iceland moss, *Cetraria islandicus*, which is digested by invertebrates only. A white gelatinous substance or a white powder, soluble in hot water, m.10.

lichenol. $C_9H_9O_4.C_2H_5$ = 210.1. The ethyl ester of evernesic acid from the oil of oak moss, *Evernia prunastri.* Cf. *sparassol.*

licorice. Glycyrrhiza. **Indian-** Abrus. **Spanish-** Glycyrrhiza. (U. S. usage, cf. *liquorice.*)

Lichtenberg figures. The pattern formed by an electric spark when passing through a thin layer of insulator; as, sulfur. They are recorded on a photographic film and the pattern indicates the nature of the current. Cf. *klydonograph.*

Lieben solution. A solution of iodine in potassium iodide.

Liebermann, Carl. 1842–1914. A German chemist noted for the synthesis of alizarin (with Gräbe). **L. reaction.** Nitroso reaction for phenols. A small fragment of sodium nitrite is dissolved in 5 cc. conc. H_2SO_4 and added to a crystal of phenol; a brown solution results, which changes to blue. The mixture poured into water gives a red solution, which changes to blue on the addition of alkali, owing to the formation of p-nitroso-phenol.

Liebig, Justus Freiherr von. 1803–1873. A German chemist, noted as the founder of agricultural chemistry and a popular teacher. **L. condenser.** A glass tube, surrounded by a wider tube in which water circulates; used as condenser in distillation apparatus. **L. extract.** A meat extract, manufactured in Argentine, used as a nutrient and in bacteriological work for making bouillon. **L. potash bulb.** A triangularly-bent glass tube with two or more bulbs filled with potassium hydroxide, used in organic analysis.

lien siccus. The dried and powderized spleen of cattle; used medicinally.

Liesegang rings. A periodic precipitation formed in gelatin by the gradual diffusion towards one another of two types of ions, which are previously added to different portions of the gelatin and which normally precipitate one another. Under these conditions the precipitate appears banded in distinct rings.

Justus von Liebig.

(From Moore's "History of Chemistry." McGraw-Hill Book Company, New York, N. Y.)

life. (1) The vital force, or the principle underlying the phenomena of organized beings. It depends on the *protoplasm*, which exercises the function of *metabolism, growth, reproduction, adaptation*, and *evolution*, q.v. (2) An inappropriate synonym for "time" or "time-period"; as: **damping l.** See *damping period.* **half l.** See *half-life* and *radioactivity.* **lingering l.** See *lingering period.* (3) Colloquially, but inappropriately, the period of usefulness of a device, machine, or other inanimate thing.

l. elements. The bioelements (q.v.) necessary for an organism. Their functions are classified as follows:

Group I.	Hydrogen and oxygen; *energy exchange elements.*
Group II.	Carbon, nitrogen, sulfur, and phosphorus; *anion (or acid) group formers, with varying valence; energy storers.*
Group III.	Sodium, potassium, calcium and magnesium; *cation (or base) formers, with fixed valence; translocation regulators.*
Group IV.	Manganese, iron (cobalt and nickel), copper and zinc; *cation (or base) formers, with varying valence; oxidation-reduction regulators.*
Group V.	Boron, aluminium, silicon, arsenic, selenium; *ampholytes, with varying valence; functions unknown.*
Group VI.	Chlorine, fluorine (bromine and iodine); *anion (or acid) formers, with fixed valence; functions unknown.*

Group VII. Cobalt and nickel; *cation (or base) formers, with varying valence; functions unknown, but perhaps those of Group IV.*

Group VIII. Germanium, gallium and other rare elements; *ampholytes; functions unknown.*

Cf. *abundance, protoplasm, periodic system, food, fertilizer.*

l. everlasting. The dried herb of *Gnaphalium obtusifolium* (*Antennaria dioica*), a Compositae, used as a fluid extract as a diuretic and astringent. **l. root.** Senecio.

ligasoid. A dispersed colloidal system, consisting of a liquid phase suspended in a gaseous phase; as, a fog or mist.

light. (1) A form of radiant energy. Cf. *radiation, spectrum.* In particular, those electromagnetic waves which affect the sight sense and form the visible spectrum: red orange, yellow, green, blue, violet; or those radiations which, on being stopped by an object, render it visible by virtue of their transformation into visible rays. The average velocity of light in air is 299,711 km. per second. The average velocity of light in a vacuum is 2.99776×10^{10} cm. per second = 984×10^6 ft. per sec. = 299,776 km. per second = 186,285 miles per sec. In different media it changes proportionally to the wavelength as follows:

	For violet λ 4200	*For red* λ 6500
in air	1.000297	1.000292
in water	1.3420	1.3320
in diamond	2.4570	2.4108

These figures represent the ratio: velocity in vacuo/velocity in medium. Its *intensity*, is measured in phots; its *quantity*, in lumens; its *quality* as colors. Thus:

Physical phenomenon	Objective stimulus	Subjective response
radiation	light	color
intensity	brightness	brilliance
wavelength-distribution	dominant λ and purity	hue and saturation

Cf. *photometry, spectroscopy.* (2) Not heavy; as, l. metals. **absorbed-** Those radiations which are transformed by matter. **actinic-** Radiations which are rich in ultraviolet rays; as, the l. of a mercury vapor lamp. Cf. *irradiation.* **artificial-** A gas-filled lamp operated at a color temperature of 2848°K. which was adopted as the *normal* artificial l. by an International Commission in 1931. **axial-** The rays passing through the optic axis of a system. **diffracted-** L. which has undergone diffraction, q.v. **diffused-** L. which has been scattered or reflected. **Finsen-** Sunlight which has passed through a copper sulfate solution, which absorbs the yellow, red and infrared rays. **monochromatic-** L. consisting of one wavelength only; as the l. of a sodium flame; however, this apparently pure yellow light is made up of several wavelengths. An absolutely monochromatic l. can be obtained only by screening a spectrum. **polarized-** L. whose vibrations are all in the same plane, or whose vibrations are parallel to each other and change uniformly; as, circularly- or elliptically-polarized l., q.v. Polarized light can be obtained by reflection, or by passage through certain minerals; as Iceland spar (Nicol prism, q.v.). **reflected-** L. which is turned back from a smooth surface; as a glass plate, mirror, or polished metal surface. **refracted-** L. which passes at an angle through a transparent medium, gas, liquid or solid, and thereby changes its direction; as in prisms and lenses. **scattered-** See *scattering, Raman effect, Tyndall effect.* **transmitted-** L. which has passed through a medium, and has not been absorbed. **ultraviolet-** See *radiations* and *rays.*

l. filter. Color screen. **l. metal.** A metallic element with a density below four. In particular, the elements located in the upper right hand portion of the periodic table; alkali metals, earth-alkali metals and earth metals. They are characterized by a single valence (1, 2, or 3), a simple spectrum, strong electromotive force (positive), and they form colorless compounds. Their valence electrons rotate at a distance from the nucleus. Cf. *periodic system.* Antonym: Heavy metals, nonmetals. **l. oils.** A fractional distillate from coal tar, b.110–210, used as a source of benzene, toluene and xylenes. **l. scattering.** See *scattering.* **l. titration.** See *titration.* **l. year.** A unit of astronomical distance. The distance which light travels in one year at the rate of 299,800 km. per sec. It equals 9.5×10^{12} km. or 5.9×10^{13} miles.

lightning. The electric flash associated with thunderstorms; or artificially produced. **l. jar.** An electric condenser or Leyden jar.

lignasan. Ethyl mercuric chloride. A wood preservative.

lignin. (1) A generic term for the cellulose-like substance which lines woody fibres, and includes lignose, lignone and lignin. It is supposed to consist of four condensed molecules of coniferol. (2) $C_{20}H_{20}O_6$ = 356.2. A cyclic unsaturated compound from wood.

lignite. A brown coal, in which the original structure of the wood is still recognizable. It contains 25–45 % carbon. See *jet, hartite, geocerinic acid, montan wax.*

lignoceric acid. $C_{24}H_{48}O_2$ = 368.50. Tetracosanoic acid*, $C_{23}H_{47}COOH$. An acid derived from wood, m.81, soluble in alcohol or ether. **Δ^{14}-.** Nervonic acid. **α-hydroxy-** $C_{22}H_{45}CHOH.COOH$. An acid from phrenosin. **α-hydroxy-Δ^{14}-** α-Hydroxy-nervonic acid. An unsaturated acid, $Me(CH_2)_7CH:CH(CH_2)_{12}CHOH.COOH$, from nervone.

lignone. A substance derived from wood, containing 50.1 % C, 5.82 % H and 44.08 % O. **l. sulfonate.** The waste liquor from sulfite process of paper making.

lignose. A substance derived from wood, containing 46.1 % C, 6.09 % H and 47.81 % O.

lignosulfin. Lignosulfite.

lignosulfite. Lignosulfin. A liquid obtained as by-product in the manufacture of sulphite cellulose; used for inhalations in pulmonary tuberculosis, and as a tanning agent.

lignum. The Latin term for wood. **l. benedictum.** The wood of guaiac. **l. cedrum.** Cedar wood. **l. nephriticum.** The wood from *Pterocarpus indicus*, a tree of the Philippines, or *Eysenhardtia polystachia*, a Mexican tree. These woods give highly fluorescent infusions. **l. rhodium.** The wood of *Amyris balsamifera*,

a tree of tropical America. **l. sanctum, l. vitae.** Guaiac.

ligroin. Ligroine. The fourth fraction petroleum distillation-product. d.0.707–0.722, b.90–120; used as a solvent.

ligustrin. Syringin.

ligustron. A crystalline principle from the bark of *Ligustrum vulgare.* Colorless crystals, m.105.

Ligustrum. A genus of oleaceous shrubs, the privets.

lilac. The dried leaves and fruits of *Syringa vulgaris;* used as a bitter tonic.

lilacin. Syringin.

Liliaceae. Lily family, a group of herbs with flowering stems springing from bulbs or corms, with parallel nerved leaves. The following species yield drugs:

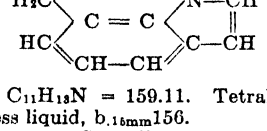
Smilax china	china root
Smilax officinalis	sarsaparilla
Convallaria majalis	lily of the valley
Veratrum viride	American hellebore
Schoenocaulon sabadilla	sabadilla
Polygonatum biflorum	Solomon's seal
Trillium erectum	trillium
Asparagus officinalis	asparagus
Allium sativum	garlic
Helonias dioica	helonias
Urginea maritima	scilla or squill
Colchicum autumnale	meadow saffron, colchicum seeds
Aloe vera, ferox, etc.	aloes
Xanthorrhoea species	acaroid gum

See also *comosic acid, imperialine, superbine, zygadenine.*

Liliiflorae. An order of phanerogamous plants consisting of the families Juncaceae, Liliaceae, Amaryllidacea, Iridaceae, Dioscoraceae and Bromeliaceae.

liliquoid. A dispersed or colloidal system consisting of two liquid phases; as emulsions.

lilole. $C_{11}H_9N$ = 155.1. The heterocyclic hydrocarbon:



lilolidine. $C_{11}H_{13}N$ = 159.11. Tetrahydrolilole. A colorless liquid, $b._{15mm}$156.

lily of the valley. Convallaria.

limanol. A preparation of salt-marsh mud used for rheumatism.

lime. (1) Calcium oxide, calx, quicklime, burnt lime. (2) The fruit of *Citrus acida,* a Rutaceae, used for its juice and as antiscorbutic. (3) The linden or l. tree, *Tilia Europaea,* a Tiliaceae. Its flowers are used as tonic. Cf. *linden.* **burnt-** Calcium oxide. **chloride of-, chlorinated-** Bleaching powder. **fat-** Burnt-. **quick-** Calcium oxide. **hydrated-** Calcium hydroxide. **slaked-** A dry white powder, chiefly calcium hydroxide, obtained by treating quicklime with sufficient water to satisfy its chemical affinity under the condition of its hydration. **unslaked-** Calcium oxide. **sulfurated-** Calcium sulfide.

l. juice. Succus Citri. The expressed sap from lemons, the ripe fruits of *Citrus medica C. limonum* or *C. acida,* a Rutaceae. It contains 5–10 gm. citric acid, and is used as antiscorbutic, antiseptic and refrigerant. **l. nitrate.** A commercial grade of calcium nitrate, used as fertilizer. **l. oil.** (1) An essential oil expressed from the rinds of the fruit of *Citrus limetta,* a Rutaceae, containing citral and limonene. Used in flavoring extracts and perfumery. (2) An essential oil distilled from citron, b.175–215, containing d-limonene. **l. water.** Liquor calcis. A saturated solution of calcium hydroxide in water; it contains about 0.15 gm. of $Ca(OH)_2$, and is used as a reagent and as an antiacid.

limelight. An illumination produced by heating lime to brilliant white heat with an oxyhydrogen flame.

limene. $C_{12}H_{24}$ = 204.2. A sesquiterpene from lime oil.

limestone. A pulverized rock consisting mainly of calcium carbonate; used in fertilizers, concrete mixtures, and in metallurgy. **magnesian-** q.v.

liminal. (1) Barely perceptible by the senses. (2) The lowest or minimal quantity. **l. value.** That fraction of a normal solution (in moles per liter) of a narcotic or other drug which produces a definite physiological effect; it is therefore inversely proportional to the narcotic power of a drug. *E.g.,* the liminal value for monacetin is 0.5, for sulfonal 0.006. Cf. *schwellenwert, Meyer's theory.*

liming material. Material used as a medium for the application of lime or limestone in agriculture, *e.g.,* burnt or lump lime mixed with marl.

limit. A border or boundary. **l. of elasticity.** The smallest stress which produces a permanent alteration.

limiting curve. A line on a graph which represents a boundary between two phases.

limnology. The study of fresh waters.

limonene. $C_{10}H_{16}$ = 136.2. $\Delta^{1,8(9)}$-*p*-menthadiene, q.v. A terpene of lemon-like odor. A colorless liquid, d.0.853, b.176, insoluble in water, soluble in alcohol or ether. Three isomers: **d-** or dextrolimonene, citrene, carvene, hesperidene, found in the essential oils from citrons and dill. **l-** or levolimonene, occurring in the oil of fir cones. **dl-** or **i-** inactive limonene (terpene).

limonite. Bog ore. A hydrated ferric oxide (60–70 % Fe_2O_3), with some carbonate used as iron ore from Rotorua, New Zealand; used as a cure for bushsickness.

Linaceae. Flax family. A group of herbaceous (sometimes woody) plants that yield some important drugs and fibres:

Linum usitatissimum	linen, flaxseed, linseed oil.
Erythroxylon coca	coca leaves

linaloe oil. An essential oil distilled from a Mexican wood. A colorless fragrant, liquid, d.0.88, insoluble in water, soluble in alcohol, ether, chloroform or benzene; used in the manufacture of linalool and in perfumery.

linalool. $C_{10}H_{18}O$ = 154.2. Coriandrol, 2,6-dimethyloctadiene-2,7-ol-6, $Me_2C{:}CH(CH_2)_2{\cdot}CMeOHCH{:}CH_2$. A terpene of bergamot-like odor in coriander and linaloe oil. A colorless liquid, *d-* d.0.875, b.198; *l-* d.0.866, b.195, slightly soluble in water, soluble in alcohol or ether; and used in perfumery.

linalyl. The monovalent radical $C_{10}H_{17}$—, 2.6-dimethylocta-2.7-dienyl, derived from linalool. **l. acetate.** $C_{12}H_{20}O_2$ = 196.2. Linalool acetic ester. $Me_2C{:}CH(CH_2)_2CMe(OCOMe)CH{:}$-

CH_2. A colorless liquid, d.0.91, b.220, slightly soluble in water, soluble in alcohol or ether. Used in perfumery.

linamarin. $C_9H_{13}NO_7$ = 247.14. An acetone cyanhydrin glucoside, m.141, from flax and *Phaseolus lunatus*.

linarin. A glucoside from toad-flax, *Linaria vulgaris*, a Scrophulariaceae.

linarite. A basic copper and lead sulfate. $PbSO_4,Cu(OH)_2$.

linden. A tree of genus *Tilia*, a Tiliaceae. **American-** Basswood, American lime, *T. americana*, which yields l. oil. **European-** *T. europaea*, yielding tilia and lime (3). **l. flowers.** See *lime* (3). **l. oil.** Basswood oil. An oil expressed from linden flowers and seeds, which resembles cotton seed oil.

lindgrenite. $2CuMoO_4.Cu(OH)_2$. A Chilean mineral, transparent, green, biaxial holohedra.

lindol. Trade name for tricresyl phosphate.

line. (1) The dimension of extension which possesses length but neither breadth nor thickness. (2) The $\frac{1}{12}$ part of an inch. (3) A narrow streak or strip; as, the image produced by the slit of a spectroscope, q.v. **absorption-** A line corresponding with light which has been absorbed on its passage through a gaseous, liquid or solid medium. **bright-** The emission lines characteristic of an element. **C-** The dark Fraunhofer line of λ6562.8 which corresponds with the hydrogen line H_α. **calcium-** The characteristic lines of calcium, especially the Fraunhofer lines G, H, and K. **D_1-, D_2-** The yellow light of the sodium flame; λ5895.9, λ5890.0, respectively. **dark-** Absorption or Fraunhofer lines. **emission-** The bright l. characteristic of an element. **Fraunhofer-** A dark l. in the solar spectrum caused by the absorption of light in passing through incandescent vapor. Cf. *solar spectrum*. **hydrogen-** See *H. line*. **hyperfine-** L. close together, due to nuclear moments. **K-** See *K line*. **metallic-** L. due to metallic elements. **nebular-** L. characteristic of nebulae. Cf. *nebulium*. **solar-** See *solar spectrum*.

l. of force. The direction in which a force acts; as: **electric-** The curves radiating from a positive towards a negative charge. **magnetic-** The curves or lines made visible by small iron filings in the field of force of a magnet. **l. spectrum.** A spectrum which shows lines instead of bands. They are the images of the slit before the prism, and the source of light contains rays of as many different wavelengths as there are lines. Single wavelengths, (lines) are caused by excited atoms and ions; while bands are due to molecules.

linear. Pertaining to one dimension: length. **l. expansion.** The length-wise expansion of materials under the influence of heat. Cf. *cubical expansion*. **l. measures.** The units of measuring length (q.v.) or distance.

linen. A textile manufactured from flax, the fibers of the flax stem. Cf. *lint*.

lingering period. The time, usually very short, during which an electron travels in the highest energy level of an excited atom. It is followed by the *damping* period (during which the characteristic radiation is emitted), and return to the normal state.

linhay. A concrete platform, on which china clay is stored prior to shipment.

liniment. An oily liquid preparation, used medicinally for external application.

linin. (1) Oxychromatin. A morphological or structural element of the cell, commonly termed the linin network. (2) The active principle of purging flax, *Linum catharticum*, a Linaceae of Europe. Colorless, lustrous, bitter crystals; used as a purgative.

lining. (1) The inside portion of a furnace. (2) A thin coating. **acid-** L. made of silica bricks. **basic-** L. made of magnesite bricks. **neutral-** L. made of coal or chrome bricks.

link. li. An obsolete linear measure used in surveying. 1 li. = 0.66 feet = 20.11684 cm. = $\frac{1}{25}$ rod.

linkage. The lines used in structural formula to represent valency connections between the atoms; thus each line represents a valency of one, a double line a valency of two, etc. In more recent conceptions a linkage or nonpolar bond (q.v.) is produced by a pair of electrons, one from each atom, by which two atoms are held together. See *bond, polar*.

linnaeite. $(Co,Ni)_3S_4$. Linnaetite. Cobalt-nickel pyrite. A native cobalt-nickel sulfide.

linnaetite. Linnaeite.

linoleate. A compound of a metal and linoleic acid of the type $C_{17}H_{31}COOM$, where M is a monovalent metal. If M is replaced by an alcohol radical, the resulting compound is a fat.

linoleic acid. $C_{17}H_{31}COOH$ = 280.2. Linolic acid, *9.12*-octadecadienoic acid*, octadecadien-*9.12*-oic acid, $Me(CH_2)_4CH:CH.CH_2.CH:CH.(CH_2)_7COOH$. A fatty acid occurring as glyceride in all drying oils. A yellow oily liquid, d.0.921, m.−18, b.230, insoluble in water, soluble in alcohol, ether, chloroform or benzene. **l. acid series.** A group of unsaturated aliphatic acids of the general formula

$C_nH_{2n-4}O_2$.

sorbic acid	$C_6H_8O_2$
geranic acid	$C_{10}H_{16}O_2$
palmitolic acid	$C_{16}H_{28}O_2$
linoleic acid	$C_{18}H_{32}O_2$
humoceric acid	$C_{19}H_{34}O_2$
eicosinic acid	$C_{20}H_{36}O_2$

linolenic acid. $C_{17}H_{29}COOH$ = 278.2. Octadecatrien-*9.12.15*-oic acid, *9.12.15*-octadecatrienoic acid*. A colorless liquid, d.0.922, insoluble in water, soluble in alcohol or ether.

linoleum. A canvas coated with a mixture of linseed oil, powdered cork and pigment. Cf. *oil cloth*.

linolic acid. Linoleic acid.

linotype metal. An alloy of lead (83.5 %), antimony (13.5 %) and tin (3 %) used for making printing type.

linoxyn. Solid, oxidized linseed oil, used in the manufacture of linoleum.

linseed. The dried seeds of flax, *Linum usitatissimum*, a Linaceae, sometimes used medicinally as a demulcent and emollient. **l. cake, l. meal.** The solid residue of l. after removal of the oil; used as a cattle feed. **l. oil.** Flax seed oil, oleum lini. A yellow oil expressed from linseed, the seeds of *Linum usitatissimum*, a Linaceae. Oily yellow liquid, d.0.932, m.−27, saponification value 188–195, iodine value 170–192, refractive index 1.473 at 40°C., insoluble in water, soluble in alcohol, ether, chloroform, benzene or turpentine. Used in paints, varnishes, lacquers, rubber substitutes, linoleum and leather industry. *boiled-* A linseed oil which has

been thickened by boiling, and dries more rapidly on exposure to air; used in varnishes and driers.

lint. Charpie byssus. A soft and flexible linen used for dressing wounds. **cotton-** An inferior short-fibred product made from cotton.

linter. The short cotton fibers left after ginning; they are used as a source of pure cellulose.

linum. The Latin term for linseed (flax).

lionite. An impure native tellurium.

lion's tooth. Taraxacum.

lipase. A ferment occurring in the liver, pancreas and other digestive organs, which splits neutral fats into glycerin and fatty acids: also applied to any ferment which splits fats into fatty acids and alcohol. **gastric-** A lipase of the stomach. **pancreatic-** Steapsase. **vegetable-** A lipase occurring in many plants.

lipide. A proposed name for lipins. **complex-** A l. which contains phosphorus and/or nitrogen. Cf. *lipoid*. **tertiary-** A l. which contains neither phosphorus nor nitrogen.

lipins. A generic term for fats and lipoids, or the alcohol-ether soluble constituents of protoplasm, which are insoluble in water. Classification, (Matthews):

1. a. FATS—neutral esters of glycerol and fatty acids. b. FATTY ACIDS.
2. FATTY OILS—neutral esters of glycerol and fatty acids, liquid at 20°C.
   a. drying oils—harden on exposure to air.
   b. semi-drying oils—thicken slowly on exposure to light and air.
   c. non-drying oils—remain liquid on exposure to light and air.
3. ESSENTIAL OILS—Volatile, generally odoriferous substances, *e.g.*, terpenes, aldehydes and alcohols.
4. WAXES—Esters of sterols and fatty acids.
5. STEROLS—High-atomic alcohols, solid at 20°C.
6. PHOSPHO-LIPINS—Phosphatides. Fatty compounds which contain phosphoric acid, as lecithins.
7. GLYCO-LIPINS—Fatty substances which contain carbohydrates, as cerebron, phrenosin.
8. SULFO-LIPINS—Fatty substances, contain sulfuric acid, as protagon, brain-sulfatide.
9. AMINO-LIPINS—Fatty substances, contain amino-acids, as bregenin.
10. CHROMO-LIPINS—Lipochromes. Fatty substances, contain a pigment or coloring matter.

lipochrome. One of a group of fatty pigments or coloring matters occurring in natural fats, such as egg-yolk and butter. See *carotenoids*.

lipoclastic. Lipolytic.

lipoid, lipoidic. Having the character of a lipid.

lipoids. A group of nitrogenous fats consisting of lecithins, cholesterol, and phosphatides.

lipoiodine. $C_{21}H_{39}I_2COOEt$ = 618.1. Ethyl-diiodobrassidate, ethylester of diiodobrassidic acid. White odorless, tasteless, needles m.37, insoluble in water, slightly soluble in alcohol, soluble in ether, phenol or oils; used medicinally as a substitute for iodides.

lipolysis. The decomposition or dissolving of a fat; the reverse reaction of saponification.

lipolytic. Lipoclastic. An agent that decomposes a fat into its alcohol (glycerin) and fatty acid.

lipoprotein. A group of complex proteins consisting of a simple protein combined with a higher fatty acid.

Lipowitz' alloy. A low melting-point alloy of 50 % Bi, 27 % Pb, 13 % Sn and 10 % Cd; m.71.7. Used in automatic fire sprinklers and for toy spoons.

lippia. Yerba dulce. The dried leaves and inflorescence of *Lippia dulcis*, a Verbenaceae, used as the fluid extract, as a demulcent or expectorant. **l. citriodora.** Lemon scented verbena. The dried leaves of *Aloysia citriodora*, a Verbenaceae, used as sedative and in sachets.

lippianol. A monohydric alcohol from the essential oil of *Lippia species* (Verbenaceae).

Lippmann, Edmond O. von. 1857– . A German organic chemist, noted for work on the sugar industry and chemical history. **L. electrode.** Capillary electrode. An early form of the mercury dropping electrode (q.v.), used as a standard electrode. **L. electrometer.** Capillary electrometer.

liquation. The extraction of metals from ores by heating on an inclined hearth and collecting the molten metal.

liquefaction. The change to the liquid form, especially the condensation of gases to a liquid.

liquefon. A unit of the starch-liquefying power of enzymes:

$$\text{Log}_{10} L = (S - 1078)\ 0.000565,$$

where L = liquefons per 10 cc. infusion, S = mg. starch liquefied in one hour.

liquescent. Tending to become fluid or liquid.

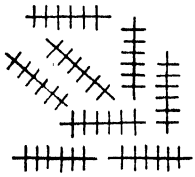
liqueur. A strongly flavored and sweetened alcoholic beverage.

liquid. A fluid or substance that flows readily. A state of matter intermediate between a solid and a gas, shapeless and fluid, taking the shape of the container and seeking the lowest level. It differs from a gas in its inability to diffuse throughout the whole volume of a containing vessel. Cf. *solvent*, *parachor*. **associated-** Polar-. A l. in which the molecules form groups, (probably coordinate bonds, q.v.), and in which K of the Ramsay-Shields or Morgan equation increases linearly with temperature until at t_c it has maximum value. **Newtonian-** True liquids, which do not alter in viscosity on stirring. Cf. *thixotropy*. **non-associated-** Normal-. **normal-** Nonpolar-. A l. consisting of independent molecules, that is, with no coordinate bonds or unshared electrons in the octet, and in which K = 2.12 ergs per degree. **polar-** Associated. **semipolar-** A l. intermediate between associated and normal; as, alcohol, glycerol. See figure.

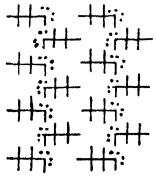
l. acetylene. Acetylene gas compressed into steel cylinders containing some infusorial earth and acetone; used in welding. **l. air.** Liquefied air, or a mixture of liquid oxygen and nitrogen. A clear colorless liquid, intensely cold, and giving off oxygen and nitrogen vapors which freeze the moisture of the surrounding air; kept in open Dewar vessels. Used for the production of low temperatures; medicinally, in the treatment and relief of poison oak and poison ivy eruptions. **l. ammonia.** Ammonia gas liquefied under pressure and shipped in steel cylinders. For uses, see *ammonia*. **l. carbon dioxide.** Carbon dioxide gas compressed into steel cylinders. Used as a refrigerant, for producing pressure in carbonated and soft drinks, for blowing up tires of automobiles, etc.; see

carbon dioxide. **l. chlorine.** Chlorine gas compressed into steel cylinders and used extensively in bleaching industry; see *chlorine.* **l. ethylene.** Ethylene gas compressed in steel cylinders and used as an anesthetic and in welding. See *ethylene.* **l. helium.** Helium gas compressed into steel cylinders, and used for filling dirigibles. **l. hydrogen.** Hydrogen gas compressed in steel cylinders and used in welding, production of high temperatures, filling balloons and dirigibles, hydrogenation of oils and cracking of petroleum; see *hydrogen.* **l. hydrogen sulfide.** Hydrogen sulfide gas compressed in steel cylinders; used in chemical industry, and as a reagent. **l. nitrous oxide.** Nitrous oxide gas compressed in steel cylinders and used as a dentist's anesthetic, as a substitute for oxygen in jewelers' blowpipes, as a preservative for perishable foods, fruits, tissues, and biological liquids. **l. oxygen.** Oxygen gas compressed into steel cylinders and used in welding, anesthesia, mine-rescue work and as a detonating and blasting material; see *oxygen.* **l. smoke.** The first distillate in the fractional distillation of wood, which contains acetic acid, tar, and phenol compounds (pyroligneous acid); used in the preservation or "smoking" of meat. **l. sulfur dioxide.** Sulfur dioxide gas compressed into glass bottles; used in the laboratory as a reducing agent and in synthesis. See *sulfur dioxide.*

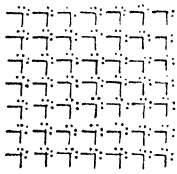
TYPES OF LIQUIDS



Hexane
Nonpolar or *normal* L.
benzene
carbon tetrachloride
hydrocarbon oils



Alcohol
Semipolar or *intermediate* L.
alcohol
glycerol
methylal
ether
acetone
chloroform



Water
Polar or *associated* L.
glycol
liq. ammonia
water

liquidambar. Copal balsam, copalin. The balsamic exudates of *Liquidambar styraciflua,* a Hamamelidaceae, of North America; used medicinally for coughs. Cf. *storax.*

liquidus. A curve relating to a liquid phase of a 2-component solution (see *solidus*).

liquor. An aqueous solution. **l. ammoniae.** Ammonium hydroxide. **l. calcis.** Lime water. **l. of flints.** A solution of silica in potash (potassium silicate). **l. trinitrin.** A 1 % solution of glyceryl trinitrate in alcohol.

liquorice. Glycyrrhiza. (British usage, cf. *licorice.*)

liroconite. A native, hydrated copper aluminum arsenate.

lisoloid. A dispersed or colloidal system consisting of a liquid phase surrounded by a solid phase; as, a jelly or a liquid crystal.

Lissajou's figure. The pattern produced by a spot of light reflected from two mirrors, mounted on the ends of two tuning forks that are vibrating at right angles.

Lister, Joseph, [*Baron*]. 1827–1912. An English surgeon who founded antiseptic surgery.

listerine. A proprietary antiseptic solution containing boric acid, benzoic acid, thymol, and essential oils of *Eucalyptus, Gaultheria,* etc.

liter, litre. The metric unit of volume or capacity. One liter is the volume occupied by 1 kg. of pure water at 4°C. and 760 mm. pressure. It was originally intended to be 1000 cc. 1l. = 1000 mil = 1000.028 cc. = 1.05671 quarts = 0.264178 gallon = 33.8174 fluid ounces = 270.518 fluid drams. 1 mol of any gas occupies 22.4 liters at 0°C. and 760 mm. **micro-** μl or λ, lambda. One millionth part of a liter, $1\lambda = 10^{-6}$ l. **milli-** ml. One thousandth part of a liter, 1 ml. $= 10^{-3}$ l. = approximately 1 cc. **Mohr-.** An obsolete unit of volume. The volume of 1 kg. of water at 15°C. weighed in vacuo. It occupies 1000.91 cc.

litharge. Lead oxide, yellow.

lithate. Urate.

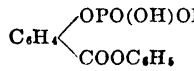
lithia. Lithium oxide. **l. mica.** Lepidolite. **l. water.** A solution of lithium bicarbonate.

lithic acid. Uric acid.

lithii. The Latin genitive of lithium, used in the U.S.P. to designate salts of lithium; as, lithii benzoas = lithium benzoate.

lithium. Li = 6.94. An element, atomic number 3, the first member of the alkali metals in group 1 of the periodic system. It has a valency of one. A silver-gray metal, d.0.524, m.186, b.1400, reacting with water and must be stored in kerosene or petrolatum. L. is widely distributed, but only in very small quantities; its principal minerals are amblygonite (8–9 % Li) lepidolite (1–6 % Li) petalite, and spodumene (5–7 % Li); it occurs also in several mineral waters. It was discovered in 1817 by Arfvedson, and named from the Greek lithos (= stone). It forms only one series of compounds which are all soluble in water and dissociate into the Li^+ ion. Used as "scavenger" in purifying metals; traces of Li added to Al increase hardness; with Pb it produces a bearing metal. Also used as deoxidizer in copper alloys. **l. acetate.** $Li(C_2H_3O_2).2H_2O$ = 102.0. Rhombic white crystals, m.70, soluble in water; used as a diuretic and antirheumatic. **l. acetyl salicylate.** $C_2H_3O.OC_6H_4COOLi$ = 186.06. Hydropyrine, apyron, tyllithin, litmopyrine, grifa. Used for medicinal purposes. **l. agaricinate.** A white powder of slight saline taste, soluble in water and used as an anhidrotic. **l. amide.** $(LiNH_2)_n$ = $(22.96)_n$. Colorless cubic crystals, d.1.178, m.390, b.430, decomp. in water; used in organic synthesis and as catalyst. **l. arsenate.** $Li_3AsO_4.\frac{1}{2}H_2O$ = 168.8. A white powder, soluble in water; used as an anti-arthritic in gout, malaria and anemia. **l. benzoate.** $LiC_7H_5O_2$ = 128.0. A light white powder of cooling taste, soluble in water; used as a diuretic, urinary antiseptic and sedative. **l. benzosalicylate.** A white crystalline powder, soluble in water and used as an urinary antiseptic. **l. bicarbonate.** $LiHCO_3$ = 68.0. A white powder, slightly soluble in water (lithia water). **l. bichromate.** $Li_2Cr_2O_7$ = 229.9. An orange-red crystalline powder, soluble in water. **l. bitartrate.** $LiC_4H_5O_6.H_2O$ = 174.1. Tartarlithine. Colorless

crystals, soluble in water; used medicinally for gout. l. **borate.** $Li_2B_4O_7.5H_2O$ = 259.2. A white powder, slightly soluble in water; used as an antiseptic and in dental cements. *meta*- $LiBO_2$ = 49.76. A white powder, soluble in water. l. **borocitrate.** $Li_2HC_6H_5O_7.2HBO_3.2H_2O$ = 359.4. A white powder, soluble in water; used as an urinary antiseptic. l. **bromide.** LiBr = 86.9. A hygroscopic, colorless powder, d.3.464, m.442, soluble in water, or alcohol; used as a nerve sedative. l. **cacodylate.** $LiMe_2AsO_2.H_2O$ = 162.1. A light, white powder, soluble in water; used medicinally for anemia. l. **caffeine sulfonate.** Symphorol. l. **carbide.** Li_2C_2 = 37.89. A white powder. $d_{18°}$.1.65. l. **carbonate.** Li_2CO_3 = 73.9. Colorless prisms, d.2.11, m.700, slightly soluble in water, insoluble in alcohol; used as an antiacid and in artificial mineral waters. *acid*- L. bicarbonate. l. **chlorate.** $2LiClO_3.H_2O$ = 198.82. A deliquescent solid, m.50. *per*- L. perchlorate. l. **chloride.** LiCl = 42.4. Colorless octahedric crystals containing $2H_2O$, d.2.068, m.606, soluble in water, alcohol or ether; used medicinally as an antirheumatic, and commercially in pyrotechnics for the production of red fires. l. **chromate.** $Li_2CrO_4.2H_2O$ = 166.1. A yellow, hygroscopic crystalline powder, soluble in water, alcohol or ether. l. **citrate.** $Li_3C_6H_5O_7.4H_2O$ = 281.9. A white, odorless, slightly hygroscopic, powder. It is frequently used medicinally in the treatment of gout. l. **dichromate.** L. bichromate. l. **dithiosalicylate.** $(LiC_7H_4O_3S)_2$ = 350.1. A gray powder, soluble in alcohol or water; and used as an antirheumatic. l. **fluophosphate.** $LiF.Li_2PO_4.H_2O$ = 169.8. Colorless crystals, soluble in water; used as a flux in ceramics. l. **fluosilicate.** $Li_2SiF_6.2H_2O$ = 191.97. L. silicofluoride. White monoclinic crystals, d.2.33, soluble in water. l. **fluoride.** LiF = 26.0. A white crystalline powder, slightly soluble in water; used in ceramics for enamels. l. **formate.** HCOOLi = 52.1. Colorless crystals, soluble in water; used medicinally for gout. l. **germanate.** Li_2GeO_3 = 134.48. Colorless powder, d.3.53, m.1239, slightly soluble in water. l. **glycerophosphate.** $Li_2C_3H_7O_6P$ = 184.1. A white crystalline powder soluble in water; used medicinally in gout. l. **hippurate.** $LiC_9H_8O_3N$ = 185.1. A white powder, slowly soluble in hot water, used medicinally for uric acid diathesis. l. **hydride.** LiH = 7.95. A white solid, m.680, d.0.82, decomp. in water to H_2 and LiOH. l. **hydroxide.** LiOH = 24.0. White crystals, soluble in water, slightly soluble in alcohol; used as a reagent and in the manufacture of lithium salts. l. **iodate.** $LiIO_3$ = 182.0. A white powder, soluble in water. l. **iodide.** LiI = 133.86. White hygroscopic crystals containing $3H_2O$, d.4.063, m.720 soluble in water or alcohol. Used medicinally as a diuretic and alterative; commercially, in the manufacture of artificial mineral waters. l. **lactate.** $LiC_3H_5O_3$ = 96.0. A colorless crystalline powder, soluble in water; used as a diuretic. l. **laurate.** $C_{12}H_{23}O_2Li$ = 206.12. A white solid, m.229.5. l. **mercuric iodide.** Mercuric lithium iodide. l. **metaborate.** $LiBO_2$ = 49.8. A white powder, slightly soluble in water. l. **myristate.** $C_{14}H_{27}O_2Li$ = 234.15. White solid, m.223.9. l. **nitrate.** $LiNO_3$ = 69.0. Colorless rhombohedric crystals, d.2.39, m.253, soluble in water; used in pyrotechnics for red fires, and in the manufacture of artificial mineral waters. l. **nitride.** Li_3N = 34.83. Used as catalyst in ammonia synthesis. l. **nitrite.** $LiNO_2.H_2O$ = 70.96. Colorless needles, d.1.615, soluble in water. l. **oxalate.** $Li_2C_2O_4$ = 102.0. Colorless crystals, soluble in water. l. **oxide.** Li_2O = 29.9. Lithia. A colorless and caustic powder, d.2.102, subliming at 600, soluble in water, slightly soluble in alcohol; used in the manufacture of lithium salts. l. **palmitate.** $C_{16}H_{31}O_2Li$ = 262.18. A white solid, m.224.5. l. **perchlorate.** $LiClO_4.3H_2O$ = 160.45. A deliquescent soluble solid. l. **phenate.** LiC_6H_5O = 100.0 L. carbolate, l. phenylate, phenollithium. A colorless powder which turns pink with age, soluble in water or alcohol; used as an antiseptic. l. **phenolsulfonate.** $LiC_6H_5SO_4.H_2O$ = 198.1. L. sulfocarbolate. A white crystalline powder, soluble in water; used medicinally in the treatment of uric acid diathesis. l. **phosphate.** $Li_3PO_4.H_2O$ = 133.9. Colorless rhomboidal crystals, d.2.41, m.857, slightly soluble in water; used in medicine. l. **platinichloride.** $Li_2PtCl_6.6H_2O$ = 529.9. Yellow crystals, used in analysis. l. **quinate.** Urosine. l. **rhodanate.** L. thiocyanate. l. **salicylate.** $LiC_7H_5O_3$ = 144.0. A white, hygroscopic, odorless powder, soluble in water or alcohol; used as an antirheumatic and intestinal antiseptic. l. **salol orthophosphite.** Salvosal lithia, the lithium salt of salol-o-phosphorous acid:



Colorless crystals, decomp. in hot water, soluble in cold water; used medicinally for influenza and gout. l. **silicate.** Li_2SiO_3 = 89.94. White rhombic crystals, d.2.52, m.1201, insoluble in water. **basic-** Li_4SiO_4 = 119.82. White crystals, d.2.28, m.1256, insoluble in water. l. **silicide.** Li_6Si_2 = 97.76. Blue crystals, d.1.16, decomp. by heat or water. l. **silicofluoride.** L. fluosilicate. l. **sozoiodolate.** $C_6H_2(OH)I(SO_3Li)$ = 304.97. Colorless or slightly yellow, shining leaflets, slightly soluble in water; used as an antirheumatic. l. **stearate.** $C_{18}H_{35}O_2Li$ = 290.21. A white solid, m.221.0. l. **succinate.** $Li_2C_4H_4O_4.3H_2O$ = 184.1. Colorless crystals, soluble in water or alcohol; used as an antiseptic. l. **sulfate.** Li_2SO_4 = 110.0. Colorless monoclinic crystals containing $1H_2O$, d.2.21, m.843, soluble in water or alcohol. Used medicinally as a diuretic and antirheumatic, technically in pyrotechnics for red fires, and in the manufacture of artificial mineral waters. l. **sulfide.** Li_2S = 46.0. A colorless powder, d.1.66, soluble in water. l. **sulfite.** $Li_2SO_3.H_2O$ = 111.96. Needle-shaped soluble crystals. l. **sulfocarbolate.** L. phenolsulfonate. l. **sulfocyanide.** L. thiocyanate. l. **sulfoichthyolate.** A tarry liquid, used as an ichthyol substitute. l. **tartrate.** $Li_2C_4H_4O_6.H_2O$ = 180.1. A white crystalline powder, soluble in water or alcohol; used as an antirheumatic. l. **thallium tartrate.** $C_4H_4O_6LiTl.2H_2O$ = 396.39. Triclinic crystals, d.3.144. l. **thiocyanate.** Li-CNS = 65.0. L. rhodanate. Colorless, hygroscopic crystals, soluble in water; used as a reagent. l. **urate.** $C_5H_3O_3N_4Li$ = 174.04. A soluble salt of lithium used for gout. l. **valerate.** $LiC_5H_9O_2$ = 108.1. White crystals of valerian-like odor, soluble in water; used medicinally as an antirheumatic and sedative. l. **vanadate.**

$LiVO_3.H_2O$ = 123.9. A yellowish crystalline powder, soluble in water.

litho- A prefix derived from the Greek indicating "stone"; as in lithography (stone-writing).

lithocholic acid. $C_{24}H_{40}O_3$ = 376.32. An acid from bile. Cf. *choline, sterols.*

lithofellic acid. $C_{20}H_{36}O_4$ = 340.28. Microscopic crystals, m.206, insoluble in water.

lithography. A method of printing in which the design is drawn transversely inverted on a stone with a greasy ink, and treated in succession with water and a printing ink which is accepted only by the greasy design; the stone is then used for printing on paper. In modern lithography the design is produced photographically on a zinc plate from which it is transferred on a rotary machine to a rubber blanket, which is brought into contact with the paper (offset process).

lithology. Petrology.

lithomarge. The mineral, $K_2O,Al_2O_3,6SiO_2, xH_2O$.

lithopone. Lithophone, Griffith white, Orr white, Charlton white. A stoichiometric mixture of zinc sulfide and barium sulfate, used as a white pigment in paints, in the rubber industry, for oil cloth manufacture and as a filler. **cadmium.** A red or yellow pigment analogous to l., in which the zinc sulfide is replaced by cadmium sulfide.

lithosphere. The solid earth crust as compared with the liquid (hydrosphere) and gaseous (atmosphere) layers of the earth surface. For composition, see *abundance.*

lithuric acid. $C_{15}H_{19}NO_9$ = 357.15. White crystals, m.204.5, from bladder stones.

litmin. azo- See *azolitmin.* **erythro-** See *erythrolitmin.*

litmopyrine. Lithium acetyl salicylate.

litmus. Lacmus, turnsole, lacca coerulea. A purple coloring matter obtained from various lichens, *Roccella* and *Dendrographa* species. A blue, amorphous powder, which is usually marketed mixed with calcium carbonate and compressed into small cubes; it contains azolitmin and lecanoric acid. Used as an indicator in volumetric anaysis, for the preparation of litmus paper and litmus tincture. **l. milk.** Milk colored with litmus and used in bacteriology as a culture medium, to detect the production of acidity. **l. paper.** (*neutral-* or *purple-*) A filter paper impregnated with a solution of litmus of pH 7.0. (*blue-*) A filter paper impregnated with a litmus solution of pH 8.0 (colored blue by a few drops of alkali). (*red-*) A filter paper impregnated with litmus solution of pH 6.0 (colored red by a few drops of acid). **l. pencil.** A wax pencil colored red and blue with litmus, used in analytical chemistry to make streaks on glass ware or paper, thus to detect acidity alkalinity. **l. tincture.** A saturated solution of litmus in alcohol and/or water; used in analytical chemistry as an indicator and in bacteriology for culture media.

litre. Liter.

Little, Arthur Dehon. 1863–1935. An American chemist noted for developments in chemical engineering.

littorol. See *pelagic.*

Littrow prism. A glass prism with 90°, 60° and 30° angles, which reflects light internally from one surface; used in spectrographs. Cf. *Cornu prism.*

liver. (1) A gland of mammals which forms glycogen from the maltose of veinous blood, and which secretes bile. It also stores glycogen, takes part in the formation and destruction of blood corpuscles, and converts nitrogeneous materials into urea. (2) A natural sulfide mineral. **l. extract.** A concentration of the antianemic principle of mammalian l.; used to stimulate erythrocyte-formation in the bone marrow. **l. of sulfur.** The result of fusing together potassium carbonate and sulfur. It contains chiefly potassium sulfide and polysulfides; used for skin diseases. **l. ore.** Cinnabar. **l. sugar.** Glycogen.

liverwort. The dried herb of *Hepatica triloba,* a Ranunculaceae, used as a mild mucilaginous astringent. **English-** Lichen caninus, ground liverwort. The lichen, *Peltigera canina,* used as a mild purgative.

livetin. A protein from egg-yolk.

livingstoneite. $2Sb_2O_3.HgO$. Antimonite (q.v.) containing mercury.

lixiviation. The extraction and separation of a soluble substance from a mixture with insoluble matter; *e.g.,* leaching of salts from ashes.

lixivium. The filtrate obtained by leaching a soluble from an insoluble matter, as the lye obtained from wood ashes.

ln. Abbreviation for natural logarithm.

loadstone, lodestone. Magnetite.

loading. A heavy substance, usually of mineral nature, (clay, gypsum, starch etc.) added to textiles, papers, rubber etc. to give weight or smoothness. Cf. *filler.*

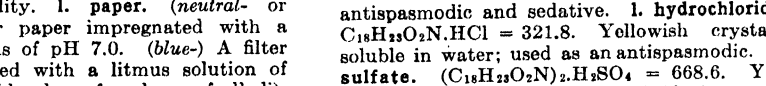
loalin. Trade name for a polystyrene plastic.

loam. Clay mixed with sand.

lobate. Describing a growth of bacteria, in which the borders of the cultures show lobes or deep undulations or fissures.

lobelia. Indian tobacco. The dried leaves and flowering tops of *Lobelia inflata,* a Lobeliaceae. Used as a fluid extract, as an antispasmodic and expectorant.

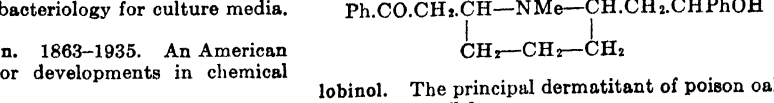
lobeline. $C_{18}H_{23}O_2N$ = 285.3. Inflatine. An alkaloid from the seeds of lobelia.



A yellowish syrupy liquid, insoluble in water, soluble in alcohol or chloroform; used as an antispasmodic and sedative. **l. hydrochloride.** $C_{18}H_{23}O_2N.HCl$ = 321.8. Yellowish crystals, soluble in water; used as an antispasmodic. **l. sulfate.** $(C_{18}H_{23}O_2N)_2.H_2SO_4$ = 668.6. Yellowish, hygroscopic crystals, soluble in water. Used as a powerful relaxant and antispasmodic, and in the treatment of the tobacco habit.

lobeloid. The combined principles of Indian tobacco; used medicinally as an expectorant and relaxant.

lobinine. $C_{22}H_{27}NO_2$ = 335.2. An alkaloid from *Lobelia inflata.*



lobinol. The principal dermatitant of poison oak, *Rhus diversiloba.*

local. Restricted to one place or spot; as, local anesthesia (anesthesia of one particular region of the body).

locamphen. A liquid obtained by the interaction of 10 pts. iodine, 20 pts. phenol, and 70 pts. camphor. A dark reddish-brown viscid liquid,

insoluble in water, soluble in alcohol; used as an antiseptic.

Locke's solution. An artificial, protein-free blood-serum consisting of 9.0 gm. NaCl, 0.2 gm. $CaCl_2$, 0.4 gm. KCl, 0.2 gm. $NaHCO_3$, 0.25 gm. glucose in 1000 cc. water. Cf. *Ringer's solution.*

Lockyer, Sir Joseph Norman. 1836–1920. An English astronomer who discovered (with Frankland) helium in the sun's chromosphere.

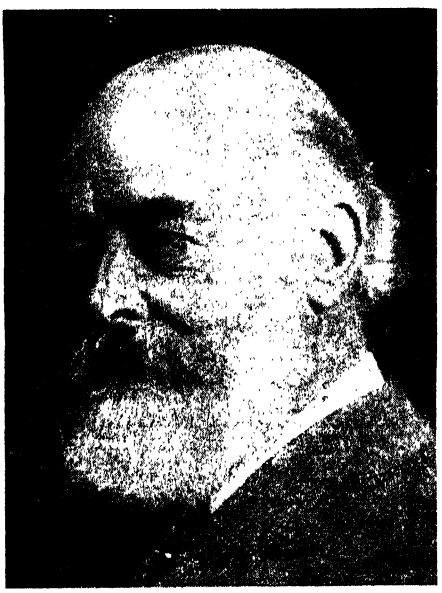
locust bean. Carob bean. **l. tree.** The tree *Robinia pseudacacia* of semi-desert North America, which yields robin.

lodal. A derivative of papaverine: 6.7-dimethoxy-2-methyl-3.4-dihydroisoquinoline chloride; it is a proprietary drug.

lode. A vein of metallic deposit filling the fissure of a rock. **mother-** The great gold vein of Central California.

lodestone. Magnetite.

Lodge, Sir Oliver Joseph. 1851–1940. An English physicist, noted for his work in electrical science. **L.-Cottrell process.** A process for the electrostatic precipitation of smokes and fog, widely used in industry. Cf. *Cottrell.*



Sir Oliver Joseph Lodge.

(From Thomson's "Outline of Science." Courtesy of G. P. Putnam's Sons, N. Y.)

Loeb, Jacques. 1859–1924. An American physiologist, noted for his work on colloids, artificial parthenogenesis and the effects of ions on protoplasm. **L. collection.** A collection of chemical types (elements and compounds) deposited by research workers in the United States National Museum for record purposes.

Loeffler. See *Löffler.*

Loew theory. A theory explaining the physiological action of poisons on a chemical basis: All substances capable of acting on aldehyde- or amino-groups are poisonous to the living tissue, even in very dilute solutions, as they exert a substituting action and thereby change the dynamic equilibrium of the protoplasm.

Löffler, Friedrich A. J. 1852–1915. A German bacteriologist, noted for his methods of staining bacteria. **L. methylene blue.** A bacteriological dye-solution prepared by dissolving 0.5 gm. methylene blue, in 40 cc. alcohol, 2 cc. N/10 KOH, and 98 cc. water. **L. mixture.** A culture medium for the growth of bacteria: 250 cc. glucose bouillon and 750 cc. horse-serum or beef-blood serum.

log. Abbreviation for logarithm. $\log_{10}$. Common logarithm. $\log_e$ or ln. Natural logarithm.

Loganiaceae. Logania family. A group of herbs, shrubs or trees, many of them poisonous, which yield many important alkaloids and drugs; as:

seeds:	
Strychnos nux vomica.....	nux vomica strychnine brucine
Strychnos ignatii.....	St. Ignatius bean
bark:	
Strychnos malaccensis.....	hoang-nan
rhizomes:	
Gelsemium sempervirens....	gelsemine
Spigelia marilandica.....	pink root
extractive:	
Strychnos castelnaeana.....	curare.

loganin. $C_{25}H_{34}O_{14}$ = 558.26. A glucoside from nux vomica, m.215.

logarithm. The logarithm (log) of a number, n, is the power, x, to which the logarithmic base, a, must be raised to give that number. $n = a^x$, and $x = \log_a n$. **common-** L. whose base is 10. Abbreviated log or $\log_{10}$. **Napierian-** Natural. **natural-** Napierian-. L. whose base is e (q.v.) or 2.71828 . . . Abbreviated, $\log_e$ or ln.

l. conversion: ln ( ) = **2.3026** log ( ), where ln is the natural, and log the common logarithm.

logarithmic. Pertaining to logarithms. **l. sector method.** Quantitative spectroscopy based on the difference in length between two tapering wedges, produced by photographing the two spectra concerned after passage of the incident light through a wedge-shaped aperture in a disc which rotates in front of the spectrograph.

logwood. Haematoxylon. **l. crystals.** Hematoxylin. **l. extract.** A dark reddish-blue paste made by extracting logwood. Used in dyeing textiles and leather and for the manufacture of haematoxylin. **l. paste.** Hematoxylin paste. Cf. *brazilwood, fustic, sappan.*

-logy. A suffix derived from the Greek λογος (word), indicating a science or doctrine; as, histology, pathology.

loiponic acid. $C_{17}H_{11}NO_4$ = 173.1. Piperidine-3.4-dicarboxylic acid. An oxidation-product of meroquine and quinine.

lokav. Chinese blue.

loliin. A volatile constituent of the seeds of *Lolium* species.

lolium. Poisonous darnel. A grass, *L. temulentum*, found abundantly in wheat and oat fields during wet seasons.

Lomonósov, Michájlo Vasílievič. 1711–1765. A Russian scientist noted for theories of molecular structure, conservation of energy and matter, and of light waves.

London clay. A tough, compact, lower Eocene clay formation, red-brown at the surface and blue-gray below. **L. paste.** A mixture of quicklime and caustic soda moistened with alcohol. **L. purple.** An insecticide: 43 parts arsenic trioxide, 12 parts aniline, 21 parts lime and 1 part ferrous oxide.

longitude. See *co-ordinates.*

longitudinal. Lengthwise or parallel to the longer axis of a body. Antonym: latitudinal.

looseness. The extent to which a dyestuff may be removed by friction.

lophine. $C_{21}H_{16}N_2$ = 296.27. *2.4.5*-Triphenylimidazole. Colorless needles, m.275, insoluble in water.

lophophorine. $C_{13}H_{17}O_3N$ = 235.2. Methoxyanhalonine. An alkaloid from mescal buttons, the buds of *Anhalonium lewinii*, a cactus of Mexico. It is physiologically active, similar to anhalonine and mescaline, and produces hallucinations.

lopion. G2949. A gold-thiourea preparation, used for treatment of tuberculosis.

lorandite. A native sulfo-arsenide of thallium, $TlAsS_2$.

lorenit. $C_9H_6O_4NSI$ = 351.04. An isomer of loretin, used medicinally in dressing wounds and as a substitute for iodoform.

Lorentz, Hendrik Antoon. 1853–1928. A Dutch physicist noted as a pioneer of the electron theory. **L.-Lorenz equation.** The molecular refractivity, R, is related to the molecular weight, M, density, d, and refractive index, n, by

$$R = \frac{n^2 - 1}{n^2 + 1} \cdot \frac{M}{d}$$

Cf. *collinsics*.

loretin. $C_9H_4IN.OH.SO_3H$ = 351.05. 7-iodo-8-hydroxyquinoline-5-sulfonic acid, yatren. Bright yellow, odorless crystals, slightly soluble in water, insoluble in ether, readily soluble in Na_2CO_3 solution. It forms salts with metals; used medicinally as a wound dressing substitute for iodoform and a specific amebicide in dysentery.

loretinates. The metal salts of loretin, *e.g.*, bismuth loretinate (loretin bismuth) and calcium loretinate (loretin calcium); used as antiseptics in wound dressings.

Loring, Frederick Henry. 1870– . An English chemist. **L. numbers.** See *probability*.

loriodendrin. A bitter principle from the bark of the tulip-tree, *Liriodendron tulipifera*, a Magnoliaceae. White, brittle crystalline scales, m.82, decomp. 125, insoluble in water, soluble in alcohol or ether. Cf. *tulipiferine*.

lorol. Trade name for a mixture of aliphatic alcohols formed by the high pressure hydrogenation of coconut oil.

Loschmidt number. The number, n, of gas molecules per cc. at 0°C. and 760 mm. pressure: $n = 2.705 \times 10^{19}$ molecules. Cf. *Avogadro number*.

losophan. $C_7H_5I_3O$ = 485.6. Triiodo-m-cresol. $C_6HI_3(OH)Me$. Colorless crystals, insoluble in water, soluble in ether, chloroform oils, or fats; used as an external antiseptic.

lotase. An enzyme of *Lotus arabicus*, converting lotusin into hydrocyanic acid and lotoflavin.

loth. An obsolete German metallurgical unit of weight. 1 loth per centner = 1 part per 3200.

lotion. A liquid preparation used for washing and rinsing; usually an antiseptic solution. **black-** A solution of calomel in lime water, used as a parasiticide and antiseptic. **yellow-** A solution of corrosive sublimate in lime water.

lotoflavin. $C_{17}H_{16}O_6$ = 286.08. A yellow coloring matter from *Lotus arabicus*. Cf. *lotusin*.

lotusin. $C_{28}H_{31}NO_{16}$ = 637.3. A glucoside from the leaves of *Lotus arabicus*, a Leguminosae. Yellow crystals hydrolysed to dextrose, hydrocyanic acid and lotoflavin.

loudness. The intensity of sound as measured by the human ear and expressed in bels (q.v.). Common conversation is about 60 decibel. L. differs from the sound energy as measured by electrical instruments (cf. *phon*):

Loudness (*human ear*)	=	Sound Energy (*electric instrument*)
10 decibels	=	10
20 decibels	=	100
30 decibels	=	1,000
40 decibels	=	10,000
50 decibels	=	100,000
60 decibels	=	1,000,000
70 decibels	=	10,000,000
80 decibels	=	100,000,000
90 decibels	=	1,000,000,000
100 decibels	=	10,000,000,000

loup. A simple magnifying lens.

louver. A ventilator of sloping boards or slats, usually fixed, which keep out rain, but not air.

lovage. Sea parsley, levisticum, ligusticum, Chinese tang-kui, man-mu. The dried herb of *Levisticum officinale*, an Umbelliferae; used as the fluid extract, as an aromatic and carminative. Cf. *eumenol*. **Scotch-** The root of *Ligusticum scoticum*, used sometimes by Highlanders as chewing tobacco. **l. oil.** A colorless essential oil of fragrant odor distilled from lovage; insoluble in water, soluble in alcohol or ether and used in perfumery. It contains terpineol and terpene.

Lovibond tintometer. A colorimeter for comparing the color of a liquid with a standard series of tinted glass slides.

low. Weaker or poorer. **l. carbon.** A steel with small carbon content. **l. explosives.** A class of unstable chemicals and mixtures consisting of carbon, sulfur and nitrates, such as black gunpowder, blasting powder. Antonym: high explosives.

löweite. $2MgSO_4,2Na_2SO_4,5H_2O$. A vitreous yellow, or white, fusible mineral.

Lowenstjern. See *Kunkel*.

lox. An explosive consisting of liquid oxygen, used in mining. With fuses it explodes like gunpowder; with detonators it detonates like dynamite.

loxa bark. Cinchona bark.

lozenge. A medicated tablet, usually for throat diseases.

Lu. The symbol for lutecium.

luargol. $(C_{12}H_{12}O_2N_2As)_2.AsBr.SbO(H_2SO_4)_2$. *3.3'*-Diamino-*4.4'*-hydroxy arsenobenzene silver bromide antimonyl sulfate. A remedy for sleeping sickness.

lubanol. Coniferol.

luboil. Lubricating oil.

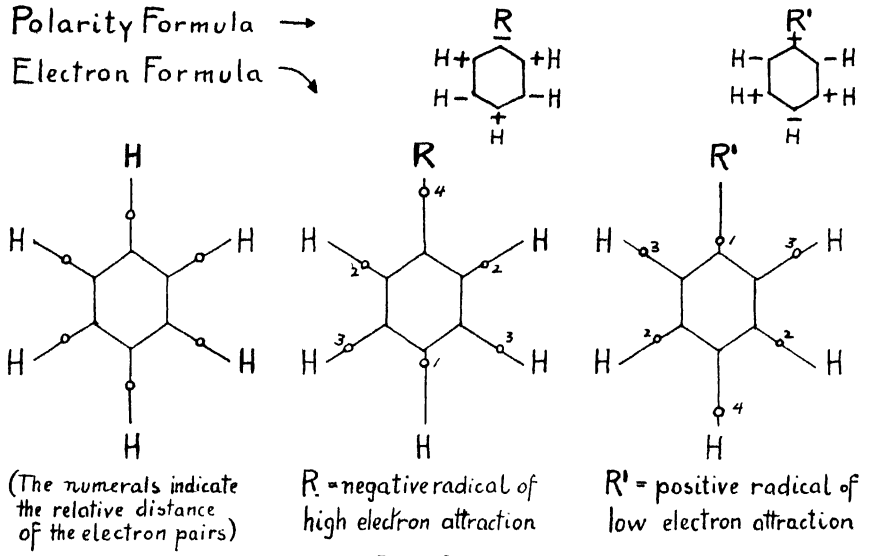
lubricant. An agent that decreases friction between moving surfaces. **liquid-** An oil or semi-liquid grease. **solid-** A lubricant such as graphite, talc, soap, or sulfur.

lubricating oil. A heavy distillate of petroleum of varying density, used for lubricating machinery.

lubrication. Making smooth or slippery.

lubricator. Lubricant.

Lucas, Howard J. 1885– . An American chemist, noted for work in organic chemistry. **L. theory.** In an organic compound the substituting radical affects the electronic orbits of a carbon atom either: (a) by pulling the electronic pair towards the substituting radical if it has a high electron attraction (*i.e.*, is nega-



Lucas theory.

tive); or (b) by repelling it from the substituting radical, if the latter has a low electron attraction (*i.e.*, is positive). In each case the remaining electronic orbits are either shortened or elongated. This explains, in conjunction with the Pauling structure of benzene, the difference in the degrees of reactivity of the para, ortho, and meta positions which are respectively, most, less and least influenced by the substituting radical. (See figure.) Cf. *screening effect.*

lucerne. Alfalfa.

luciferase. An enzyme found in a luminous mollusk, *Pholas dactylas*, which is luminescent in cold but not hot aqueous solutions.

luciferin. A water-soluble protein from a luminous mollusk, *Pholas dactylus*, or the fire-fly, *Cypridina hilgendorfi.*

luciferinase. An enzyme associated with the production of luciferin.

lucigenin. Methyl acridilium nitrate.

lucinite. A native aluminum phosphate $Al_2O_3.P_2O_5.4H_2O$.

lucite. Trade-mark for plastic based on polymerized methyl methacrylate resin, widely used for the enclosures of airplanes. Cf. *leucite.*

lucitone. Trade-mark for methyl methacrylate resins used in making dentures.

lucium. A supposed chemical element discovered in 1896, which proved to be a mixture of rare earth metals.

Lucretius. About 98–55 B.C. The earliest scientific writer, in whose works a conception of the atomic theory exists.

lucumin. A glucoside from the bark of *Lucuma glycyphloea.* Colorless needles. See *monesia.*

ludlamite. $Fe_3(PO_4)_2$. A green mineral.

Ludolf's number. The ratio of the circumference of a circle to its diameter, usually termed π or pi = 3.14159,26535,89793,23846.

Ludwig effect. Soret effect.

ludwigite. $3MgO.B_2O_3$, Fe_3O_4. A blue or green mineral.

ludyl. $C_{30}H_{26}O_3N_4S_2As_4Na$. Sodium salt of benzene-*m-3.3'*-disulfamino-bis-(*3*-amino-*4.4'*-dihydroxybenzene), used for syphilis.

luetin. An extract from killed cultures of *Treponema* bacteria; used in skin tests for syphilis.

luffa. Vegetable sponge, gourd towel, wash-rag sponge, loofah. The fibrous skeleton of the fruits of *Luffa cylindrica*, a Cucurbitaceae, used as a sponge.

Lugol solution. A solution containing 5 gm. iodine and 10 gm. (U.S.P.) or 7.5 gm. (B.P.C.) potassium iodide per 100 cc.

lukabro oil. An oil from *Hydnocarpus anthelmintica*, of Siam, similar to hydnocarpus oil; $d._{30}°0.943–0.950$, n_D^{30} 1.4733–1.4753.

Lully, Raymond. 1235–1315. Ramon Lull, Raymundus Lullus. A Spanish alchemist and writer of alchemical books, who described and prepared nitric acid, aqua regia, alcohol and potassium carbonate.

lumarith. Trade name for a cellulose acetate plastic.

lumbang oil. Candle nut oil. A colorless oil expressed from the seeds of *Aleurites moluccana*, candle nut, d.0.923, insoluble in water, soluble in alcohol or ether. Used as an illuminant, in soap manufacture and in paints.

lumen. (1) A unit of luminosity or luminous flux, the light emitted by a point-source of one candle power: 1 lumen = 0.001496 watt = 0.07958 spherical candle powers. 1 lumen emitted per square foot has a brightness of 1.076 milli-lamberts. 1 spherical candle power = 12.57 lumens. (2) The bore of a small tube. *E.g.*, the cavity of a thermometer tube, blood vessel, etc.

luminal. $C_{12}H_{12}O_3N_2$ = 232.2. Phenobarbital, phenylethylbarbituric acid, phenylethylmalonylurea, *2.4.6*-trioxy-*5*-phenylethylpyramidine. A white, odorless powder, m.172, insoluble in water, soluble in alcohol or ether; used medicinally as a hypnotic. **l. sodium.** Sodium phenyl ethyl barbiturate. Cf. *luminol.*

luminescence. The emission of light at room temperature under the influence of various physical agents; as mechanical (tribo-l.), electrical (electro-l.), radiant (photo-l.), thermal (thermo-l.), or chemical (chemo-l.) means. Cf. *fluorescence, irradiation, excitation, phosphorescence.* **chemo-** The emission of light as a result

of a slow chemical reaction in which no appreciable increase in temperature takes place; as, by phosphorus, decaying wood, fireflies. *Cf. phosphorescence, luminol.* **crystallo-** The emission of light during crystallization; as, arsenous acid from HCl-solution, or on crystallization after fusion. **electro-** The emission of light due to the passage of electricity through gases at low pressure and temperature; as, in vacuum tubes. **photo-** The emission of light on exposure to invisible radiations; hence the transformation from one wavelength into another; as, ultraviolet rays into visible rays. According to the quantum theory the atoms become excited by the absorption of energy from radiations, and on returning to normal they emit the energy previously absorbed in the form of their own characteristic radiations. Cf. *quantum, Bohr atom, spectrum, scattering, Raman effect.* The intensity of l. of some substances under the influence of ultraviolet rays from a mercury arc lamp or an ultraviolet argon lamp are:

Intensity	*Color*
10 uranium nitrate	green
9 sodium salicylate	violet
9 anthracene	green
9 calomel	orange
9 caffeine	violet
8 phloroglucinol	blue
8 antipyrine	white
8 quinine salicylate	violet
8 salol	green
8 benzidine	blue
8 salicylic acid	blue
7 novocaine	violet
7 calcium gluconate	orange
6 aluminum tartrate	white
6 phthalic anhydride	violet
6 phenolphthalein	blue
5 atropine	white
5 potassium cyanide	blue
4 mercury salicylate	green
4 methyl salicylate	green
3 turpentine	blue
2 phenol	yellow.

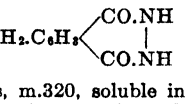
radio- The emission of light by radioactive substances. **thermo-** The emission of light after slight heating; as, by chlorophane. **tribo-** The emission of light caused by friction or other mechanical means in which no rise of temperature takes place; as, by sugar crystals, calcium chloride, quartz.

luminiferous. Giving off light without a rise in temperature. Cf. *incandescent.*

luminoflavin. A luminescent substance having a blue fluorescence which is produced by the irradiation of flavin with ultraviolet light; it occurs in urine and in plant products.

luminogram. A registered trade name for a photograph of the fluorescence of a substance produced by the action of ultraviolet light.

luminol. $C_8H_7O_2N_3$ = 170.04. *3*-Aminophthalhydrazide, *5*-amino-*1.4*-dihydroxyphthalazine,



White crystals, m.320, soluble in water. The alkaline solution becomes brightly luminescent when treated with H_2O_2 and $K_3Fe(CN)_6$. Cf. *luminal.*

luminophore. (1) A substance which gives off light at room temperature. (2) An organic radical which produces or increases the luminescence of a compound.

luminosity. (1) The quantity of visible rays or light emitted by a body, measured in lumens. (2) Luminescence.

luminous. Pertaining to luminescence. **l. flux.** The radiant power of a substance, *e.g.*, its capacity to produce the sensation of light; the unit is the lumen. **l. intensity.** The unit of brightness; candle power. **l. paint.** A pigment which is luminescent or phosphorescent and glows in the dark after exposure to light, composed usually of the sulfides of calcium, barium and zinc, to which may be added a small quantity of a radioactive substance. Used for watch dials, door knobs, signs, or electric switches.

lumisterol. Irradiated ergosterol. Cf. *cholane, vitamin D_1.*

lumophore. Luminophore.

lunar caustic. Fused silver nitrate. **l. cornea.** Fused silver chloride.

Lunge, Georg. 1839–1923. A German chemist, noted for work on technological analytical methods, (nitrometer), coal distillation and commercial production of chemicals. **L. nitrometer.** Nitrometer.

lupanine. $C_{15}H_{24}ON_2$ = 248.3. An alkaloid from the seeds of *Lupinus angustifolius*, a Leguminosae. A pale yellow, syrupy liquid of green fluorescence, slightly soluble in water, soluble in alcohol or ether. **iso-** Matrine.

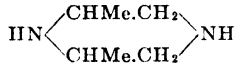
luparenol. $C_{15}H_{24}O$ = 220.2. An unsaturated alcohol from the higher-boiling fraction of hop oil, b.$_{3mm}$125–128.

luparol. $C_{16}H_{26}O_2$ = 250.20. A phenolic ether derived from luparone. A colorless liquid, d.0.9170, b.$_{2mm}$123.

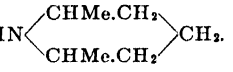
luparone. $C_{13}H_{22}O$ = 194.17. A ketone derived from the higher-boiling fractions of hop oil. A colorless liquid, d.08861, b.$_{3mm}$75.

lupeose. $C_{22}H_{42}O_{21}$ = 666.32. A tetrasaccharide from lupine.

lupetazin. $C_6H_{14}N_2$ = 114.2. Dimethylpiperazine, dipropylenediamine



A white crystalline powder, insoluble in water, soluble in alcohol or ether; used as an antirheumatic.

lupetidine. $C_7H_{15}N$ = 113.2. 2.6-dimethylpiperidine,  A colorless oily liquid.

lupigenin. $C_{17}H_{12}O_6$ = 312.1. A decomposition-product of lupinin.

lupin(e). *Lupinus.* A genus of leguminous plants; some are poisonous, others are cultivated as forage plants. **l. alkaloids.** The alkaloids derived from *Lupinus* species; as, lupinine, lupinidine, arginine and their derivatives.

lupinidine. (1) $C_8H_{15}O_2N$ = 157.2. An alkaloid from the seeds of *Lupinus luteus* and *L. niger.* A yellowish syrupy liquid. (2) Sparteine. **l. hydrosulfate.** $(C_8H_{15}O_2N)_2 \cdot H_2SO_4$ = 412.4. Colorless crystals, soluble in water; used in medicine.

lupinin. $C_{29}H_{52}O_{16}$ = 636.3. A glucoside from various *Lupinus* species. Yellowish crystals, soluble in alkali and hydrolysed to glucose and lupigenin. Cf. *lupinine.*

lupinine. $C_{21}H_{40}N_2O_2$ = 352.33. An alkaloid from the seeds of *Lupinus niger* and *Lupinus luteus*. A colorless crystalline powder, m.67, b.256, insoluble in water, soluble in alcohol, ether or chloroform. Cf. *lupinin*. **anhydro-** $C_{10}H_{17}N$. **dimethyl-** $C_{10}H_{17}ONMe_2$. **methyl-** $C_{10}H_{18}ONMe$.

lupulin. Humulin. A bright, yellowish-brown granular powder, of characteristic odor and hop taste, consisting of the glandular trichomes from the strobiles of *Humulus lupulus*, hops; used medicinally as a sedative and stomachic.

lupulinic acid. $C_{32}H_{50}O_7$ = 546.5. The bitter principle of hops. Brittle, large, rhombic prisms of hop taste.

lupulon. $C_{26}H_{38}O_4$ = 414.3. A constituent of the soft resin of hop lupulin. Cf. *humulon*.

lupulus. Hops.

lupus lapidis. Stone consumption. The decay of rocks due to the action of bacteria, yeasts and molds, and not to weathering.

luster. The reflection from the fractured surface of a rock, metal or crystal.

lustron. Trade name for a polystyrene plastic.

lute. A mixture of fireclay and water used to seal cracks in or covers of crucibles.

lutecium. Lu = 174.99. A rare earth metal, atomic number 71, valencies 3 and 4. It was discovered (1905) by Auer von Welsbach and named cassiopeium; and in 1907 by Urbain, and named after Lutetia (= Paris). **l. chloride.** $LuCl_3$ = 281.5. White crystals, soluble in water. **l. oxide.** Lu_2O_3 = 398.0. White powder, insoluble in water.

lutein. (1) $C_{40}H_{56}O_2$ = 568.4. The carotenoid (q.v.) coloring matter of egg yolk, consisting of 70 % xanthophyllin and 30 % zeaxanthin. (2) A yellow pigment from the fully-developed corpora lutea of the hog, free from foreign material, dried and powdered. **l. solution.** A solution of the water-soluble extractives of lutein; used in medicine for injections in pregnancy and for women's diseases.

luteo- A prefix, from the Latin, indicating orange-yellow.

luteocompounds. A series of yellow cobaltiammonium compounds, *e.g.*, hexammincobaltic-chloride; $[Co(NH_3)_6]Cl_3$. The ammines of a tetra-, tri- or bivalent metal of the general type, $[M(NH_3)_6]X_3$ and $[M(NH_3)_6]X_2$.

luteol. Oxychlordiphenylquinoxaline. An indicator exceeding in its sensitiveness litmus and phenolphthalein, and more sensitive to ammonia than Nessler's reagent; it is yellow in alkali and colorless in acid solutions. **l. solution.** A solution of one gram of luteol in 100 cc. alcohol, used as an indicator in volumetric analysis.

luteole. A carotene in yellow corn grain.

luteolin. $C_{15}H_{10}O_6$ = 286.08. Isofisetin. Tetrahydroxyflavone. A flavone derivative and a coloring matter of weld, *Reseda luteola* which was used as a dye in Caesar's time. Yellow, silky shining crystals, m.328, insoluble in water, soluble in alcohol, alkalis, ether or benzene. Used in dyeing silk and as a diuretic.

luteosalts. See *luteo-compounds*.

luteosterone. Progesterone.

lutidine. C_7H_9N = 107.07. Dimethylpyridine*. A group of pyridine derivatives: α- or alpha- or **1.2-** A colorless liquid, d.0.947, soluble in water. β- or beta or **1.3-** A colorless liquid, used medicinally as an antispasmodic. **2.4-** A colorless liquid, d.0.938, b.157, soluble in water. **2.6-** The commonest lutidine, obtained from tar and bone oils. A colorless liquid, d.0.942, b.142, soluble in water. **3.6-** A colorless liquid, b.163, soluble in water. **dihydro-** See *dihydrolutidine*. **hexahydro-** Lupetidine.

lutidinic acid. $C_7H_5O_4N,H_2O$ = 185.07. 1.3-pyridine dicarboxylic acid*. Colorless crystals, m.249, soluble in water or alcohol, insoluble in ether.

lutidone. C_7H_9ON = 123.1. 2.4-dimethyl-3-oxypyridine, $HN\langle \begin{matrix} CH.CMe \\ CH.CMe \end{matrix} \rangle CO$. Colorless crystals, m.225.

lutol. Aluminum borotannate.

lux. A unit of illumination: 1 lux equals 1 lumen per square meter. 1 lux = 1 lumen per $m.^2$ = 0.0001 phot = 0.1 milliphot = $\frac{1}{10}$ foot-candle.

luzidol. Benzoyl peroxide.

lyaconine. Acolytine.

lyate ion. A solvent molecule minus a proton, as OH^- from water. Cf. *acid*, *base*.

lycetol. $C_{10}H_{20}O_6N_2$ = 264.3. Lupetazin tartrate, dimethylpiperazine tartrate. Colorless crystals, m.243, soluble in water; used in medicine.

lychnin. A poisonous glucoside from *Lychnis* species, Caryophyllaceae.

lycine. $C_5H_{11}O_2N$ = 117.1. An alkaloid from the leaves of *Lycium halimifolium*, a Solanaceae. White, hygroscopic, crystals, soluble in hot water or alcohol. Cf. *lysine*.

lycoctonine. $C_{27}H_{41}O_9N$ = 523.4. An alkaloid from the roots of *Aconitum lycoctonum*, a Ranunculaceae. White crystals, m.100, insoluble in water, soluble in alcohol, or chloroform.

lycopene. $C_{40}H_{56}$ = 536.4. Licopin. An unsaturated hydrocarbon and carotenoid (q.v.) pigment from many plants, as, tomato, etc.; also in *Lycopersicum esculentum*. Red crystals, m.168, isomeric with carotene, q.v.

lycopodium. Vegetable sulfur. A dry, light, yellow powder consisting of the inflammable spores of *Lycopodium clavatum*, a club-moss. It is used as a dusting powder, microscope reagent, for coating medicinal pills, and formerly on the stage for producing flashes of light.

lycorine. $C_{16}H_{17}O_4N$ = 287.2. Narcissine. An alkaloid from the bulbs of *Crinum giganteum*, *Lycoris radiata*, *Narcissus pseudonarcissus*, and other Amaryllidaceae species. Colorless polyhedric crystals, decomp. 250, slightly soluble in water, soluble in alcohol or ether; used medicinally as a substitute for emetine. **dimethyl hydroxy-** Sekisanine.

lyddite. An explosive containing principally picric acid.

lydian stone. Jasper.

lye. (1) The alkaline solution obtained by leaching wood-ashes. (2) A solution of sodium or potassium hydroxide. Cf. *ley*.

lygosin. $C_{17}H_{12}O_3Na_2.7H_2O$ = 436.2. Sodium lygosinate, $CO(CH:CH.C_6H_4ONa)_2$. Lustrous green crystals, soluble in water with a red color; used as a bactericide.

Lyman series. The first group of spectrum lines of hydrogen. Cf. *energy level*, *Balmer*, *Paschen series*.

lymph. A transparent, slightly alkaline liquid, permeating the animal organism and resembling blood serum.

lymphocyte. A white blood-corpuscle with a single nucleus. They constitute about 25 % of the white blood-corpuscles.

lyochromes. A group of natural water-soluble plant pigments. Cf. *carotenes.*

lyonium ion. A solvent molecule plus a proton, as H_3O^+ from water. Cf. *acid, base, hydronium.*

lyophil(e). Attracting liquids. A colloidal system in which the dispersed phase is a liquid and has an attraction for the dispersing medium. Cf. *hydrophile.*

lyophilized biological. Any biological substance, such as blood plasma, antitoxins, toxins, serums, etc., which has been prepared in dry form by rapid freezing and dehydration, while in the frozen state, under high vacuum. Such a preparation is more stable than the product from which it was derived, does not require refrigeration, and is made ready for use by the addition of sterile, distilled water. Commercial processes of freezing and dehydration are referred to as *cryochem, desivac,* and *lyovac.*

lyophobe. Repelling liquids. A colloidal system in which the dispersed phase is a solid and has no attraction for the dispersion medium; hence it is unstable and tends to separate. Cf. *hydrophobe.*

lyosorption. The adhesion of a liquid to a solid; hence the adsorption of a solvent film on the surface of suspended particles. Cf. *adsorption.*

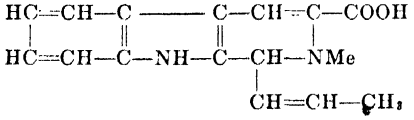
lyotrope. (1) An ion or radical of a lyotropic series. (2) A readily soluble substance.

lyotropic series. A number of ions, radicals, or salts, arranged according to their influences on different phenomena in colloid chemistry on physiological action or on catalytic effects, which are due to the alteration of the properties of the solvent by the ions. Thus the following salts appear always in the same order, although with some phenomena the order is reversed. Potassium ferrocyanide > sodium citrate > sodium hydrogen phosphate > sodium fluoride > sodium sulfate > sodium tartrate > sodium thiosulfate > sodium acetate > sodium formate. Cf. *Hofmeister series.*

lyovac process. A process of freezing and dehydrating aqueous preparations. Cf. *lyophilized biological.*

lysatine. $C_6H_{13}O_2N_3$ = 159.2. A crystalline alkaloid derived from casein.

lysergic acid. $C_{16}H_{16}N_2O_2$ = 270.14. A monobasic acid from ergot.



lysidine. $C_4H_8N_2$ = 84.1. Ethylene-ethenyldiamine, μ-methylglyoxalidine, methyldihydroimidazol, . Red, hygroscopic crystals, m.105, b.196; soluble in water, alcohol, or ether. Used medicinally. **l. solution.** A 50 % aqueous solution of l., a yellowish or pinkish, soapy liquid used medicinally as a solvent for uric acid. **l. tartrate.** Colorless crystals, soluble in water.

lysimeter. A device for determining approximately the solubility of substances.

lysin. An antibody which dissolves cells; as, hemolysin, bacteriolysin, cytolysin.

lysine. $C_6H_{14}O_2N_2$ = 146.32. α, ϵ-diaminocaproic acid, *2,6*-diaminohexanoic acid*. $NH_2.CH_2.CH_2.CH_2.CHO_2.CHNH_2.COOH$. An isolog of ornithine and an amino-acid in many proteins. White needles, m.224, very soluble in water. Usually prepared from casein, gelatin or protamines. Cf. *lycine, lysin.* **hydroxy-** $C_6H_{14}N_2O_3$ = 162.32. An amino acid and constituent of proteins.

lysis. (1) The dissolution of a substance as the result of the action of a lysin; as hemolysis, cytolysis, etc. (2) The decomposition of a substance; as, electrolysis and analysis. (3) The cleavage of a bond or the decomposition of a compound accompanied by the addition of:

H—OH, water	hydrolysis
H—NH_2, ammonia	ammonolysis
HO—C_2H_5, alcohol	alcoholysis
H—H, hydrogen	hydrogenolysis

lysitol. Lycetol.

lysogen. A substance which produces or generates a lysin.

lysol. The registered trade-mark for a cresylic disinfectant and antiseptic.

lysozyme. The powerful antiseptic agent found in tears, in leucocytes, bodily secretions, egg albumin and turnips.

lytic. (1) Pertaining to lysins, *e.g.*, hemolytic, cytolytic. (2) Pertaining to lysis, as hydrolytic, electrolytic.

lyxose. $C_5H_{10}O_5$ = 150.1. A pentose or pentatomic monosaccharide, which ocurs in two optically active isomers: d- and l-. $(CHOH)_3.O.CH.CH_2OH$.

M

M. (1) A symbol for metal; M^I a univalent, M^{II} a divalent metal etc. (2) An abbreviation for: (*a*) mass, (*b*) molal, (*c*) molecular weight, (*d*) mega, or one million, (*e*) the mathematical constant, $\log_{e10} = 0.43429,44819$. $(M)^{-1}$. The mathematical constant $\log_e 10 = 2.30258,50930$. **M. acid.** *1*-Amino-*5*-naphthol-*4*-sulfonic acid. **M.A.R.** An abbreviation for microanalytical reagent. **M. electron.** The e. of the M shell or M orbit (q.v.); there are eight in the second, and eighteen in the third and following periods. **M. orbit.** The third layer or energy-level, in which electrons move around the proton in the dynamic atom. **M. radiation.** A series of homogeneous x-rays characteristic of the metal used as anticathode, and fainter than the K and L series. They are assumed to be caused by electrons falling back to the M orbit. **M. series.** The spectral lines produced by the M radiations when they are diffracted through a crystal grating. Cf. *Moseley spectra.* **M. shell.** The third layer or energy level, in which electrons oscillate in the static atom.

m. An abbreviation for: (1) meter, (2) meta-position, (3) milli or one-thousandth part. m^2. An abbreviation for square meter. m^3. An abbreviation for cubic meter. Cf. *mm., mmm.*

♏. An abbreviation for minim.

μ. The Greek letter "mu" (m). An abbreviation for: (1) micron, (2) meso-position, (3) micro- or one-millionth of a unit, (4) magnetic permeability. Cf. mμ, μμ.

Ma. The symbol for masurium.

ma. An abbreviation for milliampere.

Maassen cylinder. A porous, unglazed porcelain cylinder, used for filtering biochemical solutions.

Mac. See also *Mc.*

macaroni. Long, slender, stiff brittle tubes made of paste of the highly glutinous flour of hard Italian wheat. If cooked it is edible.

macassar oil. A yellowish-white fat of pleasant odor extracted from the seeds of *Schleichera trijuga*, from India and the Malay States.

mace. Macis. The dried covering tissues of the seeds of *Myristica fragrans;* used as a condiment. **m. oil.** An essential oil from mace. A colorless liquid of characteristic odor, d.0.91, soluble in alcohol or ether; used in flavoring agents. Cf. *nutmeg, otoba, myristica, lawang oil.*

macene. $C_{10}H_{18} = 138.1$. A liquid terpene from mace oil.

maceral. A general name for the microscopic structures of the mineral constituents of coals.

macerate. To steep or soften and break up a solid by soaking in water.

maceration. The act of steeping or soaking a solid in a liquid.

mache unit. [Heinrich Mache, Austrian physicist, 1876– .] M.E. A unit of radioactive emanation. The quantity of emanation which produces a saturation current of one-thousandth of an electro-static unit. 1 curie $= 2.8 \times 10^9$ mache; 1 mache $= 3.64 \times 10^{-10}$ curie/liter = 3.64 eman.

mackay bean. The dried seeds of *Entada scandens*, a leguminous plant of Queensland, used as a coffee substitute.

Mackey test. A test to determine the autoxidation fire hazards of oils.

Maclaurin series. A series of numbers expressed by the general equation:

$$f(x) = f(o) + \frac{x}{1} f'(o) + \frac{x^2}{2} f''(o) + \cdots \frac{x_n}{n} f^n(o) \cdots$$

maclayine. $C_{17}H_{32}O_{11} = 412.26$. An alkaloid derived from *Illipe maclayana*, a Sapotaceae of the tropics.

MacLeod, John James Rickard. 1876–1935. A Scottish-Canadian biochemist, noted as discoverer of insulin (with Banting) and Nobelist in 1924.

macleyine. Protopine.

maclurin. $C_{13}H_{10}O_6.H_2O = 280.1$. Pentahydroxybenzophenone, osage orange (q.v.), moringatannic acid; $C_6H_3(OH)_2CO.C_6H_2(OH)_3$. The pale yellow coloring matter from the wood of *Maclura aurantiaca.* A bright, yellow, crystalline powder, m.200, soluble in hot water, alcohol or ether; used as a dye.

macro- A prefix derived from the Greek (*μακρός* broad), indicating "large."

macroaxis. The long axis in orthorhombic or triclinic crystals.

macrobacterium. A large bacterium.

macrocarpine. An alkaloid from *Thalictrum macrocarpum*, a Ranunculaceae; yellow crystals, soluble in water.

macrochemistry. (1) The chemistry of chemical reactions which are seen by the naked eye. Antonym, microchemistry, q.v. (2) Chemical operations on a large scale.

macrodome. See *dome.*

macrofarad. Megafarad.

macrograph. Photomacrograph.

macroscopic. Objects visible to the naked eye. Antonym, microscopic, q.v.

macrotin. Cumicifugin.

macrotoid. The combined principles from the root of *Cimicifuga racemosa;* used in medicine as an antispasmodic.

macrotys. Cimicifuga.

maculanin. Potassium amylate.

madder. Turkey red, q.v. The dried and pulverized root of *Rubia tinctorum* and other species. It contains several glucosides which yield, on fermentation, alizarin and purpurin. Used in dyeing, and as a pigment in lakes. Cf. *garancin, purpuroxanthic acid.*

mafic. A rock-forming material consisting mainly of magnesium and iron silicates.

mafurite. A mineral association of kieserite and augite (q.v.).

magdala red. $C_{30}H_{21}N_4Cl$. Naphthalene red. A safranine of the naphthalene series. A dark brown powder, used as a dye for silk.

magenta. Fuchsin.

magma. (1) In geology: a liquid molten rock, or the material from which igneous rocks have been formed. (2) in pharmacy: a suspension of a fine precipitate in water; *e.g.*, ferric hydroxide magma, magnesia magma. Cf. *milk.*

magnalium. An alloy of magnesium and aluminum containing from 2–10 % magnesium. Used in the construction of airships, flying machines, balances, and automobiles.

magnesia. Magnesium oxide. **calcined-** Magnesium oxide obtained by heating the carbonate. **fluid-** A solution of magnesium bicarbonate (2.65 grams per 100 cc.). **milk of-** See *milk.* **ponderous-** Heavy magnesium oxide.

m. alba. A hydrated magnesium carbonate. *m. a. levis.* $4MgCO_3.Mg(OH)_2.5H_2O$. *m. a. ponderosa.* $MgCO_3.Mg(OH)_2.4H_2O$. **m. mixture.** A clear, colorless liquid made by dissolving 55 gm. $MgCl_2.6H_2O$, and 70 gm. NH_4Cl in 650 cc. water and adding 350 cc. 10 % NH_4OH. Used in analysis for precipitation of phosphates and arsenates. **m. niger.** An early name for pyrolusite. **m. usta.** Magnesium oxide.

magnesian limestone. Limestone containing variable amounts (about 10 %) of magnesite.

magnesioferrite. A spinel, $MgFe_2O_4$.

magnesite. $MgCO_3$. A native magnesium carbonate, used as a refractory lining for furnaces and kilns, and in medicine as a substitute for plaster of Paris.

magnesium. Mg = 24.32. An alkaline earth-metal element, atomic number 12, valency 2. A silver-white metal, d.1.74, m.651, b.1120, insoluble in water, decomp. or dissolved by all acids with the formation of the corresponding salts. It occurs in nature in magnesite and dolomite (carbonates); serpentine, asbestos, talcum, biotite and meerschaum (silicates); in Stassfurt salts and mineral waters; and in sea water. The metal was first obtained by electrolysis (1830) by Liebig and Bunsen. Magnesium forms only one series of compounds, which yield the Mg^{++} magnesium ion in aqueous solutions. It is manufactured in bars, sheets, ingots, ribbons, wire, and powder. Used in electric batteries; in construction of airships and flying machines; in flash-light powders, and pyrotechnics; as a deoxidizer in making brass and for thermite. **m. acetate.** $Mg(C_2H_3O_2)_2.4H_2O$ = 214.4. Colorless monoclinic crystals, d.1.45, soluble in water or alcohol. **m. acid citrate.** $MgHC_6H_5O_7.5H_2O$ = 304.4. Citresia. A white, odorless, crystalline substance of pleasant acid taste, soluble in water; used as a laxative and purgative. **m. alkyl compounds.** A series of organic compounds of the general type, MgX_2, where X is an alkyl radical; *e.g.*, $MgEt_2$ = magnesium ethide. **m. alkyl condensation.** Grignard reaction. **m. aluminate.** $MgAl_2O_4$ = 142.26. Spinel. Colorless cubic crystals, d.3.6, m.2135, insoluble in water; used as refractory. **m. ammonium arsenate.** $MgNH_4AsO_4.6H_2O$ = 289.4. Colorless tetragonal crystals, soluble in water. **m. ammonium chloride.** $MgCl_2.NH_4Cl.6H_2O$ = 254.4. A white, crystalline powder, soluble in water; used in magnesia mixture, q.v. **m. ammonium phosphate.** $MgNH_4PO_4.6H_2O$ = 245.6. Colorless, tetragonal crystals, d.1.71, decomp. by heat into magnesium pyrophosphate; soluble in water or acids. **m. ammonium sulfate.** $MgSO_4(NH_4)_2SO_4.6H_2O$ = 360.4. Colorless crystals, soluble in water. **m. arsenide.** Mg_3As_2 = 222.88. Decomp. by water. **m. aryl compounds.** A series of organic compounds of the general type, MgX_2, where X is an aryl radical; *e.g.*, $MgPh_2$ = magnesium diphenyl. **m. benzoate.** $Mg(C_7H_5O_2)_2$ = 266.4. A white powder, soluble in water; used as an antiseptic. **m. bicarbonate.** A solution of $MgCO_3$ in carbonated water. **m. bichromate.** $MgCr_2O_7$ = 240.3. Orange-brown, hygroscopic crystals, soluble in water. **m. biphosphate.** $MgH_4(PO_4)_2$ = 218.4. Acid magnesium phosphate; monobasic magnesium phosphate. A yellow, crystalline powder, insoluble in water or alcohol, soluble in acids; used as a laxative. **m. bisulfate.** $MgH_2(SO_4)_2$ = 218.3. Acid magnesium sulfate. A colorless crystalline powder, soluble in water; used as a cathartic. **m. borate.** $Mg(BO_2)_2$ = 109.9. Antifungin. A white powder, soluble in water, used as an antiseptic. **m. boride.** An insoluble powder of doubtful composition. **m. boro-citrate.** $Mg_2(BO_2)C_6H_5O_7$ = 280.6. A colorless powder, soluble in water, used as an antiseptic. **m. bromate.** $Mg(BrO_3)_2.6H_2O$ = 388.3. Colorless crystals, soluble in water, decomp. by heat. **m. bromide.** $MgBr_2.6H_2O$ = 292.25. Colorless, hexagonal crystals, decomp. by heat, soluble in water; used for the electrolytic preparation of magnesium, and in medicine as a sedative. **m. butyrate.** $Mg(C_4H_7O_2)_2$ = 198.4. Colorless, hygroscopic crystals, soluble in water. **m. cacodylate.** $Mg(AsMe_2O_2)_2$. A white powder, soluble in water. **m. calcium chloride.** Tachhydrite. **m. carbide.** (1) MgC_2 = 48.32. (2) MgC_3 = 60.32. **m. carbonate.** $MgCO_3$ = 84.32. Magnesite, dolomite, heavy m. carbonate. Colorless, rhombic, crystalline powder, d.3.04, decomp. 350; slightly soluble in water, soluble in acids or carbonated water. Used in the preparation of magnesium salts, fireproofing compositions, and pharmaceutical preparations (tooth-paste). *basic-* $4MgCO_3.Mg(OH)_2.5H_2O$ = 485.7. Magnesia alba levis, light m. carbonate, magnesii carbonas (U.S.P.). Very light, white powder, d.2.18, slightly soluble in water, soluble in ammonia; used medicinally as a dusting powder, antiacid, and laxative. *heavy-* Magnesia alba ponderosa. *light-* Basic magnesium carbonate. **m. chromate.** $MgCrO_4.7H_2O$ = 266.4. Orange-yellow crystals, m.100; soluble in water. **m. chlorate.** $Mg(ClO_3)_2.6H_2O$ = 299.2. A hygroscopic, colorless, crystalline powder, m.40, soluble in water; used medicinally in ointments for skin diseases. **m. chloride.** $MgCl_2$ = 95.21. Fused magnesium chloride, anhydrous m. chloride. White, crystalline masses, d.2.17, m.708, soluble in water. Used in the manufacture of metallic magnesium; for fireproofing; for magnesia cements, composition floorings and artificial stones. *hydrated-* $MgCl_2.6H_2O$ = 203.3. Crystallized magnesium chloride. Colorless, bitter, hygroscopic crystals, d.1.57, m.100, decomp. 186, soluble in water or alcohol. Used in medicine as a saline cathartic; commercially for disinfectants, fireproofing, and dressing cotton fabrics. **m. citrate.** $Mg_3(C_6H_5O_7)_2.14H_2O$ = 703.1. Colorless scales, soluble in water; used in pharmaceutical preparations. *effervescent-* A granular mixture of magnesium citrate, sodium bicarbonate, citric acid, and sugar; used medicinally as a saline laxative. **m. copper**

alloy. An alloy used as activator for the Grignard reaction. **m. dioxide.** M. peroxide. **m. dust.** Finely powdered, magnesium metal used in pyrotechnics, for photographic flashlights, and as a chemical reagent. **m. ethide.** $Mg(C_2H_5)_2$ = 82.4. A colorless liquid. **m. ethyl bromide.** EtMgBr = 133.23. Grignard's reagent, used in organic synthesis. **m. fluoride.** MgF_2 = 62.3. A white powder, d.2.47, m.1396, insoluble in water; native as sellaite. Used as an antiseptic, in ceramics and in glass. **m. fluosilicate.** $MgSiF_6$ = 166.6. M. silicofluoride. A white powder, used in ceramics. *hexahydrate-* $6H_2O$ = 274.38. Trigonal crystals, d.1.788, soluble in water. **m. formate.** $Mg(CHO_2)_2.2H_2O$ = 150.3. Colorless prisms, soluble in water, insoluble in alcohol or ether; used in analysis. **m. glycerinate.** $Mg(C_3H_5O_4)_3$ = 339.4. A white powder, soluble in water. **m. glycerinophosphate.** $Mg(C_3H_7O_2)PO_4$ = 194.4. M. glycerophosphate. A white powder, soluble in water; used medicinally for anemia. **m. glycerophosphate.** M. glycerinophosphate. **m. halides.** A group of organic compounds of the general type, RMgX, (see *Grignard reagent*) where R is an aryl or alkyl radical, and X, a halogen (Cl, Br, I or F). **m. hydrate.** M. hydroxide. **m. hydrosulfide.** $Mg(HS)_2$ = 90.44. An unstable compound, which on warming, yields pure hydrogen sulfide. **m. hydroxide.** $Mg(OH)_2$ = 58.34. M. hydrate. Brucite. White, rhombohedric crystals, or white powder, d.2.36, decomp. on heating. It is insoluble in water, soluble in ammonium salt solutions; used in the manufacture of magnesium oxide, milk of magnesia, and in refining sugar. **m. hypophosphite.** $Mg(H_2PO_2)_2.6H_2O$ = 262.5. Colorless crystals, soluble in water. Used as a tonic. **m. hyposulfite.** M. thiosulfate. **m. iodate.** $Mg(IO_3)_2.4H_2O$ = 446.22. A crystalline powder, soluble in water, decomp. by heat. **m. iodide.** MgI_2 = 278.2. A colorless powder decomp. by heat, soluble in water, alcohol, or ether. *hydrated-* $MgI_2.8H_2O$ = 422.33. A colorless, hygroscopic, crystalline powder, soluble in water; used in medicine. **m. lactate.** $Mg(C_3H_5O_3)_2.3H_2O$ = 256.4. White crystals, soluble in water, insoluble in alcohol or ether. Used as a laxative. **m. lactophosphate.** M. phospholactate. A white powder soluble in water; used in medicine. **m. laurate.** $Mg(C_{12}H_{23}O_2)_2$ = 422.68. Colorless crystals, m.150.4. **m. lime.** Lime or quicklime containing 20 % or less of MgO. **m. magma.** An aqueous suspension containing 7–8.5 % $Mg(OH)_2$, with a flavoring agent. Cf. *milk of magnesia.* **m. malate.** $MgC_4H_4O_5$ = 156.3. Colorless crystals, soluble in water; used as a laxative. **m. minerals.** Magnesium is one of the most abundant metals, and is an essential constituent of rocks (olivines, micas, pyroxenes, and amphiboles):

magnesite	$MgCO_3$
dolomite	(Mg, Ca)CO_3
talc	Silicates
chlorite	Silicates
serpentine	Silicates
kieserite	$MgSO_4$
boracite	MgB_4O_7
brucite	$Mg(OH)_2$

m. molybdate. $MgMoO_4$ = 184.3. Colorless crystals, soluble in water. **m. myristate.** $(C_{14}H_{27}O_2)_2Mg$ = 478.74. White powder, m.131.6. **m. nitrate.** $Mg(NO_3)_2.6H_2O$ = 256.4. Colorless monoclinic or triclinic crystals, d.1.46, m.90, soluble in water or alcohol. Used as a reagent and in pyrotechnics; decomp. by heat. **m. nitride.** Mg_3N_2 = 100.98. A yellow-green amorphous mass, decomp. by water. **m. nitrite.** $Mg(NO_2)_2.2H_2O$ = 152.31. Colorless hygroscopic crystals, soluble in water. Used as a reagent. **m. oleate.** $Mg(C_{18}H_{33}O_2)_2$ = 587.0. M. oleinate. A yellowish, oily mass, insoluble in water, soluble in oils, alcohol, or ether. Used as a varnish drier. **m. oxalate.** $Mg(OOC)_2.2H_2O$ = 148.4. Colorless crystals, d.2.45, soluble in water, used in organic synthesis. **m. oxide.** MgO = 40.3. Magnesia, calcined magnesia, periclase, ponderous magnesia, magnesia usta. A white, regular or hexagonal, crystalline powder, d.3.43, m.1900, insoluble in water, soluble in acids or ammonium salt solutions. Used commercially in packings and heat insulations, refractories, rubber and paper manufacture; medicinally, as a dusting powder, antiacid, and laxative. *heavy-* Amorphous m. oxide, obtained by heating basic m. carbonate, d.3.58. *light-* Crystalline m. oxide obtained by heating m. carbonate, d.3.36. See also *m. peroxide.* **m. palmitate.** $Mg(C_{16}H_{31}O_2)_2$ = 535.0. A white, soap-like mass, m.120, insoluble in water, soluble in alcohol; used as a varnish drier. **m. peptonate.** A yellowish powder, slightly soluble in water, used medicinally in stomach disorders. **m. perborate.** MgB_4O_7 = 179.6. A white powder, soluble in water, used in dryers. **m. perchlorate.** $Mg(ClO_4)_2$ = 223.23. Anhydrone. A porous, white granulated substance, used as a regenerable desiccant. **m. perhydrol.** M. peroxide. **m. permanganate.** $Mg(MnO_4)_2.6H_2O$ = 370.3. A granular, dark blue mass, soluble in water; used as an antiseptic. **m. peroxide.** MgO_2 = 56.3. M. superoxide, m. dioxide. A white powder containing 25 % MgO_2 and 75 % MgO, insoluble in water. Used as a reagent to detect bilirubin; medicinally, for gastric disturbances; also used for bleaching silk and wool. **m. phosphate.** $Mg_3(PO_4)_2.4H_2O$ = 179.6. Tribasic or normal m. phosphate. A colorless monoclinic crystalline powder, insoluble in water. *acid-* $MgHPO_4.7H_2O$ = 246.5. Dibasic or m. orthophosphate. A colorless hexagonal crystalline powder, d.2.13, insoluble in water, soluble in dilute acids; used medicinally as an alterative and antirheumatic. *dibasic-* Acid m. phosphate. *monobasic-* M. biphosphate. *pyro-* $Mg_2P_2O_7$, $3H_2O$ = 276.77. Colorless crystals, d.2.40; insoluble in water. *tribasic-* M. phosphate. See also *m. ammonium phosphate.* **m. phosphide.** Mg_3P_2 = 135.01. A dark powder, decomp. by water. **m. phosphite.** $MgHPO_3$ = 104.3. A colorless crystalline powder, soluble in water. **m. phospholactate.** M. lactophosphate. **m. propionate.** $Mg(C_3H_5O_2)_2$ = 170.4. A white powder, soluble in water. **m. pyrophosphate.** See *m. phosphate.* **m. rhodanate.** M. thiocyanate. **m. salicylate.** $Mg(C_7H_5O_3).4H_2O$ = 233.4. A white, crystalline powder, soluble in water; used as an antirheumatic, antifermentative, and intestinal antiseptic. **m. silicate.** $MgSiO_4$ = 116.6. A fine white powder, insoluble in water; used as an astringent, and in the manufacture of rubber. **m. silicides.** (1)

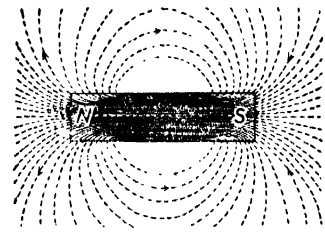
Mg_2Si = 76.70. (2) MgSi = 52.38. (3) Silicon magnesium. **m. silicofluoride.** M. fluosilicate. **m. stearate.** $(C_{18}H_{35}O_2)_2Mg$ = 590.86. Dolomol. A white, soap-like powder, m.132. **m. succinate.** $MgC_4H_4O_4$ = 140.3. A white powder, soluble in water. **m. sulfate.** (1) $MgSO_4$ = 120.4. Anhydrous m. sulfate. A white powder, d.2.66, soluble in water. (2) $MgSO_4{\cdot}2H_2O$ = 156.4. *Dihydrate*, desiccated m. sulfate. A white powder, soluble in water. (3) $MgSO_4.7H_2O$ = 246.5. *Heptahydrate*, crystallized m. sulfate, epsom salt, Magnesii sulfas (U.S.P.), bitter salt. Colorless tetragonal or monoclinic crystals, d.1.67, decomp. by heat, soluble in water or alcohol. Used as a reagent; for loading and warp-sizing cotton goods and textiles; fireproofing; in mineral waters; as a constituent of bleaching solutions; in the paper and leather industries; in electrical batteries; and medicinally, as a saline cathartic and refrigerant. (4) $MgSO_4$, H_2O = 138.4. Kieserite. d.2.3. **m. sulfide.** MgS = 56.4. Brown cubical crystals, d.2.82, decomp. by heat; soluble in water. **m. sulfite.** $MgSO_3.6H_2O$ = 212.4. A white crystalline powder, m.260, soluble in water; insoluble in alcohol. Used as an antiseptic and cathartic. **m. sulfocyanide.** M. thiocyanate. **m. tartrate.** $C_6H_4O_6Mg.5H_2O$ = 262.43. White monoclinic crystals, d.1.67, slightly soluble in water. *acid-* $MgH_2(C_4H_4O_6)_2.4H_2O$ = 394.46. White rhombic crystals, d.1.72, soluble in water. **m. thiocyanate.** $Mg(CNS)_2$ = 140.3. M. rhodanate. Colorless, hygroscopic crystals, soluble in water. Used as a reagent. **m. thiosulfate.** $MgS_2O_3.6H_2O$ = 244.4. M. hyposulfite. Colorless crystals, soluble in water. Used medicinally as an antiseptic. **m. tungstate.** $MgWO_4$ = 272.3. M. wolframate. Colorless crystals, insoluble in water or alcohol, soluble in acid solutions. It becomes fluorescent in X-rays, and is used for fluorescent screens and luminous paints. **m. urate.** $MgC_5H_2O_3N_4$ = 190.3. A white amorphous powder, insoluble in water or alcohol. **m. valerate.** $Mg(C_5H_9O_2)_2$ = 226.4. A white powder, soluble in alcohol. Used medicinally as a sedative. **m. wolframate.** M. tungstate.

magneson. *p*-Nitrobenzene azo-resorcinol. **m.-II.** p-Nitrobenzene azo-α-naphthol.

magnesyl. The monovalent radical —MgX, of the Grignard reagent.

magnet. A lodestone or iron that attracts iron. **bar-** A rod or bar of magnetized soft iron. **electro-** A piece of iron rendered temporarily magnetic by an electric current passing through a coil wound around it. **horse-shoe-** A bar of iron first magnetized and then bent into U-shape.

magnetic. Pertaining to or possessing magnetism. **m. declination.** The deviation of the compass needle from the true axis of the earth, owing to the magnetic pole not being coincident with the geographic north or south pole. **m. deflection.** The deflection of radioactive rays or particles by a magnetic field, according to the sign and magnitude of their charges. **m. elements.** The elements of the iron family all of which show perceptible magnetism; other elements have only very slight magnetic properties. **m. field.** The region or the lines of force in the space around the magnetic poles of a magnet. *atomic-* The magnetic region around an atom. **m. flux.** The state existing in a magnetic circuit, which is proportional to the strength of the magnetic poles, and is measured by the total number of lines of force round the coil and circuit. Magnetic flux = μH, where μ is the magnetic permeability and H the intensity of the field of force. **m. force.** The force (F) that acts on a magnetic pole; it depends on the strengths of the pole and of the field. The strength or intensity of a magnetic field (H) at a point is equal to the number of dynes (m) which act on a unit magnetic pole at the point; hence, F = m × H. **m. guard.** A mask of magnetised steel wire gauze, used to protect workers from iron dust. **m. induction.** The m. flux per unit of area taken perpendicularly to the direction of the magnetic flux. Cf. *induction*. **m. intensity.** The magnetic moment per unit volume. **m. iron ore.** Magnetite. **m. meridian.** The direction registered by a compass needle at any place. **m. moment.** Pole strength × length of magnet. **m. optic.** See *magneto-optic*. **m. ore.** (1) Magnetite. (2) A magnetic ore. **m. permeability.** The value of the total magnetic induction in a unit field, (μ). It is a measure of the force (F) of repulsion between two rigid magnetized poles (m and m′) a distance r apart: $F = \mu(m.m')/r^2$. Cf. *magnetic flux*. **m. phenomena.** The effects produced in a magnetic field; *e.g.*, the *Ettinghausen-*, *galvanometric-*, *Hall-*, *Joule-*, *Leduc-*, *Nernst-*, *thermomagnetic-*, *Wiedemann-* effects. **m. polarization.** The optical activity acquired by an optically-inactive substance when placed in a magnetic field. **m. pole.** The point on which magnetic lines of force converge. **m. p. strength.** See *magnetic units*. **m. potential.** Magnetomotive force. **m. pyrite.** Pyrrhotite. **m. reluctance.** The ratio: magnetomotive force/flux. **m. rotation.** Magnetic polarization. *specific-* The ratio of the m. rotation of the substance to that of water under the same conditions. **m. separator.** A device, usually a powerful electromagnet, for separating magnetic iron ore from non-magnetic minerals. **m. spectrum.** The pattern produced by iron filings scattered on a plane surface in a magnetic field. It illustrates the lines of force. See *m. field*. **m. susceptibility.** (1) The susceptibility of a substance to magnetism. (2) The magnetic intensity produced in a substance compared with the intensity of the magnetic field which produces it. **m. units.** (a) Quantity: A unit pole is the quantity of magnetism that repels another unit pole with a force of one dyne. (b) Intensity: The intensity of magnetization, or pole strength per unit area. (c) Field strength: The number



Magnetic field.

of lines of force which cross a unit area in normal direction; a unit for one line per unit area = gauss. (d) Magnetic flux: unit, the maxwell.

magnetism. (1) The property of substances, like iron, which under certain conditions attract or repel each other or a like substance. (2) The science of magnetic phenomena. **electro-** M. due to induction currents. **ferro-** M. due to iron and independent of an electric current. **photo-** See *photomagnetism.*

magnetite. $FeO.Fe_2O_3$. Magnetic iron ore, hercules stone, lodestone. A native ferrous-ferric oxide; a black, dense mass with magnetic properties. Cf. *ferriferrous oxide.*

magnetization. The act of rendering magnetic. **specific-** See *specific m.*

magneto-electricity. A current of electricity produced by magnetism. Compare *electro-magnetism* (magnetism produced by electricity).

magnetometer. A device for measuring magnetic force.

magnetomotive force. M.M.F. The amount of work required to bring a unit quantity of positive (attractive) magnetism from zero to a certain potential.

magneton. A ring of negative electricity, assumed to consist of an electron traveling in a circular motion with the velocity of light. **m. theory.** A theory of atomic structure in which magnetons form octets, similar to the electrons of Lewis-Langmuir theory. It has been developed by Parsons and others.

magneto-optic effect. A time lag observed in m. rotation which is characteristic for and used to detect minute quantities of substances. **m. rotation.** Magnetic rotation, magnetic polarization. A beam of polarized light is rotated when passing through a magnetic field. The amount of rotation depends upon the strength of the field, the wavelength of light, and the kind of matter through which the polarized light passes. The magnetic rotation of a substance is usually read at 15°C., with monochromatic light (sodium flame), and a length of liquid of one decimeter. Cf. *Verdet's constant.*

magnification. An enlargement or increase in size, *e.g.*, produced by a reading glass, microscope, stereopticon, or telescope.

magnifier. A lens used to read accurately, thermometer scales, burette scales, balances and other instruments.

magnify. To increase the apparent size of an object by means of lenses.

magnifying power. The ratio of the actual size of an object to the amplified image of that object. Cf. *auxiometer.*

magnitude. Any measurement taken of an object. Cf. *units, constants, length* and tables for *mass, time, velocity, temperature.* **astronomical-** The size of a star, measured in the terms of its brightness.

magnochromite. A variety of chromite containing magnesium.

Magnoliaceae. A family of trees and shrubs including:

Drimys	drimin, drimol
Illicium	staranise, sikimin
Liriodendron	loriodendrin, tulipiferine
Magnolia	magnolin
Michelia	champakol

magnolin. A crystalline glucoside from the fruit of *Magnolia tripetala*, a Magnoliaceae; insoluble in water, soluble in ether.

magnolite. Hg_2TeO_4. A white mineral.

magnolium. An alloy of 90 % Pb and 10 % Sb.

Magnus, Albertus. 1193–1280. Albrecht, Graf von Bollstädt. A German philosopher, the founder of the European school of alchemists.

Magnus, Heinrich Gustav. 1802–1870. A German chemist, noted for research in physical and inorganic chemistry. **M. rule.** There is for each metal a specific voltage at which it is deposited from a solution containing a mixture of metallic salts. **M. salt.** The first of the platin-ammonium compounds; discovered by Magnus in 1828. Dark green needles, slightly soluble in water: tetramin-plato-tetrachloro-platinate, $Pt(NH_3)_4PtCl_4$.

main cell. An accumulator consisting of an amalgamated zinc cathode and a lead dioxide anode suspended in sulfuric acid; 2.5 volts.

maisin. A protein from maize.

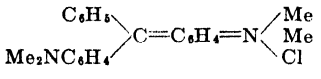
maize. Indian corn. The seeds of *Zea mays*, used as a cereal. Cf. *zea, corn starch.* **m. oil.** Corn oil. A yellow oil, d_{25} 0.915–0.920.

maizolith. An insulating material, obtained from cornstalks and corncobs and pressed into sheets.

majolica. A lustrous pottery enameled with a tin oxide composition.

malachite. $Cu_2(OH)_2CO_3$. A green basic copper carbonate, forming dense, smaragd or emerald green masses, which may be polished. Azurite is a blue variety. **azur-** A bluish-green m. from Arizona. **blue-** Azurite. **pseudo-** $Cu_3(PO_4)_2,H_2O$. Phosphocalcite. Phosphochalcite. A green native copper phosphate.

m. green. (1) Pulverized malachite, used as a pigment. (2) Victoria green, benzal green. A triphenylmethane dye,



Dark green, shining crystals, soluble in water. Used as a reagent for detecting sulfites in the presence of thiosulfates; also for bacteriological staining solutions. It is a pH indicator, changing at 1.0 from yellow (acid) to blue-green (alkaline). **leuco-** See *leucomalachite.*

malacolite. Augite.

malacon. An impure zircon.

Malaguti, Faustino Jovita. 1802–1878. An Italian-born French chemist, noted for his work on the mass-action of salts.

malakin. $C_{15}H_{15}ON$ = 225.2. Salicylal-p-phenetidine, $EtO.C_6H_4.N:CH.C_6H_4(OH)$. Small yellow needles, m.92, insoluble in water, soluble in ether, used as an antirheumatic.

malakograph. An apparatus which measures the rate of softening of wax by means of a falling weight attached to an arm which carries an indicator.

malamide. $C_4H_8O_3N_2$ = 132.2. *2*-Hydroxybutanediamide*, malic amide. The diamide of malic acid, $NH_2CO.CH_2.CHOH.CONH_2$. Colorless crystals, m.156. Cf. *aspargine, malonamide.*

malarin. $C_{17}H_{19}ON$ = 253.15. Acetophenonephenetidine, $EtO.C_6H_4.N{=}CMe.C_6H_4Me$. A yellowish crystalline powder, used as an antipyretic.

malate. A salt of malic acid, which contains the bivalent —OCO.CH_2.CHOH.COO— radical.

Malay camphor. *d*-Borneol.

malchite. A variety of diorite containing quartz, feldspar, hornblende and biotite.

maldonite. A slightly pink native alloy of gold and bismuth, Au_2Bi.

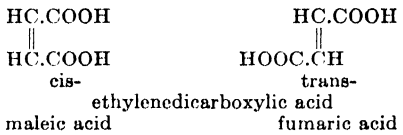
male fern. Aspidium. **m. f. oil.** An essential oil distilled from the rhizome of *Dryopteris filix-mas*. Colorless liquid, d.0.85, b.150, used in flavoring extracts. It contains hexyl and octyl esters of fatty acids.

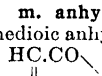
male hormone. See *androsterone, cholane derivatives*.

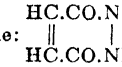
maleamic acid. $C_4H_5O_3N$ = 99.1. Aminomaleic acid, maleinamic acid, maleamidic acid, $NH_2CO.CH:CH.COOH$. Colorless crystals, m.152.

maleate. Any salt of maleic acid which contains the bivalent —OCO.CH:CH.COO— radical.

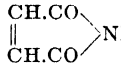
maleic acid. $C_4H_4O_4$ = 116.1. Ethylene dicarboxylic acid, *cis*-butanedioic acid*. An unsaturated dibasic acid, HOOC.CH:CH.COOH. Colorless prisms, d.1.59, m.130, soluble in water, alcohol or ether, decomp. by heat. It is an isomer of fumaric acid:



amino- Maleamic acid. **methyl-** Citraconic acid. **m. anhydride.** $C_5H_4O_3$ = 98.04. *cis*-butenedioic anhydride*. A heteroatomic pentacycle  O. Colorless, trimetrical crystals, d.0.93, m.56, b.202, insoluble in water.

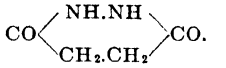
m. hydrazine. $C_4H_4O_2N_2$ = 112.2. A heteroatomic hexacycle:  Colorless crystals, m.250, used in organic synthesis.

maleinamic acid. Maleamic acid.

maleinanil. $C_{10}H_7O_2N$ = 173.1.  NPh.

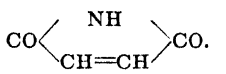
Colorless crystals, m.90.

maleinhydrazide. $C_4H_6O_2N_2$ = 114.1.



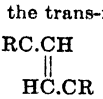
maleinhydrazine. $HOOC.CH:CH.CONH.NH_2$.

maleinimide. $C_4H_3O_2N$ = 97.1.



malenoid. The cis-form of geometrical isomerism:

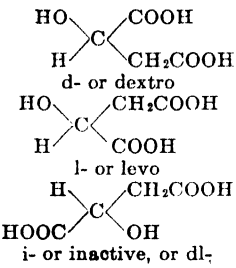
as compared with the trans-form (fumaroid):



maletto tannin. $(C_{19}H_{20}O_9)_n$. A brown powder, from the bark of *Eucalyptus occidentalis*, soluble in water or alcohol.

maleyl. The bivalent $C_4H_2O_2<$ radical, derived from maleic acid.

malic acid. $C_4H_6O_5$ = 134.07. Oxyethylene-succinic acid, butanoldiacid, hydroxysuccinic acid, hydroxybutane dioic acid*. A dibasic hydroxy acid in unripe fruits. It is an intermediate in metabolism, and exists in three isomeric forms:



dextro-, (*d*)- Colorless needles, d.1.59, m.133, soluble in alcohol, water, or ether. **inactive-,** (*dl*)- Colorless crystals, d.1.60, m.129, soluble in water, alcohol, or ether, decomp. by heat. **iso-** Methyltartronic acid. The isomer. $Me.COH(COOH)_2$. A white solid, m.160 (decomp.), soluble in water, alcohol or ether. **levo-,** (*l*)- Common m. Colorless crystals, d.1.595, m.100, decomp. 140. Cf. *aceric acid*. **β-hydroxy-** Tartaric acid. **methyl-** Citramalic acid.

m. amide. Malamide.

mallardite. A vitreous, fusible, yellow or white, native manganese sulfate, $MnSO_4.7H_2O$.

malleability. The quality of tenacity and ability to withstand hammering out or rolling into thin sheets, without fracture or returning to the original shape.

malleable. Capable of being hammered or shaped by hammering, or by pressure. **m. casting.** A small iron casting, which is made m. by heating.

mallee bark. The bark of *Eucalyptus occidentalis*, from which a commercial grade of eucalyptus oil is distilled.

Mallet, John William. 1832–1912. An Irish-born American chemist, noted for atomic weight determinations.

mallophene. $C_{11}H_{11}N_5.HCl$ = 249.6. Phenylazo-α-diaminopyridine hydrochloride. $Ph.N:N.C_5H_2N(NH_2)_2.HCl$. A dark red powder, soluble in water or alcohol, used as dental and surgical antiseptic. Cf. *mellophanic acid*.

mallotoxin. Rottlerin.

mallow. Malva. The dried leaves of *Malva sylvestris* and other *M.* species; used as herb-teas. **marsh-** Althaea.

malol. Ursolic acid.

malon oil. Black fish oil. An oil from the pilot whale, *Globicephalus melas*.

malonaldehydic acid. $C_3H_4O_3$ = 88.03. Formylacetic acid, $CHO.CH_2.COOH$. An isomer of peruvic acid.

malonamic acid. $C_3H_5NO_3$ = 103.03. The half-amide, $COOH.CH_2.CONH_2$, of malonic acid.

malonamide. $C_3H_6O_2N_2$ = 102.1. Propanediamide*, malonic diamide. The diamide, $NH_2CO.CH_2.CONH_2$. Colorless crystals m.170. Cf. *malamide*.

malonanilic acid. $C_9H_9O_3N$ = 179.1. The monobasic acid, $PhNH.CO.CH_2.COOH$. Colorless crystals, m.132.

malonanilide. $C_{15}H_{14}O_2N_2$ = 254.1. $PhNH.CO.CH_2.CO.NHPh$. Colorless crystals, m.232.

malonate. A salt of malonic acid of the type $M_2C_3H_2O_4$.

malonic acid. $C_3H_4O_4$ = 104.1. Propanedioic acid*, methane dicarboxylic acid. The dibasic acid, $CH_2(COOH)_2$, propandiacid, occurring in many plants. Colorless triclinic crystals, m.132 (decomp.), soluble in water, alcohol or ether. **allyl-** See *allyl malonic acid.* **bromo-** $CHBr(COOH)_2$ = 183.01. Colorless needles, decomp. 112, soluble in water. **butyl-** $CHBu(COOH)_2$ = 160.09. *n-* White crystals, m.101.5. *iso-* m.107. *sec.-* m.76. **cetyl-** $C_{19}H_{36}O_4$ = 328.29. White solid, m.121. **chloro-** $CHCl(COOH)_2$ = 138.48. Colorless crystals, m.133. **diethyl-** $CEt_2(COOH)_2$ = 160.09. White powder, m.121. **dimethyl-** $CMe_2(COOH)_2$ = 132.06. Colorless crystals, m.193. **ethyl-** $CHEt(COOH)_2$ = 132.06. White crystals, m.111.5, decomp. 160. Cf. *pyrotartaric, glutaric acid.* **ethylene.** Vinaconic acid. **hydroxy-** Tartronic acid. **keto-** Mesoxalic acid. **methyl-** Isosuccinic *acid.* **nitril-** Cyanacetic acid. **oxo-** Mesoxalic acid. **oxy-** Tartronic acid.

m. anhydride $C_3H_2O_3$ = 87.1. 

m. amide. $C_4H_6O_2N_2$ = 168.1. $CH_2(CONH_2)_2$. Colorless needles, m.170, slightly soluble in water, insoluble in alcohol; used in organic synthesis. **m. dinitrile.** Malononitrile. **m. ester.** $C_7H_{12}O_4$ = 160.08. Diethyl malonate, $CH_2(COOEt)_2$. A colorless liquid, d.1.055, m.50, b.198. Its two H are replaceable by Na, and these sodium compounds react with alkyl halides yielding homologs of malonic ester. **m. e. synthesis.** Synthesis of complex compounds by use of m. e. and sodium.

malonitrile. $C_4H_4N_2O$ = 96.0. Malic dinitrile, dicyanoethanol, $CN.CHOH.CH_2.CN$.

malononitrile. $C_3H_2N_2$ = 66.1. Propanedinitrile*, malonic dinitrile, methylene cyanide, $CH_2(CN)_2$. White powder, m.30, b.218, soluble in water, alcohol or ether; used in organic synthesis.

malonurea. Veronal. Cf. *malonyl urea.*

malonyl- The bivalent radical $-OC.CH_2.CO-$ derived from malonic acid. **m. urea.** Barbituric acid, cf. *malonurea.*

malourea. Barbital.

malt. Maltum. The grain of *Hordeum distichum* or *H. sativum* (barley), which has been partly germinated, then dried. Yellow grains of agreeable odor and sweet taste. Used as a nutritive and digestant, and in the manufacture of malt extract, and beer. **m. extract.** Extractum malti. A dark brown syrupy liquid obtained by evaporating an infusion of malt; used as a tonic, starch digestant, and emulsifying agent. **m. liquor.** An alcoholic beverage derived from fermented infusions of malt; as beer.

maltase. Grease. An enzyme in yeast, blood-serum, lymph, salivary, pancreatic and intestinal juices, which hydrolyzes maltose to dextrose; used in brewing.

maltha. A tar or pitch resulting from the oxidation and drying up of petroleum. Dark asphalt-like masses, insoluble in water, soluble in benzene.

malthenes. Petrolenes.

maltobionic acid. $C_{12}H_{22}O_{12}$ = 358.2. An oxidation-product of maltose.

maltoboise. Maltose.

maltodextrin. Amyloin. A polysaccharide, which is converted to maltose by hydrolysis. Constitutionally it is midway between dextrin and maltose, and it is produced from the starch material of barley during modification in the manufacture of malt. Its composition depends on the relative amounts of maltose and dextrin.

maltonic acid. *d*-Gluconic acid.

maltosazone. $C_{12}H_{14}O_7(:N.NHPh)_4$. The osazone of maltose, used in the synthesis of $C_{226}H_{142}O_{58}N_4I_2$ = 4021.0. (Hepta-tribenzoyl-galloyl-p-iodophenyl maltosazone), the largest molecule so far synthesized (by Emil Fischer).

maltose. $C_{12}H_{22}O_{11}.H_2O$ = 360.2. Maltsugar, glucose-α-glucoside. A dextro disaccharide obtained from malt and starch. Colorless crystals, $[\alpha]_D$ +138°, soluble in water or alcohol. Used as a sweetening agent, and is fermentable, being an intermediate formed in brewing, distilling and vinegar manufacture. **iso-** Gentiobiose.

maltsugar. Maltose.

maltum. Malt.

malva. Shallow.

Malvaceae. Mallow family, a group of mucilaginous plants:

Althaea officinalis	marsh-mallow
Althaea rosea	hollyhock
Hibiscus abelmoschus	musk seed
Malva sylvestris	mallow
Gossypium herbaccum	cotton-plant

malvidin. The blue aglucone of the glucoside malvin in wild mallow.

malvin. A glucoside and anthocyan pigment from mallow.

malvon. $C_{29}H_{36}O_{20}$ = 704.3. An oxidation-product of malvin and the glucoside of a didepside sugar ester.

mammary gland. The dried mammary gland of the sheep. A yellow powder with slight odor, partly soluble in water; used medicinally for menorrhagia.

man. The highest, living organism of the third group of living beings. See *life.* The elementary composition of the human body has been calculated as follows:

oxygen	66.0 %
carbon	17.6 %
hydrogen	10.1 %
nitrogen	2.5 %
calcium	1.5 %
phosphorus	1.0 %
potassium	0.4 %
sodium	0.3 %
chlorine	0.3 %
sulfur	0.25 %
magnesium	0.04 %
iron	0.004 %
Si, F, I	traces

manaca. The dried root of *Brunfelsia hopeana,* a Brazilian Solanaceae. The fluid extract is used as a diuretic and diaphoretic, and contains francisceine.

manacine. Vegetable mercury. An alkaloid from manaca; used as diuretic and diaphoretic.

manchester brown. Triaminoazobenzene.

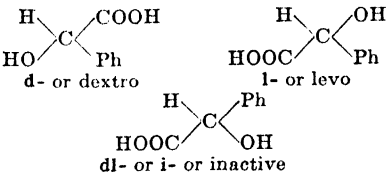
mancona bark. Erythrophloeum.

mancophalolic acid. $C_{10}H_{30}O_2$ = 184.3. An amorphous resinous acid from Manila copal.

mandarine. (1) The reddish-yellow fruit of *Citrus nobilis.* (2) Orange II, β-naphtholorange. A monoazo dye, $C_{10}H_6(OH)N:NC_6H_4SO_3H$. **m.**

oil. The essential oil from m., b.175–179, containing limonene, citral and methyl anthranilate.

mandelic acid. $C_8H_8O_3$ = 152.1. Phenylglycollic acid, amygdalic acid, amygdalinic acid, α-hydroxy-α-toluic acid, phenylhydroxyacetic acid, benzoylglycolic acid. An aromatic hydroxy acid occurring in three isomeric forms:



inactive-, *dl-*. Colorless rhombic crystals, d.1.36, m.118, soluble in water, alcohol or ether. **levo-**, **l-** The natural form from amygdala, m.133. **para-** Inactive. **amino-** Hydrindic acid. **methyl-** Atrolactic acid. **phenyl-** Benzilic acid.

Mandelin's reagent. A reagent for alkaloids: 0.5 gm. vanadium oxide or chloride in 100 cc. conc. sulfuric acid.

mandelonitrile. C_7H_7ON = 133.06. *dl*-Benzaldehyde cyanohydrin, benzalcyanhydrin, Ph.CH(OH)CN. A yellow oily liquid, d.1.124, m. −10, b. (decomp.) 170, insoluble in water; used in organic synthesis.

mandioc. Tapioca.

mandragorine. $C_{17}H_{23}O_3N$ = 289.2. An alkaloid from the seeds and roots of *Mandragora officinalis*, a Solanaceae of the Orient. Colorless, odorless, deliquescent crystals, m.78. Used as a narcotic and sedative.

mandrake. Podophyllum.

mandrel. A handle or shaft in which a rotating tool is held.

manelemic acid. A constituent of elemi; α-$C_{37}H_{56}O_4$, and β-$C_{44}H_{80}O_4$.

mangal. A non-corrosive aluminum alloy containing 1.5 % manganese.

mangan. Manganese. **m. blende.** A native manganese sulfide, MnS.

manganate. A salt containing the bivalent MnO_4= radical. **per-** A salt containing the monovalent MnO_4— radical.

manganese. Mn = 54.93. A metallic element, atomic number 25, valencies 2, 3, 6, and 7. A grayish-pink, lustrous, brittle metal, d.7.42, m.1207, b.1900, insoluble in water, reacting with boiling water, soluble in acids. Used in alloys with iron, copper, and silicon. Metallic manganese was discovered in 1774 by Scheele, isolated in 1789 by Gahn, and named from the Greek manganidso (purify) in allusion to the use of its dioxide in the manufacture of glass; it neutralizes the green color due to iron compounds. Manganese forms several series of compounds according to its valency:

Valence number		Ions	Color of compounds	Oxide
2	manganous.....	Mn^{++}	slightly pink	MnO
3	manganic.....	Mn^{+++}	slightly green	Mn_2O_3
4	manganites.....	MnO_3—	green	MnO_2
6	manganates.....	MnO_4—	dark green	
7	permanganates.	MnO_4^-	dark purple	Mn_2O_7

black- Pyrolusite. **dvi-** Rhenium. **eka-** Masurium. **red-** (1) Rhodonite. (2) Rhodochrosite.

m. acetate. Manganous acetate. **m. binoxide.** M. dioxide. **m. blende.** A native manganese sulfide, MnS. **m. boride.** MnB_2 = 76.6. A black powder, insoluble in water. **m. boron.** A bronze containing manganese: 88 % Cu, 10 % Sn, 2 % Mn. **m. carbide.** Mn_3C = 177.1. A black crystalline mass. **m. chloride.** See *manganic, manganous.* **m. copper.** M. bronze. **m. dioxide.** MnO_2 = 86.93. M. peroxide, pyrolusite, battery manganese. Black, amorphous powder, d.5.03, decomp. 390, insoluble in water, soluble in acids. Used as an oxidizing agent; in the manufacture of chlorine and other halogens; in electric dry cells; in paints and varnishes; as a black or purple color for glass glaze, enamel and ceramics; for making ferromanganese and manganese compounds, in the rubber industry; medicinally, as a tonic and alterant. **m. glaze.** A dark-colored lustrous enamel on porcelain containing manganese. **m. green.** Barium manganate. **m. heptoxide.** Mn_2O_7 = 221.86. Permanganic acid anhydride. A dark green liquid, rapidly decomp. to MnO_2, a most powerful oxidizing agent. **m. minerals.** Manganese occurs in nature in small quantities widely diffused in most rocks and minerals. The principal ores are:

pyrolusite	MnO_2
psilomelane	$Mn(OH)_3$
braunite	Mn_2O_3
hausmannite	Mn_3O_4
manganite (manganese spar, rhodochrosite)	MnO(OH)
mangan spar (rhodonite, manganite)	$MnCO_3$
mangan blende	MnS

m. nitrides. There are two nitrides: Mn_6N_2 = 302.67. Mn_3N_2 = 192.81. **m. oxides.** (1) MnO, *manganous oxide.* (2) Mn_3O_4, *manganic manganous oxide.* (3) Mn_2O_3, *manganic oxide.* (4) MnO_2, *manganese dioxide.* (5) MnO_3, *manganese trioxide.* (6) Mn_2O_7, *manganese heptoxide.* **m. peroxide.** M. dioxide. **m. protoxide.** Manganous oxide. **m. sesquioxide-** Manganous manganic oxide. **m. silicate.** Mn_2SiO_4. See *braunite, rhodonite, tephroite.* **m. spar.** (1) Rhodonite. (2) Rhodochrosite. **m. steel.** A steel containing about 12 % Mn, which is extremely hard and ductile; used in machinery that is subject to hard wear, *e.g.*, crushers. **m. sulfate.** See *manganic, manganous.* **m. tetrachloride.** $MnCl_4$ = 196.77. A green solid. **m. tetrafluoride.** MnF_4 = 130.93. A brown solid. **m. titanium.** An alloy of m. and titanium, used in the steel industry. **m. trioxide.** MnO_3 = 102.93. An acidic oxide, which forms manganates, *e.g.*, K_2MnO_4. **m tungstate.** See *hübnerite.*

manganesium. Manganesum. An early name for manganese.

manganic. Describing compounds of trivalent manganese. They are generally unstable and yield in aqueous solution the green Mn^{+++} ion, which readily decomposes to the stable Mn^{++} state (manganous). **m. acid.** H_2MnO_4 = 120.9. An acid unknown in the free state, but existing in salts of the type M_2MnO_4—, manganates. **per-** $HMnO_4$ = 119.9. A dark red unstable liquid. It forms salts of the type $MMnO_4$—, permanganates. **m. chloride.** $MnCl_3$ = 161.3. An unstable compound which forms more stable double salts; soluble in water, and decomposes to $MnCl_2$ and Cl_2. **m. hydrox-**

ide. $Mn(OH)_3$ = 106.1. An unstable hydroxide, which rapidly loses water and forms a brown crystalline precipitate, MnO(OH) of d.4.4; insoluble in water, decomp. by acids. Used as a pigment for textiles. **m. manganous oxide.** Mn_3O_4 = 228.79. Manganomanganic oxide. A red, insoluble, crystalline solid. **m. metaphosphate.** $Mn_2(PO_3)_6.2H_2O$ = 620.13. Pink crystals. **m. oxide.** Mn_2O_3 = 157.9. Manganese trioxide, m. sesquioxide, black m. oxide, braunite. A black powder, d.4.33, insoluble in water, but soluble in acids. *hydrated-* $Mn_2O_2(OH)_2$ = 175.88. A black powder. **m. sulfate.** $Mn_2(SO_4)_3$ = 398.1. Dark green crystals, decomp. by water or at 160; used as a powerful oxidizing agent in synthesis.

manganiferous. Containing or carrying manganese.

manganin. A non-corroding alloy of 12 % Mn, 84 % Cu, and 4 % Ni, d.8.4, m.910. Used in electric rheostats and heating elements.

manganite. $Mn_2O_3.H_2O$. Acerdese. A native manganic oxide hydrate.

manganites. A series of compounds derived from tetravalent manganese and its hydroxide, $Mn(OH)_4 = H_4MnO_4$, by replacement of the hydrogen; hence, a salt containing the tetravalent MnO_4 radical or the divalent MnO_3 radical:

$$H_4MnO_4 = H_2MnO_3 + H_2O$$

mangano-manganic oxide. Manganic-manganous oxide.

manganosiderite. A native carbonate of manganese and iron.

manganosite. MnO. A native manganous oxide, occurring in emerald green, isometric masses.

manganostilbite. A mineral consisting of MnO with As_2S_3 and Sb_2S_3.

manganotantalite. A mineral consisting of MnO and Ta_2O_5, Sn, and W.

manganous. The more common manganese salts containing the divalent Mn^{++} ion; usually colorless or slightly pink, soluble in water. **m. acetate.** $Mn(C_2H_3O_2)_2.4H_2O$ = 245.0. M. acetate. Pale red, monoclinic crystals, d.1.59, soluble in water or alcohol. **m. ammonium phosphate.** $MnNH_4PO_4.H_2O$ = 186.0. Manganese ammonium phosphate. Colorless crystals, soluble in water. **m. ammonium sulfate.** $Mn(NH_4)_2(SO_4)_2$ = 283.1. M. alum. Pale rose crystals, soluble in water; used as a reagent. **m. arsenate.** $MnHAsO_4$ = 195.0. Manganese arsenate. A pale rose powder, slightly soluble in water. Used medicinally as a hematinic, nutritive, and alterative tonic. **m. benzoate.** $Mn(C_7H_5O_2)_2$ = 297.1. Manganese benzoate. Colorless scales, soluble in water, slightly soluble in alcohol. **m. borate.** $Mn_2B_4O_7$ = 265.1. Manganese borate, manganese siccative. A white powder, soluble in water; used as a drier in varnishes and paints, and in the leather industry. **m. bromide.** $MnBr_2$ = 214.8. Manganese bromide. Rose red crystals, soluble in water. **m. butyrate.** $Mn(C_4H_7O_2)_2$ = 229.2. Manganese butyrate. A rose red, crystalline powder, soluble in water or alcohol; used for acute streptococcal infection. **m. cacodylate.** $Mn(Me_2AsO_2)_2$ = 329.1. Manganese cacodylate. Pale, rose red crystals, soluble in water; used as a tonic. **m. carbonate.** $MnCO_3$ = 114.9. Manganese carbonate, native as dialozite and rhodochrosite. Rose colored, rhombic crystals, d.3.13, decomp. by heat, insoluble in water, soluble in dilute acids. Used medicinally for anemia. **m. chloride.** *anhydrous-* $MnCl_2$ = 125.9. Rose red crystals, d.2.98, m.650, soluble in water. *hydrous-* $MnCl_2.4H_2O$ = 197.7. Rose red, monoclinic crystals, d.1.91, m.87, soluble in water, slightly soluble in alcohol. Used medicinally in chlorosis, and as an antiseptic in gargles; technically, as a mordant; in the manufacture of manganese salts; in the glass industry; as a disinfectant; and for regeneration of manganese dioxide. **m. chromate.** $MnCrO_4$ = 171.1. Manganese chromate. A dark brown powder, partly soluble in hot water. **m. citrate.** $MnHC_6H_5O_7$ = 245.1. Manganese citrate. A white powder, soluble in water; used medicinally as a tonic and astringent. **m. dithionate.** M. hyposulfate. **m. ferrocyanide.** $Mn_2Fe(CN)_6$ = 322.0. Manganese ferrocyanide. A pale green powder, insoluble in water, soluble in cyanide solutions. **m. fluoride.** MnF_2 = 93.0. Manganese fluoride. A rose red powder, soluble in water. **m. fluosilicate.** $MnSiF_6.6H_2O$ = 305.08. Rose red hexagonal prisms, d.1.903, soluble in water. **m. formate.** $Mn(OOCH)_2.2H_2O$ = 180.98. Rhombic, red crystals, d.1.953, soluble in water. **m. glycerinophosphate.** $MnC_3H_7O_3PO_3$ = 225.0. Manganese glycerophosphate. A rose red, crystalline powder, soluble in water; used medicinally as a tonic. **m. glycerpphosphate.** M. glycerinophosphate. **m. hydrate.** M. hydroxide. **m. hydroxide.** $Mn(OH)_2$ = 89.0. Manganese hydroxide, native as pyrochroite. A white, hexagonal, crystalline powder, d.3.26, insoluble in water, soluble in acids, decomp. if heated. **m. hypophosphite.** $Mn(H_2PO_2)_2.H_2O$ = 203.0. Manganese hypophosphite. Rose red crystals, soluble in water; used medicinally for anemia and chlorosis. **m. hyposulfate.** MnS_2O_6 = 215.1. Manganese dithionate. Colorless needles, soluble in water. **m. iodide.** $MnI_2.4H_2O$ = 183.8. Manganese iodide. Rose colored monoclinic crystals, decomp. by heat, soluble in water; used medicinally as an antiseptic, tonic, and alterant. **m. lactate.** $Mn(C_3H_5O_3)_2.3H_2O$ = 287.1. Manganese lactate. Pale rose, crystals, soluble in water or alcohol; used medicinally as a tonic. **m. lead resinate.** Manganese lead resinate. A mixture of lead and manganese resinates; used as a drier in varnishes and paints. **m. linoleate.** $Mn(C_{18}H_{31}O_2)_2$ = 613.1. Manganese linoleate. A dark brown fatty mass, insoluble in water, soluble in oils; used in driers for varnishes and paints. **m. metaphosphate.** M. phosphate. **m. nitrate.** $Mn(NO_3)_2.6H_2O$ = 287.1. Manganese nitrate. Rose red, monoclinic crystals, d.1.82, m.25.8, b.129, decomp. 230, soluble in water; used as a reagent. **m. oleate.** $Mn(C_{18}H_{33}O_2)_2$ = 617.6. Manganese oleate. A brown, granular, fatty mass, insoluble in water, slightly soluble in alcohol, soluble in ether or oils. Used medicinally in ointments, and as a drier for varnishes. **m. oxalate.** $Mn(OOC)_2 2\frac{1}{2}H_2O$ = 188.0. Manganese oxalate. A white, crystalline powder, d.2.45, decomp. 150; slightly soluble in water, soluble in acids. Used for the preparation of metallic magnesium, and as a drier. **m. oxide.** MnO = 70.9. Manganese protoxide. A grayish-green powder, d.5.09, insoluble in water, soluble in acids. *manganic-* Mn_3O_4 = 228.8. Mangano-manganic oxide, manganous manganate. A brownish-black powder, d.4.61,

used as a reagent in chemical analysis. **m. peptonate.** Manganese peptonate. A brown powder, soluble in water; used medicinally as a nutritive and tonic. **m. phosphate.** (1) *ortho-*. $Mn_3(PO_4)_2.7H_2O$ = 481.0. Normal manganese phosphate. Red amorphous powder, insoluble in water, slightly soluble in alcohol, soluble in dilute acids. Used as a reagent, and medicinally as a tonic. (2) *meta-*. $MnHPO_4$ = 150.97. Manganese metaphosphate. Pale rose crystals, soluble in water, used in analysis. (3) *pyro-*. $Mn_2P_2O_7$ = 283.9. Manganese pyrophosphate. A white amorphous powder, d.3.58, insoluble in water. **m. propionate.** $Mn(C_3H_5O_2)_2$ = 201.0. Manganese propionate. A pale rose powder, slightly soluble in water. **m. pyrophosphate.** M. phosphate. **m. salicylate.** $Mn(C_7H_5O_3)_2$ = 329.1. Manganese salicylate. A white, crystalline powder, soluble in water or alcohol. Used medicinally as a tonic and antirheumatic. **m. silicate.** $MnSiO_3$ = 131.2. Manganese silicate. Pale red crystals, d.3.35, m.1218, insoluble in water. Used in ceramics and the glass industries. **m. succinate.** $MnC_4H_4O_4$ = 171.0. Manganese succinate. A white crystalline powder, soluble in water. **m. sulfate.** (1) *anhydrous-* $MnSO_4$ = 151.0. Manganese sulfate, native as mallardite. Red crystals, d.2.95, soluble in water. (2) *tetrahydrate-* $MnSO_4.4H_2O$ = 223.1. Labile, rose red prisms, slightly hygroscopic, d.2.11, m.30, soluble in water. Used medicinally as a tonic and carthartic; in the ceramic and glass industries; as a mordant in the textile industry. (3) *pentahydrate-* $MnSO_4, 5H_2O$ = 241.08. Stable at 8–27. (4) *heptahydrate-* $MnSO_4.7H_2O$ = 277.10. Red prisms, d.3.1, m.542. **m. sulfide.** MnS = 87.0, or $MnS.H_2O$ = 105.0. Manganese sulfide, native as alamandite and mangan blende. A gray to pink to brown fusible powder, d.3.93, insoluble in water, soluble in acids; used as a pigment. **m. sulfite.** $MnSO_3$ = 135.0. Manganese sulfite. A gray, crystalline powder, insoluble in water, soluble in dilute sulfurous acid. Used medicinally. **m. sulfophenate.** $Mn(C_6H_4OH.SO_3)_2$ = 401.1. Manganese phenolsulfonate. Red crystals, soluble in water or alcohol; used medicinally as an antiseptic and tonic. **m. tannate.** Manganese tannate. A compound of Mn and tannin. A brown powder, insoluble in water, soluble in acids. **m. tartrate.** $MnC_4H_4O_6$ = 203.1. Manganese tartrate. A white crystalline powder, slightly soluble in water. **m. valerate.** $Mn(C_5H_9O_2)_2.2H_2O$ = 293.2. Manganese valerate. A brown powder, slightly soluble in water; used as a tonic.

manganum. The Latin term for manganese.

mangiferin. $C_{19}H_{18}O_{11}$ = 422.2. Euxantogen. A principle from the leaves of *Mangifera indica;* thin, pale yellow needles, m.271.

mango. The tree *Mangifera indica*, an Anacardiaceae of India. **m. gum.** A resin from the mango tree; amber colored or reddish-yellow lumps.

mangrove. An extract from the bark of *Rhizophora mucronata*, containing 30–35 % tannin; used in tanning. Cf. *cutch.*

Manihot. A group of South American shrubs and herbs (Euphorbiaceae) which yield cassava, Brazilian arrowroot, cassareep and ceara rubber.

Manila copal. A resin from *Agathis dammara*, a conifer of the Philippine Islands. It contains 80 % of mancopha olic acid. **M. hemp.** Abaca. **M. paper.** A strong paper made from old M. rope (M. fibers).

manioc. Cassava.

manioca. Tapioca.

manna. The dried saccharine exudation of *Fraxinum ornus*, an Oleaceae of the Orient. It contains mannite, and forms a yellowish-white mass of sweet, slightly acrid taste. Used medicinally as a mild cathartic. **Armenian-** A m. from oak trees, containing glucose. **Australian-** A m. from the eucalyptus species, containing melitose. Cf. *lerp.* **yeast-** Yeast gum.

mannan. A glucoside constituent of yeast gum, and manna, analogous to araban.

mannide. $C_6H_{10}O_4$ = 146.08. An anhydride of mannitol, b.317. **iso-** A solid, m.87, b.274.

mannitan. $C_6H_{12}O_5$ = 164.3. An anhydride of mannitol. A syrupy liquid, m.100; or crystals, m.137.

mannite. Mannitol.

mannitol. $C_6H_{14}O_6$ = 182.2. Mannite. A hexatomic alcohol obtained from manna and many plants (larch, celery, sugar cane, *Viburnum*, *Opulus*, *Syringa* and *Fraxinus* species), occurring in two isomeric forms: dextro- and levo-. Colorless needles, d.1.52, m.166, $b._{1mm}$.278, soluble in water or alcohol. Used medicinally as a mild laxative, and chemically as a reagent for detecting glucose. **m. nitrate.** $C_6H_8(ONO_2)_6$ = 452.15. Hexanitrin, nitromannite, nitromannitol, d.1.604. Insoluble in water, and soluble in ether, m.108. It explodes on further heating, and is used as a substitute for mercury fulminate in high explosives.

mannitose. Mannose.

mannoheptitol. Perseitol.

mannoheptonic acid. $C_7H_{14}O_8$ = 226.11. White solid, decomp. 175, soluble in water.

mannoheptose. $C_7H_{14}O_7$ = 210.11. A heptose m.134, in the avocado, the fruit of *Persea gratissima*, a Lauraceae.

mannolite. Chlorazene.

mannonic acid. $C_6H_{12}O_7$ = 196.1. d-, l-, or i-. An acid derived from mannitol, which forms its lactone (q.v.) on heating. **m. lactone.** $C_6H_{12}O_6$ = 180.1. d- A solid, m.150,

mannosans. Polysaccharides, $(C_6H_{10}O_5)_n$, which hydrolyze to mannose.

mannose. $C_6H_{12}O_6$ = 180.1. $CH_2OH(CHOH)_4CHO$. A hexose or fermentable monosaccharide and isomer of glucose, occurring in two optically-active forms and obtained from manna. **dextro-** Seminose. Colorless prisms, d.1.539, m.132, soluble in water or alcohol.

mannoside. A glucoside which yields mannose. Cf. *rhamnomannoside.*

mannotriose. $C_{18}H_{32}O_{16}$ = 504.25. Glucose-galactose-galactoside. A trisaccharide from manna, indigestible by man and hydrolyzed to glucose and 2 galactose molecules.

manocryometer. A device for determining the melting point of substances under pressure.

manometer. An instrument for measuring the pressure of gases or liquids. **differential-** A glass instrument for measuring pressures up to 20 mm. water pressure. **gas-** See *gage, McLeod steam gage.* **mercury-** A U-tube filled with mercury; the difference in the heights in the arms indicates the pressure. **photo-** A m. adapted for making a photographic record of the pressure changes (see figure). **sphygmo-** An instrument for measuring blood pressure. **spring-** A manometer constructed from a coiled

tube into which the gas or steam passes and, according to its pressure, uncoils and records on the dial. Cf. *McLeod*. **water-** A U-tube filled with water, with one side open and the other connected to the gas container. The difference

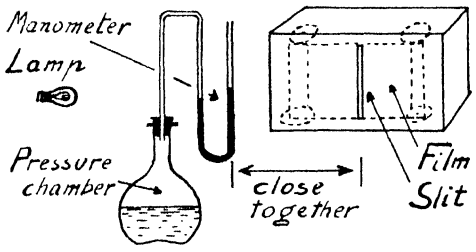


Photo-manometer.

in the heights of the water columns indicates the pressure.

MANOMETERS
(*Behar's Classification*)

(1) Low pressure

Ionization gage	0.0001–0.1μ Hg.
pyrometric gage	0.001–1μ Hg.
resistance gage	0.01–1μ Hg.
McLeod gage	0.01–1000μ Hg.
Micromanometer	0.01–10 mm.

(2) Atmospheric pressure

U-tube	1–1000 mm.
single tube	2–2000 mm.

(3) High pressure

spring manometer	0.5–10 lb.
diaphragm	0.5–200 lb.
carbon pile	50–2000 lb.
crystals	100–20000 lb.
steel-tube spiral	1000–10000 lb.

manoscopy. Gas-volumetric analysis.
mantle. The outer wall of a furnace. **filter-** Berkefeld filter. **gas-** Welsbach mantle.
manure. Refuse (*e.g.*, excreta, straw, etc.), used as a fertilizer. **m. salt.** A potassium salt (chiefly chloride) containing 20–30 % potash.

AVERAGE COMPOSITION OF MANURES

	% N_2	% P_2O_5	% K_2O
cattle manure	0.58	0.28	0.53
horse manure	0.59	0.34	0.52
sheep manure	0.68	0.40	0.75
yard manure	0.51	0.33	0.53

manzoul. A mixture of hashish and muscat nut, used as a narcotic.
mapharsen. Trade name for the hemialcoholate of oxophenarsine hydrochloride (q.v.).
maple. The tree *Acer saccharum* (in U.S.) or *Acer campestris* (in Britain). **red-** The bark of *Acer rubrum*, swamp m., used by American Indians for sore eyes. **m. sugar.** A brown mass obtained by evaporating m. syrup. It is chiefly sucrose with small amounts of glucose, coloring matter and proteins. **m. syrup.** The concentrated sap of *A. saccarum*, which yields 2–4 lbs. per tree.
Maranta. Arrowroot.
marble. $CaCO_3$. A native calcium carbonate, which occurs in many forms and colors and is limestone recrystallized under the influence of heat and/or pressure.
marc. (1) The residual vegetable tissue and mucilage which remains after expression of oil from a plant or nut kernel. (2) The cellular tissue left after complete extraction of the juice of the sugar beet or sugar cane. Cf. *bagasse*.
marcasite. FeS_2. Coal brass. A native iron sulfide, pale yellow, orthorhombic crystals, sometimes called white iron, spear, binarite, coxcomb, or radiated pyrites.
Marcet, Alexander. 1770–1822. A Swiss physician, who became an English chemist and noted lecturer-demonstrator.

Jane Marcet.

Marcet, Jane Haldemand. 1769–1858. A Swiss writer and exponent of popular science, noted for her "Conversations on Chemistry."
Marchand, Richard Felix. 1813–1850. A German chemist, noted for atomic weight determinations. **M. tube.** A U-shaped, calcium chloride tube, with bulb and side-tube attached.
marcitine. $C_8H_{19}N_3$ = 157.1. A basic substance obtained from putrid pancreas.
Marcy tambour. A writing point attached to a drum-like membrane; used in physiological work.
marennin. A green pigment from certain oysters on the French coast, which is derived from the chlorophyll of microorganisms which infest them.
maretin. $C_8H_{11}ON_3$ = 165.11. m-tolyl semicarbazide, m-tolylhydrazine carbonate, $MeC_6H_4NH.NH.CONH_2$. Colorless crystals, m.184, insoluble in water or alcohol, soluble in acetone or chloroform; used as an antirheumatic.
margaric acid. $C_{17}H_{34}O_2$ = 270.4. Heptadecanoic acid*, heptadecylic acid, daturic acid. A saturated fatty acid (q.v.) occurring in lichens but also synthesized. Colorless mass, d.0.853, m.60, $b._{100mm.}$227, insoluble in water, soluble in alcohol or ether. Cf. *dorosmic acid*.
margarine. A butter substitute which consists of a solid emulsion of fats in milk serum. **oleo-** The liquid fat from which margarine is made by hydrogenation, which saturates the double bond.
margarite. $CaAl_4H_2Si_2O_{12}$. A native calcium aluminum silicate, forming lustrous, pearly, monoclinic masses of various shades.

margaron. $(C_{16}H_{33})_2O$ = 466.7. Dihexadecyl ether. A white, odorless powder from beef suet; used as an ointment base.

margaronitrile. $C_{17}H_{33}N$ = 251.27. Heptadecane nitrile*, cetylcyanide, *n*-hexadecylcyanide, $Me(CH_2)_{15}CN$. White crystals, m.53.

Marggraf, Andreas Sigismund. 1709–1782. A German chemist, the founder of the beet sugar industry.

margosa oil. Neem oil, veepa oil, veppam fat, oil of azedarach. An oil from the seeds of *Melia azedarach*, the bead tree, Indian lilac, Cape syringa or China tree, a Meliaceae of Asia and Africa.

margosic acid. $C_{22}H_{40}O_2$ = 336.4. A fatty acid obtained from margosa oil; probably impure oleic acid.

margosine. An alkaloid from the bark of *Melia azadirachta*, the Indian lilac tree. Colorless crystals, m.175. Cf. *azedarine.*

marialite. The vitreous, green mineral, $2NaCl, 2Na_2O, 3Al_2O_3, 18SiO_2$.

Marie Davy cell. A voltaic cell, which consists of amalgamated zinc, in dilute sulfuric acid, as anode; and carbon, in a paste of mercurous sulfate, as cathode (1.5 volts).

Marignac, Jean Charles Galissard de. 1817–1894. A Swiss (Geneva) chemist, noted for determinations of atomic weights, and investigations of rare earth metals. **M. salt.** Potassium stannosulfate.

marigold. Calendula.

marihuana. Hashish.

marinating. Pickling in brine.

Mariotte, Edme. 1629–1684. A French prior and experimenter, noted for his gas law. **M. law.** The product of volume and pressure of a gas is constant (1676). Cf. *Boyle's law.*

marjoram. The herbs, *Origanum*, of the Labiatae. **sweet-** The herb and leaves of *O. major*, used as tonic and emmenagogue. **wild-** The herb of *O. vulgare*, used as a stimulant. It yields origanum oil. **m. oil.** An essential oil from *Origanum majorana*, a Labiatae. An odorless liquid, d.0.9, in soluble in water, soluble in alcohol or ether; used in perfumery and for scenting soap. Cf. *origanum oil.* **French-** The essential oil of *Calamintha nepeta*, a Labiatae, containing calaminthone.

marker. An electric instrument for registering small time intervals on smoked paper; used in physiological work.

marking. To brand or label. **m. apparatus.** A device which takes the place of the objective in a microscope, and is used to make small circles on the cover-glass marking desired fields for future reference. **m. ink.** A solution of silver nitrate; used to mark textiles. **m. nut.** Seme-carpus.

Markownikoff's rule. (1) In the addition reaction of two organic molecules at a *low* temperature the least hydrogenated carbon atom of one will combine with the most negative element of the other; whereas, at a *higher* temperature, it will combine with the more positive element or radical. (2) When the additive agent adds as H and R, the latter goes to the carbon atom with the smaller number of H atoms.

marl. (1) An earth consisting of clay, sand, and chalk. (2) An earthy or soft rock deposit rich in calcium carbonate.

marmatite. A native zinc, iron, and manganese sulfide.

Marme's reagent. A solution of 6 gm. KI and 3 gm. CdI_2 in 18 cc. water. Used as a reagent for alkaloids, most of which generally form a white or yellowish precipitate with it.

marmite. (1) An earthenware vessel for boiling large volumes of bouillon or media. (2) A trade name for a food prepared by treating yeast with an acid under pressure, and neutralising the product.

Marne, N. H. [Johann Bernhard Herrmann.] A German phlogistic chemist who attempted the first classification of elements, 1786; *Ueber die Anzahl der Elemente.*

maroti oil. A fatty oil, d.0.96, expressed from the seeds of *Hydnocarpus wightiana*, a Flacourtiaceae. Cf. *chaulmoogra oil.*

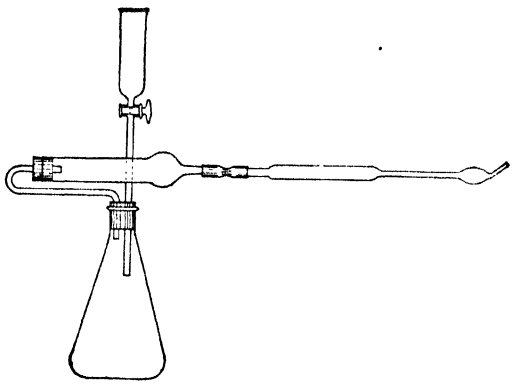
marri-kino. A red gum from *Eucalyptus calophylla*, a Myrtaceae, used in tooth powders.

marrubiin. $C_{21}H_{28}O_4$ = 344.22. The active principle from the leaves of *Marrubium vulgare*, a Labiatae. Colorless scales, m.155, $b._{15mm}$297, slightly soluble in water; used medicinally as a tonic.

marrubium. Horehound.

marsh gas. The gaseous products, chiefly methane, formed from decaying, moist organic matter in marshes and mines. Cf. *firedamp.* **m. mallow.** Althaea. **m. mint.** Wild mint. The herb, *Mentha sativa*, a Labiatae, used as an emetic and stimulant. **m. ore.** Bogore. **m. tea.** Labrador tea.

Marsh, James. 1789–1846. An English chemist. **M. test.** Marsh-Berzelius test. A test for arsenic. The substance is added to pure zinc in a gas-generating bottle. Pure hydrochloric acid is slowly added, and the evolved hydrogen, together with the arsenic hydride, AsH_3, is passed through a long tube which is heated near



Marsh test apparatus.

the end so that a deposit of As forms; or the escaping hydrogen is ignited, and a cold porcelain dish is held above the flame. The As deposits on it as a black mirror that can be dissolved in KOCl solution, while the Sb deposit does not dissolve.

Marshall apparatus. A device for the determination of urea in blood.

marshmallow. Althaea.

Martens densitometer. An optical device for measuring the density of the silver deposit on photographic plates. **M. illuminator.** A photometer for determining the relative efficiency of illumination in rooms. **M. spectroscope.** A direct-vision spectroscope.

martensite. A solid solution of 2% carbon in iron, which is present in quenched steel. On slow cooling it decomposes into iron and iron carbide.

martial ethiops. Magnetic ferric oxide.

Martin's flask. A culture flask, consisting of a glass bulb with three long necks which can be sealed; used in the manufacture of toxins. **M.'s centrifuge.** A small laboratory centrifuge driven by water power. **M.'s filter.** A Berkefeld filter with a funnel, used for filtering toxins directly into a flask.

martite. A native ferric oxide (see *hematite*).

Martius yellow. The calcium salt of naphthalene yellow.

marzipan. A mixture of sugar, ground almonds and starch, used for confectionery.

mascagnine. A mineral ammonium sulfate.

mash. A warm mixture of malted barley and water used in the brewing industry to prepare wort, q.v.

masked. Hidden or concealed. **m. element.** An element present in an organic compound, but combined in such a manner that its properties are subdued or hidden, so that it does not give the usual reactions; *e.g.*, iron is masked in hemoglobin, magnesium is masked in chlorophyll. **m. group.** An atomic group present in an organic compound, but combined in such a manner that its usual properties are subdued. **m. radical.** M. group.

masonite. Gun fiber. A wood fiber used as a constructional and insulating material. **m. process.** Chips of wood are placed in autoclaves (guns) and subjected to steam of 1000 pds. pressure per in.^{2} for five seconds; the sudden release explodes the chips.

mass. (1) M. A definite quantity of matter (q.v.) which offers resistance to change of motion. It is the physical quantity of an electron, atom, molecule, or an assembly of these; *e.g.*, mole. The unit is the milligram, gram, or kilogram. Mass is an unchangeable quality of matter; *e.g.*, one gram of water always contains a definite number of molecules. Weight is a changeable property of matter as it is influenced by location on the earth surface, and a gram-weight of water at sea level contains less molecules than a gram-weight at the top of a mountain. **active-** The number of moles (gram-molecules) in unit volume (1 liter). Cf. *atomic mass.* (2) In pharmacy: a homogeneous solid or semi-solid mixture, as; **blue-** A preparation of fine metallic mercury, suspended in honey or syrup. **copaiva-** Copaiva solidified with magnesium oxide. **ferrous carbonate-** Vallet's mass. A paste containing 33% ferrous carbonate; used as a hematinic. **mercury-** Blue mass. **Vallet's-** Ferrous carbonate mass.

MAGNITUDES OF MASS

Einstein universe	8×10^{78} gm.
Galaxy (Milky Way system)	2.3×10^{55} "
Large stars	1×10^{36} "
Sun 331,950 × earth	1.99×10^{33} "
Small star	1×10^{32} "
Jupiter 317 × earth	1.9×10^{29} "
Earth 1.0 earth	5.99×10^{26} "
Mercury 1/25 × earth	2.5×10^{25} "
Moon 1/81.56 × earth	7.5×10^{24} "
Hydrosphere 1,335,000,000,000 Mill. tons	1.3×10^{24} "
Atmosphere 5,633,000,000 " "	5.6×10^{21} "
Average steroid 1,000,000,000 " "	1×10^{21} "
Steamship Queen Mary 72,000 tons	7.2×10^{10} "
Meteorites, annual fall 40,000 "	4×10^{10} "
1 ton = 1000 kg. (2205 pounds)	1×10^{6} "
Man, average weight 76 kg. (166 pds.)	7.5×10^{4} "
1 kilogram (kg.) = 1000 gm. (2.2 pds.)	1×10^{3} "
1 gram (gm.) = 1000 mg. (15.4 grs.)	1 "
1 milligram (mg.) = 1000 μg.	1×10^{-3} "
1 microgram (μg.) = 1000 γ.	1×10^{-6} "
1 gamma (γ) = 0.000,000,001 gm.	1×10^{-9} "
Vitamin A, effective dose 3 γ	3×10^{-9} "
Magnesium by chemical test 2 γ	2×10^{-9} "
Microbalance sensitivity 0.4 γ	4×10^{-10} "
Sodium by flame test 0.07 γ	7×10^{-11} "
Mercaptan by odor 0.002 γ	2×10^{-12} "
Gold particle (0.000,01 cc. cube)	2×10^{-14} "
Colloid particle (0.000,000,5 cc. cube)	2×10^{-18} "
Protein molecule 100,000 × H	1×10^{-18} "
Maltoseazone molecule 4,021 × H	6.7×10^{-21} "
Octodecapeptide molecule 2,112 × H	3.5×10^{-21} "
Oilfilm (0.000,000,2 cm. square)	2×10^{-21} "
Tristearin molecule 890 × H	1.48×10^{-21} "
Cane-sugar molecule 342 × H	5.7×10^{-22} "
Uranium atom 238 × H	4×10^{-22} "
Water molecule 18 × H	3×10^{-23} "
Hydrogen atom 1 × H	1.663×10^{-24} "
Electron 1/1845 of H	9.01×10^{-28} "

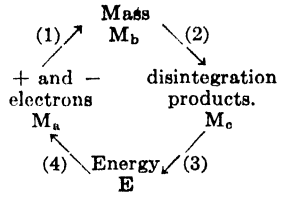
m. action. A law of chemical reaction: In a homogenous system, the product of the molar concentrations of the different participating substances on one side of the equation, when divided by the product of the molar concentrations of the substances on the other side of the equation, gives a constant value for each temperature, no matter how great or small the concentration was at the beginning of the reaction. It applies to both the direct and reverse reactions (law of Guldberg and Waage). The velocity of a chemical reaction is proportional to the active masses (= molar concentrations) of the reacting substances. For instance in the reaction:

$$n_1A_1 + n_2A_2 + \cdots \rightleftharpoons n_1'A_1' + n_2'A_2' + \cdots$$

$$K = \frac{k_1}{k} = \frac{[A_1]^{n_1}.[A_2]^{n_2} \cdots}{[A_1']^{n'_1}.[A_2']^{n'_2} \cdots}$$

where K is the dissociation constant, and k and k_1 the constants of proportionality for Guldberg and Waage's Law applied to the direct and reverse equations. **m. a. constant.** The constant k in the above formula. The equation is applicable to other types of equilibria *e.g.*, ionization, etc. **m. conservation.** A law of physics: No matter can be destroyed, neither can new matter be created; all changes of matter are simply transformations. It is analogous to the law of energy conservation. Cf. *energy, matter.* **m. energy cycle.** The

postulate of a transformation of matter into energy, and vice versa, which follows from Einstein's theory:



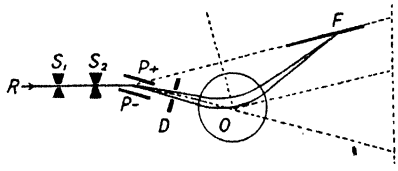
where for each given system $\Sigma M_a > \Sigma M_b > \Sigma M_c$ (degradation of mass). It is based upon:

(1) *Atom building* (q.v.), as in the process $4H \rightarrow He$, or $4 \times 1.00778 \rightarrow 4.00216$ where 0.029 gm. per mol disappears and is transformed into $0.029 \times c^2$ ergs, as $c^2\delta M = \delta E$, where $\Sigma M_a > M_b$.

(2) *Atom disintegration* (q.v.), as exemplified by radioactive elements: $\delta E/c^2 = \delta M$, where $M_b > \Sigma M_c$.

(3) *Atom annihilation* (q.v.), as the disappearance of a hydrogen atom when its electron neutralizes its positive charge: $H^+ + e = 1.00778c^2$ ergs; the complete transformation, $Mc^2 = E$.

(4) *Atom creation* (q.v.), or the formation of positive and negative electrons by the absorption of energy, $E/c^2 = M$, which probably occurs in interstellar or intergalactic space. Cf. *materialization*. **m. law.** (1) Mass conservation. (2) Mass action. **m. number.** The isotopic number, applied where the atomic number is not ascertained. Cf. *isobars*. **m. spectra.** Aston spectra. Spectra of isotopes. The separation of an element into its isotopes by making it the anode in a vacuum tube with a perforated cathode. By passing a current of high voltage through the tube, the canal rays (formed behind the cathode), when exposed to a magnetic field or electric field, are deviated more or less from a straight path.



Mass spectra.

This deviation is proportional to their mass, and can be made visible either by a fluorescent screen or a photographic plate. **m. spectrogram.** The photographic images produced when positive rays, deflected by a magnetic or electric field, fall on a photographic plate. **m. spectrograph.** A device for determining the relative masses of isotopes: canal rays, R, pass through slits, S, into the electric field, P^+ and P^-, and diaphragm, D, selects a portion of equal velocity which passes over magnetic field, O, which focusses particles of equal mass at F.

massecuites. A mixture of syrup and crystals of cane sugar, used in the sugar industry.

massicot. A native lead monoxide, d.9.3, m.-600.

mastic. (1) Mastiche. The concrete resinous exudations from *Pistacia lentiscus*, an Anacardiaceae of the Mediterranean region. A pale yellowish or greenish, transparent resin, insoluble in water, soluble in alcohol. Used in lacquers, incense, plasters, dental cements, chewing gum; and medicinally, as a styptic and carminative. (2) A mixture of finely-powdered rock and bituminous material, used for highway construction. (3) A mortar used for plastering walls; a mixture of finely-ground limestone, sand, litharge, and linseed oil. **m. oil.** An essential oil from m., d.0.858–0.868, b.155–160, containing d-pinene.

mastic acids. A group of resinous acids obtained from mastic:

masticihic acid	$C_{20}H_{32}O_2$	= α-resin
masticin	$C_{20}H_{30}O$	= β-resin
masticinic acid	$C_{23}H_{36}O_4$	
masticolic acid	$C_{23}H_{36}O_4$	
masticonic acid	$C_{32}H_{48}O_4$	

mastication. The process of chewing food, in which it is mixed with the salivary enzymes and amylolytic changes begin. Cf. *digestion*.

masticatory. An agent to increase the secretion of saliva; *e.g.*, chewing gum.

mastix. Mastic (1).

masurium. Eka-manganese. Ma = 98(?). An element of the manganese family, atomic number 43, discovered (1925) by Noddack from the x-ray spectra of platinum ores, gadolinite, and columbite. Its existence has been doubted. Cf. *nipponium*.

masut. The residue remaining after the distillation of benzine and kerosene from Russian petroleum. It contains 87 % C, 12 % H and 1 % O and burns at about 100°C.

mat. Matte (2).

match. A small strip of wood, paper, or wax dipped in a pyrophoric mixture. **lucifer-** A m. dipped into a paste of scarlet or yellow phosphorus or P_4S_3, gum, red lead, and sometimes potassium chlorate, which ignites when rubbed on sand paper. **safety-** A m. dipped in a mixture of 24 pts. antimony sulfide, 22 pts. potassium chlorate, 12 pts. potassium dichromate, 22 pts. red lead, and gum and coloring pigments. It ignites when rubbed on paper coated with red phosphorus, glass powder and gum. The wood, being impregnated with borax, does not glow.

maté. Paraguay tea, yerba, Jesuit tea, Brazil tea, yerba mate. The dried leaves of *Ilex paraguayensis*, an Aquifoliaceae of South America. Its infusion is used as a beverage. **Zapek-** Maté leaves which have been treated at high temperature.

Materia Medica. (1) A knowledge of the natural history, physical characters, and chemical properties of drugs. (2) Pharmacy. (3) Pharmacology. (4) Therapeutics.

materialization. The production of matter, *e.g.*, electrons and positrons, by the transformation of gamma-rays: $h\nu = m_{e+} + m_{e-}$ + kinetic energy; where m_{e+} and m_{e-} are the mass of the positron and electron. Cf. *mass-energy cycle*.

matesterin. $C_{23}H_{40}O_3$(?). A dihydroxy sterol from maté. White needles, m.270.

matico. The dried leaves of *Piper angustifolium*, a Piperaceae. Used as fluid extract, as a genito-urinary stimulant. **m. camphor.** $C_{12}H_{16}O$ = 176.1. A terpene from matico. **m. oil.** An essential oil from m., d.0.930–1.130, soluble in alcohol.

matildite. A silver ore, $AgBiS_2$.

matlochite. A native lead chloride and oxide, $PbO.PbCl_2$.

matrass. An obsolete term for a distilling flask.

matricaria. German chamomile. The dried flowerheads of *M. chamomilla*, a Compositae; used as the fluid extract, as a febrifuge and tonic.

matrine. (1) $C_{15}H_{24}ON_2$ = 248.20. Isolupanine. The chief alkaloid of kuh-seng; it occurs in four isomeric forms: α- Needles, m.77. β- Rhombic prisms, m.87. γ- A liquid, d.1.088, b.223. δ- Prisms, m.84. They are all soluble in water, alcohol or chloroform. (2) $C_{15}H_{26}N$ = 220.2. A liquid alkaloid from *Sophora angustifolia*. Cf. *cytisine, sophorine.*

matrix. (1) Ground mass; rock or earth which contains a metallic ore or a mineral. (2) The impression left in a rock by a fossil or crystal. (3) The material surrounding a precious stone. (4) A conventional arrangement of numbers in horizontal rows and vertical columns, the latter being more numerous. It is useful in interpreting quantum numbers. Cf. *Pauli's principle, Stoner quanta.* **m. theory.** The spectral line which corresponds with a transition from one quantum state to another (*e.g.*, 2 to 1; 2 to 3, etc.) is expressed by an amplitude or intensity factor (a) and a frequency or energy factor (e) in terms of the following series:

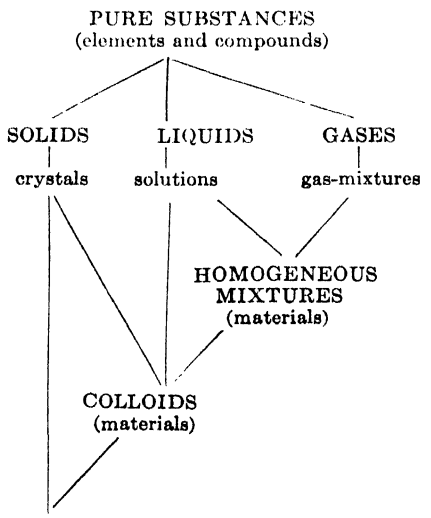
a(11) a(12)e(12) a(13)e(13).....
a(21)e(21) a(22) a(23)e(23).....
a(31)e(31) a(32)e(32) a(33).....

Cf. *quantum theory.*

matt salt. Acid ammonium fluoride.

matte. (1) The crude metal obtained by smelting sulfide ores, which still contains some sulfur. (2) A roughened surface which diffuses light. Antonym—glossy.

matter. Any body, substance or particle which is subject to gravitation; hence any substance, either solid, liquid or gaseous, which occupies space. Cf. *mass.* Classification:



annihilation of- The theory that matter is destroyed in the interior of a star by the transformation of mass into radiations; cf. *energy, mass-energy cycle.* **conservation of-** See *mass conservation.* **creation of-** The assumption that the diffuse gaseous nebulosities absorb radiations and transform it into matter; cf. *energy, mass-energy cycle.* **destruction of-** See *annihilation of-* and *disintegration of-.* **disintegration of-** The radioactive transformations by which matter of one kind is transformed into matter of another kind with the partial liberation of energy. Cf. *packing effect, radioactivity.* **transformation of-** Chemical changes, reactions.

Matthiessen's rule. The product of specific resistance and mean temperature coefficient of resistance is constant.

Maumené, Edme Jules. 1818–1891. A French chemist. **M. number.** The rise in temperature occurring in the M. test. **M. test.** A reaction to distinguish between drying and non-drying oils. 50 gm. of oil are added to 10 cc. of conc. H_2SO_4; if the rise in temperature succeeds 70°C, drying oils are present.

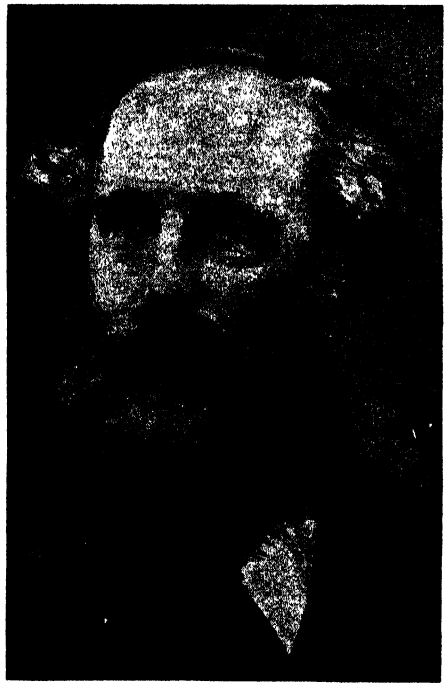
mauvein. $C_{27}H_{24}N_4$ = 404.4. Aniline purple, Perkin's mauve. A violet dye of the phenyl safranine group; the first aniline dye, and prepared by Perkin in 1856.

maximal. The greatest value. **m. work.** The greatest amount of energy obtainable from a process or reaction.

maximum. The largest quantity or value. **m. boiling point mixture.** That mixture of two or more liquids which has the highest boiling point. **m. temperature.** The temperature above which the growth of bacteria does not take place.

maxite. Leadhillite.

maxivalence. The highest valency of an element; it generally corresponds with the group-number in the periodic system.



James Clerk Maxwell.

(From Thomson's "Outline of Science." Courtesy of G. P. Putnam's Sons, N. Y.)

Maxton screen. A rotating screen.

Maxwell, James Clerk. 1831–1879. A Scottish physicist, noted for his electrical and magnetical researches. **M. demon.** A means by which molecules of different velocities may be separated. **M. law.** If μ is the refractive index of a medium, and k the inductivity of a medium: $k = \mu^2$, provided the frequencies of the electrical and light vibrations are the same.

maxwell. A unit of magnetic quantity or flux:
1 Internat. maxwell = 1.00043 absolute maxwells = 1 line = 10^{-8} volt-seconds.
1 Int. maxwell per cm.^{2} = 6.452 maxwell per inch.
1 absol. maxwell = 0.99957 intern. maxwell.
Absolute dimensions, $L^{\frac{1}{2}}M^{\frac{1}{2}}k^{-\frac{1}{2}}$ *e.s.u. units* or $L^{\frac{1}{2}}M^{\frac{1}{2}}T^{-1}\mu^{\frac{1}{2}}$ *e.m.u. units.*

may apple. Podophyllum.

Mayer, Julius Robert von. 1814–1878. A German physician and physicist, who originated the mechanical theory of heat and conservation of energy and matter. Cf. *Meyer.*

mayer. My. A unit of heat capacity. The mayer is the heat capacity of a body which is raised one degree centigrade by one joule. The heat capacity of 1 gram water, at 20°C., is 4.18 mayers.

Mayer's hemalum. A staining solution consisting of 1 gm. hematein, 50 cc. 90 % alcohol, 50 gm. alum, 0.5 gm. thymol, and 1000 cc. water.

Mayer's reagent. A solution of 1.35 gm. $HgCl_2$ and 5 gm. KI, in 100 cc. water; used as a reagent for alkaloids, with which it gives a white precipitate.

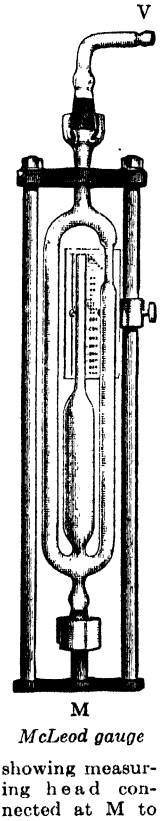
maysin. A globulin in corn meal (0.25 %), which coagulates at 70°C.

Mayow, John. 1643–1679. An English chemist who discovered that the atmosphere consists of two gases, one supporting life and combustion, and indicated their origin.

McBain, James William. 1882– . A Canadian-born, American physical chemist. **McBain-Baker balance.** A silica spring-balance enclosed in heavy glass tubing, for the study of sorption at different pressures. **McB. centrifuge.** An ultracentrifuge (q.v.), consisting of a spinning top driven by and floating on air.

McLaurin process. A low-temperature carbonization method for coal.

McLeod gauge. A device for measuring low gas pressures (0.2 to 0.0005 mm.) in a high vacuum system by trapping a known volume of gas and compressing it to a measurable pressure. Cf. *MacLeod.*



McLeod gauge
showing measuring head connected at M to barometric mercury column, and at V to high vacuum pump.

McPherson, William. 1864– . An American chemist noted for research on organic compounds.

Me. Abbreviation for methyl, CH_3—.

mead. Hydromel.

meadol. Trade name for a lignin plastic prepared from soda wood black liquors.

meadow anemone. Pulsatilla. **m. crocus.** Colchicum. **m. lily.** The bulb of *Silium candidum*, a Liliaceae, used as mucilaginous emulsion. **m. sweet.** Queen-of-the-meadow. The herb of *Spiraea ulmaria*, a Rosaceae, used as a diuretic. **m. saffron.** Colchicum.

mean. An average. **arithmetic-** The quotient obtained by dividing the sum of n numbers by n, hence $\frac{a+b+c+d}{4}$ = arithmetical mean of a, b, c and d. **geometric-** The nth. root of n numbers multiplied by each other; hence, $\sqrt[4]{abcd}$ = geometrical mean of these 4 numbers. **harmonic-** The quotient obtained by dividing n by the sum of 1/n numbers, or $\frac{4}{\frac{1}{a}+\frac{1}{b}+\frac{1}{c}+\frac{1}{d}}$ = harmonic mean of these 4 numbers. **proportional-** The quotient obtained by dividing $ma + nb + oc \cdots$ by $(m + n + o \cdots)$; thus the atomic weight is the p. mean of the isotopic weights (multiplied by the percentages present). **quadratic-** The square root of the quotient obtained by dividing the sum of n^2 numbers by the number of added numbers; as, $\sqrt{\frac{a^2+b^2+c^2+d^2}{4}}$ = quadratic mean of the 4 numbers. A comparison of the different means shows that their numerical value is in the following order: quadratic (highest value), arithmetic, geometric, harmonic (lowest value). **m. path.** The mean free path of molecules is the average distance which they are supposed to travel without collision. **m. refractive index.** The average refractive index of a substance for the extreme red and extreme violet rays.

means. The second and third term in the mathematical expression a:b::c:d where b and c are the means, a and d the extremes: $\frac{a}{b} = \frac{c}{d}$. The rule: "Multiply the means and divide by the extremes," enables any unknown value to be obtained if three values are known; thus $a = \frac{bc}{d}$; $b = \frac{ad}{c}$; $c = \frac{ad}{b}$; and $d = \frac{bc}{a}$.

measure. An appliance with which to determine a physical quantity; generally restricted to those which determine length, diameter, volume, and capacity; *e.g.*, rules, calipers, graduates, etc. For units of measures, see *metric system.*

measuring. The determination of a physical quantity.

meat. The edible portion of animal flesh, excluding fish. **m. bases.** An arbitrary analytical number of meat foodstuffs. It is given by the difference (in percentages): [Total nitrogen − insoluble and coagulable nitrogens, proteoses, peptones and gelatin] × 3.12. **m. extract.** A partly-evaporated bouillon, used as nutrient and for culture media. **m. meal.** A fertilizer consisting of cooked, dried and powdered meat, with little bone. It contains 10–11.5 % nitrogen and 1–5 % P_2O_5. **m. sugar.** Inositol.

mebaral. Phemitone (q.v.).

Mecca balsam. Balm of Gilead.

mechanical. Pertaining to the physical forces of masses and their control; *e.g.*, levers, gravita-

tion, hydraulic, and gaseous pressures. **m. analysis.** Analysis by mechanical as distinct from physical or chemical means, *e.g.*, sifting, sedimentation. **m. antidote.** The use of the stomach-tube or -pump to remove a poison from an organ. **m. equivalent.** Joule. The quantity of energy which, transformed into heat, yields 1 calorie of heat = 4.8×10^7 ergs (at 20°C). **m. pulp.** A pulp obtained by the wet grinding of wood and used in the manufacture of low grades of paper.

mechanics. A branch of physics dealing with those actions of forces or bodies (solid, liquid, or gaseous) which involve no change in state or composition: *e.g.*, machines (levers, wheels, screws), hydraulics, and pneumatics. **quantum-** See *quantum theory.* **wave-** See *wave mechanics.*

mechanism. A machine or instrument which transforms or transmits mechanical force.

mecholyl. Acetyl β-methyl choline.

mecocyanin. $C_{27}H_{30}O_{16}$ = 610.23. An anthocyanin from the poppy.

meconate. A salt of meconic acid, containing the bivalent $C_5H_2O_3(COO)_2$ = radical.

meconic acid. $C_7H_4O_7,3H_2O$ = 254.12. Hydroxypyrocomane dicarboxylic acid. A dibasic hydroxy acid, from opium. White crystals, soluble in water or alcohol. Cf. *comenic acid.*

meconidin. $C_{21}H_{23}NO_4$ = 353.19. Yellow amorphous powder, m.58, insoluble in water.

meconin. $C_{10}H_{10}O_4$ = 194.1. Opianyl, 5.6-dimethoxyphthalide. The lactone of meconinic acid, derived from opium. Colorless crystals, m.102, slightly soluble in water, soluble in alcohol or ether.

meconinic acid. $C_{10}H_{12}O_6$ = 212.1. $C_6H_2(OMe)_2(CH_2OH)COOH$, 1.2-methoxy-3-carboxyl-4-methanol-benzene. It exists only in salts, and as its lactone, meconine.

media. The plural of *medium.*

median. See *frequency.*

medical. Pertaining to the diagnosis and treatment of disease. **m. jurisprudence.** Legal *medicine.*

medicinally. Pertaining to a remedy used in the treatment of disease.

medicine. (1) The science and art of healing. (2) A drug or substance administered to the body to correct a disturbance of its normal function. **clinical-** The study of disease by laboratory methods. **forensic-** Legal medicine. **legal-** The study of disease applied to the detection of crime. **patent-** A medicine or drug protected by letters of patent. **preventive-** A branch of medical knowledge, which aims to prevent disease. **veterinary-** The application of medical knowledge in the treatment of diseases of animals.

medinal. A proprietary brand of *barbital sodium.*

medium. (1) A substance which acts as the transmitter of a force. (2) See *culture* medium. (3) An average or mean.

meerschaum. $H_2Mg_2(SiO_3)_3,H_2O$. Sepiolite. A common porous rock-forming magnesium silicate, d.2.

mega- (1) A prefix derived from the Greek term for large. (2) One million times.

megabar. A unit of pressure: 1 megabar = 1,000,000 bars = 0.987 atm. It is equivalent to the pressure of one megadyne per square centimeter. (Sometimes used erroneously for millibar.)

megabarye. Megabar.

megadyne. A unit of work: 1 megadyne = 1,000,000 dynes (about 1 kg.).

megaerg. A unit of force: 1 megaerg = 1,000,000 ergs.

megafarad. Macrofarad. A unit of electrical quantity: 1 megafarad = 1,000,000 farads.

megameter. A unit of length: 1 megameter = 1,000,000 meters.

megarrhizin. A glucoside from the root of *Megarrhiza californica*, a Cucurbitaceae.

megavolt. A unit of electrical potential: 1 megavolt = 1,000,000 volts.

meiler. A pit or heap of wood covered with soil for the manufacture of charcoal.

meinorite. A vitreous, white to colorless, translucent to transparent, native calcium aluminum silicate.

Meissner, Paul Traugott. 1778–1850. An Austrian pharmaceutical chemist, noted for his *Handbuch.*

MEK. A technical abbreviation for methyl ethyl ketone.

Mekker burner. A modified bunsen burner containing, in its enlarged opening, a metal screen in which the gas and air are more intimately mixed than usual, and thus produce a high temperature (about 1700°C. at the center of the cone).

mekonine. Meconin.

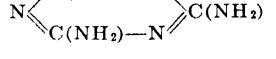
mel. Honey. The saccharine substance deposited by the honey bee, *Apis mellifera*, rich in fructose. Cf. *nectar, ceromel, hydromel, oxymel.*

melaconite. A native, black copper oxide, CuO.

melamac. Trade name for a melamine-formaldehyde plastic.

melam. $C_6H_9N_{11}$ = 235.21. A white powder, obtained by heating ammonium thiocyanate; insoluble in water. See *albene, melem.*

melamine. $C_3N_3(NH_2)_3$ = 126.7. Cyanurotriamide, cyanuramide, *2.4.6*-triamino-*s*-triazine. The amide of cyanuric acid:



Transparent colorless crystals, d.1.573, m. below 250, soluble in water.

melampyrine. Dulcitol.

melampyrite. Dulcitol.

melan. A dark brown oily fluid expressed from *Melilotus coeruleus*, a Leguminosae; used externally on burns and ulcers.

melaniline. Diphenylguanidine.

melanine. $C_{77}H_{98}O_{33}N_{14}S$ = 1779.2. A black coloring matter (chromoprotein) obtained from various insects, hairs of animals, and dark skins; soluble only in alkali and is formed by oxidation of the tyrosine ring of white protein. Cf. *tyrosinase.*

melanite. A black variety of andradite. See iron *garnet.*

melanterite. A native ferrous sulfate, $FeSO_4.7H_2O$.

melanuric acid. See *isocyanurimide.*

malasol. An emulsion of titrol used as an antiseptic.

meldola blue. New blue. Naphthol blue. A blue aniline dye of the methylene blue type.

melee. A diamond weighing less than a quarter carat; used for glass cutting.

melem. $C_6H_6N_{10}$ = 218.2. An amide of cyanuric acid, obtained with melam by heating ammonium thiocyanate.

melene. $C_{30}H_{60}$ = 420.6. Triacontylene. An unsaturated hydrocarbon from bees-wax. A colorless, fatty mass, d.0.89, m.62, b.375, insoluble in water, soluble in hot alcohol or ether.

meletin. Quercetin.

melezitose. $C_{18}H_{32}O_{16}$ = 504.3. Melicitose, melizitose. A trisaccharide obtained from manna and from the sap of conifers and poplars, which hydrolyzes to glucose and turanose (glucose-fructose). Cf. *melizitose.*

melibiase. An enzyme in bottom- but not top-yeasts, which ferments raffinose.

melibiose. $C_{12}H_{22}O_{11}$ = 342.17. Glucose-α-galactoside. A disaccharide $[\alpha]_D$ + 143°, obtained from Australian manna, yellow mallow, and by hydrolysis of raffinose.

melicitose. Melezitose.

meligrin. A condensation-product of dimethyl oxyquinine and methylphenylacetamide; used medicinally in neuralgia.

melilite. (1) A group of anhydrous, calcium, aluminum silicates in igneous rocks. (2) The mineral $(Al, Fe)_2(Ca, Mg)_3Si_2O_{10}$.

melilith. $Ca_4Si_3O_{10}$. A melilite.

melilot. Melilotus, sweet yellow clover. The dried leaves and flowering tops of *Melilotus officinalis*, a Leguminosae, which contains coumarin, coumaric and melilotic acid; used as a mild anodyne.

melilotic acid. $C_9H_{10}O_3$ = 166.08. o-hydrocoumaric acid, oxyhydrocinnamic acid, β-phenolpropionic acid. An aromatic, hydroxy acid obtained from the Melilotus species. Colorless crystals, m.81; on heating further it forms a lactone. **m. lactone.** $C_9H_8O_2$ = 148.-06. m.25.

melinite. A high explosive of the lyddite type.

melissa. The dried leaves and tops of balm, *Melissa officinalis*, a Labiatae used as carminative and febrifuge. **m. oil.** Verbena oil. **East Indian-** Lemongrass oil.

melissic acid. $C_{30}H_{60}O_2$ = 452.6. A monobasic, fatty acid beeswax. Colorless scales, m.90, insoluble in water, soluble in alcohol or ether. **m. alcohol.** Myricyl alcohol. **m. palmitate.** Myricin.

Melissos of Samos. 470–410 B.C. A Greek philosopher famous for the statement: "Nothing can come from nothing."

melissyl alcohol. $C_{30}H_{62}O$ = 438.65. Colorless crystals, m.88.

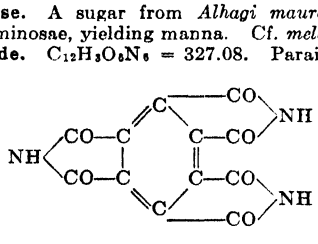
melitic. Mellitic.

melitose. $C_{12}H_{22}O_{11}$ = 342.2. A disaccharide from Australian manna.

melitriose. Raffinose.

melizitose. A sugar from *Alhagi maurorum*, a Leguminosae, yielding manna. Cf. *melezitose.*

mellimide. $C_{12}H_3O_6N_3$ = 327.08. Paraimide.



mellisic. Melissic.

mellite. (1) In pharmacy, any medicated honey. (2) In mineralogy, *honeystone.*

mellitene. $C_{12}H_{18}$ = 162.1. Hexamethylbenzene, C_6Me_6. Colorless scales, m.164, insoluble in water.

mellitic acid. $C_{12}H_6O_{12}$ = 342.1. Hexacarboxyl-benzene, benzene hexacarboxylic acid, $C_6(COOH)_6$. Colorless needles, m.287, soluble in water or alcohol. Its aluminum salt occurs in peat as honeystone. **m. imide.** Euchroic acid.

mellityl alcohol. $C_{11}H_{16}O$ = 164.12. Tetramethylphenyl metanol. $C_6HMe_4CH_2OH$.

mellon(e). C_9H_{12} = 121.1. A hydrocarbon obtained, in addition to melam and melem, by igniting mercuric thiocyanate. See *Pharaoh's serpents.*

mellophanic acid. $C_{10}H_6O_8$ = 254.05. Benzene-1.2.3.5-tetracarboxylic acid, q.v. Colorless crystals, m.238. Cf. *prehnitic* and *pyromellitic acid, mallophene.*

Mellor, Joseph William. 1869–1938. An English chemist, noted for his handbook of inorganic chemistry.

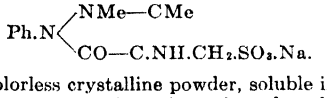
mellorite. A complex lime-ferric oxide silicate of the garnet type.

Mellot's metal. D'Arcet metal.

melonite. (1) Ni_2Te_3. Tellurnickel. A native nickel-telluride, reddish granular particles. (2) A silica mineral of the scapolite group, $Ca_4Al_6Si_6O_{25}$.

melting. Fusing. The transformation of a solid to a liquid by means of heat. **m. furnace.** A furnace used for fusing; as a glassmaker's furnace. **m. point.** The temperature at which a solid changes to a liquid; or at which liquid and solid phase are in equilibrium under a pressure of 1 atmosphere. The highest known m.p. is 4200°C. for a mixture of 25 % HfC and 75 % TaC; and 3887°C. for HfC. The lowest m.p. that of helium. **m. point tube.** A capillary tube used to determine the melting point of the substance which is contained in it, by attaching it to a thermometer and heating it in a liquid until the contents fuse. Cf. *Thiele tube.*

melubrin. $C_{12}H_{14}O_4N_2SNa$ = 305.2. Sodium-1-phenyl-2.3-dimethyl pyrazolone sulfonate.



A colorless crystalline powder, soluble in water; used as a nontoxic antipyretic and analgesic.

membrane. A thin, enveloping or lining substance, which divides a space or an organ. **animal-** A skin-like tissue obtained from animal tissues (parchment), used for dialyzing. **semi-permeable-** A tissue which permits the passage of certain substances (*e.g.*, water or crystalloids), but prevents the passage of others (*e.g.*, colloids). Classification:

(1) *sieves*, as such, or coarse filterpaper.
(2) *cell filters*, such as very fine filterpaper.
(3) *bacterial filters*, such as kieselguhr.
(4) *colloidal filters*, such as parchment or collodion.
(5) *molecular sieves*, such as copper ferrocyanide.

menachanite. Menaccanite, menacanite, menakanite, menacconite. A titaniferous magnetic oxide of iron from Menachan, in Cornwall. Cf. *ilmenite.*

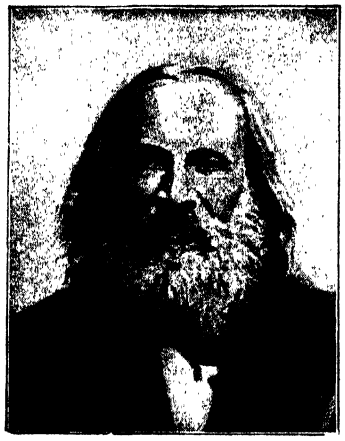
menadione. 2-Methyl naphthoquinone.

menaphthone. 2-Methyl naphthoquinone.

menaphthyl. The monovalent methyl naphthyl radical, $C_{10}H_7.CH_2$—.

Mendelyeev, Dmitri Ivanovitch. Mendeléeff, Mendelejeff. 1834–1907. A Russian chemist,

noted as one of the discoverers of the periodic law (see *Meyer*, Lothar), and predictor of several *eka* elements. **M. chart.** Periodic



Dmitri Ivanovitch Mendelyeev.

(From McPherson & Henderson's "First Course in Chemistry." Courtesy of Ginn & Co.)

table. **M. group.** A vertical group of the periodic table. **M. law.** Periodic law. **M. system.** Periodic system.

MENDELYEEV'S PERIODIC TABLE

Series	Period	0	I R_2O	II RO	III R_2O_3	IV RO_2 RH_4	V R_2O_5 RH_3	VI RO_3 RH_2	VII R_2O_7 RH	VIII
1			H							
2	1	He	Li	Be	B	C	N	O	F	
3	2	Ne	Na	Mg	Al	Si	P	S	Cl	
4	3	A	K	Ca	Sc	Ti	V	Cr	Mn	Fe Co Ni
5			Cu	Zn	Ga	Ge	As	Se	Br	
6	4	Kr	Rb	Sr	Y	Zr	Cb	Mo	Ma	Ru Rh Pd
7			Ag	Cd	In	Sn	Sb	Te	I	
8	5	Xe	Cs	Ba	La	Ce				
9					Rare Earths					
10	6					Hf	Ta	W	Re	Os Ir Pt
11			Au	Hg	Tl	Pb	Bi	Po	El	
12	7	Rn	Ve	Ra	Ac	Th	Pa	U		

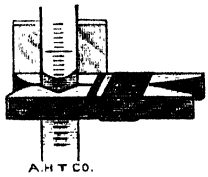
mendozite. A massive, white, fibrous, sodium-aluminum sulfate, or sodium alum.

meneghinite. A native, lead-antimony sulfide, $4Pb_2SbS_2$.

menformon. Theelin.

menhaden. The fish *Brenvoortia tyranniss*, used for making oil and fertilizer.

meniscus. The crescent-shaped surface of a liquid in a tube, either concave (when the liquid wets the material of the container, as water and glass), or convex (when liquid does not wet, as mercury and glass). **m. reader.** (1) A colored streak placed behind a buret to enable the height of the liquid to be read more exactly. It is customary to read the lowest point of the meniscus. (2) A clamp and card attached to the buret.



Meniscus reader.

Menispermaceae. Moonseed family, a group of woody, climbing tropical plants:

Anamirta paniculata	cocculus indicus
Cisampelos pereira	cisampeline
Jateorhiza palmata (calumba)	calumba
Chondodendron tomentosum	pareira
Menispermum canadense	menispermum

Cf. *cucoline, deyamittin, diversine, sinomenine.*

menispermine. $C_{18}H_{24}N_2O_2$ = 300.3. An alkaloid from *Cocculus indicus, (Anamirta paniculata)* and *Menispermum canadense;* colorless crystals.

menispermoid. The combined principles from *Menispermum canadense;* used in medicine.

menispermum. Yellow parilla or moonseed. The dried roots of *Menispermum canadense.* Used as the fluid extract, similarly to sarsaparilla.

menstruum. A solvent used for the extraction of drugs.

mensuration. The act of measuring. **m. formula.** (pl. **-ae, -as**). The mathematical equations by which plain, cubical, or spherical figures or bodies are measured.

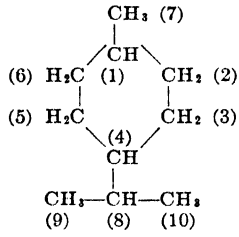
mentha. (1) Mint (*e.g.*, peppermint). (2) A genus of Labiatae.

M. aquatica	marshmint, poco oil
M. crispa	spearmint oil
M. longifola	pennyroyal oil
M. piperita	peppermint oil
M. sativa	marshmint
M. spicata	spearmint
M. sylvestris	English horsemint
M. viridis	spearmint

m. camphor. l-Menthol. **m. viridis.** Spearmint.

menthadiene. A group of terpenes with two double bonds, derived from menthane, *e.g.*, $\Delta^{1.8(9)}$-*m-* or *1.8(9)-m-* Sylvestrene. *1.3-p-* α-Terpinene. *1.4(8)-p-* Terpinolene. *1.5-p-* α-Phellandrene. *1(7)2-p-* β-Phellandrene. *1.8(9)-p-* Limonene. **m. dione.** Thymoquinone. **m. one.** Carvone.

menthane. $C_{10}H_{20}$ = 140.2. Terpane. 4-isopropyl-1-methylcyclohexane, hexahydrocymene, menthonaphthene. A saturated hydrocarbon and parent substance of many terpenes:



A colorless liquid, d.0.807, b.169, insoluble in water. **amino-** Menthylamine. **dihydroxy-** Terpine. **epoxy-** Cineole. **3-hydroxy-** Menthol. **m. diol.** Terpinol.

menthanol. A hydroxy derivative of menthane. **2-** Carvomenthol. **3-** Menthol.

menthanone. A keto-derivative of menthane, *e.g.*, **3-** Menthone.

menthe. A peppermint liqueur (Créme de menthe), prepared from menthol and alcohol.

menthene. $C_{10}H_{18}$ = 138.2. Δ^3-menthane. A colorless liquid, b.167, d.0.814, insoluble in water. **carvo-** Carvomenthane.

menthenol. A hydroxy-derivative of menthene. **3-** Pulegol.

menthenone. A keto-derivative of menthene, **3-$\Delta^{4(8)}$-** Pulegone; **3-$\Delta^{8(9)}$-** Isopulegone. **Δ^1-** Piperitone. **Δ^2-** Carvenone.

menthol. $C_{10}H_{20}O$ = 156.2. Peppermint camphor. 3-hydroxymenthane, menthacamphor, 1-methyl-4-isopropyl-3-hydroxy-hexahydrobenzene. A d-rotatory terpene alcohol, in many essential oils. Colorless crystals, d_{15}.0.890, m.42, b.212, slightly soluble in water, soluble in alcohol or ether. Used in perfumery, flavoring extracts, confectionery; and medicinally (externally), for headache, toothache, colds, skin diseases, and internally as an anodyne, anesthetic, and antispasmodic. **m. salicylate.** Salimenthol. **m. valerate.** Validol.

menthonaphthene. Menthane.

menthone. $C_{10}H_{18}O$ = 154.2. Δ^3-hydroxymenthene, 3-terpanone. A d-rotatory colorless liquid, d.0.896, b.207, slightly soluble in water, soluble in alcohol or ether. **levo-** Apinol.

enthyl. The monovalent radical, 3-menthanyl, $C_{10}H_{19}$—, derived from menthane by replacing the hydrogen of the third carbon atom. **m. amine.** $C_{10}H_{19}NH_2$ = 155.1. 3-aminomenthane. A colorless liquid, b.205. *carvo-* See *carvomenthylamine*. **m. borate.** $BO_3(C_{10}H_{19})_3$. Estoral. Colorless crystals, used in medicine. **m. camphorate.** A white powder, insoluble in water, soluble in alcohol or oils; used medicinally in the treatment of tuberculosis.

menyanthes. Marsh trefoil, buckbean. The dried leaves of *Menyanthes trifoliata*, a Gentianaceae. Used as an aromatic bitter.

menyanthin. $C_{33}H_{50}O_{14}$ = 670.4. Celastin. A bitter glucoside from the leaves of the buckbean; soluble in water or ether, insoluble in alcohol.

menyanthol. $C_7H_{11}O_2$ = 111.09. A split-product of menyanthin.

mepacrine. Quinacrine (q.v.).

mephitic. An obsolete term for foul, noxious, or poisonous. **m. air.** Black damp, choke damp. An obsolete name for carbon dioxide or nitrogen.

mephobarbital. Phemitone (q.v.).

merbaphen. $C_{16}H_{19}N_2O_6ClNaHg$ = 592.1. Novasurol. A mercury derivative of barbital, used as a diuretic.

mercaptal. Thioacetal. A compound formed from mercaptans and aldehydes which combine in the presence of hydrochloric acid. Thus, in general—

$$R'.CHO + 2HSR'' = H_2O + R'.CH(SR'')_2.$$

Cf. *mercaptol*.

mercaptan. (1) Ethyl mercaptan. (2) A hydrosulfide or compound containing the radical —SH. It is indicated by the *prefix* mercapto- and the *suffix* -thiol; thus CH_3SH, methanethiol*; $CH_2SH.CH_2SH$, *1.2*-ethanedithiol*.

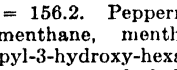
mercaptan acid. An organic compound containing the —SH and —COOH radicals, *e.g.*, $HS.CH_2.COOH$, thioglycollic acid, or ethanethiol acid; HS.CHMe.COOH, thiolactic acid or i-propanthiol acid.

mercaptide. Metal mercaptan. A metallic derivative of mercaptans, in which the sulfur hydrogen is replaced by a metal; thus, a compound of the general type, R—SM, where R is an aryl or alkyl radical and M, a metal.

mercapto- A prefix indicating the presence of a thiol group, —SH *e.g.*, mercaptothiazole. **m. sulfothiobiazole.** Bismuthiole.

mercaptol. Mercaptans and ketones combine in the presence of acid to form mercaptols of the general type $R_2C(SR')_2$. Cf. *mercaptal*.

mercaptophenyl- A prefix indicating the presence of the $HS.C_6H_4$— radical. **m. dithiodiazolone.** $C_8H_6N_2S_3$ = 226.05. White crystals, used as a microreagent for bismuth (red precipitate). Cf. *bismuthiole*.

mercaptothiazole. The hypothetical ring compound,  .

Mercer, John. 1791–1866. An English cotton printer who developed the mercerization process in 1850; this was developed practically in 1889 by Horace Arthur Lowe. **M. process.** Mercerization.

mercerization. The treatment of cotton with 25 % NaOH, which causes it to shrink and become heavier, stronger, denser and acquire a milky luster; it will not shrink and is more easily dyed.

mercerized. Treated with caustic soda; see *mercerization*.

mercur- A prefix indicating a mercury compound. **m. ammonium.** Mercurammonium. **m. diammonium.** The bivalent radical $Hg(NH_3)_2$=. **m. diammonium chloride.** $Hg(NH_3Cl)_2$ = 305.9. An infusible, white precipitate obtained from Hg^{++} and Cl^- in the presence of NH_4^+.

mercurammonium- A prefix indicating the presence of mercury and ammonia-nitrogen in a compound. The usual type have the formula NHg_2X, where X is a halogen, and Hg_2 has replaced the H_4 of ammonium. They are yellow or brown solids, insoluble in water; as,

m. bromide	NHg_2Br
m. chloride	NHg_2Cl
m. hydroxide	NHg_2OH
m. iodide	NHg_2I
m. nitrate	NHg_2NO_3.

Cf. *mercuriammonium*.

mercuration. Mercurization.

mercurial. A drug containing mercury. **m. oil.** Grey oil.

mercurialine. A supposed alkaloid of *Mercurialis annua*, an Euphorbiaceae; probably methylamine.

mercurialis. The dried herb of *M perennis*, sometimes used medicinally for syphilis.

mercuriammonium. Mercuric ammonium. A double salt of NHg_2X with one or three molecules of NH_4X; as

(a) $NHg_2Cl + NH_4Cl \rightarrow 2HgNH_2Cl$
(b) $NHg_2Cl + 3NH_4Cl \rightarrow 2Hg(NH_2)_3Cl_2$

Cf. *mercurammonium*.

mercuric. A compound of mercury, containing the divalent Hg= atom. **m. acetate.** $Hg(C_2H_3O_2)_2$ = 318.7. White crystals, d.3.25, soluble in water or alcohol; used as a reagent, medicinally as an antisyphilitic, and as a cosmetic. **m. acetylide.** $3C_2Hg.H_2O$ = 691.8. A white powder, d.5.3, insoluble in water, and explosive. **m. amidosuccinate.** $Hg(C_4H_7N_2O_3)_2$. Colorless needles, insoluble in water, soluble in acids; used as an antisyphilitic. **m. aminophenyl arsenate.** Mercuric atoxylate.

m. ammonium chloride. $HgNH_2Cl$ = 251.8. Mercuriammonium chloride, white precipitate, ammoniated mercury. White powder, insoluble in water, soluble in ammonium carbonate solutions; is used medicinally as an antiseptic and alterant. **m. ammonium propionate.** $HgNH_2C_3H_4O_2$ = 288.6. Mercuriammonium propionate. White needles, soluble in water; used medicinally as an antisyphilitic. **m. anilinate.** $Hg(C_6H_4NH_2)_2$ = 384.3. A white, microcrystalline powder, insoluble in water; used as an antisyphilitic. **m. arsenate.** $Hg_3(AsO_4)_2$ = 879.7. A yellow powder, insoluble in water, soluble in acids; used as an antisyphilitic. **m. atoxylate.** $C_{12}H_{14}O_6N_2As_2Hg$. Mercuric-p-amino-phenylarsonate, asiphyl, aspirochyl, atoxyl mercury. A white powder, insoluble in water, used as an antisyphilitic. **m. benzoate.** $Hg(C_7H_5O_2)_2.2H_2O$ = 478.6. Colorless crystals, insoluble in water, slightly soluble in alcohol, soluble in sodium chloride or ammonium benzoate solution. Used medicinally as an antisyphilitic and in skin diseases. **m. bichromate.** $HgCr_2O_7$ = 416.5. A red, crystalline powder, insoluble in water. **m. borate.** M. pyroborate. **m. bromide.** $HgBr_2$ = 360.4. Mercury dibromide. Colorless, rhombic crystals, d.5.74, m.235, b.319, slightly soluble in water, soluble in alcohol or ether; used as an antisyphilitic. **m. cacodylate.** $Hg(Me_2AsO_2)_2$. Mercuric methyl arsenate. A white, crystalline powder, soluble in water; used in ampule medication. **m. carbolate.** M. phenolate. **m. carbonate.** $HgCO_3$ = 260.3. A white powder, insoluble in water. Known chiefly as its basic salts, $HgCO_3.2HgO$, and $HgCO_33HgO$. **m. chloride.** $HgCl_2$ = 271.5. Corrosive sublimate, sublimate, corrosive mercury chloride, mercury bichloride. White rhombic crystals which are extremely poisonous (antidote: 10 % sodium thiosulfate solution), d.5.43, m.287, b.305. Soluble in water, alcohol, or ether. Used for the preservation of wood and museum specimens, as an insecticide and exterminator of rodents and other animals, in tanning, embalming, purification of gold, photography, textile printing, etching of steel and iron, as a mordant and in dyeing furs; also medicinally, as an antiseptic and caustic; and chemically, as a reagent. **m. chloro-iodide.** $HgCl_2.HgI_2$ = 725.8. A red, crystalline powder, soluble in alcohol; used as an antisyphilitic. **m. chromate.** $HgCrO_4$ = 316.4. A yellow, crystalline powder, insoluble in water. **m. cyanide.** $Hg(CN)_2$ = 252.6. Colorless, tetragonal crystals, d.4.02, decomp. by heat, slightly soluble in water or alcohol. Used in photography and in manufacturing cyanogen; medicinally, as an antiseptic, antisyphilitic, and tonic, usually as ampoules; chemically, as a reagent for palladium. **m. diiodosalicylate.** $Hg(C_7H_3I_2O_3)_2$. A yellow, amorphous powder, insoluble in water, soluble in alcohol. **m. ethylchloride.** Colorless, lustrous scales, slowly soluble in water or alcohol; used medicinally as an antisyphilitic. **m. ferrocyanide.** $Hg_2Fe(CN)_6$ = 612.8. A brown powder, insoluble in water or alcohol. **m. fluosilicate.** $HgSiF_6.6H_2O$ = 450.76. Rhombohedral crystals. **m. fulminate.** $Hg(ONC)_2.\frac{1}{2}H_2O$ = 293.6. Colorless, rhombic crystals which explode on detonating or at 175°C, slightly soluble in water or alcohol; used as a detonator. **m. gallate.** $[C_6H_2(OH)_3COO]_2Hg$. A greenish-black powder, insoluble in water, used as an antisyphilitic. **m. halides.** The divalent halogen compounds of mercury, HgX_2. *alkyl-* A group of organic compounds of the type, RHgX, where R is an aliphatic or alkyl radical. *aryl-* A group of organic compounds of the type, RHgX, where R is an aryl or aromatic radical. **m. hydroxide.** $Hg(OH)_2$ = 234.6. White amorphous powder, insoluble in water. **m. hydroxides.** A group of organic compounds of the type, RHgOH. **m. iodate.** $Hg(IO_3)_2$ = 550.4. A white amorphous powder, insoluble in water, soluble in sodium chloride or potassium iodide solutions. **m. iodide.** HgI_2 = 454.4. *red-* Mercury biniodide. Red, tetragonal crystals, d.6.25, m.241, b.349, insoluble in water, soluble in alcohol or potassium iodide solution. Used medicinally as an alterative, antiseptic and germicide, and as an antisyphilitic in form of tablets, granules, and ampoules. *yellow-* Yellow, rhombic, crystalline powder, d.6.0, m.241, b.349, insoluble in water, soluble in iodide solutions. **m. lactate.** $Hg(C_3H_5O_3)_2$ = 378.4. A white, crystalline powder, slightly soluble in water; used as an antisyphilitic. **m. lithium iodide.** $HgI_2.2LiI$ = 722.4. Mercuricide. A yellow powder, soluble in water or alcohol; used as an antisyphilitic. **m. naphtholate.** $Hg(C_{10}H_7O)_2$ = 486.6. β-naphtholmercury, mercury naphthol. A lemon-yellow powder, insoluble in water, used as an antiseptic. **m. nitrate.** $Hg(NO_3)_2$ = 324.6. A white, hygroscopic powder, decomp. by heat, soluble in water, m.79. Used as a reagent, and medicinally, as an antisyphilitic. *basic-* (1) $2Hg(NO_3)_2.2H_2O$ = 685.29. Deliquescent colorless crystals. (2) $2Hg(OH).NO_3.H_2O$ = 577.27. (3) $Hg(NO_3)_2.2HgO.H_2O$ = 775.87. A white, unstable powder. **m. oleate.** $Hg(C_{18}H_{33}O_2)_2$ = 763.0. A yellowish or red liquid; a solution of mercuric oxide in oleic acid, insoluble in water, soluble in alcohol or ether. Used medicinally as an antiseptic and antisyphilitic. **m. oxalate.** HgC_2O_4 = 288.61. White powder insoluble in water. **m. oxide.** HgO = 216.6. *red-* Hydrargyri oxydum rubrum, red mercury oxide. Red, monoclinic prisms, d.11.14, decomp. by heat, insoluble in water, soluble in acids. Used in the manufacture of mercury salts, for paints and pigments for ship keels, in ceramics; medicinally, as a stimulant, caustic and parasiticide. *yellow-* Hydrargyri oxydum flavum, yellow precipitate. Orange-yellow, tetragonal crystals, or amorphous powder, insoluble in water, soluble in acids; used medicinally in ointments as a parasiticide. **m. oxycyanide.** $HgO.Hg(CN)_2$ = 469.2. A white, crystalline powder; soluble in water; used as an antiseptic. **m. phenolate.** $Hg(C_6H_5O)_2$ = 386.7. Mercury phenolate, m. carbolate, phenol mercury. A gray to pink powder, insoluble in water, soluble in alcohol or ether; used medicinally as an antiseptic and antisyphilitic. **m. phenylacetate.** $HgC_6H_5.C_2H_3O_2$ = 336.7. Colorless prisms, m.149, soluble in alcohol or benzene. **m. phosphate.** $Hg_3(PO_4)_2$ = 791.9. A white powder, insoluble in water. *acid-* $HgHPO_4$ = 296.3. A white or slightly yellow powder, insoluble in water, soluble in acids; used medicinally as an antisyphilitic. **m. potassium cyanide.** $HgK(CN)_3$ = 317.7. Potassium mercury cyanide. Colorless crystals, soluble in water or alcohol; used technically, in the manufacture of mirrors, and medicinally, as an antiseptic. **m. potassium**

iodide. $HgI_2.2KI$ = 786.5. Mayer's reagent. Yellow, deliquescent crystals, soluble in water; used as a reagent for alkaloids. Cf. *Toulet's* solution. **m. potassium thiosulfate.** $3Hg(S_2O_3)_2.5K_2S_2O_3$. Mercury and potassium thiosulfate. Colorless crystals, soluble in water, used as an antisyphilitic. **m. pyroborate.** HgB_4O_7 = 355.9. Mercuric tetraborate. A brown amorphous powder, insoluble in water. **m. rhodanate.** Mercuric thiocyanate. **m. salicylate.** $Hg(C_7H_5O_3)_2$ = 474.6. A white powder, insoluble in water, soluble in alkalis or salt solutions; used medicinally as an antiseptic, antisyphilitic, and alterant. **m. santonate.** $Hg(C_{15}H_{19}O_4)$ = 463.5. A colorless powder, used in medicine. **m. silicofluoride.** $HgSiF_6.2H_2O$ = 579.3. Prismatic crystals, soluble in water; used as a wound antiseptic. **m. stearate.** $Hg(C_{18}H_{35}O_2)_2$ = 767.0. Yellow, granular powder, slightly soluble in alcohol, soluble in fats and oils; used medicinally in ointments. **m. subsulfate.** $HgSO_4.2HgO$ = 729.9. Basic mercuric sulfate, turpeth mineral, Queen's yellow. A lemon-yellow, heavy powder, insoluble in water, soluble in acids. **m. succinate.** $Hg(C_4H_4O_4)$ = 316.6. Colorless crystals, insoluble in water, soluble in salt solutions. *imido-* M. succinimide. **m. succinimide.** $Hg[C_2H_4(CO)_2N]_2$ = 372.5. M. imido-succinate. A white crystalline powder, soluble in water; used as an antiseptic and antisyphilitic. **m. sulfate.** $HgSO_4$ = 296.7. Mercury bisulfate, mercury persulfate. A white or yellow powder, d.6.47, decomp. by heat, slightly soluble in water. Used in the manufacture of calomel, in the extraction of gold and silver, in electric batteries, and medicinally, as an antisyphilitic. *basic-* M. subsulfate. *hydrous-* (a) $HgSO_4.2H_2O$ = 332.71. (Erroneously called "basic.") Yellowish crystals, d. 6.44, slightly soluble in water; used similarly to the anhydrous salt. (b) $3HgO.SO_3.4H_2O$ = 962.10. A yellow powder. **m. sulfide.** HgS = 232.7. *black-* Black mercury sulfide, metacinnabarite. Amorphous, black powder, d.7.7, insoluble in water or alcohol, soluble in sulfide solutions; used as a pigment. *red-* Red mercury sulfide, artificial cinnabar, vermilion, cinnabar. Rhombohedric, scarlet red, crystalline powder, d.8.09, subliming at 446°C, insoluble in water or alcohol; used technically as a pigment and for fumigation. **m. sulfite.** $HgSO_3$ = 280.6. A white powder which becomes pink with age, slightly soluble in water. **m. sulfocyanide, m. thiocyanate.** $Hg(CNS)_2$ = 316.6. M. rhodanate, m. rhodanide, m. sulfocyanate. A white powder, usually pressed into sticks, decomp. by heat. When ignited it glows and forms a voluminous, cohesive and light ash (Pharaoh's serpent, q.v.), insoluble in water or alcohol, soluble in chloride or cyanide solutions; used in photography. **m. urate.** $HgC_5H_2O_3N_4$ = 366.6. A yellowish powder, insoluble in water. **m. xanthates.** A group of organic compounds of the type, R.HgS.CS.OR, in which R is either an aliphatic or aromatic radical.

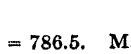
mercuricide. Mercuric lithium iodide.

mercurides. An organic compound of divalent mercury, R_2Hg, where R is a hydrocarbon radical. See *mercury methide*, and *ethide*.

mercurification. Amalgamation. Cf. *mercurization.*

mercurify. Amalgamate.

mercurimetry. The determination of a substance by precipitating it with a mercury salt and determining the mercury in the precipitate.

mercurindene. C_8H_6Hg = 302.6. The ring-system, 

mercurio-vegetal. Manaca.

mercurius. Mercury. **m. praecipitatus.** The "red precipitate" (HgO) of the Latin alchemist Geber. **m. vitae.** Antimony oxychloride.

mercurization. The addition of mercury to an organic compound.

mercuroammonium. Mercurous ammonium. A double salt of the type $HgNH_3X$. **m. chloride.** $HgNH_3Cl$, a black powder.

mercurochrome. $C_{20}H_8O_6Na_2Br_2Hg$. Disodium-dibromo-hydroxy-mercury-fluorescein. An iridescent, green, crystalline powder, soluble in water producing a deep red color. Its 2% solution is used as a germicide and genito-urinary antiseptic, and as a less irritating household antiseptic than tincture of iodine. Cf. *apagallin.*

mercurol. Mercury nucleinate. A compound of mercury and nucleic acid made from yeast (20% Hg). A brownish-white powder, soluble in water, insoluble in alcohol; used medicinally as an astringent, antisyphilitic, and antipyretic.

mercurophen. Sodium hydroxy mercury-o-nitrophenolate. A brick red powder, soluble in water, used as germicide.

mercurous. A compound of monovalent mercury, Hg—, usually represented as Hg_2X_2, where X is a monovalent acid radical. **m. acetate.** $HgC_2H_3O_2$ = 259.6. Colorless, crystalline powder, slightly soluble in water; used medicinally as an antisyphilitic. **m. arsenite.** Hg_3AsO_3 = 724.8. A brownish-white powder, insoluble in water, soluble in acids; used as a parasiticide. **m. benzoate.** $HgC_7H_5O_2$ = 321.3. A colorless, crystalline powder, insoluble in water; used as an antiseptic. **m. bitartrate.** $HgHC_4H_4O_6$ = 349.3. A colorless, crystalline powder, insoluble in water. **m. bromide.** HgBr = 280.5. Yellow, tetragonal crystals, d.7.31, sublime at 350°C, insoluble in water, soluble in chloride solutions; used as a substitute for calomel. **m. carbonate.** Hg_2CO_3 = 461.2. A yellow powder, slowly decomp., insoluble in water. **m. chloride.** HgCl = 236.1. Hydrargyri chloridum mite, calomel, mercury monochloride, mild mercury chloride, mercury subchloride, mercury protochloride; native as horn quicksilver. Colorless, rhombic, or tetragonal, crystalline powder, d.7.1, sublimes at 303°C, insoluble in water. Used as a reagent; medicinally, as a cathartic, intestinal antiseptic, and alterative; in pyrotechnics, for green fires; in ceramics, for gold colors. **m. chromate.** Hg_2CrO_4 = 517.2. A red powder, insoluble in water, decomp. by heat. **m. citrate.** $Hg_3C_6H_5O_7$ = 790.8. A colorless powder, slightly soluble in water. **m. diammonium acetate.** $Hg(NH_2)_2(C_2H_3O_2)_2.H_2O$ = 370.74. White rectangular plates, very soluble in water. **m. fluosilicate.** $Hg_2SiF_6.2H_2O$ = 579.29. Colorless prisms. **m. formate.** $H.COOHg$ = 245.62. White glistening scales, slightly soluble in water. **m. iodide.** HgI = 327.5. Yellow mercury iodide, hydrargyri iodidum flavum, mercury protiodide, mercury monoiodide. Yellowish-green, tetragonal, crystalline powder, d.7.7, m.290, b.310, insoluble in water, alcohol or,

ether; used medicinally as an alterative and antisyphilitic. **m. iodobenzene-p-sulfonate.** Anogen. A yellow, crystalline powder, insoluble in water or oils; used suspended in oil as an antisyphilitic. **m. lactate.** $HgC_3H_5O_3$ = 289.3. A white, crystalline powder, slightly soluble in water; used as an antisyphilitic. **m. nitrate.** $HgNO_3.2H_2O$ = 298.6. Colorless monoclinic crystals, d.4.78, decomp. by heat, soluble in water. Used as a reagent, and as an antiseptic, caustic, and antisyphilitic. **m. oxalate.** HgC_2O_4 = 489.22. A white powder, insoluble in water. **m. oxide.** Hg_2O = 417.2. A black powder, d.9.8, insoluble in water. *Hahnemann's-* $Hg_2O.Hg_2NH_2NO_3$ = 896.4. Black precipitate, mercurius solubilis, Hahnemann's mercury. A black or gray powder, insoluble in water or alcohol, soluble in acetic acid; used as an antisyphilitic and in ointments. **m. phosphate.** Hg_3PO_4 = 681.2. A colorless powder, insoluble in water. **m. potassium tartrate.** $HgKC_4H_4O_6$ = 387.74. White crystals, insoluble in water. **m. protoxide.** Black m. oxide. Native as montroydite. **m. santonate.** $HgC_{15}H_{19}O_4$ = 463.5. A white powder, insoluble in water, slightly soluble in alcohol. **m. sulfate.** Hg_2SO_4 = 497.3. White, monoclinic crystals, d.7.56, slightly soluble in water, decomp. by heat; used for batteries and standard cells. **m. sulfide.** Hg_2S = 433.3. A black powder, insoluble in water. **m. tannate.** $Hg_2OH(C_{14}H_9O_9)_3$. Hydrargotin. A gray powder, used as an antisyphilitic. **m. tartrate.** $Hg_2C_4H_4O_6$ = 549.25. Yellowish white crystalline powder, insoluble in water. *acid-* $HgHC_4H_4O_6$ = 349.65. M. bitartrate. White crystals, insoluble in water.

mercuroxyammonium. A double salt of the type $NH_2Hg_2O.X$. *E.g.*, m. chloride $NH_2Hg_2O.Cl$, and **m. hydroxide** $NH_2Hg_2O.OH$.

mercury. Hg = 200.61. Hydrargyrum, Quicksilver, mercurius, liquid silver. A liquid metal and element, atomic number 80. A silver-white, metallic liquid, d.13.595, freezing at −38.8, b.357.2, insoluble in water, alcohol, or ether, soluble in nitric acid. Mercury occurs in nature chiefly as sulfide (cinnabar). It forms two series of compounds: mercurous (valency 1), and mercuric (valency 2). Used as a catalyst in Kjeldahl nitrogen determination; for filling gas analysis apparatus; as a catalyst; in electric cells; in the manufacture of mercury salts, the filling of thermometers, barometers, and mercury vapor lamps; in metallurgy and dentistry for amalgams with gold and silver; for electric rectifiers, and vacuum tube lights; for silvering mirrors; and in the manufacture of explosives. **ammoniated-** $HgNH_2Cl$ = 251.8. Sal alembroth, white precipitate, hydrargyrum ammoniatum, mercury and ammonium chloride. A white powder, insoluble in water; used medicinally as an antiparasitic. **biphenyl-** Mercury biphenyl. **repurified-** Redistilled mercury used for dental amalgams or for electrodes. **soluble-** See *soluble*. **vegetable-** Manacine.

m. acetate, m. acetylide, etc. See *mercuric* and *mercurous*. **m. arc.** An electric arc between mercury electrodes. **m. alloys.** Mixtures of mercury with other metals. If liquid or semi-liquid they are termed amalgams. **m. amalgams.** See *m. alloys*, and *amalgams*. **m. alkylides.** An organic mercury compound of the general type, HgR_2, in which R is a monovalent alkyl radical, *e.g.*, mercury ethide, mercury methide, etc. **m. arylides.** An organic compound of mercury and an aryl radical, *e.g.*, mercury phenide. **m. bichloride.** Mercuric chloride. **m. biiodide.** Mercuric iodide. **m. biphenyl.** $Hg(C_6H_4Ph)_2$ = 506.75. Colorless crystals, m.216. **m. boiler.** A power plant using mercury vapor instead of steam, said to be more efficient. **m. cathode.** (1) See dropping *electrode*. (2) The positive electrode in a rectifier or a mercury vacuum tube lamp. Cf. *polarograph*. **m. cathode cup.** A glass cylinder with fused-in platinum electrode; used in the electrolytic determination of mercury. **m. chloride.** See *mercuric chloride* (sublimate), and *mercurous chloride* (calomel). *corrosive-* Mercuric chloride. *mild-* Mercurous chloride. **(ethyl-)*** C_2H_5HgCl = 265.11. Ethylmercuric chloride. White iridescent crystals, d.3.5, m.-192.5. **(methyl-)*** CH_3HgCl = 251.09. Silvery crystals, d.4.063, m.170. **(phenyl-)*** Chloromercurybenzene, C_6H_5HgCl = 313.11. White leaflets, m.251. **(*p*-tolyl-)*** *p*-Chloromercury toluene, $Me.C_6H_4HgCl$ = 327.12. Silky crystals, m.233, insoluble in water. **m. cup.** A small tray containing mercury into which the ends of two electric wires are dipped in order to make contact. The glass bulb of a thermometer containing mercury. **m. dibenzyl.** $Hg(C_7H_7)_2$ = 382.72. Long needles, soluble in alcohol or ether. **m. dibutyl.** $Hg(C_4H_9)_2$ = 314.75. Colorless liquid, d.1.835, b.-205. **m. diethyl.** M. ethide. **m. dimethyl.** M. methide. **m. dinaphthyl.** M. naphthide. **m. diphenyl.** (1) M. phenide. (2) M. biphenyl. **m. dipropyl.** $Hg(C_3H_7)_2$ = 286.72. Colorless liquid, d.2.124, b.190, insoluble in water. **m. ditolyl.** $Hg(C_7H_7)_2$ = 382.72. White powder, m.107, b.219, soluble in hot benzene. **m. dropping electrode.** See *electrode*. **m. ethide.** $HgEt_2$ = 258.7. M. diethyl. A colorless liquid, d.2.44, b.159, insoluble in water, slightly soluble in alcohol. **m. furnace.** A retort for distilling mercury from cinnabar. **m. gatherer.** A stirrer for collecting mercury from amalgams and rock material. **m. helide.** The supposed compound $HgHe_{10}$. **m. mass.** See *mass*. **m. mercaptide.** $Hg(SEt)_2$ = 322.8. Colorless leaflets, m.86, insoluble in water. $EtSHgCl$ also exists. **m. methide.** $HgMe_2$ = 230.66. M. dimethyl. A colorless liquid, d.3.069, b.96, insoluble in water, soluble in alcohol or ether. **m. minerals.** The chief ores of mercury are native mercury and its sulfide:

native mercury	Hg
cinnabar	HgS
tiemannite	HgSe
coloradoite	HgTe
onofrite	Hg(S,Se)
lehrbachite	HgPbSe
livingstonite	$HgSb_4O_7$
montroydite	HgO
calomel	HgCl
terlingarite	Hg_2ClO
eglestonite	Hg_4Cl_2O

m. naphthide. $Hg(C_{10}H_7)_2$ = 454.71. Dinaphthylmercury. A white powder, d.1.921, m.188. **m. nitrate.** See *mercuric* and *mercurous*. **m. nucleinate.** Mercurol. **m. ointment.** Blue *mass*. **m. ore.** (1) Native mercury. (2) Cinnabar. **m. oxide.** See *m. peroxide, mercuric*, and *mercurous oxide*. (*black-*) Mercurous oxide. (*red-*) Mercuric oxide. (*yellow*)- Mercuric oxide. **m. periodide.** HgI_4 = 962.20. A

brown unstable powder. **m. peroxide.** HgO_2 = 232.61. An amorphous, brick-red powder, fairly stable in the absence of water. **m. phenide.** $HgPh_2$ = 354.4. A white powder, d.2.3, m.120, insoluble in water. **m. phosphate.** See *mercuric, mercurous.* **m. potassium iodide solution.** See *Toulet's solution.* **m. protiodide.** Mercurous iodide. **m. protochloride.** Mercurous chloride. **m. protoxide.** Mercurous oxide. **m. pump.** Sprengel pump. **m. rhodanate, m. rhodanide.** Mercuric thiocyanate. **m. saccharate.** A mixture of 1 pt. Hg and 2 pts. sugar; used as a vermifuge. **m. subchloride.** Mercurous chloride. **m. subsulfate.** Mercuric subsulfate. **m. sulfuret.** See *mercuric* or *mercurous sulfide.* (*black-*) Mercurous sulfide. (*red-*) Mercuric sulfide. **m. thiocyanate reagent.** A solution of 30 gm. mercuric chloride and 33 gm. ammonium thiocyanate in 50 cc. water. It gives crystals of characteristic shape with copper, cobalt and zinc solutions. **m. trap.** M. well. A box used in amalgamators to prevent the escape of mercury. **m. vapor lamp.** An evacuated glass tube containing some mercury which is vaporized by heat and gives an intense blue light on passage of an electric discharge; used in photography and as an ultra-violet light source.

mer-, mere-, meri- A prefix derived from the Greek, indicating a "part."

mergal. A mixture of one part mercuric cholate and two parts albumin tannate; used as an antisyphylitic.

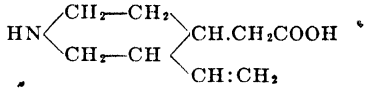
meridian. A geographical unit equal to 4 quadrants or 40 million meters.

meriquinone. A compound whose electronic constellation resembles that of a quinone but which contains no oxygen; as, *Wurster's red.*

merit number. A numerical expression of the quality of a steel. Merit number = ultimate strength (in pds. per in.^{2}) × elongation (in inches). For the best and strongest manganese steel it is 7 millions; for the next strongest (nickel) steel, 2 millions.

merochrome. A chromo-isomeric crystal consisting of two isomeric forms.

meroquinene. $C_9H_{15}O_2N$ = 169.5. β-vinylpiperidine acetic acid,



A split-product of quinine.

merotropy. Desmotropy. Cf. *tautomerism.*

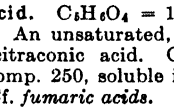
merron. Proton.

merthiolate. $C_2H_5.HgS.C_6H_4.COONa$. Sodium ethyl mercurithiosalicylate. Colorless crystals, soluble in water, used as germicide.

merwinite. $Ca_3Mg(SiO_4)_2$. A calcium magnesium orthosilicate in refractory bricks and blast furnace slags, m. (approx.) 1590. It is formed when the mixed oxides of calcium, magnesium and silica are heated at 1500°C.

mes-, meso- A prefix derived from the Greek "middle" or "intermediate."

mesaconic acid. $C_5H_6O_4$ = 130.1. Methylfumaric acid. An unsaturated, dibasic acid and isomer of citraconic acid. Colorless needles, m. 202, decomp. 250, soluble in water, alcohol, or ether. Cf. *fumaric acids.*



mescal. An intoxicant spirit distilled from pulque, the fermented juice of various Mexican species of *Agave.*

mescal buttons. The dried buds or young leaves of *Anhalonium lewinii* (q.v.), used as cardiac tonic and narcotic. Cf. *lophophorine, pellotine.*

mescaline. $C_{11}H_{17}O_3N$ = 211.2. *3.4.5*-Trimethoxy-*1*-β-aminoethyl benzene. (*3.4.5*-)MeO.-$C_6H_2.CH_2CH_2NH_2$(*1*). An alkaloid from *Anhalonium lewinii,* a cactus species of Central America.

mesembrene. $C_{28}H_{56}$ = 392.45. An unsaturated hydrocarbon from *Mesembryanthemum expansum,* a Ficoidaceae (Aizoaceae).

mesembrine. $C_{16}H_{19}NO_4$ = 289.15. An alkaloid from *Mesembrianthemum tortuosum,* the kougoed or channa, an Aizoaceae of South Africa.

mesh. The number of openings per unit area in a screen or sieve. See *particles.*

mesicerin. $C_9H_{12}O_3$ = 168.1. Mesitylene glycerol, $C_6H_3(CH_2OH)_3$. A colorless, viscous liquid.

mesidine. $C_9H_{13}N$ = 135.1. A homolog of aniline, *2.4.6*-trimethyl aniline. A colorless liquid, d.0.963, b.233.

mesitene lactone. Dimethyl *coumalin.*

mesitic acid. Uvitic acid.

mesitilol. Mesitylene.

mesitine spar. Mesitite.

mesitite. $2MgCO_3.FeCO_3$. Mesitine spar. A native magnesium and iron carbonate.

mesitol. $C_9H_{12}O$ = 136.1. Mesitylene alcohol, 2.4.6-trimethylphenol, $Me_3C_6H_2OH$. Colorless crystals, m.69, b.220.

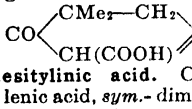
mesitonic acid. $C_7H_{12}O_3$ = 114.09. Dimethyl levulinic acid, α.β-dimethyl-γ-keto pentoic acid, Me.CO.CHMe.CHMe.COOH.

mesityl. The radical $C_6H_3Me_2CH_2$— from mesitylene. **m. alcohol.** Mesitol. **m. chloride.** Chloromesityl. **m. oxide.** $C_6H_{10}O$ = 98.11. 4-methyl-Δ^3-2-pentenone, $MeCO.CH:CMe_2$. A colorless liquid, d.0.858, b.131.

mesitylene. C_9H_{12} = 120.2. Mesitylol, *sym.*- or 1.3.5-trimethylbenzene, $C_6H_3Me_3$. A colorless liquid, d.0.86, m. −57.5, b.164; insoluble in water, soluble in alcohol or ether. **chloro-** Chloromesitylene. **dihydroxy-** Mesorcinol. **hexahydro-** *1,3,5*-Hexahydrocumene. **hydroxy-** Mesitol. **m. alcohol.** Mesitol. **m. carboxylic acid.** *2.4.6*-Trimethylbenzoic acid. **m. glycerol.** Mesicerin. **m. lactone.** Dimethyl*coumalin.*

mesitylenic acid. Mesitylinic acid.

mesitylic acid. $C_9H_{13}O_3$ = 169.1. trimethyl glutaric lactam. The pentacyclic compound,



mesitylinic acid. $C_9H_{10}O_2$ = 150.13. Mesitylenic acid, *sym.*- dimethylbenzoic acid, $Me_2C_6H_3$-COOH. White, monoclinic crystals, m.166, slightly soluble in water, readily soluble in alcohol or ether. **hydroxy-** See *phenol acids.*

mesitylol. Mesitylene.

mesityloxide. See *mesityl.*

meso- A prefix, indicating between.

meso-form. Mesomer. An optically-inactive isomer containing asymmetric carbon atoms with internal compensation of the optical rotation; one C-atom is dextrorotatory, the other levorotatory, thus: —C(*d*-)—C(*l*-)—

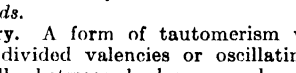
Cf. *racemic* mixture.

meso-paraffins. See *paraffin.*

meso-position. (1) That of a substituting radical that is attached to a carbon atom situated between the two hetero-atoms in a ring; it is indicated by the Greek letter μ. (2) The *5-* or *10-*position in the anthracene ring. (3) The *10-*position in phenanthridine.

mesocolloid. Particles from 250 to 2500 Å.U. long, and consisting of 100 to 1000 molecules. They are midway between *hemicolloids* and *eucolloids.*

mesohydry. A form of tautomerism which assumes divided valencies or oscillating bonds; especially between hydrogen and some other atoms;  , where the dotted line indicates the oscillating bond; as in:



mesomer. Meso-form.

mesomeric. Pertaining to the meso-form.

mesomerism. (1) Desmotropism. (2) Resonance.

mesomethylene carbon. The 7th carbon atom in the camphane or menthane structure, which forms a bridge inside the ring system.

mesomorphic. The anisotropic liquid crystal shape, intermediate in properties between the true liquid and the crystal states.

mesonin. A protein constituent of wheat gluten in which it occurs to the extent of 25 %; separates at low temperature in presence of acetic acid.

mesorcin. Mesorcinol.

mesorcinol. $C_9H_{12}O_2$ = 152.1. A homolog of resorcinol: Mesorcin, 1.3-dioxy-2.4.6-trimethylbenzene, 2.3-dioxymesitylene, or 2.4.6-trimethylresorcinol. Colorless, lustrous scales, m.150, b.275, insoluble in water.

mesotan. $C_9H_{10}O_4$ = 182.1. Ericin, methyloxymethylsalicylate, $C_6H_4(OH)COOCH_2OMe$. A yellow liquid, d.1.2, slightly soluble in water; soluble in alcohol, ether, or chloroform; used medicinally as an anodyne.

mesotartaric acid. $C_4H_6O_6.H_2O$ = 168.1. Colorless scales, d.1.66, m.140, soluble in water. See *tartaric acid.*

mesothorium. MsTh: A radioactive isotope of radium formed from thorium (see *radioactive elements*). It is produced technically from thorium minerals; used, on account of its radioactivity, in luminous pigments, and medicinally, for its radium emanations. Weight for weight it is 250 times as active as radium.

m. 1. $MsTh_1$. An isotope of element No. 88, atomic weight 228, average life of 9.7 years.

m. 2. $MsTh_2$. An isotope of element 89, atomic weight 228, average life of 8.84 hours.

m. mud. Barium carbonate containing m. and radium carbonates, used as source of m.

mesotomy. The separation of optically-inactive isomers into equal parts of dextro- and levorotatory compounds. Cf. *inversion, resolution.*

meson. mesotron. Heavy electron.

mesoxalate. A salt of mesoxalic acid.

mesoxalic acid. $C_3H_4O_6$ = 136.1. Propan-dioldiacid, dioxymalonic acid, oxomalonic acid, oxopropanedioic acid*. A dibasic, dihydroxyacid: $COOH.C(OH)_2.COOH$. Hygroscopic, colorless needles, m.120, souble in water, alcohol, or ether. **anhydrous-** Oxymalonic acid. The simplest dibasic keto-acid: $COOH.CO.COOH$, from which the mesoxalyl radical is derived.

mesoxalyl. A bivalent radical,  , derived from anhydrous mesoxalic acid.

mesoxalyl urea. Alloxan.

mesozoic. An era of geologic (q.v.) time, which followed the paleozoic and preceded the cenozoic era.

mesquite gum. A dark brown resin obtained from *Prosopis juliflora,* a Leguminosae of New Mexico and Texas. It resembles gum arabic.

met-, meta- A prefix derived from the Greek (beyond, over, or after) and indicating: (1) The 1.3-position of benzene; cf. *ortho-, para.* (2) A change, exchange, or transformation, as in petrology; a mineral which has undergone metamorphosis. (3) A polymeric compound, *e.g.,* metaldehyde. (4) A less hydrous acid, *e.g.,* metaphosphoric acid. (5) Any derivative of a complex compound, *e.g.,* a metaprotein.

metaacetaldehyde. Metaldehyde.

metaacetone. Diethylketone.

metaaluminates. Aluminates.

metaarsenate. A salt of the type $MAsO_3$.

metaarsenic acid. See *arsenic acid.*

metaarsenite. A salt of the type $MAsO_2$.

metabolic. Pertaining to metabolism.

metabolism. The resultant of chemical reactions occurring in a living cell or organism, by which food is transformed into living protoplasm, reserve materials stored up, and waste materials eliminated. **analytic-** Catabolism, or destructive metabolism. The reduction of complex into simpler compounds, as carbohydrates to glucose, proteins to aminoacids. **basal-** The energy metabolism of an individual at rest. **constructive-** Anabolism, or synthetic metabolism. The processes which build the more complex from the simpler compound, as the construction of new protoplasm and tissues from absorbed digestive products. **destructive-** Analytic *metabolism.* **energy-** The heat liberated by a living organism. **synthetic-** Constructive *metabolism.*

metaborate. A salt of the type MBO_2.

metaboric acid. See *boric acid.*

metacasein. An intermediate protein formed in the digestion of caseinogen to casein by the pancreatic juice.

metacellulose. An isomer of cellulose, soluble in concentrated sulfuric acid, insoluble in cuprammonia. It occurs in fungi and lichens.

metacenter. The center of gravity of that portion of a floating body which is not submerged. For stable flotation it should be as high as possible above the center of gravity of the body.

metacetaldehyde. Metaldehyde.

metacetin. Methacetin.

metacetone. Diethylketone.

metacetonic acid. Propionic acid.

metachemistry. See *chemistry.*

metachromatic. The property of certain substances of appearing in different colors according to the wavelength of the light in which they are viewed.

metacinnabarite. HgS. A native, black mercuric sulfide.

metacrolein. $(C_3H_4O)_3$ = 168.1. A derivative of acrolein. Colorless crystals, m.45, b.170.

metacompound. A derivative of benzene obtained by substitution of the first and third

hydrogen atoms. (See under the respective compounds.)

metacresol. See *cresol.* **m. purple.** Cresol purple. **m. sulfon phthalein.** A pH indicator, changing at pH 2 from red (acid) to yellow (alkaline); and at pH 8.5 from yellow (acid) to purple (alkaline).

metadiazine. Pyrimidine.

metadyne. An electric machine utilising the principles of both the dynamo and electric motor to produce rapid acceleration and braking.

metaelement. A hypothetical substance, intermediate between an element and protyl.

metafiltration. Edge-filtration through superimposed metallic strips with bevelled edges, which thus involves a change from coarse filtration (due to the strips themselves) to fine filtration (due to the filter bed formed in their interstices).

metaformaldehyde. Trioxymethylene.

metafuel. A tablet-form of metacetaldehyde, used as a solid substitute for methylated spirits in alcohol lamps.

metaiodate. A salt of the type MIO_3.

metaiodic acid. See *iodic acid.*

metaisocymophenol. Carvacrol.

metaisomerism. A form of isomerism (q.v.) due to the shifting of a double bond; as, in sterols.

metakliny. An intramolecular transference of groups, as the pinacone-pinacoline rearrangement (*pinacole conversion*).

metal. (1) An electropositive chemical element characterized by ductility, malleability, luster, and conductivity of heat and electricity, which can replace the hydrogen of an acid and forms bases with the hydroxyl radical. Cf. *nonmetal, periodic system.* (2) An alloy. **alkaline-** The elements of the first group in the periodic table. **alkaline earth-** The elements of the second group of the periodic table: Mg, Ca, etc. **basic-** Base metal. A metal which is readily oxidized, *e.g.*, iron in comparison with the noble metals. **earth-** The elements of the third group of the periodic system: Al, etc. **fine-** White-. **fusible-** A metal or alloy of relatively low melting point, *e.g.*, Na, Pb, Sn. **heavy-** A metal with a density above 4. They are located in the lower half of the new periodic table, q.v. **light-** Any metal with a density below 4. They are located in the right upper part of the new periodic table. **noble-** A metal which is not readily oxidized or dissolved in acid, *e.g.*, members of the gold and platinum families of the periodic table. **primary-** A m. used for the first time. Cf. *secondary m.* **rare-** An element which occurs only in small quantities, *e.g.*, Os, Ir, V, W. **rare earth-** The elements of the third long period, from at. no. 57 to 72. **respiratory-** The metals: iron, manganese, copper and vanadium. **secondary-** A m. recovered from waste and scrap. **type-** See *type.* **virgin-** Primary-. **white-** (1) Fine m. The almost pure cuprous sulfide obtained in the Welsh process for smelting copper. (2) Alloys containing large proportions of Pb or Sn; *e.g.*, plumber's solder, pewter, type m., and certain bearing m., and fusible alloys.

m. bath. A fusible metal, as lead or tin, which can be used instead of a steam or sand bath to obtain a higher temperature. **m. compounds.** Intermetallic compounds, usually present in alloys.

metalammine. Metal ammonia compound, ammino-compounds. An ammine (q.v.) of a metal.

metalammonia compound. Metalammine.

metalbumin. Paralbumin. A protein from ovarian cysts.

metalceramics. Powder metallurgy.

metaldehyde. (1) $(C_2H_4O)_3$ = 132.2. Metacetaldehyde. Colorless tetragonal crystals or needles, sublime 112, insoluble in water, soluble in alcohol or ether; used medicinally as a sedative or hypnotic. (2) $(C_2H_4O)_4$ = 176.12. A polymer of acetaldehyde, b.150. Cf. *aldol, paraldehyde.*

metalepsis. A term introduced by Dumas in 1834, to indicate a substitution.

metalepsy. Substitution.

metalignitious. Non-caking; as, of coals.

metallic. Pertaining to metals in their uncombined forms. **m. carbonyls.** A group of compounds of carbon monoxide with metals, such as cobalt carbonyl $Co(CO)_4$, nickel carbonyl $Ni(CO)_4$. **m. luster.** The more or less mirror-like and bright surface of compact masses, usually metals or minerals. **m. nitroxyls.** A group of compounds of nitrogen peroxide with metals, *e.g.*, cuprous nitroxyl, $Cu_2(NO_2)$. **m. oxide.** An oxide of a metal. **m. poison.** A poisonous metal salt, as distinguished from vegetable and other poisons. **m. soap.** See *soap.* **m. sulfides.** A sulfide of a metal, especially those occurring in nature, as iron sulfide, zinc sulfide.

metalliferous. Describing an ore which contains a metal.

metallify. (1) To convert into a metal. (2) To extract a metal from its ore.

metalline. Resembling a metal.

metallization. A process by which a surface is coated with a metal.

metallochrome. A tint imparted to metal surfaces by metallic salts.

metallography. (1) The science of metals, and of their ores, production, properties, and uses. (2) The microscopic study of the etched surface of metals and alloys and its interpretation. Cf. *mineralography.* (3) The modern m., which relates structure of metals and alloys to their properties. Cf. *crystallography, phase rule, diagram.*

metalloid. (1) A non-metal (French usage). (2) Having the physical properties of metals and the chemical properties of non-metals, *e.g.*, As, Sb, Si, Bi.

metallurgy. The science and art of preparing metals from their ores: smelting, amalgamation, electrolytic separation, etc. Cf. *siderurgy.* **electro-** The preparation of metals by electrical means. **hydro-** The preparation of metals by leaching processes. **powder-** The working of metals in the state of compressed powders, *e.g.*, as obtained by reducing the corresponding oxides. Metals of very high melting point (*e.g.*, tungsten) may thus be formed nto solid masses by heat and pressure, and can then be forged or drawn into wire. **pyro-** The preparation of metals by smelting, roasting, or furnace methods.

metalorganic. Pertaining to a metal in organic combination. **m. compounds.** Organometallic c. A compound of organic radicals with a metal, R_xM; they are designated by the name of the radical as prefix to the metal, *e.g.*, dimethyl zinc, methylmagnesium chloride.

metamerie. A term whose meaning has changed repeatedly in the history of chemistry; today it means *metamerism.*

metamerism. Isomerism between two compounds which contain the same number and kind of atoms, each having the same valency but the radicals in different positions. Hence they produce compounds with different properties: as,

$CH_3.CH_2.CH_2.CO.H$ and $CH_3.CH_2.CO.CH_3$
(an aldehyde) (a ketone)

Cf. *isomery.*

metamers. Metameric compounds. A set of substances which exhibit metamerism, q.v.

metamorphism. In geology, a change in the texture and composition of a rock due to the external agencies of heat and cold, wet and drought, etc.

metamorphosis. (1) In biology, a change of form or structure, as during the embryonic development of an organism. (2) In geology, a change in the crystalline structure of a mineral. **thermo-** Thermometamorphism.

metandren. A trade name for methyltestosterone.

metanil yellow. Metaniline yellow, sodium phenylamidobenzene metasulfonate. A yellow aniline dye for wool or paper; also used in bacteriology for counterstaining tissues; and as an indicator, changing at pH 2.5 from red (acid) to yellow (alkaline).

metanilic acid. $C_6H_7O_3NS.2H_2O$ = 209.19. m-Aminobenzene sulfonic acid, aniline-*m*-sulfonic acid, $NH_2.C_6H_4.HSO_3$. An intermediate in dyestuff manufacture, decomp. 280.

metaniline yellow. Metanil yellow.

metantimonate. A salt of the type $MSbO_3$.

metantimonic acid. The monobasic acid $HSbO_3$, from which the metantimonates are derived.

metapeptone. A digestive product of peptone.

metaperiodic acid. Periodic acid.

metaphen. $CH_3.C_6H_2.ONO_2Hg$ = 783.0. The anhydride of 4-nitro-5-hydroxy mercury-*o*-cresol. A yellow powder, insoluble in water; used as a germicide and antiseptic.

metaphenylene. The bivalent radical, $C_6H_4{=}$, derived from benzene in which substitution takes place in the *1-* and *3*-positions. **m. diamine.** $C_6H_4(NH_2)_2$ = 108.1. Phenylenediamine, 1.3-diaminobenzene. **m. diamine hydrochloride.** $C_6H_4(NH_2)_2.2HCl$ = 181.0. Metadiaminobenzene hydrochloride. White crystals, which are soluble in water. Used as a reagent for the detection of nitrites in water.

metaphosphate. A salt of the type MPO_3. See *phosphates.*

metaphosphinic acid. (1) A group of nitrogen-phosphor acids of the general type $[PN(OH)_2]_n$. (2) $PN(OH)_2$. **hepta-** $7PN(OH)_2.H_2O$. **tetra-** $4PN(OH)_2.2H_2O$.

metaphosphoric acid. The monobasic acid, HPO_3. See *phosphoric acids.*

metaposition. The *1-* and *3*-positions in the benzene ring.

metaprotein. A hydrolytic split-product of proteins, soluble in either weak acids or alkalis, insoluble in water.

metargon. An isotope of argon, at. wt. 38.

metarsenic acid. Metaarsenic acid.

metartrose. $C_{315}H_{504}O_{106}N_{90}S$. A product obtained on digestion of the proteins of wheat.

metasilicic acid. The dibasic acid H_2SiO_3, derived from silicic acid.

metasomatism. The natural enrichment of ores by chemical reactions with external substances.

metasomatosis. A chemical alteration of a mineral, by which a new mineral is formed.

metasome. An individual mineral which has developed within another mineral.

metastability. An intermediate condition between stable and unstable.

metastable. An unstable condition which changes readily, either to a more stable or to a less stable condition. **m. electron.** An electron moving in an excited orbit. **m. phase.** The existence of a substance as a solid, liquid, or vapor under conditions in which it is normally unstable in that state.

metastannate. A salt of the type $M_2Sn_5O_{11}$.

metastannic acid. See *stannic acid.*

metastasic electron. (1) An electron which transfers from one atom to another. (2) An electron which changes its position within the atom during a radioactive change; *e.g.*, changes from one shell to another.

metastasis. The alpha-change in radioactive disintegration, during which an α-particle is thrown off and two electrons pass from the valence shell into inner orbits of the atom.

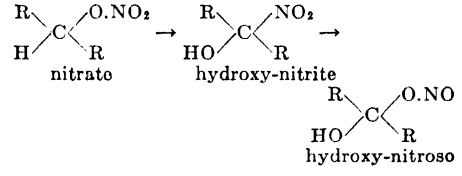
metastructure. A structure having one or more dimensions between that of the molecule and the smallest structure visible microscopically; cf. *colloids, micelle, mesocolloid.*

metastyrene. $(C_8H_8)_x$ = $(104.10)_x$. Metastyrolene. A fatty liquid, d.1.054, b.320, (decomp.) insoluble in water or alcohol, soluble in ether.

metastyrolene. Metastyrene.

metasulfite. Pyrosulfite. A salt of the acid $H_2S_2O_5$ (see *sulfur* acids); only a few are known.

metatenomeric change. The irreversible tautomeric transformation of nitrogen compounds; as,



metatenomery. An irreversible rearrangement of the atoms in a nitrogen compound.

metathesis. A chemical reaction (as, neutralization) in which there is an exchange of elements or radicals according to the general equation:

$$\overset{+-}{AB} + \overset{+-}{CD} = \overset{+-}{AD} + \overset{+-}{BC}$$

It differs from oxidation-reduction reactions in that there is no change of valency.

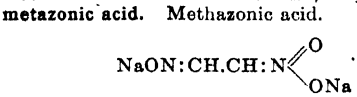
metathiazole. Thiazole.

metavanadate. A salt of the type MVO_3, derived from metavanadic acid.

metavanadic acid. The monobasic, hypothetical acid HVO_3, which exists only in the form of its salts, metavanadates.

metazoa. A multicellular animal; cf. *protozoa.*

metazonic acid. Methazonic acid.



Metchnikoff. See *Metshnikoff.*

meteoric. Pertaining to meteorites. **m. iron.** The metallic iron which occurs in meteorites;

it usually contains nickel. **m. stone.** A meteorite, which consists mainly of aluminum silicates. **m. water.** Water reprecipitated as rain, snow, etc., that has entered the lithosphere from the earth's surface.

meteorite. Aerolite. A stony or metallic body that has fallen to the earth from the outer space. Three types:

1. siderite	meteoric iron
2. siderolite	meteoric iron and stone
3. aerolite	meteoric stone.

For average composition of m., see *abundance*.

meteorograph. An apparatus that automatically records atmospheric pressure, temperature, humidity, and wind velocity.

meteorology. A branch of physical geography that deals with the causes of climatic conditions: rainfall, wind, barometric pressure, temperature, cloudiness and humidity.

meter, metre. (1) A unit of length which was supposed to be the $\frac{1}{10{,}000{,}000}$ part of the distance from the pole to the equator. Newer measurements have shown a slight difference, so that the meter is defined as the length of a platinum-iridium bar, copies of which are kept in the principal capitals; the original being in Paris. The meter is likewise defined as 1,553,164.13 times the wavelength of the red cadmium line.

1 m. = 100 cm. = 1000 mm. = 0.001 km.
1 m. = 39.37011 inches = 3.280843 feet = 1.093 yards = 4.97096 links = 0.198838 rods = 0.0497096 chains.

(For larger and smaller units see *magnitudes, kilometer, millimeter, micron.*) **atom-** Ångström unit. **centi-** One hundredth of a meter. **dynamic-** The gain in potential when a body is raised through 1 meter in a hypothetical place where g = 1000 cm./sec². It equals 10^5 ergs per gram. See *specific energy*. **fast-** A measure of the volume of a stack of wood. 1 fast m. = approx. 35 cu. ft., voids excluded. Cf. *cord, cunit, board foot*. **International-** Prototype meter. The platinum-iridium bar taken as the standard meter. **kilo-** One thousand meters. **leo-** Dynamic m. **milli-** One thousandth meter. **tenth-** Ångström unit, *i.e.*, 10^{-10} meter.

m. angle. The angle of vision on viewing a point a meter distant. **m. bridge.** A slide-wire resistance one meter long, used in electrical resistance measurements. **m. candle.** The intensity of illumination produced by a candle one meter distant; or the luminosity of a white surface at one meter from a standard candle. **m. kilogram.** The force necessary to lift one kg. one m.

(2) A measuring device for determining the quantity of matter or force. **electro-** See *electrometer*. **gas-** A device for determining the quantity of gas passing through a pipe-line. **gaso-** Gas holder. **photo-** See *photometer*. **ureo-** See *ureometer*. **Venturi-** A pipe-line meter for liquids.

meth- A prefix indicating methyl, *e.g.*, methoxy.

methacetin. $C_9H_{11}O_2N$ = 165.1. p-methoxy-acetaminophenol, p-acetanisidine, p-methoxy acetanilide, m-acetaniside, $MeOC_6H_4NHCO$-Me. Colorless needles, m.127, slightly soluble in water, soluble in alcohol or ether; used as an antipyretic and analgesic.

methacrylic acid. $C_4H_6O_2$ = 86.07. Δ^1-methyl-1-propionic acid, α-methyl-acrylic acid. d.-1.015, m.16, b.160. The unsaturated acid, CH_2=CMeCOOH, which is isomeric with vinylacetic, crotonic, and isocrotonic acid.

methal. Myristic alcohol.

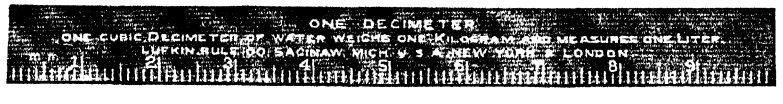
methallyl chloride. $CH_2CMe.CH_2Cl$ = 90.0. A colorless liquid $d._{20°}$0.925, b.72, made from petroleum hydrocarbons; used as an insecticide.

methanal*. Formaldehyde.

methanamide*. Formamide.

methane*. CH_4 = 16.04. Methylhydride, MeH. Cf. *marsh gas, fire damp*. The simplest saturated hydrocarbon. A colorless, inflammable gas, $d._{air}$0.558, m. −184, b. −164, slightly soluble in water or alcohol. It is one of the chief constituents of illuminating gas, and is formed in the decomposition of organic matter. Pure methane is obtained from aluminum carbide and water; used in the manufacture of formaldehyde and in organic synthesis. For most of its compounds see: *methyl-* (CH₃—), *methylene* (—CH₂—), *methenyl* (=CH—). **m. d.** Deuteromethane, diplogen m. The isotopic compounds CH_3D, CH_2D_2, CHD_3 and CD_4. **azi-** Diazomethane*. **bromo-*** Methyl-bromide. **chloro-*** Methylchloride. **cyano-** Acetonitrile. **diazo-*** Diazomethane. **dibromo-*** Methylene bromide. **dichloro-*** Methylene chloride. **dichlorodifluoro-*** Dichlorodifluoromethane. **dimethoxy-*** Formal. **dimethyl-** Propane*. **dimethylethyl-** Isopentane. **diphenyl-** Diphenylmethane. **diphenylene-** Fluorene. **fluoro-*** Methyl-fluoride. **hydroxy-** Methanol. **iodo-*** Methyliodide. **methoxy-*** Methylether. **methyldithio-*** Methyldisulfide. **methyl thio-*** Methyl sulfide. **nitro-*** CH_3NO_2 = 61.03. A colorless liquid, d.1.130, m. −29.2, b.101.9, slightly soluble in water. **phenyl-** Toluene. **tetrabromo-*** Carbon tetrabromide. **tetrachloro-*** Carbon tetrachloride. **tetrahydroxy-** *ortho*-Carbonic acid. **tetramethyl-** *tert.*-Pentane. **tribromo-*** Bromoform. **trichloro-*** Chloroform. **trichloronitro-*** Chloropicrin. **trifluoro-*** Fluoroform. **triiodo-*** Iodoform. **trimethyl-** Isobutane.

m. acetic acid. Gentaric acid. **m. acid** Formic acid. **m. alcohol.** Methanol. **m. aldehyde.** Formaldehyde. **m. amide.** Formamide. **m. arsonic acid.** Methylarsinic acid. **m. base.** Tetramethyl diamino diphenylmethane. **m. chloride.** Methyl chloride. **m. dicarboxylic acid.** Malonic acid. **m. disulfonic acid.*** Methionic acid. **m. phosphonic acid.** Methylphosphinic acid. **m. series.** Paraffins, alkanes. A group of saturated hydrocarbons of the general formula C_nH_{2n+2}, denoted by the suffix *-ane*.



10 cm. = $\frac{1}{10}$ meter (actual size).

METHANE SERIES

Paraffins, alkanes, saturated aliphatic hydrocarbons

CH_4	Methane, methylhydride, MeH.	1*
C_2H_6	Ethane, ethylhydride, EtH.....	1
C_3H_8	Propane, propylhydride, PrH...	1
C_4H_{10}	Butane, butylhydride, BuH.....	2
C_5H_{12}	Pentane, amylhydride.....	3
C_6H_{14}	Hexane, hexylhydride.....	5
C_7H_{16}	Heptane, heptylhydride.....	9
C_8H_{18}	Octane, octylhydride.....	18
C_9H_{20}	Nonane, nonylhydride.....	35
$C_{10}H_{22}$	Decane, decylhydride.....	75
$C_{11}H_{24}$	Undecane, undecylhydride.....	159
$C_{12}H_{26}$	Dodecane, dococylhydride.....	355
$C_{13}H_{28}$	Tridecane, tridecylhydride.....	802
$C_{14}H_{30}$	Tetradecane, tetradecylhydride..	1858
$C_{15}H_{32}$	Pentadecane, pentadecyl hydride	4347
$C_{16}H_{34}$	Hexadecane, hexadecyl hydride..	10,359
$C_{17}H_{36}$	Hepdecane, heptadecyl hydride..	24,894
$C_{18}H_{38}$	Octodecane, octodecyl hydride..	60,523
$C_{19}H_{40}$	Nondecane, nondecyl hydride...	147,284
$C_{20}H_{42}$	Eicosane, eicosyl hydride.....	366,319
$C_{21}H_{44}$	Heneicosane, heneicosyl hydride	
$C_{22}H_{46}$	Docosane, docosyl hydride	
$C_{23}H_{48}$	Tricosane, tricosyl hydride	
$C_{24}H_{50}$	Tetracosane, tetracosyl hydride	
$C_{25}H_{52}$	Pentacosane, pentacosyl hydride.	36,797,588
$C_{26}H_{54}$	Hexacosane, hexacosyl hydride	
$C_{27}H_{56}$	Heptacosane, heptacosyl hydride	
$C_{28}H_{58}$	Octocosane, octocosyl hydride	
$C_{29}H_{60}$	Noncosane, noncosyl hydride	
$C_{30}H_{62}$	Triacontane.....	4,111,846,763
$C_{31}H_{64}$	Hentriacontane, hentriacontyl hydride	
$C_{32}H_{66}$	Dotriacontane, dotriacontyl hydride	
$C_{35}H_{72}$	Pentatriacontane, pentatriacontyl hydride	
$C_{40}H_{82}$	Tetracontane.....	62,491,178,805,831
$C_{60}H_{122}$	Hexacontane, hexacontyl hydride	

* The number of possible isomeric forms.

m. siliconic acid. MeSiOOH = 76.09. Silicoacetic acid. White powder, insoluble in water. **m. stannonic acid.** MeSnOOH = 106.73. Methylstannic acid, stannoacetic acid. White amorphous powder, infusible and insoluble in water. **m. sulfonic acid*.** Methylsulfonic acid. **m. sulfonylchloride.*** $MeSO_2Cl$ = 114.54. Colorless liquid, d.1.51, b.160. **m. thial*** Thioformaldehyde. **m. thiol*.** CH_3SH = 48.09. Methylmercaptan. Colorless liquid or gas, d.0.868, m. −123, b.7.6. **m. triacetic acid.** Centaric acid.

methano- A prefix indicating a $—CH_2—$ bridge in a ring compound; as, *1.8-*; *2.9-* and *9.10-*methanoanthracene, indicating the $—CH_2—$ group between the carbon atoms 1.8-; 2.9- and 9.10-respectively.

methanoic acid*. Formic acid.

methanol*. CH_4O = 32.04. Methyl alcohol, carbinol, wood alcohol, pyroxylic spirit, wood spirit, wood naphtha, columbian spirit, colonial spirit, methyl hydroxide, CH_3OH or MeOH. A colorless liquid, d.0.810, m. −97.1, b.64.7, inflammable, soluble in water, alcohol, or ether. Used as a solvent in place of alcohol (ethanol) for varnishes, paints, organic compounds; as fuel; in the manufacture of formaldehyde; in organic synthesis, and for denaturing alcohol (ethanol). For derivatives, see *carbinol* ($—CH_2OH$).

methanoyl. Formoyl.

methazonic acid. Metazonic acid.

methedrine. Desoxyephedrine (q.v.).

methemoglobin. A transformation product derived from oxyhemoglobin but not from hemoglobin, having the same composition as the latter but with its oxygen more firmly bound; it contains trivalent iron. It occurs in transudates containing blood, and in urine after hematuria. Molecular weight, 16,666. Cf. *porphin.*

methenamine. Hexamethylene tetramine.

methene. Methylene. The bivalent group $—CH_2—$. Cf. *methano.* **m. disulfonic acid.** Methionic acid.

methenyl. Formylene-, methine. The trivalent radical, HC≡. **di-** Acetylene. **m. bromide.** Bromoform. **m. chloride.** Chloroform. **m. iodide.** Iodoform.

methethyl. A mixture of ethyl and methyl chlorides, used as a local anesthetic.

methide. A methyl compound of a metal, as $MgMe_2$ or $AlMe_3$.

methine. Methenyl: HC≡.

methionic acid. $CH_2(SO_3H)_2$ = 176.3. Methene disulfonic acid. Colorless hygroscopic crystals, used in organic synthesis.

methionine. $C_5H_{11}NO_2S$ = 149.15. *2-*Methylthiol-*α*-aminobutyric acid, *2-*amino-*4-*methylthiobutanoic acid*, $MeS.CH_2.CH_2.CHNH_2.COOH$. An amino acid obtained from many proteins, *e.g.*, casein, edestin, gelatin and wool, m.283 (decomp.).

methionyl. The bivalent radical. $—SO_2.CH_2.SO_2—$.

metho- A prefix indicating that a methyl group is attached to a carbon atom of a side-chain, or sometimes to a nitrogen atom in a ring; as, methochloride of pyridine.

methonal. $C_5H_{12}O_2S$ = 136.1. Dimethyl sulfone dimethyl methane. $Me_2CSO_2Me_2$. Colorless crystals, soluble in water, used as a hypnotic.

methose. $C_6H_{12}O_6$ = 180.09. A carbohydrate synthesized by the polymerization of formaldehyde in presence of magnesia. Cf. *i-fructose.*

methoxide. Methylate.

methoxy- A prefix indicating the presence of a methoxy group, $—OCH_3$.

m. group. The monovalent $CH_3O—$ or MeO—radical. **m. phenylacetone.** Anisacetone.

methoxybenzoic acid. $C_8H_8O_3$ = 152.1. **ortho-** 2-methoxybenzoic acid. Colorless monoclinic scales, d.1.18, m.98, slightly soluble in water. **meta-** 3-methoxy-benzoic acid. Colorless needles, m.167, slightly soluble in water, soluble in alcohol or ether; used in organic synthesis. **para-** Anisic acid.

methoxyl. Methoxy, MeO—. **m. amine.** Methyl hydroxylamine.

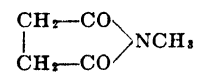
methyl. The monovalent $CH_3—$ or Me— radical. **m. acetamide.** C_3H_7ON = 73.1. $Me.CO.NHMe$. **m. acetanilide.** Exalgin. **m. acetate.** $C_3H_6O_2$ = 74.0. The ester, MeCOOMe. A colorless, volatile, inflammable liquid with a fragrant apple-like odor, d.0.924, m. −98, b.54,

soluble in water, alcohol, or ether; used as a solvent, and in flavoring extracts. **m. acetic acid.** Propionic acid. **m. acetoacetate.** $C_5H_8O_3$ = 116.03. $MeCOCH_2COOMe$. A colorless liquid, d.1.077, b.170; used in organic synthesis. **m. acetone.** A mixture of methylacetate and acetone; used as a solvent for rubber. **m. acetyl.** Acetone. **m. acetylene.** Allylene. **m. acetylsalicylate.** $C_{10}H_{10}O_4$ = 194.08.

$$C_6H_4\langle{}^{O.CO.Me}_{CO.OMe}.$$

Colorless crystals, m.54. It is an isomer of dimethyl phthalate. **m. acrylic acid.** See *acrylic acids.* **m. alcohol.** Methanol. **m. aldehyde.** Formaldehyde. **m. allylphenol.** Anethol. **m. amidophenol.** Anisidine. **m. amine*.** CH_3NH_2 = 31.1. Aminomethane. A colorless gas, $d._{11°}0.699$, m. −92.5, $b._{75mm}$ − 6, soluble in water. It is formed in the distillation of wood and bones, the putrefaction of fats, in putrefying fish, and is a constituent of mercurialis. **m. allyl ether.** Allyl m. ether. **m. amyl ketone.** $MeCOC_5H_{11}$ = 114.11. A constituent of oil of cloves and oil of cinnamon. **m. aniline.** C_7H_9N = 107.12. C_6H_5NHMe, d.0.986, m.−80, b.193.8. **m. anthranilate.** $C_8H_9O_2N$ = 151.08. M. o-aminobenzoate, $NH_2.C_6H_4.CO$-OMe. Colorless crystals, d.1.168, m.24.5, b.125, soluble in alcohol or ether. It has an orange flower odor; used in perfumery and cosmetics. **m. arsenic acid.** *mono-* Arrhenic acid. *di-* Cacodylic acid. Cf. *m. arsinic acid.* **m. arsine.** See *arsine.* **m. arsine dichloride.** CH_3AsCl_2 = 160.90. A volatile liquid, d.1.858, m. −59, b.136; used in organic synthesis. **m. arsenic acid.** $MeAsO(OH)_2$ = 139.97. White monoclinic leaflets, m.161, soluble in water. Cf. *m. arsenic acid.* **m. arsenious oxide.** CH_3AsO = 105.98. The anhydride of arrhenic acid, Me.As:O, m.95. **m. azide.** CH_3N_3 = 57.1. Azoimidemethane, methylazoimide. The hypothetical compound, $CH_3N\langle{}^{N}_{N}\|$, known from its derivatives. **m. benzene.** Toluene. **m. benzoate.** $C_8H_8O_2$ = 136.1. Essence niobe, PhCOOMe. The simplest aromatic ester. A colorless fragrant liquid, d.1.094, m. −12, b.198, insoluble in water, soluble in alcohol or ether; used in perfumery. **m. benzoic acid.** Toluic acid. **m. borate.** $C_3H_9O_3B$ = 104.0. Trimethoxyboron, $B(OMe)_3$. A volatile liquid, $d._{0°}0.94$. It imparts a green color to a flame, and is used to test for borates in foods etc. **m. bromide.** CH_3Br = 95.0. Bromomethane*. A colorless, volatile liquid, d.1.732, m. −84, b.4.5, insoluble in water, soluble in alcohol or ether. Used in organic synthesis, in refrigerators and as an antiseptic. **m. bismuthine.** $MeBiH_2$ = 226.04. A colorless liquid, d.2.30, b.110, insoluble in water. **m. blue.** A pH indicator changing at 11 from blue (acid) to brown (alkali). **m. butyl.** Pentane. **m. butyl carbinol.** Hexyl alcohol. **m. butyrate.** $C_5H_{10}O_2$ = 102.08. The ester $C_3H_7COOCH_3$ used in perfumes. **m. capri blue.** An oxidation-reduction indicator, q.v. **m. carbamate.** Urethylan. **m. carbimide.** CH_3NCO, methyl ψ-cyanate. **m. carbinol.** Ethanol. **m. carbonate.** See *carbonic acid esters.* **m. carbylamine.** CH_3NC = 41.1. Methylisocyanide acetoisonitrile, d.0.76. A volatile liquid of characteristic unpleasant odor, m. −45, b.59.6, slightly soluble in water, alcohol or ether. **m. catechol.** Guaiacol. **m. cellosolve.** See *cellosolve.* **m. chloride.** CH_3Cl = 50.5. Chloromethane*. Artic, arctic. A colorless gas, d.0.918, m. −91.5, b. −23.7, soluble in water or alcohol. Used medicinally as an external anesthetic, and refrigerant. **m. chlorofluoride.** Dichlorodifluoromethane. **m. chloroform.** $MeCCl_3$ = 133.4. Trichlorethane, ethenylchloride. A colorless, volatile liquid of pungent odor, d.1.346, b.74; used as an anesthetic. **m. cinnamate.** C_8H_7COOMe = 162.08. White crystals, d.1.091, m.36, b.261, insoluble in water, used as an insect bait. **m. cocaine.** Cocainidine. **m. crotonic acids.** See *tiglic* and *angelic acids.* **m. cyanate.** C_2H_3ON = 57.04. $N{\equiv}COCH_3$. Cf. *m. isocyanate.* **m. cyanide.** Acetonitrile. **m. cyclohexane.** Hexahydro toluene. **m. diacetyl.** A diketone: pentane-2.3-diketone or 2.3-pentanone, Me.CO.CO.Et. **m. disulfide.** $C_2H_6S_2$ = 94.19. Methyldithiomethane*, MeS.SMe. **m. ene.** Methylene. A colorless liquid, b.112. **m. ether.** C_2H_6O = 46.06. Dimethyl ether, methoxymethane*, MeOMe. A gas, d.1.617, m. −138, b. −25; soluble in alcohol, slightly soluble in ether or water; used as a refrigerant. **m. ethylamine.** MeNHEt. **m. ethylether.** MeOEt. **m. ethylketone.** C_4H_8O = 72.1. Butanone, M.E.K., MeCOEt. A colorless, inflammable liquid, d.0.808, m. −86, b.80, soluble in water, alcohol, or ether; used in organic synthesis, as a solvent, and in the manufacture of colorless plastics. **m. fluoride.** CH_3F = 34.02. Fluoromethane*. A colorless gas, b. −78. **m. formate.** $C_2H_4O_2$ = 60.1. Methyl formic acid ester: HCOOMe. A colorless liquid, d.0.973, m. −100, b.32, soluble in water, alcohol, or ether; used in organic synthesis. **m. gadenine.** $C_8H_{19}NO_2$ = 161.16. A poisonous oxygenated ptomaine from fish. **m. gallate.** Gallicin. **m. gallium dichloride.** $GaMeCl_2$ = 155.66. White crystals, m.75, decomp. in water. **m. glycine.** Sarcosine. **m. glycosine.** Sarcosine. **m. glyoxal.** Pyruvic aldehyde. **m. glyoxalidine.** Lysidine. **m. green.** A triphenylmethane dye $(Me_2N{-}C_6H_4)_2C{=}C_6H_4{=}NMe_2Cl$, used in dyeing silk, in bacteriology to stain mitochondria, and as pH indicator changing from yellow (acid) through blue green to colorless (alkaline). **m. guanidine.** $MeN{:}C(NH_2)_2$ = 73.06. A ptomaine formed from creatine or arginine. **m. heptenone.** $Me_2C{:}CH(CH_2)_2COMe$ = 126.11. Colorless liquid, d.0.860, m.67.3, b.174, found in some essential oils. **m. heptine carbonate.** Heptine methyl carbonate. **m. heptyl ketone.** 2-Nonanone*. **m. hexalin.** Methyl cyclohexanol. **m. hexane.** Heptane. **m. hexylketone.** Hexylmethyl ketone. **m. hydrate.** Methanol. **m. hydrazine.** $MeNHNH_2$ = 46.07. A liquid, $b._{745mm}$87. **m. hydrazone.** $MeCH{=}NNH_2$. **m. hydroxide.** Methanol. **m. hydroxy-benzene.** (1) Cresol. (2) Hydroxybenzyl alcohol. **m. hydroxylamine.** See *hydroxylamine.* **m. indole.** Skatole. **m. iodide.** CH_3I = 142.0. Iodomethane*. A colorless liquid, d.2.28, m. −66, b.44, insoluble in water, soluble in alcohol or ether, used in organic synthesis, and as a local anesthetic. **m. isocyanate.** C_2H_3ON = 57.04. CONMe, b.45; cf. *m. cyanate.* **m. isocyanide.** C_2H_3N = 41.03. Methylcarbylamine, m. isonitrile,

MeNC. A colorless liquid, d.0.756, m. −45, b.60. **m. isophthalic acid. 4-** Seylidic acid. **5-** Uvitic acid. **m. isothiocyanate.** M. *mustard oil.* **m. mercaptan.** Methane thiol. **m. mercuric chloride.** MeHgCl = 251.09. White crystals with a disagreeable odor, d.4.063, m.170. **m. mercuric iodide.** MeHgI = 342.55. Pearly leaflets, m.145, insoluble in water. **m. morphine.** Codeine. **m. nitramine.** $CH_4N_2O_2$ = 76.0. $Me.NH.NO_2$. **m. nitrate.** CH_3NO_3 = 77.04. Me—O—NO_2. An explosive liquid, $d._5$°1.2, soluble in water. **m. nitrite.** CH_3NO_2 = 61.04. Me—O—NO. A gas, d.0.99, b. −12. **m. nitrobenzene.** Nitrotoluene. **m. nitrolic acid.** Formoxime. **m. nitrosamine.** $CH_4N_2O_2$ = 60.1. Me—NH—NO. **m. nonyl ketone.** *2*-Hendecanone*. **m. orange.** The sodium salt of p-dimethylaminoazobenzenesulfonic acid, $Me_2NC_6H_4N:NC_6H_4SO_2Na$. An orange-yellow powder, soluble in water or alcohol. It is used as an indicator in volumetric analysis, (alkalis, yellow; acids, red; pH range 3.1–4.4). **m. oxide.** M. ether. **m. oxyaniline.** Anisidine. **m. pentose.** A sugar, $C_6H_{12}O_5$, containing 6 carbons but only 5 hydroxy groups; as, fucose, rhamnose. **m. phenate.** Anisole. **m. phenidine.** See *phenacetin.* **m. phenylacetamide.** Exalgin. **m. phenyl ether.** Anisole. **m. phosphate.** CH_5O_4P = 112.09. The solid $MePO_2(OH)_2$, m.105. **m. phosphine.** CH_5P = 48.09. The gas, $MePH_2$, b. −14, soluble in water or alcohol. **m. phosphinic acid.** $CH_3PO(OH)_2$ = 96.06. Methane phosphonic acid. Colorless crystals, m.105. **m. propionate.** Et-COOMe = 88.06. M. propanoate*, colorless liquid, d.0.9148, m. −87, b.79.9, soluble in water; used in perfumes. **m. propyl ether.** $C_4H_{11}O$ = 74.77. MeOPr. A colorless liquid, d.0.738, b.38.9. **m. propyl ketone.** $C_5H_{10}O$ = 86.77. Acetylpropane, 2-pentanone*, Me.CO.Pr. A colorless liquid, d.0.812, m. −77.8, b.101.7. **m. propylphenol.** Thymol. **m. pyridine.** Picoline. **m. pyruvate.** $C_4H_6O_3$ = 102.05. MeCOCOOMe. A liquid, d.1.154, b.137; used as a solvent for resins. **m. quinolines.** *alpha-* Quinaldine. *gamma-* Lepidine. **m. red.** $C_{15}H_{16}O_2N_3$ = 269.3. p-dimethylaminoazobenzene carboxylic acid, $Me_2NC_6H_4N:NC_6H_4COOH$. A dark red powder, insoluble in water, soluble in alcohol or ether; used as an indicator for titrating ammonia, alkaloids, and weak organic acids (alkalis, yellow; acids, violet red; pH range 3–6). **m. resorcinol.** Orcinol. **m. rhodanate, m. rhodanide.** M. thiocyanate. **m. rubber.** An early name for synthetic rubber made by polymerisation of dimethyl butadiene. Cf. *elastomer, plastics.* **m. salicylate.** $C_8H_8O_3$ = 152.1. Artificial wintergreen oil, methylic salicylas, synthetic oil of wintergreen, $C_6H_4(OH)COOMe$. A colorless, liquid, d.1.183, m. −8, b.222, insoluble in water, soluble in alcohol or ether. Used medicinally as an antipyretic, antiseptic, and in antirheumatic liniments; also in flavoring extracts and confectionery. **m. salicylic acid.** $MeC_6H_3(OH)COOH$. **m. selenide.** Selenium dimethyl. **m. silicane.** CH_6Si = 46.11. $SiH_3.CH_3$. A colorless gas, $d._{-57}$°0.62, m. −156.5, b. −56.8. **m. stannic acid.** CH_4O_3Sn = 166.73. MeSnOOH. White amorphous powder insoluble in water. **m. styryl ketone.** Benzylidene acetone. **m. succinic acid.** Pyrotartaric acid. **m. succinimide.** $C_5H_7O_2N$ = 113.1. 1-Methyl-2.5-diketopyrrolidine.



m. sulfate. Me_2SO_4 = 126.1. Dimethylsulfate. A colorless liquid, d.1.352, m. −10, b.188, slightly soluble in water, soluble in alcohol or ether. Used as a poison gas in warfare; and in organic synthesis, for methylating phenols and amines. **m. sulfide.** Me_2S = 62.1. Dimethylsulfide, methylthiomethane, methyl thioether. A colorless liquid, d.0.845, m. −83, b.37, insoluble in water, soluble in alcohol or ether; used in organic synthesis. **m. sulfine.** CH_4O_2S = 80.1. Me—SO—OH. **m. sulfocyanide.** M. thiocyanate. **m. sulfonal.** Trional. **m. sulfone.** $C_2H_6O_2S$ = 94.1. Me—SO_2—Me. **m. sulfonic acid.** CH_4O_3S = 96.1. Methane sulfonic acid*. Me—SO_2—OH. A syrupy liquid, d.1.481, decomp. 130. **m. sulfoxide.** C_2H_6OS = 78.1. Me—SO—Me. **m. tartronic acid.** Iso*malic acid.* **m. telluride.** $(CH_3)_2Te$ = 157.1. A light-yellow liquid with garlic-like odor, b.82. **m. theobromine.** Caffeine. **m. thiocyanate.** CH_3CNS = 73.1. M. rhodanate, m. rhodanide, m. sulfocyanide. A colorless liquid, d.1.088, b.133, soluble in alcohol or ether. **m. thionine chloride.** Methylene blue. **m. thiophen.** Thiotolene. **m. tin bromide.** CH_3SnBr_3 = 373.47. White needles, m.54, b.211, soluble in water. **m. tin chloride.** CH_3SnCl_3 = 240.09. Colorless crystals, m.43, soluble in water. **m. tin iodide.** CH_3SnI_3 = 514.48. Yellow needles, m.86.5, soluble in water. **m. toluidine.** Xylidine. **m. urea.** See *urea.* **m. urethane.** Urethylan. **m. violet.** Crystal violet, pyoktanin blue. A mixture of the hydrochlorides of pentamethyl-p-rosaniline and hexamethyl-p-rosaniline. Dark green, lustrous crystals, soluble in water or alcohol. Used as a reagent, indicator, and as a textile dye. (Alkalis, violet; acids, yellow; pH range 2–3.1.)

methylal. Formal.

methylamine. See *methyl.*

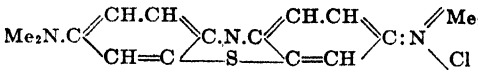
methylamino- A prefix indicating the monovalent—NHMe radical.

methylate. (1) The introduction of the methyl radical, or the substitution of a methyl group for another atom or radical. (2) Methoxide. A compound of a metal with the methoxy group, of the general type, CH_3OM, *e.g.*, sodium methylate, $NaOCH_3$. (3) To add methanol, with or without other substances, to grain alcohol to render it unpotable (denaturate).

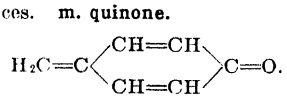
methylated ether. Ethyl ether made from methylated spirit instead of from pure ethanol. **m. spirit.** Rectified spirit (q.v.) denatured by addition of 10 % of crude wood spirit, 0.4 % of mineral naphtha or pyridine and a purple coloring matter. Cf. *ethanol.* **power m.s.** The official British term for alcohol denatured for power purposes.

methylation. The process of substituting a CH_3— group for an H atom.

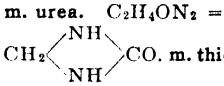
methylene. Methene. The bivalent radical. —CH_2—, derived from methane. Cf. *di-, tri-, tetra-, penta-, hexa-, hepta-methylene.* **meso-** See *mesomethylene.* **trioxy-** Paraformaldehyde. **m. blue.** $C_{16}H_{18}N_3SCl.3H_2O$ = 373.7. Tetramethylamidophenthiazinium chloride, methylthionine chloride, tetramethylthioninchlorhydrate, methylthioninae chloridum U.S.P., a dye of the thiazine group:



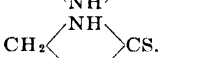
Dark blue-green crystals with a metallic luster, soluble in water or alcohol. Used as an indicator in volumetric analysis, for determining sugars, chlorates or perchlorates; in bacteriology, as stain; in medicine, as an antidote to cyanide poisoning, as anodyne and a antiperiodic; in the textile industry, as a dye. *alkaline-* A solution containing 5 gm. methylene blue, 5 gm. sodium percarbonate per liter of water; used as a stain. **m. bromide.** CH_2Br_2 = 174.0. Dibromomethane*. A colorless or yellowish liquid, d.2.59, b.98, insoluble in water, soluble in alcohol or ether; used in organic synthesis. **m. chloride.** CH_2Cl_2 = 85.0. Dichloromethane*, methylbichloride, carrene. A colorless liquid, d.1.377, m. −96.7, b.40.5, soluble in alcohol or ether. Used medicinally as an anesthetic in the skin spray; in industry, as a solvent, constituent of lacquers, degreaser, dewaxing and spotting agent; as a refrigerant, for air conditioning. **m. cyanide.** Malonitrile. **m. dicotoin.** Fortoin. **m. dioxy.** The bivalent radical, $-OCH_2O-$. **m. disulfonic acid.** Methionic acid. **m. ditannin.** Tannoform. **m. glycol.** CH_4O_2 = 48.0. The hydrated form of formaldehyde, $CH_2(OH)_2$, present in aqueous formalin solution. **m. imine.** See *methylenimine.* **m. iodide*.** CH_2I_2 = 267.86. Diiodomethane, methylbiiodide. A yellow liquid, d.3.335, m.4, b.180, insoluble in water, soluble in alcohol, or ether; used for determining the density of mineral mixtures and water-soluble substances. **m. quinone.**



m. urea. $C_2H_4ON_2$ = 72.1.



m. thiourea. $C_2H_4N_2S$ = 88.1.



m. triol. Is phloroglucitol.

methyleneblue. See *methylene.*

methylenimine. CH_3N = 29.01. Azomethine. The simplest imine, $H_2C{:}NH$.

methylgreen. See *methyl.*

methylic. An obsolete term for methyl. **m. acid.** Formic acid. **m. alcohol.** Methanol.

methylin. A lignin extracted from wood, straw or other plant material by the mono-methyl ether of ethylene glycol.

methyloic. A prefix indicating that the —COOH or carboxyl group is present as a sidechain; thus $Et_2CH.COOH$ is pentane-3-methyloic acid (diethylacetic acid). Cf. *ethyloic, propyloic.*

methylol. Hydroxymethyl. The monovalent radical, $HO.CH_2-$. See *carbinol.*

methylorange. See *methyl.*

methyltestosterone. Metandren, neo-hombreol-M, oreton-M. The 17-methyl derivative of testosterone (q.v.).

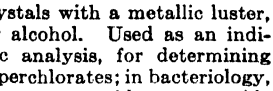
methylviolet. See *methyl.*

methysticin. Kavain.

methysticum. Kava.

metol. C_7H_9ON = 123.1. Methyl-p-aminophenol, pictol, rhodol, $MeNH—C_6H_4OH$. Used as its hydrochloride or hydrosulfate, as a photographic developer. **m. poisoning.** A mis-nomer for dermatitis caused by alkali; or by *p*-dimethyldiaminobenzene, formerly an impurity of metol.

metoxazine. C_4H_9ON = 87.1. The ring compound,



metozine. Antipyrine.

metrazol. $C_5H_{10}N_4$ = 126.1. Pentamethylenetetrazole. White monoclinic crystals, m.58. soluble in water; thought to be a heart stimulant,

metre. Meter.

metric. (1) Pertaining to measure. **gravi-** Analysis involving the use of the balance. **volu-** Analysis carried out by measuring volumes with pipette and burette. (2) Pertaining to the system of weight and measures of which the meter is the basis. **m. slug.** See *slug.* **m. system.** The weights and measures based on the "meter," from which all other scientific units are derived. The multiples of units are uniformly prefixed with the Greek terms:

mega	= 1,000,000	$= 10^6$
myria	= 10,000	$= 10^4$
kilo	= 1,000	$= 10^3$
hekto	= 100	$= 10^2$
deka	= 10	$= 10^1$

The fractions of units are uniformly prefixed with the Latin terms:

deci	$= \frac{1}{10} = .1$	$= 10^{-1}$
centi	$= \frac{1}{100} = .01$	$= 10^{-2}$
milli	$= \frac{1}{1000} = .001$	$= 10^{-3}$
micro	$= \frac{1}{1000000} = .000001$	$= 10^{-6}$

The units commonly used are:

Length = meter = m.; also km., cm., mm. and μ (10^{-6} m.), mμ, $\mu\mu$.
Area = square meter = $m.^2$, also are = 100 $m.^2$
Volume = liter = l., also cc. (cubic-centimeter) and λ (10^{-6} l.)
Mass = gram = g., also kg., mg. and γ (10^{-6} g.)

m. ton. One thousand kilograms = 2204.6 pounds.

metronome. An instrument for measuring short time intervals, usually by means of a mechanically driven pendulum.

metrotonin. An ergot substitute consisting of epinephrine, acetylcholine, and other amines.

-metry. A suffix indicating measurement and measuring.

Metshnikoff, Elie. Metchnikoff. 1845–1918. A Russian physiologist, noted as the discoverer of phagocytosis.

metso. Sodium metasilicate used as a scouring agent.

metycaine. Neothesin, hydrochloride of γ-(2-methyl piperidino) propyl benzoate. A white powder, used as local anesthetic.

mev or MEV. Abbreviation for million electron volts.

Mexican poppy oil. A brownish-yellow oil extracted from the seeds of prickly poppy, *Argemone mexicana,* d.0.922; used in soap manufacture. **M. onyx.** A variety of calcite, used in interior decorations. **M. scammony root.** Ipomoea.

Meyer, Lothar Julius. 1830–1895. A German chemist noted as a discoverer of the periodic system. Cf. *Mendeléeff.* **M., Victor.** 1848–

1897. A German chemist noted for his research in stereochemistry and organic chemistry, and for his methods of vapor-density determination. **M.'s formula.** (1) See *molecular free path.* (2) An equation connecting viscosity (q.v.) and temperature. **M.'s law.** Law of *esterification.* **M.'s theory.** Anesthetics and narcotics are generally substances which diffuse rapidly. See *liminal value.* **M.'s tube.** An absorption tube for CO_2, filled with $Ba(OH)_2$; used in steel analysis. **M.'s value.** Liminal value. Cf. *Mayer.*

meyerhoffite. $2CaO.3B_2O_3.7H_2O$. A native calcium borate.

meymacite. $WO_3.H_2O$. A native, hydrated tungsten oxide, light-brown, resinous masses.

meymacite. A native hydrated tungsten oxide, $WO_3.H_2O$; light-brown, resinous masses.

mezcal. Mescal.

mezcaline. Mescaline.

mezereum. Mezereon.

mezereon. Mezereum, dwarf bay, paradise plant, wild pepper, spurge flax. The dried bark of *Daphne mezereum,* a European shrub; used medicinally as a diaphoretic stimulant or diuretic. Cf. *daphnin.*

mezquit. The shrub or tree *Prosopis juliflora* of Mexico and the S. W. United States. Its gum resembles gum arabic.

mg. Milligram. **mg.-%.** Mg. per 100 cc.

Mg. Symbol for magnesium.

mho. A unit of electrical conductivity (the reciprocal of ohm, the unit of resistance). One mho conductance per centimeter cube with a potential of one volt allows the passage of one ampere current per square centimeter.

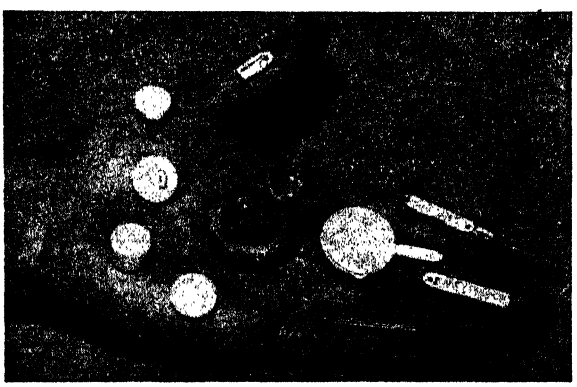
miamine. Chlorazene.

miargyrite. $AgSbS_2$. A silver sulfide ore.

miasma, miasm. A noxious exhalation, or vapors arising from swamps.

miazines. Meta-diazines or pyrimidines. A group of heterocyclic compounds having two nitrogen atoms in the meta position; as, pyrimidine and quinazoline. Cf. *piazines, oiazines.*

mica. (1) One of a group of laminated silica minerals (q.v.). (2) $3Al_2O_3.K_2O.6SiO_2.2H_2O$. Isinglass, muscovy glass. A native hydrous silicate, which can be split into very thin transparent sheets. Used as an insulator for electrical instruments; as windows in furnaces and refracting instruments; and in the ground state, as a lubricant. The term is used in geology as a prefix to rocks containing it, such as mica basalt. **amber-** Phlogopite. **lithia-, lithium-** Lepidolite. **potash-** $KH_2Al_3(SiO_4)_3$, potassium metasilicate. **ruby-** Muscovite. **m. black.** See *hibernium.*



Microchemical apparatus.

micell(e). (1) An electrically-charged colloidal particle; a colloidal ion, consisting of oriented molecules. Cf. *zone.* (2) An oriented arrangement of a number of molecules; as in cellulose, rubber, starch, where there are no or few unshared electron pairs. Cf. *liquid, association.* (3) An aggregate composed of a number of molecules held loosely together by secondary forces (which are weaker than primary valence bonds). Cf. coordinate *bonds.*

Michael's reaction. An organic addition reaction in which the sodium salts of acetocetic acid or malonic esters disrupt the double bond to unsaturated compounds of the type, R—CH:-CH—X, where X is a carbonyl or cyanogen radical.

Michler's hydrol. $C_{17}H_{22}N_2O$ = 270.19. *p*-Tetramethyl diaminobenzo hydrol, $(Me_2NC_6H_4)_2CH_2OH$. White crystals, m.96, used in organic synthesis. **M. ketone.** $C_{17}H_{20}ON_2$ = 268.3. Tetramethyl-p,p'-diaminobenzo-phenone, $(Me_2NC_6H_4)_2CO$. Colorless, lustrous plates or scales, m.172, b.360, insoluble in water, soluble in alcohol. Used in the synthesis of dyestuffs and auramine derivatives.

micrinite. An opaque material found in coal durains (q.v.), and intermediate in character between fusain and vitrain.

micro- (1) A prefix derived from the Greek, indicating small. (2) The one-millionth part of a unit; as, μ = micrometer, λ = microliter and γ = microgram.

microampere. One-millionth of an ampere.

microanalysis. The identification of substances by examination with the microscope. Cf. *microchemistry, microreaction.*

microbalance. A very sensitive balance (*e.g.,* based on the torsion of a very fine quartz fibre, as McBain balance). Used for weighing micro quantities.

microbe. An microorganism of animal or vegetable nature; generally those which may cause disease, as bacteria and pathological protozoa.

microbic. Pertaining to microorganisms.

microbicide. Any agent that destroys microorganisms.

microbiology. The study of microorganisms or microbes.

microbiotic. Any antibacterial substance produced by molds, bacteria or other organisms; an antibiotic.

microburner. A small bunsen burner.

microcalorie. See small *calorie.*

microchemical. (1) Pertaining to reactions observed under the microscope. (2) Pertaining to chemical reactions in miniature apparatus with small quantities. **m. analysis.** The qualitative or quantitative analysis of small amounts of substances, *e.g.,* of the order of 10 mg. or less. Qualitative methods are based on spot, colour or microscope tests, q.v.; quantitative methods are usually small-scale adaptations of existing macro-methods.

microchemistry. (1) Microscopical chemistry. Chemical investigation by means of the microscope, especially the performance of chemical reactions on a microscope slide and the observa-

tion of resulting precipitates or colors. This requires only minute quantities of substances. (2) The qualitative and quantitative reactions performed with small quantities (micrograms and microliters), using small apparatus (*e.g.*, a capillary tube for burette).

microcidin. A surgical antiseptic consisting of sodium-β-naphtholates and phenates.

microcline. Amazonite.

micrococcus. A minute spherical or round bacterium.

microcosmic salt. $NaNH_4HPO_4.4H_2O$. Phosphor salt. Acid sodium ammonium phosphate; used in blow-pipe analysis for bead tests (q.v.). It occurs in blood, and natural waters.

microcoulomb. One-millionth part of a coulomb.

microcrith. An obsolete term for the weight of a hydrogen atom.

microcrystalline. Cryptocrystalline. Crystallizing in minute crystals.

microfarad. One-millionth part of a farad, the ordinary measure of electrostatic capacity.

microfilm. A photographic film on which is reproduced printed matter on a greatly reduced scale. In this way the contents of whole libraries can be reproduced and stored in a comparatively small space. The m. are read by projection on to a large screen.

microgram. Gamma, γ, the one-millionth part of a gram; a measure in microanalysis.

micrography. (1) Photomicrography. (2) The measurement of physical properties with the aid of the microscope.

microhm. One-millionth part of an ohm.

microlamp. (1) A lamp used as an illuminator for microscopes. (2) Any small artificial source of light.

microline. $K_2O,Al_2O_6,6SiO_2$. A vitreous yellow mineral.

microliter. Lambda, λ, the one-millionth part of a liter; a measure in microanalysis. 1λ = 1 mm^3.

microliths. Very small crystals ($\frac{1}{1000}$ inch) in microscopic sections of rocks and slags.

micromanipulator. The attachments to the microscope stage, consisting of controls and levers which enable one to manipulate an object while under observation; *e.g.*, for dissections, injections, etc.

micromerol. $C_{33}H_{52}O_2$ = 480.43. A monobasic alcohol from *Micromeria chamissonis*, a Labiatae.

micrometer. (1) Micron. (2) An instrument for measuring small lengths or objects under the microscope, *e.g.*, the extension or expansion of cement or iron bars, the size of bacteria. **m. caliper.** An instrument for measuring with an accuracy up to $\frac{1}{100}$ mm.

micromicron. $\mu\mu$(mu-mu) = the one-millionth part of a micron; = 10^{-12} meter = 10^{-9} mm. = 10λ = 10 x-units. (See *magnitudes.*)

micromillimeter. Same as micron = one-thousandth part of a millimeter.

micromonosporin. An antibiotic substance produced by *Micromonospora* species of actinomycetes.

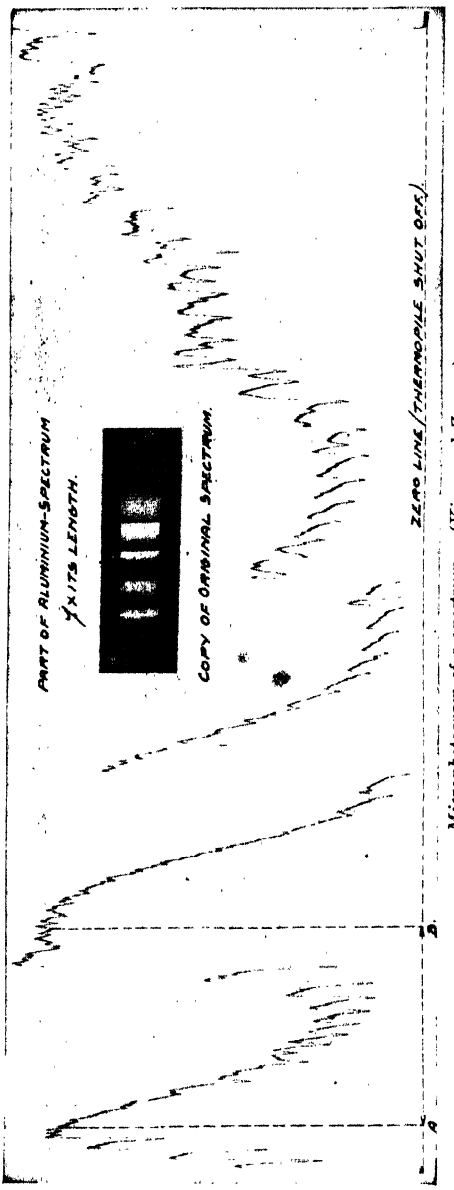
micron. (1) μ = mu, or $m\mu$. A unit of length equal to one-millionth part of a meter, or one-thousandth part of a millimeter. **micro-** See *micromicron.* **milli-** See *millimicron.* (See *magnitudes, amicron, submicron, ultramicron.*) (2) A colloidal particle whose size ranges from 0.2 to 10μ. The range is:

micron... 10 to 0.2μ; or 10^{-3} to 2×10^{-3} cm.
submicron 0.2μ to 5mμ; or 2×10^{-5} to 10^{-7} cm.
amicron.. less than 5mμ; or 10^{-7} cm.

m. of mercury. The pressure exerted by a column of Hg 1μ high; a unit of high vacua. 1μ Hg = 0.001 mm. Hg = 1.333 bars = 0.000,001,3 atm.

microörganism. Any minute animal or plant, visible only through a microscope.

microphone. An instrument for intensifying or transmitting sound by means of electrical impulses.



Microphotogram of a spectrum. (Kipp and Zonen.)

microphotogram. The record made by a microphotometer.

microphotograph. (1) A photograph reduced in scale. Cf. *photomicrograph.* (2) Is microphotogram.

microphotometer. An instrument to measure the intensity of spectral lines by determining

the density of their photographic images over small areas. It consists of a lighting system driving mechanism, photoelectric cell, and a galvanometer which magnifies greatly any change in the intensity of the photographic image and thus produces automatically a microphotogram on a sheet of light-sensitive paper (see figure).

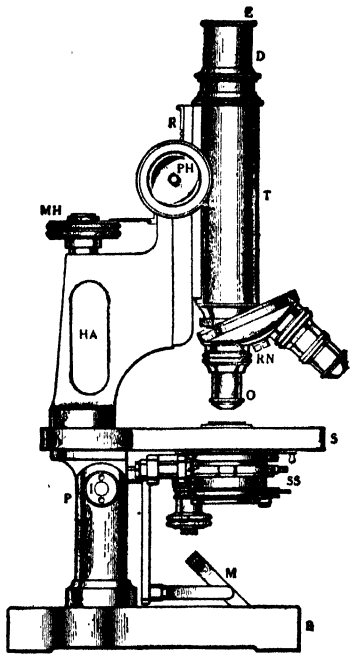
microporous. Having openings or cavities of microscopic size. **m. rubber.** See *mipor rubber.*

micropolariscope. A microscope with polariscope attached; used in the study of minerals and crystals.

microreaction. A chemical reaction performed under the microscope with minute amounts of reagents. Used for the visual identification of elements or ions by means of their characteristic crystalline precipitates. Cf. *spot analysis.*

microsal. A mixture of copper carbonate and crude sulfonephenolic acids, used as disinfectant.

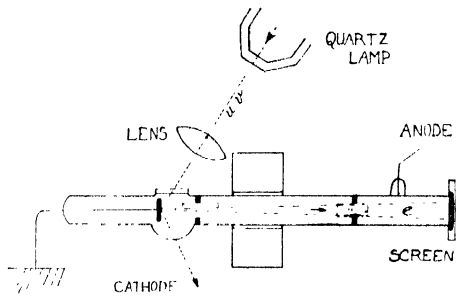
microscope. An optical instrument consisting of objectives and eyepiece that magnifies minute objects for visual inspection or photographic record by direct illumination. Normally the lower limit of visibility is 0.10μ.



Microscope.

E = ocular or eyepiece
O = objective
RN = revolving nosepiece
PH = pinion head (adjustment of focus)
MH = micrometer head (fine adjustment)
S = stage
SS = substage with diaphragm and condenser
M = mirror

binocular- A m. having two eyepieces, which used simultaneously, produce a perspective effect of the object examined. **compound-** An ordinary m., enlarging from 30–1000 diameters. **electron-** A device analogous to an ordinary microscope, in which a beam of electrons replaces the source of light and magnetic condensers replace the lenses; the image is rendered visible by projection on to a fluorescent screen. Magnifications of up to 100,000 are obtainable. Cf. *Kikuchi lines.* **fluorescence-** A m. in which the illumination is filtered ultraviolet light; used to study fluorescence (q.v.) phenomena. Cf. *ultraviolet*



Electron microscope.

m. **polarizing-** A m. in which the object is on a rotating stage between crossed nicols. **ultra-** A m. in which the object is indirectly illuminated, *e.g.*, a thin layer of a colloidal solution is illuminated at right angles to the line of sight, and the colloidal particles appear as bright points on a dark field. The lower limit of visibility is 5mμ. **ultraviolet-** A high-power m., in which an ultraviolet ray of few or single wave-length is the illumination. Objects may be enlarged from 1000 to 6000 diameters. The lower limit is 30$\mu\mu$ (3×10^{-6} cm. or 10^{-6} inches). Cf. *fluorescence m.* **m. test.** Microreaction.

microscopic. Visible under the microscope; lower limit, about 0.10μ. **a-** Invisible under the ordinary microscope. **sub-** Amicroscopic. **ultra-** Recognizable with the ultramicroscope; lower limit, about 5mμ. Cf. *micron.*

microscopy. (1) The art and science of the optical enlargement of objects, and their photography. (2) The application of the microscope to useful ends. **fluorescence-** See *fluorescence.*

microspectroscope. (1) A microscope with spectroscope attached; used for a study of the absorption spectra of tissues. (2) A spectroscope with microscope attached; used for a study of the structure of spectral lines.

microtome. An instrument for cutting thin sections of materials and tissues for microscopic examination.

micro-unit. A unit of small measurement, usually the one-millionth part, to which micro- is prefixed. It is characterized by a Greek letter; as, γ, λ, σ for microgram, microliter, microsecond, respectively.

microvolt. The one-millionth part of a volt.

midrol. Iodomethylphenylpyrazolone, mydrol. Colorless crystals soluble in water; used in medicine as a mydriatic.

miemite. $CaCO_3.MgCO_3$. A vitreous, yellow-brown mineral.

Miers, Sir Henry. 1858–1942. A British chemist, noted for his work on mineralogy and crystallography.

Miescher pipette. A small tube used for diluting blood specimens for hemacytometers.

mignonette oil. Reseda oil.

migrainin. A proprietary mixture of 85 % antipyrine, 9 % caffeine, and 5 % citric acid; used medicinally for headaches.

migration. A movement or change of place, such as the m. of ions in an electric cell. **atomic-** See *rearrangement.*

m. tube. An H-shaped glass vessel with electrodes. On filling this tube with a salt solution, adding a suitable indicator, and passing an electric current through the solution, the migration of the ions is illustrated by the progress of the color reaction. **m. velocity.** The velocity with which ions move through a solution during electrolysis. (See *transport numbers.*) They are related to the absolute ionic velocities, (expressed in cm. per sec. per dyne). Thus, abs. velocity = $10^8 \times$ migration velocity/96,000. Cf. *mobility.*

mikro- Micro-.

mikrobe. See *microbe.*

mikrobin. Sodium p-chlorobenzoate. A preservative for wine or cider.

mil. (1) ml. The one-thousandth part of a liter, 1 mil = 1.000028 cc. This term is used in the British Pharmacopoeia (milliliter) but was discontinued in the U.S.P. X in favor of 1 cc. (2) A wire measurement, equal to $\frac{1}{100}$ inch = 25.4001 microns.

milammeter. Milliammeter.

milarite. $HKCa_2Al_2(SiO_3)_{12}$. A native, potassium, calcium, aluminum silicate; colorless or greenish, brittle, hexagonal prisms.

mile. A measure of length; 1 mile = 1.60935 km. = 1609.35 meters. (1 mile = 5280 feet = 1760 yards = 80 chains.) **admiralty-** 6080 ft. **nautical-** 1.853 km. = 1853.25 m. = 6082.66 feet = 80 fathoms. **geographical-** Nautical mile.

milk. (1) The opaque secretion of the mammary glands; an important food. A white emulsion, d.1.029–1.039, containing (averages, in 10 × %):

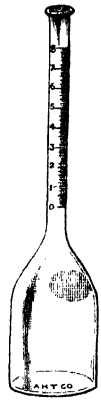
Milk of the	Water	Proteins	Fat	Sugar	Salts
Dog.....	754.4	99.1	95.7	31.9	7.3
Cat.....	816.3	90.8	33.3	49.1	5.8
Goat.....	869.1	36.9	40.9	44.5	8.6
Sheep.....	835.0	57.4	61.4	39.6	6.6
Human....	875.5	12.5	35.0	75.0	2.0
Cow.....	871.7	35.5	36.9	48.8	7.1
Mare.....	900.6	18.9	10.9	66.5	3.1
Ass.....	900.0	21.0	13.0	63.0	3.0
Pig.....	823.7	60.9	64.4	40.4	10.6
Elephant...	678.5	30.9	195.7	88.5	6.5

acid of- Lactic acid. **butter-** Milk from which the fat has been removed. **certified-** A good quality milk, which has been chemically and bacteriologically tested, and contains but few bacteria. **condensed-** Milk from which some water has been removed and to which sugar has been added. **fermented-** Kumyss. **homogenized-** A milk which has been re-emulsified (*e.g.*, after pasteurization) or treated so that the fats do not separate into cream. **modified-** A cream which is diluted with a lactose solution; used for infant feeding. **pasteurized-** A milk which has been heated at 60°C. for 30 minutes. **skimmed-** Milk from which the separated cream has been removed. **sterilized-** A milk that has been heated at 100°C. for 45–60 minutes. **vegetable-** An emulsion of fats derived from the soya bean, used extensively in China for beancakes or cheese-like foods.

m. extract. A condensed milk, in which the casein has been partly peptonized. **m. fat.** The total fats obtained from milk. **m. powder.** A milk that has been evaporated and powdered. **m. scale.** A white opal strip which runs the length of a burette or other graduated glass instrument, and enables accurate meniscus (q.v.) readings to be obtained with ease. **m. serum.** Whey. **m. stone.** A flint, whitened by fire. **m. sugar.** Lactose. **m. test bottle.** A graduated centrifuge tube, used in the determination of the fat-content of milk (see figure). **m. weed.** Silkweed.

(2) Magma. An emulsion or suspension.

m. of almonds. An emulsion of 6 % almond oil with acacia, in water; used in pharmaceutical preparations and cosmetics. **m. of asafoetida.** An emulsion of 4 % asafoetida in water; used medicinally as a sedative and carminative. **m. of barium.** A suspension of barium hydroxide in water. **m. of bismuth.** Magma bismuthii, bismuth magma. A suspension of bismuth subnitrate in water; used medicinally. **m. of lime.** A suspension of calcium hydroxide in water. **m. of magnesia.** Magma magnesia. A suspension of 7 % magnesium hydroxide in water; used medicinally as an antiacid for gastric disturbances. **m. of sulfur.** Precipitated sulfur.



Milk test bottle.

milky. Having a flat, white or opaque appearance. **m. quartz.** A variety of quartz having a milk-like color and greasy luster.

mill. (1) A crushing, grinding, or pulverizing apparatus. (2) An establishment for reducing ores by mechanical means. (3) An establishment in which grinding, crushing, or powdering is done, as paper mill, flour mill, etc. (4) The equipment of a rolling mill; hence, a steel plant. **assay-** A small mechanical crusher for the laboratory. **ball-** A grinding apparatus in which iron or quartz balls are used for powdering. **drug-** A laboratory apparatus for grinding drugs or seeds. **pebble-** Ball mill. **porcelain-** A laboratory machine for grinding wet or dry chemicals or bacteriological materials.

m. iron. A pig iron suitable for puddling or for the basic open-hearth process.

millboard. Board made from paper-refuse.

Miller, William Lash, 1866–1940. A Canadian chemist, noted for his study of bios and physical chemistry. **M. indices.** See *atomic planes.*

millerite. NiS. Nickel pyrites. A native nickel sulfide.

millet. A small-grain, edible cereal, cultivated on dry, sandy soils, *Setaria italica,* a Gramineae.

milli- A prefix derived from the Latin, indicating one-thousandth.

milliammeter. An amperemeter for measuring one-thousandth of an ampere.

milliampere. One-thousandth part of an ampere.

milliångström. λ. The one-thousandth part of an Ångström unit, $\lambda = 0.1\mu\mu = 10^{-11}$ cm.

millibar. One-thousandth part of a bar.

milligram. mg. A unit of weight equal to the one-thousandth part of a gram. 1 mg. = 0.01543 grains. **m. atom.** mg. at. The number of milligrams of an element, divided by its atomic weight; used in the analysis of sea water. **m. per cent.** mg.-%. The concentration of a solution expressed in mg. per 100 cc.

milligramage. A unit of radioactive dosage: the amount of radium exposure produced by 1 mg. radium in one hour.

milligram hour. Milligramage.

Millikan, Robert Andrews. 1868– . An American physicist, noted for his researches on electric phenomena, electrons, x-rays and radiation. **M.'s rays.** Cosmic rays. A high-frequency radiation from the cosmos, which penetrates the atmosphere and upper crust of the earth. Its origin is at present thought to be the interstellar space. Cf. *mass-energy cycle.*

millilambert. A unit of illumination, equal to 0.929 lumens emitted per square foot.

milliliter. Same as mil. (Cf. *cc.*)

millimeter. mm. = The one-thousandth part of a meter.

millimicron. mμ = The one-millionth part of a millimeter; the one-thousandth part of a micron; cf μμ = micro-micron.

millimol. The one-thousandth part of a gram-molecule (mol).

milling. The operation of crushing, grinding, or powdering.

millinormal. A solution having one-thousandth part of the concentration of a normal solution.

million. 10^6 or 1,000,000. One thousand thousands.

milliphot. A unit of illumination equal to one-thousandth part of a phot = 0.929 foot candle.

Millon's base. A yellow powder [probably $HO(Hg_2O)NH_2.H_2O$ or $(HOHg)_2NH_2OH$] produced from a solution of mercuric oxide in ammonium hydroxide. **M.'s reagent.** A reagent for the detection of proteins made by dissolving mercury in twice its weight of concentrated nitric acid and diluting with twice the volume of water; originated in 1849 by N. A. E. Millon, a French chemist. **M.'s test.** An intense, red precipitate or color is produced in the presence of proteins by warm Millon's reagent.

millstone. Burstone. A hard stone used for grinding cereals; it usually consists of a coarse sandstone with fine quartz inclusions.

milorganite. An organic fertilizer prepared in Milwaukee by the dehydration of sewage. A brown granular powder resembling coffee grounds, free from bacteria and seeds, and containing 5.4 % N and 3 % H_3PO_4.

milori blue. A pigment similar to soluble Prussian blue, but having a red tint; prepared by the oxidation of a paste of potassium ferrocyanide and ferrous sulfate.

mimetite. $PbCl_2.3Pb_3(AsO_4)_2$. Mimetisite. A native lead chloride and lead arsenate.

mimosa bark. The dried bark of *Acacia mimosa*, a Leguminosae. It contains an astringent principle used in tanning.

min. ℿ. An abbreviation for minim.

mine. The subterranean workings for minerals, coal, or ores; cf. *quarry, outcrop.*

mineral. Any non-organic or fossilized organic substance found in nature. Minerals have a definite chemical composition, and are formed by inorganic reactions. They are classified according to their chemical compositions, or to their forms of physical crystallization. **Ethiops-** Black mercuric sulfide with some free Hg and S.

m. acid. An inorganic acid. **m. adhesive.** Sodium silicate. **m. alkali.** An inorganic base, *e.g.*, NaOH, $Ca(OH)_2$. **m. blue.** (1) A mixture of ferriferrocyanide with calcium sulfate or barium sulfate. (2) A blue copper or tungsten ore. **m. butter.** Antimonous chloride. **m. caoutchouc.** Alaterite, helenite, bitumen elastic. A plastic type of bitumen. **m. carbon.** Graphite. **m. chameleon.** Potassium permanganate. **m. charcoal.** An amorphous coal having a distinct vegetable structure, which occurs as thin layers in bituminous coal. See *coal* (fusain). **m. coal.** Fusain. **m. cotton.** M. wool. **m. dye.** An inorganic pigment. **m. fat.** Petrolatum. **m. green.** Copper carbonate. **m. jelly.** A semi-solid mixture of hydrocarbons; as, vaselin, solid petrolatum. **m. oil.** Paraffin oil, or its homologs. **m. oils.** An oil obtained from inorganic matter, as petroleum and its products. **m. paint.** A pigment derived from a colored mineral. **m. pigments.** A native colored ore, or any artificial inorganic coloring matter. **m. pitch.** Asphalt. **m. purple.** A red, iron oxide pigment, or ochre. **m. resin.** A hydrocarbon mineral, such as asphalt, bitumen, copal. **m. rubber.** Gilsonite. **m. separating fluid.** See *density fluid.* **m. streak.** The characteristic colored streak produced when certain minerals are rubbed on a porcelain plate. **m. tallow.** Hatchettenine. **m. water.** A natural water containing sufficient salts or gases in solution to give it certain properties and taste (see *water*). *artificial-* A solution of certain salts in carbonated or distilled water. **m. wax.** Ozocerite. **m. white.** Pearl hardening. A pure form of natural calcium sulfate, used as a loading in paper, etc. **m. wool.** Mineral cotton. A mass of finely interlaced filament produced by suddenly cooling molten slag. Used as a filling material, for walls and coverings for steam pipes. **m. yellow.** Lead oxychloride.

mineralization. The process of replacing organic constituents by inorganic matter, *e.g.*, in fossilized plants and animals. Cf. *petrifaction.*

mineralize. Petrify.

minerallac. A trade name for asphalt solution used for insulating cable joints.

mineralography. (1) The descriptive branch of mineralogy. (2) The study of minerals by microscopic methods, and the recording of their structures by photographs of thin sections of the polished and etched minerals.

mineralogy. A branch of science dealing with the occurrence, description, mode of formation, and uses of minerals.

miner's inch. An arbitrary measurement of water, which is generally fixed as that quantity of water which will flow through a square inch hole through a two inch plank, the water standing six inches above the top of the hole. This quantity of water amounts to 2274 cubic feet in 24 hours (= 1½ cubic feet per minute).

miner's lamp. A lamp used by miners: oil lamps, carbide lamps, Davy lamp, electric cap-lamps, or flame-safety lamps.

minetisite. Mimetite.

minim. ℿ = min. A unit of volume in the English system. 1 minim = 0.0616 cc.; 1 min.

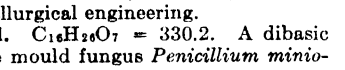
= $\frac{1}{60}$ part of a fluid dram. **U.S.-** 0.9606 imperial m. = 0.9483 grain H_2O at 62°F.

minimal. Smallest quantity.

minimum. The smallest amount or the lowest value or limit.

mining. The processes by which useful minerals are obtained from the earth's crust, both by surface mining (from quarries) and by underground mining (from mines). **m. engineering.** The art and science of excavating, working, and controlling the technical processes of mines, including branches of civil, electrical, mechanical, and metallurgical engineering.

miniloteic acid. $C_{16}H_{26}O_7$ = 330.2. A dibasic acid from the mould fungus *Penicillium miniloluteum.*



minium. Red *lead oxide*, Pb_3O_4. Originally the term for cinnabar, but now applied to its chief adulterant, red lead. Cf. *sandix.*

minivalence. The lowest valency of an element, as shown by its position in the periodic system.

mink fat. The soft fat from *Putorius lutreula.* White solid, d.0.941, m.36.5, n_D.1.4608.

mint. Mentha (q.v.). **horse-** Monarda. **marsh-** Marshmint. **mountain-** Calaminth. **pepper-** Peppermint. **spear-** Spearmint.

minulite. The mineral $KAl_2(OH,F)(PO_4)_2.3.5H_2O$ from Western Australia.

minute. (1) Any particularly small object. (2) A unit of time, the sixtieth part of an hour. **m. glass.** An 8-shaped sealed glass vessel, on a base. It is filled with fine sand which flows, in a given time, from the upper to the lower compartment.

Miocene. The geological epoch (q.v.) between the Eocene and Pliocene periods.

miostagmin reaction. Ascoli reaction. The lowering of the surface tension of diluted blood-serum which results from the antigen-antibody reaction, and is measured with Traube's stalagmometer.

miotic. Myotic.

mipor. Microporous. **m. rubber.** A soft rubber, penetrated by pores of about 0.0004 mm. average diameter. Used in filter-presses. **m. scheider.** A diaphragm of m. rubber used in accumulators and batteries.

mirabilite. A native sodium sulfate, Na_2SO_4, H_2O.

miramant. A tungsten-molybdenum alloy, used in cutting tools.

mirbane oil. Nitrobenzene.

mirror. A highly-polished surface that reflects light, made of polished metal, (nickel or its alloys) or glass with a metal backing (mercury, tin). **concave-**A)-shaped mirror. **convex-** A (-shaped mirror. **plane-** A perfectly flat mirror.

mirrorstone. (1) Mica. (2) Muscovite.

misce. The Latin term for mix.

mischmetall. (1) An impure form of selenium. (2) An unseparated reduction product from a natural mixture of the rare earths. It contains a mixture of rare earth metals. (3) Commercial cerium. A mixture of 40–75 % Ce, with varying amounts of La, Nd, Pr, etc. and sometimes 1–5 % Fe; used for pyrophoric alloys. Cf. *Auer metal.*

mischzinn. [German, mixed tin.] An alloy of 54.4 % Sn, 41.9 % Pb and 3.6 % Sb, used for the preparation of solders.

miscibility. The ability of certain liquids to mix with each other in all proportions. **m. gap.** The temperature range in which certain liquids which are normally miscible will not mix.

miscible. Capable of mixing or dissolving in all proportions. **im-** Not able to mix.

miso. A fermented soya-bean paste used as food. Cf. *kogi.*

mispickel. $FeS_2.FeAs_2$. A native iron sulfide and arsenite.

mist. Fog. Cf. *colloidal systems.* **m. tree.** Chionanthus.

mistletoe. The leaves and young twigs of *Phoradendron flavescens;* used, as a fluid extract, as antispasmodic and narcotic. Cf. *viscum.*

mistura. The Latin term for mixture; used in the U.S.Pharmacopoeia.

mitogenic. Describing radiations supposed to be emitted by living humans. They have been associated with religious hysteria; cf. *scotography.*

mitosis. Karyokinesis.

mitragynine. $C_{22}H_{31}O_5N$ = 389.25. Mitragyne. An alkaloid, m.106, $b._{5mm}$.240, from *Mitragyna speciosa,* a Rubiaceae.

mitraversine. $C_{22}H_{36}O_4N_2$ = 392.30. An alkaloid, m.237, from *Mitragyne diversifolia,* a Rubiaceae.

Mitscherlich, Eilhardt. 1794–1863. A German chemist, noted for his research in mineralogical and organic chemistry. **M. desiccator.** A desiccator, with side-tubes attached for evacuation. **M. eudiometer.** A closed glass buret, with platinum electrodes at one end and glass stopcock at the other end. **M. law.** (1) The law of isomorphism (q.v.), which is not rigidly correct. The same number of atoms of similar elements combined in the same way produce an identical crystalline structure, which is, therefore, not dependent on the elements contained in it, but on the mode of arrangement of the atoms. (2) The spectra of isomorphous substances are similar. **M. pulp.** A strong sulphite wood pulp prepared by the M. process, in which wood chips are digested for 70–80 hr. at 45 lbs./sq. in. pressure, the cooking liquors being circulated and heated outside of the digester.

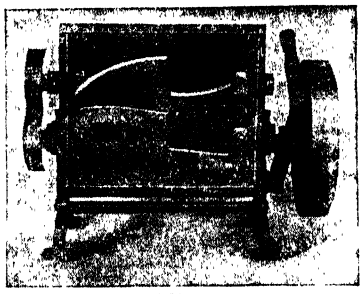
mitsubaene. $C_{15}H_{24}$ = 204.19. A sesquiterpene from *Cryptotaenia japonica* (mitsuba-zeri), a Japanese Umbelliferae.

mix. (1) To intermingle. (2) The physical mixture of substances from processing; as applied to rubber, asphalt etc.

mixed crystals. A crystal of two isomorphous substances, both of which crystallize in the same system. **m. esters.** An ester R—COO—R′, in which the two radicals, R and R′ are different. **m. ethers.** An R—O—R′ ether, in which the radicals, R and R′ are different *i.e.*, an oxide of two different hydrocarbons. **m. infection.** The invasion by and growth of two or more microorganisms in the animal body. **m. ketones.** A ketone of the type R—CO—R′. **m. salt.** A salt derived from a polyvalent acid, in which the hydrogen atoms are replaced by different metals, as $KNaNH_4PO_4$, $KAl(SO_4)_2$, or $KNa(C_4H_4O_6)$. **m. vaccine.** A suspension of two or more microorganisms, as bacteria in water; used medicinally for injections.

mixer. Equipment used for incorporating one or more material into another; it consists of

a steel bowl, with revolving mixing arms moving in opposite directions, which mix or knead pastes, semi-solid or solid materials. Cf. *mill* (see figure).



Mixer.

mixite. Cu_2O,As_2O_3,xH_2O with 13 % Bi_2O_3. An emerald mineral.

mixture. (1) Two or more substances which are mixed; but not chemically combined. Mixtures are non-homogeneous, and may be separated by mechanical means. **A.C.E.-** An anesthetic mixture: 1 part alcohol, 2 parts chloroform, 3 parts ether. **constant boiling-** A mixture of two liquids which, at a given pressure, distils unchanged, the boiling point remaining constant. Cf. *azeotropy*. Thus 20 % HCl and 80 % H_2O boil at 110°C., a *maximum* b.p. for these mixtures, while 95.6 % alcohol boils at 78°C., a *minimum* b.p. for alcohol-water mixtures. **freezing-** A mixture of salts and water or ice which produces low temperatures. **law of-** Law of *alligation*. (2) Mistura. A pharmaceutical preparation. **m. copaiba.** Lafayette m. A solution of 15 min. copaiva and 30 min. acacia in 1 fl. oz. of water.

M.K.S.-system. Meter-kilogram-second system. A technical system of measurements derived from the metric system: C.G.S-system (centimeter-gram-second). It was recommended by the International Electrotechnical Commission in 1938, as for certain purposes it is simpler than the C.G.S. system.

ml. Abbreviation for mil or milliliter (B.P. usage).

mm. Abbreviation for millimeter = $\frac{1}{1000}$ meter. **mm^2.** Abbreviation for square millimeter. **mm^3.** Abbreviation for cubic millimeter. **mm.** Abbreviation for millimoles.

mμ. Abbreviation for millimicron, 10^{-9} m.

μμ. Abbreviation for micromicron, 10^{-12} m.

mmm. An abbreviation for millimicron.

Mn. The symbol for manganese.

Mo. The symbol for (1) molybdenum; (2) monium.

(*Mo.*) The abbreviation for $C_{17}H_{19}O_3N$ (morphine).

mobile. Changing or moving.

mobility. (1) The motion of atoms, molecules, ions, or colloidal particles. The mobility (α) of an ion in a liquid is given by the expression, $\alpha = 1.037 \times 10^{-5}\lambda n$, where λ is the equivalent conductivity, and n the transport number of the ion concerned. (2) The visible motion of colloidal particles and micro-organisms. Cf. *Brownian motion*.

mobilometer. A form of viscometer in which the time is noted for a disc to fall through a column of the liquid under investigation. It is used for measuring the consistency of oils, cream and liquid foods.

mocha. See *coffee*. **m. stone.** Moss agate.

mochyl alcohol. $C_{26}H_{46}O$ = 374.35. An alcohol, m. 234°C., from mochi, a Japanese birdlime.

mock gold. Iron pyrites. **m. lead.** Zinc blende. **m. ore.** Sphalerite. **m. silver.** Britannia metal. **m. vermilion.** Lead chromate.

mode. The actual composition of a substance (*c.g.*, rock) as compared with its norm (q.v.).

model. An arrangement by which an idea or concept can be visualized. **crystal-** A set of glass or cardboard forms or other devices, which illustrate the shapes of crystals. **space lattice-** A group of wire nets and balls which indicate the arrangement of atoms within a crystal. Cf. *space lattice*.

modification. (1) A slight alteration or change. (2) The conversion of cereal starch into a form in which it is readily acted on by proteolytic or amylolytic enzymes, as in the malting of barley.

modified soda. A mixture of sodium carbonate and sodium bicarbonate, used as a cleaning agent in laundries, dairies, the textile industries, and in the household.

modulus. The measure of a force or properties of mass or their effects. A constant which converts a proportionality into an equality. **bulk-** An approximate value, expressed in dynes per sq. cm., which lies between the limit of elasticity and the breaking strength of a material. **Young's-** The force (or longitudinal elasticity), in dynes per sq. cm., required to stretch a metal wire a length proportional to $M = \frac{FL}{al}$, where M is Young's modulus, F the whole force, a the area, L, the entire length of wire, and l, the extension.

m. of elasticity. The ratio of the magnitude of the stress to that of the corresponding strain. (*a*) If the strain is one of volume and the stress is pressure, P, the modulus of elasticity of volume (= k, bulk modulus) is $k = PV/v$, where v is the change in volume. (*b*) If the strain is a shear, the modulus of elasticity is the ratio: $n = T/\theta$ (shear modulus), where T denotes the shearing stress, and θ, the corresponding shear. **m. of rigidity.** Modulus of elasticity (*b*).

Mohr, Karl Friedrich. 1806–1879. A German chemist and physicist. He is considered by some as the originator of the conservation of energy law, prior to Mayer. **M. condenser.** A modified Liebig condenser. **M. pipet.** A small buret with tap, which is used as a pipet. **M. liter.** G.W.A. The space occupied by an amount of water at 17.5°C. having an apparent weight in air (brass weights) of 1000 grams. 1000 G.W.A. = 1002 milliliters. **M. salt.** $(NH_4)_2Fe(SO_4)_2.6H_2O$. Ferrous ammonium sulfate, used as a standard in volumetric analysis.

Mohs, Friedrich. 1773–1839. A German mineralogist. **M. scale of hardness.** The hardness of a mineral is gauged by its ability to scratch or be scratched by one of ten standard minerals:

1. talc	6. orthoclase
2. gypsum	7. quartz
3. calcite	8. topaz
4. fluorite	9. corundum
5. apatite	10. diamond

Each mineral in the scale is scratched by all below it. Cf. *abrasives*.

Moissan, Henri. 1852–1907. A French chemist noted for his research on the production of artificial diamonds and gems, and on the isolation of fluorine. **M. furnace.** A high-temperature electric furnace. **M. process.** The production of metallic chromium by the reduction of chromic oxide with carbon in an electric furnace lined with calcium chromite.

moistness. The amount of liquid, generally water, held by a solid or gas. Cf. *wetting, adsorption.*

moisture. The wetness or dampness of a substance; the percentage of water contained in a substance.

mol. Mole. A gram-molecule, or formula weight in grams. The quantity of matter weighing M grams, where M is the molecular weight. Thus, one mol water weighs 18 grams, two mols, 36 grams.

molal. (1) Molar. Gram-molecular, or pertaining to mols; the molecular weight expressed in grams. (2) Moles per weight, as in m. solution. **m. conductivity.** The conductivity between electrodes one centimeter apart of a solution containing one mol (gram-molecule) of the substance dissolved in one liter. **m. latent heat.** Molecular heat of vaporization. The quantity of heat in calories required per molecular weight to transform a substance from the liquid to the gaseous state. **m. surface.** The area of a sphere of one mol of a substance. **m. solution.** The concentration of a solution expressed in moles of solute per 1000 grms. of solvent. Cf. *molar solution.* **m. volume.** The volume occupied by one mol of a substance. This volume is 22.4146 ± 0.0008 liters for an ideal gas under standard conditions. **m. weight.** The molecular weight expressed in grams; a mol.

molality. *M.* The concentration of a solution expressed in mols per 1000 gm. of solution. Cf. *molal, molar solution.*

molar. (1) Molal. (2) Referring to molecules in bulk; as distinguished from *molecular* (single molecules) and *molal* (a definite quantity). Cf. *molecular, colloidal, molal, normal solutions.* (3) Moles per volume, as in *m. solution.* **m. solution.** A solution which contains one mol of substance in 1000 cc. of solution = M. Thus:

1.0M NaCl solution contains 58.5 gm. per liter
0.5M NaCl solution contains 29.25 gm. per liter
2.0M NaCl solution contains 117.0 gm. per liter

It may or may not be identical with a *normal* solution (q.v.), or a *molal* solution.

molarity. M. The concentration of a substance in one thousand cc. of solution, expressed in mols. Cf. *molar, molal solution, concentration.*

molasses. Treacle. The uncrystallizable syrup obtained on boiling down raw cane- or beet-sugar. It contains 70 % of sugars. Cf. *affination.*

mold. Mould. A variety of fungoid growth, usually filamentous, which grows on damp vegetable material. Cf. *mould.* **slime-** Myxomycetes.

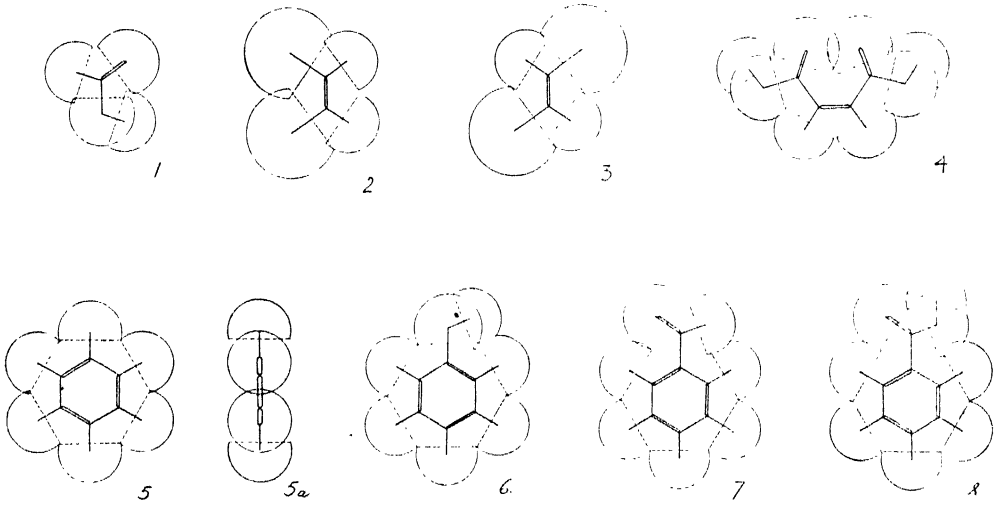
moldavium. Virginium.

mole. Mol.

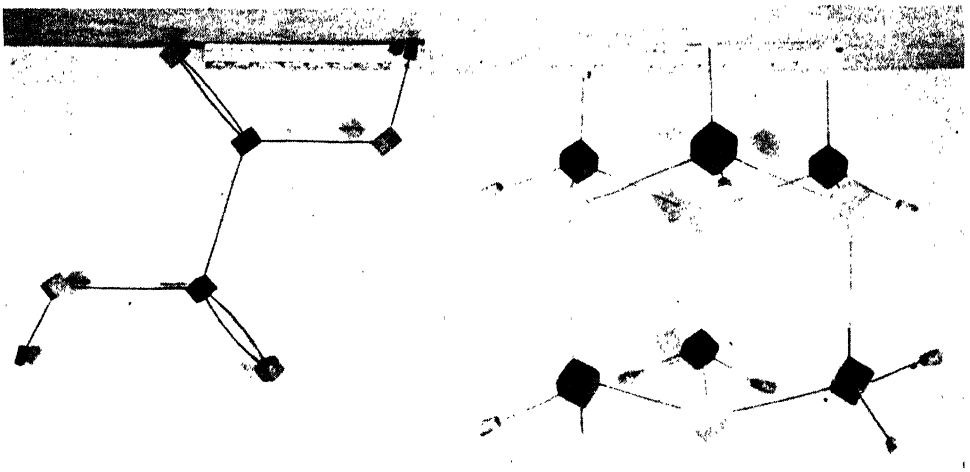
molecular. Pertaining to single molecules. Cf. *molar, molal.* **m. association.** Two or more molecules held by coordinate bonds, q.v. **m. colloid.** See *colloid.* **m. combination.** See *combination.* **m. compound.** Double salt. **m. conductivity.** Molal conductivity. **m. conversion.** See *rearrangement.* **m. depression.** The lowering of the freezing point of a solution. See *Raoult's Law.* **m. diagrams.** Drawings to scale of a view of the m. model. They resemble structure symbols, but show the ionic and effective radii and the shape of the molecule. **m. diameter.** The diameter of a molecule expressed in 10^{-8} cm. and calculated either from (a) Sutherland's equation, (b) van der Waal's equation, (c) the heat of conductivity, (d) the

MOLECULAR DIAGRAMS

These are drawn to scale in Ångström units. The HEAVY lines represent the bonds (cf. *structure symbols*) or the vector force lines from the atoms. The CIRCULAR lines are the effective radii around the atoms. The DOTTED lines dissect the bonds at the atomic radii; thus, 0.77Å. for C, 0.66Å. for N.



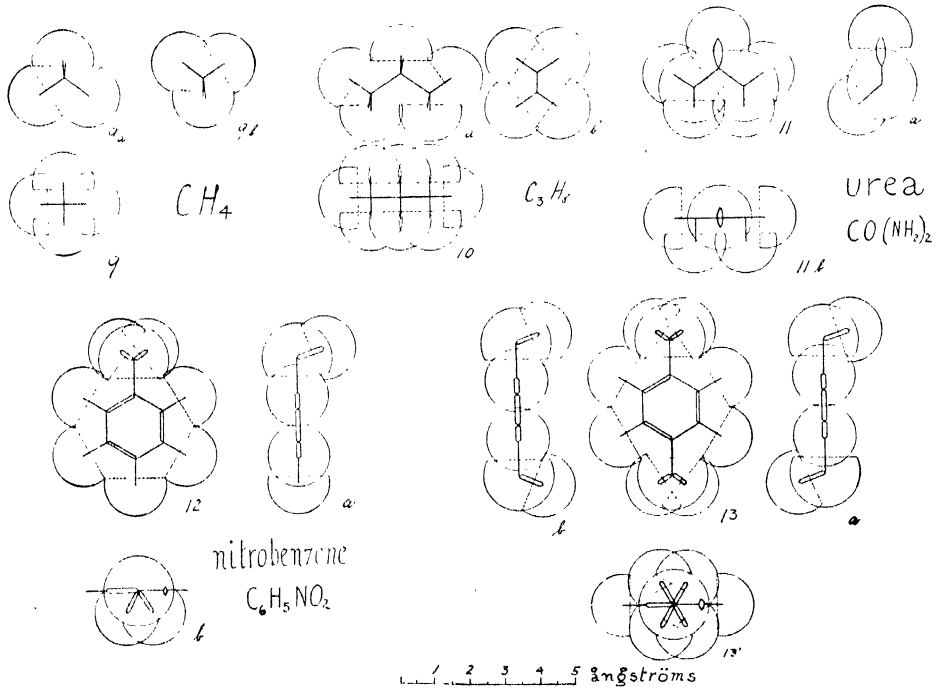
Front views of: **1. *formic acid***, H.CO.OH; **2. *cis-dichloroethylene***, CHCl:CHCl; **3. *trans-dichloroethylene***, CHCl:CHCl; **4. *maleic acid***, HO.CO.CH:CH.CO.OH; **5. *benzene***, C_6H_6, **5a., *side view;*** **6. *phenol***, C_6H_5OH; **7. *benzaldehyde***, C_6H_5.CO.H; **8. *benzoic acid***, C_6H_5.CO.OH.



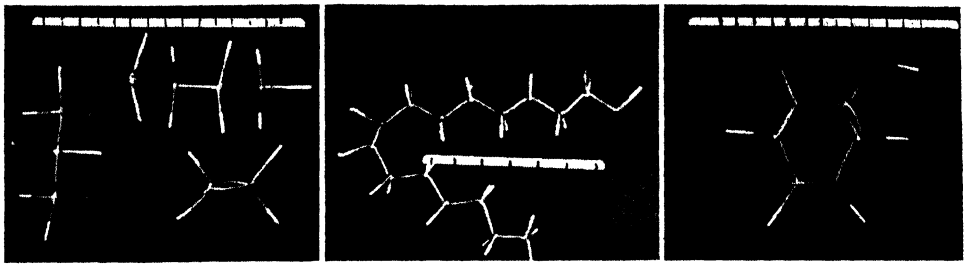
Hexamethylenetetramine Oxalic acid

Molecular models (2).

Scale of models: 10 cm. per Ångström. (Note that the cubes representing atoms are located so that their corresponding faces are all parallel.)



Three-directional views of: 9. *methane,* CH_4 *top view,* 9*a. front view,* 9*b. side view;* 10. *propane,* $CH_3.CH_2.CH_3$ *top view,* 10*a. front view,* 10*b. side view;* 11. *urea,* $NH_2.CO.NH_2$ *front view,* 11*a. side view,* 11*b. top view;* 12. *nitrobenzene* $C_6H_5.NO_2$ *front view,* 12*a. side view,* 12*b. top view;* 13. *para-dinitrobenzene,* $NO_2.C_6H_4.NO_2$ *front view,* 13*a. side view of trans-form,* 13*b. side view of cis-form,* 13. *top view of trans-form.*



Propane, Propylamine, Ethylene cis-oleic acid Phenol

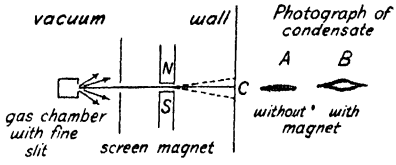
Molecular models (3).

Scale of models: 2 cm. per Ångström. (Compare these wire models with the corresponding structure symbols.)

specific heat at constant volume. Some of the molecular diameters are, (Ångström units):

	(a)	(b)	(c)
hydrogen	2.40	2.34	2.32
helium	1.90	2.65	2.30
oxygen	2.98	2.92	—
nitrogen	3.18	—	—
mercury	—	3.01	—

See figures. **m. dispersion.** M. rotation. **m elevation.** The raising of the boiling point of a solution. See *Raoult's Law.* **m. equation.** See *chemical equation.* **m. field.** See *field.* **m. film.** A monomolecular layer; as produced in adsorption. **m. flow.** See *flow.* **m. formula.** A combination of chemical symbols from which the molecular weight of a substance can be obtained by the simple addition of the atomic weights of the constituents. Cf. *formula.* **m. free path.** The average free path, L, of a molecule in a solution or gas. It is calculated from (a) Boltzmann's equation, $L = \mu(0.3592\rho\Omega)$ or (b) Meyer's formula, $L = \mu(0.3097\rho\Omega)$, in which μ is the viscosity, ρ the density of the medium and Ω the molecular velocity. **m. frequency.** A ratio obtained by $v = k(T_m/M\gamma^{\frac{2}{3}})^{\frac{1}{2}}$, where v is the molecular frequency, T, the absolute temperature of the melting point of the substance, M, the molecular weight, γ, the molecular volume, and k, a constant whose empirical value (Nernst) is 3.08×12^{12}. **m. heat.** The specific heat of a substance multiplied by its molecular weight. **m. heat of vaporization.** Molal latent heat. **m. model.** (1) A series of differently-sized balls, representing atoms, which are united to show the structure of a m. (2) A series of cubes, representing atoms, having holes from the corners to the center into which fit wires that may be cut to suitable lengths (10 cm. for 1 Ångström unit) and united with other cubes to illustrate a molecule. (3) A series of wires of suitable length (2 cm. for 1 Ångström unit) which are the vectors representing bonds, as in (2). (See figures.) **m. number.** (1) A number, analogous to the atomic number, obtained by arranging the different molecules according to their molecular frequencies. (2) The sum of the atomic numbers of the elements of a molecule; in a compound it is *even*, in a free radical it is an *odd* number. Cf. *combination.* **m. rays.** A stream of molecules moving uniformly in a similar direction, obtained by the escape of vapor through an orifice into a vacuum, screening, and condensing the vapor on the wall of the vessel. Such a beam of molecules may be influenced by electric and magnetic fields. The velocity is calculated by $\alpha = \sqrt{2RT/M}$, and is about 2×10^4 cm. for hydrogen at room temperature. **m. rearrangement.** See *rearrangement.* **m. rotation.** The specific rotation of a substance multiplied by its molecular weight. **m. solution.** A true



Molecular rays.

solution in which single molecules of the dissolved substance are moving in the dissolving liquid; cf. *colloidal solution,* which consists generally of aggregates of molecules in the solvent. **m. solution volume.** The difference between the volume of a solution containing 1 mol substance per liter, and that of 1 liter of the pure solvent. **m. velocities.** The mean velocity, G, with which the molecules move. It is proportional to the mean kinetic energy, and the pressure which the molecules exert on the walls of the vessels (cf. *kinetic theory*) and is calculated from: $G = W\sqrt{\frac{3}{2}} = 1.225W$. W is the most probable velocity obtained by the equation, $W = 15{,}800\sqrt{(T/m.)}$ (cm./sec.) in which T is the absolute temperature and, m, the molecular weight. **m. volume.** The molecular weight, M, of a substance divided by its density D; hence, $MV = M/D$. In an ideal gas: $R = 22.416 \pm 0.0008$ liter $mole^{-1}$. See *parachor, volume.* **m. weight.** M. The relative mass of a molecule in relation to that of a hydrogen atom. It is calculated by adding together the atomic weights indicated by the formula of the substance; or it may be determined by many chemical and physical methods, as, lowering of freezing point, raising of the boiling point, vapor pressure, conductivity or vapor density. Cf. *Landsberger, Sakurai-Landsberger.*

molecule. The chemical combination of two or more like or unlike atoms. It has been defined as the smallest quantity of matter that can exist in the free state and retain all the properties of the original substance. In noble gases and metals the molecule is identical with

the atom, *i.e.*, the molecules are monatomic. Other gaseous molecules usually consist of two atoms, as O_2, Cl_2. All the molecules of all compounds contain two or more atoms. Cf. *additive, colligative, entropy, Sutherland's equation, molecules, kinetic theory, contraction.* **activated-** A m. with one or more excited atoms; *i.e.*, atoms with one or more electrons moving at a higher energy level. It is indicated by a ′ or *; as Cl_2′ or Cl_2*. **biatomic-** (1) A m. of two atoms. (2) An isosteric m. having two atoms, the hydrogen atoms not being counted; as, O_2, N_2H_4, C_2H_6, CH_3F, CH_3OH. **compound-** A m. consisting of different types of atoms. **elementary-** A m. consisting of one type of atoms. **excited-** Activated. **gram-Mol. isosteric-** A group of molecules having the same number of electrons, the same sum of atomic numbers and, sometimes, the same molecular weight; as, CO_2 and N_2O; O_2 and HN:NH; N_2 and CO. **nonpolar-** q.v. **oriented-** q.v. **polar-** q.v. **saturated-** A molecule in which all valencies are satisfied. **tetratomic-** (1) A m. having four atoms. (2) An isosteric m. with four atoms, excluding the hydrogen; as, $(CH_3)_3N$ and $(CH_3)_3CH$. **triatomic-** (1) A m. having three atoms. (2) An isosteric m. having three atoms, excluding the hydrogen atoms; as, $(CH_3)_2O$, $(CH_3)_2NH$ and C_3H_8. **unsaturated-** A m. in which there are double and/or triple bonds between certain of the atoms.

molecules (constants). (1) The number of molecules per gram-molecule (mol.) is $N = 6.06 \times 10^{23}$, (mean). Avogadro's number. (2) The number of molecules of a gas per cc. at 0°C. and 760 mm. pressure is, $n = 2.70 \times 10^{19}$. Loschmidt number. (3) The following are calculated constants for some molecules of gases:

	H_2	O_2
mass of molecule (molecular weight)	2	32
velocity of molecule (average in meters per second at 0°C.)	1859 m.	465 m.
mean free path (in mm.)	965×10^{-7}	560×10^{-7}
collisions (millions per second)	17,750	7,646
diameter (in mm.)	5.8×10^{-7}	7.6×10^{-7}
mass (in grams)	46×10^{-25}	736×10^{-25}
number of molecules in 1 cc	3.8×10^{19}	3.8×10^{19}

molions. The supposed negatively-charged atomic groups of an ionized inert gas.

moloxide. An unisolated primary auto-oxidation product of one or more molecules of oxygen, added to an unsaturated organic compound.

molybdate. A salt of molybdic acid. The simpler salts have the formula, $M_2(MoO_4)$, or, $M_2Mo_2O_7$, corresponding with the chromates and bichromates, respectively. A more complex salt is $M_6Mo_7O_{24}$, as in ammonium molybdate.

molybdaenum, molybdan. Early names for both native molybdenum sulfide and graphite, which were frequently confused.

molybdenic. Molybdic.

molybdenite. MoS_2. The white or green mineral sulfide of molybdenum.

molybdenous. A salt of divalent molybdenum, Mo=.

molybdenum. Mo = 95.95. A heavy metal; atomic number 42, belonging to the chromium group of the periodic system. A gray metal, d.9.01, m.2535, b.5690, insoluble in water or alkalis. It occurs in molybdenite, molybdite, wulfenite, and other rare minerals. The metal is used in metallurgy and steel manufacture for crank-shafts and connecting rods; as a resistor, in heating devices and radio-apparatus; as wire, for vacuum tubes and contacts. Its valency may be 2, 3, 4, 5, or 6; but the more common compounds are derived from divalent (molybdenous), trivalent (molybdic), and hexavalent (molybdates) molybdenum. **m. blue.** A mixture of m. dioxide and trioxide, $MoO_2.4MoO_3.H_2O$. **m. chlorides.** *di-* $MoCl_2$ = 166.9. Molybdenous chloride. A yellow insoluble amorphous powder. *tri-* $MoCl_3$ = 202.4. Molybdic chloride. Red needles. *tetra-* $MoCl_4$ = 237.8. Brown crystals. *penta-* $MoCl_5$ = 273.3. Black crystals, d.9.5, m.194, b.268. **m. hexacarbonyl.** $Mo(CO)_6$ = 264.0. Colorless crystals. **m. hydroxide.** (1) $Mo(OH)_3$. A black, insoluble powder. (2) $Mo(OH)_5$. A brown, insoluble powder. **m. minerals.** The principal ore of molybdenum is the sulfide; ores:

molybdenite	MoS_2
molybdite	MoO_3
wulfenite	$PbMoO_4$
powellite	$CaMoO_4$
belonesite	$MgMoO_4$
koechlinite	$Bi_2(MoO_4)_3$

m. orange. A series of pigments formed by the co-precipitation of lead molybdate, lead chromate and lead sulfate in varying proportions. **m. oxides.** *di-* MoO_2 = 128.0. Bluish-red prisms, d.6.44, used as blue pigment in the textile industry. *sesqui-* Mo_2O_3 = 240.0. Yellowish to black amorphous mass, soluble in HCl. *tri-* MoO_3 = 144.0. Molybdic anhydride. The most common oxide; white rhombic crystals, d.4.39, soluble in ammonia or strong alkalis. Used as a reducing agent, and reagent for P_2O_5, As_2O_5, H_2O_2, aromatic oxycompounds, phenols, and alcohols. **m. sulfides.** *di-* MoS_2 = 160.1. Molybdenite. A black crystalline mass, d.4.80, insoluble in acids or water. *tri-* MoS_3 = 192.2. Red brown crystals. *tetra-* MoS_4 = 224.3. Brown crystals.

molybdenyl. (1) The divalent MoO_2 = radical. (2) The tetravalent MoO ≡ radical. **m. dichloride.** $MoO(OH)_2Cl_2$ or $MoO_2Cl_2.H_2O$. **m. tetrachloride.** $MoOCl_4$. **m. trichloride.** $MoOCl_3$. Green, soluble crystals.

molybdic. Describing a salt of trivalent or hexavalent molybdenum. **m. acid.** H_2MoO_4 = 162.0. Molybdic hydroxide. Colorless needles, soluble in alkalis. *hydrous-* $H_2MoO_4.4H_2O$ = 234.08. Yellowish, monoclinic crystals, d.-3.124, soluble in ammonia or alkalis. Used as a reagent, in the preparation of ammonium molybdate solution. **m. anhydride.** MoO_3. See *molybdenum oxides.* **m. ochre.** Molybdite.

molybdite. MoO_3. Molybdenum trioxide, molybdic ochre. Occurring native as yellowish earthy or capillary tufted forms.

molybdœna. An obsolete term applied in confusion to both graphite and molybdenum sulfide.

molybdyl. Molybdenyl.

molysite. An incrustation of ferric chloride found in lava and near volcanos.

moment. The power to overcome resistance. **magnetic-** The strength of a magnetic pole

multiplied by its length. **m. of force.** Torque. The effectiveness of a force in producing rotation around a center, measured in dyne-centimeters (the force multiplied by the distance from the center). **m. of inertia.** See *inertia, momentum.*

momentum. The force effect of a moving body (inertia), measured by multiplying its mass by its velocity. Quantity of motion = MV = MLT^{-1} (M-mass, V-velocity, L-length, T-time). **angular-** Spin.

momordicin. Elaterin.

mon-, mono- A prefix derived from the Greek, indicating "one."

mona wax. Peat wax.

monacetin. $C_5H_{10}O_4$ = 134.1. Glyceryl monoacetate. $CH_2OH.CHOH.CH_2OOCCH_3$. A colorless liquid, d.1.221, soluble in water, alcohol or ether, $b._{2-3mm}$.131. Used as a solvent for basic dyes.

monacid. A compound having one hydroxyl group that can replace the hydrogen of an acid; thus, monacid bases, KOH or NaOH; monacid alcohols, MeOH or EtOH.

monad. A monovalent element or radical, atom or atomic group, *e.g.*, Na—, NH_4—, CH_3—, or —COOH. Cf. *dyad, polyad.*

monamide. An amide containing one amido group.

monamine. An amine containing one amino group.

monarda. American horsemint, bee-balm. The dried herb of *Monarda punctata*, a Labiatae; used medicinally. **m. oil.** An essential oil from m., of thyme odor, d.0.930–0.940, containing thymol and cymol.

monardin. A thymol-like terpene from horsemint oil.

monascin. $C_{24}H_{30}O_6$ = 414.2. A red pigment produced by the growth of the fungus *Monascus purpureus* on rice, m.137, insoluble in water.

monastral blue. A phthalocyanin, (q.v.) containing a copper atom. It is a blue pigment and has a greater combined resistance to light, heat, reagents, etc. than any other blue dye known.

monatomic. (1) Monad. Describing: (2) a molecule consisting of one atom; (3) an atom or atomic group having one free valency.

monazite. A native phosphate sand of the rare earths, especially Ce, La, and Th, found in India and Brazil. Used in the manufacture of thorium and cerium compounds for Welsbach burners, and in the production of pyrophoric alloys.

Mond, Ludwig. 1839–1909. An English chemist (naturalized German). **M. gas.** A process for manufacturing a fuel gas by the passage of superheated steam over coal. **M. process.** A method for separating nickel and copper by means of carbon monoxide; the volatile nickel carbonyl, $Ni(CO)_4$, is formed, and is subsequently decomposed by heat. Cf. *Oxford process.*

monel metal. A native alloy of 67 % nickel, 28 % copper, 1–2 % manganese and 1.9–2.5 % iron, d.8.82, m.1160–1360. It is very resistant to corrosion, and is used in chemical plant.

monesia bark. The bark of *Chrysophyllum glyciphloeum*, a Brazilian tree; used medicinally as a tonic and astringent.

monesin. $C_{32}H_{54}O_{16}$ = 694.5. A saponin-like glucoside from monesia bark.

mongumic acid. An acid obtained from monguma bark, a bark from a Madagascan tree.

monistic. Pertaining to singleness. **m. compound.** A substance which does not ionize in solution; as, sugar.

monium. Victorium (q.v.). A supposed rare earth element discovered in 1898, which proved to be a mixture of rare earth metals.

monks hood. Aconite.

mono- Mon-.

monoacetin. Monacetin.

monoacid. A base or alcohol with one hydroxyl group which can replace one hydrogen atom of an acid.

monoamino acid. An organic acid of the type, NH_2—R—COOH.

monoatomic. Describing: (1) a base or alcohol containing one replaceable hydroxyl group; (2) an acid containing one replaceable hydrogen atom; (3) a molecule consisting of one atom.

monobasic. Describing an acid having one hydrogen atom which can be replaced by a metal or positive radical.

monobromated. A compound having one bromine atom. **m. camphor.** See *camphor.*

monobromethane. (1) Ethyl bromide. (2) Methyl bromide.

monobromo- Describing a compound which contains one bromine atom. **m. acetanilide.** Antisepsin. **m. isovaleryl urea.** Bromural.

monobutyrin. $C_7H_{14}O_4$ = 162.1. Glycerol monobutyrate. $C_3H_7COOC_3H_5(OH)_2$. Colorless liquid, d.1.008, b.271 which is produced by lipolytic action.

monochloro- Describing a compound having one chlorine atom. **m. amine.** NH_2Cl = 51.5. An intermediate product in the preparation of hydrazine from chlorine and ammonia. It is an unstable, pungent liquid. **m. ethane.** Ethyl chloride. **m. methane.** Methyl chloride.

monochroic. Monochromatic.

monochromatic. Monochroic. A substance having but one color; more accurately, represented by one wavelength only. **m. analysis.** The measurement of colors by mixing white light with light of a pure spectral hue; the hue and whiteness only vary. **m. illuminator.** M. lamp. **m. lamp.** A gas flame colored yellow with sodium compounds, or a spectrum apparatus provided with a narrow slit for isolating a ray of one wavelength; used as a source of light for a polariscope or for irradiation.

monoclinic. See *crystal systems.*

monoethanol. A compound having one ethanol radical, —$CH_2.CH_2OH$. **m. amine.** See *ethanolamine.*

monoethyl. Any compound containing one ethyl radical.

monoethylin. See *ethylin.*

monofilm. Monolayer.

monoformin. $C_4H_8O_4$ = 120.1. Glycerylformate, $C_3H_5(OH)_2.COOH$. An oily liquid, b.165.

monogenetic. (1) In biology: pertaining to non-sexual reproduction. (2) In industry: pertaining to dyestuffs which produce only one color on textiles, as compared with polygenetic dyes.

monoglyceride. A glyceride, (q.v.) containing one acid molecule.

monohydrate. A crystal containing one molecule of water of crystallization. **m. crystals.** Sodium carbonate. $Na_2CO_3.H_2O$. Used as cleansing agent in laundries, dairies, and the household.

monohydric. Describing a compound or acid containing one replaceable hydrogen atom.

monolayer. Monofilm. A mono-molecular layer. Cf. *adsorption, orientation.*

monolupine. $C_{16}H_{22}N_2O$ = 258.2. An alkaloid from *Lupinus caudatus* (0.45 %). A yellow glass, b.$_{4mm}$257, $[\alpha]_D$.−40.81° soluble in alcohol. It is related to anagyrine.

monoleate. A combination of a base with one oleic acid radical.

monometric. Isometric.

monomolecular. Pertaining to one molecule. **m. layer.** A layer one molecule thick; cf. *zone, orientation, adsorption.* **m. reaction.** A reaction concerning one molecule only, such as, decompositions or dissociations, intramolecular oxidations and reductions, intramolecular rearrangements. Cf. *reaction order.* **m. zone.** See *zone.*

monomorph. Occurring in one crystal form only. Cf. *dimorph.*

mononitraniline. See *nitraniline.*

mononuclear. (1) In chemistry: describing an aromatic compound having one ring of atoms. (2) In biology: a cell having one nucleus.

monoolein. $C_{21}H_{38}O_4$ = 354.30. Glycerol-*1*-monooleate, $C_{17}H_{31}COOCH_2.CHOH.CH_2OH$. White crystals, d.0.947, m.35, insoluble in water. It has been synthesized from fats by pancreatic lipase.

monopalmitate. An ester, especially of glycerol, containing one palmitic acid radical only.

monopalmitin. $C_{19}H_{38}O_4$ = 330.3. α- Glycerol-*1*-monopalmitate, $C_{15}H_{31}COOCH_2CHOHCH_2$-OH. White leaflets, m.77, soluble in alcohol. β- Glycerol-2-monopalmitate. $C_{15}H_{31}COOCH$-$(CH_2OH)_2$.

monophosphate. A salt containing one phosphate radical.

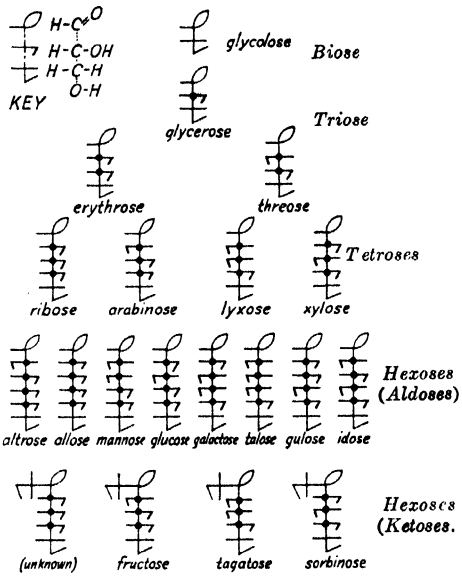
monopole soap. A soap of highly sulfonated fatty acids.

monopoly. Control over the production and sale of an article or material. Taking the world's production as 100, the commodities come nearest to being monopolized by the countries shown in the table. Cf. *trust, patent.*

Commodity	*Proportion produced*	*Annual value in million dollars*
Helium	100 % by U. S. A.	No sale
Radium	100 % by Belgium	6
Chilean nitrate	100 % by Chile	100
Natural camphor	95 % by Japan	7.5
Potash	95 % by Germany and France	75
Asbestos	91 % by British Empire	
Quinine	90 % by Dutch Indies	
Nickel	90 % by Canada	
Molybdenum	85 % by U. S. A.	
Vanadium	78 % by Peru	
Iodine	80 % by Chile	4
Sisal	75 % by Mexico	15
Silk	75 % by Japan	270
Sulfur	71 % by U. S. A.	
Coffee	65 % by Brazil	140
Antimony	66 % by China	
Manganese	64 % by Russia	
Petroleum	61 % by U. S. A.	
Chromium	63 % by Rhodesia	
Rubber	55 % by British Empire	400
Gold	53 % by South Africa	
Copper	51 % by U. S. A.	

monorefringent. An isotropic solid or mineral.

monosaccharide. A hexose or pentose; in general, an aldehyde-alcohol or ketone-alcohol, cf. *carbohydrates.* There are:



Monosaccharides.

monose. A hexose or pentose. See *saccharides.*

monosilane. Silane.

monostearin. $C_{21}H_{42}O_4$ = 358.3. α- Glycerol-*1*-monostearate, $C_{17}H_{35}COOCH_2.CHOH.CH_2$-OH. White needles, m.73.5, insoluble in water. β- Glycerol-2-monostearate, $C_{17}H_{35}$-$COOCH(CH_2OH)_2$. White solid, m.80.

monosulfide. Containing one divalent sulfur atom, *e.g.*, FeS. **m. equivalent.** A value of lime-sulfur solutions determined by titrating with iodine to disappearance of the yellow color. It represents the S of calcium sulfide, as distinct from the polysulfides.

monotropitoside. A primeveroside of methyl salicylate from *Monotropa hypopitys*, yellow birds nest, a Pyrolaceae. It is probably identical with gaultherin.

monotropic. Describing a substance occurring in one crystalline form only. **pseudo-** Describing a substance which occurs in one stable form only; as iodine chloride.

monotype metal. An alloy of Pb (80 %), Sb (15 %), Sn (5 %), used for making printing type.

monovalent. Describing an atom or radical having a valency of one.

monovinyl acetylene. Vinylacetylene.

monox. A mixture of silicon monoxide and dioxide, used as a thermal and electric insulating material.

monoxide. A binary compound containing one oxygen atom; as PbO, FeO, N_2O.

monsel salt. Ferric subsulfate. **m. solution.** Liquor ferri subsulfatis. A dark, reddish-brown liquid containing about 15 % iron; used medicinally as a styptic.

montan wax. A native hydrocarbon extracted from lignites. Brown or white masses, soluble in chloroform or benzene; used as a substitute for carnauba wax.

montanic acid. $C_{29}H_{58}O_2$ = 438.46. A monobasic acid, m.87, from montan wax.

montanin. A disinfectant consisting chiefly of hydrofluosilicic acid.

montanite. $Bi_2O_3.TeO_3.2H_2O$. A rare bismuth tellurate from Montana.

montanyl alcohol. $C_{29}H_{60}O$ = 424.26. Nonacosanol*. White crystals, m.84.5, from beeswax, and *Parosela barbata*, a Leguminosae.

monte-acid. An acid elevator or acid pump for raising acids to the tops of towers by means of air pressure.

montejus. An apparatus for raising liquids by air pressure (acid egg or monte-acid).

month. The twelfth part of a year; the period of revolution of the moon around the earth. **anomalistic-** = 27.5546 days, or the time of revolution of the moon from one perihel to another. **nodical-** = 27.2122 days, or the time of revolution of the moon from a node to the same node again. **sidereal-** = 27.32166 days, or the time of revolution of the moon from some distant star back to that star. **synodic-** = 29.5306 days, or the time elapsing from new moon to new moon. The ordinary month.

monticellite. $MgO.CaO.SiO_2$. A native, calcium, magnesium silicate, belonging to the olivine group, and occurring in limestone in colorless or gray crystalline masses.

montmorillonite. $(Mg.Ca)O.Al_2O_3.4SiO_2.nH_2O$. A rose-red mineral and acidic clay constituent, active in base exchange. **calcium-** Fuller's earth. **sodium-** Bentonite.

montroydite. HgO. Native mercury protoxide.

moonstone. A variety of feldspar with a delicate, pearly opalescent play of colors; used as a gem.

mora. Mowrah.

Moraceae. A group of plants belonging to the Urticaceae, (q.v.), yielding important products (rubber, lac, hemp, timber, etc.).

moradeine. An alkaloid from the bark of the rubiaceous tree, *Pogonopus febrifugus* of South America. Colorless prisms, m.195, soluble in alcohol or ether; used similarly to quinine.

moradin. A fluorescent substance from the bark of *Pogonopus febrifugus*, allied to scopoletin.

morbific. Producing disease.

mordant. A chemical used for fixing colors on textiles by adsorption. Common mordants are the soluble salts of aluminum, chromium, iron, tin, antimony, and copper. **m. dye.** An artificial or natural color for fibers which usually forms an insoluble metal-compound (lake) with metallic salts (mordants). **m. rounge.** Aluminum acetate.

morenosite. The mineral $NiSO_4.7H_2O$. Nickel vitriol.

Morgan, Sir Gilbert Thomas. 1872–1940. A British industrial and research chemist; the first Director of the Chemical Research Laboratory. **M., John Livingston Rutgers.** 1872– . An American physical chemist, noted for research on the liquid state. **M. equation.** A modification of the Ramsay-Shields equation;

$$w(M/D) = k(t_c - t - 6);$$

where w is the weight of the drop of liquid, M mol. wt., D density, t_c critical temperature. Cf. *stalagmometer*. Used to determine the molecular weights.

morin. $C_{15}H_{10}O_7$ = 302.1. *2'.3.4'.5.7*-Pentahydroxyflavone. A flavone (q.v.), and the coloring matter of the wood of *Morus tinctoria*, fustic wood, m.285. Used in dyeing wool yellow; and in chemistry, as a sensitive indicator for aluminum, with which it develops a greenish fluorescence.

morindone. $C_{15}H_{10}O_5$ = 270.1. Trihydroxymethylanthraquinone. A red coloring matter, similar to morin, from fustic, the dye wood of *Morus tinctoria*, a Moraceae.

Morley, Edward W. 1838–1923. An American chemist, noted for his research on the composition and synthesis of water and the density of gases.

morograph. Death point delineator. An instrument that records the death of vegetable tissues.

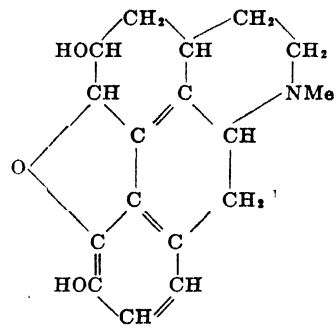
-morph, -morphous. A suffix derived from the Greek, meaning "form." See *amorphous*, *isomorph*, *monomorph*, *polymorph*.

morphenol. $C_{14}H_8O_2$ = 208.05. The anhydride of *3.4.5*-trihydroxyphenanthrene.

morphia. Morphine.

morphina. Morphine.

morphine. $C_{17}H_{19}O_3N.H_2O$ = 303.3. Morphina, morphinum, morphia, morphium. (*Mo.*) An alkaloid derived from opium.



Knorr formula.

Colorless, shining crystals, d.1.32, decomp. 230, slightly soluble in water, alcohol, or ether. Used medicinally as a narcotic. **apo-** Apomorphine. **benzyl-** Peronine. **dehydro-** See *dehydromorphine*. **diacetyl-** Heroine. **dimethyl-** Thebaine. **ethyl-** Codethyline. **para-** Thebaine. **methyl-** Codeine.

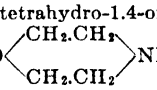
m. acetate. $(Mo)C_2H_4O_2.3H_2O$ = 399.36. A yellowish-white powder, soluble in water, alcohol, or glycerol; used as a narcotic. **m. anisate.** $(Mo)C_8H_8O_3$ = 413.35. The salt of morphine and anisic acid, a colorless crystalline salt, soluble in water; used as a narcotic. **m. benzoate.** $(Mo)C_7H_6O_2$ = 407.33. The salt of morphine and benzoic acid. White prisms or colorless powder, soluble in water; used as a narcotic. **m. borate.** The salt of morphine and boric acid. Used in ophthalmology and for hypodermic injections. **m. bromide.** See *m. hydrobromide*. **m. chloride.** See *m. hydrochloride*. **m. citrate.** $(Mo)_3C_6H_8O_7.H_2O$ = 1065.92. Colorless crystals, soluble in water or alcohol; used as a narcotic. **m. hydrobromide.** $(Mo)HBr.2H_2O$ = 402.24. Colorless, crystalline needles, soluble in water or alcohol; used for hypodermic injections. **m. hydrochloride.** $(Mo)HCl.3H_2O$ = 375.8. Colorless needles, soluble in water or alcohol; used medicinally as a narcotic. **m. hydro-**

sulfate. M. sulfate. **m. lactate.** $(Mo)C_3H_6O_3$ = 375.33. Colorless prisms, soluble in water or alcohol. **m. meconate.** $(Mo)_2C_7H_4O_7.5H_2O$ = 575.5. The natural form of morphine in opium. A yellowish, crystalline powder, soluble in water or alcohol; used medicinally as a narcotic. **m. methylbromide.** Morphosane. **m. phthalate.** $(Mo)_2C_8H_6O_4$ = 736.4. Colorless crystals, soluble in water or alcohol; used for hypodermic injections. **m. saccharinate.** $(Mo).C_7H_4ON(SO_2)$ = 467.2. Colorless crystals. **m. salicylate.** $(Mo)C_7H_6O_3$ = 423.2. A colorless crystalline powder. **m. stearate.** $(Mo)C_{17}H_{35}COOH$ = 569.57. Colorless crystals, soluble in water or alcohol; used as a narcotic. **m. sulfate.** $(Mo)_2H_2SO_4.5H_2O$ = 758.6. Colorless needles, decomp. 250, soluble in water or alcohol. It is the most commonly used morphine salt. **m. tartrate.** $(Mo)_2C_4H_6O_6.H_2O$ = 738.4. A colorless crystalline powder, soluble in water, alcohol, or ether; used medicinally in hypodermic injections. **m. valerate.** $(Mo)C_5H_{10}O_2$ = 387.36. Colorless crystals, soluble in water or alcohol; used medicinally as a narcotic.

morphinone. $C_{17}H_{17}NO_3$ = 283.05. The keto-form of morphine. **dihydro-** Dilaudide.

morphinum. Morphine.

morphol. $C_{14}H_{10}O_2$ = 210.1. *3.4*-Dihydroxyanthracene, *3.4*-phenanthrenediol. White needles, m.143, insoluble in water.

morpholine. C_4H_9ON = 87.1. Tetra-hydro-*p*-oxazine, 2.3.5.6-tetrahydro-1.4-oxazine. The ring compound,  . A colorless liquid, d.0.9998, b.128, soluble in water, alcohol or ether; used as a reagent for Zn or Cu. **pheno-** See *pheno-morpholine.*

morphology. A branch of biology that deals with the form and structure of the living organism:

internal: cytology = the structure of cells. histology = the structure of cell-aggregates (tissues). anatomy = the structure of tissue-aggregates (organs).

external: taxonomy = the arrangement of organisms.

morphosane. Morphine methylbromide. A proprietary morphine salt, used as a narcotic.

-morphous. See *-morph.*

morrenine. An alkaline isolated from *Morrenia brachystephana*, an Argentine milkweed. Colorless crystals, m.106.

morrhua. The codfish, *Gadus morrhua*, from which cod liver oil is obtained.

morrhuic acid. An acid obtained in the saponification of cod-liver oil. Its salts are used in the treatment of tuberculosis and varicose veins.

morrhuin. $C_{19}H_{27}N_3$ = 297.3. A thick, liquid ptomaine, occurring in some samples of cod liver oils.

morrhuol. The active principle of cod liver oil containing S, I, and P. A dark-brown liquid, d.0.94, insoluble in water; used medicinally in place of cod liver oil.

Morse, Harmon Northrup. 1848–1920. An American chemist noted for osmosis experiments. **M. buret.** A capillary buret holding one cubic centimeter.

mortar. (1) An urn-shaped container of glass, iron, agate, or brass, used for powdering materials. (2) A building material consisting of slaked lime and sand, sometimes mixed with plaster of Paris or cement. Cf. *pozzolana.*

morus. The Latin term for mulberry. **m. tinctoria.** Yellow Brazil wood, old fustic. The yellow wood from *Morus tinctoria;* used for making morin and dyeing textiles.

Morveau. See *Guyton.*

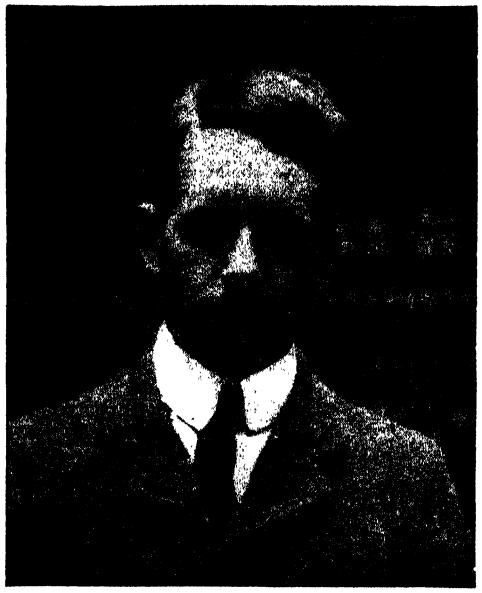
moryl. Carbachol.

mosaic gold. (1) A pigment consisting of stannic sulfide, SnS_2. (2) A yellow alloy of copper and zinc. **m. silver.** An amalgam of tin and bismuth.

Mosander, Carl Gustav. 1797–1858. A Swedish chemist, noted for the discovery of some rare earth metals.

mosandrium. A rare earth metal isolated from samarskite by J. Lawrence Smith; it was later separated into Sa and Gd.

Moseley, Henry Gwyn Jeffreys. 1887–1915. An English physicist killed in the World War; noted for his research on x-ray spectra.



H. G. Moseley.

M. formula. The frequency, ν, is related to Rydberg's constant, ν_0, and atomic number, N, by: $\nu = \frac{3}{4}\nu_0(N - 1)^2$. **M. law.** All elements can be arranged successively, according to the frequencies of their x-ray spectra, in one continuous series which corresponds generally with the order of their atomic weights. The following relation exists: $Q = \sqrt{\frac{\nu}{\frac{3}{4}\nu_0}} = N - 1$, or $\sqrt{\frac{1}{\lambda}} = a(N - N_0)$; in which ν is the frequency of the principal line of the x-ray spectrum of longer wavelength, ν_0 is Rydberg's constant, and N the atomic number of the element, which is identical with the nuclear charge or the number of electrons outside the nucleus. **M. number.** Atomic number. **M. series.** An arrangement of elements according to increasing atomic numbers, as determined from the square-root of the frequency of the principal line in their x-ray spectrum. Cf. *periodic chain.* **M. spectrum.** The characteristic lines pro-

duced when the x-rays produced at the anticathode (which consists of the metal under examination) are diffracted through a crystal. Cf.; *crystallogram, x-ray spectrometer, K lines.*

moslene. $C_{10}H_{16}$ = 136.12. A terpene from *Mosla japonica*, a Labiatae.

moss. A small cryptogamic plant of the natural order *Musci.* **Ceylon-** See *agar.* **Iceland-** Cetraria. **Irish-** Chondrus.

m. agate. Mocha stone. A variety of chalcedony, or an agate containing brown or black, moss-like dendritic forms due to infiltrations of iron and manganese salts. It is used as a semi-precious stone. **m. gold.** Native gold in moss-like form. **m. silver.** Native silver in moss-like form. **m. starch.** Lichenin.

motalin. A German anti-knock fuel, which contains iron penta-carbonyl.

mote. A solid particle (*e.g.*, of dust or soot) in air or a gas, which acts as a nucleus of condensation; hence, the black fog of the modern city.

mother. A progenitor. **m. cell.** A single cell that divides into two daughter cells. **m. liquor.** The residual saturated liquid which remains after the crystallization of a portion of a liquid or solution. **m. lode.** The principal vein of a metallic deposit passing through a district, especially the California gold vein extending eighty miles from Amador County to Mariposa County. **m. of coal.** Fusain. **m. of pearl.** Nacre.

motherwort. The dried herb of *Leonurus cardiaca*, used as the fluid extract, as a bitter tonic and antispasmodic.

motile. Possessing motion.

motility. The phenomena of motion, especially as observed under the microscope (colloidal motility, Brownian motion) or detected by chemical or physical means (ionic motions).

motion. Change of position. **Laws of-** (Newton). (1) A body left to itself will continue in its state of rest or of motion. (2) The rate of change of momentum of a body is proportional to the impressed force acting on it.

motor. An agent that produces motion or mechanical power (muscle or machine). **air-** A windmill. **electric-** A reversed dynamo or a machine for transforming electrical into mechanical power. **hot air-** An apparatus in which a current of hot air drives a set of propellers. **water-** A device for transforming a stream of water into mechanical power.

motor fuels. A liquid (as gasoline) used in internal combustion engines. Motor fuels may be manufactured from coal by: (1) high temperature carbonization; (2) low temperature carbonization; (3) Bergius process; (4) gasification and conversion into methanol and other liquid combustibles; (5) cracking processes. Cf. *petroleum.* **synthetic-** Methanol or synthol obtained from hydrogen and carbon monoxide subjected to pressures of 150–250 atmospheres at 300–425°C., using a catalyst, *e.g.*, the oxides of Zn, Cr, V, Mn, W, Pb, or Bi.

mould, mold. (1) A receptacle in which a molten or liquid mass solidifies. (2) To shape or form. (3) A variety of minute fungus growths, *Hypomycetes*, found on damp, usually vegetable material; *e.g.*, *penicillium.* (4) The loose earth on the upper surface of cultivated soil. Cf. *humus.*

mountain ash. Sorbus. **m. balm.** Eriodictyon. **m. blue.** Azurite. **m. butter.** A hydrated aluminum sulfate, occurring in fibrous masses or crusts. **m. cork.** An elastic form of asbestos. **m. crystal.** Rock crystal. **m. flax.** (1) A fine silky variety of asbestos. (2) Purging flax. The herb of *Linum catharticum*, used as laxative and cathartic. **m. grape.** Oregon grape. The root of *Berberis aquifolium*, used as alterative and tonic. **m. green.** Malachite. **m. laurel.** Kalmia. **m. leather.** A tough variety of asbestos, occurring in thin, flexible sheets. **m. milk.** A soft, spongy variety of calcite. **m. mint.** Calamint. **m. soap.** An unctuous variety of halloysite. **m. tallow.** Hatchettenine. A wax-like, soft hydrocarbon. **m. tobacco.** See *Arnica.* **m. wood.** A brown, compact, fibrous variety of asbestos.

mounting. The preparation of specimens for microscopic study.

Moureu, Charles Léon Francois. 1863–1929. A French chemist noted for research in catalysis, rubber chemistry and autoxidation.

mouse jar. A glass jar with an iron screen top, to hold small animals. **m. factor.** A supposed vitamin (q.v.), the absence of which causes blindness in mice.

mowrah. Mora, mowa. The seeds of *Bassia butyraceae*, a Sapotaceae of India. **m. fat.** A soft fatty mass expressed from m., used in soap making. **m. meal.** The dried and ground residue of m. seeds, remaining after expression of the fat. It contains saponin and is unfit for animal food, but is used as fertilizer. It contains 2.7 % N. If spread on lawns or golf greens and washed into the ground it causes worms to come to the surface.

m-radiations. See *M.*

ms. Abbreviation for *meso-*

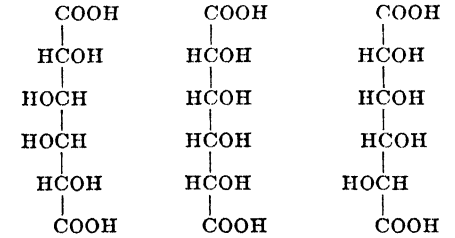
M. S. or **M. Sc.** Abbreviation for Master of Science.

mu. The greek letter μ. A unit of microscopical length, micron or micromillimeter.

muava. The dried bark from a leguminous tree of Madagascar, used by the natives as an arrow poison.

muavine. An alkaloid from muawa or muavi bark, an East African tree of the *Erythrophloeum* species of the Leguminosae. A yellowish powder, soluble in water or alcohol; used as a digitalin substitute.

mucic acid. $C_6H_{10}O_8$ = 210.5. *2.3.4.5*-Tetrahydroxy hexanedioic acid. A tetrahydroxy acid, $COOH(CHOH)_4COOH$. Colorless crystals, decomp. 224, insoluble in water or alcohol; formed by the oxidation of *d-* galactose. Three of the other ten isomers of this constitution are named from mucic acid, namely *allo* m. from *l*-galactose and *d-* and *l-talo* m. from *d-* and *l-talose*, respectively.



mucic acid *allo*mucic acid *talo*mucic acid.

mucicarmine. A staining solution for mucin, consisting of 2 pts. carmine, 1 pt. aluminum chloride, and 4 pts. distilled water.

mucilage. (1) A paste prepared from dextrin or gum. (2) In pharmacy, a solution of acacia, chondrus (Irish moss), tragacanth, or starch.

mucilaginous. Slimy or adhesive.

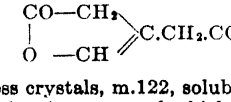
mucin. A glycoprotein, or the chief constituent of mucus, the slimy secretion of organs or organisms. It is soluble in water and precipitated by alcohol. Cf. *chitosan*, *mucoid*. **frog egg-** M. from frog eggs; it yields galactosamine on hydrolysis. **salivary-** M. from saliva containing mucoitinsulfuric acid. **m. sugar.** Fructose.

muck. (1) A soil composed largely of organic matter, so highly decomposed as to show little or nothing of the original plant structure. Cf. *humus*. (2) Peat. (3) The miners' term for loose rock and ore.

muckite. A resinous substance, $C_{20}H_{28}O_6$, found in some coal beds.

mucoid. A group of glycoproteins, differing from the mucins in solubility and precipitated by acetic acid. They are found in bone, tendon, cartilage, the cornea, white of egg and ascitic fluids. **ovo-** The nitrogeneous substances from the white of egg, which do not coagulate. **chondro-** M. from cartilage yielding chondroitin sulfuric acid. **cornea-** A m. from the cornea. **ovo-** A m. forming 10 % of the solids of egg-white. **serum-** A mucoid from blood serum, forming from 0.5–1 % of its proteins.

mucolactonic acid. $C_6H_6O_4$ = 142.0.



Colorless crystals, m.122, soluble in water.

mucolipoid. A compound which contains a fatty acid residue bound to a carbohydrate residue; *e.g.*, Wassermann antigens.

muconic acid. $C_6H_6O_4$ = 142.0. *2.4*-Hexadienedioic acid, $\Delta^{1,3}$-1,4-butadiene carboxylic acid, COOH.CH:CH.CH:CH.COOH. Colorless crystals, m.260, decomp. 272, soluble in water.

mucopolysaccharide. A compound having a low but significant protein content, but whose chemical reactions are primarily those of a carbohydrate. *E.g.*, skin, heparin.

mucoprotein. A compound having a relatively high protein or peptide content, but whose chemical reactions are predominantly those of a protein; *e.g.*, plant globulins.

mucorin. A protein from plant molds.

mucous. Mucus.

mucus. (1) Slimy. (2) The saliva. (3) A slimy secretion from an organ or organism. **vegetable-** Tragacanthin.

mudaric acid. $C_{30}H_{46}O_3$ = 454.37. An acid from *Calotropis gigantea* (mudar), an Asclepiadaceae.

mudat. The poorest quality of opium, which consists of the refuse recovered from "yenshee," q.v.

Muencke pump. A filter pump made of glass, attached to a water faucet.

muffle. A semicylindrical container of alundum, fire-clay, porcelain or silica, that protects substances placed in it from fuel gases and sudden temperature changes when heated. **m. furnace.** A square box of fire-clay, provided with resistance wires or other means of heating, which produces high temperatures rapidly owing to reflection of the heat from the walls. Used in laboratory operations (drying, fusion, cupellation, scorification, ignition); for hardening high carbon steel (razor blades, dies, punches); and for experimental work; and in dental laboratories, for porcelain and gold work.

mugwort. Felon herb. The leaves of *Artemisia vulgaris*, a Compositae, used as emmenagogue and diaphoretic.

muirapuama. The dried stems and roots of *Dulacia ovata* of Brazil; used as a fluid extract, as an aphrodisiac or nervine.

muirapuamine. An alkaloid obtained from muirapuama wood, an *Olacaceae* of Brazil.

mukogen. $C_{18}H_{15}N_2O_3Cl$ = 326.5. Dimethylphenyl-*p*-ammonium-*β*-oxynaphtoxazime chloride. A green crystalline powder, insoluble in water, soluble in alkalis or alcohol; used as a cathartic.

mullein flowers. The dried flowers of *Verbascum thapsus*, a Scrophulariaceae; used as the fluid extract, as a demulcent. **m. leaves.** The dried leaves of *Verbascum* species, used as the flowers.

Müller's glass. Hyalite.

Mulliken, Samuel Parsons. 1864– . An American chemist, noted for methods of identifying organic compounds. **M.'s classification.** An arrangement of organic compounds based upon their qualitative (*genus*) and quantitative (*order*) reactions:

Order I—Compounds containing
(1) carbon and hydrogen.
(2) carbon, hydrogen and oxygen.
Order II—Compounds containing
(1) carbon and nitrogen.
(2) carbon, nitrogen and hydrogen.
(3) carbon, nitrogen and oxygen.
(4) carbon, nitrogen, hydrogen and oxygen.
Higher Orders—Compounds containing any combination of the elements found in order I and II with any additional elements, such as halogens, sulfur, phosphorus, etc.
Suborder I—*Colorless* compounds.
Suborder II—*Colored* compounds.
Genus I consists of aldehydes.
Genus II consists of carbohydrates.
Genus III consists of acids.
Genus IV consists of phenolic compounds.
Genus V consists of esters.
Genus VI consists of anhydrides.
Genus VII consists of ketones.
Genus VIII consists of alcohols.
Division A of each genus are *solid* compounds.
Division B of each genus are *liquid* compounds.
(See M., Method of Identification of Pure Organic Compounds.)

mullite. $3Al_2O_3.2SiO_2$. An orthorhombic aluminum silicate, from the Island of Mull, or artificially made by heating andalusite, sillimanite or cyanite, and consists of a homogeneous solid solution of alumina in sillimanite. It is the only compound of Al and Si which is stable at high temperatures, and it is formed in fire-clay above 1060°C.; it does not deform under loads up to a temperature of 1800°C. is resistant to corrosion and has a low coefficient of expansion. Used as a refractory.

mulls. A group of pharmaceutical ointments of high melting point, which are spread on soft muslin or "mull."

mulser. An emulsifying machine.

multi- A prefix derived from the Latin, indicating "many." Cf. *poly-*.

multifrequent. Different wavelengths; as comprising a heterogeneous beam of light.

multiple proportions. Dalton's law. The chemical elements always combine in a definite ratio or in multiples of that ratio. If A and B form several compounds, then the ratio of their relative combining masses is a simple one, as N_2O, NO, N_2O_3, NO_2, and N_2O_5. **m. series.** Parallel series. A method of wiring a large number of lamps, electrical apparatus, or other devices in series, and connecting these series in parallel. It is used in mining for wiring a large number of blasting charges. **m. tube burner.** Three or more bunsen burners mounted close together and supplied from one connection.

multiplet. A spectral line, which on close examination is found to consist of two, three or more single lines close together. Hence the terms, doublet and triplet.

multipolar. Having more than two poles.

multirotation. Birotation.

multivalent. Having a valency of three or more. Cf. *polyvalent*. **m. vaccine.** A suspension of two or more species or varieties of the same microorganism.

mumetal. An alloy which contains approximately 74 % Ni, 20 % Fe, 5.3 % Cu and 0.7 % Mn. It has a high magnetic permeability and low hysteresis; used for electric cables.

mundic. Iron pyrites. **white-** Arsenical iron pyrites.

mung. Green gram. The mung bean, *Phaseolus mungo* (*Ph. aureus*), used in China and India as a food; it is rich in vitamin B.

Munktell paper. A brand of filterpaper.

Muntz metal. Yellow brass. An alloy of 60 parts copper and 40 parts zinc. It can be rolled hot or cold, and is corroded less than copper.

murexan. Uramil.

murexide. $C_8H_4O_6N_5NH_4.H_2O$ = 302.2. Ammonium purpurate. Purple carmine. A purple coloring matter produced from uric acid by the action of nitric acid and neutralizing with ammonia. Brownish-red, crystalline powder, green in reflected and red in transmitted light, soluble in water, insoluble in alcohol or ether; used as a dye.

muriacite. Anhydrite.

muriate. An obsolete term for chloride. **m. of potash.** Potassium chloride. **m. of soda.** Sodium chloride.

muriatic acid. An obsolete term for hydrochloric acid. **oxygenated-** An early name for chlorine.

muscarine. $C_8H_{19}O_3N$ = 177.11. Hydroxycholine, $MeCH_2.CHOH.CH(NMe_3OH)CHO$. An alkaloid from mushrooms, *Agaricus muscarius*, and a ptomaine of decaying fish. It is extremely poisonous and resembles pilocarpine in its effects. Cf. *amanitine*. **m. effect.** See *m. wirkungs einheit*. **m. hydrochloride.** $Me_3NCl.CH_2.CH(OH)_2.HCl$ = 277.5. Colorless crystals, soluble in water. **m. nitrate.** $Me_3C(OH).CH_2.CH(OH)_2.HNO_3$ = 198.14. An oxidation product of choline. Brown, hygroscopic crystals, soluble in water or alcohol. **m. sulfate.** $C_5H_{15}O_3N.H_2SO_4$ = 238.1. *artificial-* An oxidation product of choline. Yellowish, deliquescent needles, soluble in water. *natural-* A salt from the alkaloid of *Amanita* (toadstool). Dark-brown syrup, soluble in water; used medicinally as a cardiac sedative. **m. wirkungs einheit.** M.W.E. A unit of poison effect; the amount which, in Ringer solution, reduces the activity of an isolated frog heart by 25 ± 5 %. Muscarine base has 184 Mill. M.W.E. per gram.

muscarufin. (1) $C_{25}H_{16}O_9$ = 460.15. An orange dyestuff, m.275.5, from *Amanita muscaris*. (2) $C_{25}H_{16}O_8$ = 396.15. A glucoside from *Amanita muscaris*.

musci. Mosses. A division of Bryophyta.

muscicide. An agent that destroys flies.

muscle fibrin. Syntonin. **m. sugar.** Inositol.

muscone. $C_{16}H_{30}O$ = 238.2. Muskine. *3*-methyl cyclopentadecanone. A ketone derived from musk. A thick, heavy liquid, b.328; used in perfumery.

muscovite. $KH_2Al_2(SiO_4)_3$. Phengite. A potash-mica, and constituent of granite. Varieties are baddeckite, damourite, fuchsite, sericite and plumose mica.

musenine. Mussanine.

musennin. An acid resin from the bark of mussena (*Albizzia anthelmintica*), a Leguminosae; used as a tenifuge.

mushroom. (1) A fungus (q.v.) having the form of a toadstool; *e.g.*, *Amanita*, *Boletus*. (2) The edible m., *Agaricus campestris*.

musical note. A succession of sharp regular impulses at regular intervals of time. (Cf. *sound*, *phonic*.) **m. scale.** An arrangement of sound vibrations in a harmonic series, the frequency of vibration of successive notes being denoted by fixed ratios for a particular scale. The scientific diatonic scale is based upon C_3 = 256 vibrations per sec.; the musical even-tempered chromatic scale, on A_3 = 435 v.p.s. The lower and higher octaves are obtained by multiplying or dividing by a power of two.

Scientific scale		*Practical scale*			
C_3	256	C_3	258.6	C_3	274
D_3	288	D_3	290.3	D_3	307.6
E_3	320	E_3	325.9		
F_3	341.3	F_3	345.3	F_3	365.8
G_3	384	G_3	387.5	G_3	410.6
A_3	426.6	A_3	435	A_3	460.8
B_3	480	B_3	488.3		
C_3	512	C_3	517.3		

musk. Moschus, deer musk, tonquin musk. The dried secretion from the follicles of *Moschus moschiferous*, the musk deer of Central Asia. Irregular, dark, shiny grains of penetrating and persistent odor, soluble in water or alcohol; used in perfumery, and medicinally as an antispasmodic. **artificial-** $C_{12}H_{13}N_3O_6$ = 295.1. *2.4.6*-Trinitro-*1.3*-dimethyl-*5*-*tert*.-butylbenzene. Trinitro-*tert*.-butyl xylene, $Me_2C_6(NO_2)_3CMe_3$. A musk substitute, occurring in colorless prisms, m.96, slightly soluble in water; used in perfumery. **vegetable-** M. seed.

m. root. Sumbul. **m. seed.** The seeds of *Hibiscus abelmoschus*, a Malvaceae; used for clarifying sugar, and medicinally.

muskine. Muscone.

Muspratt, James Sheridan. 1821–1871. An Irish chemist, and founder (1848) of the College of Chemistry in Liverpool; noted for his works on applied chemistry.

mussanine. Musenine. An alkaloid from *Acacia anthelmintica*.

must. (1) Most. The expressed and unfermented juice of grapes. (2) Any juice freshly expressed from fruits.

mustard. A condiment made by grinding the seeds of *Brassica* (*Sinapis*) species. **black-** The finely-ground seeds of *Brassica nigra*. It con-

tains a fixed oil, a pungent, irritant, essential oil consisting chiefly of allyl thiocyanate, an enzyme myrosin, and a glucoside sinigrin. Cf. *sinamine*. **French-** Table m. **table-** A semi-liquid mixture of 3 parts white mustard, ¼ part salt, 1 part sugar, and 8 parts vinegar. **white-** Yellow or English mustard. The finely-ground seeds of *Sinapis alba*, containing the same constituents as black mustard except that a different glucoside (sinalbin) is present. Used as a condiment, and medicinally, as a counter-irritant and stimulant. **m. meal.** The dried and ground residue of m. seeds after extraction of the oil. It contains 5 % N, 1 % P_2O_5 and 1 % K_2O; used as fertilizer. **m. seeds.** The dried ripe seeds of *Brassica nigra*, used as a source of m. oil.

mustard gas. $C_4H_8Cl_2S$ = 158.9. *2,2'*-Dichlorodiethyl sulfide, yperite, H.S., $(CH_2Cl.CH_2)_2S$. A sulfoether occurring as an oily liquid d.1.28, m.14, b.215–217, which was used in the World War as a vesicant; it causes blistering of the skin by penetrating the tissues and forming HCl.

mustard oil. (1) A fixed oil expressed from mustard seeds, d.1.1014, m. −17; it is used in medicine. (2) Oleum sinapis volatile. A volatile or essential oil obtained by distillation of macerated mustard seeds. Its chief constituents are allyl isothiocyanate and allyl thiocarbimide. A colorless liquid of pungent odor, d.1.018, b.148, soluble in alcohol, ether, or chloroform; used in medicine. (3) Allyl isothiocyanate, C_3H_5CNS = 99.0. Allylmustard oil, $CH_2:CH.CH_2.N{:}CS$, a colorless liquid, d.1.017, b.151, which was used in the World War as poison gas. (4) Acrinyl isothiocyanate. (5) A group of isothiocyanic esters. See *mustard oil*. **artificial-** Mustard oil (3). **black-** Mustard oil (2). **fixed-** Mustard oil (1). **essential-** Mustard oil (2). **synthetic-** Mustard oil (3). **volatile-** Mustard oil (2).

mustard oils. Isothiocyanates, isosulfocyanic esters, sulfocarbimides. Compounds containing the monovalent —N:C:S radical:

MeNCS. Methyl mustard oil, m. isothiocyanate, m. isosulfocyanic ester, m. sulfocarbimide. Colorless crystals, m.34, b.-119.

EtNCS. Ethyl mustard oil. A colorless liquid, b.133.

PrNCS. Propyl mustard oil. A colorless liquid, b.153.

Me_2CHNCS. Isopropyl mustard oil. A colorless liquid, b.137.

$CH_2:CHCH_2NCS$. Allyl mustard oil. See *mustard oil (3)*.

mutamer. A compound showing dynamic isomerism, that is, the attainment of equilibrium which is the cause of mutarotation; *e.g.*, *α-* and *β-d-*glucose.

mutamerism. The phenomenon of changing from one newly-dissolved isomer into another, and establishing an equilibrium between the two; as shown by mutarotation, q.v.

mutarotation. Birotation. A change of optical rotation occurring in newly-prepared solutions of reducing sugars. Thus *α-d-*glucose solution has at first a specific rotation of $[\alpha]_D$ + 110°; this drops slowly to +87° in 25 minutes, and finally to +52.5° in six hours, at which it remains constant (*β-d-*glucose).

Muthman liquid. Acetylene tetrabromide.

mutterlauge. German for *mother liquor*.

mutual induction. The change of current in a circuit produced by a change of current in a neighboring circuit.

M.W. Abbreviation for molecular weight.

mycelioid. A bacterial growth that resembles the radiated filamentous appearance of molds.

mycelium. A mass of protoplasmic colorless threads, constituting the plant body of mushrooms, toadstools and certain molds (spawn).

mycoban. Trade name of a product containing sodium propionate used by bakers to prevent bread mold.

Mycoderma. Torula.

mycogalactan. $(C_6H_{10}O_5)_n$. A polysaccharide from the fungus, *Aspergillus niger*.

mycoin. An antibacterial substance, probably identical with notatin.

mycophenolic acid. $C_{17}H_{20}O_6$ = 320.2. An acid from the mould fungus, *Penicillium brevi-compactum*.

mycoporphyrin. Penicilliopsin.

mycoprotein. The albuminous material of bacteria.

mycose. $C_{12}H_{22}O_{11}.2H_2O$. = 360.17. A carbohydrate occurring in manna, several fungi, and in ergot of rye. It does not reduce copper solutions, and is soluble in alcohol. Cf. *trehalose*.

mycosterol. $C_{30}H_{48}O_2$ = 440.37. A sterol, m.160, from fungi and lichens.

mycoxanthin. A biologically-active carotinoid, from algae.

mydaleine. A ptomaine from putrefied viscera.

mydatoxin. $C_6H_{13}O_2N$ = 131.1. A ptomaine from decaying flesh.

mydine. $C_9H_{11}O_2N$ = 165.1. A ptomaine found in cultures of typhoid bacillus and in putrefied flesh.

mydriatic. An agent that causes dilation of the pupil, as atropine, homatropine, daturine, cocaine.

mydrol. Midrol.

myelin. (1) A soft, yellowish kaolin. (2) A lipoid from organic tissues differing from fat in being doubly refractive.

mykonucleic acid. $C_{36}H_{52}O_{14}N_{14}.2P_2O_5$ = 1192.5. A nucleic acid obtained from yeast.

mylonite. A rock deformed by earth movements, so as to lose all its original structure.

myocardiograph. An apparatus for recording movements of the heart muscles.

myogen. An albumin in muscle juice that is said to change to myosin; soluble in water and salt solutions.

myoglobin. The principal red pigment of meat; it is similar to hemoglobin.

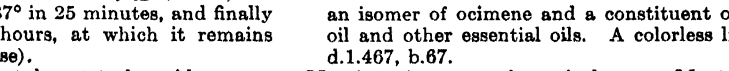
myosin. A globulin forming the clot in muscle press juice, insoluble in water, soluble in dilute alkali or salt solutions, coagulated by heat, and converted into santonin by acids. Cf. *myogen*.

myotic. Miotic. An agent that causes contraction of the pupil, as eserine, pilocarpine.

myoxanthin. A lipochrome, m.117.5, from the unsaponifiable matter of *Rivularia nitida*.

myrbane oil. Nitrobenzene.

myrcene. $C_{10}H_{16}$ = 136.1. *2*-Methyl-*6*-methylene-*2,7*-octadiene*. The unsaturated hydrocarbon,



an isomer of ocimene and a constituent of bay oil and other essential oils. A colorless liquid, d.1.467, b.67.

Myrcia. A genus of tropical trees, Myrtaceae, related to the tree-myrtles. **m. oil.** The essen-

tial oil of *Pimenta acris*, a Myrtaceae of the West Indies.

myria- A prefix derived from the Greek, indicating 10,000.

myrialiter. Ten thousand liters.

myriameter. Ten thousand meters, or ten kilometers.

myrica. Bayberry, waxmyrtle, candleberry. The dried bark of *Myrica cerifera*, a shrub of the United States; used in medicine. **m. leaves.** The leaves of *Myrica acris*, from which bay-rum is prepared. **m. oil.** Bay oil.

myricetin. $C_{15}H_{10}O_8$ = 318.1. Oxyquercetin. A ketone and yellow pigment derived from the bark of Myrica species.

myricetrin. A glucoside resembling quercitrin.

myricin. $C_{30}H_{61}O_2C_{16}H_{31}$ = 676.9. Myricyl palmitate. A fatty ester (wax) and crystalline principle from bees-wax; or extracted from the bark of the wax myrtle (*Myrica cerifera*).

myricoid. The combined principles of *Myrica cerifera* (wax myrtle); used medicinally as an alterative and hepatic stimulant.

myricyl. The monovalent radical, $C_{30}H_{61}$—. **m. alcohol.** $C_{30}H_{61}OH$ = 438.7. Melissic alcohol. A constituent of carnauba and bees-wax. Colorless needles, m.85, insoluble in water, soluble in alcohol or ether. **m. palmitate.** Myricin.

myriocarpin. A neutral resinous substance, insoluble in water, soluble in alcohol, from the fruit of *Cucumis myriocarpus*, wild cucumber, a Cucurbitaceae.

myristamide. $C_{14}H_{29}NO$ = 227.23. Tetradecanamide*, myristic amide, $Me(CO_2)_{12}CONH_2$. White leaflets, m.103, b.$_{12mm}$217.

myristic acid. $C_{13}H_{27}COOH$ = 228.29. Tetradecylic acid, tetradecanoic acid*. An acid occurring in many fats; human subcutaneous fat contains 1%. Colorless leaflets, m.54, b.251, insoluble in water, slightly soluble in alcohol or ether.

myristica. Nutmeg, nux moschata. The kernels of the ripe fruits of *Myristica fragrans:* used as a condiment, and in pharmaceutical preparations. Cf. *mace, otoba.* **m. oil.** Oleum myristicae, oil of nutmeg. The essential oil of m.

myristicene. $C_{10}H_{14}$ = 134.1. An eleoptene derived from the essential oil of nutmeg.

myristicin. $C_{11}H_{12}O_3$ = 192.1. *3*-Methoxy-*4-5*-methenedioxypropenyl benzene, *5*-methoxysafrole. An aromatic ether from myristica oil; a yellow liquid, d.1.1425, m. below −20, b.$_{15mm}$149.5.

myristicol. $C_{10}H_{16}O$ = 152.1. A stearoptene from the essential oil of nutmeg.

myristin. $(C_{14}H_{27}O_2)_3C_3H_5$ = 722.9. Trimyristin, glyceryl myristate, trimyristic acid glycerin ester, laurel wax, myrtle wax. A fat in nutmeg butter, spermaceti, and other fats. Colorless needles, m.55, soluble in ether, insoluble in water.

myristoleic acid. $C_{14}H_{26}O_2$ = 226.2. Tetradecenoic acid*. Unsaturated fatty acid from whale and fish oils. Δ^9-. Colorless liquid, b.$_{2mm}$135. The Δ^5-isomer also exists.

myristone. $(C_{13}H_{27})_2{:}CO$ = 394.57. Myristic ketone. A solid, d.0.801, d.$_{76°}$76, m.75, soluble in alcohol.

myrobalan. Terminalia. The dried fruits of *Terminalia* (*Myrobalanus*) *chebula*, a Combrataceae, a tree of Asia, containing 30% tannin; used as tanning material. Cf. *beda nuts, chebulinic acid.*

myronic acid. $C_{10}H_{19}NS_2O_{10}$ = 377.3. An acid found in sinigrin, the glucoside of black mustard, which is hydrolysed to mustard oil.

myrosase. Myrosin.

myrosin. Myrosase. An enzyme of white and black mustard, which hydrolyzes the glucosides sinalbin and sinigrin to allyl mustard oil, glucose, and potassium sulfate.

myroxin. $C_{23}H_{36}O$ = 328.31. A principle from Peru balsam.

myrrh. A resinous gum exuded from the stems of *Commiphora myrrha*, a burseraceous tree of Arabia, Abyssinia, and Somaliland. It contains the resin myrrhin, a volatile oil, and a gum, which occurs as irregular brown tears or masses of balsamic odor. Used medicinally as an astringent or carminative; and in dentistry for carious teeth, and in toothpowders. **m. oil.** An essential oil distilled from myrrh. A colorless liquid d.0.998, b.220–235, insoluble in water, soluble in alcohol or ether; used in perfumery. Cf. *oxyburserasin, myrrholic acid.*

myrrhin. A resin from myrrh.

myrrholic acid. $C_{17}H_{22}O_5$ = 306.17. An acid from myrrh.

Myrtaceae. The bay or eucalyptus family, a group of trees and shrubs which usually have pungent and fragrant leaves, fruits and seeds, that yield essential oils and spices.

roots:	
Eucalyptus globulus	eucalyptus
	eucalyptus oil
Eugenia vulgaris	jambosine
leaves:	
Pimenta (Myrcia) acris	bay leaves
	bay oil
Eugenia chekan	chekan
Melaleuca leucadendron	cajuput oil
Myrtus communis	myrtle, myrtol
flowers:	
Eugenia aromatica	cloves
	clove oil
fruits and seeds:	
Pimenta officinalis	pimenta
	pimenta oil
Eugenia jambolana	Java plum

myrtenal. $C_{10}H_{14}O$ = 150.11. Myrtenic aldehyde. A colorless liquid, d.0.988, b.$_{10mm}$90; obtained from myrtol.

myrtenic acid. $C_{10}H_{14}O_2$ = 166.2. An acid from myrtol.

myrtenol. $C_{10}H_{16}O$ = 152.12. An alcohol, d.0.976, b.224, and the chief constituent of myrtol.

myrtilin. An aqueous extract of myrtle, used as an insulin substitute.

myrtillidin. The aglucone of an anthocyan glucoside from the flowers of stocks, rose and mallow.

myrtillin. $C_{22}H_{22}O_{12}$ = 478.17. An anthocyanin from billberry, *Vaccinium myrtillus*, an Ericaceae; used as an indicator. **m. chloride.** (1) $C_{22}H_{23}ClO_{12}$ = 514.67. An anthocyanin from whortle berries, *Vaccinium uliginosum.* (2) A plant extract from *Vaccinium* with insulin-like properties.

myrtle. The dried leaves of *Myrtus communis.* The finely-powdered leaves are used as antiseptic in wound-dressings. **m. oil.** A light yellow oil distilled from myrtle leaves, which contains eucalyptole, d-pinene, and dipentene, d.0.90, insoluble in water, soluble in alcohol or

ether; used in medicine for vapor inhalations. **m. oil.** Myrtol. **m. wax.** Bayberry wax.

myrtol. A refined myrtle oil, the essential oil of *Myrtus communis;* used in medicine for bronchial and pulmonary affections, and as an antiseptic. Cf. *myrtenal, myrtenol.*

mystin. A mixture of sodium nitrite and formaldehyde, used as a preservative.

mytilite. Mytilitol.

mytilitol. $C_7H_{14}O_6$ = 194.11. Mytilite, pentahydroxy methoxybenzene, methyl inositol, $C_6(OH)_5OMe$. A methyl cyclose from the mussel, *Mytilus edulis.* Rhombohedral crystals, d.1.335, m.186, b.210. Cf. *inositol.*

mytilotoxin. $C_6H_{15}O_2N$ = 133.2. A leukomaine derived from mussels and rendered harmless by canning alkaline.

mytolin. A protein obtained from muscles, to which the empirical formula $C_{234}H_{360}O_{70}N_{60}S$ has been given.

myxo- A prefix indicating mucus or mucoid. **m. xanthinophyll.** $C_{40}H_{56}O_7$ = 648.6. The characteristic pigment of certain freshwater algae.

myxomycetes. Mycetozoa, myxogastres, slime molds. A group of thallophytes, comprising microorganisms having both vegetable and animal characteristics.

N

N. (1) The symbol for nitrogen: N_2-nitrogen molecule; N_2^* an excited N molecule; **N*** an excited N atom; **NI** an ionized atom, **NII** a doubly-ionized N atom. (2) The abbreviation for: (a) normal; (b) normal solution. (3) Avogadro's number, the number of molecules in one mol. **N electron.** The e. of the N shell or orbit; there are eight in the third, eighteen in the fourth, and thirty-two in the fifth period. **N orbit.** The fourth layer or energy level, in which electrons move around the proton in the dynamic atom. **N shell.** The fourth layer or energy level in which electrons oscillate in the static atom. **N.V.M.** Abbr. for non-volatile matter. **N.W. acid.** Neville acid.

N-. In chemical names: the radical prefixed by N- is attached to the nitrogen atom.

n. (1) Any unknown number; as in C_nH_{2n}. (2) The symbol for the index of refraction. (3) The number of molecules (q.v.) in 1 cc. of gas. (4) Transport number. **n rays.** See *n-rays*.

n-. In chemical names: normal, as distinguished from isomeric, thus, *n*-butane or *n*-butanol.

ν The Greek letter nu. A symbol for frequency.

η. The Greek letter eta. See under *E*.

Na. The symbol for sodium (natrium).

naal oil. An essential oil distilled from naal grass, *Cymbopogon nervatus*, a grass growing in the Sudan. Colorless or slightly yellow liquid, d.0.954, insoluble in water, soluble in alcohol or ether. Its chief constituents are l-limonene and perilla alcohol.

nacconol. The trade name of a group of sodium alkyl aryl sulfonates possessing surface-active properties.

nacre. Mother of pearl. The hard, iridescent inside layer of oyster, mussel, abalone and other sea-shells.

nadorite. $PbClSbO_2$. A native Algerian lead chloro-antimoniate, occurring in brownish orthorhombic crystals.

naehrsalz. (Germ. for nutrient salt.) A mixture of sodium and ammonium phosphates.

naftolens. $(C_9H_4)_n$. A group of unsaturated vulcanisable hydrocarbons, b.200–380, obtained from acid tar by-products of mineral oil refining; used as extenders for rubber.

nagyagite. Tellurium glance. A lead sulfotelluride which contains gold and antimony.

nahcolite. Naturally-occurring sodium bicarbonate.

nakrite. $Al_2O_3,2SiO_2,H_2O$. A gray-white clay.

nandinine. $C_{19}H_{19}O_3N$ = 309.2. A diisoquinoline alkaloid from the root-bark of nanten, *Nandina domestica*, a berberidaceous tree of Japan. Cf. *domesticine*.

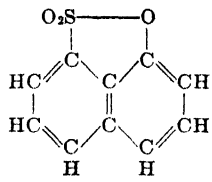
nantokite. CuCl. A native cuprous chloride.

napalite. C_6H_4. A native hydrocarbon; a dark red wax, m.42, b.300, from the Phoenix mine, near Napa, Cal.

napelline. $C_{26}H_{35}O_7N(OH)_4$ = 541.3. Benzaconine. An alkaloid from aconite.

naphsultam acid. $C_{10}H_7O_2NS$ = 205.1. The ring compound, (8) O_2S——NH (1) $C_{10}H_6$. Cf. *naphsultone*.

naphsultone. $C_{10}H_6O_3S$ = 206.1. Naphthosultone. The ring compound,



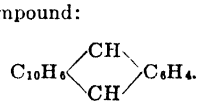
Colorless crystals, m.154, b.360, soluble in water, alcohol or ether.

naphtalin. Naphthalene.

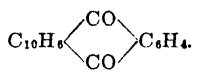
naptha. (1) Oils of the C_nH_{2n+2} series. A mixture of low-boiling hydrocarbons, b.95–150, obtained in the distillation of petroleum coal tar, and shale oil. (2) Gasoline. (3) A kind of bitumen, q.v. **boghead-** Photogen. **coal tar-** Mainly benzene and its homologs. **petroleum-** Mainly paraffins and naphthenes distilled from crude oil. **shale-** Ligroin. It contains olefines and paraffins. **solvent-** A coal tar distillate. **wood-** Mainly methyl alcohol and acetone, obtained by the distillation of wood; used as a solvent and for denaturing alcohol.

naphtha aceti. Ethyl acetate.

naphthacene. $C_{18}H_{12}$ = 228.1. A hydrocarbon and ring compound:

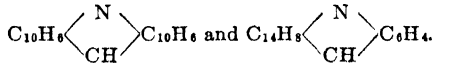


naphthacenequinone. 5,12- $C_{18}H_{10}O_2$ = 258.1. The aromatic ketone and ring compound:



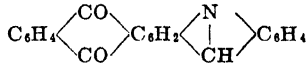
naphthacetol. *4*-Acetamido-*1*-naphthol.

naphthacridine. $C_{21}H_{13}N$ = 279.1. Dibenzacridine. The ring compound



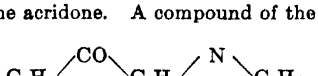
There are 6 possible isomers. **di-** Dinaphthacridine. **fluoren-** Fluorenaphthacridine. **pheno-** Benzacridine.

n. dione. $C_{21}H_{11}O_2N$ = 319.11. Anthraquinone acridine. A group of compounds of the type



n. **5,13-** dione

n. trione. $C_{21}H_{10}O_3N$ = 324.12. Anthraquinone acridone. A compound of the type



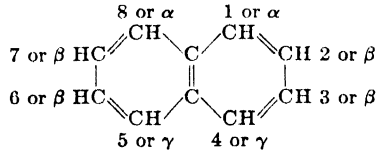
n. **5,8,13-** trione

naphthal. The bivalent radical, $C_{10}H_7CH=$, from naphthoic aldehyde.

naphthalene*. Dekalin.

naphthaldehyde. $C_{10}H_7CHO$ = 156.1. Naphthoic aldehyde, naphthalene carbonal. **alpha-** A colorless liquid, b.291. **beta-** Colorless crystal m.59.

naphthalene*. $C_{10}H_8$ = 128.1. Naphthalin, naphthene, tar camphor. A hydrocarbon obtained from coal tar distillates:

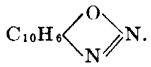


Colorless monoclinic crystals, d.4°1.152, m.80, b.218, insoluble in water, soluble in alcohol or ether. Used as raw material for aniline dyes; under the name of "albocarbon," for enriching illuminating gas and gasolene; for the manufacture of indigo and lampblack; and as an insecticide (moth balls), introfier and antiseptic. The mono-substitution products are alpha-, beta- or gamma-, compounds. The poly-substitution products are termed according to numbers or names viz.:

1.2 = ortho	= *o*	—
1.3 = meta	= *m*	—
1.4 = para	= *p*	—
1.5 = ana	= α	—
1.6 = epi	= ε	—
1.7 = kata	= κ	—
1.8 = peri	= π	—
2.6 = amphi	= φ	—
2.3 = pros	= ρ	—

acetyl- Naphthylmethyl ketone. **amino-** Naphthylamine. **azo-** See *azonaphthalene*. **azoxy-** See *azoxynaphthalene*. **benzyl-** See *benzylnaphthalene*. **bi-** See *binaphthalene*. **bromo-*** $C_{10}H_7Br$ = 206.97. **1-** or α- Colorless crystals, m.5, b.279, d.1.476. **2-** or β- Colorless crystals, d.1.605, m.59, b.282. **chloro-*** $C_{10}H_7Cl$ = 162.51. **1-** or α- Colorless liquid, d.1.191, b.258, immiscible with water. **2-** or β-. Colorless crystals, d.1.138, m.56, b.264.3. Used in organic synthesis and added to gasoline to lubricate the valve stems of internal combustion engines (*halowax*). **chlorinated-** C.K wax. **decahydro-*** Dekalin. **di-** Binaphthalene. **diamine-** Naphthylenediamine. **dihydro-*** $C_{10}H_{10}$ = 130.08. **1.2-** or o- Colorless liquid, d.0.997, m.−9, $b._{16mm}$84.5. **1.4-** or p- d.0.998, m.15.5, b.212. **diazoamine-** See *diazoaminonaphthalene*. **dichloro-*** $C_{10}H_6Cl_2$ = 196.96. Colorless solids, insoluble in water. **1.2-** d.1.315, m.37, b.282. **1.3-** m.61, b.289. **1.4-** d.1.300, m.68, b.287.6. **1.5-** m.107. **1.6-** m.48. **1.7-** d.1.261, m.62, b.286. **1.8-** d.1.292, m.88. **2.3-** m.120. **2.6-** m.135, b.285. **2.7-** m.114. **dihydro-*** $C_{10}H_{10}$ = 130.08. Dialine. A colorless liquid consisting of **1.2-** or o- d.0.997, m.−9, $b._{16mm}$84.5; and **1.4-** or p- d.0.998, m.15.5, b.212. **dihydrodiketo-** Naphthoquinone. **dihydroketo-** Naphthalenone. **dihydroxy-** Naphthalenediol. **dimethyl-*** $C_{12}H_{12}$ = 156.09. **1.4-** Colorless solid, d.1.1016, b.264.3. **2.3-** b.266. **2.6-** m.111. **dinitro-** Dinitronaphthalene. **ethoxy-*** Bromelia. **ethyl-*** $C_{12}H_{12}$ = 156.09. **1-** or α- Colorless liquid, d.1.064, m.−1.1. b.258. **2-** or β- m.−19, b.251, d.1.008. **ethylene-** Acenaphthene. **fluoro-*** $C_{10}H_7F$ = 146.05. **1-** or α- d.1.135, b.216.5. **2-** or β- m.59, b.212.5. **hexahydro-*** $C_{10}H_{14}$ = 134.11. A colorless liquid, d.0.934, b.205.5. **hydrazo-** Hydrazonaphthalene. **hydroxy-** Naphthol. **isopropylmethyl-** Eudalene. **methyl-*** $C_{11}H_{10}$ = 142.08. **1-** or α- Colorless liquid, d.-1.025, m.−22, b.243. **2-** or β- Colorless crystals, d.1.029, m.35.1, b.245. **methyl-i-propyl-** Eudalene. **monoxy-** Naphthol. **nitro-*** Nitronaphthalene. **para-** Anthracene. **phenyl-** Phenyl-naphthalene. **phenyldihydro-** Atronene. **tetrahydro-*** Tetralin. **tetrahydrotetramethyl-** Irene. **tetrahydrotrimethyl-** Ionene. **tetranitro-*** See *tetranitronaphthalene*. **trimethyl-** Sapotalene. **trinitro-*** See *trinitro-naphthalene*.

n. aldehyde. Naphthoic aldehyde. **n. carbonal.** Naphthaldehyde. **n. carboxylic acid.** Naphthoic acid. **n. diamine.** Naphthylene diamine. **n.-2.1-diazo oxide** $C_{10}H_6N_2O$ = 170.1.

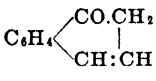


Colorless crystals, m.76. **n. dicarboxylic acid.** $C_{10}H_6(COOH)_2$ = 216.12. (1) **1.5-**Colorless crystals, m. exceeds 286. (2) **1.8.** Naphthalic acid. **n. diol.** See *naphthalenediol**. **m. disulfonic acid.** $C_{10}H_6(SO_3H)_2$ = 288.2. Armstrong acid. **2.6-** or amphi-. Colorless needles, soluble in water or alcohol, insoluble in ether; used in organic synthesis. **2.7-** or pros-. Colorless leaflets, very soluble in water or alcohol, insoluble in ether; used in organic synthesis. **n. red.** Magdala red. A complex red dyestuff derivative of naphthalene. **n. sulfinic acid.** $C_{10}H_7SO_2H$ = 192.13. A colorless solid, *alpha-* m.85; *beta-* m.105. **n. sulfonic acid.** $C_{10}H_7SO_3H.H_2O$ = 226.15. *alpha-* or 1-. Colorless crystals m.90 soluble in water or alcohol; used in organic synthesis and the manufacture of alpha-naphthol. *beta-* or 2-. Colorless crystals, m.102, soluble in water or alcohol; used in organic synthesis and the manufacture of beta-naphthol. **n. sulfonic chloride.** $C_{10}H_7SO_2Cl$ = 194.6. *alpha-* Colorless tablets, m.67, insoluble in water, soluble in alcohol or ether. *beta-* Colorless tablets, m.77, insoluble in water, soluble in alcohol or ether. Both are used in organic synthesis. **n. thiol*.** Thio*naphthol*. **n. yellow.** $C_{10}H_5(NO_2)_2OH$ = 234.2. Dinitro-α-naphthol. Its calcium salt is the yellow dye, martius yellow.

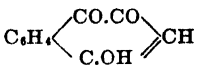
naphthalenediol*. $C_{10}H_8O_2$ = 160.1. Dihydroxynaphthalene. A group of naphthols: **1.2-** m.60. **1.3-** m.125. **1.4-** m.176. **1.5-** m.258. **1.6-** m.138. **1.7-** m.178. **1.8-** m.140. **2.3-** m.159. **2.6-** m.216. **2.7-** m.190.

naphthalenedione*. Naphthoquinone.

naphthalenone. $C_{10}H_8O$ = 144.06. Dihydroketonaphthalene. A group of ketones of the type



naphthalic acid, 1.8-, or alpha-. (1) $C_{10}H_6(COOH)_2$ = 216.1. Naphthalene dicarboxylic acid. Colorless crystalline needles, slightly soluble in water, alcohol, or ether; used in organic synthesis. (2) $C_{10}H_6O_3$ = 174.05.



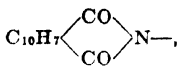
Yellow needles, m.190 (anhydride).

naphthalic acid lactone. $C_{10}H_6(CO.O)_2$ = 214.1. Colorless crystals, m.169, slightly soluble in water.

naphthalide. (1) A compound of the type $MC_{10}H_7$, as, $Hg(C_{10}H_7)$, mercury naphthalide. (2) A compound of the type $RNHC_{10}H_7$; as, $CH_3CONHC_{10}H_7$, acetnaphthalide.

naphthalidine. Naphthylamine.

naphthalimido. The monovalent radical,



derived from naphthalic acid amide.

naphthalin. Naphthalene.

naphthalize. To enrich a gas or liquid with naphthalene; as illuminating gas or gasolene.

naphthalol. $C_6H_4(OH)COOC_{10}H_7$ = 264.0. Betol, salinaphthol, naphthyl salicylate. A colorless powder, insoluble in water; used medicinally as an intestinal antiseptic.

naphthamide. $C_{10}H_7CONH_2$ = 171.1. Naphthalene carbonamide*. **alpha-** Colorless leaflets, m.202, slightly soluble in water or alcohol. **beta-** Colorless crystals, m.192, soluble in alcohol or ether.

naphthamine. Hexamethylenamine.

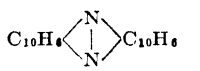
naphthane. Dekalin.

naphthanthracene. Benzanthrene.

naphthaquinone. Naphthoquinone.

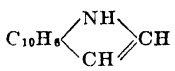
naphthazarine. Alizarin black.

naphthazin(e). $C_{20}H_{12}N_2$ = 280.2. Anthrapyridine. The ring compound,

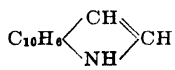


Colorless crystals, m.273.

naphthazole. $C_{12}H_9N$ = 167.1. Naphthindole. The ring compounds,

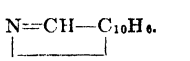


alpha- or 1-



beta- or 3-

peri- $C_{11}H_8N$ = 154.1. The ring system



naphthene. (1) A group of cyclic hydrocarbons of the general formula, C_nH_{2n}; also termed cyclo-paraffins or hydrogenated benzenes. They occur in Caucasian and Californian petroleums, and are derivatives of cyclo-pentane and cyclohexane. Polycyclic members are also found in the higher-boiling fractions. (2) The naphthalene ring system; as, in acenaphthene. **mentho-** Menthane.

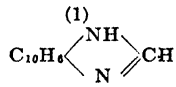
naphthenic acid. (1) $C_6H_{11}COOH$ = 128.1. Hexahydrobenzoic acid. Colorless crystals, d.1.048, m.38, b.232, slightly soluble in water. (2) A group of acids found in some petroleums; derivatives of methyl cyclo-pentanes.

naphthenics. The undesirable constituents of lubricating oil, which may be separated from the paraffinic hydrocarbons by organic solvents. They have steep viscosity-temperature curves.

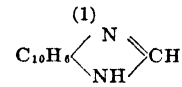
naphthenyl. The trivalent radical, $C_{10}H_7C\equiv$.

naphthieno. The bivalent radical $—C_{10}H_6S—$, attached to two carbon atoms of another ring.

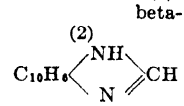
naphthimidazole. $C_{11}H_8N_2$ = 168.0. The ring compounds:



alpha-



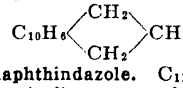
beta-



betabeta-

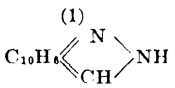
Cf. *benzimidazole.*

naphthindan. $C_{13}H_{12}$ = 168.1. The ring system

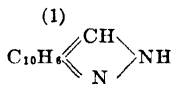


Cf. *naphthindene.*

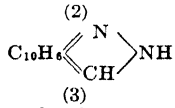
naphthindazole. $C_{11}H_8N_2$ = 168.1. A series of tricylic compounds:



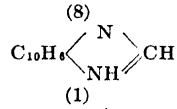
alpha-



beta-



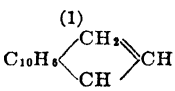
betabeta-



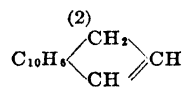
peri-

Cf. *naphthisoiindazole.*

naphthindene. $C_{13}H_{10}$ = 166.1. The aromatic hydrocarbon:



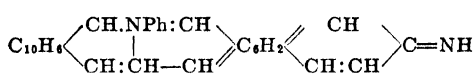
alpha-



beta-

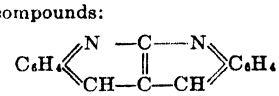
Cf. *indene.*

naphthinduline. $C_{27}H_{18}N_2$ = 370.2. A crystalline coloring material, m.250.



Cf. *induline.*

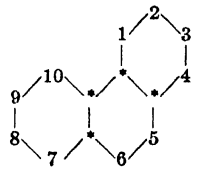
naphthinoline. $C_{16}H_{10}N_2$ = 230.1. The heterocyclic compounds:



naphthionic acid. $NH_2.C_{10}H_6.SO_3H.\frac{1}{2}H_2O$ = 232.2. **o-** *1*-Naphthylamine-*2*-sulfonic acid. **p-** or 1.4-Naphthylaminesulfonic acid. Colorless needles, slightly soluble in water, soluble in alcohol, insoluble in ether; decomp. by heat. Used in the synthesis of dyestuffs and pharmaceuticals.

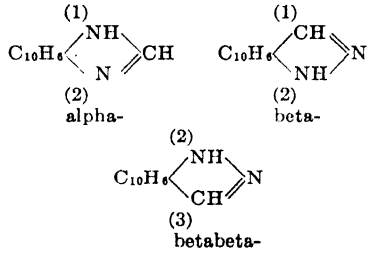
naphthisodiazine. $C_{12}H_8N_2$ = 180.1. The ring compounds derived from phenanthrene by the replacement of two carbon atoms by two nitrogen atoms. The ten different structural

possibilities are named according to the positions of the two nitrogen atoms in the ring:



1.2-naphthisodiazine (or 9.10-)
1.3-naphthisodiazine (or 8.10-)
1.4-naphthisodiazine (or naphthoquinoxaline)
2.3-naphthisodiazine (or 8.9-)
2.4-naphthisodiazine (or 7.9-)
3.4-naphthisodiazine (or 7.8-)
4.7-naphthisodiazine (or pseudophenanthroline)
4.10-naphthisodiazine (or phenanthroline)
5.6-naphthisodiazine (or benzocinnoline)
5.10-naphthisodiazine (or quinoquinoline).

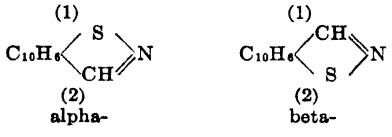
naphthisoindazole. $C_{11}H_8N_2$ = 168.1. The ring compounds:



Cf. *naphthindazole.*

naphthisotetrazine. $C_{10}H_6N_4$ = 182.2. The ring compound derived hypothetically from phenanthrene (see *naphthisodiazine*) by the replacement of four carbon atoms by four nitrogen atoms. The numberings on the ring are the same, *e.g.*, 1.2.3.4-naphthisotetrazine, 1.4.7.10-naphthisotetrazine.

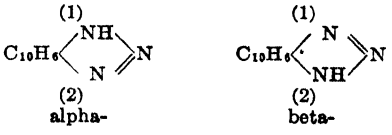
naphthisothiazole. $C_{11}H_7SN$ = 169.1. The ring compounds:



Cf. *naphthothiazole.*

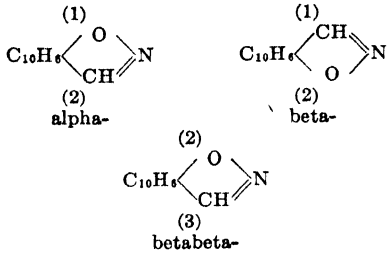
naphthisotriazine. $C_{11}H_7N_3$ = 181.2. The ring compounds derived from phenanthrene by the replacement of three carbon atoms of the ring by three nitrogen atoms. The positions of the nitrogen atoms are indicated by the numbers (see *naphthisodiazine*), as 1.2.3-, 1.2.4- or 1.3.4-naphthisotriazine. Cf. *naphthotriazine.*

naphthisotriazole. $C_{10}H_7N_3$ = 169.2. The ring compounds:



Cf. *naphthotriazole.*

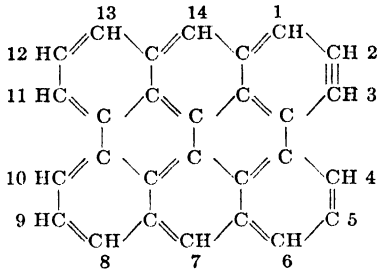
naphthisoxazole. $C_{11}H_7ON$ = 169.1. The ring compounds:



Cf. *naphthoxazole.*

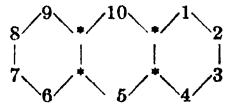
naphtho- A prefix indicating relationship to naphthalene or to its ring structure.

naphthodianthrene, meso-. $C_{28}H_{14}$ = 350.1. An octocyclic hydrocarbon,



Cf. *benzodianthrene.*

naphthodiazine. $C_{12}H_8N_2$ = 180.1. The ring structures derived hypothetically from anthracene by replacing two of its carbon atoms by two nitrogen atoms:

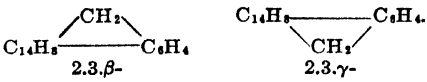


There are six different structures, which are designated by the positions of the nitrogen atoms in this ring as follows:

1.2-naphthodiazine (or 3.4-, or 6.7- or 8.9-)
1.3-naphthodiazine (or 2.4-, or 6.8- or 7.9-)
1.4-naphthodiazine (or 6.9-)
1.9-naphthodiazine (or 4.6-)
1.10-naphthodiazine (or a-quinoquinoline)
5.10-naphthodiazine (or phenazine).

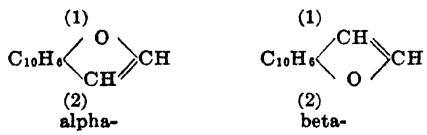
See *naphthisodiazine, perinaphthodiazine, benzodiazine.*

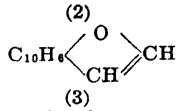
naphthofluorene. $C_{21}H_{14}$ = 266.2. A hydrocarbon and ring compound.



Cf. *benzofluorene.*

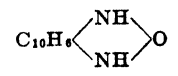
naphthofuran. $C_{12}H_8O$ = 168.0. Benzocoumarane. The ring compounds:





betabeta-

naphthofurazan. $C_{10}H_8ON_2$ = 172.2. The ring compound:



naphthoic acid. $C_{10}H_7COOH$ = 172.1. Naphthalene carboxylic acid. **alpha-** Colorless crystals, m.160, slightly soluble in water, soluble in alcohol or ether. **beta-** Colorless crystals, m.184, slightly soluble in water, soluble in alcohol or ether. **nitro-** See *nitronaphthoic acid.* **oxy-** See *oxynaphthoic acid.*

naphthoic aldehyde. $C_{10}H_7CHO$ = 156.1. Naphthyl aldehyde, naphthalene aldehyde. **alpha-** Colorless liquid, b.292, insoluble in water, soluble in alcohol or ether. **beta-** Colorless leaflets, m.60, slightly soluble in water, soluble in alcohol or ether; used in organic synthesis.

naphthol. $C_{10}H_8O$ = 144.1. Hydroxynaphthalene, monoxynaphthalene, naphthyl hydroxide or alcohol, $C_{10}H_7.OH$. **alpha-** Colorless monoclinic crystals, d.1.224, m.94, b.278, slightly soluble in water, soluble in alcohol or ether. Used in organic synthesis for dyestuffs and pharmaceuticals; medicinally as an antiseptic and antifermentative. **beta-** Colorless leaflets, d.1.217, m.122, b.285, slightly soluble in water, soluble in alcohol, ether or chloroform. Used technically in organic synthesis, and medicinally as an antiseptic. **acetamino-** See *acetaminonaphthol.* **amino-** $C_{10}H_9NO$ = 159.08. $NH_2.C_{10}H_6.OH$. 3-β-. White crystals, m.234. 7 β-. m.163. Cf. *helthin.* **aminoazobenzene-** Sudan red. **anilineazo-** Sudan yellow. **benzoyl-** N. benzoate. **diiodo-** Thymol iodide. **dinitro-** See *dinitronaphthol.* **lacto-** Lactol. **nitro-** See *nitronaphthol.* **nitroso-** See *nitrosonaphthol.* **sulfo-** See *sulfonaphthol.* **thio-** $C_{10}H_8S$ = 160.12. 2-Naphthalenethiol*, β-naphthyl mercaptan, $C_{10}H_7SH$. White shining scales, d.1.550, m.81, b.288, slightly soluble in water.

n. antipyrine. Naphthopyrine. **n. aristol.** Diiodo-β-naphthol. **n. benzoate** $C_{17}H_{12}O_2$ = 248.09. Benzoylnaphthol, benzonaphthol, naphthylbenzoate, $PhCOOC_{10}H_7$. White crystals, α- m.56, β- m.110, slightly soluble in water. **n. bismuth.** Bismuth β-naphtholate. **n. blue.** Meldola blue. **n. disulfonic acids.** See *sulfonic acids.* **n. ethyl ether.** Nerolin. **n. green B.** $C_{20}H_{10}O_{10}N_2S_2FeNa_2$ = 604.2. The disodium ferrous salt of nitroso-β-naphthol sulfonic acid. A green powder, soluble in water. **n. lactate.** Lactol. **n. methyl ether.** Jara-jara. **n. orange.** Tropaeolin. **n. phthalein.** A pH indicator changing from slight pink (pH = 7.3) to green (pH = 8.7); used especially for titrating weak acids in alcoholic solution. **n. salicylate.** Naphthyl salicylate. **n. sulfonic acid.** $HO.C_{10}H_6.SO_3H$ = 224.2. A group of acids, used in organic synthesis as intermediates for dyestuffs. **1.2-** or ortho-. Colorless tablets, m.250, soluble in water. **2.6-** amphi- or Schäffer's acid. Colorless leaflets, m.122, soluble in water or alcohol. **1.4-** Neville-Winther's acid. Colorless crystals, m.170 (decomp.), soluble in water. **1.5-** Cleves' acid. Colorless hygroscopic crystals, soluble in water, alcohol or ether. **2.7-** Casella acid. Colorless crystals, m.89, soluble in water or alcohol. **n. yellow.** $(NO_2)_2C_{10}H_4(OH)SO_3H$ = 314.2. **2.4-** Dinitro-α-naphthol sulfonic acid, S yellow. Yellow crystals. **n. yellow S.** $C_{10}H_4O_8N_2SNa$ = 412.21. Citronin. The potassium salt is used as a dye for woolen and silken textiles, as a food color and as an oxidation-reduction and pH indicator, changing from colorless (acid) to yellow (alkali).

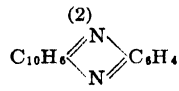
naphtholate. A compound derived from naphthol by replacing the hydroxyl-hydrogen by a base.

naphtholbenzein. $C_{54}H_{38}O_5$ = 766.3. A reddish-brown powder, soluble in alcohol. Used as an indicator in volumetric analysis (alkalis—green; acids—orange), but very sensitive to carbon dioxide.

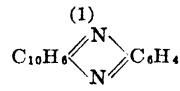
naphthonitrile. $C_{10}H_7CN$ = 153.1. Naphthylcyanide, naphthalenecarbonitrile*. **alpha-** Colorless needles, d.1.117, m.34, b.296, insoluble in water, soluble in alcohol or ether. **beta-** Colorless leaflets d.1.094, m.66, b.304, insoluble in water, soluble in alcohol or ether.

naphthophenanthrene. Dibenzanthrene.

naphthophenazine. $C_{16}H_{10}N_2$ = 230.2. Tribenzoparadiazine, benzophenazine, phenonaphthazine. The ring compounds:



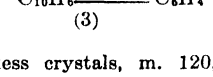
betabeta- m.233



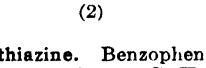
alphabeta- m.142, b. exceeds 360

Both are soluble in alcohol, ether or benzene. Cf. *benzophenazine.*

naphthophenocarbazole. $C_{16}H_{11}N$ = 217.1. Phenylnaphthylcarbazole. Colorless crystals,

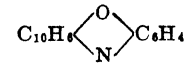


iso- Colorless crystals, m. 120, insoluble in water.

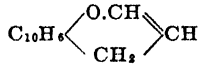


naphthophenothiazine. Benzophenothiazine.

naphthophenoxazine, 1.6.-. $C_{16}H_{10}ON$ = 233.2. The ring compound:

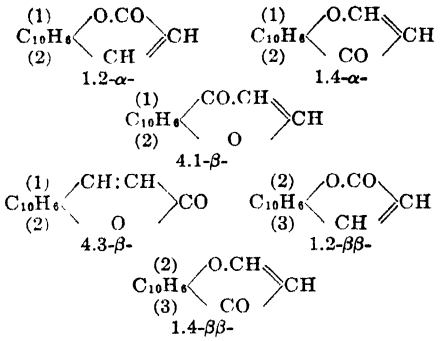


naphthopyrane. $C_{13}H_{10}O$ = 182.1. The ring compound:



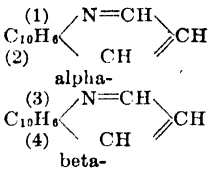
naphthopyrazine. Benzoquinoxaline.

naphthopyrone. $C_{13}H_8O_2$ = 196.1. The ring compounds:



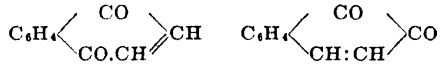
naphthoquinaldine. $C_{13}H_9N.CH_3$ = 193.17. **alpha-** A liquid, b. exceeds 300. **beta-** A solid, soluble in water, alcohol or ether, m.82, b. exceeds 300.

naphthoquinoline. $C_{13}H_9N$ = 179.1. **alpha-** Colorless crystals. Soluble in alcohol or ether, and slightly soluble in water, m.52, b.351. **beta-** Colorless crystals, m.93, b.$_{740mm}$350, soluble in water, alcohol or ether.



octohydro-α-, 1.2.3.4.7.8.9.10-octohydro-α-naphthoquinoline. Colorless crystals, m.48, b.216. **octohydro-β-,** 1.2.3.4.5.6.7.8-octohydro-b-naphthoquinoline. Colorless crystals, m.325, b.325. **tetrahydro-α-,** 1.2.3.4-tetrahydro-a-naphthoquinoline. Colorless crystals, m.46. **tetrahydro-β-.** Colorless crystals, m.63.

naphthoquinone. $C_{10}H_6O_2$ = 158.1. Dihydrodiketonaphthalene. **alpha** or **1:4-** Yellow crystals, m.125, slightly soluble in water, soluble in alcohol or ether. **beta** or **1:2-** Red needles, decomp. 115, soluble in water, alcohol, chloroform or ether; used as test for resorcinol and thalline. **amphi-** or **2:6-** Orange crystals, changing to gray at 130–135.



1.4- or alpha- or para- *1.2-* or beta- or ortho-**n. dioxime.** $C_{10}H_8O_2N$ = 174.1. A group of derivatives of naphthoquinone formed by replacing the =CO groups by =CN.OH groups. Alpha-compound, m.207. ***δ*-hydroxy-** Tuglone.

naphthoquinoxaline. *1.4*-Naphthisodiazine.

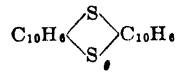
naphthoresorcinol. $C_{10}H_8O_2$ = 160.0. *1.3*-Dihydroxynaphthalene, naphthalenediol*. Colorless crystals, m.124, soluble in water; used as reagent for aldehydes, sugars and uronic acids.

naphthosalol. Betol.

napthosultone. See *naphsultone.*

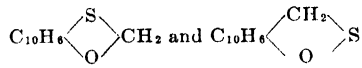
naphthotetrazine. $C_{10}H_6N_4$ = 182.2. The ring structures derived theoretically from anthracene by the replacement of four carbon atoms by four nitrogen atoms. According to the position of the nitrogen atoms the compounds are numbered: 1.2.3.4.-, 1.4.6.9-, or 1.4.5.10-naphthotetrazine (see *naphthodiazine*). Cf. *naphthisotetrazine.*

naphthothianthrene. $C_{20}H_{12}S_2$ = 316.3. The ring compound:



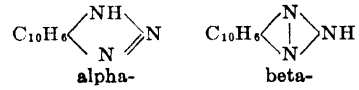
naphthothiazole. $C_{11}H_7NS$ = 185.2. Ring compounds similar in structure to the corresponding naphthoxazoles, the O of the latter being replaced by an S-atom. For structure of a-, aa-, b-, and bb-, see *naphthoxazole.*

naphthothioxole. $C_{11}H_7OS$ = 187.1. The ring compounds



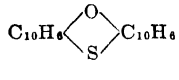
naphthotriazine. $C_{11}H_7N_3$ = 181.2. Ring compounds similar to the naphthodiazines, but having one more nitrogen atom in place of a carbon atom. The position of N-atoms is indicated by numbers, as 1.2.3-, 1.4.9-, and 1.4.10-naphthotriazine (see *naphthodiazine*). Cf. *naphthisotriazole.*

naphthotriazole. $C_{10}H_7N_3$ = 169.2. The ring compounds: (cf. *naphthisotriazole, perinaphthotriazole*)



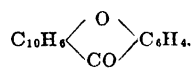
naphthoxanthene. Benzoxanthene.

naphthoxanthine. $C_{20}H_{12}OS$ = 300.2. The ring compound:



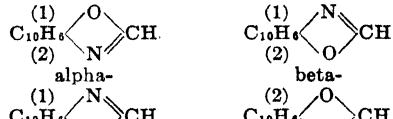
Cf. *phenothioxthine.*

naphthoxanthone. $C_{17}H_{10}O_2$ = 246.1. The ring compound:



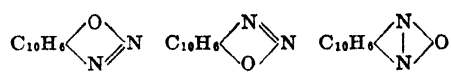
naphthoxazine. Phenoxazine.

naphthoxazole. $C_{11}H_7ON$ = 169.1. The ring compounds:



Cf. *naphthisoxazole, naphthothiazole, benzoxazole.*

naphthoxdiazole. $C_{10}H_6ON_2$ = 170.1. The ring compounds:



Cf. *benzoxdiazole.*

naphthoxy. The monovalent radical, $C_{10}H_7O$—, derived from naphthol.

naphthoyl. The monovalent radical, $C_{10}H_7CO$—, derived from naphthoic acid.

naphthyl. The monovalent $C_{10}H_7$— radical derived from naphthalene. **di-** See *dinaphthyl.*

n. acetate. $CH_3COOC_{10}H_7$ = 186.1. *alpha-* Colorless needles, m.130, slightly soluble in water, soluble in alcohol or ether. *beta-* Colorless needles, m.142, insoluble in water, soluble in alcohol or ether. **n. acetic acid.** $C_{10}H_7CH_2COOH$ = 186.1. *alpha-* Colorless crystals, m.131. *beta-* Colorless crystals, m.139. **n. alcohol.** Naphthol. **n. acetylene.** $C_{12}H_8$ = 152.1. *alpha-* A liquid, b.$_{25mm}$143. *beta-* white crystals, m.36, soluble in alcohol, ether or acids. **n. aldehyde.** Naphthoic aldehyde. **n. amine.** See *naphthylamine.* **n. benzene.** A hydrogen ion indicator changing at pH 8.0 colorless (acid) to blue (alkaline). **n. benzoate.** Naphthol benzoate. **n. carbinol.** $C_{10}H_7.CH_2OH$ = 158.1. Naphthobenzyl alcohol. *alpha-* Colorless crystals, m.60, b.301, soluble in alcohol. *beta-* Colorless crystals, m.80. **n. cyanide.** Naphthonitrile. **n. ether.** $(C_{10}H_7)_2O$ = 270.2. N. oxide, naphthoxy-naphthalene*, *alpha-* or *1.1.-* Colorless crystals, m.110, b.360, insoluble in water, soluble in alcohol or ether. *beta-* or *2.2-* Colorless crystals, m.105, b.360, insoluble in water, but soluble in alcohol or ether. **n. ethyl ether.** *α-* See *ethyl naphthyl ether.* *β-* Bromelia. **n. hydrazine.** $C_{10}H_7.NHNH_2$ = 158.1. *alpha-* Colorless leaflets, m.117. *beta-* Colorless leaflets, m.125. Both are slightly soluble in water, soluble in alcohol or ether. The hydrochlorides are used as reagents for sugars. **n. hydroxide.** Naphthol. **n. isocyanate.** $C_{10}H_7.NCO$ = 169.0. Colorless crystals used as reagent for hydroxy and amino compounds. **n. ketone.** $(C_{10}H_7)_2CO$ = 282.1. *alphabeta-* Colorless needles, m.135, insoluble in water, soluble in alcohol or ether. **n. lactate.** Lactol. **n. mercaptan.** $C_{10}H_7SH$ = 160.17. Thionaphthol. A liquid, insoluble in water, decomp. 285. **n. methyl ether.** $C_{10}H_7.O.CH_3$ = 158.1. Methoxynaphthalene*. *α-* Colorless liquid, d.1.096, m. below −10, b.258. *β-* Yara-yara, nerolin. A colorless powder of fruit-like odor, m.78, b.274, insoluble in water, soluble in alcohol or ether. Used in perfumery and in synthetic perfumes. **n. methyl ketone.** $C_{10}H_7.CO.Me$ = 170.1. *alpha-* Acetonaphthone. Colorless crystals, m.34, b.295, soluble in alcohol. **n. salicylate.** *α-* Alphol. *β-* Betol.

naphthylamine. $C_{10}H_7NH_2$ = 143.1. Naphthalidine. **alpha-** Colorless needles, d.$_{25}$°1.123, m.50, b.300, slightly soluble in water, soluble in alcohol or ether. Used in organic synthesis in the manufacture of Martius yellow, magdala red, and other dyestuffs; also as a reagent for nitrites and nitrates. **beta-** Colorless leaflets, d.$_{98}$°1.0614, m.111, b.306, soluble in water, alcohol, or ether; used in organic synthesis, in the manufacture of azo-dyes. **acet-** Acetnaphthalide. **dimethyl-β-** $C_{10}H_7NMe_2$ = 171.11. Colorless crystals, m.46, b.305. **ethyl-α-** $C_{10}H_7NHEt$ = 171.11. A colorless liquid. b.303. **methyl-α-** $C_{10}H_7NHMe$ = 157.10. A colorless liquid, b.293. **nitro-** See *nitronaphthylamine.* **nitroso-** q.v., **phenyl-** q.v., **tetrahydro-** q.v. **thiophenyl-** Benzophenothiazine.

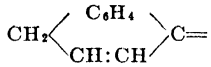
n. brown. Acid brown. 4-sulfo-α-naphthalene-azo-α-naphthol. An indicator for the pH range 6.0 (orange)-8.4 (pink). **n. hydrochloride.** $C_{10}H_7NH_2.HCl$ = 179.6. *alpha-* Colorless needles, soluble in water, alcohol, or ether; used as an intermediate in organic synthesis. *beta-* Colorless leaflets, soluble in water, alcohol, or ether; used in organic synthesis. **n. sulfonic acid.** A compound derived from naphthalene by substitution of one hydrogen by —NH_2, and another H by —SO_2OH. There are 13 isomeric monosulfonic acids $C_{10}H_6.(NH_2)SO_3H$; 20 isomeric disulfonic acids $C_{10}H_5(NH_2)(SO_3H)_2$; and 10 isomeric trisulfonic acids, $C_{10}H_4(NH_2)(SO_3H)_3$. The more important are:

1.4-naphthylamine sulfonic acid, see *naphthionic acid.*
2.8-naphthylamine sulfonic acid, Baden acid or α-acid.
2.6-naphthylamine sulfonic acid, Brönner's acid, or β-acid.
2.5-naphthylamine sulfonic acid, Dahl's acid or γ-acid.
2.7-naphthylamine sulfonic acid, F-acid, δ-acid or Bayer acid.

naphthylene. (1) The bivalent radical, $C_{10}H_6$=, derived from naphthalene. (2) An obsolete name for cyclohexene, C_6H_{10}. **di-** Perylene. **periethylene-** Acenaphthene.

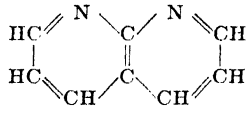
n. diamine. $C_{10}H_6(NH_2)_2$ = 158.1. Diaminonaphthalene, naphthalenediamine. There are several compounds, all colorless crystals: 1.2-naphthylene diamine, m.98; 1.3-naphthylene diamine, m.95; 1.4-naphthylene diamine, m.120; 2.3-naphthylene diamine, m.191.

naphthylidene. The bivalent radical,



naphthylmercuric. The monovalent radical $C_{10}H_9Hg$—. **n. acetate.** $CH_3COOHgC_{10}H_9$ = 388.70. Colorless fine needles, m.154, insoluble in water. **n. chloride.** $C_{10}H_9HgCl$ = 356.14. Silky, quadratic crystals, m.188, insoluble in water.

naphthyridine. $C_8H_6N_2$ = 130.06. *1.8-*benzodiazine, q.v., *1.8-*pyridopyridine. The ring compound:



Cf. *benzodiazine.*

octohydro- $C_8H_{14}N_2$ = 138.2. Colorless crystals, m.227.

naphtol. Naphthol.

Napier, John. 1550–1600. A Scotch mathematician, the inventor of logarithms.

Napierian logarithms. The exponent of the power to which the quantity e (= 2.71828) must be raised in order to produce a given number. See *logarithms, "e."*

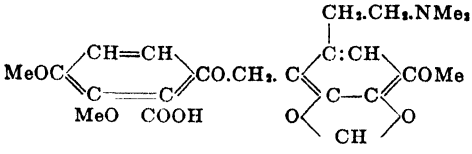
napiform. Having the form of a turnip. The turnip-shaped cavities seen in culture media that have been liquefied by bacteria.

Naples jar. A glass jar for staining microscope slides. **n. yellow.** Lead antimoniate.

napoleonite. Corsite.

naptha. Naphtha.

narceine. $C_{23}H_{27}O_8N.3H_2O$ = 499.4. An alkaloid from opium. Colorless prisms, m.170, slightly soluble in water or alcohol. Used medicinally as a hypnotic and sedative.



ethyl- Narcyl. **n. hydrochloride.** $C_{23}H_{27}O_8N.HCl = 535.7$. White, granular powder, m.-190, soluble in water, alcohol, or ether; used as a hypnotic. **n. meconate.** $C_{23}H_{27}O_8N.C_7H_4O_7 = 699.4$. Yellow crystalline needles, m. 126, soluble in hot water or alcohol. **n. sodium salicylate.** Antispasmin. **n. sulfate.** $C_{23}H_{27}O_8N.H_2SO_4 = 595.3$. Yellowish crystals, soluble in water or alcohol. **n. valerate.** $C_{23}H_{27}O_8N.C_5H_{10}O_2 = 601.5$. A greenish-white powder, decomposes on ageing, soluble in hot water or alcohol.

narcine. Narceine.

narcissine. Lycorine.

narcophine. A double salt of morphine and narcotine meconate.

narcosan. A solution of the lipoids from soya beans and cotton seeds (extracted with hot alcohol), the non-specific proteins from alfalfa seeds (extracted with dilute HCl), and the water-soluble vitamins from plant seeds (percolated with physiological salt solution). Used for nervous disorders and drug addiction.

narcotic. A drug that produces stupor, complete insensibility, or sleep; as opium, chloral, cannabis. Three chief groups:

opium group—which produce sleep.

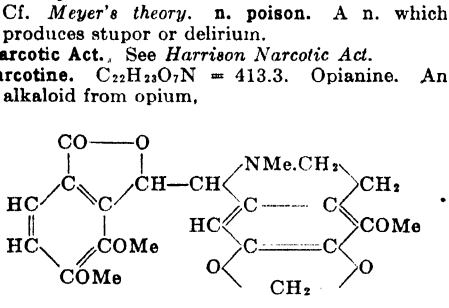
belladonna group—which produce illusions and delirium.

alcohol group—which produce exhilaration and sleep.

Cf. *Meyer's theory.* **n. poison.** A n. which produces stupor or delirium.

Narcotic Act. See *Harrison Narcotic Act.*

narcotine. $C_{22}H_{23}O_7N = 413.3$. Opianine. An alkaloid from opium,



Colorless needles, m.176, insoluble in water, slightly soluble in alcohol or ether. Used medicinally as an antipyretic and tonic, and has little narcotic effect. Cf. *cotarnine.*

narcyl. $C_{25}H_{31}O_8N.HCl = 509.7$. Ethylnarceine hydrochloride. Colorless crystals, slightly soluble in water, soluble in alcohol.

narcylene. A pure acetylene gas, used as an anesthetic gas.

nard. Aralia.

naregamine. An alkaloid from the root of *Naregamia alata,* Goanese ipecac, used as an emetic.

nargol. Silver nucleinate.

naringenin. $C_{15}H_{12}O_5 = 272.09$. 4.5.7-trihydroxyflavanone. A synthetic flavone, q.v.

naringin. $C_{21}H_{26}O_{11} = 454.2$. Aurantium. A crystalline glycoside from the flowers of *Citrus decumana,* the grapefruit or pomelo tree. Yellow prisms, soluble in hot water or hot alcohol, insoluble in ether. It hydrolyzes to naringenin.

narki metal. An alloy of iron and silicon, used in acid resisting utensils.

nascency. Nascent state.

nascent. Describing a chemical substance at the moment of its formation; especially a gas at the moment it is generated in which condition it is more chemically-active, presumably on account of free single *atoms* being present, instead of the less active gas *molecules.* **n. state.** The condition of a substance during its formation, or liberation from its compounds (see *status nascendi*).

nasrol. Symphorol N.

naszogen process. The production of oxygen from a mixture of a chlorate, inert substance (as, kieselguhr) and an exothermic compound.

natalite. A mixture of alcohol and ether, used as fuel in internal combustion motors.

nataloin. $C_{34}H_{38}O_{15} = 686.3$. A principle derived from Natal aloes. Cf. *aloin.*

National Physical Laboratory. An English Government institution near London, which issues certificates for scientific glassware, weights, and measuring instruments having a specified high degree of accuracy, and carries out physical research. Certified articles bear a monogram N.P.L.

National Research Council. An institution established in April, 1916 by the National Academy of Sciences in Washington (U. S. A.) for the better coordination of research in industrial problems.

native. A pure substance occurring in nature. The term is used (a) to indicate an uncombined element, as native mercury or native gold; and (b) to distinguish substances which occur naturally, from those artificially made, as native garnet, native soda. **n. coke.** Carbonite. **n. compounds.** A chemical compound that occurs in nature. **n. element.** A chemical element that occurs uncombined in nature. **n. metal.** A metal that occurs uncombined in nature, as copper, silver, gold. **n. paraffin.** Ozocerite. **n. prussian blue.** Vivianite. **n. soda.** Natron.

natrine. An alkaloid from *Solanum tomatillo,* a Solanaceae.

natrium. The Latin and German names for sodium, Na.

natrocalcite. Gaylussite.

natrolite. $Na_2O,Al_2O_3,3SiO_2,2H_2O$. Needle stone. A white or yellow zeolite mineral or sodium aluminum silicate. Cf. *radiolite.*

natron. $Na_2CO_3.10H_2O$. A native sodium carbonate, occurring in the desert regions of Egypt, from which the term natrium (sodium) has been derived. (Cf. *trona, urao.*)

natronkalk. Soda-lime.

natrum. An early (Arabic) name for trona. Cf. *natrium.*

natural. Not artificial or synthetic. **n. bases.** Alkaloids. **n. changes.** (1) The reactions produced by decay, fermentation, or putrefaction of organic compounds. (2) The reactions produced by decomposition, corrosion, oxidation and hydrolysis of inorganic compounds. **n. dyes.** The coloring materials derived from the vegetable or animal world, as indigo or carmine. **n. gas.** (1) An almost pure mixture of hydrogen and methane gas or a mixture of simple hydrocarbon homologs found in the vicinity of oil fields. Typical compositions are:

	Eastern, per cent.	Western, per cent.
Hydrogen	20	
Methane	70	70
Other hydrocarbons	6	27
Carbon dioxide	1	3
Nitrogen, oxygen	3	

It is collected at the oil fields, and piped to the cities to be used as fuel. An odorous substance is usually added as a warning aid in detecting leaks. (2) Helium. **n. immunity.** The resistance of species or races to certain infectious diseases. *E.g.*, Man is never attacked by chicken cholera. **n. logarithm.** Napierian logarithm. **n. philosophy.** The interpretation of natural science by theories and abstract concepts. It includes theoretical chemistry and theoretical physics. Cf. *natural science.* **n. science.** The knowledge of the phenomena of nature, as opposed to abstract or philosophical science. Natural science is mainly descriptive and is conveniently classified into: descriptive chemistry and physics, descriptive biology (botany, zoology and anthropology), descriptive geology (topography, oceanography, and meteorology), and descriptive astronomy. (Cf. *natural philosophy.*) **n. ventilation.** The ventilation of a mine by natural means.

naucleine. $C_{21}H_{26}O_4N_2$ = 370.2. An alkaloid obtained from *Nauclea excelsa*, a Japanese plant; used as a cure for the opium habit.

nauli gum. An oleoresin from *Canarium commune*, a tree of the Solomon Islands. **n. oil.** An essential oil of anise-like odor, distilled from nauli gum. Cf. *elemi.*

naumannite. A native lead-silver telluride, $(Ag_2Pb)Se$; large cubes with a metallic luster.

nauseant. An agent that produces a feeling of sickness and vomiting.

nautical mile. A measure of distance, equal to 1.15136 statute miles = 6082.66 feet. **n. speed.** See *knot.*

naval brass. An alloy of 61 parts Cu, 38 parts Zn, and 1 pt. Sn. **n. stores.** (1) A group name for the materials originally used by builders of wooden ships; such as, tar, pitch, rosin, turpentine, asphalt, pine oil. (2) The products obtained from rosin; as, turpentine, pine oil.

Navashin's solution. A fixative for plant tissues consisting of equal parts of (a) (1.5 % CrO_3, 10 % CH_3COOH, 90 % H_2O); (b) (40 cc. formaldehyde, 60 cc. H_2O).

Nb. The symbol for niobium (columbium).

Nd. The symbol for neodymium.

Ne. The symbol for neon.

neat's-foot oil. Oleum bubulum. A liquid oil of varying composition obtained by boiling calves' and sheep's feet and shinbones. A pale yellow oil, d.0.916, soluble in alcohol, ether, benzene, or chloroform. Used as a lubricant, leather dressing, and for oiling wool.

nebulium. A hypothetical light element, atomic weight 1.31. It is assumed (from spectroscopic evidence) to exist in nebulas, but its characteristic lines are due to doubly- and triply-ionized oxygen and doubly-ionized nitrogen. Cf. *coronium, aurorium.*

nebulization. The transformation of a liquid into a fine spray.

nebulizer. An atomizer or instrument for producing a spray.

necic acids. The acid products of hydrolysis of senecio alkaloids.

necines. The basic products of hydrolysis of senecio alkaloids.

necrocryptoxanthol. A provitamin A in yellow corn grain.

nectandrine. $C_{20}H_{23}O_4N$ = 341.3. An alkaloid from the bark of *Nectandra rodiaei*, a Lauraceae. A white amorphous powder resembling bebeerine in action.

nectar. The sugary juice of flowers, and the source of honey.

needle. (1) A sharp pointed rod of metal for puncturing or sewing. (2) A needle-shaped crystal. (3) A magnetic needle. **astatic-** See *astatic.* **compass-** A magnetized needle, mounted so that it can move freely in a horizontal direction. **dipping-** A magnetized needle, hung so that it can move freely in a vertical plane. **hypodermic-** A hollow needle, used for the injection of solutions beneath the skin. **n. ore.** (1) An iron ore, which occurs in long fibrous filaments. (2) Aikenite. A native sulfide of lead, bismuth, and copper. **n. spar.** Aragonite. **n. stone.** Natrolite. **n. valve.** A screw-valve with a long tapering point instead of a disk; used on high pressure gas cylinders.

neem. n. bark. Azadarach. **n. oil.** Margosa oil, nim oil. An oil expressed from the seeds of *Melia azadirachta*, containing various sulfur compounds. Used medicinally for syphilis, as an anthelmintic, and as a denaturant for alcohol. Cf. *margosa* oil, *margosic* acid.

negative. (1) Having a charge due to electrons, as a negative ion or radical. (2) The absence of a reaction, property or phenomenon; as, negative catalysis or negative crystal. (3) The opposite of positive, as a photographic negative. **n. catalysis.** The retardation of a chemical reaction by means of a catalyst. **n. cotton.** A low-nitrated cellulose, soluble in ether or alcohol, used for photographic plates. **n. crystal.** A birefractive crystal in which the refractive index of the ordinary ray is more than the refractive index of the extraordinary ray. **n. electrode.** Cathode. **n. element.** An acid-forming element or an atom with four to seven valency electrons, as C = 4, N = 5, O = 6, Cl = 7. It is characterized by tendency to attract additional electrons and form a stable system of eight. Cf. *octet, negative ion, periodic system.* **n. group.** (1) An acid radical. (2) A radical, the introduction of which into a molecule, causes an organic compound to become more negative, that is, become less basic and so enable the hydrogen atoms to be replaceable by metals. Such negative radicals are carbethoxyl-, carboxyl-, naphthyl-, nitro-, nitrosyl-, phenyl-, and thionyl-groups. **n. ion.** An atom charged with one or more negative electrons; an anion. **n. plate.** A photographic plate in which, on exposure to light and subsequent development and fixation, the image is inverted: light appears black, and shadows white. **n. radical.** An acid radical. **n. test.** A reaction or test which indicates the absence of the substance sought.

negatron. A negative electron (q.v.) as compared with the positron.

negion. Proposed name for cation. Cf. *posion.*

negode. Proposed name for cathode, q.v.

nemalite. Brucite.

nematic. Pertaining to liquid crystals of the thread-like type. Cf. *smectic.*

nembutal. Pentobarbital.

neo- A prefix derived from the Greek, indicating "new" or "recent."

neoarsaminol, neoarsenobenzol, neoarsphenamine. Neosalvarsan.

neoarsycodyl. Sodium methyl arsenate.

neobrucidine. $C_{23}H_{26}N_2O_4$ = 394.2. An isomer of brucidine.

neobrucine. $C_{23}H_{26}N_2O_4$ = 394.2. An isomer of brucine.

neocaine. Procaine.

neocalamine. Prepared neocalamine. A mixture of 93 % zinc oxide, 3 % red ferric oxide, and 4 % yellow ferric oxide; used like calamine in skin diseases but has a uniform color.

neocerotic acid. $C_{25}H_{50}O_2$ = 382.4. A fatty acid, m.77.8, from bees-wax.

neocianite. The blue mineral CuO,SiO_2.

neocid. See DDT.

neocinchophen. Novatophan. A cincophen derivative used similarly to that compound in medicine.

neocryl. Succinanilomethylamide-*p*-arsonic acid. Used in treating syphilis and sleeping sickness.

neocupferron. The homologous napthyl derivative of cupferron (q.v.). It is a reagent for iron.

neocyanine. A dyestuff derivative of cyanine, used as a photographic sensitizer for infrared.

neodiarsenol. Neosalvarsan.

neodymia. Neodymium oxide. See also *didymia.*

neodymium. Nd = 144.27. A rare earth metal, atomic number 60, discovered by Auer v. Welsbach (1885). Cf. *rare* earths. A yellowish metal, d.6.96, m.840, which tarnishes slowly in air. It occurs in cerium and lanthanum minerals, and forms salts that are generally purple colored and fluorescent. Its valency is 3. **n. acetate.** $(CH_3COO)_3Nd.H_2O$ = 339.36. Pink crystals, soluble in water. **n. acetylacetonate.** $Nd(MeCOCH_2COO)_3$ = 441.43. Violet crystals, m.120–125, soluble in water. **n. chloride.** $NdCl_3$ = 250.65. Rose crystals, soluble in water. **n. hydroxide.** $Nd(OH)_3$ = 195.29. A reddish-white powder, insoluble in water. **n. iodide.** NdI_3 = 525.07. A purple crystalline powder, soluble in water. **n. oxalate.** $Nd_2(C_2O_4)_3$ = 732.70. Rose crystals, insoluble in water. **n. oxide.** Nd_2O_3 = 336.54. A pale blue powder, insoluble in water. **n. phosphate.** $NdPO_4$ = 239.29. A red powder, used as an amethyst coloring for porcelain. **n. sulfide.** Nd_2S_3 = 384.72. A yellowish-green powder, d.5.387, m.2200.

neogen. A silver-white alloy: 58 parts copper, 27 parts zinc, 12 parts nickel, 2 parts tin, 0.5 part of aluminum and bismuth.

neohexane. *2.2*-Dimethylbutane*.

neo-hombreol. A trade name for testosterone propionate. **n-h M.** Methyltestosterone.

neokharsivan. A British-made brand of neosalvarsan.

neolactose. An isomer of lactose.

neoline. $C_{28}H_{39}O_6N$ = 425.2. An alkaloid obtained by hydrolysis of neopelline.

neolite. A green, silky, fibrous, aluminum-magnesium silicate.

neolithic. Late Stone Age. Pertaining to an epoch in human civilization characterized by the beginning of agriculture, discovery of fire, and better implements of stone and bone. It was preceded by the paleolithic age and followed by the copper and bronze age.

neon. Ne = 20.183. A rare, noble gaseous element, atomic number 10, discovered in the atmosphere in 1898 by Ramsay and Travers. A colorless gas, $d._{H=1}$9.96, m. −253, b. −243. It occurs in the air in traces (1 in 55,000) and consists of two isotopes (atomic weight, 20 and 22). It forms no chemical compounds, and is used as a residual gas in vacuum tubes (*e.g.*, for spark plug testers, and sources of illumination for spectroscopic work), and incandescent lamps. **n. lamp, n. light, n. tube.** A vacuum tube containing a trace of neon. It emits an intense red light of great fog-penetrating power, used for advertising signs and beacons for airways and lighthouses.

neonal. $C_{10}H_{16}O_3N_2$. 5-*n*-Butyl-5-ethylbarbituric acid, used as a hypnotic.

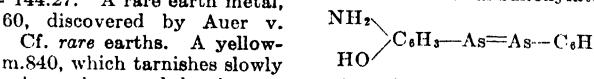
neonicotine. Anabasine.

neopelline. $C_{32}H_{45}O_8N$ = 571.36. An alkaloid from *Aconitum napellus*, aconite.

neopentane. *2.2*-Dimethylpropane.

neoprene. Generic name for synthetic rubber made by polymerization of 2-chloro-1,3-butadiene (prepared by the action of hydrogen chloride on monovinylacetylene). Neoprene vulcanizates are markedly resistant to oils, greases, chemicals, sunlight, ozone, and heat.

neosalvarsan. $C_{12}H_{11}O_2N_2As_2(CH_2)O.SONa$ = 466.2. Neoarsaminol, neoarsphenamine, neodiarsenol, Ehrlich No. 914, novarsenobenzol, sodium-3.3′-diamino-4.4′-dihydroxy-arsenobenzol-methanal-sulfoxylate,



A product of salvarsan and formaldehyde sodium sulfoxylate discovered by Ehrlich and Bertheim in 1912. An orange-yellow powder, with a peculiar odor, very soluble in water; used for intravenous and intramuscular injections.

neosine. A nitrogenous base from muscle.

neostibosan. The diethylamine salt of stibanilic acid. It is similar in action, and preferable to stibosan, q.v.

neostrychnine. $C_{21}H_{22}N_2O_2$ = 334.15. An isomer of strychnine.

neosynephrine. $C_9H_{13}NO_2$ = 167.1. Levo-α-hydroxy-β-methylamino-3-hydroxy ethylbenzene. White crystals, used as a vasoconstrictor.

neothesine. $C_{16}H_{23}NO_2.HCl$ = 297.7. γ-(*2*-methylpiperidino) propyl benzoate hydrochloride, $PhCOO(CH_2)_3N.(CH_2)_4CHMe.HCl$.

White crystals, m.172, soluble in water, alcohol or chloroform; used as local anesthetic. Cf. *procaine, cocaine.* **n. base.** A yellow oil, insoluble in water.

neotype. Alstonite.

neoytterbium. Ytterbium.

nepalin. $C_{17}H_{14}O_4$ = 282.11. A crystalline constituent from the *Rumex* species, Polygonaceae. Cf. *nepodin.*

nepheline. A granular rock, which consists chiefly of nephelite and pyroxene.

nephelite. (1) An orthosilicate of sodium, potassium, and aluminum consisting of 20 % $KAlSiO_4$, 75 % $NaAlSiO_4$, and 5 % $NaAlSi_3O_8$. It is the basis of many rocks. (2) $NaAlSiO_4$. Elaeolite. A silica mineral (q.v.) typical of a group. Cf. *beemerose.*

nephelometer. A photometric or optical device for determining the amount of suspended matter in a solution by comparison of the amount of light scattered by the suspended particles with that scattered by the particles of a standard suspension. It is used to determine proteins, the growth of bacteria, and any metallic or acid radicals which can be precipitated in finely-divided form. Cf. *turbidimetry.*

nephelometry. Quantitative analysis by determining the degree of light scattered from a fog or suspension. Cf. *turbidity.*

nephrite. Jade.

nepodin. $C_{18}H_{16}O_4$ = 296.12. A principle, m.-158, from *Rumex nepalensis*, a Polygoniaceae. Cf. *nepalin.*

neptunium. (1) An element of atomic number 93, and atomic weight 239, obtained by bombarding ordinary uranium with neutrons. It undergoes transformation into plutonium, of atomic number 94, and atomic weight 239. (2) A supposed element of atomic weight 118, which proved to be a mixture of tantalum and niobium.

neral. β-Citral.

neriantin. A crystalline glucoside from the leaves of *Nerium oleander.*

neriin. A glucoside from the leaves of *Nerium oleander*, an Apocynaceae, soluble in water or alcohol, insoluble in ether, which resembles strophantin and has a digitalis-like action. Cf. *oleandrin.*

neriodorin. A glucoside from the bark of *Nerium odorum.*

nerium. Oleander.

Nernst, Walter. 1864–1942. A German physicist and chemist, noted for his work in thermodynamics and physical chemistry. **N. effect.** The thermomagnetic difference in potential observed on passing a current from left to right through a metallic plate placed between two magnetic poles. The effect is positive when the upper edge of the plate has the higher potential. **N. heat theorem.** The entropy of a condensed, chemically-homogeneous substance vanishes at the zero of absolute temperature. **N. lamp.** See *lamp.* **N. law.** Partition law. Distribution law, Nernst theorem. A substance in contact with two immiscible liquids and soluble in both, will dissolve in each of the two liquids in fixed proportions, regardless of the quantity of liquid, providing no molecular association or electrolytic dissociation takes place. **N. theory.** (1) The electric stimulus to the tissues of an organism is due to the dissociation of the salts, as a result of which a concentration of ions is produced in the solution surrounding the cell membranes. (2) The theory of electrolytic solution pressure (q.v.), according to which the potential of a metal in a solution of its ions may be calculated from a knowledge of the concentration of the latter. The potential is set up as a result of the tendency of the metal to go into solution with the formation of ions.

nerol. $C_{10}H_{18}O$ = 154.14. A primary alcohol derived from neroli oil. A colorless liquid, d.0.881, b.226.

neroli oil. A brown, essential oil distilled from orange blossoms, *Citrus bigardia* and *C. aurantium*, d.0.87, containing nerol, linalool, geraniol, and limonene; used in perfumery.

nerolidol. $C_{15}H_{26}O$ = 222.20. Peruviol, *3.7.11*-trimethyldodecatriene-*1.6.10*-ol-3. $Me_2C:CH(CH_2)_2CMe:CH(CH_2)_2CMeOH.CH:CH_2$. A tertiary alcohol from neroli oil and Peru balsam, d.0.880, b.277. It is an isomer of farnesol; used in perfumery.

nerolin. (1) $C_{10}H_7.O.C_2H_5$ = 172.1. β-naphthylethylether. (2) $C_{10}H_7.O.CH_3$ = 158.1. β-naphthylmethylether. A colorless crystalline powder of fruity odor, m.72, b.271, insoluble in water, soluble in alcohol or ether; used as a substitute for nerol in perfumery.

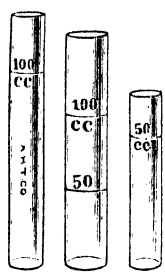
nerve. A fiber-like whitish cord, which transmits impulses to and from the central nervous system. **n. sedative.** An agent that diminishes the activity of sensory nerves, as chloral, bromides, belladonna, opium, henbane. **n. stimulant.** An agent that increases the activity of sensory nerves, as nux vomica, strychnine, caffeine.

nervon. $C_{48}H_{91}NO_8$ = 809.74. A galactoside, m.61, containing nervonic acid, sphingosine and galactose occurring in the brain. Cf. *cerebroside.*

nervonic acid. $C_{24}H_{46}O_2$ = 366.36. Selacholeic acid, *6,15*-tetracosanic acid. The unsaturated acid, $Me(CH_2)_7CH:CH(CH_2)_{13}COOH$. White crystals, m.41, insoluble in water; in fish liver oils, nervon and sphingo myelin. **α-hydroxy-** $C_{24}H_{46}O_3$ = 382.36. An acid from hydroxynervone.

nesquehonite. A hydrous magnesium carbonate, $MgCO_3.3H_2O$.

Nessler, A. 1827–1905. A German chemist noted for his development of analytical methods. **N. reagent.** Dissolve 3.5 gm. KI in 10 cc. H_2O (Sol. A), and 1.7 gm. $HgCl_2$ in 30 cc. H_2O (Sol. B). Slowly add B to A until a permanent precipitate occurs, then dilute with 20 % NaOH to 100 cc. Again add solution B, until a permanent precipitate forms, let settle, decant, and keep solution in the dark. The solution improves on keeping. **N.'s solution.** An alkaline mercuric potassium iodide solution. See *Nessler's reagent, N. test.* **N.'s test.** A delicate test for detecting ammonia, aldehydes, and hexamethylenamine. N. reagent gives a reddish brown precipitate with ammonia and with traces of NH_3 a more or less intense yellow tint due to NHg_2I, which can be used for its colorimetric determination. 1 part per 100,000,000 of water is detectable. **N. tube.** A glass cylinder with a flat bottom; used for the comparison of colors in colorimetric reaction analysis.



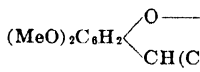
Nessler tubes.

nesslerize. To treat with Nessler's reagent.

nethamine. N-ethylephedrine hydrochloride; the levo 1-phenyl-2-methylethylaminopropan-1-ol hydrochloride. It is used like ephedrine.

nether. An early (Egyptian) name for trona.

netoric acid. $C_{12}H_{14}O_5$ = 218.08. A monocarboxylic acid, m.92, derived from rotenol.



nettle. Urtica. **horse-** *Solanum carolinense*, q.v.

Neuberg ester. Fructose-*6*-monophosphate, produced in the fermentation of sugar by yeast. Cf. *Robison ester.*

neudorfite. $C_{18}H_{28}O_2$ = 276.2. A resinous oxidized hydrocarbon in Bavarian coal beds.

neuridin. $C_5H_{14}N_2$ = 102.2. A ptomaine found in decaying animal matter.

neurine. $C_5H_{13}ON$ = 103.4. Amantine. Trimethylvinylammoniumhydroxide. A quaternary amine: $(CH_3)_3{\equiv}N\langle^{CH:CH_2}_{OH}$, in decaying proteins from fishes, fungi, and brain substances. An extremely poisonous liquid known in solution only, soluble in water, alcohol or ether. (See also *choline, amanitine, muscarine.*) **oxy-** Betaine.

neurodin. $C_{13}H_{16}O_3N$ = 282.12. Acetyl-p-oxyphenylurethane. $C_6H_4(OCOCH_3)_2NHCOOC_2H_5$. A colorless crystalline powder, soluble in water; used medicinally as an antineuralgic and antipyretic.

neurodine. $C_5H_{19}N_2$ = 107.1. A ptomaine in decomposing flesh.

neurolecithin. An ester of fatty acids with glycerophosphoric acid and choline, prepared from the brain and spinal cord of healthy animals and used medicinally as a lecithin preparation. Cf. *lecithin.*

neuron. A nerve cell.

neuronal. $C_6H_{12}ONBr$ = 194.0. Diethyl bromacetamide, bromodiethylacetamide, $NH_2.CO.CBrEt_2$. Colorless crystals, m.66, soluble in water; used medicinally as a somnifacient.

neurosin. Calcium glycerophosphate.

neurotic. An agent or substance acting on the nervous system (see *poisons*).

neuton. The theoretical zero element, consisting of neutrons, $_0n^1$, having atomic number zero and mass one. Cf. *neutron.*

neutral. (1) Non-acidic and non-basic. Cf. *amphoteric.* (2) Having no free electric charge. Cf. *neutron, isoelectric point.* **n. atom.** An atom in which the nuclear positive charge is balanced by the negative electrons, but the latter may be in *excited* or in *normal* orbits. **n. compound.** A compound that has neither acid nor basic reaction. **n. element.** A member of the zero group of the periodic system, the rare gases: He, Ne, A, Kr, Xe and Rd. **n. molecule.** A system of two ions (cation and anion) in a solvent. (See *solvate theory.*) **n. oil.** Light petroleum, d.32–32°Be., flash point, 290–320°F., which is sometimes mixed with animal or vegetable oils. **n. point.** The point at which a solution has a neutral reaction, due to the union of the H^+ ions from an acid and the OH^- ions from a base to give practically undissociated water. The hydrogen ion concentration therefore, corresponds with pH = 7.00, which is that of pure water. Cf. *isoelectric point.* **n. principle.** The non-acid and non-basic constituents of plants; as, glucosides, esters, oils. **n. reaction.** A reaction that is neither acid nor basic. **n. red.** Toluylene red, dimethyldiaminotoluphenazin hydrochloride, $Me_2NC_6H_3\langle^{N}_{N}\rangle C_6H_2MeNH_2.HCl$. A dark green powder, soluble in water (red color). Used as a dye, and medicinally to test the function of the stomach. It is an indicator, changing at pH 7.5 from blue (acid) to magneta (alkaline), and at pH 8 to orange-yellow. **n. salt.** A salt that does not react acidic or basic. It differs from the normal salt which may be either neutral, acid or basic. **n. salt effect.** The reduction of the ionisation of a weak acid or weak base by the addition of an ionisable salt containing one of the ions already present. Cf. *buffer solutions.* **n. solution.** A solution in which the number of hydrogen ions equals the number of hydroxyl ions. A solution with pH 7.07, or a concentration of $10^{-7}H^+$ and OH^-. **n. violet.** $C_{14}H_{18}N_4Cl$. A compound similar to n. red, having H in place of a methyl group.

neutrality. The state of being neither acid nor basic in reaction.

neutralization. (1) The process of making a solution neutral, that is, adding a base to an acid solution or an acid to an alkaline or basic solution. (2) The fundamental reaction of neutralization is

$$H^+ + OH^- \leftrightarrows HOH,$$
$$\text{Acid} + \text{Base} \leftrightarrows H_2O + \text{Salt}$$

while the reverse reaction is hydrolysis. The end-point of neutralization is determined either by indicators or by measuring the electrical conductivity (volumetric analysis and electrometric titration respectively). **heat of-** The amount of heat liberated during the neutralization of a strong acid and a strong base in equivalent quantities of dilute solutions equals about 13.7 large calories or 57 kilojoules. (3) Proton reaction. The transfer of a proton, H^+, from an acid to a base, producing a weaker acid, A′, and a weaker base, B′; such as,

$$A + B = A' + B'$$
$$HCl + H_2O \rightleftharpoons H_3O^+ + Cl^-$$
$$H_3O^+ + Ac^- \rightleftharpoons HAc + H_2O$$
$$H_3O^+ + OH^- \rightleftharpoons H_2O + H_2O$$
$$NH_4^+ + OH^- \rightleftharpoons NH_3 + H_2O$$

n. ratio. The ratio of the concentration of the anion of an acid to the total concentration of the undissociated acid.

neutralize. To make neutral.

neutralizer. Any agent produces a state of neutrality.

neutrino. Photon. (1) A nuclear particle (q.v.) of zero mass and zero charge, probably a positron and electron. Cf. *neutron.* (2) A hypothetical particle with no charge and small mass, 6×10^{-30} gm., emitted with an electron in radioactive and similar changes. It shares the momentum and part of the energy of the particle. Cf. *neutron.*

neutron. n or $_0n^1$. (1) A proton and electron in immediate contact; a "building stone" of the atomic nucleus. Each isotope contains in its atom (I—A) neutrons, where I is the isotopic weight and A the atomic number. (2) An electrically-neutral particle, with the mass of 1.006, which does not ionize air, produced from elements by bombardment with alpha-particles. Cf. *nuclear reactions, neutrino, neuton, particles.*

Neville acid. 1.4-α-Naphthol-sulfonic acid.

nevyanskite. A native alloy of iridium and osmium with other platinum metals.

new blue. (1) Meldola blue. (2) Prussian blue. **n. fuchsin.** $C_{22}H_{23}N_3.HCl$ = 367.8. Soluble fuchsin. A bluish-red dye obtained by oxidation of diamino-o-ditolyl-methane.

Newlands, John Alexander Reina. 1838–1898. An English chemist and pioneer in the development of the periodic system (q.v.) from his conception of "octaves."

Newton, Sir Isaac. 1642–1727. An English mathematician and philosopher, the originator of the Law of universal gravitation. **N.'s alloy.** An alloy of 20 parts bismuth, 30 parts tin, and 50 parts lead, m.202°F. **N.'s law.** The attractive force between two bodies is proportional to their masses. **N.'s rings.** Colored rings produced when plane and convex

Sir Isaac Newton.

glass surfaces are pressed together; they are the result of interference between the beams of light reaching the eye by reflection from the two surfaces on account of the difference in the lengths of the paths traversed.

N.F. Abbreviation for National Formulary, a supplement to the United States Pharmacopoeia. It contains the non-official remedies.

ngai camphor. Borneol.

Ni. Symbol for nickel.

niacin. Nicotinic acid (q.v.).

niacinamide. Nicotinamide (q.v.).

Niagara blue. Trypan blue.

niccolic. Nickelic.

niccolite. A pale-red native nickel arsenide, NiAs. Copper nickel, arsenical nickel.

niccolous. Nickelous.

niccolum. The Latin name for nickel.

Nichols, William Henry. 1852–1930. An American industrial chemist. **N. medal.** A prize founded in 1902 for an achievement in industrial chemistry.

Nicholson, William. 1753–1815. An English physicist and chemist, and a pioneer in electrolyzing water.

nicholsonite. A variety of aragonite, $CaCO_3$, containing various proportions of zinc.

nichrome. A high melting-point alloy of 60 % nickel, 25 % iron and 15 % chromium used in electric heating or resistance devices and acid-resisting apparatus. A trade name. **n. wire.** A wire of 80 % nickel and 20 % chromium alloy. Used in the laboratory as a platinum substitute (for bead and flame tests), for the construction of heating elements around glass tubings, and the construction of electrical resistances.

nickel. Ni = 58.69. An element of the iron group, atomic number 28. A silver-white metal, d.8.8–8.9, m.1452, b.3380, insoluble in water, dilute acids or alkalis. It occurs in niccolite and monel metal, in kupfernickel, nickel glance, and nickel blende. It was isolated in 1751 by Cronstedt. Nickel has valencies of 2 and 3.

2	3
Ni^{++}	Ni^{+++}
nickelous	nickelic
(niccolous)	(niccolic)

It is refined either by the Mond or the Oxford process, and is used for the galvanic coating of other metals (stainless steels), for acid-resisting alloys, for chemical apparatus, for coins and medals, for electric apparatus, surgical and dental instruments, as a catalyst in the hydrogenation of fats and oils (margarine manufacture), and in the manufacture of nickel salts. World output in 1940 was 130,000 tons, mostly produced in Canada. **Admiralty-** Adnic. **arsenical-** Niccolite. **emerald-** Zaratite. **Raney-** q.v. **super-** q.v.

n. acetate. Nickelous acetate. **n. alloys.** A series of non-corroding alloys, as argentan, china-silver, new-silver, nickelin, ferronickel. Some of these are harder than steel and are used for surgical instruments. The melting points of some common alloys are (in °C.):

with	90 %Ni 10 %	80 %Ni 20 %	70 %Ni 30 %	60 %Ni 40 %	50 %Ni 50 %
Cu	1440	1430*	1410‡	1380†	1335§
Sn	1380	1290	1200	1235	1290

* = nickeline, † = constantan, ‡ = corronel, monel, § = alpro, copel.

See also mumetal (74 %), permalloy (30–80 %), nichrome (60–80 %), monel (67 %), permivar (45 %) and German silver (30 % Ni). **n. ammonium nitrate.** $Ni(NO_3)_2(NH_3)_4(H_2O)_2$ = 286.9. Nickelo-amin-nitrate. $[Ni(NH_3)_4(H_2O)_2](NO_3)_2$. Green crystals, soluble in water, insoluble in alcohol, used in nickel plating. **n. ammonium chloride.** $Ni(NH_4)Cl_3.6H_2O$ = 291.2. Nickelous ammonium chloride. A double salt which occurs in green, rhombic crystals, d.1.645, soluble in water or alcohol; used in nickel plating. **n. ammonium sulfate.** $Ni(NH_4)_2(SO_4)_2.6H_2O$ = 395.0. Nickelous ammonium sulfate. A double salt, green crystals, d.1.929, soluble in water; used in nickel-plating and as a reagent. **n. arsenate.** Nickelous arsenate. **n. benzoate.** Nickelous benzoate. **n. black.** N. peroxide. **n. blende.** A native n. sulfide, NiS. **n. bloom.** Annabergite. **n. borate.** Nickelous borate. **n. bromide.** Nickelous bromide. **n. carbide.** Ni_3C = 188.07. A black solid. **n. carbonate.** Nickelous carbonate. **n. carbonyl.** $Ni(CO)_4$ = 170.7. N. carbonoxide. A colorless liquid, d.1.318, m. −25, b.43, insoluble in water or alcohol. Used medicinally for hypodermic injections; and in the Mond process for the isolation of nickel (q.v.) since it gives this metal if heated: $Ni(CO)_4 \leftrightarrows Ni + 4CO$. If pure it explodes at 60:—$Ni(CO)_4 = Ni + 2CO_2 + 2C$. **n. carbonoxide.** Nickel

carbonyl. **n. carbonyl.** A poisonous gas. **n. chloride.** Nickelous chloride. **n. chrome steel.** An alloy of 95 pts. Fe, 3 pts. Ni, 1.5 pts. Cr, and 0.5 pt. C; used for heat- and acid-resisting machinery. **n. chromium triangle.** A triangle made of nickel-chromium (nichrome) wire and used for heating small laboratory utensils (crucibles, dishes). **n. citrate.** Nickelous citrate. **n. cyanide.** Nickelous cyanide. **n. dimethyl glyoxime.** $Ni(C_4H_7N_2O_2)_2$ = 288.7. A bright red crystalline precipitate, used to determine so little as 0.01 mg. nickel; sublimes at 120. **n. fluosilicate.** $NiSiF_6$-$6H_2O$ = 308.84. Green trigonal crystals, d.2.109, soluble in water. **n. glance.** Ni_2AsS. A native arsenide and sulfide of nickel. **n. gymnite.** Genthite. A gymnite, in which part of the magnesium is replaced by nickel. **n. iodide.** Nickelous iodide. **n. minerals.** Nickel occurs in nature associated with cobalt and iron as a constituent of meteorites; with chromium in olivine; and as sulfide, arsenide, and silicates.

native nickel	Ni
awaruite	(Ni, Fe)
bunsenite	NiO
millerite	NiS
pentlandite	(Ni, Fe)S
beyrichite	Ni_2S_3
polydymite	Ni_4S_5
niccolite	NiAs
chloanthite	$NiAs_2$
rammelsbergite	$NiAs_2$
gersdorffite	NiAsS
morenosite	$NiSO_4.7H_2O$
zaratite	$NiCO_3.Ni(OH)_2$
garnierite	$2(Ni, Mg)_6Si_4O_{13}, 3H_2O$
smaltite	$(NiCoFe)As_2$
white nickel ore	$NiAs_2$
nickel ochre	$Ni_3(AsO_4)_2, 8H_2O$

n. monoxide. Nickelous oxide. **n. nitrate.** Nickelous nitrate. **n. ocher (ochre).** Annabergite. **n. oleate.** $Ni(C_{18}H_{33}O_2)_2$. A waxy nickel soap or a compound of nickel with oleic acid; used medicinally in ointments. **n. oxalate.** Nickelous oxalate. **n. oxides:** NiO, nickelous oxide; Ni_2O_3, nickelic oxide; Ni_3O_4, nickelous nickelic oxide; NiO_2, nickel peroxide; NiO_4, nickel superoxide. **n. phosphate.** Nickelous phosphate. **n. plating.** The deposition of pure nickel on copper, or steel coated with copper. The deposit is soluble in acetic acid. Saturated nickel ammonium sulfate is the usual medium. **n. pyrites.** Millerite. **n. salipyrine.** A salt of nickel and salicylic acid and antipyrine. A pale greenish powder, used medicinally as an antiseptic. **n. sesquioxide.** Nickelic oxide. **n. silver.** An alloy of 10–30 % Ni, 50–70 % Cu and 10–30 % Zn. Cf. *German silver*. **n. steel.** A very tough alloy of 96.5 pts. iron and 3.5 pts. nickel. **n. stibine.** Ullmannite. **n. sulfate.** Nickelous sulfate. **n. sulfide.** Nickelous sulfide. **n. superoxide.** NiO_4 = 122.69. A black oxide produced by electrolysis. **n. tetracarbonyl.** N. carbonyl. **n. vitriol.** Morenosite. **n. yellow.** See *nickelous phosphate*.

nickelic. Niccolic. Describing compounds of trivalent nickel. They are all strong oxidizing agents, and readily reduced to the more stable nickelous compounds. **n. hydroxide.** $Ni_2(OH)_6$ = 219.41. Niccolic hydroxide. A black powder, rapidly decomp. by heat. Used as an oxidizing agent, and in the manufacture of nickelic compounds. **n. nickelous sulfide.** Ni_2S_4. Native as polydymite. **n. oxide.** Ni_2O_3 = 165.4. Nickel sesquioxide, niccolic oxide, nickel tetroxide, black nickel oxide. A black powder, d.4.83, reduced to NiO at 600°C., insoluble in water, soluble in acids and ammonium hydroxide; used in storage batteries as an oxidizing agent. **n. sulfide.** Ni_2S_3. Native as beyrichite (q.v.).

nickeline. (1) An alloy of 80 pts. copper and 20 pts. nickel. (2) An alloy consisting of 56 pts. copper, 31 pts. nickel, and 13 pts. zinc; used in high resistance apparatus.

nickelous. Describing compounds containing divalent Ni^{++}. The anhydrous salts are yellow, the hydrous salts green. **n. acetate.** $Ni(C_2H_3O_2)_2.4H_2O$ = 248.8. Green crystals, d.1.798, soluble in water. **n. arsenate.** $Ni_3(AsO_4)_2$-$8H_2O$ = 598.2. A yellowish-green powder, insoluble in water, soluble in acids. **n. benzoate.** $Ni(C_7H_5O_2)_2.H_2O$ = 318.7. A light green powder, soluble in ammonium salt solutions. **n. borate.** $Ni(BO_2)_2.2H_2O$ = 180.7. A bright green powder, insoluble in water. **n. bromide.** $NiBr_2$ = 218.52. Anhydrous nickel bromide. Yellow scales, d.4.64, decomp. by heat, soluble in water, alcohol, or ether. *hydrous-* $NiBr_2.3H_2O$ = 272.57. Nickel bromide trihydrate. Green, deliquescent needles, soluble in water, alcohol, or ether; used in medicine as an antiseptic and nerve tonic. *ammonia-* $NiBr_2.6NH_3$ = 320.73. Nickel ammonia bromide, nickelo-ammonia bromide. Purple crystals, d.1.837, soluble in water. **n. carbonate.** $NiCO_3$ = 118.7. A light green, rhombic, crystalline powder, insoluble in water, soluble in acids; used in electroplating. *basic-* $2NiCO_3.3Ni(OH)_2.4H_2O$ = 587.5. A light green, amorphous powder, insoluble in water, but soluble in acids or ammonia; used in nickel plating. **n. chloride.** $NiCl_2$ = 129.6. Anhydrous nickel chloride. Yellow scales, d.2.56, soluble in water or ammonium hydroxide. It sublimes, and is used as a reagent for detecting sulfocarbonates, as an absorbent in gas masks, for nickel plating, and for preparing sympathetic ink. *hydrous-* $NiCl_2.6H_2O$ = 237.7. Nickelo-aqua-chloride. Hexagonal green crystals, soluble in water or alcohol; similarly to the anhydrous salt. *ammonia-* $NiCl_2.6NH_3$ = 231.8. Nickelo-ammonia-chloride (different from nickelous ammonium chloride). Purple crystals, soluble in water. **n. citrate.** $Ni_3(C_6H_5O_7)_2.8H_2O$ = 698.2. Nickel citrate. A green, hygroscopic, crystalline powder, soluble in water; used in nickel plating. **n. cyanide.** $Ni(CN_2).4H_2O$ = 182.8. Nickel cyanide. An apple-green powder, insoluble in water, soluble in cyanide solutions; used in electroplating and metallurgy. **n. formate.** $(HCOO)_2Ni.2H_2O$ = 184.74. Green crystals, d.2.154, soluble in water. **n. hydroxide.** $Ni(OH)_2$ = 92.7. A white amorphous powder d.4.36, insoluble in water, soluble in ammonia. *hydrous-* $4Ni(OH)_2H_2O$ = 388.8. A light green powder, d.4.36, insoluble in water, soluble in ammonia solutions or acids; used in the manufacture of nickelous salts. **n. iodide.** NiI_2 = 312.5. Nickel iodide. Black scales, d.2.05, m.57, b.137, soluble in water or alcohol. **n. nickelic oxide.** Ni_3O_4 = 240.0. Nickel tetroxide. A gray powder, insoluble in water, soluble in acids. **n. nitrate.** $Ni(NO_3)_2$

= 182.7. Anhydrous nickel nitrate. A yellow powder, soluble in water (green color). *hydrous-* $Ni(NO_3)_2.6H_2O$ = 290.8. Nickelo-aqua-nitrate. A monoclinic, crystalline, deliquescent mass, d.2.05, m.57, b.136.7, soluble in water, alcohol, or ether; used as a reagent and in nickel plating. *ammonia-* $Ni(NO_3)_2.6NH_3$ = 284.7. Nickelo-ammonia-nitrate. Dark blue crystals, soluble in water; used combined with tannic acid, in staining hair and fur. **n. oxalate.** NiC_2O_4 = 146.7. Nickel oxalate. A pale green powder, insoluble in water, soluble in acids. **n. oxide.** NiO = 74.7. Nickel monoxide, nickel protoxide, green nickel oxide. A green powder, d.6.96, insoluble in water, soluble in acids or ammonium hydroxide; used in the manufacture of nickel salts, and in green pigments for ceramics. **n. phosphate.** $Ni_3(PO_4)_2.7H_2O$ = 492.2. Normal nickel (ortho) phosphate. A green powder, insoluble in water, soluble in acids. Used in the nickel plating of iron, copper, and brass, and in the manufacture of a yellow pigment (nickel yellow). **n. sulfate.** $NiSO_4$ = 154.8. Anhydrous nickel sulfate. Regular yellow crystals, d.3.418, decomp. 830, soluble in water or alcohol. *hydrous-* (1) $NiSO_4.7H_2O$ = 280.86. Nickelous sulfate heptahydrate, nickelo-aqua-sulfate. Green rhombic crystals, d.1.98, dehydrated at 100°C, soluble in water, or alcohol. Used in nickel plating, for blackening brass and zinc, as a mordant in the textile industry, and in medicine as a tonic and sedative; also as a reagent for glucose and albumose. (2) $NiSO_4,6H_2O$ = 262.84. Blue or green crystals, soluble in ammonia. **n. sulfide.** NiS = 90.8. Nickel sulfide. A black, hexagonal, crystalline powder, d.4.60, m.797, slightly soluble in water, soluble in acids; used in ceramics. **n. tartrate.** $NiC_4H_4O_6.5H_2O$ = 296.9. Light green powder, insoluble in water. **n. thallous sulfate.** $NiSO_4.Tl_2SO_4.6H_2O$ = 767.6. Nickel thallium sulfate. A double salt, forming green crystals soluble in water.

Nicol, William. 1768–1851. An English physicist noted for his inventions of optical devices. **N.'s prism.** See *nicols.*

nicoline. C_3H_4O = 56.0. A constituent of *Lonchocarpus rufescens,* a Leguminosae of Guiana. The plant is used by the natives to stupify fishes.

nicols. Nicol's prism. A set of two prisms of Iceland spar cemented together, used as polarizer and analyzer in polariscopes. Cf. *polaroids, polarizing disks.*

nicopyrite. A variety of pyrite containing nickel.

nicoteine. $C_{10}H_{12}N_2$ = 160.11. An alkaloidal mixture from Kentucky tobacco, consisting of nornicotine and anabasine.

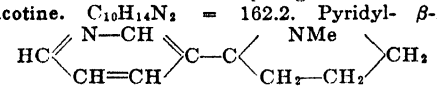
nicotelline. An alkaloid from tobacco.

nicotiana. Tobacco.

nicotianine. A volatile, fragrant principle from tobacco.

nicotinamide. $C_6H_6N_2O$ = 122.12. Niacinamide. Nicotinic acid amide, $C_5H_4N.CONH_2$. A white, crystalline powder, soluble in water. Used in the treatment of pellagra.

nicotine. $C_{10}H_{14}N_2$ = 162.2. Pyridyl- *β*-N-



methylpyrrolidine. A di-acid alkaloid from the leaves of *Nicotiana tabacum.* Colorless or yellowish liquid, d.1.01, b.247, soluble in water, alcohol or ether. Used as an antiparasitic and insecticide in horticulture and agriculture; in sheep dips; and medicinally, as an antitetanic agent. **dihydroxy-** Pilocarpidine. **neo-** Anabasine. **nor-** Nornicotine.

n. group. A group of alkaloids derived from pyridine and pyrrolidine:

1. Nicotine and pilocarpine and derivatives. 2. Sparteine, oxalethyline, and lobeline. 3. Coniine. 4. Pyridine bases. **n. hydrochloride.** $C_{10}H_{14}N_2.2HCl$ = 235.1. Colorless hygroscopic crystals, soluble in water. **n. salicylate.** $C_{10}H_{14}N_2.C_7H_6O_3$ = 300.3. Colorless plates, m.117, soluble in water, or alcohol; used medicinally in ointments for skin diseases. **n. tartrate.** $C_{10}H_{14}N_2.(C_4H_4O_6)_2.2H_2O$ = 494.4. Colorless or reddish crystals, soluble in water or alcohol; used medicinally as an anti-tetanic agent and in strychnine poisoning.

nicotinic acid. Niacin. C_5H_4NCOOH = 123.1. Pyridine-*β*-carboxylic acid, 2-pyridine-carboxylic acid*. Colorless needles, m.228, slightly soluble in water, soluble in alcohol or ether. Cf. *vitamin* B_5. **iso-** 3-pyridine-carboxylic acid. Colorless crystals, m.304, slightly soluble in water. **tetrahydro-*1*-methyl-** Arecaidine.

nicouic acid. $C_{12}H_{12}O_8$ = 284.09. *2.4*-$(COOH)_2$-*3*-$(OH).C_6H_2OCMe_2COOH$. A tribasic acid obtained from rotenone and deguelin.

nicoulin. A resin from nekoe or stink wood, *Gustavia ocotea;* used by the Malayans as an arrow poison.

nicouline. Rotenone.

niello silver. Russian tula, blue silver. A bluish alloy of silver, copper, lead, and bismuth.

Nierenstein, Max. 1877– . An English chemist, noted for organic synthesis. **N. reaction.** The synthesis of ketones by means of diazomethane: $R.COCl + CH_2N_2 \rightarrow R.COCH_2Cl + N_2$. Cf. *Schlotterbeck reaction.*

Nieuwland, Father Julius Arthur. 1878–1936. A Jesuit American chemist, noted for the synthesis of acetaldehyde, vinylacetylene and synthetic rubber from acetylene.

nigella. Black caraway, black cumin, small fennel. The dried seeds of *Nigella sativa;* used as a condiment, in snuff, and medicinally.

nigelline. An alkaloid in the seeds of *Nigella sativa,* a Ranunculaceae.

night-blooming cereus. Cactus grandiflorus.

nightshade. The name of several plants of the Solanaceae. **deadly-** Belladonna. **garden-** *Solanum nigrum.* **woody-** Bittersweet.

nigraniline. Nigrosine.

nigre. A dark colored layer, formed in the soap pan, between the neat soap and the lye, as an isotropic solution containing a higher concentration of soap than the lye, a fairly high concentration of salts and colored impurities.

nigrite. A variety of asphalt.

nigrium. Alleged new element discovered by Church in 1869, probably impure hafnium.

nigrometer. An instrument to evalue the color of carbon blacks.

nigrosine. $C_{36}H_{27}N_3$ = 525.3. Aniline black. Pure nigrosine obtained by oxidation of aniline; used as a microscopic stain.

nigrosines. A group of black or deep blue aniline dyes obtained by oxidation of aniline and its homologues. Used in the manufacture of inks and shoe polishes, and in dyeing leather, textiles, wood, and furs.

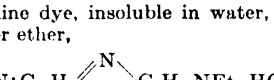
nigrotic acid. *3.6*-Dihydroxy-*2.7*-sulfonaphthoic acid.

nihil album. Zinc oxide.

nikethamide. Coramine. Nicotinic acid diethylamide.

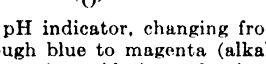
Nikiforoff stain. (1) A borax-carmine solution acidified with acetic acid and used to stain nuclei. (2) An alkaline concentrated methylene blue solution, used as counter-stain.

nile-blue. $C_{20}H_{19}ON_3$ = 317.2. A bright, green-blue aniline dye, insoluble in water, soluble in alcohol or ether,



Used as a pH indicator, changing from yellow (acid) through blue to magenta (alkaline). **n. blue sulfate.** An oxidation-reduction and pH indicator, used also as vital stain.

ninhydrin. $C_9H_6O_4$ = 178.09. A trade name. Triketohydrindene hydrate, ninidrine,



Colorless crystals, used as a reagent in the Abderhalden test for proteins and amino acids (blue color) in diagnosing pregnancy.

ninidrine. Ninhydrin.

niobate. Columbate, CbO_3^{--}.

niobe oil. Methyl benzoate.

niobic. A salt of pentavalent columbium (Nb^{+++++} or Cb^{+++++}). See *columbic.* **n. acid.** $HNbO_3$. Columbic acid. $HCbO_3$. **n. anhydride.** Nb_2O_5. Columbic anhydride, Cb_2O_5.

niobite. $(Fe,Mn)O.(Nb,Ta)_2O_3$. A native iron, manganese niobate and tantalate, which occurs in black crystals.

niobium. Nb. A metallic element, discovered in 1844 by H. Rose and named after Niobe, the daughter of Tantalus, as it resembles tantalum. It is commonly named columbium, Cb, (q.v.).

niobous. Columbous.

nioboxy. Columboxy.

nioform. Vioform.

nipagin. $C_8H_8O_3$ = 152.06. Solbrol. Methyl-*p*-hydroxybenzoate, $HO.C_6H_4COOMe$. An isomer of methylsalicylate, used as a preservative.

nipasol. $C_{10}H_{12}O_3$ = 180.18. Propyl-*p*-hydroxybenzoate. White powder, used as preservative.

nipecotic acid. $C_5H_{10}N.COOH$ = 129.09. 3-piperidinecarboxylic acid. An isomer of hygric and nicotinic acids, q.v.

nipponium. The element No. 43 reported by Ogawa. It has not been verified. See also *masurium.*

ni-resist. A heat-resistant, non-magnetic weldable alloy of iron with 12–15 % Ni, 5–7 % Cu and 1.5–4 % Cr, used in glass-annealing furnaces and in manifold valves of automobile engines.

nirvanine. $C_{14}H_{20}O_4N_2$ = 280.2. Diethylglycine-methyl-*2*-hydroxy-*5*-amino benzoate.

$$Et_2N.CH_2CONH.C_6H_3(OH)COOMe.$$

A cocaine alkaloid. Colorless prisms, m.185, soluble in water; used medicinally as a local anesthetic.

nirvanol. $C_{11}H_{12}O_2N_2$ = 204.11. *5.5*-phenylethyl hydantoin. A white powder, used as a hypnotic. Cf. *luminal.*

nisinic acid. $C_{24}H_{36}O_2$ = 356.29. A highly-unsaturated acid from fish liver oils.

niter, nitre. Potassium nitrate. **Chile- or cubic-** Sodium nitrate. **Norwegian-** Calcium nitrate. **rough-** Magnesium chloride. **spirit of-** Spirit of *ethyl nitrite.*

n. air. See *oxygen.* **n. cake.** Crude sodium sulfate containing some bisulfate and nitrate, obtained as a by-product in the manufacture of nitric acid by the retort process.

niton. Nt. (1) The element of atomic number 86, which consists of the isotopes radon, actinon, and thoron. It was discovered in 1898 by Mme. Curie. (2) Radon.

nitracetanilide. $C_8H_8O_2N_2$ = 180.12. Nitroacetanilide. Colorless crystals, *o-* m.92, *m-* m.151, *p-* m.210.

nitragin. A nitrifying bacterial ferment obtained from the root tubercles of leguminous plants.

nitralloy. Chromium-aluminum steels containing 0.2–0.6 % carbon. They are surface-hardened by nitridation.

nitramide. NH_2NO_2 = 62.1. Colorless crystals, m.75. **phenyl-** $C_6H_5NH.NO_2$ = 138.1. Colorless crystals, m.46, b.98, soluble in water.

nitramides. A group of compounds derived from nitramide and differing from nitramines by the presence of a —COO— radical:

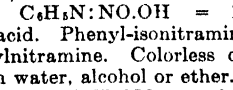
$NO_2.NH_2$ = nitramide
$NO_2.NH.COOH$ = nitrocarbamic acid
$NO_2.NH.COOEt$ = nitrourethane
$NO_2NH.CH_2.COOH$ = nitramineacetic acid.

nitramine. (1) An organic compound containing the monovalent $-NH.NO_2$ or the bivalent $=N.NO_2$ radical. (2) Picrylmethylnitramine used as a pH indicator, changing at pH 10.5 from colorless (weakly) alkaline to brown (strongly alkaline). **diethyl-** $Et_2N.NO_2$ = 118.1. A colorless liquid, b.206. **dimethyl-** $Me_2N.NO_2$ = 90.1. Colorless crystals, m.58, b.187, soluble in water. **ethyl-** $EtNH.NO_2$ = 90.1. A colorless liquid, m.3. **iso-** An organic compound containing the monovalent

radical. **phenyl-** $NHPh.NO_2$ = 138.1. Colorless crystals, m.46, b.98, soluble in water. **phenylmethyl-** $MeNPh.NO_2$ = 152.2. Colorless crystals, m.39, soluble in water. **propyl-** $PrNH.NO_2$. A colorless liquid, b.140.

nitramino. The monovalent radical, $NO_2NH—$. **n. acetic acid.** $C_2H_4O_4N_2$ = 120.2. A homolog of nitrourethane: $NO_2.NH.CH_2.COOH$. Colorless crystals, m.103, soluble in water, or alcohol, with a strong acid reaction.

nitranilic acid. $C_6H_2O_8N_2$ = 230.07. Dinitrodihydroxy benzoquinone



A solid, m.100, decomp. 170, soluble in water or alcohol, but insoluble in ether.

nitranilide. $C_6H_5N:NO.OH$ = 138.1. Diazobenzene acid. Phenyl-isonitramine. An isomer of phenylnitramine. Colorless crystals, m.46, soluble in water, alcohol or ether.

nitraniline. $NH_2.C_6H_4.NO_2$ = 138.1. **ortho-** 1.2-nitraniline, 1-amino-2-nitrobenzene. Colorless needles, d.1.443, m.71, slightly soluble in water, soluble in alcohol or ether. **meta-** 1.3-nitraniline. Yellowish needles, d.1.430, m.114, b.285, slightly soluble in water, soluble in alcohol or ether. **para-** 1.4-nitraniline. Yellow needles, $d._{14}$1.437, m.146, slightly soluble in water, soluble in alcohol or ether. Used in organic synthesis and as indicators for strong acids. **di-** See *dinitroaniline.*

nitranilines. A group of compounds derived from benzene by the substitution of two or more hydrogen atoms by one or more NH_2— and NO_2— radicals:

Mononitranilines: 1.2- = ortho-, 1.3- = meta-, and 1.4- = para-.

Dinitranilines: 1.2.3- and 1.2.4-.

Trinitranilines: 1.2.4.6- = Picramide.

Tetranitraniline: 1.2.4.5.6- = Tetryl.

The higher nitrated anilines are extremely powerful explosives.

nitrate. (1) A salt of nitric acid, or any compound containing the monovalent —NO_3 radical. (2) Nitration. **n. ion.** The NO_3^- ion, colorless, and forming no insoluble precipitates with metallic ions. **n. of lime.** Calcium nitrate. **n. of potash.** Potassium nitrate. **n. of soda.** Sodium nitrate. **n. of soda-potash.** A crude Chilean saltpeter containing 75 % $NaNO_3$ and 25 % KNO_3, used as fertilizer.

nitrated. Describing an organic compound containing the —NO_2 group.

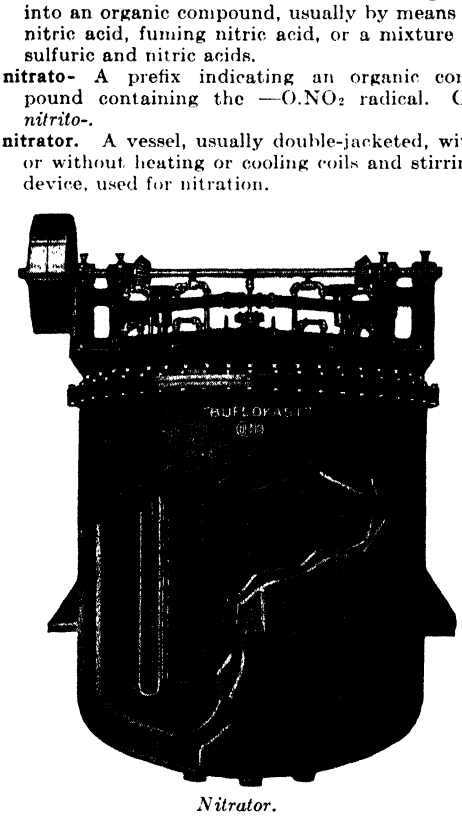
nitratine. A mineral form of sodium nitrate.

nitrating. Performing a nitration, q.v.

nitration. The introduction of the NO_2 group into an organic compound, usually by means of nitric acid, fuming nitric acid, or a mixture of sulfuric and nitric acids.

nitrato- A prefix indicating an organic compound containing the —$O.NO_2$ radical. Cf. *nitrito-*.

nitrator. A vessel, usually double-jacketed, with or without heating or cooling coils and stirring device, used for nitration.



Nitrator.

nitrazine yellow. A dye used as a pH-indicator. At pH 6.5 it changes from yellow (acid) to blue-green (alkaline). **n. paper.** A filter-paper impregnated with sodium dinitrophenyl-azo-naphthol disulfonate; used to determine pH-values of solutions as follows: yellow, pH 4.5; olive green, pH 6.2; blue, pH 7.0.

nitre. Niter. **n. air.** See *oxygen*.

nitrenes. A group of compounds of the type, $R_2C{:}NR{:}CR_2$.

nitric acid. HNO_3 = 63.02. A colorless liquid, $d._0$1.53, m. −40.3, b.86, soluble in water in all proportions; used extensively in its aqueous solutions:

(a) Fuming, d.1.48, containing 86 % HNO_3.

(b) Concentrated, d.1.40–1.42, containing 65 % HNO_3.

(c) d.1.20, containing 32–34 % HNO_3.

(d) Dilute, d.1.06, containing 10 % HNO_3.

concentrated- 65 % HNO_3. Aqua fortis, azotic acid. A clear, colorless or faintly yellow liquid, d.1.40. Used as a solvent for metals, as an oxidizing agent, in nitrating organic compounds, as a reagent, in etching, and in innumerable chemical operations. **chloro-** See *chloro-*. **diluted-** 10 % HNO_3. A clear, colorless liquid, used as a reagent, as a solvent, as an acidifying agent, and in numerous chemical operations. **fuming-** 86 % HNO_3 with some N_2O_4. Yellow or brownish-red fuming liquid, d.1.48–1.5. Used as an energetic oxidizing agent in chemical analysis and synthesis. **per-** HNO_4. An acid of doubtful existence. **n. anhydride.** Nitrogen pentoxide. **n. hydrate.** $HNO_3 + 32\ \% H_2O$. $d._{15.5}$1.414, b.120.5.

nitric ether. Ethyl nitrate.

nitric oxide. NO = 30.0; N_2O_2 = 60.0. Nitrogen dioxide. A colorless gas, $d._{(air=1)}$1.0366, m. −160, b. −153. Slightly soluble in water. Formed in the electric arc from air, and oxidizes readily to nitrogen peroxide.

nitridation. (1) The formation of metallic nitrides by heating metals in an atmosphere of nitrogen. The hardness of the metal is increased. Cf. *nitration*. (2) A type of de-electronation in the ammonia system, analogous to oxidation in the water system. Cf. *nitridizing agent*.

nitride. A binary compound of nitrogen and a metal. The alkali and earth-alkali nitrides are readily hydrolyzed by water to ammonia: $Mg_3N_2 + 6H_2O = 3Mg(OH)_2 + 2NH_3$.

nitridizing agent. A substance which furnishes nitrogen or causes an exchange of electrons in liquid ammonia; as, hydrazoic acid (ammono-nitric acid) HN_3, iodoamine (ammono-hypoiodous acid) H_2NI, mercuric nitride Hg_3N_2, which are analogous to HNO_3, HOI and HgO as oxidizing agents.

nitrifiable. Any nitrogen compound that can be transformed into nitrates by soil bacteria.

nitrification. The oxidation of the nitrogen in ammonia to nitrous and nitric acid or salts.

nitrifiers. The soil bacteria which oxidize ammonia and its derivatives to nitrites, as nitromonas and nitrococcus; or to nitrates, as nitrobacter.

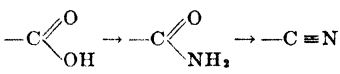
nitrifying. To cause the oxidation of ammonia or atmospheric nitrogen to nitrites and nitrates, *e.g.*, by n. bacteria and n. catalysts.

nitrilase. A catalase which converts aldehydes to hydroxynitriles or cyanohydrins, R.CHOH.-CN.

nitrile. A cyanide prepared from an acid amide, $R.CONH_2 - H_2O$ = R.CN; hence acetonitrile or methylcyanide, propionitrile or ethylcyanide, which on hydrolysis yield the corresponding acid with evolution of ammonia. **n. group.** The negative, trivalent ≡N which remains from ammonia after substitution of its three hydrogen atoms.

nitriles. Cyanides. An organic compound containing the monovalent —CN radical. **acid-**

Nitrile. This name indicates their relationship with the —COOH group:



On hydrolysis they yield acid amides and acids. **basic-** A tertiary amine: NR_3. It differs from the nitriles by having three different carbon atoms attached to the same nitrogen. **di-** Dicyanide. A compound containing two —CN radicals. **mono-** A compound containing one —CN radical.

nitrilo- A prefix indicating the presence of a triple bond nitrogen atom, ≡N

nitrine. N_3 = 42.02. A hypothetical allotropic form of nitrogen analogous to ozone, O_3. See *active nitrogen.*

nitrite. A salt of nitrous acid, or a compound containing the monovalent —NO_2 radical. The inorganic nitrites of the type, MNO_2, are all insoluble, except the alkali-nitrites. The organic nitrites or nitrito-compounds may be isomeric, but not identical with the corresponding nitro-compounds.

nitrito- Describing an organic compound containing the monovalent —O.N:O (or oxynitroso) radical.

nitro- (1) A prefix which denotes the presence of the monovalent —NO_2 or  radical.

Nitro-compounds are usually yellowish in color, and differ from the less stable, isomeric nitrito-compounds. Cf. *nitroxyl, nitrite, nitrito.* (2) A misnomer for nitrate; as, nitroglycerin (glyceryl nitrate). **aci-** Isonitro- **iso-** See *isonitro-*

nitroacid. A compound containing both the —COOH and —NO_2 radicals, as
$NO_2.CH_2.COOH$ = nitroacetic acid;
$NO_2.CH_2.CH_2.COOH$ = nitropropionic acid.

nitroalizarin. $C_{14}H_5O_2(OH)_2NO_2$ = 285.1. **alpha-** or 4:1:2. Yellow crystals, decomp. 290. **beta-** 3:1:2. Alizarin orange. Orange-yellow crystals, decomp. 244, slightly soluble in water, soluble in alcohol; used as dye, and as an intermediate in organic synthesis.

nitroamine. Nitramine.

nitroanisole. $C_6H_4(OMe)NO_2$ = 153.1. **ortho-** 1-methoxy-2-nitrobenzene. A yellow liquid, d.1.268, m.9, b.265. **meta-** m.38, b.258. **para-** Colorless or yellowish plates, d.1.233, m.54, b.258. Both are insoluble in water, soluble in alcohol or ether.

nitroanthracene. $C_{14}H_9NO_2$ = 223.2. Nitroso-anthrone. Yellow needles, m. 146, insoluble in water, soluble in benzene or chloroform.

nitroanthraquinone. $C_6H_4(CO)_2C_6H_3NO_2$ = 253.1. **alpha-** or 1- Yellow needles, m.228, subliming when heated, insoluble in water, soluble in alcohol or ether. **beta-** or 2- Yellow needles, m.184, subliming when heated, insoluble in water, soluble in alcohol or ether. **n. sulfonic acid.** A reagent for sugars.

nitrobacter. A soil bacterium or other micro-organism that oxidizes ammonia and its derivatives, or atmospheric nitrogen, to nitrites or nitrates.

nitrobacteria. Soil bacteria, as nitrobacter, nitrosococcus or nitrosomonas.

nitrobarite. A native barium nitrate, $Ba(NO_3)_2$.

nitrobenzaldehyde. $C_6H_4(NO_2)CHO$ = 151.1. **ortho-** Yellow needles, m.44, $b._{23mm}$153, slightly soluble in water, soluble in alcohol or ether. **meta-** Colorless needles, m.58, $b._{23mm}$164, soluble in alcohol or ether. **para-** Colorless prisms, m.106, slightly soluble in water, soluble in alcohol or ether; used in organic synthesis. The ortho-compound is used in the synthesis of indigo.

nitrobenzamide. $NO_2.C_6H_4.CONH_2$ = 166.1. **ortho-** Colorless needles, m.174, b.317, soluble in water, alcohol, or ether. **meta-** Yellow needles, m.140, b.310, soluble in alcohol or ether. **para-** Colorless needles, m.198, slightly soluble in water, soluble in alcohol or ether; used in organic synthesis.

nitrobenzanilide. $NO_2.C_6H_4.CONHPh$ = 242.2. **meta-** 3-nitro-1-benzamido benzene. Colorless leaflets, m.143, insoluble in water, soluble in alcohol or ether.

nitrobenzene. $C_6H_5NO_2$ = 123.08. Nitrobenzol, oil of mirbane, phenylnitrite, essence of mirbane, artificial oil of bitter almonds. $Ph\text{-}NO_2$. A yellow liquid, $d._{20°}$1.198, m.5, b.210, slightly soluble in water, soluble in alcohol or ether. Used as a reagent for sulfur, calcium oxide, and glucose; in perfumery, as a substitute of almond oil; technically, in large quantities, as a raw material for aniline and aniline derivatives, benzidine, quinoline, and other organic compounds. **amino-** Nitraniline. **chloro-** $C_6H_4ClNO_2$ = 157.50. Colorless crystals. **o-** d.1.365, m.32.5, b.245.7. **m-** d.1.534, m.44, b.235. **p-** d.1.520, m.83.5, b.242. **di-methyl-** Nitroxylene. **methyl-** Nitrotoluene. **tetra-** q.v. **tri-** q.v.

n. azoresorcinol. Magneson. A reagent for magnesium (blue color). **n. reduction.** The chemical reactions involved in the reduction of nitro-benzene to amino-benzene (aniline) in alkaline solutions. The following compounds are produced:

$PhNO_2 + NO_2Ph$ = 2 mol. nitrobenzene.
$Ph.N\langle\rangle N.Ph$ = 1 mol. azoxybenzene.
$Ph.N{=}N.Ph$ = 1 mol. azobenzene.
$Ph.NH{-}NH.Ph$ = 1 mol. hydrazobenzene.
↓ $PhNH_2 + NH_2Ph$ = 2 mol. aniline.

n. sulfonylchloride. A reagent for amines.

nitrobenzoic acid. $NO_2.C_6H_4.COOH$ = 167.1. **ortho-** Yellow crystals, d.1.57, m.148 soluble in water, alcohol or ether; used in organic synthesis and as a reagent. **meta-** Yellowish white leaflets, d.1.49, m.141.4, soluble in water, alcohol, or ether. **para-** Nitrodracylic acid. Yellowish crystals, d.155, m.242.4, slightly soluble in water, soluble in alcohol or ether; used in organic synthesis.

nitrobenzol. Nitrobenzene.

nitrobenzonitrile. $NO_2.C_6H_4.CN$ = 148.1. **ortho-** 2-nitro-1-cyano-benzene. Colorless, silky needles, m.109, soluble in hot water, alcohol, or ether. **meta-** Colorless needles, m.115, slightly soluble in water, soluble in alcohol, or ether. **para-** Colorless leaflets, m.149, insoluble in water, slightly soluble in alcohol, soluble in chloroform or ether; used in organic synthesis.

nitrobenzophenone. $NO_2.C_6H_4.CO.C_6H_5$ = 227.1. **ortho-** Colorless needles, m.105, soluble in alcohol. **meta-** Colorless leaflets, m.95, soluble in alcohol. **para-** Colorless needles, m.1?8, soluble in alcohol.

nitrobenzoquinone. $C_6H_3O_2NO_2$ = 153.1. Yellow crystals, decomp. 206, slightly soluble in water.

nitrobenzoyl. The monovalent radical, $NO_2.C_6H_4.CO$—, derived from nitrobenzoic acid. **n. chloride.** $C_7H_4O_3NCl$ = 185.5. **ortho-** A solid, m.75, $b._{165mm}$205. **meta-** m.34, b.278. **para-** m.72. **n. formate.** $C_6H_4NO_2.CO.COOH$ = 195.09. **ortho-** A solid, soluble in warm water, m. about 123.

nitrobenzyl. The monovalent radical, $NO_2.C_6H_4.CH_2$—, derived from nitrotoluene by replacing a hydrogen of the methyl group. Three isomeric radicals: ortho-, meta-, and para-nitrobenzyl. **n. alcohol.** $NO_2C_6H_4CH_2OH$ = 153.1. **ortho-** Colorless needles, m.74, slightly soluble in water, soluble in alcohol or ether. **meta-** Rhombic crystals, m.27, **para-** Colorless needles, m.93, b.180, soluble in alcohol or ether. **n. bromide.** $C_6H_4NO_3CH_2Br$ = 215.95. A reagent for hydroxy compounds. **n. chloride.** $C_6H_4NO_2.CH_2Cl$ = 171.55. **ortho-** A solid, m.48. **meta-** A solid, m.46. **para-** A solid, m.71. **n. cyanide** $NO_2C_6H_4CH_2CN$ = 162.1. **ortho-** Colorless needles, m.83, soluble in hot water. **meta-** Colorless prisms, m.115, insoluble in water, soluble in alcohol or ether. **para-** Colorless crystals, m.110, soluble in alcohol.

nitrobromoform. NO_2CBr_3 = 297.78. Bromopicrin. A colorless liquid, d.2.81, m.10, $b._{48mm}$.-128, insoluble in water, soluble in alcohol or ether.

nitrocarbamate. Any salt or ester of nitrocarbamic acid or a compound containing the $NO_2.NH.COO$— radical. **ethyl-** Urethane. **potassium-** $NO_2NHCOOK$.

nitrocarbamic acid. $CH_2N_2O_2$ = 74.0. $NO_2.NH.COOH$.

nitrocarbol. Nitromethane.

nitrocellulose. $C_6H_7O_5(NO_2)_3$ = 297.2. Any ester of nitric acid and cellulose; thus, pyroxylin (11.2–12.4 % N) and guncotton (12.4–13 % N). Cf. *rayon, viscose.* A granular, amorphous, yellow mass used in the manufacture of celluloid and collodion; mixed with picrates and other explosives, as an explosive; also extensively used as constituent of lacquers, q.v. The name is also applied to other nitrates of cellulose (cf. *cellulose nitrate*).

nitro-chalk. A fertilizer containing 10 % of available nitrogen. It consists of ammonium nitrate and calcium carbonate (cf. *calnitro*).

nitrochlorobenzene. $NO_2C_6H_4Cl$ = 157.6. **ortho-** Colorless crystals, soluble in alcohol or ether; used in organic synthesis.

nitrochlorobenzol. Nitrochlorobenzene.

nitrochloroform. Chloropicrin.

nitrocinnamic acid. $NO_2C_6H_4CH:CHCOOH$ = 193.1. **ortho-** Colorless scales, m.240, insoluble in water, soluble in alcohol or ether. **meta-** Yellow needles, m.196, slightly soluble in water. **para-** Colorless prisms, m.285, insoluble in water, soluble in alcohol or ether; used in organic synthesis.

nitrococcus. Nitrosococcus.

nitrocolors. A series of colored compounds and dyes containing the nitro-group, as picric acid, naphthol yellow, naphthol green.

nitrocompound. An organic compound containing the monovalent —NO_2 group.

nitrocotton. Guncotton.

nitrocresol. $CH_3.C_6H_3.NO_2.OH$ = 153.10. A yellow solid, m.54, soluble in ether or alcohol, insoluble in water.

nitrocumene. $C_9H_{11}O_2N$ = 165.14. $C_6H_4.NO_2.CHMe$. A colorless liquid, m.−35, b.224 (decomp.).

nitrocymene. Nitroisopropylmethyl benzene.

nitrodiethylaniline. $NO_2C_6H_4NEt_2$ = 194.2. **ortho-** A soluble oily liquid, b.290. **para-** Colorless needles, m.77, soluble in hot alcohol or ether.

nitrodimethylamine. NO_2NMe_2 = 114.1. Colorless crystals, m.57, b.187, soluble in water, alcohol, or ether.

nitrodimethylaniline. $NO_2C_6H_4NMe_2$ = 166.14. **ortho-** A liquid, $b._{32mm}$151. **meta-** Red prisms, d.1.31, m.60, decomp. 280, insoluble in water, soluble in alcohol or ether. **para-** Yellowish needles, m.164, insoluble in water, soluble in alcohol or ether.

nitrodiphenyl. $NO_2C_6H_4Ph$ = 199.14. **ortho-** Colorless leaflets, m.37, b.320, insoluble in water, soluble in alcohol or ether. **meta-** Yellow solid, m.61. **para-** Colorless needles, m.114, b.340, insoluble in water, slightly soluble in alcohol or ether.

nitrodracylic acid. p-Nitrobenzoic acid.

nitrodye. A dyestuff containing one or more nitro-groups (**n**itrocolor).

nitroerythrite. Nitroerythrol.

nitroerythrol. $C_4H_6(NO_3)_4$ = 302.11. Butine tetranitrate, erythrol tetranitrate, tetranitroerythritol. Large glistening plates, m.61, exploding on percussion or heating, soluble in ether, slightly soluble in water; used in explosives.

nitroethane. $C_2H_5NO_2$ = 75.047. A colorless liquid, d.1.056, m.−50, b.114, slightly miscible with water, soluble in alcohol or ether; cf. *ethyl nitrite.*

nitroform. $CH(NO_2)_3$ = 151.1. Trinitromethane. Colorless crystals, m.15, which explode when heated, soluble in water.

nitrogelatin. Dynamite.

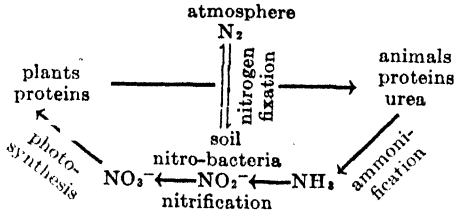
nitrogen. N = 14.008. A gaseous element (N_2) in the atmosphere, atomic number 7. Colorless gas, $d._{air=1}$ 0.967, m.−210, b.−195, slightly soluble in water or alcohol. Nitrogen was first produced by Rutherford in 1772 from air and named "mephitic air," Priestley, in 1780, called it "phlogisticated air," and Cavendish, in 1785, produced nitric acid from air and called it nitrogen (niter-producing gas). Nitrogen (as element) occurs in many minerals, *e.g.*, chili nitre $NaNO_3$, saltpeter KNO_3. The principal valencies of nitrogen are 3 and 5, but it forms numerous oxides and several series of compounds. On account of its readiness to change its valency, all nitrogen-containing compounds are fairly unstable, such as explosives and proteins. It is the cheapest chemical substance, and is used in the manufacture of nitric acid, nitrates, cyanamides, ammonia, nitrides, and cyanides by the various processes of nitrogen fixation. The different series of nitrogen compounds, or the various stages of oxidation are closely interrelated (see table). **activated-** Excited. **active-** A chemically-active form of nitrogen, which is considered by some to be analogous to ozone, N_3; by others to be of atomic character. It has a characteristic afterglow. **alloxuric-** The N contained in organic tissues which is bound in purine bases. **alpha-** See *n. molecule.* **ammonia-** The N of the NH_4 group of ammomniu salts. **atmospheric-** The N of the atmosphere, q.v. **beta-** See *n. molecule.* **carboxyl-** α-amino acid

NITROGEN COMPOUNDS

Valence		Oxide or hydride	Hydroxide or acid	Derivatives
Reduction ↓ Oxidation ↑	+5	N_2O_5	HNO_3	nitrates
	+4	N_2O_4		
	+3	N_2O_3	HNO_2	nitrites
	+2	N_2O_2		
	+1	N_2O	HNO	hyponitrites
	±0	N_2		nitrogen
	−1	(NH)	NH_2OH	hydroxylamines
	−2	N_2H_4		hydrazines
	−3	NH_3	NH_4OH	ammonium salts

nitrogen. **excited-** The N which has been exposed to radiations and low pressures and has become luminous, due to the electrons passing back from the excited to the normal state: $N^* = N + h\nu$. **filtrate-** Rest n. **fixed-** See *n. fixation.* **formol-** The N of the NH_2 group of amino acids. See *formol titration.* **free-** Uncombined N; as in the atmosphere, or the elementary N which enters vegetable or animal tissues (leaves or lungs). **hydro-** See *hydronitrogens.* **ionized-** The atoms or molecules of nitrogen which have become ionized at low pressures, and are the cause of certain lines in the spectra of aurora, corona, nebulas and stars. They are indicated as NI for singly- and NII for doubly-ionized N. **ortho-** See *n. molecule.* **oxides of-** See *nitrous oxide* (N_2O), *nitric oxide* (NO), *nitrogen peroxide* (N_2O_4), *nitrogen pentoxide* (N_2O_5). **para-** See *n. molecule.* **protein-** The N contained in the protein portion of the tissues. **radio-** A short-lived isotope of mass 13, obtained by bombardment with alpha-particles. Cf. *radio elements.* **soil-** The N found in the soil as nitrate or nitrites. **urea-** The N eliminated as urea.

n. apparatus. A glass apparatus for the determination of N in urine. **n. balance.** The relation of n. intake (proteins) to the n. output (urea, uric acid) of the human body. In the normal adult it is equal. **n. benzide.** Azobenzene. **n. carbon monoxide.** $CO(N_3)_2 = 112.06$. The compound, $N_3—CO—N_3$. **n. cycle.** The passage of nitrogen from the atmosphere to the soil by means of gaseous nitrogen compounds produced as a result of climatic changes (*e.g.*, thunder storms); through bacteria to the plant; from the plant to the animal body; and thence back to the soil as excreta:



n. degradation. The annual loss of N from the soil by crops. In U.S. it is estimated as:

Removal of N by crops	9,000,000 tons
Returned as fertilizer	5,466,000 tons
Degradation, or loss	3,534,000 tons

n. dioxide. Nitric oxide. **n. equilibrium.** The state of an organism in which the N in the food equals the amount of N in the excreta during a definite period. **n. equivalent.** The amount of nitrogen contained in proteins: 1 gm. nitrogen is equivalent to 6.25 gm. of protein, or 1 gm. of protein to 0.16 gm. of nitrogen. **n. fixation.** A process by which atmospheric nitrogen is made into a compound; two types:

(a) natural processes
  (1) Non-symbiotic fixation—the direct conversion of atmospheric nitrogen to nitrates by soil bacteria; as, azotobacter.
  (2) Symbiotic fixation—the gradual conversion of atmospheric nitrogen into nitrates by the intermediate formation of ammonia and nitrites. Each step is due to a certain group of bacteria, as nitrosococcus, nitrosomonas, etc.

(b) artificial processes
  (1) The electric arc process—the direct union of nitrogen and oxygen to oxides of nitrogen at 2800–3300°C. in the electric arc. It requires 12 HP-year for each ton of nitrogen.
  (2) Furnace process (Hausser process)—the direct union of oxygen and nitrogen in an electric furnace.
  (3) Haber process—the direct catalytic union of nitrogen and hydrogen to form ammonia at 200 atm. pressure and 600°C. It requires ½ HP-year for each ton of nitrogen.
  (4) Claude process—similar to the Haber process, but at 900 atm. pressure.
  (5) Casalle process—similar to the Haber process, but uses 600 atm. pressure.
  (6) Nitride process (Serpek process)—the formation of metallic nitrides: $Al_2O_3 + 3C + N_2 = 2AlN + 3CO$ at 1750°C. It requires 2 HP-year for each ton of nitrogen.
  (2) Cyanamide process—the formation of calcium cyanamide from calcium carbide and nitrogen at 1100°C. It requires 2 HP-year for each ton of nitrogen.

(8) Cyanide process (Bucher process)—the formation of cyanides, as $Na_2CO_3 + 4C + N_2 = 2NaCN + 3CO$ at 1000°C. It requires 1½ HP-year for each ton of nitrogen.

World consumption (1926):

atmospheric n	588,000 tons
(ammonia n	408,000 tons)
(cyanamide n	150,000 tons)
(arc process	30,000 tons)
coal distillation	333,000 tons
Chilean nitrate	324,000 tons.

In 1935 the World's nitrogen-fixation production was:

Germany	33.3 %	England	2.6 %
Japan	16.8 %	Poland	1.7 %
France	8.9 %	Yugoslavia	1.1 %
United States	8.8 %	Czechoslovakia	1.0 %
Norway	5.9 %	Switzerland	0.5 %
Italy	5.9 %	Manchuria	0.5 %
Netherlands	5.3 %	Sweden	0.4 %
Belgium	3.7 %	Spain	0.3 %
Canada	3.1 %	Rumania	0.1 %

n. iodide. $N_2H_3I_3$ = 411.80. A dark-red explosive compound, d.3.5, soluble in water. **n. lag.** The time elapsing between protein intake and the appearance of an equivalent amount of nitrogen compounds in the urine. **n. molecule.** Like the hydrogen molecule (q.v.) normal N_2 is a mixture of 1 part *ortho*-N or β-N with odd rotational quantum numbers, (1.3.5.7 . . .); and 2 parts *para*-N or α-N with even rotational quantum numbers (0.2.4.6 . . .). **n. monoxide.** Nitrous oxide. **n. output.** An indication of protein metabolism by an analysis of the waste materials. The daily nitrogen output is:

	N-rich diet	N-poor diet
Total N_2	14.8–18.2 gm.	4.8–8.0 gm.
Distributed as follows		
Urea-nitrogen	86–89 %	62–80 %
Ammonia-nitrogen	3–5 %	4.11 %
Creatinine-nitrogen	3–4 %	5–11 %
Uric acid-nitrogen	0.5–1 %	1–2.5 %
Undetermined nitrogen	3–5 %	5–15 %

n. oxychloride. NOCl = 65.5. Nitrosylchloride. Yellow or red crystals or a colored gas, $d._{air=1}2.31$, m. −60, b. −5, decomp. by water. It is a constituent of aqua regia, and a strong oxidizing agent. **n. partition.** The distribution of the total nitrogen in urea, ammonia, uric acid, and other compounds (see *nitrogen output*). **n. pentoxide.** N_2O_5 = 108.0. Nitric acid-anhydride. Colorless crystals, d.1.64, m.30, b.46, (decomp.), soluble in water forming nitric acid. **n. peroxide.** N_2O_4 or NO_2 = 46.0. An isomer of nitrogen tetroxide. Colorless crystals, m. −9.3, b.22; or a brown gas of irritating odor. **n. sulfides.** (1) N_4S_4 = 184.28. An orange-red crystalline solid, d.2.2, m.179, decomp. 185, or by water; sublimes at 135. (2) N_2S_5 = 188.32. Nitrogen pentasulfide. A deep red liquid $d._{18°}1.9000$ m.10–11, decomp. by heat. **n. sulfochloride.** N_2S_4Cl. Thiazylchloride. **n. tetroxide.** N_2O_4 = 92.0. An isomer of nitrogen peroxide. A colorless crystalline mass at low temperatures, d.1.49, m. −9, b.22, soluble in water. **n. tribromide.** NBr_3 = 253.77. A dark red, volatile explosive oil. **n. trichloride.** NCl_3 = 120.39. A dark liquid, exploding at 95. **n. trifluoride.** NF_3 = 71.01. A liquid, m. −200. **n. trioxide.** N_2O_3 = 76.0. A bluish-green liquid, d.1.447, m. −103, b.3.5, soluble in water.

nitrogenated. Containing nitrogen. **n. oil.** Describing an oil containing nitrogen compounds, as oil of bitter almonds.

nitrogenium. The Latin name for nitrogen.

nitrogenization. The act of combining with nitrogen; or of impregnating with nitrogenous compounds.

nitrogenize. To combine with nitrogen; or to impregnate with nitrogenous compounds.

nitrogenous. A compound containing nitrogen, or a substance containing nitrogen compounds. **n. equilibrium.** A condition in metabolism, in which the intake and output of nitrogen are equal. **n. food.** An article of food containing proteins. **n. tankage.** Process tankage. A fertilizer made by digesting nitrogenous waste materials (wood, felt, leather, hair, feathers, etc.) with steam under pressure, sometimes adding sulfuric acid, drying and grinding.

nitroglucose. $C_6H_9O_8NO_2$ = 207.2. Yellowish crystals, used medicinally as an arterial stimulant.

nitroglycerin. $C_3H_5(ONO_2)_3$ = 227.1. Glyceryl nitrate, nitroglycerol, trinitrin, agioneurosin, nitric ester of glycerin, glonoin, trinitroglycerin, propenyltrinitrate, nitroleum, blasting oil. A colorless or pale yellow oil, d.1.60, m.13, explodes 260, insoluble in water, soluble in alcohol or ether. Used in the preparation of explosives; and medicinally, as a vasodilator.

nitroglycerol. Nitroglycerin.

nitro group. Nitryl. The monovalent —NO_2 group.

nitroguanidine. $NO_2.NH.CNH.NH_2$ = 104.1. Colorless needles, m.230 (decomp.), slightly soluble in water, soluble in alcohol, ether or potassium hydroxide.

nitrohydrochloric acid. Aqua regia.

nitroic acids. A group of compounds containing the monovalent—$NO(OH)_2$ radical.

nitroleum. Nitroglycerin.

nitrolevulose. Levulose nitrate, dextrose nitrate. Yellow crystals, which explode when heated.

nitrolic acid. A series of organic compounds of the type, $R—C\begin{matrix}NOH\\ \\ NO_2\end{matrix}$; thus,

$H.C(:NOH)NO_2$ is methylnitrolic acid, or nitroformoxime, m.64

$CH_3—C(NOH)NO_2$, ethylnitrolic acid or nitroacetoxime, m.80.

$CH_3.CH_2.C(:NOH)NO_2$, propylnitrolic acid, m.60.

The solutions of nitrolic acids are deep red.

nitrolim(e). Calcium cyanamide.

nitrols. A series of organic compounds of the type,

$R_2{=}C\begin{matrix}NO\\ \\ NO_2\end{matrix}$, or $R.CH\begin{matrix}NO\\ \\ NO_2\end{matrix}$,

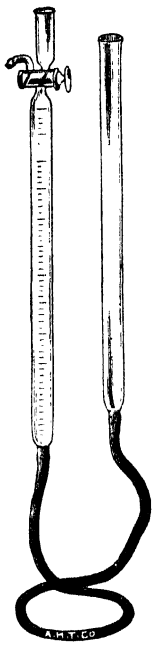
thus, $(CH_3)_2{=}C(NO)NO_2$, propyl-pseudonitrol. The solutions of nitrols are deep blue.

nitromagnesite. A native magnesium nitrate, $Mg(NO_3)_2.xH_2O$.

nitromannite. Mannitol nitrate.

nitrometal. An addition-compound (nitroxyl) of nitric oxide and metallic oxides, *e.g.*, Cu_2NO_2, Ni_2NO_2, or Co_2NO_2. They form nitrites and NO with water, and are decomposed by heat into the metal and NO_2.

nitrometer. A glass apparatus for measuring nitrogen or other gases evolved during a chemical reaction. It consists essentially of a buret (a eudiometer with a two-way stopcock connecting the air or a funnel to the buret) in which NO is liberated from the sample by concentrated sulfuric acid in the presence of mercury.



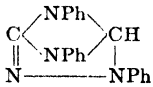
Nitrometer.

nitromethane. CH_3NO_2 = 27.0. Nitrocarbol. A heavy, colorless liquid, d.1.14, m. −26, b.101, slightly soluble in water, soluble in alcohol or ether.

nitromonas. A group of soil bacteria that convert ammonium salts into nitrites and nitrates. They will not grow in organic media.

nitromuriatic acid. Aqua regia.

nitron. (1) $C_{20}H_{16}N_4$ = 312.39. 1.4-Diphenyl-3.5-endo-anilino-4.5-dihydro-1.2.4-triazole, *4.5*-dihydro-*1.4*-diphenyl-*3.5*-phenyl-imino-*1.2.4*-triazole,



Yellow crystalline needles, insoluble in water, slightly soluble in alcohol or ether, soluble in chloroform or acetone. Used for the detection and determination of nitrates. (2) An early (Greek) name for trona. Cf. *nitrone*.

n. nitrate. $C_{20}H_{16}N_4.HNO_3$ = 375.3. An insoluble precipitate formed by nitrates and nitron.

nitronaphthalene. $C_{10}H_7NO_2$ = 173.1. **alpha-** Yellow crystals, d.1.33, m.61, b.304, insoluble in water, soluble in alcohol or ether. Used technically in organic synthesis, and to remove the fluorescence from oils. **beta-** Colorless, rhombic needles, m.79, b.165, insoluble in water, soluble in alcohol or ether; used in organic synthesis.

nitronaphthoic acid. $C_{10}H_6(NO_2)COOH$ = 217.1. A group of acids, colorless prisms, slightly soluble in water, soluble in alcohol or ether. **2.1-** or 2-α- m.218, **3.1-** or 3-α- m.168, **4.1-** or 4-α- m.164. **5.1-** or 5-α- m.171. **8.1-** or 8-α- m.215. **1.2-** or 1-β- m. 103, **5.2-** or 5-β- m.147, **6.2-** or 6-β- m.158, **8.2-** or 8-β- m.145.

nitronaphthol. $C_{10}H_6(NO_2)OH$ = 189.1. **2.1-** Colorless leaflets, m.128. **1.2-** Yellow crystals, m.103, **4.1-** Yellow needles, m.164, **5.2-** Yellow needles, m.147, **8.2-** Yellow needles, m.144. **1.5-** Yellow needles, m.171. **3.1-** m.168. **6.2-** m.158. They are all soluble in alcohol or ether, and used in organic synthesis.

nitronaphthylamine. $C_{10}H_6(NO_2)NH_2$ = 188.1. **2.1-** Yellow prisms, m.144, **1.2-** Orange-yellow needles, m.126, **5.2-** Red needles, m.142, **8.2-** Red needles, m.103. They are all soluble in alcohol or ether, and used in organic synthesis. **1.4-** m.191, **1.8-** m.97, **1.5-** m.118.

nitrone. (1) The trivalent radical =C:NO—; as in phenylnitrone, $Ph_2C:N(:O)$—Ph. Cf. *nitron*. (2) $CH_2:NH:O$.

nitronic acid. A group of compounds containing the  radical.

nitronitroso- See *pseudonitrols*.

nitropentaerythrol. $C_5H_{11}O_4.NO_3$ = 165.09. An explosive.

nitrophenetol. $C_8H_9O_3N$ = 167.08. $C_2H_2O.C_6H_4NO_2$. **ortho-** Yellow crystals m.2.1, b.$_{57mm.}$-267. **meta-** Yellow crystals, m.34, b.264. **para-** Yellow crystals, m.57.8, b.$_{758mm.}$283.

nitrophenol. $C_6H_5O_3N$ = 139.05. $C_6H_4(NO_2)$-OH. **ortho-** Yellow prisms, m.45, b.214, slightly soluble in water, soluble in alcohol or ether. **meta-** Yellow tablets, m.96, slightly soluble in water, soluble in alcohol or ether. **para-** Colorless monoclinic crystals, m.114, decomp. 279, slightly soluble in water, soluble in alcohol or ether. Used in organic synthesis for the manufacture of rhodamine dyestuffs, phenolphthalein, phenacetin, etc. The para-compound is also used as an indicator in alkalimetry, and as a pH indicator for blood and seawater, changing at pH 6 from colorless (acid) to yellow (alkaline). **chloro-** $C_6H_4ClNO_3$ = 173.50. Chloro-nitro-hydroxy benzene, $Cl.C_6H_3(OH)NO_2$. A group of solids used in organic synthesis. The first number indicates Cl, the second NO_2, while OH is assumed to be in the 1-position: **4.2-** m.87, **5.2-** m.38.9, **6.2-** m.70, **2.3-** m.120, **4.3-** m.127, **5.3-** m.147, **6.3-** m.118. **2.4-** m.111, **3.4-** m.133.

nitrophenols. A group of organic compounds, derived from phenol by the substitution of one or more nuclear hydrogen atoms by the nitro group:

mono- containing one nitro-group, $C_6H_4(NO_2)$-OH

di- containing two nitro-groups, $C_6H_3(NO_2)_2OH$

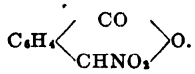
tri- containing three nitro-groups, $C_6H_2(NO_2)_3$-OH (see *picric acid*)

tetra- containing four nitro-groups, $C_6H(NO_2)_4$-OH

nitrophoska. A fused, ternary mixture of KNO_3, NH_4Cl and $(NH_4)PO_4$, used as a fertilizer.

nitrophthalic acid. $C_6H_3(NO_2)(COOH)_2$ = 211.1. **3-** Yellow, monoclinic crystals, m.220, slightly soluble in water, soluble in alcohol or ether. **4-** Colorless needles, m.161, soluble in water, alcohol, or ether; used in organic synthesis.

nitrophthalide. $C_8H_5O_4N$ = 179.2.



Colorless needles, m.141, insoluble in water, soluble in alcohol or ether.

nitropropane. $C_3H_7NO_2$ = 89.1. A colorless liquid, d.1.01, b.131, slightly soluble in water, soluble in alcohol or ether.

nitroprussiate. Nitroprusside.

nitroprusside. A compound containing the bivalent $[Fe(NO)(CN)]_5$ = radical.

nitroquinoline. $C_9H_6N.NO_2$ = 174.1. **5-** Colorless needles, m.72, slightly soluble in water, alcohol, or ether. **6-** Colorless needles, m.150, slightly soluble in alcohol, water, or ether. **7-** Colorless needles, m.132, soluble in alcohol or ether. **8-** Colorless needles, m.88, insoluble in water, soluble in alcohol or ether. Used in organic synthesis, and as reagent for palladium.

nitrosalicylic acid. $C_6H_3(NO_2)(OH)COOH$ = 183.1. **3-** or meta-, (3.2.1-) Long, white needles, m.144, slightly soluble in water, soluble in alcohol or ether. **5-** or asymmetric-, (5.2.1-). Colorless needles, m.230, slightly soluble in water, soluble in alcohol or ether. Used in organic synthesis.

nitrosalol. $C_6H_4(OH)COOC_6H_4NO_2$ = 259.08. A yellow powder, m.148, insoluble in water, soluble in alcohol or ether.

nitrosamine. (1) A series of yellow organic compounds containing the bivalent =N.NO radical. They are obtained by the action of nitrous acid on secondary amines, and differ from nitrosoamines which contain the $—NH_2$ and —NO radicals. *E.g.*, **diethyl-** $Et_2N.NO$. Nitrosodiethyline, b.177. **dimethyl-** $Me_2N.NO$. Nitrosodimethyline, b.148. **diphenyl-** $Ph_2N.NO$. **phenylethyl-** PhEtN.NO. **phenylmethyl-** PhMeN.NO. (2) A compound containing the monovalent —NH.NO radical; as: **ethyl-** EtNHNO. **methyl-** MeNHNO. **phenyl-** PhNHNO.

nitrosates. A series of organic compounds containing the trivalent $\begin{matrix}=C.ONO_2\\|\\—C=NOH\end{matrix}$ group; as, isoamylene nitrosate, $\begin{matrix}Me_2C—ONO_2.\\|\\Me\ C=NOH\end{matrix}$

nitrose. A solution of nitrosyl sulfuric acid in sulfuric acid, made by passing NO_2 and NO into sulphuric acid.

nitrosites. A series of organic compounds containing the trivalent $\begin{matrix}=C—ONO\\|\\—C=NOH\end{matrix}$ group, as *isoamylene nitrosite.* $\begin{matrix}Me_2=C—ONO.\\|\\Me—C=NOH\end{matrix}$

nitroso. Oximido, hydroximino. The monovalent radical, —NO, containing trivalent nitrogen. **iso-** The monovalent radical, —N:OH. **oxy-** Nitrito. **n. R. salt.** $C_{10}H_4OH.NO(SO_3Na)_2$, which gives a blue color with cobalt and iron only.

***i*-nitrosoacetophenone.** Benzoylformoxime.

nitrosoamines. A series of organic compounds containing both the $—NH_2$ and —NO radicals; as, nitrosoaniline. Cf. *nitrosamines.*

nitrosoaniline. $C_6H_4(NO)NH_2$ = 122.1. **para-** Steel-blue needles, m.174, insoluble in water, soluble in alcohol or benzene; used in the synthesis of organic dyestuffs.

nitrosobacter. A rod-like form of nitrifying bacteria.

nitrosobacteria. Nitrifying bacteria. See *nitromonas.*

nitrosobenzene. C_6H_5NO = 107.1. Blue monoclinic needles, m.68, soluble in alcohol or ether.

nitrosobenzoic acid. $C_6H_4(NO)COOH$ = 151.1. **ortho-** Colorless crystals, decomp. 210, very slightly soluble in water, alcohol or ether.

nitrosococcus. A round-shaped nitrifying bacteria of the soil; converts ammonia to nitrites. Cf. *nitrosomonas.*

nitrosodiethylamine. $(C_2H_5)_2N.NO$ = 102.1. Nitrosodiethyline, diethylnitrosamine. A yellow, oily liquid, d.0.951, b.177, soluble in water, alcohol, or ether; used in organic synthesis.

nitrosodiethylaniline. $C_6H_4(NO)NEt_2$ = 178.2. **para-** Colorless needles, m.84, slightly soluble in water alcohol or ether.

nitrosodimethylamine. $(CH_3)_2N.NO$ = 74.1. Nitrosodimethyline, dimethylnitrosamine. A yellow, oily, liquid, b.148, soluble in water, alcohol, or ether.

nitrosodimethylaniline. $C_6H_4(NO)NMe_2$ = 150.1. **para-** Green scales, m.88, slightly soluble in water, soluble in alcohol or ether; used in the manufacture of dyestuffs. **n. hydrochloride.** $C_6H_4(NO)NMe_2.HCl$ = 186.45. Yellow needles, soluble in water, alcohol, or ether; used in the manufacture of dyes.

nitroso dyes. A series of dyestuffs derived from quinone oxime, which contains the chromophore group: $\begin{matrix}=C—O\\|\ \ |\\=C—N.OH.\end{matrix}$

nitrosoethane. C_2H_5NO = 59.1.

nitrosohydroxylamines. A series of organic compounds containing the monovalent $—N\begin{matrix}NO\\OH\end{matrix}$ radical; as, phenyl-nitroso-hydroxylamine, $C_6H_5N(OH)NO$.

nitrosoketones. A series of compounds containing the bivalent $\begin{matrix}—CO\\|\\—C:NOH\end{matrix}$ group, *e.g.*, isonitrosoacetone, Me.CO.CH(:NOH); isonitrosomethylacetone, MeCO.CMe(:NOH).

nitrosomonas. A soil bacterium of Europe, Asia, and Africa that converts ammonia into nitrites. Cf. *nitromonas, nitrosococcus.*

nitrosonaphthol. $C_{10}H_6(NO)OH$ = 173.1. **alpha-alpha-,** 4-nitroso-1-hydroxy-naphthalene. Yellow crystals, m.194, insoluble in water, soluble in alcohol or ether. **alpha-beta-,** 1-nitroso-2-hydroxy-naphthalene. Yellowish prisms, m.110, slightly soluble in water, completely soluble in alcohol or ether. **beta-alpha-,** 2-nitroso-1-hydroxy-naphthalene. Yellow needles, m.162, slightly soluble in water, completely soluble in alcohol or ether. They are used in organic synthesis, and as reagents for cobalt.

nitrosonaphthylamine. $C_{10}H_6(NO)NH_2$ = 172.1. **alpha-beta-,** 1-nitroso-2-amino-naphthalene. Green needles, m.150, slightly soluble in hot water, soluble in alcohol or ether; used in organic synthesis.

nitrosonitric acid. Fuming nitric acid.

nitrosophenol. $C_6H_5O_2N$ = 123.1. $OH.C_6H_4.NO$. A solid, m.140 (decomp.), soluble in water, alcohol or ether. See also *quinone monoxime,* its tautomeric form.

nitrosophenyldimethyl pyrazole. $C_{11}H_{11}O_2N_3$ = 217.2. A reaction-product of antipyrine and nitrites in acid solution. Green needles, exploding at 200, soluble in ether, chloroform, or alkalis; used as an antipyretic and diuretic.

nitrososulfuric acid. Nitrosyl sulfate.

nitrosotoluene. $C_6H_4(NO)CH_3$ = 121.1. **ortho-** Yellow needles, decomp. 120, soluble in water, alcohol or ether, used in organic synthesis.

nitrostarch. Starch nitrate, $[C_{12}H_{12}O_{10}(NO_2)_8]n$. A nitrated starch used in the manufacture of explosives. An orange powder, soluble in alcohol or ether.

nitrostyrene. $NO_2C_6H_4.CH:CH_2$ = 149.1. Nitrostyrolene. **ortho-** A colorless liquid, m.12 (decomp.) insoluble in water, soluble in concentrated sulfuric acid. **meta-** A colorless liquid, m.15.8, b.235, soluble in alcohol or ether. **para-** Colorless prisms, m.58, b.254, soluble in hot alcohol or ether.

nitrostyrolene. Nitrostyrene.

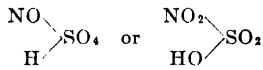
nitro-substitution. The result of the process of nitration, (q.v.).

nitrosulfamide. $H_2N.SO_2:NHNO$ = 125.2. A colorless liquid obtained by nitrating sulfamide. Its silver salt is used as a detonator.

nitrosulfonic acid. Nitrosyl sulfate.

nitrosulfuric acid. A mixture of one part nitric acid and two parts sulfuric acid, used as a nitrating agent. Cf. *nitrosyl sulfuric acid.*

nitrosyl. The nitroso radical, NO—, when attached to a strongly electro-negative element or group; as, Cl— or —HSO_4. **n. bromide.** NOBr = 109.93. A brown liquid decomp. −2. **n. chloride.** NOCl. Nitrogen oxychloride. **n. fluoride.** NOF = 49.01. A gas, m. −134, b. −56. **n. perchlorate.** $NOClO_4$ = 129.47. An unstable liquid. **n. sulfate.** $NO.HSO_4$ = 111.1. Nitrososulfuric acid, chamber crystals, nitrosulfonic acid, n. sulfuric acid, nitrose.



Colorless crystals, m.75 (decomp.), formed in the lead chambers during the manufacture of sulfuric acid. **n. sulfuric acid.** N. sulfate. **n. sulfurylchloride.** $ClSO_4ONO$ = 177.54. A crystalline solid, produced from sulfur trioxide and nitrosyl chloride.

nitrothiophen. $NO_2.C_4H_3S$ = 129.1. Colorless crystals, m.44, b.224, insoluble in water, soluble in alcohol or ether.

nitrotoluene. $C_7H_7O_2N$ = 137.1. $Me.C_6H_4.NO_2$. **ortho-** A yellow liquid, d.1.168, m. −3.8, b.218, insoluble in water, soluble in alcohol or ether. **meta-** Yellow crystals or liquid, m.16, b.230, insoluble in water, soluble in alcohol, ether or benzene. **para-** Yellow crystals, m.54, b.238, insoluble in water, soluble in alcohol or ether. They are used in organic synthesis. **di-** q.v. **tri-** See *trinitrotoluene.*

nitrotoluidine. $C_6H_3(NO_2)(NH_2)CH_3$ = 152.12. A series of nitro-amino-methyl-benzenes, used in the synthesis of dyestuffs. They are usually slightly soluble in water, soluble in alcohol, ether, or benzene. According to the positions of the three groups in the benzene ring there are:

NO_2	NH_2	CH_3	
			(ortho-toluidines)
3	2	1	= Orange prisms, m.92,
4	2	1	= Yellow monoclinic crystals, m.104.
5	2	1	= Yellow needles, m.127.
6	2	1	= Yellow leaflets, m.92.
			(meta-toluidines)
2	3	1	= Yellow needles, m.53.
4	3	1	= Yellow leaflets, m.109.
5	3	1	= Orange needles, m.98.
6	3	1	= Yellow needles, m.138.
			(para-toluidines)
2	4	1	= Yellow monoclinic crystals, m.77.
3	4	1	= Red prisms, m.114.

nitrourea. $CH_3O_3N_3$ = 105.1. $NH_2.CO.NHNO_2$. A white crystalline powder, decomp. by heat, slightly soluble in water, soluble in alcohol or ether.

nitrourethane. $NO_2.NH.COO.C_2H_5$ = 134.1. Colorless leaflets, m.64, b.140 (decomp.), soluble in water, alcohol, or ether.

nitrous. (1) Describing nitrogen compounds containing positive trivalent nitrogen, as nitrous acid. Their ammonia compounds contain negative trivalent nitrogen. (2) An early term describing a compound of nitric acid. **n. acid.** HNO_2 = 47.0. An aqueous solution of nitrogen trioxide (N_2O_3). **n. anhydride.** Nitrogen trioxide. **n. ether.** $C_2H_5NO_2$ = 75.047. (1) Ethyl nitrite. (2) Nitroethane. **n. oxide.** N_2O = 44.1. Nitrogen monoxide, laughing gas, dental gas. A colorless gas, d.1.529, m. −90.7, b. −88.4, soluble in water, alcohol, ether, or benzene. Used as a surgical and dental anesthetic, and to preserve perishable organic liquids and tissues, including milk, fruits, and other foods. **n. vitriol.** A solution of oxides of N and sometimes of SO_2 in strong H_2SO_4, formed during the manufacture of H_2SO_4 (q.v.).

nitroxanthic acid. Picric acid.

nitroxyl. The radical, —NO_2, when attached to a strongly electro-negative group, as F; or to a metal, as copper nitroxyl, $Cu_2(NO_2)$. **n. chloride.** NO_2Cl. = 81.47. A yellow liquid, d.1.316. **n. fluoride.** NO_2F = 65.0. A colorless gas m. −139, b. −63.5, rapidly decomp. by water.

nitroxylene. $C_8H_9O_2N$ = 151.1. $Me_2.C_6H_3.NO_2$. **1.2.3-** A yellow liquid, d.1.147, m.8, b.250. **1.2.4-** Ortho- Yellow crystals, d.1.139, m.29, b.258. **1.3.2-** Meta- A yellow liquid, d.1.112, m.13, b.225. **1.3.4-** A liquid, d.1.126, b.238. **1.3.5-** A solid, m.74, b.275. **1.4.2-** Para- A yellow liquid, d.1.132, b.239. They are all insoluble in water, soluble in alcohol, ether, benzene, or chloroform, and are used in organic synthesis.

nitroxylic acid. H_2NO_2 = 48.0. Hydronitrous acid. The hypothetical acid from which nitroxyls (q.v.) are derived.

nitrum. An early (Latin) name for trona.

nitryl. Nitro-group. The monovalent radical, —NO_2, derived from nitrous acid, HNO_2. **n. fluoride.** Nitroxyl fluoride.

nivalic acid. $C_{20}H_{26}O_6$ = 362.22. An acid from the lichen, *Cetraria nivalis.*

nivenite. A variety of uranite containing a large proportion of rare earths.

nizin. Zinc sulfanilate.

No. Atomic number; also Z (German: zahl).

No. 606. Salvarsan. **914.** Neosalvarsan.

Nobel, Alfred Bernhard. 1833–1896. A Swedish chemist, the inventor of several explosives and artificial rubber, noted as the founder of the Nobel Prize. **N.'s explosive.** A high explosive consisting of 25–80 % nitroglycerin, 0.5–7 % guncotton, 0.4–9 % liquid nitro-body, 0.9–10 % wood meal and 6–45 % K or Na nitrate. Cf. *dynamite.* **N. oil.** Nitroglycerin. **N. Prize.** An annual award from the interest of N.'s capital which is divided among five scientists who have been outstanding in the five branches of knowledge: physics, chemistry, physiology, medicine, and world-peace. The thirty chemistry awards since 1901–1935 inclusive are distributed

Geographically:
Germany 13, England 4.5, France 4, U.S.A. 3, Sweden 2.5, Switzerland 1, Holland 1, Austria 1.
Departmentally:
Physical c. 9, biochemistry 7, organic 6, radioactive 5, inorganic 4, industrial 3.

Alfred Bernhard Nobel.

Noble, Alfred. 1844–1914. An American civil engineer who founded the **Noble Prize** for the best technical paper in an engineering periodical. Cf. *Nobel Prize.*

noble gas. A member of the zero group of the periodic system: He, Ne, A, Kr, Xe, and Rn. For occurrence, see *atmospheric gases.* Uses: He, for filling dirigibles; A, for rectifiers and incandescent bulbs; also in illuminating signs, with or without mercury, the following colors being produced:

Ne	fiery orange red
A	blue
Kr	pale violet
Xe	sky blue or green.

n. laurel. Laurel. **n. liverwort.** Liverwort. **n. metal.** A metal which is not readily oxidized, in particular the metals of the gold, platinum, and palladium family of the periodic system.

noctal. $C_{10}H_{13}BrN_2O_3$ = 189.00. Nostal, *i*-propyl-β-bromo-allyl barbituric acid. White powder, m.178, used as a narcotic.

nodakenin. $C_{20}H_{24}O_9$ = 408.15. A glucoside from nodake, *Pellecedanum decursivium,* an Umbelliferae of Japan.

node. The point at which a curve or wave-motion intersects a fixed plane.

nodular. Resembling a knot or protuberance.

nodule. A small round lump, as of a mineral or earth.

noise. See *loudness, sound, decibel.*

nomenclature. The systematic terminology of chemical compounds, cf. *notation.* **Geneva-** A set of rules adopted at the International Conference on chemical nomenclature held in Geneva in 1892. These rules refer mainly to organic compounds and have since been altered in many respects (see Report 1937). The general rules for the nomenclature are:

INORGANIC COMPOUNDS

Binary compounds:
The positive element (metal) is named first, and followed by the electronegative element (nonmetal).
metal suffixes:
-ous indicates the lower valence, as ferr*ous*-
-ic indicates the higher valence, as ferr*ic*-
nonmetal suffixes:
-ide as ox*ide*, hydrox*ide*, chl*oride*, sulf*ide*, nitr*ide*.

Tertiary compounds:
acids:
-ous acid, indicating a lower valency, as chlor*ous* or sulfur*ous* acid.
-ic acid, indicating a higher valency, as chlor*ic* or sulfur*ic* acid.
If there are more than two stages of oxidation, then:
hypo- ous, the acid of lowest valency; as *hypo*chlor*ous* acid.
per- ic, the acid of highest valency; as *per*chlor*ic* acid.
salts:
-ite, when derived from an *ous*-acid, as chlor*ite*, or sulf*ite*.
-ate, when derived from an *ic*-acid, as sulf*ate* or chlor*ate*.

ORGANIC COMPOUNDS

-ane, for saturated hydrocarbons (meth*ane*, eth*ane*, menth*ane*).
-ene, for unsaturated hydrocarbons containing one double bond (eth*ene*, prop*ene*) or double bonds (benz*ene*, naphthal*ene*).
-diene, for unsaturated alkyl hydrocarbons containing two double bonds (buta*diene*).
-ine, for unsaturated hydrocarbons containing a triple bond (eth*ine*).
-enine, for hydrocarbons containing a double and triple bond (but*enine*).
cyclo-, for hydrocarbons which form a closed saturated chain (*cyclo*pentene).
-ine, for alkaloids, (morph*ine*, coca*ine*, strychn*ine*).
-in, for glucosides (sapon*in*).
-one, for ketones (also -dione, -trione).
-ose, for carbohydrates (also -pentose, -hexose etc.).
-ol, for alcohols and phenols (also -diol, -triol).
-al, for aldehydes (also -dial, -trial).
-ase, for enzymes (pep*sase*).
-oid, for an active principle of unknown composition.
-yl, for a radical.
-ino, for an ammonia derivative (amino).
-ido, for an ammonia derivative substituted in an acid group: amido —$CONH_2$.
-thial, for thioaldehydes (—CSH group).

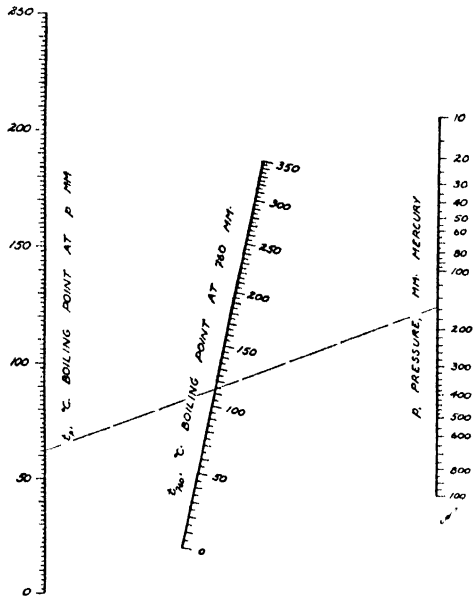
SPECIFIC NAMES

hydrate, for a compound with water, as chlorine hydrate, $Cl_2.10H_2O$.
hydroxide, for a compound containing —OH radicals, as calcium hydroxide, $Ca(OH)_2$.
hydroxy- (not oxy-), for the —OH group in an organic molecule.
-ite, for minerals.

thio- for sulfur which has replaced oxygen; as thiosulfate $=S_2O_3$, thiocyanate —CNS.
sulfo- for the group, $—SO_3H$.
oxy- for —O—, as in ethers, Me—O—Me.

nomogram. Nomograph.

nomograph. Nomogram. Alignment chart. A system of two or more graphical scales, used for the calculation of analytical results or rapid solution of complicated equations. *E.g.*, **boiling point-** A set of scales by which the boiling point of a liquid at 760 mm. may be found from its boiling point at a different pressure, and vice versa. This n. solves Trouton's rule and the integrated Clausius-Clapeyron equation. Thus *e.g.*, the b.62°C. (left scale) at 154 mm. pressure (right scale) corresponds with 114°C. at atm. pressure (middle scale).



Boiling point nomograph.
(D. S. Davis, Chemist-Analyst, 1931, 20, No. 3)

nomography. The representation of analytical or other correlations by means of charts and graphs, which eliminate calculations.

non- (1) A Latin prefix, indicating not. (2) A Greek prefix, for nine.

nonacosane*. $C_{29}H_{60}$ = 408.5. A hydrocarbon occurring in bees-wax and the fat of cabbage leaves. A colorless paraffin-like substance, m.63, b.348.

nonacosanol*. $C_{29}H_{59}OH$ = 304.5. **1-** Montanyl alcohol. **9-** White solid, m.75.4. **10-** m.74.8. **12-** m.74. **14-** m.79. **15-** m.83.6.

nonacyclic. (1) Having nine rings; as violanthrole. (2) Not acyclic.

nonadecane*. $C_{19}H_{40}$ = 268.42. Enneadecane, enndecane. A solid, $d._{32°}$0.777, m.32, b.330.

nonadecanoic acid*. $C_{19}H_{38}O_2$ = 298.30. Nonadecylic acid, $C_{18}H_{37}COOH$. White leaflets, m.66.5, $b._{100mm}$299.

nonadecanol*. $C_{19}H_{40}O$ = 284.31. Nonadecyl alcohol, $C_{19}H_{39}OH$. Opaque crystals, m.62.

nonadecanone*. $C_{19}H_{38}O$ = 282.30. **10-** Caprinone, dinonyl ketone, $(C_9H_{19})_2CO$. Colorless leaflets, m.58, insoluble in water.

nonadecyl alcohol. Nonadecanol.*

nonadecylic acid. Nonadecanoic acid.*

nonaldehyde. Pelargonaldehyde.

nonane*. C_9H_{20} = 128.2. A saturated aliphatic hydrocarbon. A colorless liquid, d.0.718, m.—51, b.149, insoluble in water, soluble in alcohol or ether. **n. carboxylic acid.** Capric acid. **n. dioic acid*.** Azelaic acid.

nonanediol*. $C_9H_{20}O_2$ = 160.16. Nonamethylene glycol, $CH_2OH.(CH_2)_7CH_2OH$. Colorless liquid, b.149, slightly soluble in water.

nonanenitrile*. $C_9H_{17}N$ = 139.14. Pelargononitrile, $Me(CH_2)_7CN$. Colorless liquid, d.0.8331, m.—34, b.224, insoluble in water.

nonanoic acid*. Pelargonic acid.

nonanol*. $C_9H_{20}O$ = 144.16. **1-** *n*-Nonyl alcohol. **2-** Heptylmethylcarbinol, $Me(CH_2)_6CHOHMe$. Colorless liquid, d.0.8190, m.—35, b.193, insoluble in water, soluble in alcohol. **3-** Ethylhexylcarbinol, $Me(CH_2)_5CHOHEt$. Colorless liquid, d.0.825, m.—22, b.194. **4-** Amylpropyl carbinol, $Me(CH_2)_4CHOHPr$. Colorless liquid, d.0.8282, b.192. **5-** Dibutylcarbinol, $[Me(CH_2)_3]_2CHOH$. Oily liquid, d.0.823, b.194.

nonanone*. $C_9H_{18}O$ = 142.14. **2-** Methyl-*n*-heptyl ketone, $Me.CO(CH_2)_6Me$. A constituent of oil of rue and oil of cloves. Colorless liquid, d.0.8317, m.—8.2, b.195. **3-** Ethyl-*n*-hexyl ketone, $Et.CO(CH_2)_5Me$. A liquid, d.0.84, m.—8, b.190. **5-** Dibutyl ketone, $[Me(CH_2)_3]_2CO$. Colorless liquid, d.0.827, m.—5.9, b.186.5.

nonanoyl*. Pelargonyl. The radical $Me(CH_2)_7CO—$ derived from nonanoic acid. **n. chloride.** $C_9H_{17}OCl$ = 176.59. Pelargonyl chloride. Colorless liquid, d.0.9590, m.—60.5, b.215, decomp. by water.

nonconductor. A substance that does not transmit electricity, heat, or light. Cf. *insulator*.

nondecylic acid. Nonadecanoic acid.*

nondrying oil. A liquid fat which remains fluid on exposure, and does not become hard. Such fats contain olein and glycerides of other unsaturated fatty acids, and absorb but little oxygen. *E.g.*, castor oil, sperm oil.

nonene*. Nonylene.

nonferrous. A metal other than iron.

nonine. Nonyne*.

nonmetal. An electronegative element located in the upper left half of the periodic system. It has no metallic properties. They are generally polyvalent (except O and H), and exist in several stages of oxidation. Their oxides form acids.

nonmetallic. Not of a metallic nature.

nonoic acid. Pelargonic acid.

nonvalent. Inert, having no combining power, and a valency of zero; as, the noble gases.

nonyl. The monovalent radical, $—C_9H_{19}$, derived from nonane. **n. alcohol.** $C_9H_{19}OH$ = 144.2. A colorless liquid, d.0.842, m.—5, b.213, insoluble in water, soluble in alcohol. For other isomers see *nonanol**. **n. aldehyde.** Pelargonaldehyde. **n. amine.** $C_9H_{19}NH_2$ = 143.17. Colorless liquid, b.195. **n. cyanide.** Caprinitrile.

nonylene. C_9H_{18} = 126.15. Nonene*. A liquid hydrocarbon, $d._{20°}$0.7433, b.147.

nonylic acid. Pelargonic acid.

nonylone. 9-Neptadecanone.

nonyne*. C_9H_{16} = 124.12. *n*-Heptyl-acetylene, nonine, $Me(CH_2)_6C{:}CH$. Colorless liquid, d.0.7924, m.—36, b.160, insoluble in water.

nopco. Trade name of a group of surface-active agents.

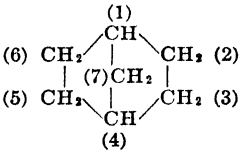
nopinene. $C_{10}H_{16}$ = 136.12. β-pinene, 7.7-dimethyl-2-methylene norpinane. A terpene occurring (30 %) in the oil of *Ferula galbaniflua* of Russia. Cf. *galbanum, asafetida.*

nopinic acid. $C_{10}H_{16}O_3$ = 184.12. 4-Hydroxy-norpinane-4-carboxylic acid. A hydroxy acid derived from norpinane. Cf. *pinonic acid.*

nor- A prefix indicating a normal or parent compound.

noratropine. An alkaloid from various Solanaceae species, allied to atropine.

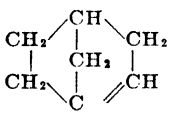
norcamphane. C_7H_{12} = 96.09. 1.2.2-bicycloheptane. The hydrocarbon:



It is the parent-compound of many terpenes. **dimethyl-** Camphenilane. **dimethylmethylene-** Camphene. **trimethyl-** Camphane.

norcamphanyl. The monovalent radical, C_7H_{11}—, derived from norcamphane.

norcarene. C_7H_{10} = 94.08. Bicycloheptene, Δ^3-norcamphane.



trimethyl- Carene.

nordenskioldine. [Swedish.] $CaSnB_2O_6$. A tin ore.

Nordhausen acid. Oleum.

norephedrine. $C_9H_{13}ON$ = 151.11. α-aminoethyl benzyl alcohol, $Ph.C(OH)NH_2.Et$, used similarly to ephedrine, q.v.

Norge saltpeter. A calcium nitrate made in Norway, and used extensively as a fertilizer.

norgine. Algin.

norit. Purified charcoal made from birch, and used to decolorize and deodorize syrup, oils or pharmaceutical products.

norium. A supposed rare earth element from zircon, which proved to be a mixture of various rare earth metals.

norleucine. $C_6H_{13}O_2N$ = 131.1. Caprine, glycoleucine, α-amino-*n*-caproic acid, α-amino-α-butyl acetic acid, 2-aminohexanoic acid*. An aminoacid (q.v.) from the leucine fractions of proteins of the brain and of casein.

norm. A theoretical standard. **n. system.** In mineralogy, a system of classification of rocks based on their theoretical chemical compositions. Cf. *mode.*

normal. (1) A plane or line perpendicular to another plane or line. (2) A fixed standard or an established type, as a normal solution, or normal hydrocarbon. (3) A prefix which indicates: (a) a neutral salt in which all the available hydrogen atoms are replaced; (b) an organic compound in its "normal" form as distinct from its "iso" form. (4) The average or mean. **n. atom.** An atom in the unexcited state; it may differ from a *neutral* atom (q.v.). **n. benzine.** Benzine of d.-0.695–0.705, b.65–95. **n. element.** An electrical battery or electrolytic cell, used as a standard of electromotive force. See *Weston element, cadmium cell.* **n. glass.** A glass whose composition can be represented by a definite chemical formula; as, $6SiO_2.CaO.Na_2O$. **n. hydrocarbon.** An aliphatic hydrocarbon that has a straight carbon chain in its molecule and no side-chains; as, n-pentane. **n. pressure.** Atmospheric pressure, atmosphere. The pressure of a column of mercury 760 mm. high at sea-level (approximately 14.7 pounds per square inch). **n. saline,** q.v. **n. salt.** A salt in which all the hydrogen atoms of the acid have been replaced by a metal, or all the hydroxide radicals of a base replaced by an acid radical:

Na_2CO_3 (normal salt); $NaHCO_3$ (acid salt).

$Bi(NO_3)_3$ (normal salt); $Bi(OH)_2NO_3$ (basic salt).

n. solution. A solution which contains one equivalent of the active reagent in grams, in one liter. The equivalent in grams may be defined as that quantity of the active reagent which contains, replaces, unites with, or in any way, directly or indirectly, brings into reaction one gram of hydrogen. A *normal* solution, N, is used for titration in quantitative analysis, and it may or may not be equal in strength to the *molal* solution.

N.HCl = 36.5 gm. HCl per liter = M.HCl.

$N.H_2SO_4$ = 49 gm. H_2SO_4 per liter = $M/2.H_2SO_4$. Weaker or stronger solutions are indicated thus, *e.g.*,

0.5N or N/2 = half-normal
0.1N or N/10 = tenth-normal
2N = twice normal.

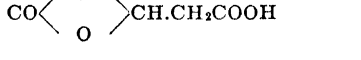
Cf. *centinormal, millinormal, supernormal.* **n. temperature.** Room temperature; 20°C. or 68°F. It differs from standard temperature (0°C.). **n. thermometer.** A standardized thermometer.

normality. The concentration of a solution expressed in gram-equivalents per liter; thus N-solution = one gram-equivalent per liter. 2N-solution = two gram equivalents per liter. 0.5N or N/2-solution = one-half gram equivalent per liter. Cf. *normal solution.*

normalization. The process of restoring normality.

normalizing. The heat-treatment of metals (especially aluminum alloys), by the action of a molten mixture of sodium and potassium nitrates at 500°C.

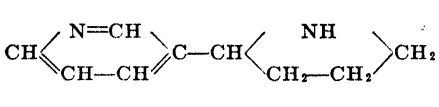
normeconine acetic acid. $C_{10}H_8O_4$ = 188.1. Dihydroxyphthalide acetic acid.



Colorless crystals, m.228.

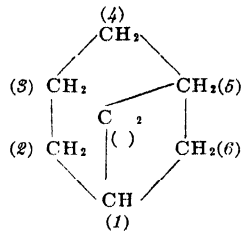
normenthane. Isopropyl cyclohexane.

nornicotine. $C_9H_{12}N_2$ = 136.11. An isomer of nicotine in Kentucky tobacco



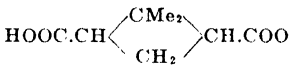
noropianic acid. $C_8H_6O_5$ = 182.1. 5.6-dihydroxy-phthalaldehyde acid. Colorless crystals, m.171, soluble in alcohol or ether.

norpinane. C_7H_{12} = 96.09. 1.1.3-bicycloheptane. The hydrocarbon:



Cf. *nopinic acid.* **dimethylmethylene-** Nopinene.

norpinic acid. $C_8H_{10}O_4$ = 170.08. 2.2-dimethyl-1.3-cyclobutane dicarboxylic acid,



Cf. *truxillic acid, nopinic acid.*

Norris, Flack James, 1871– . An American chemist noted for organic research.

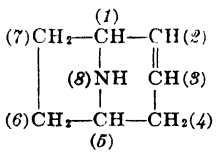
norsolanellic acid. Biloidanic acid.

Northrup furnace. An electric high-temperature furnace.

nortropane. $C_7H_{13}N$ = 111.1. *2.3*-Dihydronortropidine, *1.5*-iminocycloheptane. A cyclic hydrocarbon derived from nortropidine, q.v.

nortropene. Nortropidine.

nortropidine. $C_7H_{13}N$ = 111.1. *1.5*-Iminocycloheptene-*2*. The aromatic, heterocyclic hydrocarbon,



nortropinone. $C_7H_{11}ON$ = 125.09. A ketone derived from tropine by oxidation, a colorless powder, m.70.

norvaline. $C_5H_{11}O_2N$ = 117.1. α-aminovaleric acid. An aminoacid (q.v.) m.291, from proteins.

Norwegian saltpeter. Norge saltpeter. A calcium nitrate used as a fertilizer.

nosean. An aluminum sodium silicate containing gypsum.

noselite. $Al_3Na_8SSi_3O_{16}$. A silicate mineral (q.v.) of the sodalite group.

nosepiece. A revolving disc on a microscope, into which the different objectives can be screwed.

nosology. The classification of disease.

nosophen. $C_{20}H_{10}O_4I_4$ = 821.5. Tetraiodophenolphthalein, iodophen. $(C_6H_2I_2OH)_2(CO)_2C_6H_4$. A yellow powder, m.225, slightly soluble in alcohol or ether, soluble in alkalis; used as an iodoform substitute. **bismuth-** Eudoxin. **mercury-** Apallagin. **sodium-** Antinosin.

nostal. Noctal.

nostrum. A "cure-all," or quack medicine.

notatin. An antibiotic substance from various *Penicillium* species. It is identical with coryl-ophilline, mycoin, penatin and penicillin B.

notation. A system of numerals, or numerals and symbols, which indicate the structural characteristic of an organic compound. The principal symbols are:

a—asymmetric, or alpha-position.
α—ana-position, alpha-position, or first carbon atom.
β—beta-position, or second carbon-atom.
c—cyclic, or cis-type.
d—dextro-rotatory.
dl—racemic
δ—fourth carbon atom.
ε—epi-position, or fifth carbon atom.
γ—gamma-position, or third carbon atom.
i—iso or inactive
κ—kata-position
l—levorotatory.
m—meta-position, or mesoisomer.
μ—meso-position.
n—normal, or nitrogen substitute.
o—ortho-position, or oxygen substitute.
ω—substitution in the side-chain or on the last carbon atom, farthest from a functional group.
p—para-position or primary.
π—peri-position.
r—racemic.
ρ—pros-position.
s—syn-type, symmetric, secondary or sulfur substitute.
t—trans-type, or tertiary.
v—vicinal position.
ψ—pseudo.
φ—amphi-position.
Δ— Double bond, as Δ^2, a double bond between the second and third carbon atoms, and $\Delta^{2(4)}$, a bond between the second and fourth carbon atoms of a ring.
T—Triple bond.

Cf. *formula, nomenclature.* See also first definition(s) under each letter.

n. of energy levels. See *quantum numbers.*

n. of isotopes. See *hydrogen, isotopes, nuclear reactions.*

noumeite. Garnierite.

novaculite. Razor stone. A fine-grained rock, used as an abrasive.

novadelox. A mixture of 1 part benzoyl chloride and 3 (or 5) parts calcium phosphate, used to bleach flour.

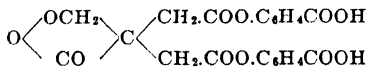
novain. Carnitine.

novaldin. A brand of dipyrrole.

novargan. A silver proteinate containing 10 % silver A yellow powder, soluble in water, is used medicinally as an astringent and bactericide.

novarsenobenzol. Neosalvarsan.

novaspirin. $C_{21}H_{16}O_{11}$ = 444.1. Methylenecitrylsalicylic acid, salicitrin.



A white, odorless powder, insoluble in water, soluble in alcohol; used medicinally as an antirheumatic and antiseptic.

novasurol. Merbaphen, the double salt of sodium mercury chlorophenoxy acetate and diethyl malonyl urea. White crystals, soluble in water, used as a diuretic and antisyphilitic.

novatophan. Neocinchophen. A trade name.

novatropine. $C_{16}H_{21}NO_3.MeBr$. Homoatropine methyl bromide. A white powder, used as an antispasmodic.

novocaine. Procaine. **n. oxide.** $C_{12}H_{22}N_2O_4$ = 274.2. A genalkaloid produced by the action of hydrogen peroxide on procaine; it is a less powerful anesthetic than procaine.

novolak. A plastic of the resole type (q.v.), but formed under acid conditions.

noxious. Harmful or hurtful. **n. gases.** A poisonous gas or any gas of strong odor.

Noyes, Arthur Amos, 1866–1936. An American chemist, noted for development of thermodynamics and chemical education. **N., William Albert,** 1859–1941. An American chemist noted for organic synthesis and atomic weight determinations.

N.P.L. Abbreviation for National Physical Laboratory (q.v.).

n-rays. A non-luminous radiation whose wave length is lower than those of visible light or heat rays, discovered in 1903 by Blondlet. It is emitted by a Welsbach burner, an x-ray tube, or the sun, and passes through thin metals, and increases the luminosity of phosphorescent bodies.

Nt. Symbol for niton, now termed radon, Rn.

NTP. Abbreviation for normal temperature (0°C.) and pressure (760 mm.).

nu. The Greek letter, ν, a symbol for frequency.

nuces. The Latin plural of "nut"; as, nuces nucistae = nutmeg.

nucin. Juglone.

nucitannin. A glucoside obtained from walnuts. It splits into glucose and rothic acid.

nucite. $C_6H_{12}O_6$ = 180.09. A carbohydrate from the leaves of *Juglans cinerea*, white walnut. It resembles inositol. Cf. *juglans*.

nuclear. Pertaining to a nucleus, q.v. **n. chemistry.** The branch of chemical physics dealing with the changes occurring in the atomic nucleus, that is, the transmutation of elements and the production of induced radio-activity. q.v. **n. equation.** An expression indicating the changes occurring in the nucleus during a n. reaction, q.v. In a n. equation both the sum of the atomic numbers (= *positive charges*) and of the isotopic weights (= *mass*) must be equal on both sides of the equation. **n. halogen.** A term erroneously applied to a halogen attached to a ring. **n. particles.** The building units of the atomic nucleus (see *atomic structure*) which may be classified as shown in the table. **n. reactions.** The disruption of an atomic nucleus by bombardment with protons, deuterons or alpha-particles, which is accompanied by the emission of neutrons, protons, alpha-particles, positive or negative electrons, and the formation of excited states or radioelements, q.v. (see table). **n. structure.** (1) Each isotope consists of Z half-alpha particles (pze) and 1-2Z neutrons (pe), where Z is the atomic number, I the isotopic weight, p a proton with one positive charge, e an electron. (2) An isotope contains Z protons and I-Z neutrons. **n. symbols.** The symbol for an element, X, is prefixed by the atomic number, Z, as subscript, and followed by its isotopic weight, I, as superscript; thus ${}_Z X^I$. *E.g.*, ${}_4Be^9$, ${}_2He^4$.

NUCLEAR REACTIONS

a. Formation of gamma rays from excited intermediates of short life:

$${}_5B^{11} + {}_1H^1 \rightarrow ({}_6C^{12})^* \rightarrow {}_6C^{12} + \gamma\text{-rays}$$
$$10^{-18} \text{ sec.}$$
$${}_6C^{12} + {}_1H^1 \rightarrow ({}_7N^{13})^* \rightarrow {}_7N^{13} + \gamma\text{-rays}$$
$$10 \text{ min.}$$

b. Formation of beta rays (electrons) from unstable intermediates:

$${}_{11}Na^{24} \rightarrow {}_{12}Mg^{24} + {}_{-1}e^0 \text{ (15 hrs.)}$$
$${}_{12}Mg^{27} \rightarrow {}_{13}Al^{27} + {}_{-1}e^0 \text{ (10 min.)}$$

c. Formation of neutrons:

$${}_8O^{16} + {}_1H^2 = {}_9F^{17} + {}_0n^1$$
$${}_4B^9 + {}_2He^4 = {}_6C^{13} = {}_6C^{12} + {}_0n^1$$
$${}_5B^{10} + {}_2He^4 = {}_7N^{13} + {}_0n^1$$

d. Formation of protons:

$${}_{12}Mg^{26} + {}_1H^2 = {}_{12}Mg^{27} + {}_1H^1$$
$${}_{14}Si^{30} + {}_1H^2 = {}_{14}Si^{31} + {}_1H^1$$
$${}_7N^{14} + {}_2He^4 = {}_8O^{17} + {}_1H^1$$

e. Formation of alpha-particles:

$${}_{12}Mg^{26} + {}_1H^2 = {}_{11}Na^{24} + {}_2He^4$$

f. Formation of positrons from radio elements:

$${}_7N^{13} \rightarrow {}_6C^{13} + {}_1e^0$$
$${}_9F^{17} \rightarrow {}_8O^{17} + {}_1e^0$$

nuclease. Any bacteriolytic enzyme that digests the nucleoproteins of bacteria.

nucleate. A salt of nucleic acid (q.v.).

nuclei. The plural of nucleus.

nucleic acids. Nucleinic acids. A group of compounds in which one or more molecules of phosphoric acid are combined with carbohydrate (pentose or hexose) molecules, which are in turn combined with bases derived from purine (such as guanine and adenine) and from pyrimidine (such as thymine, cytosine and uracil). They commonly occur, conjugated with proteins, as nucleoproteins. The molecules of the most common nucleic acids are comprised of four phosphoric acid, four carbohydrate and two basic molecules each from purine and pyrimidine and are therefore tetranucleotides. Cf. *nuclein*. *E.g.*,

from salmon	$C_{40}H_{56}N_{14}O_{26}P_4$
from thymus	$C_{43}H_{61}N_{15}O_{34}P_4$
from yeast	$C_{38}H_{49}N_{15}O_{29}P_4$
from yeast	$C_{29}H_{42}N_{13}O_{23}P_3$
from wheat embryo	$C_{41}H_{61}N_{15}O_{31}P_4$

NUCLEAR PARTICLES

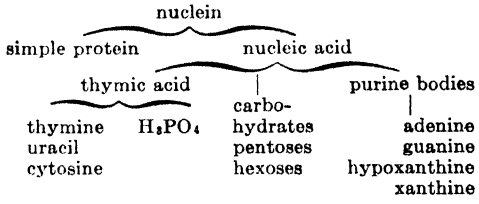
	Atomic no. −1	0	1	2
Mass 0	electron ${}_{-1}e^0$ or e^-	neutrino ${}_0n^0$	positron ${}_1e^0$ or e^+	
Mass 1	neg. proton ${}_{-1}e^1$	neutron ${}_0n^1$ or n	proton ${}_1e^1$ or ${}_1H^1$ or p	
Mass 2	.....	.....	deuteron ${}_1H^2$ or ${}_1D^2$	
Mass 4	.....	.....	.....	alpha particle ${}_2He^4$ or α

nucleid. A metal compound of nuclein.

nuclein. $C_{29}H_{49}O_{22}N_9P_3$ = 968.7. A phospho-protein in the nuclei of cells. It is obtained by peptic digestion or acid hydrolysis of albumins, and consists of nucleic acids combined with a base. A grayish powder, slightly soluble in water, soluble in alkalis: used medicinally as a bactericide and alterative.

nucleinic acid. Nucleic acid.

nucleins. A series of phospho-proteins occurring in the nuclei of cells. They consist of nucleic acids, phosphoric acids, simple proteins and xanthine bases. **cell-** True nucleins. **pseudo-** Nucleoalbumin.



nucleoalbumin. Paranuclein, phosphoglobulin, pseudonuclein. A combination of nucleic acid and albumin.

nucleogen. A compound of iron, nuclein and arsenic, used in medicine.

nucleol. Phosphoric acid. A pure nuclein from yeast.

nucleoplasm. (1) The protoplasm of the cell nucleus. (2) The liquid portion of the cell nucleus.

nucleoprotein. A compound protein, which consists of a simple protein combined with nuclein and a hexose (in animals) or a pentose (in plants). They contain from 0.5–3.0 % P, and form an important part of the cell nuclei and blood plasma. The isolated products are white powders, insoluble in water, soluble in weak alkalis and precipitated by acids.

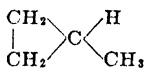
nucleoside. A glucoside-like complex of a base (cytosine, thymine, etc.) and a carbohydrate (hexose, pentose) contained in a nucleotide, e.g., cytidine, thymidine; a nucleotide (q.v.) without the phosphoric acid.

nucleosin. A thymine from the spermatozoa of salmon.

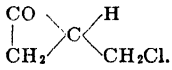
nucleothymic acid. Thymic acid.

nucleotide. The unit atomic groups of nucleic acids: HO—PO—Sugar—Base, where the PO group of one is attached to the "sugar" of the other to form polynucleotides, and the "base" is adenine, uracil, guanine, cytosine, etc. Cf. *nucleoside.*

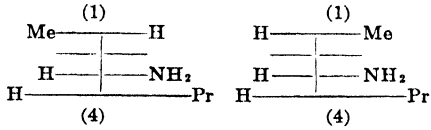
nucleus. A kernel or central part. **acyclic stem-** A hydrocarbon chain, thus $CH_3.CH_2.CH_3$ is the a.s.n. of $ClCH_2.CH_2.CONH_2$. **alicyclic-** A saturated carbon ring. **atomic-** Proton. The positively-charged center of an atom. It differs from the atomic kernel, and consists of (I) positive charges and (I–N) negative charges; where I is the isotopic weight, and N the atomic number. The positive charges are assumed to be hydrogen-kernels or protons. Cf. *nuclear reactions, particles.* **benzene-** The six-carbon ring of benzene (q.v.). **cell-** The central part of protoplasm which is darker than the remainder, and contains structural elements (chromosomes). **condensed-** A carbocyclic or heterocyclic compound, which consists of two or more rings joined by at least two carbon atoms, as in naphthalene, anthracene. **heterocyclic-** A ring compound that has another atom besides carbon in its ring. **homocyclic-** A ring compound which consists of only carbon atoms. **isocyclic stem-** A hydrocarbon ring; thus,



is the *isocyclic stem nucleus* of the compound



naphthalene- The condensed nucleus occurring in naphthalene. **projection-** A misnomer for the graphic representation of a part of an optically-active carbon ring (as, terpenes), by projecting the asymmetric carbon atoms. Thus menthylamine:



where the first and third carbon atom are asymmetric. **stem-** The hydrocarbon obtained by replacing all other atoms (except C, H, and heterocyclic atoms) by hydrogen. All organic compounds can then be classified as derivatives of

Division I.....	Acyclic stem nuclei
Division II.....	Isocyclic stem nuclei
Division III.....	Heterocyclic stem nuclei

nugget. A water-worn piece of native gold.

nujol. The trade name for a heavy medicinal paraffin oil.

null instrument. An instrument used to denote an end-point, or point of balance between two effects, owing to the fact that it ceases to be actuated at that point; *e.g.*, the galvanometer in a Wheatstone bridge circuit.

numal. Allonal.

number. A definite and characteristic value. See *atomic number, iodine number, saponification number*, etc. **preferred-** An industrial standard of the increase in size of a commodity, arranged so that a certain range is divided into 5, 10 20, 40 or 80 steps in which the increase is a constant ratio, that is 60 %, 25 %, 20 %, 6 % or 3 % respectively. Thus for the 5 step series:

	10	16	25	40	63	or 100
	$\frac{4}{4}$	$\frac{5}{4}$	1	$1\frac{1}{2}$	$2\frac{1}{2}$	
or	$\frac{2}{2}$	$\frac{2}{2}$	$\frac{2}{2}$	$\frac{3}{2}$	1	

numbering. In aliphatic compounds the carbon atoms are numbered from end to end, beginning with the carbon atom having a principal radical and continuing along the longest chain. In aromatic compounds the numbers begin with the most saturated or the heterocyclic atom.

numoquin. Optochine.

nupercaine. Percaine.

nupharine. $C_{18}H_{24}O_2N_2$ = 300.3. An alkaloid obtained from the bulbs of *Nuphar luteum*, a Nymphaeaceae (pond lily).

nutgall. Galls, galla. The excrescence of *Quercus infectoria* a Cupuliferae, and allied species, produced by the punctures and deposited

eggs of *Cynips tinctoria*, a small gall fly. Nutgalls contain tannic acids, and are used medicinally as an astringent.

nutmeg. Myristica. **n. butter.** Myristica oil. **American-** Otoba wax. **n. oil.** Myristica oil.

nutriant. A drug that modifies the nutritive processes of the body.

nutrient. A substance that nourishes and serves as food for a body, organism or cell.

nutrilite. A nutrient.

nutriment. Nourishment or food.

nutrition. The processes of taking and absorbing food, and the more remote functions of respiration, circulation, secretion and excretion connected therewith.

nutrose. A sodium caseinate, used with milk as a nutrient.

nux. A nut. **n. moschata.** Myristica. **n. vomica.** Poison nut, quaker nuts, quaker buttons. The dried seeds of *Strychnos nux-vomica*, a Loganiaceae of Ceylon, India, and Northern Australia. It contains 2.5 % alkaloids, principally strychnine and brucine; used medicinally as an extract, fluid extract or tincture, as a tonic and stimulant.

NW acid. Neville and Winther's acid.

nyctanthin. $C_{28}H_{27}O_4$ = 331.22. A crystalline principle from the tree of sadness, *Nyctanthes arbortristis*, an Oleaceae.

Nylander, Claes Wilhelm. 1835–1902. A Swedish chemist, noted for his work in biochemistry. **N. reagent.** A solution of 4 gm. potassium-sodium tartrate, 10 gm. sodium hydroxide, 2 gm. bismuth subnitrate in 100 cc. water. **N. test.** A test for sugar in urine. Add 1 part N. reagent to 10 parts of urine. A black coloration or precipitate indicates the presence of sugar.

nylon. A generic term for any long-chain synthetic polymeric amide which has recurring amide groups as an integral part of the main polymer chain, and which is capable of being formed into a filament in which the structural elements are oriented in the direction of the axis.

nystagmus. An involuntary oscillatory movement of the eyeballs. It is an occupational disease (*e.g.*, of miners) due to inadequate light reaching the eye.

Nyrop process. A method of drying and powdering substances by atomizing their solution into a heated space (*e.g.*, for soap).

O

O. (1) The symbol for oxygen. (2) Abbreviation for orange (see *colors*). **O-** A prefix indicating that the radical is attached to the oxygen atom. (See *notation.*) **O orbit.** The fifth shell. Cf. *Bohr's theory, periodic system.* **O shell.** See *atomic structure.*

o. An abbreviation for *ortho-*, or the 1.2-position.

Ω The Greek capital letter omega. (1) The symbol for ohm. (2) A symbol for the ultimate disintegration products of each of the radioactive series (lead isotopes).

ω The Greek letter omega. (1) A prefix indicating substitution in a side-chain of an aromatic compound. (2) The symbol for angular velocity. (3) Solid angle.

O.M. Abbreviation for organic matter.

oak. A genus of trees, *Quercus*, of the order Cupuliferae, which yield cork, nutgalls, quercin, and tanning materials. **poison-** See *poison oak.* **white-** Quercus. **o. bark.** The cut and dried bark of oak species, *Quercus robur*, containing 25 % tannin; is used in tanning leather, and medicinally as an astringent. **o. red.** $C_{28}H_{22}O_{11}$ = 534.2. A coloring matter obtained by hydrolysis of quercitannic acid. **o. tannin.** (1) Quercin. (2) Quercitannic acid.

oakum. A fiber made by untwisting old hemp ropes. Used medicinally as a dressing and in pads; and (usually impregnated with pitch and tar) for caulking purposes.

oat. Avena.

oatmeal. A coarse flour made from oats.

Obermayer, Fritz. 1861– . An Austrian physician, noted for clinical tests. **O.'s reagent.** A 0.4 % solution of $FeCl_3$ in dilute HCl. **O.'s test** (for indican in urine). To equal parts of urine and chloroform a few drops of Obermeyer's reagent are added, and the mixture is shaken and left to separate. The intensity of the blue color of the chloroform indicates the amount of indican.

Obermüller's test (for cholesterol). The substance is melted in a test tube, and a few drops of propionic aldehyde added; on cooling, the mass becomes successively blue, green, orange and brown-red.

oberphos. A dry, granular superphosphate, used as a fertilizer.

objective. (1) The lens of the microscope nearest the object. (2) The lens of a photographic camera. **achromatic-** A compound lens which corrects chromatic aberration (q.v.). **immersion-** An objective which is dipped into a drop of cedar oil or other liquid covering the object, and thus establishes a continuous film between object and microscope. **tele-** A lens of long focus, used for photographing distant objects.

obsidian. A volcanic glass rock used by Indians for arrow-heads, spear-heads, and other implements.

occlude. To take in or retain in pores; to adsorb.

occluded. Pertaining to a substance which is mechanically adhering to or inclosed in some other substance.

occlusion. The adhesion of a gas or liquid on solid particles or inside a solid mass; as occlusion of hydrogen on palladium, occlusion of solvent on precipitates, or occlusion of air or liquids in crystals.

oceanic sediments. The materials at the sea-bottom, which consist either of the mechanical deposits from rivers or the remains of marine animals; or substances formed by chemical action on the ocean floor. The deep sea deposits have been classified as:

red clay.....	2790 fathoms,	6.7 % $CaCO_3$
radiolarian ooze.	2894 fathoms,	4.0 % $CaCO_3$
diatom ooze.....	1477 fathoms,	22.96 % $CaCO_3$
globigerina ooze.	2049 fathoms,	64.5 % $CaCO_3$
ptoropod ooze...	1044 fathoms,	79.2 % $CaCO_3$

oceanium. Hafnium.

ocher. Paint rock, mineral purple, yellow earth. A powdered iron oxide, usually contaminated with clay. Used as a yellow (limonite), red (hematite) or brown pigment in paints, varnishes, linoleum, paper-making and oilcloth manufacture. **antimony-** Stibiconite. **bismuth-** Bismite. **brown-** Bogore. **Indian-** q.v. **molybdic-** Molybdite. **nickel-** Annabergite. **plumbic-** Brown lead oxide. **red-** A variety of hematite. **Roman-** A deep-orange o. **synthetic-** An artificial pigment, obtained by precipitating ferrous sulfate with soda and lime **telluric-** Tellurite. **tungstic-** Tungstite. **uranic-** Uraconite. **yellow-** Selwynite. A mixture of ferric oxide and clay.

ocherous deposit. The accumulation of precipitated ferric hydroxide and calcium carbonate from mineral waters, due to the escape of carbon dioxide.

ochre. Ocher.

ocimene. $C_{10}H_{16}$ = 136.12. *2.6*-Dimethyl-*1,5.7*-octatriene*. A terpene, d.0.799, b.$_{21mm}$74, from the oil of sweet basil *Ocimum basilicum*, and anemone leaf *Boronia dentigeroides.*

octad. An element or radical that has a valency of eight. Cf. *octet.*

octadecane*. $C_{18}H_{38}$ = 254.4. A liquid hydrocarbon, $d_{20°}$.0.7668, m.30, b.306. Cf. *anthemane.*

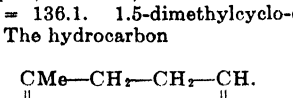
octadecanoic acid*. Stearic acid.

octadecanol*. $C_{18}H_{38}O$ = 270.30. Octadecyl alcohol, $Me(CH_2)_{16}CH_2OH$. White leaflets, d.0.8124, m.59, b.210.5, occurring in spermaceti, whale and linseed oils.

octadecenic acid. *ε-* Petroselinic acid. *θ-* Oleic acid.

octadecyl. The radical $Me(CH_2)_{17}$—. **o. alcohol.** Octadecanol*. **o. ic acid.** Stearic acid.

octadiene. C_8H_{14} = 110.11. Conylene. Colorless liquid, d.0.770, b.130. **dimethylcyclo-** $C_{10}H_{16}$ = 136.1. 1.5-dimethylcyclo-octadiene ($\Delta^{1,5}$). The hydrocarbon



It is a principal constituent of rubber. **methyl-methylene-** Myrcene.

octahedral. Pertaining to a crystal with eight surfaces. **o. iron ore.** Magnetite.

octahedrite. TiO_2. Anatase. A native titanium dioxide, which occurs in dark blue or black tetragonal crystals.

octahedron. A crystal of the isometric system with eight surfaces, each having equal intercepts on all three axes; *i.e.*, a crystal whose 8 faces are equilateral triangles.

octane*. C_8H_{18} = 114.2. Dibutyl. An oily hydrocarbon in petroleum. A colorless liquid, d.0.706, m.−56, b.125, insoluble in water. **amino-** Octylamine*. **chloro-*** Octylchloride. ***2.7*-dimethyl-*** $C_{10}H_{22}$ = 142.17. Biisoamyl. $[Me_2CH(CH_2)_2—]_2$. Colorless liquid, d.0.7264, m.−52, b.100. **iodo-*** Octyliodide.

o. carboxylic acid. Pelargonic acid. **o. dicarboxylic acid.** Sebacic acid. **o. number.** The percentage of *2.2.4*-trimethylpentane, by volume, which must be mixed with *n*-heptane to reproduce the knocking characteristics of the gasoline being tested.

octanoic acid. Caprylic acid.

octanol*. Octyl alcohol.

octanone*. **2-** Mexylmethylketone. **3-** Amylethylketone.

octavalent. Describing an element or radical having a valency of eight.

octaverine. A derivative of phenylisoquinoline, used as a spasmodic; said to be less toxic than papaverine.

octazone. N_8H_4. The hypothetical compound HN:N.NH.N:N.NH.N:NH, known in its derivatives. Cf. *hydronitrogens*.

octene. C_8H_{16} = 112.12. Octylene, caprylene. A group of alkenes, occurring in bergamot and lemon oils, as: **1-**, *n-*, or Δ^1-. $Me(CH_2)_5CH:CH_2$. A colorless liquid, d.0.722, b.123. **2-**, *i-* or Δ^2-. $Me(CH_2)_4CH:CHMe$. **3-** or Δ^3-. $Me(CH_2)_3CH:CHEt$.

octet. A group of eight valence electrons, which is chemically inert and stable. Cf. *polar bond*. **o. theory.** Lewis's theory.

octin. $C_9H_{19}N$ = 141.15. *2*-Methyl-*6*-methylamino-heptene-*2*. $Me_2C:CH.(CH_2)_2CHMe.NHMe$. White powder, used for convulsions.

octine. Octyne*.

octivalent. Octavalent.

octo- A prefix indicating eight, as octohydro-.

octodeca- A prefix indicating eighteen. **o. peptide.** An artificial protein containing nineteen amino-acids or eighteen peptide-groups, —CO.NH—. Cf. *polypeptide*.

octodecane. Octadecane.

octoic acid. Caprylic acid. **o. alcohol.** Octyl alcohol.

octoil. Ethyl hexyl phthalate, used for vacuum pumps, q.v.

octointesserakaide carbonic acid. $C_{16}H_{18}O_{16}$ = 466.2. An octocarboxylic acid, $(COOH)CH_2—(CHCOOH)_6—CH_2COOH$.

octopeptide. An artificial peptide consisting of nine combined amino-acids and having eight peptide groups, —CO.NH—.

octosan. Acetylated cane sugar. It has a bitter taste, and is used as a denaturant.

octyl. The monovalent radical, $—C_8H_{17}$ (capryl), derived from octane. **o. acetate.** $C_{10}H_{20}O_2$ = 172.15. Capryl acetate, $CH_3COOC_8H_{17}$. Colorless liquid, d.0.885, m.−38.5, b.210, **o. alcohol.** $C_8H_{17}OH$ = 130.2. Octanol*, heptyl carbinol, octoic or octylic alcohol, caprylic alcohol. There are several isomers. **n-** 1-hydroxyoctane, $Me(CH_2)_6CH_2OH$. A colorless liquid, d.0.838, m.−18, b.195.5, is soluble in water, alcohol or ether. **d-sec.** 2-hydroxyoctane, $Me(CH_2)_5CHOH.Me$. A colorless liquid, d.0.822, $b._{20mm}86$. **1-sec-** d.0.819, m.−38, b.178. **o. aldehyde.** $C_8H_{16}O$ = 128.2. Caprylic aldehyde, $C_7H_{15}CHO$. A colorless liquid, d.0.821, insoluble in water, soluble in alcohol or ether. **o. amine.** $C_8H_{17}NH_2$ = 129.3. *Normal*. A colorless liquid, b.186, slightly soluble in water, soluble in alcohol or ether. *Secondary*, $Me.CH.NH_2.C_6H_{13}$. A liquid, D.-12.65. **o. chloride.** $C_8H_{17}Cl$ = 148.64. *Normal*. A liquid, $d_{16}°0.8802$, b.180. *Secondary*. A liquid, $d_{16}°.0.8708$, b.175. **o. formate.** $HCOOC_8H_{17}$ = 158.2. The formic acid ester of octane. A colorless liquid, d.0.893, b.198, insoluble in water, soluble in alcohol or ether. **o. iodide.** $C_8H_{17}I$ = 240.0. *Secondary*—, $MeCHIC_6H_{13}$. A colorless, oily liquid, d.1.31, decomp. 200, insoluble in water, soluble in alcohol or ether.

octylene. Octene.

octylic acid. Caprylic acid. **o. alcohol.** Octyl alcohol.

octyne*. C_8H_{14} = 110.11. Octine, caprilydene, hexylacetylene; $CH:C(CH_2)_5Me$. Colorless liquid, d.0.770, b.125.

ocular. The eyepiece of an optical instrument, as a microscope, telescope, spectroscope, polariscope. **compensating-** An eyepiece that corrects the axial aberration of the objective. **Huyghenian-** q.v. **Ramsden-** An eyepiece which increases definition and consists of two plano-convex lenses, with their convex surfaces turned toward each other. **stereoscopic-** A set of two eyepieces giving a stereoscopic effect.

oculin. A glycerin extract of the corpus ciliariae of the eye.

ocymene. Ocimene.

od. Od-rays. The luminescence of living organisms. Cf. *scotography*.

odallin. A glucoside from *Cerebera odollam*. Cf. *cerberin*.

odor, odour. The volatile portion of a substance that is perceptible by the sense of smell. Six classes:

1. Spicy, like anise and clove.
   a. *aromatic:* eugenol, thymol, menthol, apiol, carvacrol, methylsalicylate.
   b. *sweet:* nitrobenzene, benzaldehyde.
   c. *citric:* citral.
2. Flowery, like geranium and heliotrope.
   a. *floral:* citronellol, terpineol, ionone, methylanthranilate.
   b. *fragrant:* coumarin, vanillin, anisaldehyde.
   c. *pungent:* heliotropine, styrone, musk, trinitroisobutyltoluene.
3. Fruity, like bergamot and acetic ether.
   a. *ethereal:* ether, alcohol, acetone, ethylacetone.
   b. *esteric:* amylacetate, ethylvalerate, ethyl acetate.
4. Resinous or balsamic, like turpentine and eucalyptus.
   a. *camphoric:* terpineol, camphor, eucalyptol.
   b. *heavy:* chloroform.
5. Burnt, like tar and pyridine.
   a. *empyreumatic:* aniline, toluidine, benzene, xylene.

b. *tarry:* phenol, cresol, guaiacol.
c. *narcotic:* pulegone, pyridine.
6. Foul, like hydrogen sulfide and mercaptans.
a. *fecal:* skatole, indole.
b. *caprylic:* valeric acid, butyric acid.
c. *fishy:* trimethylamine, cacodyl.
d. *garlic:* ethylsulfide, phosphine.

ammoniacal- An odor resembling ammonia. **aromatic-** See (1a). **balsamic-** An aromatic odor resembling balsam. **burnt-** An odor resembling tar or burnt organic matter. **camphorous-** An odor resembling camphor, see (4a). **caprylic-** See (6b). **citric-** See (1c). **delicate-** A slight and agreeable odor. **empyreumatic-** An odor resembling burnt animal or vegetable matter. **esteric-** See (5b). **ethereal-** A delicate fruity or flowery odor, see (3a). **fecal-** See (6a). **fishy-** See (6c). **floral-** See (2a). **flowery-** The odor of flowers and blossoms. **fragrant-** See (2b). **foul-** See (6). **garlic-** See (6d). **heavy-** See (4b). **narcotic-** See (5c). **pungent-** A strong odor. **resinous-** An odor resembling rosin or turpentine. **putrefactive-** The odor of decaying animal matter. **sweet-** See (1b). **spicy-** An odor resembling spices, like anise, cinnamon, cloves. **tarry-** An odor resembling tar.

o. intensity. The strength of an odor (cf. *olfacty*). Various odors are used as a warning for miners, or for the detection of leaks in pipe lines or boilers. The o. intensity is determined (cf. *olfacty*) in terms of the minimum perceptible concentration; *e.g.*,

musk	0.00004 mg. per liter air
iodoform	0.018 mg. per liter air
diamylsulfide	0.001 mg. per liter air
propylmercaptan	0.006 mg. per liter air
butyric acid	0.009 mg. per liter air
amylisovalerate	0.012 mg. per liter air
valeric acid	0.029 mg. per liter air
oil of peppermint	0.03 mg. per liter air
methylsalicylate	0.1 mg. per liter air
acetic ether	0.68 mg. per liter air
chloroform	3.3 mg. per liter air

o. permanency. The persistence of an odor, measured by placing a definite quantity of the oil on a filterpaper, exposing it to air, and comparing its odor after certain time intervals. Some of the most persistent odors, in decreasing order of permanence, are: patchouli oil, sandal wood oil, cinnamon oil, cassia oil, citronella oil, origanum oil, thyme oil, neroli oil. **o. theory.** The assumption that odor sensation is due to the combination of chemical radicals (*osmophoric* groups) of the odorous substance, with certain substances of the nasal membrane (*osmoceptors*), on analogy with Ehrlich's side chain theory of immunity. Some of the osmophoric groups are supposed to be the radicals OH, CHO, CO, and COOH.

odorator. An atomizer or nebulizer for diffusing liquid perfumes.

odoriferous. Giving off odor; fragrant.

odorimetry. Olfactometry. The measurement of the intensity and permanency of odors.

odoriphore. Osmophore.

odorometer. An apparatus for measuring the intensity of odors and stenches for industrial purposes.

odorous. Having an odor. **o. principle.** A terpene, essential oil or balsam.

oe- See *e-*.

oenanthal. Enanthaldehyde.

oenanthe. Five-finger root, water drop wort, dead tongue. The dried herb of *Oenanthe crocata*, a highly-poisonous umbelliferous plant.

oenanthic acid. Heptoic acid.

oenanthyl. Enanthyl.

oenidin, oenin. Anthocyanins from grapes.

oenotannin. A tannin in wines.

Oersted, Hans Christian. 1777–1851. A Danish physicist who discovered electromagnetism (in 1819) by passing a current of electricity through a wire in the same plane as a suspended magnetic needle.

oerstedite. Hydrated zircon containing titania.

oestradiol. $C_{18}H_{24}O_2$ = 272.2. Estradiol*, dimenformon, ovocylin, progynon-DH. The estrogen 3,17-dihydroxy-1,3,5-estratriene; in it a secondary alcohol group replaces the ketone group of oestrone (q.v.).

oestrane. $C_{18}H_{30}$ = 146.2. *2*-Methyl-*1,2*-cyclopentano-perhydro-phenanthrene. A tetracyclic hydrocarbon and parent-substance of sex-hormones. Cf. *sterols, cholane.*

oestrin. Oestrone.

oestriol. $C_{18}H_{24}O_3$ = 288.2. Estriol*, theelol, trihydroxyoestrin. A trihydric alcohol from pregnancy urine. White needles, m.218, $[\alpha]_D$ +61°, insoluble in water. Cf. *cholane.*

oestrol. Oestriol.

oestrone. $C_{18}H_{22}O_2$ = 270.2. Estrone*, theelin, emmenin, thelykinine, folliculin, progynon, menformon. The female sex hormone obtained from ovarian follicles. It is a monoatomic keto alcohol (for structure, see *cholane*). White monoclinic crystals, m.250, $[\alpha]_D$ +160°, insoluble in water, soluble in organic solvents. It occurs also in the placenta and urine of pregnant women. Cf. *androsterone.*

official. Pertaining to the United States, British or any other Pharmacopoeia. **o. compound.** A substance listed in a pharmacopoeia. **o. test.** An analytical method prescribed and listed in a pharmacopoeia.

officinal. (1) For sale in an apothecarie's shop or drug store. (2) Same as official.

O.G. Abbreviation for original gravity.

Ohm, Georg Simon. 1787–1854. A German physicist. **O.'s law.** The strength or intensity of an unvarying electric current (C) is directly proportional to the electromotive force (E), and inversely proportional to the resistance (R) of the circuit. Thus $C = E/R$.

ohm. A unit of electrical resistance, and the primary practical unit of electricity: Ω **international-** The resistance offered to an unvarying electric current by a column of mercury at 0°C., 14,4521 gm. in mass, of constant cross-section and 106.300 cm. long. 1 Int. ohm = 1.00052 absolute ohm = 10 e.m.u. = $\frac{1}{9} \times 10^{-11}$ e.s.u. = 1.01367 B.A. ohms = 1.06292 Siemens ohm. 1 B.A. ohm = 0.98651 Int. ohm. 1 Siemens ohm = 0.94080 Int. ohm. **legal-** (1884) 0.9972 international ohm. An obsolete standard. **mego-** A million ohms. **micro-** A millionth of an ohm. **reciprocal-** Mho, or ohm^{-1}. A unit of electric conductivity (q.v.); the reciprocal of the resistance. **true-** The resistance of a column of mercury 106.25 cm. long at 0°C., of 1 sq. mm. cross section. It is an experimentally-determined value, and equals 10^9 e.m.u.

ohm^{-1}. See reciprocal *ohm.*

ohmammeter. A combination ohm-meter and ampere-meter.

ohmmeter. An instrument for measuring electric resistance in ohms.

ohmoil. A mineral oil stabilized by the addition of agerite (aldol-α-naphthylamine) to prevent a decrease in electrical resistivity on prolonged heating.

oiazines. Orthodiazines. A group of heterocyclic compounds having two nitrogens in the ortho-position in the ring; as, pyridazine, cinnoline. Cf. *miazines, piazines.*

-oic. A suffix indicating the —COOH group; *e.g.*, methyloic, —COOH; ethyloic, —CH_2.COOH; propyloic, —CH_2CH_2COOH.

-oid. A suffix indicating: (1) resemblance or likeness; as, alkaloid, metalloid; (2) a preparation containing the concentrated active principles of a drug; as, echinacoid.

oil. (1) A liquid that is not miscible with water, and is generally combustible and soluble in ether. Three main groups:

A. Fixed oils, which consist of the fatty substances of vegetable and animal organisms, and contain the esters (usually glycerol esters) of fatty acids.

B. Volatile oils or essential oils, which consist of the odorous principles of vegetable organisms and contain terpenes, camphors, and related compounds.

C. Mineral oils, fuel oils and lubricants, derived from petroleum and its products, which consist of hydrocarbons.

(2) Natural oil, q.v. **aniline-** Crude aniline. **acetone-** See *acetone.* **blown-** A fixed oil that has been oxidized by a current of air. **boiled-** See *linseed oil.* **compounded-** A mixture of essential oils resembling certain flower odors and flavors used in perfumery. **crude-** Petroleum. **distilled-** Essential. **drying-** See *drying oil.* **edible-** A fixed oil, used as food or a food accessory. **essential-** The volatile or distilled oils of plants, leaves, flowers. They contain aromatic hydrocarbons, aldehydes, alcohols, ethers, acids, terpenes or camphors. **ethereal fruit-** A mixture of aromatic substances resembling fruit: banana, apples, etc. in odor. **expressed-** Fatty oil. **fatty-** The nonvolatile oils of plants and animals. They contain mixtures of fatty acids and their esters, (usually triglycerides), and are subdivided into three groups: solid (mainly stearin), semi-solid (mainly palmitin), and liquid (mainly olein). **fish-** See *fish* oils. **fixed-** Fatty. **flower-** See *essential,* or *synthetic oil.* **liquid-** A fatty oil that is liquid at room temperature. It contains chiefly olein, and can be solidified by hydrogenation. **lubricating-** A mineral oil used for lubrication. **mineral-** An oil, mainly hydrocarbons derived from inorganic matter, as petroleum, coal oil. **natural-** A mixture of hydrocarbon oils with their oxidation products; as, crude petroleum. **non-drying-** See *non-drying oil.* **quintessential-** A highly-aromatic substance derived from a natural essential oil; as, anethole from anise oil, carvol from caraway oil, eugenol from clove oil. **semisolid-** A fixed oil, melting at room temperature, and consisting chiefly of the triglyceride of palmitic acid (palmitin). **residual-** An oil which does not distil in refining processes. **solid-** An oil or fat that is solid at room temperature and consists chiefly of stearin, the triglyceride of stearic acid. **straight-cut-** A mineral oil fraction having a relatively small difference between the initial and final boiling-points. **synthetic drying-** SDO. An amber-colored, viscous liquid which polymerizes on drying to a hard, highly-resistant and chemically resistant, inflexible film. It is used as a protective coating. **volatile-** Essential oil.

o. of absinthe. Wormwood oil. **o. of ajava.** Ajowan oil. **o. of albahaca.** Tolu oil. **o. of almond, artificial.** Benzaldehyde. **o. of anthos.** Rosemary oil. **o. of ants.** Furfural. **o. of apple.** Amyl valerate. **o. of arachis.** Peanut oil. **o. of aspic.** Spike oil. **o. of badian.** Star *anise* oil. **o. of bananas.** Amyl acetate. **o. of bay.** Laurel oil. **o. of bay berry.** Myrcia oil. **o. of benne.** Sesame oil. **o. of brazil nuts.** Castanhao oil. **o. of candle nuts.** Lumbang oil. **o. of caoutchouc.** Terpene. **o. of checkerberry.** Gaultheria oil. **o. of china wood.** Tung oil. **o. of chinese beans.** Soya bean oil. **o. of chinese cinnamon.** Cassia oil. **o. of cognac.** Enanthic ether. **o. of cuscus.** Vetiveria oil. **o. of dog-fish.** Shark oil. **o. of dolphin.** Porpoise oil. **o. of earth nuts.** Peanut oil. **o. of fir.** Pine oil. **o. of flaxseed.** Linseed oil. **o. of Florence.** Olive oil. **o. of garlic.** Allyl sulfide. **o. of gingelly.** Sesame oil. **o. of glonoin.** Nitroglycerin. **o. of goosefoot.** Chenopodium oil. **o. of gourd.** Cucumber oil. **o. of ground-nuts.** Peanut oil. **o. of gynocardia.** Chaulmoogra oil. **o. of hoofs.** Neats-foot oil. **o. of illicium.** Star-*anise* oil. **o. of katchung.** Peanut oil. **o. of lemon.** Lemon oil. **o. of maize.** Corn oil. **o. of melissa.** Balm oil. (*East Indian-*) Lemongrass oil. **o. of mignonette.** Reseda oil. **o. of mirbane.** Nitrobenzene. **o. of monarda.** Horsemint oil. **o. of mosoi flowers.** Ylangylang oil. **o. of mustard, artificial.** Allyl isothiocyanate. **o. of mirbane.** Neroli oil. **o. of orange.** Orange oil. **o. of origanum.** Wild *marjoram oil.* **o. of palmarosa.** Turkish *geranium oil.* **o. of pears.** Amyl acetate. **o. of pennyroyal.** Hedeoma oil. **o. of pineapple.** Ethyl butyrate. **o. of ricinus.** Castor oil. **o. of snake root.** Asarum oil. **o. of sperm.** Whale oil. **o. of tar.** An empyreumatic oil obtained by distillation of pine tar. **o. of theobroma.** Cacao butter. **o. of verbena.** *East Indian-* Lemongrass oil. *Singapore-* Citronella oil. **o. of vitriol.** Concentrated commercial sulfuric acid. **o. of wintergreen.** Gaultheria oil. *artificial-* Methyl salicylate. *synthetic-* Methyl salicylate.

oil analysis. The identification of an oil, and the determination of its quality, purity, and constituents. It is divided into the determination of:

Physical constants:
- a. specific gravity
- b. boiling point
- c. optical rotation
- d. refractivity
- e. congealing point or melting point
- f. flash or inflammation point
- g. solubility.

Chemical properties:
- a. saponification value
- b. acetylation value } ester value
- c. formylation value }
- d. iodine value
- e. acid value.

o. bath. A metal container, similar to a water bath, filled with oil (linseed oil, rape-seed oil). It is used to heat glass apparatus to tem-

peratures of 100–200°C. **o. cake.** A by-product in the manufacture of oils. It is a compact mass of crushed seeds or nuts, from which the oil has been expressed or extracted. It contains the proteins, carbohydrates, salts, and some residual oil, and is a most valuable cattle food; also used as a basis for artificial fertilizers. The percentage composition is shown in the following table (Sadtler's Industrial Organic Chemistry):

	Water	*Fat*	*Fibers*	*Ash*	*Proteins*
earth-nut cake...	11.5	8.8	31.1	7.2	41.4
cottonseed cake..	13.0	7.5	51.0	8.5	20.0
rape-oil cake.....	10.1	9.2	41.9	6.5	31.9
colza-oil cake....	11.4	9.0	42.8	6.3	30.6
sesame-oil cake...	10.4	10.1	38.8	9.8	31.9
beech-nut cake...	11.4	8.5	49.8	5.3	24.0
linseed cake.....	10.6	9.8	44.6	6.5	28.5
camelina cake....	9.6	0.2	50.9	7.0	23.3
poppy-oil cake...	9.5	8.9	37.7	11.4	32.5
sunflower-oil cake	10.2	8.5	48.9	11.4	21.0
hempseed-oil cake	10.0	8.3	48.0	12.2	21.5
palm-nut cake...	9.5	8.4	41.0	10.6	30.4
coconut cake....	10.0	9.2	40.5	10.5	30.0

o. cloth. Linoleum. A fabric (canvas) coated with a mixture of linseed oil and pigments. **o. gas.** A group of combustible hydrocarbon gases, such as aerogene gas, Blau g., pentane g., carbo g. **o. seed cake.** O. cake. **o. shale.** A compact sedimentary rock which yields 12–60 gallons oil per ton on distillation, and contains a considerable ash (30–50 % SiO_2, 12–67 % Fe_2O_3, 0.5–33 % CaO, 0.3–8 % MgO). It occurs in Scotland, Australia, Nevada, Colorado and Wyoming. Cf. *kerogen.* **o. stone.** A fine-grained stone for sharpening knives and scalpels on which oil is used instead of water. **o. sugars.** Oleosacchara. A trituration of 2 cc. essential oil with 100 gm. sugar; used medicinally and for flavoring purposes. **o. supply.** The world-supply of o.'s (1930/31) is 26,623 Mill. pounds (weight) of which:

vegetable o.....	17.424 Mill. pds.
animal o.....	9.540 Mill. pds.
whale o.....	1.474 Mill. pds.
fish o.....	211 Mill. pds.

o. thief. An apparatus for taking samples of oil from the top, center and bottom of tank cars or storage vessels.

oildag. See *graphite, dag.*

ointment. Unguentum. A salve or fatty preparation for external or cosmetic use. **basilicon-** Resin (26 %) compounded with bees-wax, olive oil and lard. **blue-** Mercury ointment. **boric acid-** A mixture of 10 % boric acid, 85 % white petrolatum and 5 % paraffin; used as an antiseptic. **brown-** Mother's salve. A mixture of camphorated brown plaster, suet, and olive oil. **camphor-** A mixture of 22 % camphor with lard and white wax; used as an anodyne and antipyretic. **carbolized-** Phenol ointment. **iodine-** A mixture of 4 % I and 4 % KI with glycerin and benzoinated lard. **iodoform-** A mixture of 10 % iodoform with benzoinated lard. **mercury-** Mercurial ointment. An emulsion of 50 % finely-divided mercury in 10 % lard and 35 % suet. **mercury-, diluted.** Blue ointment. An emulsion of 30 % mercury in 25 % lard and 45 % suet; used as an antiparasitic. **phenol-** A simple ointment containing 2 % phenol; used as a wound antiseptic. **simple-** Unguentum. A mixture of benzoinated lard with 20 % white wax; used as an ointment base. **sulfur-** A mixture of 20 % sublimed sulfur and 10 % potassium carbonate with benzoinated lard; used as an antiparasitic. **zinc oxide-** A mixture of 20 % zinc oxide with white petrolatum or benzoinated lard; used as an antiseptic and astringent.

oiticia oil. A white, buttery fat from the nuts of the North Brazilian tree *Licania rigida*, a Rosaceae. It resembles Chinese wood oil, and contains coupeic acid.

okonite. (1) $CaH_2Si_2O_6$. A native calcium silicate in compact fibrous masses. (2) An insulating material obtained by vulcanizing a mixture of ozokerite and resin with rubber and sulfur.

-ol. A suffix, which indicates a hydroxyl group in organic compounds, as in alcohols and phenols, (cf. *-ole*).

old age theory. A theory which assumes that the stability of the elements depends on the age of the earth; *e.g.*, in the present eon the radioactive elements are the upper limit, and in eons to come elements with higher atomic weights may make their appearance. Eons ago the properties of the elements were different from those of today. The hypothesis is that the trend is a slow evolution through the periodic system as a result of the gradual slowing-down of the electronic motions of the atoms and the consequent increase in mass. Cf. *transuranium*, extinct *elements*.

-ole. A suffix denoting: (1) a substance which is not an alcohol but to which a name ending in -ol was originally given; as, indole. (2) An aromatic ether; as, anisole, estragole.

Oleaceae. Olive family, a group of trees and shrubs:

Olea europaea.....	sweet olive / olive oil
Fraxinus ornus.....	manna
Fraxinus americana.....	white ash
Fraxinus excelsior.....	fraxinin
Chionanthus virginica (fringe tree)	chionanthus
Jasminium grandiflorum.....	jasmine oil
Nyctanthes arborthristis.....	nyctanthin
Ligustrum vulgare (privet).....	syringin
Syringa vulgaris.....	syringin

oleaginous. Oily or greasy.

oleander. Nerium. A genus of subtropical, poisonous shrubs of the order Apocyanaceae, which yield essential oils, karabin, neriin, pseudocurarine and oleandrin.

oleandrin. $C_{31}H_{48}O_9$ = 270.2. A glucoside from *Nerium oleander*, an Apocyanaceae. Yellow amorphous powder, m.70–75, insoluble in water, soluble in alcohol or ether. It resembles digitoxin. Cf. *neriin*.

oleanol. $C_{29}H_{48}O$ = 412.2. Needles, m.216–230, derived from caryophyllin; sometimes used as a synonym for this compound.

oleanolic acid. Caryophyllin.

oleastene. $C_{21}H_{36}$ = 288.4. A hydrocarbon from olive oil.

oleasterol. $C_{20}H_{34}O$ = 290.26. A phytosterol from olive oil.

oleate. A compound of an alkaloid or a metal with oleic acid. Used medicinally for external applications; technically, in soaps and paints.

olefiant gas. Ethylene.

olefine. One of a series of unsaturated hydrocarbons of the type, C_nH_{2n} = ethylene series. They are distinguished by the suffix, -ene, as in ethylene, propylene, etc. See *ethylene series.* **o. acid.** A series of unsaturated hydrocarbon acids of the general type, $C_nH_{2n-1}COOH$. See *acrylic acids.* **o. alcohol.** A series of unsaturated alcohols of the general type, $C_nH_{2n-1}OH$; such as, CH_2:CH.OH, vinol, vinyl alcohol; CH_2:CH.CH_2.OH, propenol-3, allyl alcohol. **o. aldehydes.** A series of unsaturated aldehydes of the general type, $C_nH_{2n-1}CHO$, as CH_2:CHCHO, acrolein; MeCH:CH.CHO, crotonaldehyde. **o. ketones.** A series of unsaturated ketones of the general type, $C_nH_{2n}CO$; as, MeCH:CH.CO.Me, ethidene acetone; Me_2C:CH.CO.Me, mesityl oxide; Me_2C:CH.CO.CH:CMe_2, phorone.

oleic acid. $C_{17}H_{33}COOH$ = 282.4. Oleinic acid, *9*-octadecanoic acid*, red oil, $Me(CH_2)_7CH:CH(CH_2)_7COOH$. An unsaturated acid. Colorless needles, d.0.891, m.14, b.286, insoluble in water, soluble in alcohol or ether. It occurs in many (non-drying) oils, and can be hydrogenated to stearic acid (by catalysis with nickel); used in the preparation of soap. **iso-** Elaidic acid (cis-oleic acid), rapinic acid. **7-hydroxy-** Ricinoleic acid. **o. series.** Acrylic acids.

olein. $(C_{18}H_{33}O_2)_3C_3H_5$ = 885.1. (1) Triolein, glyceryl trioleate. The glyceride of oleic acid. A colorless oil, m. −6, insoluble in water, soluble in alcohol or ether. It is the main constituent of olive and many other oils. (2) Oleine. A mixture of the fatty acids obtained by steam- or vacuum-distillation of the products of acid hydrolysis of fats. (3) A glyceride of oleic acid, as, mono-olein, diolein.

oleinic acid. Oleic acid.

oleite. Sodium sulforicinoleate.

oleo- A prefix, indicating oil. **o. creosote.** Creosote oleate. **o. guaiacol.** Guaiacol oleate. **o. oil.** A yellow oil expressed from tallow, consisting of olein; used for making oleomargarine.

oleomargarine. (1) Margarine. A butter substitute made from a mixture of hydrogenated fatty oils; colored with aniline dyes. (2) The liquid fat from which margarine is made by hydrogenation.

oleometer. A hydrometer for oils.

oleoptene. See *stearoptene.*

oleoresin. (1) A natural combination of resinous substances and essential oils occurring in or exuding from plants, *e.g.,* benzoin and peru balsam. (2) A pharmaceutical preparation or ethereal extract of drugs (oleoresin capsicum, cubeb, ginger). **o. aspidium.** Oleoresina aspidii, oleoresin of male fern. A thick, olive-green liquid extracted from the male fern, which contains filicic acid; used medicinally as an anthelminthic. **o. capsicum.** Oleoresina capsica, oleoresin of red pepper, cayenne pepper. A dark brown soft mass obtained by acetone extraction of the fruit of capsicum species; used medicinally for external plasters, internally as a gastric stimulant, and as a spice for pickles. **o. cubeb.** Oleoresina cubeba. An alcohol extract from the fruits of *Piper cubeba,* insoluble in water, soluble in alcohol or ether; used medicinally as an expectorant. **o. ginger.** Oleoresina zingiberis. An acetone extract from Jamaica ginger, the rhizome of *Zingiber officinale;* used medicinally as a carminative. **o. lupulin.** An alcohol extract from the seeds of *Humulus lupulus;* used medicinally as a bitter tonic. **o. male fern.** Oleoresin aspidium. **o. parsley.** Oleoresina petroselini, liquid apiol. A dark-green semi-liquid mass obtained by alcohol extraction of parsley seeds, insoluble in water, soluble in alcohol, chloroform or ether; used medicinally as an emmenagogue. **o. pepper.** Oleoresina piperis. An acetone extract of pepper seeds, insoluble in water, soluble in alcohol or ether; used medicinally as a carminative.

oleoresina. The Latin for oleoresin. **o. aspidii.** Oleoresin aspidium. **o. capsici.** Oleoresin capsicum. **o. cubeba.** Oleoresin cubeb. **o. petroselini.** Oleoresin parsley. **o. piperis.** Oleoresin pepper. **o. zingiberis.** Oleoresin ginger.

oleosacchara. Oil sugar.

oleostearin. Beef stearin. An edible solid fat obtained from certain fatty tissues of the cow.

oleum. (1) The Latin name for oil. (2) Nordhausen acid, fuming sulfuric acid. A solution of sulfur trioxide in conc. (97–99 %) sulfuric acid, used as a reagent in chemical industry. **o. alchitri.** Juniper oil. **o. amygdalae amarae.** Bitter almond oil. **o. anisi.** Anise oil. **o. anonae.** Ylang-ylang oil. **o. anthemidis.** Chamomile oil. **o. arachis.** Peanut oil. **o. auranthii.** Orange peel oil. **o. bubulum.** Neatsfoot oil. **o. cadinum.** Cade oil. **o. cajeputi.** Cajeput oil. **o. calcis.** A solution of calcium chloride, produced by exposing the solid to air. **o. cari.** Caraway oil. **o. caryophylli.** Clove oil. **o. cassiae.** Cassia oil. **o. chaulmoograe.** Chaulmoogra oil. **o. chenopodii.** Chenopodium oil. **o. cinnamoni.** Cinnamon oil. **o. copaibae.** Copaiba oil. **o. coriandri.** Coriander oil. **o. crotonis.** Croton oil. **o. cubebae.** Cubeb oil. **o. cupressi.** Cypress oil. **o. eucalypti.** Eucalyptus oil. **o. foeniculi.** Fennel oil. **o. gaultheriae.** Wintergreen oil. **o. gossypii seminis.** Cottonseed oil. **o. graminis citrati.** Lemongrass oil. **o. juniperi.** Juniper berry oil. **o. lavendulae.** Lavender flower oil. **o. limonis.** Lemon oil. **o. lini.** Linseed oil. **o. menthae piperitae.** Peppermint oil. **o. menthae viridis.** Spearmint oil. **o. morrhuae.** Codliver oil. **o. myristicae.** Nutmeg oil. **o. olivae.** Olive oil. **o. phosphoratum.** Phosphorated oil. **o. picis liquidae.** Tar oil. **o. pimentae.** Pimenta oil. **o. pini.** Pine needle oil. **o. pini pumilionis.** Pine oil. **o. pulegii.** Pennyroyal oil. **o. ricini.** Castor oil. **o. rosae.** Rose oil. **o. rosemarini.** Rosemary oil. **o. sabinae.** Savine oil. **o, santali.** Sandalwood oil. **o. sassafras.** Sassafras oil. **o. sesami.** Sesame oil. **o. sinapis volatile.** Mustard oil. **o. terebinthinae.** Turpentine oil. **o. terbinthinae rectificatum.** Turpentine oil, rectified. **o. theobromatis.** Cacao butter. **o. thymi.** Thyme oil. **o. tiglii.** Croton oil.

oleyl. The radical, $C_{17}H_{33}CO$—, derived from oleic acid. **o. alcohol.** *9.10*-Octadecanol.

olfactometry. Odorimetry.

olfacty. A unit for expressing intensity of odor, q.v. It is the threshold value, or the minimum perceptible concentration expressed in grams per cc; this multiplied by $6.06 \times 10^{21}/M$, where M is the molecular weight, gives the number of molecules per cc; thus (cf. odor intensity):

ionone	16×10^6 molecules per cc.
ethyldisulfide	15×10^6 molecules per cc.
skatole	16×10^6 molecules per cc.
vanillin	20×10^6 molecules per cc.
valeric acid	47×10^6 molecules per cc.

olibanoresin. $C_{14}H_{22}O$ = 206.1. A neutral resin obtained from olibanum.

olibanum. Frankincense, gum thus. A gum resin obtained from incisions in the trees of various *Boswellia carteri* and other species from South Arabia and Somaliland. Yellow tears or reddish fragments; used in perfumery, as incense, and medicinally as an emmenagogue. Cf. *boswellic acid.* **o. oil.** An essential oil from olibanum containing pinene, dipentene, and phellandrene, d.0.895, insoluble in water, soluble in alcohol or ether. Used in medicine for bronchial affections.

-olid. A suffix indicating a lactone, q.v.

olifiant gas. Ethylene.

oligoclase. A silica mineral (q.v.) of the feldspar group.

oligodynamic. Small but powerful; the inhibition of fermentation or growth of bacteria due to the presence of metals (e.g., iron containers).

oligodynamics. The bactericidal action of metals, as Ag and Cu.

oligonite. $FeMn(CO_3)$. Native iron and manganese carbonate.

oligosaccharide. A carbohydrate that, in contrast to polysaccharides, yields on hydrolysis a small number of monosaccharose molecules; hence the di-, tri-, and tetra-saccharides.

olistomerism. Describing reactions in which the same substrates yield the same final products, but via different intermediate stages.

olive. The fruit of *Olea europaea*, an Oleaceae, used as food and in the manufacture of olive oil. **o. oil.** A fixed oil expressed from the olive; a pale yellow liquid, d.0.91, m. −6, insoluble in water, soluble in alcohol, ether, or chloroform. It contains olein and palmitin; impure grades are adulterated with other oils (cotton-seed oil, peanut oil). Used as a food, in pharmaceutical preparations, and in the manufacture of castile soap. **o. kernel oil.** A yellow oil extracted or expressed from the kernel of olives, d.0.918, insoluble in water, soluble in alcohol or ether; used as food, a lubricant, and in soap manufacture.

olivenite. $CuO.As_2O_5.H_2O$. Wood copper. A native copper arsenate.

olivine. (1) See *olivines.* (2) $(Mg,Fe)_2SiO_4$. Peridot, chrysolite. An orthorhombic magnesium and iron silicate, usually green crystals in many rocks; used as a gem and refractory. Cf. *chrysotile, peridotite.* **o. diabase.** A diabase containing olivine crystals.

olivines. A group of silica minerals, (q.v.) generally the sulfates of divalent metals.

Olsen's testing machine. An apparatus for determining the tensile strength of cement. It consists of an arrangement of levers and two heavy forceps, between which the specimen is placed and torn apart.

oly. The scum on molten metal.

omal. Trichlorphenol.

omega. The Greek letter ω or Ω; see under O.

-on. A little-used suffix indicating a ketonic grouping, (cf. *-one*).

ŏnanthol. Enanthol.

-one. A suffix indicating: (1) A ketone. (2) A substance related to the starches and sugars. (3) An alkone, C_nH_{2n-4}. Cf. *hydrocarbons.*

-onic. A suffix which usually denotes an acid produced by oxidation of an aldehydic group in an organic compound.

Ongstrem. The phonetic spelling of Ångström (q.v.).

onion. The edible bulb of *Allium cepa*, a Liliaceae; used as a condiment, food, and for the preparation of a syrup. **o. oil.** A light yellow oil of penetrating odor which consists mainly of allylpropyldisulfide, d.1.04, insoluble in water, soluble in alcohol or ether; used in flavoring.

onium compound. A group of organic compounds of the type RXH_y, which are isologs of ammonium and contain the element X in its highest positive valency, as

X is pentavalent:

ammonium	$-NH_4$
phosphonium	$R.PH_4$
arsonium	$R.AsH_4$
stibonium	$R.SbH_4$
X is tetravalent:	
oxonium	$R.OH_3$
sulfonium	$R.SH_3$
selenonium	$R.SeH_3$
stannonium	$R.SnH_3$
X is trivalent:	
iodonium	$R.IH_2$

They may also be considered as addition compounds, cf. *oxonium, carbonium, stibonium, -inium, -ylium.*

onocerin. $C_{28}H_{42}(OH)_2$ = 388.3. Onocol. A secondary bivalent alcohol, m.232, from the root of *Onomis spinosa;* a Leguminosae.

onocol. Onocerin.

onofrite. A native sulfo-selenide of mercury, Hg(S, Se).

ononetin. $C_{23}H_{22}O_6$ = 394.20. A split-product of ononin.

ononid. $C_{18}H_{22}O_8$ = 366.2. A neutral principle from the root of *Ononis spinosa,* a leguminous plant of Europe. A dark yellow powder, soluble in water or alcohol.

ononin. $C_{28}H_{28}O_{11}$ = 502.2. A glucoside from the root of *Ononis spinosa,* a Leguminosae of Europe. A white crystalline powder, m.201, slightly soluble in hot water or alcohol.

onychograph. A sphygmograph for recording variations in the blood pressure of the finger tips.

onyx. Calcareous sinter. A variety of agate (chalcedony quartz) in white and black alternate strata; used as a gem. **o. marble.** Mexican onyx. A calcite resembling onyx, and used as an ornamental stone.

ŏöcyanin. A blue coloring matter from certain birds' eggs.

ŏölite. Peastone. A compact limestone.

ooze. (1) The soft and slimy mud at the bottom of lakes and oceans. Cf. *oceanic sediment, diatoms.* (2) The slow exudation of a liquid.

opacifier. A substance which, when added to a transparent substance, makes it opaque; as, zirconium oxide, stannic hydroxy or arsenic and antimony compounds when added to glass.

opacity. The property of being impervious to light rays; not transparent or translucent. Cf. *opaque.*

opal. $SiO_2.xH_2O$. An amorphous form of silica containing a variable amount of water. Vitre-

ous, transparent to translucent masses of various colors, which reflect the light after refracting it so that a play of rainbow colors is produced. There are several varieties, to which specific names have been given: **agate-** An opal of agate-like structure. **cacholong-** An opaque porcelain-white, blue-white or pale yellow variety. **fire-** A red to yellow o. with fire-like reflections. **girasol-** A blue-white variety, translucent, with red reflections in strong light. **harlequin-** A variety having a variegated play of colors on a reddish background, resembling a fire opal. **hydrophan-** A white, opaque opal, that becomes transparent when immersed in water. **jasp-** A variety containing iron. **lechosos-** A variety with deep green flashes of colors. **moss-** A variety with moss-like inclusions of manganese oxide. **pearl-** An opaque, bluish-white, lustrous variety. **semi-** A native form of silica. **tabasheer-** An amorphous, opal-like silica deposited in the joints of bamboo. It resembles hydrophane. Cf. *hyalite*, *isopyre*. **wood-** A wood that has become silicified into opal.

o. flashes. The bright colors of an opal in certain positions, due to the refraction of light by thin films or layers. **o. glass.** A milky white glass. **o. jasper.** A form of silica resembling jasper.

opalescence. Milky irridescent reflected light from a mineral or from a solution, due in the latter case to the presence of a small quantity of precipitate.

opalescent. (1) Resembling an opal in appearance. (2) A milky turbidity.

opalescin. An albumin obtained from milk, it forms opalescent solutions.

opalized wood. A petrified wood resembling opal.

opaque. (1) Non-transparent; (2) non-translucent. Cf. *opacity*.

open chain. Non-cyclic. A carbon-chain that does not close and form a cyclic compound. **o. hearth.** A reverberatory furnace used in the manufacture of steel, in which hot producer gases are passed over a large open crucible containing iron ore, scrap iron and pig-iron (open-hearth process).

operation. A chemical manipulation: dissolving, precipitating, distilling, evaporating, filtering, weighing, titrating, etc.

ophelic acid. $C_{13}H_{20}O_{10}$ = 336.16. An amorphous substance in *Swertia* (*Ophelia*) *chirata*, a Gentianaceae, and split-product of chiratin; soluble in water, alcohol, or ether.

ophiolite. Serpentine containing calcium carbonate.

ophiotoxin. $C_{17}H_{26}O_{10}$ = 390.2. A poison from the venom of the East Indian cobra (*Naja tripudians*).

ophioxylin. $C_{16}H_{12}O_6$ = 301.1. A glucoside from the root of *Ophioxylon serpentinum*, an Apocynaceae of India. Yellow crystals, m.72; used medicinally as an anthelmintic and for snake bites.

ophthalin. Vitamin A.

ophthalmo- A prefix derived from the Greek, indicating "eye."

ophthalmoleukoscope. An instrument for testing color sensitiveness by means of polarized colors.

ophthalmoscope. An instrument for the examination of the interior of the eye.

opianic acid. $C_{10}H_{10}O_5$ = 210.13. 5.6-dimethoxy-phthalaldehydic acid, formyl dimethoxy benzoic acid, $C_6H_2(OMe)_2.CHO.(COOH)$. Colorless fine prisms, m.150, soluble in hot water, alcohol, or ether.

opianine. (1) Narcotine. (2) $C_{66}H_{72}O_{12}N_3$ = 938.7. An alkaloid from opium, which resembles morphine in its physiological effect.

opianyl. Meconine.

opiate. A narcotic drug.

opium. The air-dried milky juice of the unripe capsules of the poppy: *Papaver somniferum*. Brown masses, containing inert materials and a number of alkaloids (see below). Used medicinally as a narcotic, and for the preparation of opium alkaloids. See also *kusamba*, *meconine*, *meconic acid*, *chandoo*, *yenshee*, *mudat*. **o. alkaloids.** A series of alkaloids obtained from or related to opium:

(a) Morphine group: morphine
homochelidonine
chelidonine

(b) Codeine group: papaverine
codeine
laudanosine
narcotine
hydrocotarnine
sanguinarine
thebaine
laudanine
hydrastine

(c) Protopine group: protopine
cryptopine

(d) Miscellaneous group: chelerythrine
oxydimorphine
thebenine
thebaicine

Cf. *pantopone*, *holopon*, *anarcotine*, *cotarnine*, *codamine*, *gnoscopine*, *lanthopine*, *narceine*, *opianine*, *rheadine*, *tritopine*, *xanthaline*. **o. vinegar.** Black drops. A preparation containing 10 % opium.

opopanax. An oleoresin or the dried juice obtained from the roots of *Pastinaca opopanax*, an Umbelliferae of the Orient; used in incense and perfumes, and medicinally as an antispasmodic. **o. oil.** An oil, d.0.87–0.90, b.250–300 from *Commiphora katof*, a Burseraceae. Cf. *balm of Gilead*.

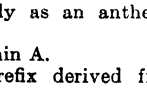
opsogens. See *opsonigenous substances*.

opsonic index. The ratio of the opsonins present in the blood of a diseased person to those of a normal individual.

opsonigenous substances. Aggressins, opsogens, Substances produced by the metabolism of bacteria. Cf. *endotoxin*.

opsonin. A substance of the blood-serum that renders invading microorganisms more susceptible to digestion by the phagocytes of the body. **common-** Normal-. **immune-** Specific opsonins. Substances formed in the blood by the stimulation of bacterial poisons (opsonigenous substances). **normal-** The protective substances of the blood present normally and in uninfected individuals. **specific-** Immune-.

opsonization. The increase of opsonins, or the retention of the opsonic index, produced by the inoculation of opsonins into an organism.

opsopyrrol. $C_7H_{11}N$ = 111.1. Ethyl-methyl-pyrrol.  . A decomposition product of hematin. Cf. *porphin ring*.

optical. (1) Pertaining to sight, as optical pyrometers. (2) Pertaining to light, as optical

activity. o. activity. O. rotation, opticity. The power of a substance or solution to rotate the plane of vibration of polarised light to the left or to the right. Optical activity is characteristic of compounds containing an asymmetric atom, usually a carbon atom. It is measured by means of the polariscope (q.v.) and is used in quantitative analysis; as, **sugar analysis.** Cf. *enantiomorph, birotation, mutarotation.* **o. bench.** A rail arranged with holders to carry a number of lenses and mirrors, whose distances apart may be varied and measured on a scale and whose optical axes are in the same straight line. Used for optical experiments. **o. density.** The quantity, log I_0/I, where I_0 is the intensity of an incident ray falling on a transparent or translucent medium (e.g., solution) and I the intensity of the transmitted ray. Cf. *extinction coefficient.* **o. isomerism.** See *isomery.* **o. pyrometer.** An instrument for measuring high temperatures by optical means; such as, the Mesure p. (using polarized light) or the Wanner p. (measuring intensity of light). A filament is heated by an electrical current of known strength until the glow exactly matches that of the furnace. The instrument is calibrated in terms of known temperatures:

500°C	red, just visible
700°C	dull red
900°C	cherry red
1100°C	orange
1200°C	white
1500°C	dazzling white

Cf. *leucoscope.* **o. rotation.** O. activity. **o. telephone.** A telephone, the diaphragm of the receiver of which is connected to a mirror, so that its vibrations are magnified as bands of light of varying size.

opticity. Optical activity. A term used in the sugar and brewing industries.

optics. Photics. A branch of physics that deals with visible radiations (light), their reflection, refraction, absorption, and transmission. Cf. *dioptrics.*

optimal. The most favorable, suitable, or best factor or condition.

optimum. Best, most favorable. **o. temperature.** The temperature at which enzymes show the greatest activity, or at which the growth of bacteria is most rapid.

optochine. $C_{21}H_{28}O_2N_2$ = 340.35. Numoquin, ethylhydrocupreine. A quinine alkaloid (q.v.), levo-rotatory, soluble in alcohol or ether; used as a specific for pneumococcic invasions. **o. hydrochloride.** Colorless crystals, soluble in water, used medicinally.

optophone. An instrument for enabling ordinary print to be read by the blind. It consists of a selenium cell, telephone and illuminating device, which transform the light waves into sound waves. Cf. *photophone.*

orange. (1) A color intermediate between red and yellow. (2) The edible yellow fruit of *Citrus* species, Rutaceae, q.v. (3) A group of pH indicators changing from purple or magenta (acid) to orange (alkaline). **bitter-** Curacao- or Seville- The fruit of *Citrus bigarardia.* **sweet-** China- or Portugal-. The fruit of *Citrus aurantium.*

o. blossom odor. See *indole.* **o. dye.** Tropeolin. **o. flower oil.** Neroli oil. **o. oil.** An essential oil expressed from the peel or rind of oranges. A pale yellow liquid, d.0.84–0.85, insoluble in water, soluble in alcohol, ether, or chloroform. It is used in flavoring extracts for the household and soda-water fountains, in perfumes, and in pharmaceutical preparations. *bitter-*, Curacao orange oil, Seville orange oil. The oil expressed from the rinds of orange peels of *Aurantii amara* (*Citrus vulgaris*). *sweet-* The oil expressed from sweet orange peels, *Aurantii dulcis* (*Citrus bigarardia*). **o. mineral.** Sandix. **o. peel.** The dried rinds from oranges. *bitter-* From the fruits of *Citrus vulgaris* = Seville orange, curacao orange. *sweet-* From the fruits of *Citrus bigarardia* = Portugal orange, China orange. Used in medicine and pharmacy, for flavoring, and in confectionery. **o. peel oil.** Orange oil. **o. pigments.** See *antimony orange, chrome orange,* etc. **o. red.** Sandix. **o. root.** Hydrastis.

orangite. A bright, orange-yellow, hydrated silicate of thorium; a variety of thorite.

orbit. The path of an electron moving round the atomic nucleus, according to the dynamic concept of the atom (Bohr's model). Orbits correspond with the shells of the static atom (Lewis' model), in which the electrons are assumed to oscillate around certain positions at different distances from the nucleus. The o. are described by the quantum numbers n_k, where n indicates the magnitude or *size* corresponding with different energy levels, q.v. (Cf. orbital *state*):

K level	n is 1
L level	2
M level	3
N level	4

k indicates the *form* or quantum state, which may be either circular, (k = n), or elliptical (k less than n), thus giving rise to different spectrum lines:

s orbit	k is 1
p orbit	2
d orbit	3
f orbit	4

The different quantum states for the first four energy levels are, thus (Cf. *Stoner quanta*):

ENERGY LEVEL	*Normal ORBITS* (k = n			
K	1_1			
L	2_1	2_2		
M	3_1	3_2	3_3	
N	4_1	4_2	4_3	4_4
	(s)	(p)	(d)	(f)

Excited ORBITS (k less than n)

Cf. *state* (of electrons).

orbital. Pertaining to motion around a center. **o. state.** See *state.*

orcein. $C_{28}H_{24}O_7N_2$ = 500.2. A coloring matter of orchil, synthesized from orcin and ammonia. Brownish-red crystals, insoluble in water, soluble in alcohol, acetone, acetic acid (red color) and alkalis (violet color). Used in microscope stains, as an antiseptic, and as a reagent.

Orchidaceae. Orchis family, a group of perennial herbs, some of them epiphytic, usually with showy flowers. Some of the species yielding drugs are:

Cypripedium species..... lady's slipper root
Orchis species..... salep
Vanilla planifolia..... vanilla
Corallorrhiza odontorrhiza... coral root

orchil. Archil, orseille extract, cudbear, persio. A thick reddish-purple liquid of slight ammoniacal odor. It is a coloring material obtained from various lichens by treatment with ammonia and exposure to air, and contains orcein, orcin, and litmus; used as a coloring material for pharmaceutical preparations. Cf. *orcein.*

orcin. Orcinol.

orcinaurine. Homofluorescein. A red dyestuff with a green fluorescence, obtained by the action of chloroform and alkali on orcinol; used as a fluorescent indicator for pH values of 6.5 to 8.0.

orcinol. $C_6H_3(CH_3)(OH)_2$ = 124.0. Orcin, *5*-methyl-*1.3*-benzenediol*, 3.5-dihydroxytoluene. 3.5-dihydroxy-1-methyl-benzene, dimethylresorcinol. A white crystalline powder, which becomes red with age, d.1.289, m.107, b.287, soluble in water, alcohol, or ether. It occurs in various lichen species and forms orcein with ammonia. Used medicinally as an antiseptic, as a reagent for pentoses, and as a stain. Its isomer is homopyrocatechol. **methyl-** Xylorcinol. **trinitro-** See *trinitroorcinol.*

ordeal bark. (1) The poisonous bark of various trees, used by savages in trial by ordeal. (2) Casca bark. Cf. *Erythrophloeum.* **o. bean.** The poisonous fruits of various trees used in ordeals by natives, *e.g., physostigma, tanghinia.*

order. A grade in scientific classification, particularly applied to zoology. **o. of compounds.** (1) An arrangement of types of compounds according to their complexity:

1st order = binary compounds; as, NaCl, CaO, H_2O.

2nd order = tertiary compounds; as, Na_2SO_4, $Al(OH)_3$.

3rd order = addition or co-ordinate compounds; as, $MgSO_4.6H_2O$ or $NiSO_4.6NH_3$. (2) See *Mulliken's classification.* **o. of reaction.** See *reaction.* **o. of terms.** In mixed fertilizers the o. is nitrogen first, phosphoric acid second and potassium third.

ordinal. Pertaining to a sequence or order. **o. number.** Rydberg's number, indicating position in the periodic system; now superseded by the atomic number. **o. test.** A reaction which determines qualitatively the elements of an organic compound, so that they may be placed in the "order" of Mulliken's classification (q.v.).

ordinary. Common. **o. iron.** Cast iron. **o. ray.** The ray of light normally reflected or refracted in a polariscope, as opposed to the extraordinary ray, which is not.

ordinate. The y-coordinate in the Cartesian system of graphical representation. Cf. *coordinates.*

ordination number. Atomic number.

ore. A natural mineral or mineral mixture from which useful substances are obtained; usually containing metallic compounds. See *iron, sulfur, radioactive, minerals,* etc. They are found mixed with the earthy matter (matrix or gangue) in which they have been deposited. The principal ores are oxides, carbonates, silicates, sulfides, arsenides, antimonides, and halides. Cf. *flotation, roasting, smelting.* **mock-** Sphalerite. **pay-** An o. that can be worked with profit. **positive-** q.v. **possible-** q.v. **raw-** An o. in its natural, but crushed untreated condition.

o. band. A zone of rock rich in ores; a vein. **o. bed.** A zone of ore between sedimentary deposits. **o. body.** A solid and continuous mass of ore. **o. crusher.** A machine for disintegrating ores preparatory to the stamp mill or rollers. **o. dressing.** The refining or cleaning of ore by mechanical means; as, jigging, cobbing, etc. **o. mill.** A concentrator or stamp mill. **o. pocket.** An isolated occurrence of a rich deposit of ore. **o. separator.** A mechanical device in which ore is separated from rock, as a cradle or jigging machine.

oreodaphene. A hydrocarbon oil of California laurel, *Umbellularia californica,* a Lauraceae; a colorless oil, d.0.894, b.175.

oreodaphnol. An alcohol in the oil of California laurel. A colorless liquid of pungent odor.

oreoselin. $C_{14}H_{12}O_4$ = 244.2. A crystalline split-product obtained from athamantin by hydrolysis with alkali.

oreoselon. $C_{14}H_{10}O_3$ = 226.2. An amorphous powder obtained by hydrolysis of athamanthin with sulfuric acid.

oreston. Positron. A positive electron (from *Orestes,* brother of *Electra*).

oreton. A trade name for testosterone propionate. **o-M.** Methyltestosterone.

orexin. $C_{14}H_{11}N_3$ = 207.1. Phenzoline, cedrarine, phenyldihydroquinazoline. $C_6H_4.CH_2N.CHN.C_6H_4$. A derivative of quinoline; a white, odorless powder or lustrous crystals, soluble in hot water. Used medicinally as a stomachic in cases of loss of appetite. **o. tannate.** The tannate of orexin. A yellowish powder, insoluble in water, soluble in acids; used medicinally as a stomachic stimulant.

Orfila, Mathieu Joseph Bonaventura. 1787–1853. A Spanish-born Frenchman; the founder of toxicology.

organ. Any tissue or part of an organism which has a distinct function.

organellæ. Substances within organic cells composed of lipoids.

organic. Pertaining to an organ or a substance derived from an organism. (See *organic compound.*) **o. acid.** A compound containing one or more carboxyl radicals, —COOH. According to the number of such radicals present there are:

monobasic acids; R.COOH

$C_nH_{2n+1}.COOH$ = acetic acid series.
$C_nH_{2n-1}.COOH$ = acrylic acid series.
$C_nH_{2n-3}.COOH$ = acetylene acid series.
$C_nH_{2n-7}.COOH$ = aromatic acid series.

dibasic acids; $R(COOH)_2$

$C_nH_{2n}(COOH)_2$ = oxalic acid series
$C_nH_{2n-8}(COOH)_2$ = phthalic acid series.

tribasic acids, $R(COOH)_3$
tetrabasic acids, $R(COOH)_4$
pentabasic acids, $R(COOH)_5$, etc.

The presence of other radicals is indicated by the descriptive terms: monohydroxy, dihydroxy, monoamino, diamino, monoketo, diketo, etc. **o. analysis.** The qualitative or quantitative determination of organic compounds. See *analysis.* **o. bases.** The amines and alkaloids. **o. chemistry.** That branch of chemistry

dealing with carbon compounds or the nonpolar compounds. It was assumed that compounds of organisms were the product of a vital force and could not be made artificially, but, with the synthesis of many of these compounds, this division into organic and inorganic chemistry has become invalid, and of convenience only. The elements entering into organic combinations, in order of importance, are: C, H, O, N, Cl, Br, I, F, S, P, Al, etc. Organic compounds vary greatly in stability. The largest ring compound is civetone with seventeen atoms in a ring. Rubrene bromide has the highest melting point (500°C). Maltosazone is the largest molecule which has been synthesized so far. Cf. *inorganic chemistry*. **o. combustion.** See *combustion*. **o. compound.** A nonpolar compound, which generally consists of carbon and hydrogen, with or without oxygen, nitrogen, or other elements, except those in which carbon plays no important part (*e.g.*, carbonates). Many may be classified into:

A. Aliphatic compounds, which consist of a chain of carbon-atoms: Hydrocarbons, alcohols, aliphatic acids and aldehydes, carbohydrates, peptides.

B. Aromatic compounds, which consist of a ring of carbon atoms with or without other atoms in the ring: Benzene, naphthalene, anthracene derivatives, and terpenes, glucosides, alkaloids, dyes.

A more appropriate classification of organic compounds is by CLASS and TYPE.

The CLASS (or *Division* of Beilstein, cf. *stem nucleus*) is based on the fundamental structure of the compound, thus:

	CHAIN COMPOUND	RING COMPOUND
HOMOGENEOUS.....	Class 1	Class 3
HETEROGENEOUS.....	Class 2	Class 4

Class 1—A homogeneous chain compound, in which the carbon atoms form a continuous or a branched chain (hydrocarbons, ketones, acids, alcohols). Division I of Beilstein.

Class 2—A heterogeneous chain compound, in which the carbon atoms are interrupted by the atoms of other elements (ethers, esters, peptides). No division in Beilstein.

Class 3—A homogeneous ring compound, in which the carbon atoms form a closed ring (benzene, phenols, anilines). Division II of Beilstein.

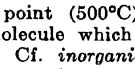
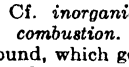
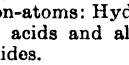
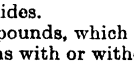
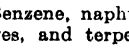
Class 4—A heterogeneous ring compound, in which the atoms of the ring consist of atoms other than of carbon. Division III of Beilstein.

Each class is subdivided into compounds containing:

a—no double or triple bonds (saturated).

b—one or more double bonds.

The TYPE (or *Functionary Class* of Beilstein, cf. *functioning group*) is based on the presence of one or more radicals to which are due the characteristic reactions of the compound; as, —OH, alcohols or phenols; $—NH_2$, amines; etc. **o. radicals.** A group of atoms that normally passes unchanged from one molecule of a carbon compound to another, *e.g.*,

acetamido..... $CH_3CONH—$
acetimido..... $CH_3C(:NH)—$
acetonyl..... $CH_3COCH_2—$
acetoxy..... $CH_3COO—$
acetyl..... $CH_3CO—$
alanyl..... $NH_2CHMeCO—$
allyl..... $CH_2:CHCH_2—$
amino, amido..... $NH_2—$
amyl..... $Me(CH_2)_4—$
anilino..... $PhNH—$
anisal..... $MeOC_6H_4CH=$
anisoyl..... $MeOC_6H_4CO—$
anisyl..... $MeOC_6H_4—$
anthranilo..... 
azo..... $—N:N—$
azoxy..... 
benzal..... $PhCH=$
benzamido..... $PhCONH—$
benzimido..... $PhC(:NH)—$
benzoxy..... $PhCOO—$
benzoyl..... $PhCO—$
benzyl..... $PhCH_2—$
butenyl, Δ^1-..... $MeCH_2CH:CH—$
butoxy..... $MeCH_2CH_2CH_2O—$
butyl..... $MeCH_2CH_2CH_2—$
butyl secondary..... $EtCHMe—$
butyl tertiary..... $Me_3C—$
carbamido..... $NH_2CONH—$
carbamyl..... $NH_2CO—$
carbony(l)..... $OC=$
carbonyldioxy..... $—O.CO.O—$
carboxyl..... $—COOH$
cinnamal..... $PhCH:CHCH=$
cinnamyl..... $PhCH:CHCO—$
crotonyl..... $MeCH:CHCO—$
cyano..... $—C:N$
ethoxy..... $EtO—$
ethyl..... Et or $CH_3CH_2—$
ethylene..... $—CH_2CH_2—$
formyl..... $H.CO—$
fural..... 
furyl..... 
glyceryl..... 
glycolyl..... $HOCH_2CO—$
glycyl..... $NH_2.CH_2.CO—$
glyoxyl..... $H.CO.CO—$
guanido..... $NH_2.CNH.NH—$
guanyl..... $NH_2C(:NH)—$
hydrazino..... $NH_2.NH—$
hydrazo..... $—NH.NH—$
hydrazono..... $NH_2.N=$
hydroxamino..... $HONH—$
hydroxy..... $HO—$
imido, imino..... $HN=$
isonitro..... $=NOOH$
isonitroso..... $=NOH$
isothiocyano..... $—N:C:S$
malonyl..... $—CO.CH_2.CO—$
mercapto..... $—SH$
methenyl..... $≡CH$
methoxy..... $MeO—$
methylene..... $=CH_2$
methyl..... Me or $—CH_3$
naphthoxy..... $C_{10}H_7O—$
naphthyl..... $C_{10}H_7—$
nitramino..... $O_2N.NH—$
nitrate..... $O_2NO—$

nitro	—NO_2
nitrite	—ONO
nitroso	—NO
oxalyl	—OC.CO—
oxamido	NH_2.OC.CO.NH—
phenacyl	$PhCOCH_2$—
phenethyl	$PhOCH_2CH_2$—
phenoxy	PhO—
phenyl	Ph or C_6H_5—
phthalyl	$C_6H_4\langle$ CO— / CO—
propenyl	MeCH:CH—
propionyl	$MeCH_2CO$—
propoxy	$MeCH_2CH_2O$—
propyl	$MeCH_2CH_2$—
protyl	—CH_2C:CH
salicyl	HO.C_6H_4—
salicylal	HO.C_6H_4CH=
salicylyl	HO.C_6H_4.CO—
styryl	Ph.CH:CH—
styrenyl	Ph.CH.CH_2— (with bond from CH)
succinyl	—CO.CH_2.CH_2.CO—
sulfamino	—NH.SO_2.OH
sulfamyl	—SO_2.NH_2
sulfino	—SO_2H
sulfo	—SO_2.OH or —SO_3H
sulfonamido	—SO_2.NH—
sulfonyl	—SO_2—
thiocarbonyl	=C:S
thionyl, sulfinyl	=S:O
toluino	MeC_6H_4.NH—
toluyl, alpha-	Ph.CH_2.CO—
toluyl, ortho-	Me.C_6H_4.CO—

See the "*Decennial Index*" of the Chemical Society (London) and of the American Chemical Society (Washington, D. C.); also *radicals*, *structure symbols*, *formula* and *notation*. **o. symbols.** Structure symbols.

organism. A living complex, undergoing dynamic changes, which exists in a colloidal protoplasmic medium (*protoplasm*, q.v.) and is organized in a definite pattern (histology, anatomy) with a definite function (physiology). Any animal, plant, or human body. Cf. *life.*

organoferric. Same as masked iron, (see *masked*).

organoleptic. Referring to sensation; as, smell and taste.

organolite. An organic base-exchange material (*e.g.*, certain phenol-formaldehyde plastics). They may be classified according to the C-metal linkage: (1) Ordinary covalent, *e.g.*, Et-Zn-Et. (2) Coordinate, *e.g.*, $K_4Fe(CN)_6$. (3) Ionic, *e.g.*, Ca—C≡C. (4) Metallic, *e.g.*, NbC.

organomagnesium halides. See *Grignard reagent.*

organometallic. Pertaining to the carbon-metal linkage. **o. compounds.** A class of compounds of the type R—M, where R is an alkyl or aryl radical and M a metal; *e.g.*, $PbEt_4$, tetra-ethyl lead; R—Mg—X, alkyl-magnesium-halide. Cf. *Grignard reagent, organolite.*

organosol. A sol in which the essential constituent is organic.

organotherapeutic extracts. Pharmaceutical preparations obtained from various animal organs, and used in the treatment of certain diseases.
brain—see *cerebrine.*
liver—see *hepar siccatum.*
lungs—see *pulmones sicci.*
kidney—see *renes siccum.*
spleen—see *lien siccus.*
bronchial gland—see *glandula bronchis.*
ciliary body—see *corpus ciliare.*
mammary glands—see *mammae siccatae.*
ovaries—see *corpus luteum.*
See: *leucocytes, pituitary, ductless glands, testes, prostate, fibrogen, eukinase, cardaissin.*

organotherapy. The treatment of disease by dried organs or organ extracts.

organotropic. A substance that acts specifically on an organism, and not on parasites (see *parasitotropic*).

organzine. Warp silk. The reeled-off fibers from a number of silk cocoons.

oriental agate. A translucent variety of agate, used as a gem. **o. amethyst.** A native purple alumina. **o. cashew-nut.** Semecarpus. **o. emerald.** A green variety of corundum. **o. garnet.** Garnet. **o. hyacinth.** A rose-colored corundum. **o. powder.** A mixture of gamboge with potassium nitrate, used as an explosive in day-fireworks. **o. ruby.** A red variety of corundum. **o. sapphire.** A blue variety of corundum. **o. sweet gum.** Styrax. **o. topaz.** A yellow variety of corundum.

orientation. (1) The structural arrangement of substituting radicals in a compound, compared in relation to each other and to the parent compound. (2) The determination of crystal structure. (3) The direction or position assumed by a molecule, due to an electric charge, adsorption, or other cause. Cf. *zone.*

origanum oil. (1) Spanish hop oil. An essential oil from *Origanum vulgare* (Labiatae), wild majoram; used in veterinary medicine and in liniments. (The oil of *O. marjorana* is marjoram oil.) (2) An essential oil distilled from *Thymus vulgaris*, and sold in France as o. oil.

orizabin. Jalapin.

orlean. Annatto.

Orlovius flask. A conical flask with a ground stopper and glass delivery-tubing, similar to a wash-bottle; used for drawing and handling of blood samples for bacteriological work under sterile conditions.

ormolu. Mosaic gold. An alloy of equal parts of copper and zinc, used for cheap jewelry, chandeliers and ornaments.

ormosine. An alkaloid from the seeds of *Ormosia dasycarpa*, a leguminous plant of Brazil. Colorless crystals, m.80, soluble in alcohol or chloroform; used as a hypnotic and sedative.

ormosinine. $C_{20}H_{33}N_3$ = 315.28. An isomer of ormosine, m.205.

ornithine. $C_5H_{12}O_2N_2$ = 132.11. $\alpha.\delta$-Diamino-valerianic acid, *2.5*-diaminopentanoic acid*. An amino acid (q.v.) from the excrements of birds. It yields arginine with urea. N^{α}-guanyl- Isoarginine. N^{δ}-guanyl- Arginine.

oroberol. $C_{18}H_{14}O_8$ = 358.1. A chromogen from the leaves of *Orobus tuberosus*, optically inactive, m.290.

orobol. $C_{15}H_{10}O_6$ = 286.1. A dihydroxy-tetrahydroflavone, m.270.5, obtained by hydrolysis of oroboside.

oroboside. A glucoside from the leaves of *Orobus tuberosus* (*Lathyrus*), a Leguminosae, yielding orobol. White crystals, m.250.

orogenic. The large-scale tangential compressive forces responsible for geological fractures.

oronite. A low-boiling gasoline used in special plant for generating a substitute gas for bunsen burners.

oropon. A tryptic puering material.

orotic acid. $C_5H_4N_2O_4$ = 154.05. Iso-uracyl carboxylic acid. An acid isolated from milk.

White crystals, m.-259.

oroxylin. $C_{16}H_{14}O_6$ = 338.11. A bitter principle from the bark of *Oroxylon indicum*. Yellow crystals, m.225, soluble in water.

orphol. Trade name for bismuth beta-naphtholate.

orpiment. As_2S_3. Kings' yellow, auripigment. A native arsenic trisulfide. Lemon-yellow crystalline masses, used as a pigment and depilatory. **red-** Arsenic disulfide.

Orr white. Lithopone.

orris. The dried rhizome of Florentine iris, *Iris florentina*. A creamy-white powder, insoluble in water; used in dentifrices and perfumery (sachet powders). **o. oil.** An essential oil distilled from the rhizome of *Iris florentina*. A yellowish, semi-solid oil, m.44, insoluble in water, soluble in alcohol or ether; used in cosmetics and perfumery. It contains myristic and oleic acids and esters.

Orsat apparatus. A portable gas analysis apparatus, consisting of a measuring buret and three or four gas-absorption pipets connected by a manifold.

orseille, orselle. Orchil.

orseillic acid, orseillinic acid. Orsellic acid.

orsellic acid. $C_8H_8O_4$ = 168.0. Orsellinic acid, orseillic acid, 2.4-dihydroxy-6-methylbenzoic acid, $MeC_6H_2(OH)_2COOH$. A split-product of lecanoric acid and a constituent of many lichens, m.176 (decomp.); hydrolysed to orcinol, q.v.

orsellin, orseillin. Roccellin. A constituent of orchil.

orsellinic acid. Orsellic acid.

orsudan. Sodium 3-methyl-r-acetylaminophenylarsenate. A yellow crystalline powder, used medicinally as an antisyphilitic and antiprotozoan.

Orth stain. Lithium carmine. An aqueous solution of 1 % lithium carbonate and 3 % carmine, with or without picric acid; used as nuclear stain.

orthanilic acid. $C_6H_7O_3NS$ = 173.17. o-Aminobenzenesulfonic acid, o-anilinesulfonic acid. An isomer of sulfanilic acid, used in organic synthesis.

orthene. *o*-Dichlorobenzene.

orthin. $C_6H_3(OH)COOH(NH.NH_2)$ = 168.1. 4-hydroxy-2-hydrazybenzoic acid, o-hydrazine-p-hydroxybenzoic acid. Colorless crystals, sometimes used medicinally as an antipyretic.

orthite. Allanite.

ortho- (1) A prefix indicating the neighboring or 1.2-position. Cf. *meta-*, *para-*. (2) A prefix indicating the most hydroxylated acid known in either the free state or as salts or esters, *e.g.*, *orthosilicic acid*. Cf. *meta-*, *pyro-*. (3) A prefix indicating an odd rotational quantum number; as, ortho-hydrogen. **o.-acid.** (1) An organic acid having the carboxyl group in the ortho-position. (2) An organic acid containing one additional molecule of water in chemical combination, as H.COOH = formic acid, and $HC(OH)_3$ = orthoformic acid. (3) An inorganic acid containing the normal amount of water, as: $P_2O_5 + 3H_2O = 2H_3PO_4$, orthophosphoric acid; $SiO_2 + 2H_2O = H_4SiO_4$, orthosilicic acid. **o.-compounds.** A benzene derivative containing two substitution radicals in neighboring positions. See *meta-*, *para-*. The ortho- or 1.2-compound is to be found under the name of the compound. **o.-hydrogen.** See *hydrogen molecule*. **o.-nitrogen.** See *nitrogen molecule*. **o. position.** See *o. compounds*.

orthoacetic acid. $CH_3.C(OH)_3$, known only in its esters; as $MeC(OEt)_3$, *1.1.1*-triethoxyethane* or ethylorthoacetate. A colorless liquid, d.-0.8847, b.142.

orthoaluminic acid. The tautomer of aluminum hydroxide: $Al(OH)_3 \rightleftharpoons H_3AlO_3$. It forms aluminates, M_3AlO_3.

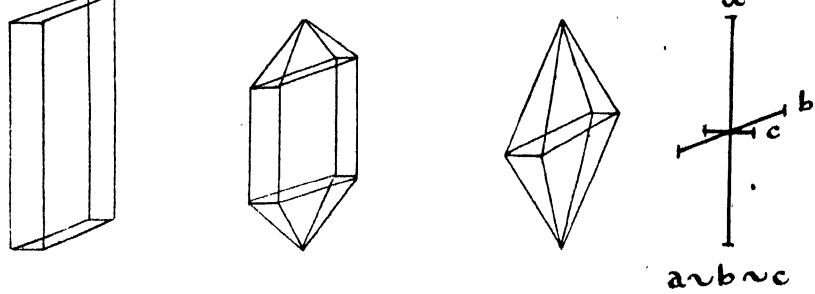
orthocarbonic acid. Tetrahydroxymethane, $C(OH)_4$ (or $H_2O.H_2CO_3$), esters of which are known; as, $C(OEt)_4$, tetraethoxymethane*, or tetraethylorthocarbonate. A colorless liquid, d.0.9197, b.159.

orthoclase. $KAlSi_3O_8$. Sunstone. A native potassium aluminum silicate, potash feldspar. It is the commonest silicate and a constituent of many rocks. It crystallizes in the monoclinic system as white, grey, or pink crystals, and often contains sodium.

orthoform. $C_6H_3(COOCH_3)OH(NH_2)$ = 167.1. Methyl-3-amido-4-hydroxybenzoate. Methyl ester of m-amido-p-hydroxybenzoic acid. A white, odorless and tasteless powder, m.142, slightly soluble in water, soluble in alcohol; used as an antiseptic and local anesthetic. **new-** Orthoform. **old-** The methyl ester of p-amido-m-hydroxybenzoic acid, or methyl-4-amido-3-hydroxybenzoate. White crystals, m.118.; used as an antiseptic.

orthoformic acid. CH_4O_3. The hypothetical acid, $HC(OH)_3$, known in the form of its esters; *e.g.*, $HC(OEt)_3$, triethoxymethane*. A colorless liquid, d.0.897, m. −76.1, b.145.9.

orthohydrogen. See *hydrogen molecule*.



Orthorhombic system.

orthokinetic coagulation. Coagulation due to the motion of particles in one direction; cf. *perikinetic.*

orthonitric acid. The hypothetical compound H_3NO_4 or $O{=}N(OH)_3$.

orthophosphate. A salt of the type M_3PO_4.

orthophosphoric acid. See *phosphoric acid.*

orthorhombic. A crystal with three unequal long axes intersecting at right angles. **o. system.** A prismatic, rhombic, or trimetric system. Crystal forms derived from a prism having three axes of different lengths intersecting at right angles (see figures).

orthosilicate. A salt containing the tetravalent SiO_4 radical.

orthosilicic acid. Silicic acid.

orthosiphonin. A glucoside from the leaves of Java tea, *Orthosiphon stamineus*, a Labiatae; used as a diuretic.

orthotaxy. Crystalline structure in the form of long parallel columns.

ortizon. $CO(NH_2)_2, H_2O_2 = 94.07$. Perhydrate. Hyperol. A compound of hydrogen peroxide and urea. Colorless and odorless crystals or sticks; used as an antiseptic, reagent and bactericide to replace hydrogen peroxide.

ortnithine. Ornithine.

oryza. Rice.

oryzamin. (1) An extract from rice bran. (2) An antineuritic vitamin from rice bran or yeast, identical with vitamin B_1, q.v.

Os. The symbol for osmium.

osage orange. The bark of *Maclura aurantiaca*, a shrub of North America. It contains a yellow coloring material and tannin; used in the textile and leather industries **o. o. wood.** The wood of *Maclura pomiferum.* Used as a yellow coloring matter and fustic substitute.

osamine. A compound derived from sugars by replacing an OH group by NH_2; *e.g.*, glucosamine.

Osann, Gottfried Wilhelm. 1797–1866. A German physical chemist noted for his work in platinum metals; he named ruthenium.

osazone. Diphenyl hydrazone. A characteristic crystalline insoluble compound obtained by heating a polyhydroxy aldehyde or ketone (aldose or ketose sugar) with phenylhydrazine hydrochloride, and sodium acetate in boiling water, *e.g.*, $R.CO + H_2NNH.Ph = R.C{:}N.NHPh + H_2O$; yellow or orange in color. **diacetyl-** A compound obtained by heating diacetone with phenylhydrazine:

$$\begin{array}{l} Me.C = N.NHPh \\ \quad\quad | \\ Me.C = N.NHPh. \end{array}$$

o. test. The microscopical examination and melting-point determination of the osazone precipitates, to distinguish different sugars.

Osborne, Thomas, Burr. 1859–1935. An American biochemist, noted for his work on vegetable proteins.

oscillation. A vibratory to-and-fro motion.

oscillograph. Oscillometer. A device for recording the wave forms of high-frequency currents. The most recent apparatus use a cathode ray discharge, and have an efficiency of 10^{-5} sec.

oscillometer. Oscillograph.

oscine. The *3.7*-anhydride of *6.7*-dihydroxytropine.

-ose. A suffix indicating: (1) a carbohydrate; (2) the substance produced by enzymic digestion of a protein, *e.g.*, an albumose.

oshaic acid. An acid obtained from the osha root, the root of *Ligusticum filicinum*, an Umbelliferae; used medicinally as an expectorant.

Oslo unit. A vitamin unit, q.v.

osmate. A salt containing the divalent OsO_4^{--} radical.

osmic. A compound of tetravalent osmium. **o. acid.** $OsO_4 = 254.9$. Osmic anhydride, osmium tetroxide, perosmic anhydride, perosmic oxide. Yellowish crystals or colorless powder, of pungent and irritating odor, d.4.91, m.20, b.100, soluble in water, alcohol or ether. Its solutions deposit black osmic hydroxide. Used as a reagent for adrenalin and indican; in microscopy for staining; in photography; and for Welsbach mantles. **o. acid anhydride.** Osmic acid. **o. anhydride.** Osmic acid. **o. hydroxide.** $Os(OH)_4 = 258.9$. A black precipitate from osmic acid solutions.

osmicate. To stain a microscopic section with osmic acid.

osmics. Pertaining to odors; the study of odors.

osmiridium. Iridosmine. An alloy of osmium (17–50 %) and iridium (77 %), with various other platinum metals. It occurs native in platinum deposits, and remains as an insoluble black powder on treating platinum ores with aqua regia. Used in the preparation of osmium and its salts, and for penpoints.

osmium. Os = 190.2. A hard, bluish-white metallic element of the platinum group, d.-22.48, m.2700, insoluble in water or acids. Atomic number 76. Used as a catalyst, in platinum alloys, for incandescent lamps, and pen-points. Osmium has valencies of 2, 3, 4, and 8:

+2 osmous, Os^{++}	green
+4 osmic, Os^{++++}	dark orange
+6 osmyl, OsO_4^{--}	orange.

It is found native as an alloy, nevyanskite.

o. chlorides: $OsCl_2$, osmium dichloride; $OsCl_3$, osmium trichloride; $OsCl_4$, osmium tetrachloride. **o. dichloride.** $OsCl_2 = 261.8$. Dark green hygroscopic needles, slightly soluble in water, alcohol or ether, soluble in sodium chloride solutions. **o. dioxide.** $OsO_2 = 222.9$. A copper-red powder, d.7.9, insoluble in water or acids. **o. disulfide.** $OsS_2 = 255.0$. A bright yellow powder, slightly soluble in water or alkalis. **o. fluoride.** $OsF_8 = 342.9$. Colorless crystals, m.34.5, b.47.3. The hexafluoride, $OsCl_6$, b.203, is also known. **o. hydroxide.** (1) $Os(OH)_3$. A dark orange, insoluble powder. (2) $Os(OH)_4$. A black, insoluble powder. **o. monoxide.** $OsO = 206.9$. A black powder, insoluble in water soluble in acids. **o. oxides:** OsO, osmium monoxide; Os_2O_3, osmium sesquioxide; OsO_2, osmium dioxide; OsO_4, osmium tetroxide or osmic acid. **o. potassium chloride.** $K_2OsCl_6 = 481.7$. Dark red octahedral crystals, soluble in water or alcohol. **o. sesquioxide.** $Os_2O_3 = 429.8$. A black powder, insoluble in water or acids. **o. sodium chloride.** $Na_2OsCl_6 = 449.5$. Red rhombic prisms, soluble in water or alcohol. **o. sulfides:** OsS_2, osmium disulfide; OsS_4, osmium tetrasulfide. **o. trichloride.** $OsCl_3 = 297.3$. A brown crystalline powder, slightly soluble in water, soluble in alkalis or acids. **o. tetrachloride.** $OsCl_4 = 332.7$. Reddish-yellow needles, slightly soluble in water, soluble in alkalis or acids. **o. tetroxide.** Osmic acid. **o. tetra-**

sulfide. OsS_4 = 319.2. A brownish-black powder, insoluble in water, soluble in nitric acid.

osmoceptor. An atomic grouping which holds an osmophore. Cf. *odor theory.*

osmometer. A device for measuring osmotic pressure.

Osmond iron. A high-grade iron made in an Osmund furnace (q.v.).

osmondite. A solid solution of iron carbide in alpha-iron.

osmophore. Odoriphore, aromatophore. Those atomic linkages in a molecule which cause odor; as, —COOR, —CHO, =CO, —CH_2OH, also sulfides, cacodyls, terpenes and pinenes. Cf. *odor theory, chromophore, pharmacophore.*

osmoscope. An osmometer, or device to demonstrate osmosis.

osmose. Osmosis.

osmosis. The diffusion of a liquid or gas through a porous wall or semi-permeable membrane, due to the attraction between a solvent and solute (*e.g.*, water and sugar) which creates the osmotic pressure, q.v.

osmotaxis. The movement of cells due to osmotic pressure.

osmotic. Pertaining to osmosis. **o. cell.** A container or compartment separated from another compartment by a semi-permeable membrane or a finely porous wall. **o. equivalent.** The ratio between the amount of water and the amount of solute passing in opposite directions through a semi-permeable membrane. **o. pressure.** The force exerted by dissolved substances on a semi-permeable membrane which separates a solution from the pure solvent; the force resulting from the molecular attraction between solute and solvent. It is proportional (a) to the number of molecules in solution (concentration), and therefore to (b) the lowering of the freezing point, and (c) the raising of the boiling point.

According to Van't Hoff's theory (q.v.) dissolved substances obey the gas-laws; hence the o. p. equals the gas pressure which the solute would exert if all the solvent were removed and the solute left in the same space in the condition of an ideal gas. Hence o. p. is defined as: the hydrostatic pressure which is necessary to bring the solution into equilibrium with the pure solvent, when the two are separated by a semi-permeable membrane.

Many phenomena are due to o.p., such as the rise of sap in the stems of plants, the tremendous expanding force of roots, which may split rocks, and the absorption and secretion of food and waste materials.

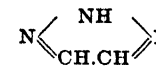
Osmund furnace. A high forge or primitive blast furnace. **O. iron.** Osmond iron.

osone. A ketonaldehyde formed from an osazone by hydrolysis with concentrated hydrochloric acid. By its reduction a ketone-alcohol is formed, so that the original aldose can be changed to an isomeric ketose by means of osazone and osone transformations.

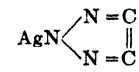
$$X.CH(OH).CHO \rightarrow X.C(:N.NHPh).CH:N.HNPh.$$
$$X.CO.CH_2OH \leftarrow X.CO.CH:O$$

osotetrazones. The derivatives of *v*-tetrazines, q.v.

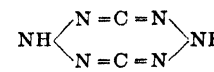
osotriazole. $C_2H_3N_3$ = 69.1. 1.2.3-triazole, pyrro(a,a')diazole. The heterocyclic compound



m.22, b.204, soluble in alcohol. **n-phenyl-,** 1-phenylosotriazole. A colorless liquid, b.224. **n-phenyl-c-amido-c-methyl-,** or 2-phenyl-5-amino-4-methylosotriazole. Colorless crystals, m.83. **o. silver.** AgC_2N_3 = 173.91.



osotriazoleazimide. $C_2N_6H_2$ = 110.08.



osram. An alloy of osmium and tungsten (wolfram). **o. lamp.** An incandescent lamp having a tungsten filament coated with osmium (trade name).

ossalin. Adeps ossium. A grayish fat with the odor of tallow, obtained from ox bone marrow; used in ointments.

ossein. Collagen. The albumenoid material (bone-marrow) which remains after treating bones with dilute hydrochloric acid; it is hydrolyzed by boiling water to glue and gelatin.

ossification. Formation of, or conversion into bone; *e.g.*, as of cartilage.

osso-albumin. A protein obtained from ossein.

ossomucin. The substance which holds bone tissue together.

osteolite. An impure apatite or calcium phosphate.

ostranite. Zircon.

ostrole. $C_{15}H_{16}O_3$ = 244.1. A substance like coumarin, m.84 from masterwort, the rhizome of *Imperatoria ostruthium.*

ostruthin. $C_{18}H_{20}O_3$ = 284.2. A crystalline substance from the root of masterwort, *Imperatoria ostruthium,* an Umbelliferae. Yellow crystals, m.119, insoluble in water, soluble in alcohol or ether. Cf. *imperatorin.*

Wilhelm Ostwald.

Ostwald, Wilhelm. 1853–1932. A German chemist and research worker in theoretical and

physical chemistry, noted for his theories of solution and color. **O. equation.** The degree of ionisation of a solution of an electrolyte at a given concentration is $\Lambda/(1a + 1c)$, where Λ is the electrical conductivity of the solution at that concentration, and 1a and 1c are the mobilities of the anion and cation, respectively, at infinite dilution. **O. law.** Dilution law. In a solution of an electrolyte the square of the number of moles ionized divided by the number of moles not ionized varies directly with the dilution. The law is derived by the application of the law of mass action to an ionization equilibrium. It must be modified to be applicable to strong electrotypes (cf. *activity, Rudolfi's equation*). **O. rule.** In the formation of a substance which can exist in more than one modification, the least stable is formed first, and changes ultimately into the more stable modification. **O. theory of indicators.** The color changes of indicators are due to their existence as weak acids or bases which follow the usual laws of ionization, one ionic radical having a different color from the undissociated molecule.

osyritin. $C_{27}H_{30}O_{17}$ = 626.23. A bright-yellow glucoside from *Osyris abyssinica*, the Cape sumach or bergbas, a Santalaceae of South Africa; used for tanning.

otavite. A native cadmium carbonate, usually hydrated.

otoba butter. Otoba wax. **o. wax.** Otoba butter, American nutmeg butter, American mace butter. The fat expressed from the fruits of *Myristica otoba* or *M. fragrans*, m.38°, containing olein, myristicin and otobite, and having a nutmeg-like odor. Cf. *mace, myristica.*

otobite. A white crystalline solid, m.133, from otoba wax.

otolith. Ear-stone. A concretion of calcium carbonate formed in the ear.

otto of roses. Attar of roses.

ouabain. $C_{30}H_{46}O_{12}.9H_2O$ = 761.4. Uabain. Crystallized strophantin, strophantin G. A glucoside from the seeds of *Acocanthera venenata* (*ouabaio*) and *Strophanthus gratus*. Colorless quadratic crystals, soluble in hot water, or alcohol, slightly soluble in ether or chloroform. Used medicinally as a digitalis substitute; constituent of Zulu arrow poison. Cf. *acocantherin, wabain.*

ounce. A measure of weight in the English system.

apothecarie's- 1 ap. oz. = ℥ = 1 troy ounce = $\frac{1}{12}$ pound = 8 drams (ʒ) = 24 scruples (℈) = 480 grains (gr.). 1 ap. oz. = **31.1034 grams.**

avoirdupois- 1 av. oz. = $\frac{1}{16}$ pound = 7.2916 drams = 18.229 pennyweights (dwt.) = 21.875 scruples = 437.5 grains. 1 av. oz. = **28.3502 grams** = 28,350.2 milligrams = 138.449 carats = 142.045 metric carats.

fluid- 1 fl. oz. = 16 pound = 0.25 gill = 480 minims (♏) = **28.3966 c.c.** = the volume of one av. oz. distilled water at 62°F.

troy- 1 oz. t. = 20 pennyweights = 480 grains = **31.10348 grams** = 1.09712 av. oz.

-ous. A suffix indicating the lower valence of an element or rădical; as, ferrous, sulfurous.

outcrop. A mineral deposit, vein, or lode that comes to the surface of the earth.

output. The total amount produced in a given time.

ouvarovite. Uvarovite.

ovalbumin. An albumin from egg-white.

ovarian substance. The dried and powdered entire ovaries of the hog, without preservative or diluent. A yellowish powder of peculiar odor, slightly soluble in water; used medicinally. Cf. *corpus luteum.*

ovarin. The dried and powdered ovaries of the cow, used medicinally.

oven. A compartment in which substances are heated, dried, roasted, baked, or annealed. Cf. *furnace.*

overcooled. Supercooled.

overgrowth. The growth of a crystal over the surface of a crystal of a different, but usually isomorphous, substance.

overheating. Superheating. (1) To heat excessively. (2) To raise the temperature of a liquid above its boiling point.

overpotential. The difference in volts between the back-potential of an electrode and that of a saturated calomel electrode at the same temperature and partial pressure, immediately after the cessation of electrolysis. Cf. *overvoltage, undervoltage.*

oversaturated. Supersaturated. Describing a solution that contains more solute than is normal for saturation at a given temperature.

Overton coefficient. Distribution coefficient.

overvoltage. (1) Overpotential. (2) Super-tension. The excess voltage above the normal reversible electrode potential of a metal electrode required to decompose the solution or cause deposition from the solution on the electrode. It depends on the nature and surface of the metal, and is important in electrolytic reactions and for the graded electrolytic deposition of metals from a mixed solution. Cf. *polarization.*

ovo. An egg. **o. flavin.** Vitamin B_2. **o. globulin.** A protein of egg-white precipitated by dialysis. **o. keratin.** The membranous lining of birds' and shark's eggs.

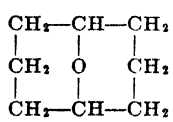
Ovoca classifier. A mechanical separator for ores, which consists of a double-screw continuous conveyor.

ovoflavin. Vitamin B_2.

ovomucin. A water-insoluble globulin from egg-white.

Owen process. A flotation process, in which the ores are agitated in water containing 2 oz. eucalyptus oil per ton.

oxa- A prefix indicating an oxygen bridge; as, oxabicyclononane:



oxacid. Oxyacid.

oxalacetic acid. $C_4H_4O_5$ = 132.03. Oxysuccinic acid, butanondiacid, oxobutanedioic acid*. A dibasic keto-acid, $COOH.CO.CH_2.COOH$. An unstable liquid whose methyl ester forms colorless crystals, m.74, b.137. **o. [ethyl] ester.** $C_8H_{12}O_5$ = 188.14. The diethyl ester of oxalacetic acid, $EtOOC.CO.CH_2.COOEt$. A colorless liquid, b.131. It can decompose in three different ways:

(a) acid decomposition, forming CH_3OH, $(COOH)_2$, and CH_3COOH.

(b) ketone decomposition, forming CO_2 and $CH_3CO.COOH$.

(c) carbon monoxide decomposition, forming CO and $EtOOC.CH_2.COOEt$.

oxalaldehyde. Glyoxal.

oxalamide. Oxamide.

oxalamidine. $C_2H_6N_4$ = 86.2. Diamidine. $NH_2.C(:NH)—C(:NH).NH_2$.

oxalanilide. Oxanilide.

oxalate. A salt of oxalic acid, or a compound containing the divalent $(COO)_2^{--}$ radical. The metallic oxalates, except those of the alkalis and magnesium, are insoluble in water. **acid-** Bioxalate. **bi-** or **acid-**, A salt containing the monovalent $HC_2O_4^-$ radical. **neutral-** Oxalate.

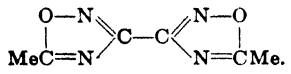
oxaldehyde. Glyoxal.

oxaldiamidoxime. $C_2H_8O_2N_4$ = 118.2. $NH_2.C(:N.OH)—C(:N.OH).NH_2$. Colorless crystals, m.196.

oxaldihydroxamic acid. $C_2H_4O_4N_2$ = 120.1. $HO.C(:NOH)—C(:NOH).OH$. Colorless crystals, m.165.

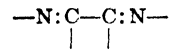
oxaldiimidedihydrazide. $C_2H_8N_6$ = 116.4. Carbohydrazidine. $H_2N.NH.C(:NH)—C(:NH)-.NH.NH_2$.

oxalenbisazoxymethenyl. The heterocyclic compound,



Colorless crystals, m.165.

oxalene. The tetravalent group:



oxalethyline. Diethyloxamide.

oxalhydrazide. $C_2H_6O_2N_4$ = 118.1. $NH_2.NH.-CO.CO.NH.NH_2$.

oxalic acid. $C_2H_2O_4.2H_2O$ = 126.1. Ethandiacid, dicarboxylic acid, ethanedioic acid*. A dibasic or dicarboxylic acid, HOOC.COOH. Colorless, monoclinic, poisonous crystals, d.-1.65, m.99, soluble in water, alcohol, or ether. It occurs in many plants; or is prepared by passing CO into concentrated NaOH, or by heating cellulose (sawdust) with NaOH. Used extensively as a reagent (for standard solutions); in the synthesis of many compounds; as a precipitant in purifying glycerin; in the dye and textile industries, as an ink eraser, in bleaching, and in photography. **diethyl-** Diethoxalic acid. **chlor-** C_2HO_4Cl = 127.5.

o. acid series. A group of dibasic organic acids containing two carboxyl radicals, $(CO-OH)_2$, and having the general formula, $C_nH_{2n-2}O_4$ or $(CH_2)_n(COOH)_2$.

oxalic acid	HOOC.COOH
malonic acid	$HOOC.CH_2.COOH$
succinic acid	$HOOC.(CH_2)_2.COOH$
glutaric acid	$HOOC.(CH_2)_3.COOH$
adipic acid	$HOOC.(CH_2)_4.COOH$
pimelic acid	$HOOC.(CH_2)_5.COOH$
suberic acid	$HOOC.(CH_2)_6.COOH$
azelaic acid	$HOOC.(CH_2)_7.COOH$
sebacic acid	$HOOC.(CH_2)_8.COOH$
brassic acid	$HOOC.(CH_2)_9.COOH$
brassylic acid	$HOOC.(CH_2)_{11}.COOH$
roccellic acid	$HOOC.(CH_2)_{15}.COOH$

o. aldehyde. Oxaldehyde. **o. dianilide.** Oxanilide. **o. monoamide.** Oxamic acid. **o. monoanilide.** Oxanilic acid. **o. monoureide.** Oxaluric acid.

oxalium. Potassium bioxalate.

oxalmethylin. $C_4H_8N_2O_2$ = 116.08. Dimethyloxamide, $(CONHMe)_2$. White crystals, m.210.

oxaluramide. $C_3H_4O_3N_2$ = 131.1. Oxalan, oxamic acid ureide. $NH_2.CO.NH.CO.CO.NH_2$, m. exceeds 310.

oxaluric acid. $C_3H_4O_4N_2$ = 132.07. Oxalic monoureide, carbamyl oxamic acid, $NH_2.CO.NH.CO.COOH$.

oxalyl. The divalent —CO.CO— radical. **o. chloride.** COCl.COCl = 126.93. Ethandioyl chloride*. A colorless liquid, m. −12, b.64 decomp. by water, or alcohol, slightly soluble in ether. **o. diacetophenone.** $PhCOCH_2CO.COCH_2COPh$ = 294.2. Colorless crystals, m.180. **o. urea.** Parabanic acid.

oxamethane. $C_4H_7O_3N$ = 117.09. Acetyloxamide, ethyloxamate, $C_2O_2NH_2(C_2H_5O)$. The ethyl ether of oxamic acid. Colorless crystals, m.115, soluble in alcohol.

oxamic acid. $C_2H_3O_3N$ = 89.1. Oxaminic acid, oxalic acid monoamide. The acid, $HOOC.-CONH_2$. Colorless crystals, decomp. 210, slightly soluble in water or alcohol. **carbamyl-** Oxaluric acid. **phenyl-** Oxanilic acid.

oxamide. $C_2H_4O_2N_2$ = 88.1. Ethanediamide*. The amide of oxalic acid, $(CONH_2)_2$. A colorless crystalline powder, d.1.476, decomp. 417, insoluble in water, alcohol, or ether.

oxamides. A group of compounds derived from oxamide by replacing the hydrogen atoms by alkyl or aryl radicals:
$(CONHMe)_2$, dimethyl oxamide, m.210.
$(CONMe_2)_2$, tetramethyl oxamide, m.80.

oxamidine. Amidoxime.

oxamido. The monovalent radical, $H_2NCO.-CONH—$.

oxaminic acid. Oxamic acid.

oxamonitrile. $C_2H_2ON_2$ = 70.1. Carbamyl cyanide. $NH_2.CO.CN$.

oxamyl. The monovalent radical, $H_2NCO.CO—$.

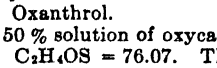
oxane. Ethylene oxide.

oxanilic acid. $C_8H_7O_3N$ = 165.1. Phenyloxamic acid, oxalic acid monoanilide. $HOOC.-CONHPh$. Colorless rhombic crystals, m.149, slightly soluble in hot water, alcohol or ether; used in organic synthesis.

oxanilide. $C_{14}H_{12}O_2N_2$ = 240.2. $(CONHPh)_2$. Colorless scales, m.245, insoluble in water or ether, soluble in hot alcohol; used in organic synthesis.

oxanthranol. $C_{14}H_{10}O_2$ = 210.1. Anthrahydroquinone, $C_6H_4(COH)_2C_6H_4$. Yellow needles, m.180.

oxanthrol. $C_{14}H_{10}O_2$ = 210.1. 5-keto-10-hydroxy-anthracene, 10-hydroxyanthrone, 5-keto-anthrol, oxanthrone.

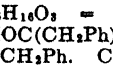


Colorless crystals, m.205.

oxanthrone. Oxanthrol.

oxaphor. A 50 % solution of oxycamphor.

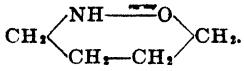
oxathietane. C_2H_4OS = 76.07. The heterocyclic compound



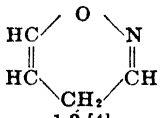
oxatollic acid. $C_{16}H_{16}O_3$ = 256.2. Dibenzylglycollic acid. $HOC(CH_2Ph)_2.COOH$ or $CH_2-Ph.C(OH)COOH.CH_2Ph$. Colorless crystals, m.156.

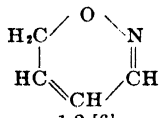
oxatyl. Carboxyl.

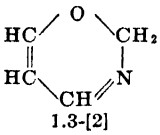
oxazidine. C_4H_9ON = 87.1. A heterocyclic compound formed by the anhydrides of gamma-aldehydes and gamma ketone-acids:

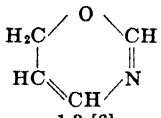


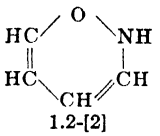
oxazine. C_4H_5ON = 83.1. A series of thirteen heterocyclic compounds, *e.g.*,


1.2-[4]


1.2-[6]


1.3-[2]


1.3-[6]

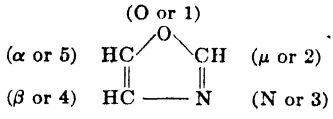

1.2-[2]

The remaining compounds are designated as 1.2-[3], 1.2-[5], 1.3-[3], 1.3-[4], 1.3-[5], 1.4-[2], 1.4-[4], and 1.4-[3]; where the first and second numeral indicates the position of O and N, and the numeral in brackets the position of the additional H (as CH_2 or NH group).

1.2-[2] is *1.2*-isoxazine.
1.3-[3] is *1.3*-isoxazine.
1.3-[4]- is also called pentoxazol.
1.4-[2]- is also called paroxazine.
1.4-[4] is *1.4*-isoxazine.
Cf. *thiazine*, *benzoxazine*, *benzoparoxazine*.

naphth- Phenoxazine. **par-** 1.4-[2]-Oxazine. **phen-** Phenoxazine.

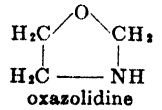
oxazole. C_3H_3ON = 69.1. Furo(b)-monazole. The heterocyclic compound,

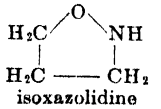


dihydro- Oxazoline. **tetrahydro-** Oxazolidine. **triphenyl-** Benzilam.

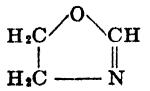
oxazoles. A series of derivatives of oxazole, formed by: (a) a condensation of halogen derivatives of ketones with an acid imide: R—CH:C(OH)Br + R′C(:NH)OH; (b) by passing HCl into a mixture of aromatic aldehydes and their cyanhydrins: R—CHO + R′—CH(OH)CN; (c) by the action of H_2SO_4 on nitriles and benzoin.

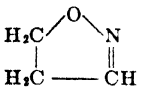
oxazolidine. C_3H_7ON = 73.1. The heterocyclic compound,


oxazolidine


isoxazolidine

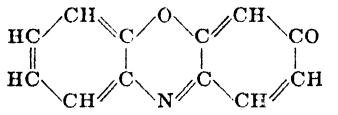
oxazoline. C_3H_5ON = 71.1. The heterocyclic compounds,


oxazoline


isoxazoline

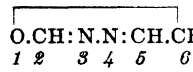
μ-amido- Ethylene urea. **μ-amido-α-methylene.** Propylene urea.

oxazone. $C_{13}H_7O_2N$ = 197.1. The heterocyclic compound,

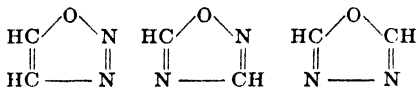


9-hydroxy- Resorufin.

oxdiazine. $C_3H_4ON_2$ = 84.047. A series of heterocyclic compounds; as, **1.3.4.6-**



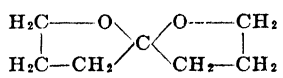
oxdiazole. $C_2H_2ON_2$ = 70.1. A series of heterocyclic compounds:



1.2.5- Furazan (furo(aa′)diazole).

oxethyl. Ethylol. The monovalent $CH_2OH.CH_2$— radical; (cf. ethoxy-, OC_2H_5).

oxetone. $C_7H_{12}O_2$ = 128.1. The heterocyclic spiro-compound,



Oxford process. The separation of nickel from copper by means of sodium sulfide. Cf. *Mond process*.

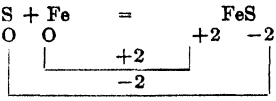
oxgall. The bile obtained from the gall bladder of oxen. Used in the textile industry, and in lithography and engraving.

oxid. Oxide.

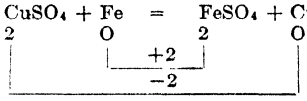
oxidase. An oxidizing enzyme in animal and vegetable tissues.

oxidation. The act of oxidizing, or the increase of the valency of an element, cf. *hydroxylation*. Originally, combining with oxygen; later the term indicated also a combination with halogens or other electronegative elements. More recently it has a broader meaning: an augmentation of the valence number of an ion or atom as the result of the loss of negative charges as electrons, thereby, making it more electropositive. See *electronation*. It is the correlative term of reduction. Cf. *redox*, *oxido-reduction*. For examples of oxidation see *nitrogen*, *heavy metals*, *chromium*. **o. process.** A process or reaction which increases the proportion of oxygen or acid-forming elements or radicals in a compound. **o. reaction.** Electronation reaction. A reaction in which the valence number of an element changes. Every oxidation must be accompanied by a correlative reduction or decrease in the valence number

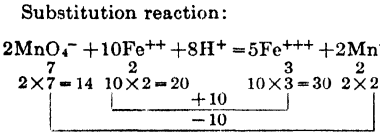
of some other element. Some types of oxidation-reduction reactions are:
Combination reactions:



The iron is oxidized 2 steps (lost 2 electrons); the sulfur is reduced 2 steps (gained 2 electrons).
Displacement reaction:



The copper is reduced (gained 2 electrons); the iron is oxidized (lost 2 electrons); the sulfate is neither oxidized nor reduced.
Substitution reaction:



which in its molecular form is:

$$2KMnO_4+10FeSO_4+8H_2SO_4=5Fe_2(SO_4)_3+2MnSO_4+K_2SO_4+8H_2O$$

Two atoms of manganese are each reduced from 7 to 2; a total gain of 10 electrons.
Ten atoms of ferrous are oxidized to ferric, a total loss of 10 electrons.
The potassium and sulfate remain unchanged.
o.-reduction indicators. See *indicators.* **o. value.** A constant of oils. The degree of oxidation (in terms of gms. of I per 100 gms. of sample) which occurs when a solution of a fat in carbon tetrachloride is oxidised by potassium dichromate in glacial acetic acid.

oxide. A binary compound of oxygen generally with a metal, M_2O (basic), or non-metal, NO_x (acid). Cf. *ethers, anhydrides.* **acid-** The oxygen compounds of non-metals, as SO_2, SO_3, P_2O_3, P_2O_5, etc. They give the oxyacids with water. **basic-** The oxygen compounds of metals, as Na_2O, K_2O, CaO, MgO, Al_2O_3. They give the bases with water. **amphoteric-** The oxygen compounds of the heavy metals, such as ZnO, Fe_2O_3, etc. They may form either weak acids or weak bases. **hydrous-** An amorphous colloidal substance, which is neither a definite hydroxide nor a definite crystalline hydrate. **inert-** Those oxygen compounds which form neither acid nor basic compounds, as CO, N_2O. **neutral-** Hydrogen oxide, or water. **per-** A binary compound containing the peroxide group, —O.O—, as H_2O_2, BaO_2. Peroxides yield hydrogen peroxides with acids, and should not be confused with dioxides, many of which do not. Thus, NO_2 is a dioxide, not a peroxide. **primary-** q.v. **prot-** The o. with the fewest oxygen atoms of a series of oxides. **sub-** An o. lower than the commonest of a series.

oxidimetry. Analytical methods in which an oxidizing agent is employed for the titration of substances.

oxidize. To unite with oxygen or to increase the proportion of electronegative elements or radicals.

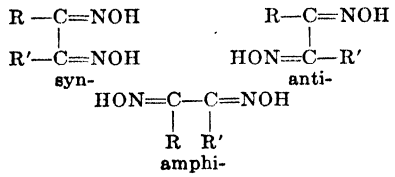
oxidizer. An oxidizing agent (q.v.) generally in the solid state; as, $NaNO_3$ or NH_4NO_3 in explosives.

oxidizing. The act of oxidation or electronation. **o. agent.** A substance that: (a) yields oxygen readily, (b) removes hydrogen from a compound, or (c) attracts negative electrons. The common oxidizing agents are: O_2, O_3, Cl_2, Br_2, $KMnO_4$, $K_2Cr_2O_7$, $KClO_3$, HNO_3, H_2O_2. **o. flame.** The outer zone of a flame containing an excess of air. (The inner cone contains more carbon and is the reducing flame.) **o. reaction.** See *oxidation, electronation.*

oxido-reduction. An oxidation reaction (q.v.) considered from both the oxidizing and reducing effects. **o. indicators.** See *indicators.* **o. potential.** r_H or rH. Reduction intensity. $r_H = \log 1/pH_2$; where pH_2 is the hydrogen gas pressure in atmospheres. Cf. *redox, rH.*

oximes. A series of compounds containing the monovalent —CH(:N.OH) radical. They are condensation products of aldehydes or ketones with hydroxylamine. (See *aldoxime, ketoxime.*) There are two isomeric types:

acet- Acetoxime. **ald-** Aldoxime. **amid-** Amidoxime. **di-** Ketoxime. A compound containing two oxime radicals. There are three types:



dimethyldi- Dimethylglyoxime. **form-** See *nitrolic acid.* **glucose-** See *glucose.* **lact-** See *lactoxime.* **pent-** See *pentoxime.*
o. group. The divalent >N.OH radical.

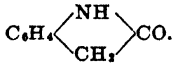
oximide. C_2HO_2N = 71.1. The imide of oxalic acid,  . Colorless prisms obtained from oxamic acid by dehydration with P_2O_5. **cyan-** See *cyanoximide.*

oximido. Isonitroso. The divalent radical, >N.OH. **o. compounds.** A series of compounds containing the monovalent —NH.CHO radical, or its derivatives.

oximinoketone. A compound of the type R.CO.C:NOH; they give a blue color with ferrous iron.

oxin(e). 8-Quinolinol.

oxindole. C_8H_7ON = 133.1. α-indolinone, 2(3)-indolone, 2-ketoindoline, 2.3-dihydro-2-ketoindole. The lactam of o-amino-phenolacetic acid, and a derivative of indole:



Colorless needles, m.126, soluble in hot water, alcohol or ether. Cf. pseudo *indoxyl.* **bi-** Indigotin. **imino-** Imesatin. **methyl-** Atrosine.

oxirane. Ethylene oxide. **methyl-** Propylene oxide.

oxirene. CH:CH.O. **methyl-** *1.2*-Epoxypropene*.

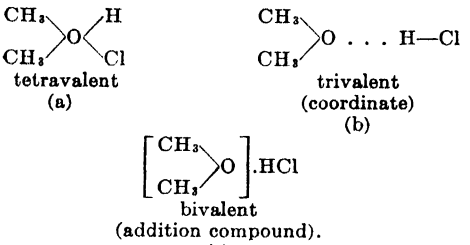
oxo- A prefix indicating the presence of the ketogroup; as oxomalonic acid, HOOC.CO.COOH. **o. compounds.** Compounds having a keto group, excluding carboxylic acids, hence: aldehydes, ketones, ketenes, quinones, lactones, etc.

oxomalonic acid. Mesoxalic acid.

oxone. "Oxygen cubes." Cubes of fused sodium peroxide with traces of CuO (as catalyst); used for making small quantities of oxygen in the laboratory by wetting the cubes. Cf. *autogenor.*

oxonite. An explosive consisting of picric acid dissolved in nitric acid.

oxonium compounds. An addition compound or double compound (c) of an organic oxide with strong acids (HCl, $HClO_3$) or their salts ($SnCl_4$). They were at first considered to contain tetravalent oxygen (as in a), and later trivalent oxygen, coordinately combined (as in b). They are analogous to ammonium salts.



tetravalent (a) trivalent (coordinate) (b) bivalent (addition compound). (c)

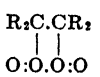
o. ion. The ion OH_3^+, which is believed to represent more accurately what is normally called the hydrogen ion (q.v.).

oxophenarsine hydrochloride. $C_6H_6AsO_2N.HCl$ = 235.49. The 3-amino-4-hydroxyphenyl-arsine oxide hydrochloride, $C_6H_3.AsO.(NH_2)(OH).HCl$. A white powder, soluble in water; it is an antisyphilitic. See *mapharsen.*

oxophenic acid. Catechol.

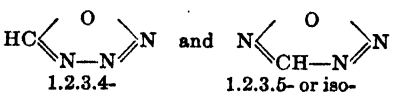
oxozone. O_4. A supposed modification of oxygen containing 4 atoms of oxygen. Cf. *ozone.*

oxozonide. A group of unstable compounds formed by the addition of 4 atoms of oxygen to the double bonds of an unsaturated organic structure:



Cf. *ozonide, isozozonide.*

oxtriazole. $CHON_3$ = 71.2. The heterocyclic compounds:



1.2.3.4- 1.2.3.5- or iso-

oxy-[1] (1) A prefix, infix or suffix indicating the presence of oxygen in a molecule. (2) A prefix for the grouping —C—O—C—. Cf. *keto-, ether.* (3) A misnomer for hydroxy, —OH. **o. acetylene.** A mixture of oxygen and acetylene gases used in a blowpipe to obtain high temperatures (6000°F.); it is used for cutting armor plates and welding. **o. hydrogen.** See *oxyhydrogen.* **o. muriatic acid.** An obsolete term for hydrochloric acid.

oxyacanthine. $C_{19}H_{21}O_3N$ = 311.17. Vinetine. An alkaloid from the root of *Berberis vulgaris,* barberry. A white crystalline powder, m.210, soluble in alcohol, ether, or chloroform. **o. hydrochloride.** $C_{19}H_{21}NO_3.HCl.2H_2O$ = 383.67. Small white needles, soluble in water.

oxyacetone. Acetol.

oxyacid. An acid containing oxygen. **inorganic-** A tertiary compound of an acid radical with hydrogen; as, $HClO_3$, H_2SO_4, H_3PO_4, H_4SiO_4. **organic-** An organic compound which contains both a —COOH radical and —OH group; as, CHOH.COOH, glycocollic acid, or MeCOH.COOH, lactic acid.

oxyalizarin. Purpurin.

oxyamides. Hydroxyamides. A series of compounds containing the $—CONH_2$ and —OH radicals; as, $CHOH.CONH_2$, glycollamide, or $MeCOH.CONH_2$, lactamide.

oxyammonia. Hydroxylamine.

oxyammonium compounds. Same as hydroxylammonium compounds (see *quaternary* amines).

oxyanthracene. Anthrol.

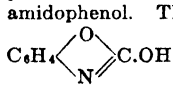
oxyazide. A compound containing the $—N_3$ and —OH radicals, *e.g.*, $HO.CH_2.CO—N{=}N_2$, glycolazide.

oxyazo- A prefix indicating the presence of the —N:N— and —OH groups. **o. benzene.** $C_{12}H_{10}ON_2$ = 198.2. The simplest oxyazo compound, $C_6H_5.N{:}N.C_6H_4OH$. An orange-red crystalline powder. **o. compounds.** An organic compound of the type, $R.N{:}N.C_6H_4OH$, obtained by the action of diazo compounds on phenols in alkaline solution. They form a class of dyes.

oxybenzene. Misnomer for phenol.

oxybenzoic. Misnomer for hydroxybenzoic or salicylic.

oxybenzoxazole. $C_7H_5O_2N$ = 135.1. Carbonylamidophenol. The heterocyclic compound,

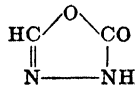


Colorless crystals, m.137.

oxybenzyl. Misnomer for hydroxybenzyl. **o. alcohol.** Misnomer for salicylic alcohol.

oxybiazole. 1.3.4-Oxydiazole.

oxybiazolone. $C_2H_2O_2N_2$ = 82.1. The heterocyclic compound,



oxybromide. (1) An organic compound containing the —OH and —Br groups. (2) The —OBr radical.

oxyburserasin. A substance obtained from myrrh, used medicinally.

oxybutyric acid. See *butyric acid.* **o. aldehyde.** Aldol.

oxycamphor. $C_{10}H_{16}O_2$ = 168.1. C_8H_{14}  .

Colorless crystals, derived from camphor, m.204, slightly soluble in water, soluble in alcohol or ether; used medicinally (see *oxaphor*).

oxycannabin. $C_{11}H_{11}O_4N$ = 221.1. A derivative of cannabinol.

oxycanthine. Oxyacanthine.

oxychloride. Describing a compound which contains the —OH and —Cl radicals; or the —OCl radical.

oxycholine. Muscarine.

oxychromatin. Linin (1).

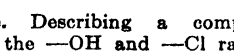
oxyconiine. Conhydrine.

oxydase. Oxidase.

oxydation. Oxidation.

oxydizing. Oxidizing.

oxyfluorenone. $C_{13}H_8O_2$ = 196.1. o-oxyd phenylene xetone.



Colorless crystals, m.115.

oxygal. A trade name for sodium peroxide.

oxygen. O = 16.000. Oxygenium, vital air, sauerstoff. A gaseous element, atomic number 8, which exists free in the atmosphere as O_2, and combined in many substances of the solid earth-crust. It is the most abundant and most important of all chemical elements, and was Hooke's *nitre air*, first isolated Aug. 1, 1774, by J. Priestley (*dephlogisticated air*) and earlier (in 1773, but not published until 1777) by K. W. Scheele (*empyreal air*). Its rôle in nature was recognized by A. L. Lavoisier who developed the theory of combustion and oxidation. A colorless gas, $d._{(air=1)}$1.1053, m. −227, b. −182, slightly soluble in water. It occurs in three isotopic forms of masses 16, 17, and 18, in the proportions of 10.000:1:8. It is prepared either by fractional distillation of liquid air, or by electrolysis of water, and is shipped in steel cylinders. Oxygen is the basis of atomic weights (O = 16), the valency system (O = 2), and the acid and base system (cf. *ammonia system.*) It is used medicinally in pulmonary diseases and anemia; with nitrous oxide, ethylene, or other anesthetics; and with hydrogen, acetylene, or illuminating gas for producing high temperatures for welding, and melting metals. **active-** Ozone, O_3. **allotropic-** Ozone, oxozone. **hydroxyl-** The oxygen of the hydroxyl group. **ketonic-** The oxygen of the >CO group. **liquid-** See *liquid o.* **radio-** A short-lived isotope obtained by bombardment of o. with deuterons or alpha particles. See *radio elements.* **o. absorbent.** A substance that removes gaseous oxygen from a gas mixture, *e.g.*, from air. The most common are an alkaline solution of pyrogallic acid, or metallic copper in ammoniacal solution of cuprous chloride. Others are:

	Absorpt. rate
chromous sulfate reagent	100 %
cuprous chloride reagent	4 %
quinone hyposulfite	4 %
potassium pyrogallate	2.3 %

o. carrier. A catalytic substance that absorbs oxygen molecules and splits off oxygen as atoms. **o. difluoride, o. fluoride.** OF_2 = 54.00. A gas, which forms at low temperatures a yellow liquid, $d._{-190°}$1.65, m. −223.8, b. −146.5.

oxygenase. An enzyme that enables atmospheric oxygen to be utilised by the organism or in the system in which it occurs.

oxygenate. To enrich with oxygen.

oxygenated water. Water saturated with oxygen gas.

oxygenation. Saturation with oxygen.

oxygenator. Any apparatus for saturating or impregnating substances with oxygen.

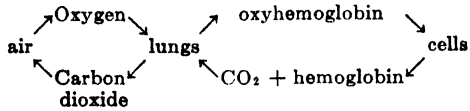
oxygenium. The Latin name for oxygen.

oxygenize. (1) Oxygenate. (2) Oxidize.

oxyhematoporphyrin. A pigment derived from oxyhemoglobin, and closely allied to urohematoporphyrin, sometimes found in urine.

oxyhemocyanin. The oxidized form of hemocyanin.

oxyhemoglobin, oxyhæmoglobin. Hematoglobulin, hematocrystallin. The red pigment of he blood corpuscles of animals; it carries the oxygen to the individual cells of the body, and emoves the carbon dioxide from them later:



Molecular weight, 16.669; it contains 1.324 cc. O_2 per gram.

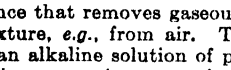
oxyhydrase. An enzyme in vegetable and animal secretions that decomposes water to H^+ and OH^-.

oxyhydrazides. A series of organic compounds which contain the —OH group and the —$NHNH_2$ radical. *E.g.*, $HOCH_2.CONHNH_2$, glycolhydrazide. $HOCHMe.CONHNH_2$, lactohydrazide.

oxyhydrogen. An extremely explosive mixture of oxygen and hydrogen. **o. blowpipe.** A burner in which a jet of oxygen is inside a jet of hydrogen, thus ensuring complete combustion of the two gases and an extremely hot flame. **o. flame.** A blowpipe flame obtained by burning hydrogen with oxygen, which gives a temperature of 5000°F. **o. light.** The "lime" light produced by heating calcium oxide with the oxyhydrogen blowpipe.

oxyhydroquinone. $C_6H_3(OH)_3$ = 126.1. 1.2.4-Trihydroxybenzene, 2.4-dihydroxyphenol, a-hydroxy-hydroquinol. Colorless crystals, m.-140.

-oxyl. A suffix denoting the RO— group; as, methoxyl, MeO—; phenoxyl, PhO—. Cf. *hydroxyl.*

oxylactone. A lactone containing a —OH radical, as  , oxyvalerolactone.

oxylepidine. Dibenzoyl *stilbene.*

oxyleucotin. $C_{34}H_{32}O_{13}$ = 632.2. A crystalline principle from paracoto bark.

oxylith. A mixture of sodium peroxide and bleaching powder, used to generate oxygen for welding purposes.

oxymalonic acid. Tartronic acid.

oxymel. A medicated honey, containing: clarified honey (80 %), acetic acid (10 %) and water (10 %).

oxymethoxyallylbenzene. Eugenol.

oxymethylconiferin. Syringenin.

oxymethylcresoltannin. Cretaform.

oxymethylene. Formaldehyde. **o. diphosphoric acid.** See *diphosphoric acid.*

oxymorphine. Dehydromorphine.

oxymuriate. Chlorate.

oxymuriatic acid. Chloric acid.

oxyn. A dihydroxy peroxide glyceride; a crystalline constituent of tung oil.

oxynaphthoic acid. $C_{11}H_8O_3$ = 188.1. α-naphthol carbolic acid, $C_{10}H_6(OH)COOH$. Colorless crystals, m.186, slightly soluble in water,

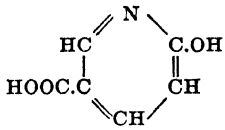
soluble in alcohol, ether, chloroform, or bicarbonate solutions; used medicinally as a disinfectant and antizymotic.

oxynaphthoxazime. Mukogen.

oxynarcotine. $C_{22}H_{23}NO_8$ = 429.14. White needles, soluble in alcohol.

oxyneurine. Betaine.

oxynicotinic acid. $C_6H_5O_3N$ = 139.1. 2-hydroxypyridine-5-carboxylic acid.



Colorless crystals, m.303. Cf. *oxypicolinic, oxyquinolinic* acid.

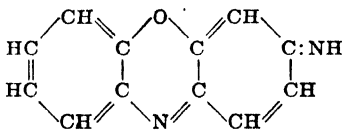
oxynitrilase. An enzyme that decomposes hydroxynitriles to aldehydes.

oxynitriles. A group of organic compounds containing the —OH and —CN radicals. *E.g.*, $HO.CH_2.CN$, ethanolnitrile, glycollic nitrile; HO.CHMe.CN, ethidene lactic nitrile.

oxynitroso. Nitrito.

oxyphenazone. Resorufin.

oxyphenoxazime. $C_{12}H_8ON_2$ = 196.1. The heterocyclic compound,



Cf. *resorufin.*

oxyphenoxazone. Resorufin.

oxyphenyl. Hydroxyphenyl, the radical, $HO.C_6H_4$—. Cf. *phenoxy.*

oxyphile. A cell structure that can be stained with acid dyes.

oxyphor. Oxycamphor.

oxyphthalic acid. α-Hydroxyphthalic acid.

oxypicolinic acid. $C_6H_5O_3N$ = 139.1. 4-hydroxy-pyridine-2-carboxylic acid. Colorless crystals, m.250 (see *oxynicotinic acid*).

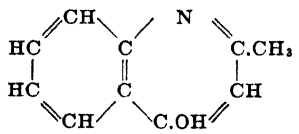
oxyproline. $C_5H_9O_3N$ = 131.1. γ-Hydroxy-α-pyrrolidine-carboxylic acid. An amino acid derived from gelatin or other proteins.

oxypurinase. An enzyme that oxidizes purine bodies.

oxypyridine. Pyridone.

oxyquercetin. Myricetin.

oxyquinaldine. $C_{10}H_9ON$ = 159.1. The heterocyclic compound,



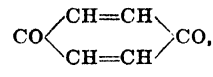
oxyquinaseptol. Diaphtherin.

oxyquinazoline. Quinazolone.

oxyquinoline. $C_9H_6N.OH$ = 146.1. A hydroxy derivative of quinoline. **o. carboxylic acid.** Kynurenic acid. **o. potassium sulfate.** Chinosol. **o. sulfate.** $(C_9H_7ON)_2H_2SO_4$ = 390.2. A yellow crystalline powder of saffron-like odor, m.175, soluble in water. Used medicinally as a disinfectant and antiseptic in eye-washes, gargles, and nasal sprays. **o. sulfonic acid.** Diaphthol.

oxyquinolinic acid. $C_6H_5O_3N$ = 139.1. 2-hydroxypyridine-5.6-dicarboxylic acid (see *oxynicotinic acid*).

oxyquinones. A group of derivatives of



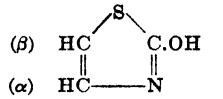
in which one or more of the hydrogen atoms are replaced by a hydroxy, methoxy, or ethoxy group.

oxysalt. A salt of an oxyacid.

oxysparteine. $C_{15}H_{24}ON_2$ = 248.4. An oxidation product of the alkaloid sparteine. Colorless crystals, m.49, soluble in water, alcohol, or ether; used medicinally as a heart stimulant.

oxysuccinic acid. Malic acid.

oxythiazole. C_3H_3ONS = 101.2. μ-Hydroxymetathiazole. The heterocyclic compound,



methyl- β-methyl-μ-oxythiazole, 5-methyl-o. Colorless crystals, m.160, soluble in water. **phenyl-** α-phenyl-μ-oxythiazole, 4-phenol-o. Colorless crystals, m.204, soluble in water.

oxy-Tobias acid. 2-Naphthol-1-sulfonic acid.

oxytocic. A drug that increases the expulsive power of the uterus, as ergot and pituitrin.

oxytocin. α-Hypophamine.

oxytoluol. Cresol.

oxytoxin. An oxidation-product of a toxin; cf. *oxytocin.*

oxytropism. The response of living cells to oxygen.

oz. Abbreviation for ounce or ounces. *ozs.* is incorrect. **oz. ap.** Abbreviation for apothecaries' ounces = ℥. **oz. av.** Abbreviation for avoirdupois ounce. **oz. fl.** Abbreviation for fluid ounce. **oz. t.** Abbreviation for troy ounce.

ozamin. Benzopurpurin. A red aniline dye.

ozocerite. Mineral wax, native paraffin, fossil wax, ozokerite. A native mixture of hydrocarbons; translucent yellow, brown to greenish masses, soluble in carbon disulfide. Used as an insulating material, for paints, leather polish, sealing wax, candles, etc. **purified-** Ceresin.

ozogen. Hydrogen peroxide.

ozokerite. Ozocerite.

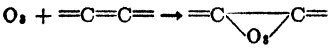
ozonation. Impregnation or saturation with ozone (cf. *ozonidation*).

ozonator. Ozoniser. Any instrument or device in which ozone is generated.

ozone. O_3 = 48.000. A modification of oxygen gas produced usually by a silent electric discharge in air or oxygen. A faint blue gas of intense odor, $d._{(air=1)}$ 1.658, b. −119, decomp. 270, soluble in water, oil of turpentine or oil of cinnamon. Used as an antiseptic, bactericide and oxidizing agent; and for bleaching oils, fats, textiles, and sugar solutions. Cf. *oxozone.* **o. paper.** A filter paper impregnated with potassium iodide and starch, which turns blue on exposure to ozone; also a filter paper impregnated with indigo solution. Cf. *thallium ozone paper.*

ozonidation. To convert into an ozonide. Cf. *ozonization.*

ozonides. A series of compounds of ozone with unsaturated organic compounds containing a double bond:



They form thick oily, unstable liquids. Cf. ***oxozonide isozonide.***

ozonization. To treat with ozone. Cf. *ozonidation.*

ozonize. To sterilize with ozone, *e.g.*, drinking water.

ozonizer. (1) An apparatus for applying ozone to wounds. (2) Ozonator. Cf. *Siemens o.*

ozonolysis. The treatment of hydrocarbons with ozone.

ozotetrazone. Vicinal *tetrazine.*

P

P. (1) The symbol for phosphorus. (2) An abbreviation for pressure; P_T at constant temperature, P_V at constant volume. (3) Principal series of spectrum lines; as ^1P, ^2P. (4) The sixth shell or orbit of electrons in the atom. Cf. *periodic chain, Bohr's theory.* (5) Parachor.

p. (1) An abbreviation for *para.* (2) The electrons responsible for the principal series of lines in the spectrum. (3) Potential.

p.p.m. Parts per million.

π, Π. The Greek letter "pi." (1) An abbreviation for *peri,-* q.v. (2) The mathematical constant 3.1415. See *radius.*

ψ, Ψ. The Greek letter "psi." (1) An abbreviation for pseudo. (2) The symbol for the electric field of Schrödinger's atom.

φ, ϕ, Φ. The Greek letter "phi." An abbreviation for phenyl.

p_H, pH, P_H. A symbol for the logarithm of the reciprocal of the hydrogen-ion concentration, C_H or $[H^+]$; hence, $p_H = \log \frac{1}{C_H}$.

p-H. Para-hydrogen (see *hydrogen molecule*).

Pa. The symbol for protoactinium.

Paal's method. Reduction by hydrogen gas, with palladium as a catalyst.

pachnolite. The mineral $NaF.CaF_2.AlF_3.H_2O$.

pachyrhizid. $C_{30}H_{24}O_{10}$ = 544.22. A glucoside obtained from *Pachyrhizus angulatus.*

pacite. Arsenopyrite.

pack fong. German silver.

packing. (1) A filling material. (2) Crowding together. **atomic-** The crowding of atoms which have lost electrons from some of the shells, and hence can approach each other more closely. Such condition is assumed to exist in the interior of certain stars, which have an enormous density (up to 50,000 times that of water). Cf. *spectral classification.* **nuclear-** The crowding of hydrogen and helium nuclei and electrons within the atomic nucleus. Cf. *p. effect.*

p. effect. A loss of mass due to the crowding of protons and electrons in the atomic nuclei; as, in the hypothetical case $4H \rightarrow He$, where the atomic weight diminishes from $4 \times 1.008 = 4.032$, to 4.002. Cf. *mass-energy cycle, cosmic radiation.* **p. fraction.** An atomic constant which measures the forces holding electrons and protons together. It is the deviation per unit mass of the isotopic weight from whole numbers (in parts per 10,000).

Element	*Packing fraction* $\times 10^4$	*Isotopic weight or mass*
H	77.8	1.00778
He	5.4	4.00216
Li^6	20.0	6.012
Li^7	17.0	7.012
B^{10}	13.5	10.0135
B^{11}	10	11.0110
C	3	12.0036
N	5.7	14.008
O	0	16.0000
F	0	19.0000
Ne^{20}	0.2	20.0004
Ne^{22}	2.2	22.0048
P	−5.6	30.9825
Cl^{35}	−4.8	34.983
Cl^{37}	−5.0	36.980
A^{36}	−6.6	35.976
A^{40}	−7.3	39.971.

paddle. A straight iron tool used for mixing and stirring ores in a furnace. **p. agitator.** A stirring device for keeping solids in suspension during a reaction, or while being dissolved.

paddy. Threshed rice.

padutin. Kallikrein.

pae, pæ- See *pe-.*

paeonine. Peonine.

paeonol. Peonol.

pagodite. Pinite. The mineral $2Al_2O_3,K_2O,-3H_2O,5SiO_2$.

pail. A small bucket, sometimes graduated, for measuring liquids.

paint. A suspension of a finely-ground pigment in a vehicle, such as linseed oil, varnish, or turpentine. The basis of nearly all paint is a white pigment (white lead, zinc oxide, barytes, etc.) to which one or more colored pigments are added. Cf. *pigments.* **luminous-** A suspension of zinc sulfide or barium sulphide in nitro-cellulose lacquer. **water-** An aqueous mixture of pigment with casein or other glue.

p. mill. A grinder that grinds to 200 mesh. **p. oils.** An oil used for thinning paints; as, linseed oil, walnut oil, tung oil, poppy seed oil. **p. rock.** Ocher. **p. remover.** A preparation used to remove paint from a painted surface. **p. thinner.** Turpentine or turpentine substitutes.

paired electrons. An electron couple, or a set of two valence electrons that forms the nonpolar bond between two atoms, each atom furnishing one of the electrons in the pair. Cf. *twin electrons.*

palaeontology. Paleontology.

palau. An alloy of palladium and gold, used as a platinum substitute.

paleontology. The science that treats of prehistoric forms of life as revealed by fossil remains of plants and animals.

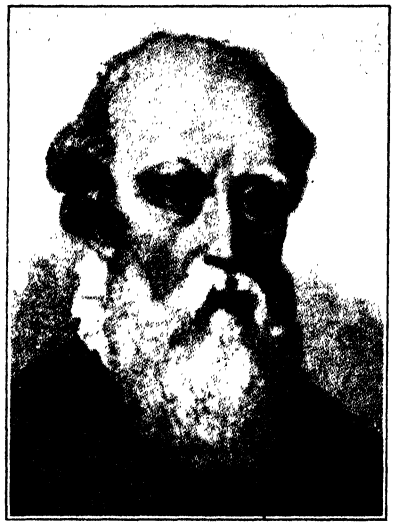
palicourine. A crystalline alkaloid from *Palicourea* species, order Rubiaceae.

Palissy, Bernard. 1499–1589. A French naturalist and leader in chemical technology and scientific thought, noted as forerunner of Boyle.

palite. $C_2H_2O_2Cl_2$ = 128.9. Chloromethylchloroformate, $ClCOOCH_2Cl$. A poison gas used during the World War. **super-** Superpalite.

palladic. Describing a compound containing tetravalent palladium; as, p. dioxide, p. disulfide.

palladichloride. A double salt of the type M_2PdCl_6 or $2MCl.PdCl_4$.



Bernard Palissy.

palladious. Palladous.

palladium. Pd = 106.7. A noble metal of the platinum group, atomic number 46, discovered in 1803 by Wollaston. A silver-white, ductile, malleable metal, d.11.4, m.1556, b.2300, insoluble in water or acids. It occurs native and alloyed with platinum metals; used in alloys with gold or platinum in dentistry and jewelry, and with copper or silver in watches, fountain pens, pencils, mirrors, and surgical instruments. Metallic palladium (as palladium black or sponge) is used as a catalyst and hydrogen absorbent. There are two series of compounds: palladous (valency 2) and palladic (valency 4). **allo-** A hexagonal or cubic variety of p_{d}, formerly confused with potarite.

p. alloys. Any alloy of palladium with another noble metal; as, gold (palau), rhodium (rhotanium). **p. asbestos.** Asbestos coated with metallic palladium; used in gas analysis for absorption of hydrogen. **p. black.** A black powder of finely-divided palladium; used as a catalyst in the hydrogenation of oils. **p. bromide.** $PdBr_2$ = 266.5. Palladous bromide. A brown powder, insoluble in water. **p. chloride.** $PdCl_2$, $2H_2O$ = 213.7. Palladous chloride. A dark-brown, hygroscopic, crystalline powder, soluble in water or acids. Used as a reagent for malic acid, cocaine or iodine; for the detection of mercury vapor; as a reagent for CO in gas analysis; medicinally, as a local germicide; in photography for toning; for porcelain prints, marking inks, and for coating instruments. **p. cyanide.** $Pd(CN)_2$ = 158.7. Palladous cyanide. A yellow solid, unstable to heat. **p. dioxide.** PdO_2 = 138.7. Palladic oxide. A black powder, decomp. 200, insoluble in water. **p. disulfide.** PdS_2 = 170.8. Palladic sulfide. A dark-brown powder; insoluble in water, soluble in nitric acid. **p. family.** The elements Ru, Rh and Pd of group 8 of the fourth period of the periodic table. **p. gold.** Porpezite. A native gold containing up to 10% palladium. **p. hydroxide.** $Pd(OH)_2$ = 140.7. Palladous hydroxide. A brown powder; insoluble in water (cf. *leptynol*). **p. iodide.** PdI_2 = 360.5. Palladous iodide. A black powder, m.100, b.360; insoluble in water, soluble in potassium iodide solution. **p. monoxide.** PdO = 122.7. A black powder, decomp. 875; insoluble in water. **p. monosulfide.** PdS = 138.8. Palladous sulfide. A black powder; insoluble in water. **p. nitrate.** $Pd(NO_3)_2$ = 230.7. Palladous nitrate. A brown, rhombic, crystalline powder; soluble in water but hydrolysed in dilute solutions; used as a reagent for ptomaines and for separating of Cl and I. **p. oxides.** See *p. monoxide, p. dioxide.* **p. potassium chloride.** See *potassium palladichloride, potassium palladochloride.* **p. sodium chloride.** Na_2PdCl_4 = 294.6. Sodium palladous chloride. A double salt; red hygroscopic crystals, soluble in water. Used as a reagent for gases (methane, carbon monoxide and iodine). **p. sponge.** A gray spongy mass of finely-divided palladium. Used in gas analysis, and as a catalyst for hydrogenation. **p. sulfate.** $Pd(SO_4)2H_2O$ = 238.8. Palladous sulfate. Brown crystals; soluble in water. **p. sub-sulfide.** Pd_2S = 245.5. An insoluble grey solid. **p. tube.** A glass tube filled with p. asbestos or p. sponge; used in gas analysis to absorb hydrogen.

pallado. Palladous.

palladous. Palladious. Describing compounds containing divalent palladium; as, palladium chloride, nitrate, or sulfate.

pallamine. Colloidal palladium.

pallas. An alloy of gold, palladium and platinum which is harder than platinum.

pallasite. A meteorite, consisting of a Ni-Fe sponge enclosing olivine.

palm. A tree of the order Palmae. **p. butter.** P. oil. **p. grease.** P. oil. **p. oil.** Oleum palmae, palm butter, palm grease. A semi-solid oil expressed from the crushed and fermented fruit of the West African oil palm, *Elaeis guineensis*, and other species. It consists of the glycerides of palmitic, oleic, and stearic acids and free palmitic acid; d.0.859–0.870, saponification value 196–205, m.33–46. Used in the manufacture of soap, candles, butter substitutes and lubricants. **p. kernel cake.** The residue which removes after expressing palm nut oil; used as a cattle food. **p. kernel oil.** Palm nut oil. **p. nut oil.** Palm kernel oil. A yellowish, fatty oil expressed from the crushed fruits of the West African oil palm, d.0.952, m.26–36, which consists of the glycerides of palmitic, oleic, and stearic acids. Used in the manufacture of soap and chocolate; in pharmacy for emulsions. **p. wax.** A yellow wax obtained from *Ceroxylon andicola*, a palm of tropical America (Ecuador); used as a substitute for bees-wax.

Palmae. Palm family, a group of tropical trees.

Areca catechu	areca nut
Serenoa serrulate	sabal
Arenga saccharifera	jaggery palm sago
Borassus flabellifer	palmyra sago
Caryo urens	toddy palm sago
Cycas circinalis	sago
Copernicia cerifera	carnauba
Ceroxylon andicola	ceroxylin, palm wax
Metroxylon species	sago
Calamus draco	dragon's blood
Elaeis guineensis	palm oil
Cocos nucifera	cocoanuts coconut oil

See also, *raffia, tagud nut, coyol, date palm, sago.*

palmarosa oil. Pamorusa oil. An essential oil d.0.885–0.896, from gingergrass, *Andropogon schoenanthus*, of South Africa; used as adulterant for oil of rose. It contains perilla alcohol, geraniol and esters.

palmellin. The red coloring material, resembling hemoglobin, from the fresh water algae, *Palmella cruenta.*

palmetto. A tannin material from sabal; the partly-dried fruit of *Serenoa serrulata*, a tree of Georgia and Florida. Used in tanning leather.

palmic. Palmitic.

palmin. A purified coconut fat used in the manufacture of butter substitutes.

palmitamide. $C_{16}H_{33}ON$ = 255.27. Palmitic acid amide, hexadecanamide*. A colorless solid, m.93.

palmitate. Hexadecanate*, cetylate. A salt of palmitic acid, which contains the monovalent $C_{15}H_{31}COO$— radical.

palmitic acid. $C_{16}H_{32}O_2$ = 256.3. Hexadecanoic acid*, *n*-hexadecoic acid, palmic acid, cetylic acid, *n*-hexadecylic acid, ethalic acid, $C_{15}H_{31}COOH$, a saturated, fatty acid which occurs in many vegetable fats and oils. Colorless needles, d.0.853, m.62, decomp. by further heat.; insoluble in water, soluble in alcohol or ether. Used in the manufacture of soap. **hydroxy-** Juniperic acid. **p. cyanide.** Palmitonitrile.

palmitin. (1) $C_{51}H_{98}O_6$ = 807.1. Tripalmitin, the tripalmitic acid ester of glycerin, $C_3H_5(C_{15}H_{31}COO)_3$, which occurs in many vegetable fats and oils. A colorless fatty mass, d.0.866, m.61; insoluble in water, soluble in alcohol, ether, chloroform, or benzene. Used in the manufacture of soap. (2) A glyceride of palmitic acid; as, monopalmitin, dipalmitin.

palmitinic acid. Palmitic acid.

palmitoleic acid. Zoomaric acid.

palmitolic acid. $C_{15}H_{27}COOH$ = 252.3. 7-Hexadecynoic acid*. An unsaturated fatty acid, in oils and Japan wax. Colorless needles, m.47; insoluble in water, soluble in alcohol or ether.

palmitone. $C_{31}H_{62}O$ = 450.65. *16*-Hentriacontanone*. The ketone of palmitic acid, obtained by distillation with lime.

palmitonitrile. $C_{15}H_{31}CN$ = 237.3. Palmitic cyanide, hexadecanenitrile*. Colorless scales d.0.832, m.30, b_{100mm}.251; insoluble in water, soluble in alcohol or ether.

palmityl. The monovalent radical, $C_{15}H_{31}CO$—, derived from palmitic acid. **p. alcohol.** Cetyl alcohol. **p. chloride.** $Me(CH_2)_{14}COCl$ = 274.70. Hexadecanoyl chloride*. Colorless liquid or crystals, m.11.

palmoil. Palm oil.

Palmquist apparatus. A portable gas analysis apparatus for the determination of carbon dioxide in the atmosphere.

palmyra. The palm, *Borassus flabellifer*, cultivated in Southern Asia. The *wood* is used for rafters; the *leaves* for thatch, writing paper, mats, baskets and brushes; the *fruits* are roasted as food; the *sap* is used in making toddy and jaggery sugar; the *fibre* from the base of the leaves is used for brushes; and the young *seedlings* are eaten or ground to a fine flour.

pamaquine. Pamaquine naphthoate. The methylene-bis-*β*-hydroxynaphthoate of 6-methoxy-8-(1-methyl-4-diethylamino)butylaminoquinoline, an antimalarial.

pamorusa. Palmarosa.

pan. (1) A cylindrical vat for crushing or amalgamating gold ore. (2) A flat iron tray for washing gold from sand and dirt. (3) A flat container or tray; as, a balance pan, incinerating pan.

pan- A prefix indicating all, or the whole.

panabase. Tetrahedrite.

panacea. A universal remedy, generally applied to a quack medicine or cure-all.

panacon. $C_{22}H_{18}O_8$ = 317.2. A colorless crystalline substance from ginseng, the roots of *Aralia* or *Panax quinquefolium.*

Panama bark. Quillaja.

panaquinol. $C_{12}H_{26}O_9$ = 313.2. A bitter principle from ginseng, the root of *Panax quinquefolium.* An amorphous yellow powder, soluble in water or alcohol. Cf. *panacon.*

panax. (1) Ginseng. (2) A genus of araliaceus plants.

panchromatic. Sensitive to light of all colors, (see *chromatic, pantachromatic*).

panclastite. An explosive; nitrogen tetroxide dissolved in a combustible liquid, such as carbon disulfide.

pancreas. A gland below the stomach of mammals; it secretes a limpid, colorless fluid for the digestion of proteins, fats and carbohydrates.

pancreatic juice. The secretions of the pancreas containing the digestive enzymes and ferments, pancreatin, trypsin, amylopsin, steapsin, rennin, and invertin in alkaline solution.

pancreatin. Pancreatinum. A mixture of the enzymes of the pancreas of warm-blooded animals. It is obtained from the fresh pancreas of the hog or ox, as a cream-colored amorphous powder of faint odor and meat-like taste, which is slowly and partly soluble in water, but insoluble in alcohol; and should convert not less than 25 times its own weight of starch into water-soluble split-products. Used medicinally, and contains amylopsin, trypsin and steapsin. Cf. *holadin.* **p. powder.** A peptonizing powder.

pandermite. $Ca_2B_6O_{11}.3H_2O$. A native calcium borate used for the manufacture of boric acid.

Paneth, Fritz. 1887– . A German physicist, noted for his work on radioactivity. **P.'s rule.** A radio-element will be adsorbed by a solid substance if its electronegative radical can form, with the adsorbing substance, a compound that is relatively insoluble.

paniculatine. $C_{29}H_{35}O_7N$ = 509.28. An alkaloid, m.263, from the seeds of *Panicularia (Glyceria)* species, Gramineae of North America.

pannic acid. $C_{11}H_{14}O_4$ = 210.1. A constituent of rhizoma pannae. Colorless crystals, m.192. Cf. *pannol.*

pannol. $C_{11}H_{14}O_4$ = 210.1. A constituent of *Aspidium athamanticum*, a Filiceae. Cf. *pannic* acid.

pansupari. A mixture of betel and areca nuts and lime, used for chewing in India.

pansy. The dried herb of *Viola tricolor;* used, as the fluid extract, as an expectorant and alterative.

pantachromatic. Existing in two or more colors; entirely achromatic, (cf. *panchromatic*).

pantachromism. The property of a compound that can exist in two or more differently-colored forms.

pantal. A corrosion-resisting aluminum alloy containing: 4.2 % copper, 0.3–0.6 % manganese, 0.5–0.9 % magnesium.

pantocaine. $C_{14}H_{21}N_2O_2$ = 249.1. The β-dimethylamino ester of 4-butylamino benzoic acid, $Me(CH_2)_3NH.C_6H_4.COO(CH_2)_2NMe$. A local and spinal anesthetic, similar to procaine.

pantochromism. Pantachromism.

pantogen. Protyl.

pantograph. A device for copying diagrams etc. to any scale. It consists of a set of adjustable levers that connect a pencil with a tracing guide or stylus.

pantomorphism. The perfect symmetry displayed by crystals.

pantopone. A mixture of the hydrochlorides of the opium alkaloids as they occur in opium. A yellowish-gray amorphous powder, soluble in water; used in medicine.

paoferro. The inner bark of the ironwood tree of Brazil; used as an antidiabetic.

paopereira. The bark of a Brazilian tree, used as a febrifuge.

papain. Papayotin, papase, caricin, carase, vegetable pepsin. A protease or digestive ferment from the fruit of the papaw, *Carica papaya*, a tree of South America. It is a grayish powder, soluble in water or glycerin, and an extremely active ferment for proteins (including fibrin) in alkaline or acid solution; used in medicine.

papase. Papain.

Papaveraceae. Poppy family, a group of herbs with a milky, narcotic juice, the source of many alkaloids:

Papaver somniferum	opium, chundoo, kusamba, mudat, poppy capsules, poppy seeds
Papaver rhoeas	rhoeadine
Argemone mexicana	argemonine
Chelidonium majus	celandine
Eschscholtzia californica	ionidine
Glaucium flavum	glaucine
Sanguinaria canadensis	sanguinaria
Stylophorum diphyllum	stylophorum

papaveraldine. $C_{20}H_{19}O_6N$ = 353.2. The ketone of papaverine.

papaveric acid. Rhoeadic acid. $C_{16}H_{13}NO_7$ = 331.11. An oxidation-product of papaverine, m.233 (decomp.).

papaverine. $C_{20}H_{21}O_4N$ = 339.3. Tetramethoxybenzylisoquinoline. An alkaloid from opium. Fine, white rhombic prisms or needles, odorless, tasteless, m.148, insoluble in cold water, slightly soluble in alcohol, ether, or chloroform; used medicinally as a narcotic. Cf. *lodal*. **p. hydrochloride.** $C_{20}H_{21}O_4N.HCl$ = 375.8. Colorless crystals, soluble in water; used in medicine.

papaverinol. $C_{20}H_{21}O_5N$ = 355.2. A hydroxypapaverine.

papaveroline. $C_{16}H_{13}O_4N$ = 283.2. Tetrahydroxybenzylisoquinoline. A derivative of papaverine, in which the methoxy groups are replaced by hydroxy groups.

papaw. (1) The edible fruit of papaya. (2) Erroneously applied to pawpaw, q.v.

papaya. Papaw, melon tree. The tropical shrub or tree, *Carica papaya*, of the order Passifloraceae, which yields a delicious fruit and milky juice containing proteolytic enzymes (papain), a milk curdling ferment, caricin, myrosin and carpain. Used by natives to make tough meat tender. Cf. *papayotin, caricin*.

papayotin. The dried milky juice of papaya that contains papain.

paper. A fabric which chiefly consists of the fibers of cellulose, *e.g.*, obtained from wood pulp, cotton, straw or esparto. **alkannin-** A filter paper dipped in alkannin solution, and used as a test paper. **art-** A paper coated on one or both sides with a mixture of a white or colored pigment (*e.g.*, satin white) and an adhesive (*e.g.*, casein), and dried and calendered to a high finish. Used for printing from fine-screen half-tone blocks. Cf. *chromo-p.* **asbestos-** A thin asbestos board or a tissue made from asbestos fibres. **azolitmin-** A filter paper dipped into a solution of azolitmin; used in place of litmus paper. **bank-, bond-** A thin strong writing paper. **blueprint-** q.v. **carbon-** q.v. **chromo-** An art paper, usually with a duller finish. **congoblue-** q.v. **coordinate-** q.v. **dahlia-** q.v. **dialyzing-** A parchment paper used for dialyzing. **drying-** An absorbent paper. **emery-** A paper coated with abrasive material. **filter-** A porous, unsized paper used as an absorbent and for filtering. **glass-** An abrasive p. coated with broken glass. **glazed-** A paper coated with a filler (*e.g.*, barytes) and highly calendered. It has a shiny surface and is used in analytical operations for transferring precipitates. **imitation art-** A paper with a high finish, obtained by addition of a high proportion of loading and calendering. Cf. *art p.* **lens-** A soft tissue paper used for wiping the lenses of microscopes. **linen-** A paper made from linen rags. **l.-faced-** A paper that has been embossed with linen, an impression of which is retained on its surface. **litmus-** A filter paper impregnated with red or blue litmus solution used as a test paper for acids and alkalis. **niter-** A paper impregnated with saltpeter. **ozone-** See *ozone*. **paraffined-** A p. saturated with hot paraffin, used for electrical insulation, waterproofing, etc. **parchment-** A paper treated with conc. sulfuric acid or zinc chloride; it is water- and grease-proof, and used in dialyzing solutions. **polarity-** q.v. **sand-** q.v. **silver nitrate-** q.v. **starch-** q.v. **test-** A filter paper impregnated with some indicator solution and generally used to determine the acid or basic character of a solution or the presence of a certain substance (see *indicators, test papers*). **tissue-** A very thin paper. **turmeric-** A filter paper dipped in turmeric solution; used to identify boric acid (red color). **varnished-** A p. treated with varnish, used for electrical insulation, or for labels. **vulcanized-** See horn *fiber*. **wax-** A paper made waterproof by treating it with paraffin wax.

p. analysis. See *Herzberg's stain*. **p. board.** (1) A thick sheet of paper pulp mixed with size and filling materials. Cf. *pasteboard, millboard*. **p. coal.** A variety of brown coal that occurs in thin layers. **p. colors.** Aniline dyes used for coloring paper. **p. filter.** A cone made of filter pulp, or a thimble made of thick filter paper. **p. pulp.** The mixture of fibres and water from which paper is deposited by drainage on wire mesh. Cf. *chemical-, mechanical-, soda-, sulfite- and sulfate-pulp, Herzberg's stain*. **p. spar.** A variety of calcite, which occurs in thin paper-like plates.

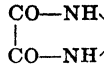
papier maché. A substance used for moulded articles, made by boiling old paper with water

and glue, and soaking the semi-dried product in linseed oil.

paprika. A finely-ground variety of red pepper used as a spice; it is rich in ascorbic acid (vitamin C).

para- A prefix: (1) derived from the Greek "beyond" or "opposite," which indicates the 1.4-position (para-compounds) of the benzene ring; (2) indicating an *even* rotational quantum number, as in *para*-hydrogen, or *para*-nitrogen; (3) to denote polymerization, as, paraformaldehyde; (4) to indicate the amount of water, as in paraperiodic acid; (5) to show a relationship, as in paracasein. **p. compounds.** See usually under the parent compounds.

Para arrowroot. Tapioca.

parabanic acid. $C_3H_2O_3N_2,H_2O$ = 132.07. Oxalylurea, imidazoletrione, the ureid of oxalic acid,  Colorless plates, m.227 (decomp.); slightly soluble in water, soluble in alcohol or ether. **dimethyl-** Cholestrophan.

parabituminous. Applied to a gas-coal having good caking properties.

parabola. A plane curve, each point of which is equidistant from a straight line (axis) and a central point (focus). Such a curve will resemble a circle at some points and a straight line at others. Cf. *elliptic.*

paraboloid. The surface traced by a parabola when its vertex is always on another parabola. **p. condenser.** A spherical mirror having an elongated focus; used on microscopes.

parabuxin. $C_{24}H_{48}ON_2$ = 380.4. An alkaloid in common garden box, *Buxus sempervirens*, an Euphorbiaceae.

paracasein. Casein digested with rennin.

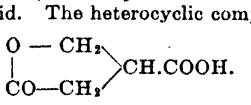
paracellulose. A variety of cellulose from the pith of plants.

Paracelsus. 1493–1541. Philippus Aurelius Theophrastus Paracelsus Bombastus von Hohenheim. A Swiss physician and alchemist, the founder of pharmaceutical chemistry, and advocate of chemical as opposed to vegetable remedies. Cf. *iatrochemistry.*

parachor. The quantity $P = M\gamma^{\frac{1}{4}}(D - d)$, where γ is the surface tension, M the molecular weight and D and d the densities of a compound in the liquid and vapor state, respectively, at the same temperature. Thus the parachor is an expression of the molecular volume, and equals 0.78 × critical volume. A comparison of the parachors of liquids is equivalent to a comparison of their molecular volumes at temperatures at which they have equal surface tensions. Since the parachor is an additive constant for saturated compounds it is used to determine chemical constitution, *e.g.*,

H = 17.1			F = 25.7
C = 4.8	N = 12.5	O = 20.0	Cl = 54.3
Si = 12.0	P = 37.7	S = 48.2	Br = 69.0
			I = 91.0
double bond = 23.2		*three-ring* = 15.5	
triple bond = 46.4		*four-ring* = 11.6	
		five-ring = 9.3	
		six-ring = 7.7	

Thus the increase in parachor for a molecule is 23.2N/Z, where N is the number of hydrogen atoms needed to saturate, and Z the number of atoms in the ring.

paraconic acid. $C_5H_6O_4$ = 130.0. Itamalic acid-γ-lactone, tetrahydro-5-oxo-3-furan carboxylic acid. The heterocyclic compound,  Colorless crystals, m.158°. Cf. *citraconic acid.* **dimethyl-** Terebic acid. **phenyl-** Phenyl paraconic acid.

paraconiine. $C_8H_{15}N$ = 125.1. An alkaloid obtained by heating butyric aldehyde with ammonia; a colorless liquid with a stupefying odor, b.170.

paracoto. The dried bark of an unidentified tree of Northern Bolivia. Used as the fluid extract, as a substitute for coto bark, q.v. It contains cotoin, paracotoin, leukotine, oxyleukotine, protocotoin and essential oils.

paracotoin. $C_{12}H_8O_4$ = 216.1. An active principle derived from paracoto; yellow crystals, m.150, soluble in alcohol.

paracotoinic acid. $C_{12}H_8O.H_2O$ = 186.1. An amorphous substance obtained by boiling paracotoin with potassium hydroxide.

paracyanogen. $(CN)_6$ = 156.12. An insoluble solid, which sublimes if heated.

paradiazine. Pyrazine.

paradichlorobenzene. See *benzene.*

paradimethylaminobenzaldehyde. $C_9H_{11}ON$ = 149.1. $C_6H_4(CHO)NMe_2$. Used as a reagent for detecting indole, skatole, pyrrole, and other organic compounds.

paradioxybenzene. Hydroquinone.

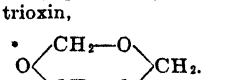
paraffin. (1) See *paraffins.* (2) A white, waxy, solid substance, d.0.890, m.43–65, insoluble in water, acids or alkalis, soluble in alcohol, ether, or chloroform. P. occurs native in ozocerite, peat, and bituminous coal, and is a constituent of petroleum from which it is distilled. It consists of a mixture of hydrocarbons; used in the manufacture of candles, waxed paper, matches, lubricants, oil crayons, and for waterproofing wood and cork. (3) See *kerosene.* **liquid-** Petrolatum.

p. bath. Molten paraffin. **p. oil.** Petrolatum. **p. scale.** A crude paraffin. **p. wax.** Paraffin (2).

paraffins. (1) Alkanes. (2) A group name for the saturated aliphatic hydrocarbons of the methane series, C_nH_{2n+2}. **iso-** An aliphatic saturated hydrocarbon containing one —CHMe— group or a side chain. **neo-** An aliphatic saturated hydrocarbon containing one $—CMe_2—$ group. **normal-** An aliphatic saturated hydrocarbon containing only $CH_3—$ and $—CH_2—$ groups. **meso-** An aliphatic saturated hydrocarbon containing two $—CMe_2—$ groups; as, mesohexane, $Me_2CH—CHMe_2$.

paraffinum. Paraffin (2).

paraform. Paraformaldehyde.

paraformaldehyde. $(CH_2O)_3$ = 90.04. Paraformaldehydum, paraform, triformol, trioxymethylene, trioxin,  A colorless amorphous powder, m.150, soluble in water, insoluble in alcohol or ether; used as an antiseptic. Cf. *paraldehyde.*

parafuchsin. $C_{19}H_{18}N_3Cl$. Para rosaniline chloride, $(C_6H_4NH_2)_2{=}C{=}C_6H_4{=}NH.HCl$. A dye. Cf. *pararosaniline.*

paraglobulin. Fibroplastin, serum-globulin. A globulin from blood-serum and lymph. It is precipitated as a white amorphous substance on passing carbon dioxide through diluted blood-serum.

paragonite. $Al_3NaH_2Si_3O_{12}$. A silica mineral (q.v.) of the mica group. Cf. *muscovite.*

Paraguay tea. Maté.

parahemoglobin. A crystalline form of hemoglobin.

parahiston. A protein from thymus, rich in sulfur.

parahydrogen. See *hydrogen molecule.*

paralactic acid. Sarcolactic acid.

paralbumin. A protein from ovarian cysts.

paraldehyde. $(C_2H_4O)_3$ = 132.1. A polymer of acetaldehyde. A colorless, transparent liquid, of strong pungent odor, d.0.994, m.10, b.124, soluble in water. Used as a reagent for alkaloids and fuchsin; medicinally, as a hypnotic and sedative. Cf. *metaldehyde, aldol.*

paraldol. $C_8H_{16}O_4$ = 176.12. A polymer of aldol, m.82, of the type $(C_4H_8O_2)_2$.

paraleucaniline. $C_{19}H_{19}N_3$ = 289.28. The leuco-base corresponding with pararosaniline.

parallax. The apparent displacement of an object by a change in the position of the observer, *e.g.*, the cause of error in reading the liquid meniscus in a buret.

parallel. (1) Running side by side; always having the same direction, but separated by equal distances. (2) Electrical connections such that the like poles of a number of units are connected to one other, or to the same terminal (cf. *series*).

parallelosterism. The relationship which exists between isomorphous groups and their chemical compositions or physical properties.

paralyser. Paralyzer.

paralysol. $Me.C_6H_4.OK$. A mixture of cresol and potassium cresolate. Colorless crystals, m.146, insoluble in water, used medicinally as an antiseptic.

paralyst. Paralyzer.

paralyzant. A substance that causes paralysis.

paralyzer. An agent that prevents a chemical reaction; a catalytic poison.

param. $C_2H_4N_4$ = 84.2. Cyanoguanidine. A condensation product of cyanamide, obtained by heating it to 150, $N{\equiv}C.NHC(:NH)NH_2$; m.204, soluble in water, alcohol or ether.

paramagnetic. A substance that has magnetic properties greater than those of air; as, iron, cobalt, and nickel. Its magnetic permeability is thus greater than unity.

paramagnetism. The property of being attracted by a magnet, as opposed to diamagnetism.

paramecium. A genus of unicellular animals or protozoa, often used in biological experiments.

paramide. Mellimide.

paramorph. A crystal that has changed physically but not chemically.

paramorphine. Thebaine.

paramorphism. The physical change of a mineral from one modification to another, without a change of chemical composition; a rearrangement of molecular structure.

paramucic acid. $C_6H_{10}O_8$ = 210.1. An isomer of mucic acid.

paramucosin. $C_{12}H_{21}O_{10}N$ = 341.3. A substance from the salivary proteins.

paramyelin. $C_{35}H_{76}O_9NP$ = 720.7. A white, solid mass, isolated from brain and nerve substance.

paramylum. $C_6H_{10}O_5$ = 162.1. A carbohydrate isolated from certain protozoa.

paranaphthalene. An early name for anthracene.

paranephrine. Adrenalin.

paranitraniline. $NO_2.C_6H_4.NH_2$ = 138.2. Paranitroaniline. A yellow, crystalline powder, m.148.3, soluble in alcohol or ether. Used as a reagent for ammonia, uric acid, saccharin, lignin, and bile pigments and in the manufacture of dyes.

parapectic acid. $C_{24}H_{34}O_{23}$ = 690.3. An oxyacid developed from pectose during the ripening of fruits.

parapeptone. Syntonin.

paraplasm. (1) The more liquid portions of the protoplasm of a cell. (2) The non-living part of protoplasm.

Paraquay tea. Maté.

paraquinanisol. $C_{10}H_9ON$ = 159.1. A synthetic alkaloid used medicinally as an antipyretic.

paraquinoid. Quinoid.

parared. A red aniline dye obtained from p-nitraniline.

pararosaniline. $C_{19}H_{19}ON_3$ = 305.3. Triaminotriphenyl carbinol. $(NH_2C_6H_4)_3C.OH$. An organic base that forms brilliant red-colored salts with acids, and is used extensively as a dye. Colorless leaflets, m.188, insoluble in water, soluble in dilute acids, alcohol, or ether. **hexamethyl-** Methyl violet. **p. chloride.** Parafuchsin. **p. dyes.** A group of dyes derived from pararosolic acid; *e.g.*, pararosaniline, methyl violet, triphenylpararosaniline, etc.

pararosolic acid. Aurin.

parartrose. $C_{120}H_{192}O_{40}N_{30}S$. A proteose obtained by digestion of wheat.

parasite. Any organism that lives on and obtains its nourishment from another living animal or vegetable organism (cf. *saprophyte, epiphyte*); some cause disease. They may be grouped into *Phyto*parasites, or *vegetable* parasites, such as bacteria and fungi; and *Zoö*parasites or *animal* parasites, such as protozoa and metazoa (worms, etc.). Each of these is again divided into occasional, temporary, or obligate; and constant, stationary or facultative parasites.

parasiticide. An agent that destroys parasites, *e.g.*, sulfur, mercury, β-naphthol, kerosene.

parasitotropic. A compound that acts specifically on protozoa (see *organotropic*).

parasorbic acid. $C_6H_8O_2$ = 112.1. An acid obtained from the berries of the mountain ash, sorbus.

paratartarics. Racemic forms.

parathesin. Benzocaine.

parathyrin. The active principle of the parathyroid gland.

parathyroid. One of the small glands beside the thyroid gland. **p. gland.** The dried or desiccated exterior parathyroid gland of the ox, free from fat. A light yellow powder of peculiar odor, which is slightly soluble in water; used in medicine as a nervine.

paraxanthine. $C_7H_8O_2N_4$ = 180.2. *1.7*-Dimethylxanthine, urotheobromine, a leukomaine in urine. A colorless crystalline powder, soluble in water, used in medicine. It is an isomer of theobromine and theophylline. **amino-** Paraxine.

paraxine. $C_7H_{10}O_2N_5$ = 196.2. Dimethylamino-p-xanthine. White crystals, m.226, soluble in water, used medicinally as a diuretic.

paraxylene. See *xylene.*

parchment. A specially-prepared animal skin. **imitation-, vegetable-** P. paper.

p. paper. Vegetable parchment. A paper that has been treated with conc. sulfuric acid and is waterproof and grease resistant.

paregoric. A flavored camphorated tincture of opium, used for cough mixtures.

pareira. Perieira. The dried root of *Chondrodendron tomentosum,* a Menispermaceae of South America which contains the alkaloid bebeerine; used medicinally.

pareirine. Pereirine.

parenamine. A protein hydrolysis product used in aminoacid therapy.

parenchyma. The principal constituent of the thin cell-wall tissue of vegetable matter.

parent substance. A compound from which derivatives or substitution products can be obtained.

parhelium. A form of helium in which both electrons move in one orbit; it gives the principal spectral line, 20.528 Ångström units.

pariantite. An asphalt from the pitch lake in Trinidad.

paricine. $C_{16}H_{18}ON_2$ = 254.3. An amorphous alkaloid from cinchona bark.

paridin. $C_{16}H_{28}O_7$ = 332.3. A glucoside from *Paris quadrifolia,* a Liliaceae. Cf. *paristyphnin.*

parietic acid. Chrysophanic acid.

parietin. Physcion.

pariglin. Smilacin.

parilla. Sarsaparilla. **yellow-** Menispermum.

parillic acid. Parillin.

parillin. $C_{40}H_{70}O_{18}$ = 838.6. Parillic acid. A glucoside from the sarsaparilla root. Colorless needles or scales (cf. *smilacin*).

parinaric acid. $C_{18}H_{28}O_2$ = 276.22. An unsaturated acid from the kernel fat of *Parinarium laurinum,* a Rosaceae.

Paris black. Lamp black. **P. blue.** Ferric ferrocyanide. **P. green.** $Cu(C_2H_3O_3)_2.3Cu(AsO_2)_2$. Schweinfürter green, copper acetoarsenite. A green pigment used as an insecticide in spraying plants. **P. red.** (1) Colcothar. (2) Minium. **P. violet.** Methyl violet. **P. yellow.** Lead chromate.

parisite. A native fluoride and carbonate of the cerium metals; brownish-yellow hexagonal pyramids.

paristyphnin. $C_{38}H_{64}O_{18}$ = 808.6. A glucoside in the root of *Paris quadrifolia,* the one-berry, a common European herb. Cf. *paridin.*

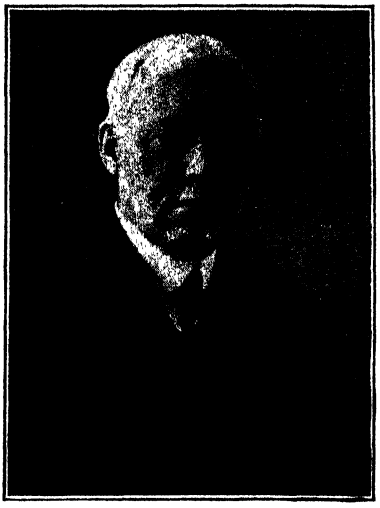
Parkes, Samuel. 1761–1825. An English technical chemist, noted for his writings and industrial methods. **P. process.** A method of refining argentiferous lead by liquation, followed by the addition of zinc to the molten mass, and skimming the surface crust which contains silver and zinc. The silver is recovered by distilling the zinc, and the lead purified by electrolysis.

parkine. An alkaloid from the seeds of *Parkia biglandalosa,* a Leguminosae of Africa (nitta tree).

Parma blue. A triphenylrosaniline dye. **p. violet.** Rosaniline violet.

paroxazine. *1.4.[2]*-Oxazine.

Parr, Samuel Wilson. 1857–1931. An American chemist noted for research in calorimetry and fuel technology. **P. apparatus.** A device for determining the total carbon in coal, coke, and other fuels by means of a calorimeter and gas burets.



Samuel Wilson Parr.

parsec. An astronomical unit of distance: the distance of a star whose annual parallax is 1 second of an arc. 1 parsec = 3.08×10^{13} km. = 19.2×10^{12} miles = 3.26 light years = 206,265 astronomical units (distance of earth to sun).

parsley. The umbelliferous plant *Carum (Apium) petroselinum* or *Petroselinum sativum.* It contains an essential oil and a camphor (apiol). Cf. *petroselinum.* **p. camphor.** Apiol. **p. fruit.** Parsely seeds. **p. leaves oil.** An essential oil from the leaves of p., d.0.900–0.925, greenish-yellow and of strong parsley odor; it contains apiol. **p. oil.** An oil distilled from parsley seeds. A colorless or pale-green liquid, d.1.07, insoluble in water, soluble in alcohol, ether, or chloroform; used in medicine, and contains apiol and pinene. **p. root.** Petroselini radix. The dried root of parsley; used medicinally as a fluid extract. **p. seeds.** Petroselinum. The seeds of parsley, used medicinally as a fluid extract, and contain apiol.

parthenicine. Parthenine.

parthenine. An alkaloid from *Chrysanthemum (Parthenium) hysterophorum,* a Compositae of the Gulf States and West Indies; used medicinally as an antipyretic.

parthenogenesis. Development of the egg without previous fertilization by a male agency. Cf. *agamy.*

partial. Fractional. A proportion of the whole. **p. pressure.** The fraction of the total pressure exerted by each constituent of a gas mixture. The sum of the partial pressures is equal to the total pressure; hence, the partial pressures are proportional to the concentrations of the individual gases in a mixture (see *Dalton's Law*). **p. valence.** An excess valence or fractional valence of a compound, responsible for the formation of addition compounds. Cf. *coordinate valence.*

particle. A small quantity of matter. **alpha-** Helium nucleus. **beta-** Electron. **colloidal-** See *colloids.* **gamma-** A misnomer for cathode rays. **nuclear-** See *subatomic p.* **subatomic-** Nuclear p. One of the "building stones" of matter, *i.e.,*

	Mass of $\frac{1}{1800}$ H	Mass of 1 H
Charge −1....	*electron (negatron)* e^- or −	*(neg. proton)*
Charge 0.....	*neutrino (photon)* ${}_0n^0$	*neutron* ${}_0n^1$
Charge +1....	*positron (oreston)* e^+ or +	*proton* p or ${}_1H^1$

Also the *deuteron (diplon)* of mass 2, and the *alpha-particle* of mass 4. Cf. *nuclear reactions.*

particle distribution. See *Perrin equation.*

parting. In assaying: the dissolution of silver from gold by means of nitric acid. **p. acids.** The nitric acids of various strengths used in the stages of the parting process.

partinium. An alloy of tungsten and aluminum.

partition. The distribution of a substance or ions between two immiscible liquids, or between a liquid and a gas. **p. coefficient.** Distribution coefficient, see *Perrin equation.* **p. law.** *Nernst's law.*

partridge berry. (1) Squaw vine. (2) Gaultheria.

Partz cell. A voltaic cell (2.06 volts), which consists of an anode of amalgamated zinc in a solution of magnesium sulfate, and a cathode of carbon in a solution of potassium dichromate.

parvoline. $C_9H_{13}N$ = 135.2. **alpha-** 2-ethyl-3.5-dimethylpyridine. A ptomaine from decaying fish or meat. An oily, amber-colored liquid, with the odor of hawthorn blossoms, b.188. **beta-** See *parvuline.*

parvuline. $C_9H_{13}N$ = 135.2. v-Tetramethylpyridine, β-parvoline. A homolog of pyridine, and an isomer of parvoline in coal tar. An amber-colored liquid, b.228.

Pascal, Blaise. 1623–1662. A French scientist and philosopher. **P.'s law.** The pressure applied to a liquid at any point is transmitted equally in all directions; the pressure in a liquid not subjected to external forces is equal at all points.

Paschen, F. A German physicist noted for his work on atomic structure. **P. galvanoscope.** A sensitive milli-amperemeter. **P. series.** The spectrum lines produced when electrons fall from an outer orbit to the third ring: $\frac{1}{\lambda} = N\left(\frac{1}{3^2} - \frac{1}{n_2{}^2}\right)$. Cf. *Balmer* and *Lyman series, energy levels, Bohr theory.*

pasque flower. Pulsatilla.

passiflora. Passion-flower.

Passiflorinae. An order of plants comprising the families: *Passifloraceae, Caricaceae, and Begoniaceae.*

passion-flower. Passiflora. The dried herb of *Passiflora incarnata,* a Passifloraceae of North America. Used medicinally as the fluid extract, as a sedative; the juice of its fruit is a beverage.

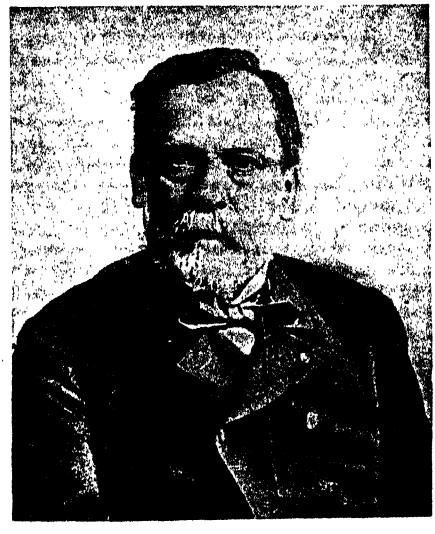
passive. Not active. **p. immunization.** The process by which the blood serum of an actively-immunized animal is injected into another animal, and protection against bacterial invasions conferred (immunization by an immune serum). **p. iron.** Iron or other metal rendered non-corrodible by treatment with heat or strong acids, *e.g.,* conc. nitric acid. This property is sometimes lost by mechanical shock. **p. state.** Passivity.

passivity. An inertness exhibited by substances under conditions in which chemical activity is to be expected; *e.g.,* certain metals will not dissolve in acids of high concentration while in the dilute acids they dissolve rapidly. The explanation is the formation of a thin layer either (a) of peroxide, (b) of oxygen, or (c) of salt, which prevents direct contact of acid and metal. Mechanical shock destroys this layer. Cf. *zone.*

paste. (1) A tenacious substance for cementing; or any viscid glue used for fastening paper on paper, boards, wood, metal, or glass. (2) A pharmaceutical preparation containing various antiseptics for external use. (3) A preparation containing poisons for exterminating vermin and rats. (4) A mixture of clay and water for making stoneware and porcelain. (5) The matrix or mineral substances in which other minerals are embedded. **dextrin-** Mix. 8 pds. of dextrin in 1 gallon cold water and let stand for 24 hours. Dissolve separately in warm water 2 oz. alum, 6 oz. glucose, 6 oz. glycerin, and add to dextrin; add ½ oz. formaldehyde and dilute the mixture to 2 gallons. **London-** A mixture of equal parts sodium hydroxide and slaked lime, moistened with alcohol. **phosphorus-** A rat poison made of phosphorus and flour. **Vienna-** A mixture of sodium hydroxide and slaked lime, moistened with water.

p. blue. Prussian blue. **p. board.** Cardboard formed by pasting fairly high-grade outer layers of paper (a pasting) on to a lower-grade middle layer or layers. It differs from an ordinary board, which is formed directly in layers on a board machine without an adhesive.

Pasteur, Louis. 1822–1895. A French chemist noted for his research on stereochemistry, fermentation and bacteria. He established



Louis Pasteur.

the connection between bacterial growth and disease, and laid the foundation of immunology. **P. filter.** See *filter.* **P. flask.** A glass flask with a neck nearly 6 times as long as the diameter of the flask. At a third of its length the neck is constricted and bent downwards (about 25°); the neck is then expanded again

for some distance, then again constricted. The end bends upward. On the opposite side from the bent neck there is a tubular outlet. It is used for bacterial cultures.

pasteuring. Pasteurizing.

pasteurization. A partial sterilization of organic fluids by heating at 65°C. for not less than thirty minutes. Cf. *Stassanization.* **flash-** Continuous p. by passing the liquid through a coil surrounded by live steam.

pasteurized milk. A milk that has been partly sterilized by heating at not less than 145°F. (63°C.) and not more than 150°F. (66°C.) for at least 30 minutes, and then immediately cooled to a temperature of not more than 55°F. (13°C.).

pasteurizer. A machine used for the process of pasteurization.

pasteurizing. The process of preserving organic fluids by the destruction of the contained ferments and fungi by heating at 60°–70°C.

pastil, pastille. A lozenge, a sugared confection, or an aromatic mass burnt as incense or fumigant.

pasting. See *pasteboard.*

patchoulene. $C_{16}H_{24}$ = 204.19. A sesquiterpene, d.0.930, b.256, from patchouli oil.

patchouli. Patchouly. The herb, *Pogostemon patchouli*, a Labiatae of India, used in perfumery; it has a very persistent odor. **p. oil.** An essential oil from the leaves of patchouli. A yellow liquid of aromatic odor, d.0.970, insoluble in water, soluble in alcohol or ether, containing cadinene, eugenol, cinnamic aldehyde, and other terpenes; used in perfumery.

patchoulin. $C_{15}H_{26}O$ = 222.2. A terpene from patchouli oil. Colorless crystals, m.59, b.296.

patchouly. Patchouli.

patent. (1) A grant conveying public lands from the Government, *e.g.*, for mining purposes. (2) Letters of patent. Any process, method, or device that has been accepted as new by the Patent Office and is, thereby, protected under the patent laws for a number of years. (3) Evident, not hidden. **provisional-** An official application for a patent, which gives temporary protection until the final patent is granted at a relatively small cost. **p. blue.** A phenylated rosaniline disulfonic acid, used as a redox indicator. **p. yellow.** $PbO.PbCl_2$. Mineral yellow. A yellow pigment, which consists of lead oxide and lead chloride.

Patera process. A method of producing silver from its ores by chloridizing, roasting and leaching with water and then with sodium hyposulfite which dissolves the silver; precipitation with sodium sulfide; and finally by heating the silver sulfide.

path. (1) Orbit. (2) The course or track along which electrons, ions, or molecules move. The fog-condensation method of C. T. R. Wilson enables the trails of α-particles, electrons from β-rays and cathode rays, and the ionization caused by the passage of x-rays to be recorded photographically. **free-** The average distance between collisions in the travel of a molecule in a gas or liquid.

pathochemistry. Chemical pathology. That branch of biochemistry which deals with the chemical changes of the living organism in a diseased condition.

pathogen. Any microorganism, bacterium, or protozoon that produces disease.

pathogenic. Describing an agent that produces disease.

pathologic. Pertaining to a diseased condition. **p. reaction.** A chemical test used in the diagnosis of disease.

pathology. A branch of medicine that deals with the nature of disease, especially with the functional (physiological) and structural (morphological) changes produced by disease. **experimental-** The study of artificially-produced disease in the animal organism. **phyto-** The study of plant diseases.

patina. The thin and often multicolored coat of oxides formed on metallic surfaces.

patronite. A native vanadium sulfide, V_2S_3.

pattern. (1) A design or arrangement of symbols or figures. (2) A model from which a cast is made. **crystal-** A space-lattice of crystal structure, q.v. **Laue-** See *Laue diagram.*

Pattinson process. A method of partly separating silver from lead, by fractional crystallization of the argentiferous lead and removal of the separated, molten, silver-free lead crystals. This method has been superseded by the Parkes process, q.v.

patulin. An antibiotic substance produced in cultures of several different fungi; it is identical with clavacin, clavatin, and claviformin.

paucine. $C_{27}H_{38}O_5N_5$ = 512.3. An alkaloid from the seeds of *Pentaclethra macrophylla*, a Leguminosae of Africa. Yellow scales, m.126, insoluble in ether or chloroform.

pauco nuts. Graine d'owala. The fruits of *Pentaclethra macrophylla*, an African Leguminosae, which contains the alkaloid paucine.

Pauli's principle. Exclusion principle. A theory which limits the number of electrons in a shell or orbit: No two electrons can have, simultaneously, all four quantum numbers the same. For the first two shells the values for the possible two and eight electrons are:

	K shell		L shell							
n	1	1	2	2	2	2	2	2	2	2
l	0	0	0	0	1	1	1	1	1	1
m_l	0	0	0	0	−1	−1	0	0	1	1
m_s	$-\frac{1}{2}$	$+\frac{1}{2}$	$-\frac{1}{2}$	$+\frac{1}{2}$	$-\frac{1}{2}$	$+\frac{1}{2}$	$-\frac{1}{2}$	$+\frac{1}{2}$	$-\frac{1}{2}$	$+\frac{1}{2}$

where:

n = principal quantum number (*energy level*).
l = azimutal quantum number (*translation*).
m_l = magnetic quantum number
m_s = equatorial quantum number (*spinning*).

Cf. *correspondence principle.* **P. rule.** The atomic nucleus has alternately odd and even numbers of alpha particles; hence the following transformation takes place by adding or subtracting:

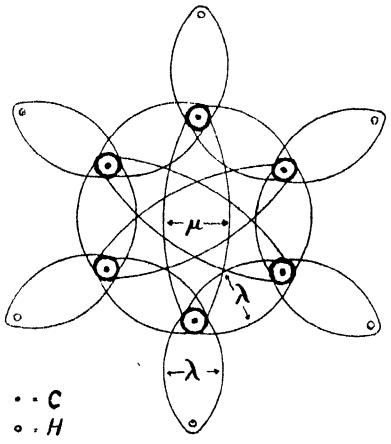
$$B^{11} \rightarrow C^{14} \text{ or } Be^{10}$$
$$B^{10} \rightarrow C^{13} \text{ or } Be^{9}$$

and the range of values is defined by

$$l = 0, \ldots, (n-1)$$
$$m_l = -l, -l-1, \ldots 0, \ldots l-1, l.$$
$$m_s = -\tfrac{1}{2} \text{ and } +\tfrac{1}{2}$$

where l is usually one unit lower than k of the old quantum theory.

Pauling, Linus C. 1901– . An American chemist noted for work on molecular and atomic structure. **P. structure.** A model of the benzene molecule based on an electronic conception of the inter-atomic bonds. Each bond results from two electrons moving in



Pauling structure of benzene.

orbits around the two nuclei of the atoms they join. In the figure each curve represents the orbits of two electrons; the smaller orbits are called λ orbits, the larger μ orbits.

paullinio tannin. $C_{38}H_{36}O_{20}$ = 800.2. Guaranatannin. White crystals from the seeds of *Paullinia cupana*, a Sapindaceae of Brazil, the seeds are used similarly to cacao.

pavemal. The phenylethylbarbiturate of papaverine; used as a hypnotic.

pavine. $C_{20}H_{23}O_4N$ = 341.2. *2.4*-dihydropapaverine. White needles m.201, soluble in chloroform, sparingly soluble in ether.

Pavy's solution. A modified Fehling's solution consisting of: (A) 4.158 gm. $CuSO_4$ in 500 cc. water, and (B) 20.4 gm. sodium potassium tartrate, 20.4 gm. KOH, 300 cc. strong NH_4OH, and water to make 500 cc. Mix in equal parts. Used for determining sugars, a solution of which is titrated into the boiling Pavy solution till the blue color vanishes. Cuprous oxide is not precipitated as with ordinary Fehling's solution, q.v.

pawpaw. The seeds of the edible fruit of *Asimina triloba*, an Anonaceae of the eastern United States; used as an emetic; cf. *papaw*.

pay ore. An ore, rock, earth, or gravel that can be worked with profit.

Payen, Anselme. 1795–1871. A French chemist noted for industrial processes (decolorizing with charcoal) and writings (*Course de Chimie*).

Payne's process. Paynization. A method of making wood fire-proof by successive treatments with ferrous sulfate and calcium chloride baths.

paynize. To treat wood according to Payne's process.

payta. Krameria.

paytine. $C_{21}H_{24}ON_2$ = 320.2. An alkaloid, m.156, from cinchona bark.

Pb. The symbol for lead.

Pd. The symbol for palladium.

pe- A syllable in the names of chemical compounds which indicates a higher degree of saturation or of hydrogenation; as, collidine and co*pe*llidine, pyridine and p*ip*eridine.

peach. The fruit of *Prunus persica*, a Rosaceae, used as food. **p. aldehyde.** γ-Undecalactone. **p. bark.** The bark of p., used as a sedative. **p. kernel oil.** The expressed oil of peach kernels. A yellow liquid, d.0.915, m.−15 saponification value 189–192, iodine value 93.5, insoluble in water, soluble in alcohol, ether, or chloroform. Used as an adulterant for almond oil, and for flavoring. **p. leaves.** The dried leaves of the p. tree, used as a diuretic and stimulant.

peacock copper. Bornite.

peanut. The edible seeds of *Arachis hypogaea*, a leguminous plant of the temperate zones. **p. hull meal.** Ground p. shells used as fertilizer, 1.5–2.5 % nitrogen. **p. oil.** Arachis oil, ground-nut oil, earth-nut oil, oil of katchung. A yellow oil expressed from peanuts, d.0.916, saponification value 188–196, iodine value 103–104, insoluble in water, soluble in alcohol, ether, chloroform or benzene. Used as a substitute and adulterant of olive oil, and in the poorer grades of soap. Cf. *Bellier's test*, *hypogaeic acid*. **p. ore.** Wolframite.

pear oil. An alcoholic solution of amyl acetate, used in flavoring.

pearl. A calcareous secretion from various species of mollusks, chiefly the oyster. **artificial-** (1) Culture p. (2) Synthetic p. **culture-** A natural pearl produced by artificial stimulation of the oyster; as, the insertion of a small grain of sand, watermite or worm. **imitation-** An imitation of natural pearls that does not aim to produce the natural structure and composition, but only the outside appearance; as, alabaster coated with p. essence. **synthetic-** A pearl that has been made synthetically by slow precipitation from a gelatinous or albuminous solution of certain salts.

p. alum. A specially prepared aluminum sulfate for paper manufacture. **p. ash.** An impure calcined potassium carbonate. **p. essence.** A product obtained from fish scales, *e.g.*, of European minnow or herring, used to obtain a highly lustrous coating; as, on imitation pearls. **p. hardening.** Gypsum used as a paper "filler." **p. mica.** Margarite. **p. opal.** An opaque, bluish-white, lustrous variety of opal. **p. powder.** A form of bismuth oxychloride, used as a cosmetic. **p. sinter.** A modification of silica. **p. spar.** Brown spar. A dolomite with pearly luster. **p. stone.** Perlite. **p. white.** (1) Lithopone. (2) Calcium sulfate for use in the paper industry. (3) A form of bismuth subnitrate, $Bi(OH)_2.NO_3$, used medicinally, and formerly as a cosmetic.

pearlite. Perlite.

pearly. Pearl like; having the appearance or luster of pearls.

peastone. Oolite.

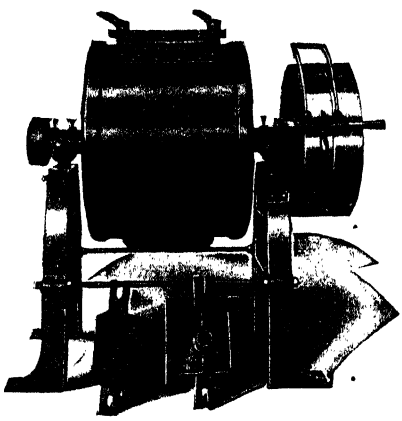
peat. A dark, brown, amorphous soil produced by the decomposition of plants in moist places, especially in swamps. It consists of carbon, hydrogen, and oxygen; used as fuel, and medicinally as a mud-bath, also as fertilizer. Partly dried peat contains:

Water	25 %
Ash	3 %
Woody fiber	50 %
Humus acids	22 %
Nitrogen	1.5-2.5 %

Cf. *dopplerite, ulmic acid, ulmin.* **p. coal.** A substance intermediate between peat and lignite; soft coal. **p. coke.** A carbonized peat, or peat charcoal produced by destructive distillation. **p. gas.** A hydrocarbon gas obtained by distillation of peat. **p. tar.** A tar obtained during the distillation of peat. **p. wax.** Mona wax. A black wax extracted by benzol or alcohol from peat; used as a substitute for montan wax in polishes.

pebble. A very small stone, worn round by the action of water. **Brazilian-** A rock-crystal or quartz, from which lenses are sometimes cut.

p. mill. A power-driven steel cylinder with a lining of porcelain, burr stone, iron or steel, and



Pebble mill.

filled a little less than half full with flint pebbles, porcelain or metal balls for pulverizing or mixing materials. Cf. *ball mill, mixer, agate mill.* **p. powder.** A gunpowder (see illustration) pressed into large cubical grains.

PeCe. A German trade name for the substance corresponding with nylon.

peck. Pk. A dry measure or unit of capacity in the British and United States systems: 1 peck = 0.25 bushel = 2 gallons.

pectase. A nitrogeneous ferment, occurring with pectose in fruits, that converts pectin into pectic acid; used to clarify fruit juices.

pectate. A salt of pectic acid.

pectenine. An alkaloid from the cactus, *Cereus poespitosus* or *Cereus pecten*, of Mexico. It is a tetanic poison.

pectic acid. $C_{17}H_{24}O_{16}$ = 484.2. A dibasic acid obtained from ripe fruits and vegetables. It forms a jelly with calcium salts, and the setting of jams and fruit preserves depends on this property. Pectic acid is formed from pectins by various enzymes, or by long boiling with dilute alkali. **para-** See *parapectic acid.*

pectinase. An enzyme that coagulates pectins by converting them to pectic acid.

pectinol. A commercial brand of pectase.

pectinose. Arabinose.

pectins. A group of compounds, formed from the protopectin of unripe fruits; its function in ripe fruits is for the cementation of individual cells. On hydrolysis it forms pectic acid in overripe fruits, which, in turn, gives the fruit juices the property of jelling.

pectization. Gelatinization or jellification.

pectize. To gelatinize.

pectocellulose. A substance from raw flax, which yields pectic acid and cellulose.

pectograph. The pattern obtained by the drying of colloidal solutions in a film on a glass plate.

pectography. The study of pectographs.

pectolinarigenin. $C_{13}H_{14}O_6$ = 314.1. *5.7*-dihydroxy-6.4'-dimethoxyflavone. Yellow needles, m.215, slightly soluble in alcohol. Cf. *pectolinarin.*

pectolinarin. $C_{28}H_{34}O_{15}$ = 622.3. A glucoside from the flowers of *Linaria vulgaris*, Linn., m.240 (decomp.), hydrolysed by acid to glucose, rhamnose and pectolinarigenin.

pectolite. $4CaO.Na_2O.6SiO_2$, H_2O. Ratholite. A hydrated acid silicate of calcium and sodium.

pectolysis. The clearing of fruit juices by the decomposition of pectin by pectase.

pectosase. An enzyme which separates the middle lamella of plants from the cell walls; cf. *pectase.*

pectose. A polysaccharide; the pulp of unripe fruits and vegetables, from which pectins are derived on ripening.

pectosinic acid. $C_{32}H_{52}O_{31}$ = 903.2. An amorphous acid substance derived from pectose by treatment with alkalis. It forms jelly-like amorphous salts, soluble in dilute acids.

pedesis. Brownian movement.

pedology. The science of the soil.

peganine. Vasicine.

peganite. Variscite.

Peganum harmala. The commonest weed of the Russian and Siberian steppes. Its seeds contain the two alkaloids, harmaline and harmine, which are used in the Orient in the preparation of a red dye, turkey-red.

pegmatite. Giant granite. An igneous rock which consists of coarse-grained mixtures of quartz, feldspar, muscovite, tourmaline, biotite, and other minerals. Some pegmatites contain lithia minerals, rare earth, tin, tungsten, tantalum, or uranium minerals, and are used as a source of these.

pegnin. A mixture of milk sugar and rennet; used medicinally in stomachic disturbances.

pegu catechu. Catechu.

pelagic. Pertaining to the deep sea; as, a pelagic deposit formed far from land at the bottom of the ocean. (Opposed to littoral.)

pelagite. The mineral, $xMnO_2,yFe_2O_3.2H_2O$.

pelargonaldehyde. $C_9H_{18}O$ = 142.1. Nonanal*, n-nonylicaldehyde, $C_8H_{17}CHO$, in citron oil; used in synthetic perfumes.

pelargone. *9*-Heptadecanone*.

pelargonic acid. $C_9H_{18}O_2$ = 158.2. Nonanoic acid*, n-nonoic acid, nondecylic acid, octane carboxylic acid, n-nonylic acid, $C_8H_{17}COOH$. An oxidation-product of oleic acid, and a constituent of oil of *Pelargonium roseum.* Colorless leaflets, d.0.91, m.12, b.253, soluble in water, alcohol or other; used as a flavoring.

pelargonidin. $C_{15}H_{10}O_5.HCl$ = 306.53. An anthocyanidin (q.v.) from the flowers of *Pelargonium* species (Geraniaceae.)

pelargonin. Pelargonidin glucoside. An anthocyan from dahlia, geranium and other flowers. **p. chloride.** $C_{27}H_{31}O_{15}Cl.4H_2O$ = 702.7. A pigment closely allied to that from scarlet pelargonium.

pelargononitrile. Nonane nitrile*.

pelargonyl. Nonanoyl*. The radical $C_8H_{17}CO$—, from pelargonic acid. **p. chloride.** Nonanoyl chloride*.

pelidisi. The ratio: $10W/cm.^2$, where W is the weight in grams and cm. the sitting height of a person. It is used in the calculation of normal diets.

Péligot, Eugène Melchior. 1811–1872. A French chemist noted for work on alcohols, sugars, uranium and chromium. **P. blue.** A hydrated copper oxide, used as a pigment. **P. salt.** Probably the potassium salt of the unknown chlorochromic acid, $K(CrO_3Cl)$, obtained by heating potassium dichromate with conc. hydrochloric acid. **P. tube.** A calcium chloride tube or U-tube with three bulbs, one in each arm, and one in the bend.

pelitic. Applied to rocks such as are, or were originally, composed essentially of clay (*e.g.*, slate).

pellagra. Lesions of the mucous membrane resulting from a deficiency of certain vitamins (q.v.).

Pelletan, Pierre. 1782–1845. A French chemist noted for his *Dictionnaire de Chimie* (1821–1824).

Pelletier, Pierre Joseph. 1788–1842. A French pharmacist who discovered toluene and several alkaloids (with Caventou). Cf. *Peltier.*

pelletierine. $C_8H_{15}ON$ = 141.1. Punicine. A pyrrolidine alkaloid obtained from the root bark of pomegranate, *Punica granatum.* A brown, oily liquid, insoluble in water, soluble in alcohol or ether; used as anthelmintic. **iso-** An alkaloid which occurs with pelletierine in the root bark of pomegranate. **pseudo-** $C_9H_{15}ON$ = 153.2. Yellow crystals, soluble in water or alcohol.

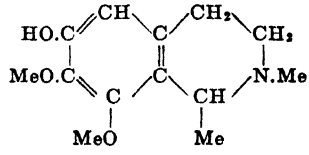
p. hydrochloride. A brown syrup, soluble in water; used medicinally. **p. sulfate.** A brown syrupy liquid, soluble in water or alcohol; used as a teniacide. **p. tannate.** A yellow-brown mass, slightly soluble in water; used as an anthelmintic.

pellicle. (1) A scum or thin skin; as, on the surface of a bacterial growth or the cortical layer of plants. (2) The crust which forms over the surface of a saturated solution during evaporation.

pellitory root. Pyrethrum.

pellote. (Mex. peyotl.) Mescal buttons.

pellotine. $C_{13}H_{19}O_3N$ = 237.2. An alkaloid from pellote, the dried cactus ***Anhalonium williamsi*** of Mexico. Colorless crystals, m.110, slightly soluble in water; used medicinally as a hypnotic.



Cf. *mescaline.* **p. hydrochloride.** $C_{11}H_{15}ON(OMe)_3.HCl$ = 273.6. The hydrochloride of pellotine. Colorless crystals, soluble in water; used as a hypnotic.

pelopium. A supposed element, isolated by Rose in 1846 from tantalite, and probably impure niobium.

peloponium. Columbium.

pelosine. Bebeerine.

pelotherapy. Treatment by the external application of natural products; as, mud, peat, etc.

Peltier, Jean Charles Athanase. 1785–1845. A French watch-maker and experimenter. **P. effect.** If a current is sent through a circuit containing a thermocouple, heat is given out at one junction, and absorbed at the other junction. Thus it is the reverse of the thermo-electric current (cf. *Kelvin-* and *Joule-effect*). **coefficient of-** The ratio of the quantity of heat applied to the quantity of electricity obtained from a thermocouple. (Cf. *Pelletier*).

pemphigus alcohol. $C_{34}H_{70}O_2$ = 510.5. A solid, m.100–105, from the wax of the insect, *Pemphigus xylostei.*

pemphygic acid. $C_{34}H_{68}O_3$ = 524.5. An oxyacid, $C_{33}H_{66}(OH)COOH$, m.101, from the wax of the insect, *Pemphigus xylostei.*

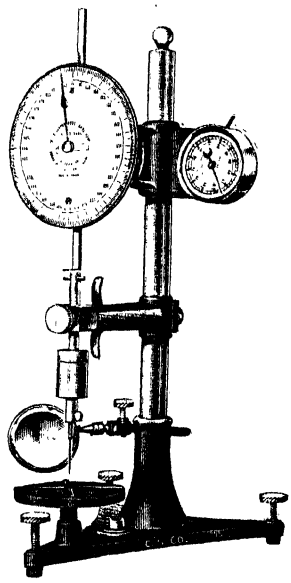
penatin. Notatin.

pencil. (1) A roll or stick that contains some substance in its center; as, a litmus p., vaseline p., wax p., or menthol p. (2) An aggregation of rays of light meeting in a point.

pencilstone. Pyrophyllite.

pendulum. A suspended disk or weight that moves to and fro, at a rate depending on fixed laws; used as a measure of time.

penetration. (1) The act of entering or piercing. (2) The distance in 0.1 mm., that a standard needle enters into a solid, like wax, paraffin etc. (3) The consistency of a material expressed as the distance that a standard needle passes vertically into a material under conditions of loading (100 gm.), time (5 sec.) and temperature (25°C.). (4) The focal distance or depth of a lens. (5) The passage of radiations through materials; as, x-rays.



Penetrometer.

penetrometer. (1) A device for measuring the hardness of a substance from the depth of penetration of a standard needle into the material to be tested, under a given load at definite temperature and in a certain time (see figure). (2) A device for measuring the penetrating powers of x-rays.

penicidin. An antibiotic substance isolated from a species of *Penicillium.*

penicillamine. $C_5H_{11}O_4N.HCl$ (?). An optically-inactive degradation-product of penicillin.

penicillic acid. $C_6H_{10}O_4$ = 170.1. The γ-keto-β-methoxy-δ-methylene-Δ-α-hexenoic acid, an antibacterial substance isolated from *Penicillium puberulum.*

penicillin. The active principle of the mold *Penicillium notatum.* It has a selective bacteriostatic effect on certain Gram + bacteria in high dilutions. **p.-B.** Notatin.

penicillinase. A substance, believed to be an enzyme, that destroys the growth-inhibiting property of penicillin.

penicilliopsin. $C_{30}H_{24}O_8$ = 512.2. Mycoporphyrin. A pigment obtained in orange needles, m.330, from the mycelia of molds.

Penicillium. A genus of Ascomycetes, fungi of the mildew group. **p. glaucum.** Blue mould. The common mould (*e.g.*, of bread). It excites alcoholic fermentation, and is used to effect a separation of d- and l-tartrates from racemic mixtures, since the d-isomer is acted on faster than the l-.

penillic acid. A dextrorotatory substance having a pale bluish fluorescence, obtained by keeping penicillin in aqueous solution at pH 2.

pennine. Penninite.

penninite. Pennine. A green crystalline chlorite from the Pennines.

pennone. $C_9H_{18}O$ = 142.1. Tetramethyl pentanone. $CMe_3.CMe_2.CO.Me$. Colorless crystals, m.63, b.167.

pennyroyal. A popular name for: (1) *Hedeoma pulegoides* of North America; (2) *Mentha pulegium* of Europe. **p. oil. American-** The essential oil of *Hedeoma* species (Labiatae), d.0.920–0.935, containing pulegone and hedeomol. **European-** The essential oil of *Mentha pulegium*, d.0.930–0.960.

pennyweight. (dwt.). A unit of weight in the English system, 1 pennyweight = 24 grains = 0.05 troy ounce = 1.5552 grams. 1 pennyweight of 24 k. gold normally has a value of $1.0335 or 4.25 shillings (4^s 3^d).

Pensky-Martens apparatus. An instrument for determining flash-points.

pent(a)- A prefix derived from the Greek, indicating five.

penta-amino- A prefix indicating the presence of five amino groups in an organic compound. See *pentamino-*.

penta-atomic. Pentatomic.

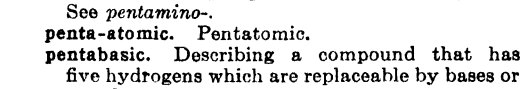
pentabasic. Describing a compound that has five hydrogens which are replaceable by bases or metals.

pentabromo- Describing a compound that has five bromine atoms in its molecule. **p. benzene.** C_6HBr_5 = 472.6. Colorless needles, m.159; insoluble in water, soluble in alcohol or ether.

pentaborane. B_5H_9 or B_5H_{11}. Cf. *boron hydrides*.

pentacarboxylic. Describing a compound that has five carboxyl groups in its molecule; as, propinyl pentacarboxylic acid, $C_3H_3(COOH)_5$.

pentacene. $C_{22}H_{14}$ = 278.11. Benzo-[β]-naphthacene, β-*i*-dibenzoanthracene. The hydrocarbon



pentacetate. A mixture of amyl alcohol and amyl acetate (80 %), b.128–148.

pentachloro. Indicating a compound that has five chlorine atoms in its molecule. **p. aniline.** $C_6Cl_5NH_2$ = 265.33. Colorless needles, m.232; soluble in alcohol or ether. **p. benzene.** C_6HCl_5 = 250.3. Colorless needles, d.0.769, m.85, b.275; insoluble in water, soluble in ether or alcohol. **p. ethane.** CCl_3CHCl_2 = 202.3. A colorless liquid, d.1.834, m.−22, b.161, insoluble in water, soluble in alcohol or ether; used as a solvent.

pentacosane. $C_{25}H_{52}$ = 352.4. A hydrocarbon from beeswax, m.54, insoluble in water.

pentacosamic acid. Cerebronic acid.

pentacyclic. Describing a molecule possessing five atomic rings, or a ring of five atoms.

pentad. Any element or radical having a valency of five.

pentadecane*. $C_{15}H_{32}$ = 212.3. Normal pentadecane. A saturated aliphatic hydrocarbon. A colorless liquid, d.0.769, m.10, b.270; insoluble in water, soluble in alcohol or ether. It occurs in the oil from the rhizomes of *Kampheria galanga*. **p. carboxylic acid.** Palmitic acid.

pentadecanoic acid. $C_{15}H_{30}O_2$ = 242.23. Isocetic acid, n-pentadecoic acid, n-pentadecylic acid, $C_{14}H_{29}COOH$. A colorless solid, m.54, $d._{100mm}$ 257, occurring in agaricus.

pentadecanol*. $C_{15}H_{31}OH$ = 228.25. Pentadecyl alcohol. Colorless crystals, m.44.

pentadecanone*. $C_{15}H_{30}O$ = 226.23. A group of ketones, as: **2-** or methyl tridecyl ketone. **3-** or ethyl dodecyl ketone. **8-** Diheptyl ketone, caprylone, $[Me(CH_2)_6]_2CO$. Colorless crystals, m.40, b.178, soluble in alcohol.

pentadecyl. The monovalent $C_{15}H_{31}$— radical derived from pentadecane. **p. alcohol.** Pentadecanone.

pentadiene*. C_5H_8 = 68.06. **1.2-** Ethylallene, $CH_2:C:CH.CH_2.CH_3$. Colorless liquid, b.45. **1.3-** α-methyl bivinyl, piperylene, $CH_3:CH.CH:CH.CH_3$. Colorless liquid, d.0.696, b.43. **1.4-** $(CH_2:CH)_2CH_2$. Colorless liquid, d.0.6594, b.26. Cf. *pentinene*. **p. carboxylic acid.** Sorbic acid.

pentadienone. C_5H_6O = 82.05. Divinyl ketone, $(CH_2:CH)_2CO$. **diphenyl-** Styryl ketone.

pentadigalloyl-glucose. $C_{76}H_{52}O_{46}$ = 1700.4. A tannin from Chinese nut galls. α- Light brown mass, soluble in water; β- less soluble in water.

pentadiine. C_5H_4 = 64.03. The diacetylene, $HC:C.CH_2.C:CH$.

pentaerythrite. $C(CH_2OH)_4$ = 136.12. A liquid, m. below −18, b.160.5.

pentaerythritol. $C_5H_{12}O_4$ = 136.12. An isomer of pentaerythrite; a colorless solid, m.253.

pentaethylbenzene. $C_{16}H_{26}$ = 218.2. C_6HEt_5. A colorless liquid, d.0.89, m.−20, b.277, insoluble in water.

pentagalloyl glucose. $C_{41}H_{32}O_{26}$ = 940.2. A tannin occurring as a yellow mass, soluble in water.

pentaglucose. Pentose.

pentaglycol. $Me_2C.(CH_2OH)_2$ = 104.12. A solid, m.129, b.206, soluble in water.

pentahydro- A prefix indicating the presence of five hydrogen atoms, or five additional hydrogen atoms; as, pentahydropyrane.

pentahydroxy- A prefix indicating the presence of five hydroxy groups. **p. benzene.** $C_6H_6O_5$ = 158.0. The aromatic penta-atomic phenol, $C_6H(OH)_5$. **p. pentane.** $C_5H_7(OH)_5$ = 152.12. A liquid, b.102.

pentaiodo- A prefix indicating the presence of five iodine atoms in the molecule; as, pentaiodobenzene, C_6HI_5.

pental. C_5H_{10} = 70.1. Trimethylethylene, β-isoamylene, the unsaturated hydrocarbon, $Me_2C{=}CHMe$. A colorless liquid, d.0.678, b.38, insoluble in water, soluble in alcohol, ether or chloroform. Used medicinally as a hypnotic and anesthetic; and in the manufacture of tert. amyl alcohol.

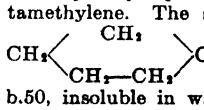
pentaline. Pentachloroethane.

pentamethyl- A prefix indicating the presence of five methyl groups in molecule. **p. benzene.** $C_{11}H_{16}$ = 148.0. The aromatic hydrocarbon,

C_6HMe_5. Colorless crystals, m.56, b.230; insoluble in water. **p. benzoic acid.** Me_5C_6COOH = 192.2. Colorless needles, m.210; soluble in water, alcohol, or ether. **p. phenol.** Me_5C_6OH = 164.1. Colorless needles, m.125, b.267; insoluble in water, soluble in alcohol.

pentamethylen- A prefix indicating the presence of five methylene groups in a molecule.

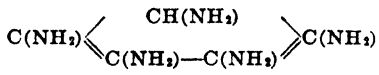
pentamethylene. (1) The bivalent radical; $-CH_2(CH_2)_3CH_2-$. (2) C_5H_{10} = 70.1. Tetrahydrocyclopenten, cyclopentane, cyclopentamethylene. The saturated ring compound,



A colorless liquid, b.50, insoluble in water, soluble in alcohol or ether. It is a constituent of Russian and Caucasian petroleums. **hydroxy-** Cyclopentanol*. **keto-** Cyclopentanol*.

p. amine. Piperidine. **p. bromide.** *1.5*-Dibromopentane. **p. diamine.** Cadaverine. **p. oxide.** Tetrahydropyran.

pentamino- A prefix indicating the presence of five amino groups in the molecule. **p. benzene.** $C_6H(NH_2)_5$ = 153.1. Colorless needles, soluble in water, insoluble in alcohol or ether. **p. pentol.** $C_5H_{11}N_5$ = 141.1. Pentamino-cyclopentadien.



pentamul. Trade name for a group of emulsifiers.

pentane*. C_5H_{12} = 72.12. Amylhydride. A saturated hydrocarbon of the methane series. A colorless liquid, d.0.634, b.36.2, insoluble in water, soluble in alcohol or ether. Used as an anesthetic, in refrigeration, and for filling thermometers. **iso-** Secondary-. Dimethyl ethyl methane, *1.1.2*-trimethyl ethane, Me_2CHCH_2Me. A colorless liquid, b.30, d.-0.622. **normal-** Pentane. **secondary-** Iso-. **tertiary-** CMe_4, tetramethylmethane. A colorless liquid or gas, b.10, a constituent of coal oil and gas. **amino-** Amylamine. **bromo-*** Amyl bromide. **chloro-*** Amyl chloride. **ethoxy-*** Amyl ethyl ether. **iodo-*** Amyl iodide. **methoxy-*** Amyl methyl ether. **tetrahydro-** Cyclopentane.

p. carboxylic acid. Caproic acid. **p.-diamine, 1.5-** Cadaverine. **p. dicarboxylic acid*.** Pimelic acid. **p. dioic acid*.** Glutaric acid. **p. dioic acid.** Glutaric acid. **p. dione*.** Acetylacetone. **p. lamp.** A source of illumination in photometric work. Cf. *Harcourt lamp*. **p. thermometer.** A capillary filled with colored pentane, used as a thermometer for low temperatures.

pentanediol*. $C_5H_{12}O_2$ = 104.09. **1.2-** α-n-Amylene glycol, $Me(CH_2)_2CHOH.CH_2OH$. Colorless liquid, d.0.980, b.212. **1.4-** γ-Pentyleneglycol, $MeCHOH(CH_2)_2CH_2OH$. Colorless liquid, d.0.9954, $b._{20mm}$131. **1.5-** Pentamethylene glycol. $CH_2OH(CH_2)_3CH_2OH$. An oily liquid, d.0.994, b.239. **2.3-** Methyl ethylethylene glycol, β-n-amylene glycol, $MeCH_2-(CHOH)_2Me$. Colorless liquid, d.0.9945, b.187.

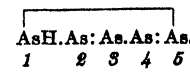
pentanethiol*. $C_5H_{12}S$ = 104.15. Amylmercaptan, $Me(CH_2)_4SH$. A colorless liquid, d.0.857, m.−76, b.126, insoluble in water.

pentanoic acid*. Valeric acid. **γ-keto-** Levulinic acid.

pentanol*. Amyl alcohol

pentanone*. A ketone derived from pentane; as: 2-pentanone (*methyl propyl ketone*), 3-pentanone (*diethylketone*). **phenyl-** Butylphenylketone. **tetramethyl-** Pennone.

pentarsenole. As_5H = 375.9.



pentase. An enzyme that ferments pentoses.

pentasol. A mixture of amyl alcohols, b.116–136.

pentasulfide. A compound containing five atoms of sulfur in the molecule, as, K_2S_5 or Et_2S_5.

pentatomic. Describing: (1) A molecule that consists of five atoms. (2) A ring compound that has five atoms in the ring; as, cyclopentane. (3) An acid that has five replaceable hydrogen atoms. (4) A base, alcohol, or phenol that has five hydroxyl groups.

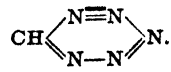
pentatriacontane*. $C_{35}H_{72}$ = 492.56. The hydrocarbon $Me(CH_2)_{33}Me$. White crystals, d.-0.782, m.75, $b._{15mm}$331.

pentavalent. An atom or group of atoms that has a valency of five.

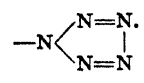
pentazane. Pyrrolidine.

pentazdiene. A compound derived from HN:N.-NH.N:NH.

pentazine. CHN_5 = 83.3. The heterocyclic compound,



pentazyl. The monovalent radical,



pentene*. (1) Amylene. (2) Cyclopentane.

pentenedioic acid. Glutaconic acid.

pentenic acid. $C_5H_8O_2$ = 100.06. Pentenoic acid*. **1.2-** or α-. Propilideneacetic acid, γ-methylcrotonic acid, $EtCH:CHCOOH$. A colorless liquid, d.0.990, m.10, b.201. **2.3-** or β-. Ethylidenepropionic acid, $MeCH:CH.CH_2COOH$. A colorless liquid, d.0.987, b.194. **3.4-** or γ-. Allylacetic acid, $CH_2:CH(CH_2)_2COOH$. A colorless liquid, d.0.984, m.−18, b.189. **i-** See *angelic*, *senecioic* and *tiglic* acid. **dimethyl-** *Teracrylic acid*. **methyl-** See *pyroterebic acid*.

pentenoic acid*. Pentenic acid.

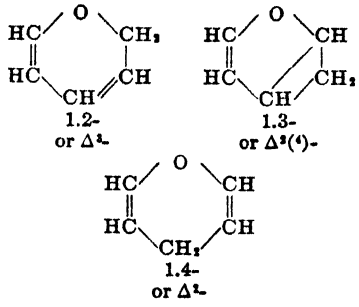
pentenol*. $C_5H_{10}O$ = 86.06. A group of unsaturated alcohols. **1-p.-3.** *1*-Penten-*3*-ol, ethylvinylcarbinol, $CH_2:CH.CHOH.CH_2.Me$. Colorless liquid, d.0.840, b.114. **3-p.-2.** Dimethylpropenylcarbinol, $Me.CHOH.CH:CH\cdot Me$. Colorless liquid, d.0.834, b.112. **4-p.-1.** β-Allylethylalcohol, $CH_2OH(CH_2)_2CH:CH_2$. A liquid, d.0.863, b.140. **4-p.-2.** Allylmethylcarbinol, $Me.CHOH.CH_2.CH:CH_2$. A liquid, d.0.834, b.116.

pentenyl. Describing a series of radicals derived from amylene; as,

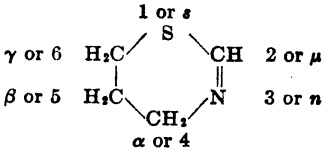
Δ^1- $—CH:CH(CH_2)_2Me$.
Δ^2- $—CH_2CH:CHCH_2Me$.

pentevalent. Pentavalent.

pentfurane. C_5H_6O = 81.1. The heterocyclic compounds:

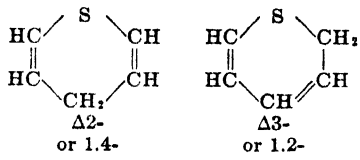


penthiazoline. C_4H_7SN = 101.1. The heterocyclic compound,



penthiofurane. Penthiophene.

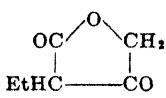
penthiophene. C_5H_6S = 98.0. Penthiofurane. The heterocyclic compounds:



pentine. Pentyne*. **p. dioic acid.** Glutinic acid.

pentinene. C_5H_8 = 68.07. A diolefine, $Me_2C{:}C{:}CH_2$, isomeric with valerylene, piperylene and pentadiene.

pentinic acid. $C_5H_8O_2$ = 128.1. α-ethyltetronic acid.



Colorless crystals, m.128.

pentinoic acid. $C_5H_6O_2$ = 98.1. $MeCH_2C{:}CCOOH$.

pentite. Pentitol.

pentitol. Pentite. A series of five pentatomic alcohols: $CH_2OH(CHOH)_3CH_2OH$, derived from the pentoses; two are optically-active. See *adonite, arabite, xylite.* **methyl-** Rhamnite.

pentlandite. A native iron and nickel sulfide, (Fe,Ni)S.

pentobarbital. $C_{11}H_{18}N_2O_3$ = 226.1. Nembutal, ethyl-*1*-methylbutyl-barbituric acid. White crystals, m.128–130; used as a hypnotic.

pentoic acid. Valeric acid.

pentol. Cyclopentadiene.

pentonic acid. A series of pentavalent monobasic acids of the type, $CH_2OH(CHOH)_3COOH$. See *arabonic, ribonic, xylonic acids.*

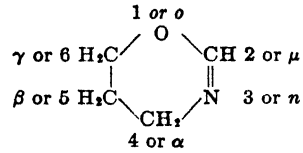
pentosans. A group of gums or resins (*hemi-* or *pseudocelluloses*) which are hydrolysed to pentoses; as, araban, xylan. They are constituents of cell membranes of plants, and occur in straw, wood, coffee and chocolate. **methyl-** Gums which yield methylpentoses on hydrolysis.

pentose. Pentaglucose. A monosaccharide or sugar containing five carbon atoms, $C_5H_{10}O_5$. They are not fermented by yeast. See *arabinose, lyxose, ribose, xylose.* **methyl-** See *rhamnose, rhodeose, fucose.*

pentoside. A nuclein in some proteins of the general composition: $A.OP(OH)O_2.B$, where *A* is a purine body and *B* a pentose; e.g., guanosin.

pentoxazol. 1.3[4]-Oxazine.

pentoxazoline. C_4H_7ON = 85.1. The heterocyclic ring compound,



phen- Phenpentoxazoline.

pentoxide. A binary compound which contains five atoms of oxygen, as nitrogen pentoxide, N_2O_5.

pentoxime. $C_5H_5O_5N_5$ = 215.2. A homolog of fulminuric acid, the cyclic compound, $C{:}NOH{-}C{:}NOH{-}C{:}NOH{-}C{:}NOH$; it contains five oxime groups.

pentrite. $C_5H_8N_4O_{12}$ = 316.0. Tetranitroerythrite, $C(CH_2O.NO_2)_4$. A high explosive.

penturonic acid. $C_5H_8O_6$ = 164.0. Any trihydroxy aldehyde acid, $CHO(CHOH)_3COOH$, derived from pentoses. Cf. *uronic acids.*

pentyl. Amyl. **p. acetate.** Amyl acetate. **p. amine.** Amylamine.

pentylene. Pentadiene.

pentylidene. Amylidene.

pentyne*. C_5H_8 = 68.06. **1-** *n*-Pentine, propylacetylene, $HC{:}C(CH_2)_2Me$. A colorless liquid, d.0.722, m. −95, b.40. **2-** Ethylmethylacetylene, 2-pentine, $Me.C{:}C.Et$. A liquid, d.0.687, m. −101, b.56. **p. dioic acid.** Glutinic acid.

Penzold's reagent. A solution of diazobenzosulfuric acid and potassium hydroxide, used as a reagent for sugar in urine.

peonin. Aurine.

peonine. An alkaloid from the rhizome of peony, *Paeonia officinalis*, a Ranunculaceae; used medicinally as an antispasmodic.

peonol. $C_9H_{10}O_3$ = 166.1. An aromatic ketone from the root of *Paeonia montana*, a Japanese plant; colorless, long needles, of pleasant aromatic odor, m.50.

pepo. Pumpkin-seed.

pepper. Piper. The dried fruit of *Piper* species. **black-** The dried unripe fruits of *Piper nigrum*, a Piperaceae of tropical countries. It contains piperine, chavicine, essential oils and a resin, and is used as a condiment and in the manufacture of pepper oil. **cayenne-** Red p. **long-** The dried, unripe fruit of *P. longum*, used as carminative and stimulant. **Jamaica-** Pimenta. **red-** The dried and ground unripe fruits of *Capsicum frutescens*, a Solanaceae. It contains an oleoresin; used as a condiment and medicinally. **Spanish-** Red p. **white-** A black pepper that has been deprived of the black outer skin of the seeds; it is milder than black pepper. **wild-** Mezereon.

p. oil. An oil extracted from the fruits of *Piper nigrum*. A pale yellow liquid, d.0.87–0.91, insoluble in water, soluble in alcohol or ether. It contains cadinene, phellandrene, and dipentene.

peppermint. Mentha piperita. The dried leaves and flowering tops of *Mentha piperita*, a Labiatae of temperate zones. Used medicinally as the fluid extract, for flavoring, and in the manufacture of peppermint oil and menthol. **p. camphor.** Menthol. **p. oil.** An essential oil obtained by distilling peppermint. A colorless liquid of strong agreeable odor, d.0.91; insoluble in water soluble in alcohol, ether, or chloroform. It contains 50–90 % menthol. Grades: American, Chinese, English, Italian, Japanese, and Spanish; used for flavoring, medicinally as a stimulant and antispasmodic, and in perfumery.

pepsase. Pepsin.

pepsin. Pepsase. Acid-proteinase. An enzyme of gastric juice that hydrolyses proteins to proteases, peptones, and peptides, preferably in acid (HCl) solution. It is obtained from the fresh stomachs of healthy pigs, as fine, amorphous, white powder or grains, slightly hygroscopic and partly soluble in water, soluble in very dilute HCl, insoluble in alcohol. One part of pepsin should be able to digest not less than 3000 parts of freshly-coagulated egg-albumen; used medicinally as a digestive. **vegetable-** Papain.

pepsinate. To mix with pepsin.

pepsinogen. The mother substance or zymogen of pepsin in the cells of the stomach glands.

peptide. A compound of aminoacids, see *polypeptide*. **p. group.** The bivalent radical —CO.NH—.

peptization. The liquefaction of a gel to a sol; the change from a jelly to a liquid.

peptizator. An agent that causes the liquefaction of a gel.

peptize. To dissolve or liquefy a jelly or gel.

peptolysis. The hydrolysis of peptone to aminoacids.

peptolytic. An agent that splits peptones.

peptone. A group of simple proteins, soluble in water and able to diffuse through parchment. They are not coagulated by heat, and are formed by the action of pepsin on albuminous bodies. Cf. *gastric digestion*. Chemically the peptones are a mixture of proteoses and amino acids which resemble polypeptides. **beef-** Meat p. **casein-** Milk p. **gelatin-** A peptone obtained by digestion of gelatin. **meta-** A digestion-product of peptones. **milk-** A light-brown powder obtained by digestion of casein, soluble in water, and used as nutrient for convalescents. **meat-** An extract made from fresh, lean beef and treated with the digestive juices of the pancreas. 1 gm. represents 10 gm. of lean beef. A brown powder, soluble in water, used as a nutrient and in bacteriology for culture media. **para-** Syntonin. **silk-** A peptone obtained from silk, and used in biochemical tests. **true-** Tryptone.

peptonization. The process of converting proteins into peptones.

peptonize. To change into peptone.

peptonizing powder. Pancreatin powder. **p. tube.** A parchment tube used for dialyzing proteins.

peptotoxine. A ptomaine from decomposing proteins.

per- A prefix derived from the Latin "per" meaning through, and indicating (1) "very" or more than ordinary, as, peracidity; (2) "above" or "beyond," as, permanganate. It denotes an indefinitely large amount of the substance or radical to which it refers.

peracetic acid. $C_2H_4O_3$ = 76.03. Me.CO.O.OH, an isomer of methyl acid carbonate, $MeHCO_3$.

peracid, per- -acid. (1) A member of a group of inorganic acids containing oxygen in the form of peroxide, or an element in its highest valency; as, perboric acid, persulfuric acid, perchloric acid, permanganic acid. (2) Organic peracids. Organic acids in which the radical, —CO.O.OH, is assumed to exist. True peracids give H_2O_2 with dilute sulfuric acid, and sometimes ozone with concentrated sulfuric acid. They are sometimes confused with acids containing "hydrogen peroxide of crystallization." Cf. *peri-acid*.

peracidity. Excessive acidity.

peractivin. Trade name for p-toluene sulfomonochloride; used as mild oxidant in textile bleaching.

perborate. A salt of a perboric acid containing the BO_3^- or $B_4O_8^=$ radicals. In general they are oxidizing agents resembling hydrogen peroxide, and are used for bleaching, cleaning, and disinfecting. **meta p.** A salt of the type MBO_3.

perboric acid. The hypothetical acid, HBO_3, from which perborates are derived. This is actually meta perboric acid, perboric acid being the acid of the salt $Na_2B_4O_8,10H_2O$.

perbunan. Trade name for a co-polymer of butadiene and styrene, related to buna, q.v.

perbutan. Trade name for a co-polymer of butadiene and acrylic nitrile, related to buna, q.v.

percaine. $C_{19}H_{28}O_2N_2$ = 330.22. α-butyl-oxy-cinchoninic acid, diethyl-ethylenediamide, nupercaine. Colorless crystals, m.97, soluble in water or alcohol, used as a spinal analgesic.

percarbide. A binary compound of carbon containing an excess of carbon.

percarbonate. A salt of the hypothetical percarbonic acid containing the divalent radical, $C_2O_6^=$. They decompose in aqueous solution to hydrogen peroxide and carbonates.

percarbonic acid. The hypothetical acid, $H_2C_2O_6$, from which the percarbonates are derived.

percentage. Parts in a hundred parts; as, 6 % means 6 parts in 100 parts, 6 grams in 100 grams, or 6 pounds in 100 pounds. The percentages of the constituents of a compound can be calculated from the formula of the compound. Let the symbols represent the atomic weights, and M, the molecular weights, then the percentage can be found for NaCl by: Na + Cl = M, 23 + 35.5 = 58.5. Hence, in 58.5 parts of salt there are 23 parts of sodium and 35.5 parts of chlorine. In 100 parts therefore:
58.5:23::100:x (x % Na = 39.4 %)
58.5:35.5::100:y (y % Cl = 60.6 %)

perch. Rod.

perchlorate. A salt of perchloric acid containing the ClO_4^- radical.

perchlorethane. Hexachlorethane.

perchlorether. $(C_2Cl_5)_2O$ = 418.6. Decachlorethylether. Colorless scales, d.1.90, m.69, decomp. by heat.

perchlorethylene. Tetrachlorethylene.

perchloric acid. $HClO_4$ = 100.5. A monobasic acid of heptavalent chlorine, its highest state of oxidation, $d_{22°}$.1.76, m.−35, b.60mm.39. A colorless liquid, d.1.12, which contains 20 % $HClO_4$ in water. Used as an oxidizing agent, in electro-analysis, for the destruction of organic material, and as a reagent for potassium. **p. anhydride.** Chlorine heptoxide, Cl_2O_7. **p. ether.** Ethylperchlorate. **p. hydrate.** $HClO_4, H_2O$ = 118.49. An explosive solid, m.50. **p. dihydrate.** $HClO_4, 2H_2O$ = 136.51. A liquid, b.203; used as an oxidizing agent (72.4 % p. acid).

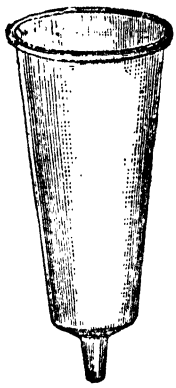
perchloride. A chloride that contains more chlorine than the corresponding normal chloride.

perchromate. One of the intensely colored salts derived from perchromic acid. There are two series of salts of the general types $MCrO_5$ (deep blue) and M_3CrO_8 (deep orange-brown). They are rapidly decomposed in aqueous solution, but more stable in ether.

perchromic acid. $HCrO_3$ = 101.1 and H_3CrO_8, $2H_2O$, or $(OH)_4Cr(O.OH)_3$ = 219.06. Two acids containing heptavalent chromium, formed by the addition of hydrogen peroxide to a chromate solution (blue color); decomp. rapidly. Below −15°C the H_3CrO_8 forms deep blue crystals.

percin. A ptomaine from perch and pike, containing 78 % arginine.

percolate. (1) To strain or pass through fine interstices; as, water percolates through stone. To extract the soluble matter from drugs by the passage of water through the powdered drug. (2) The solution obtained by percolation.



Percolator.

percolater. Percolator.

percolation. The process of extracting the soluble constituents of a substance by a slow stream of solvent. Generally used in the extraction of drugs that are ground and packed into the percolator; the height of the powder should be three times its diameter.

percolator. A conical, long glass vessel, with tubulated bottom used for the extraction of drugs. **p. bottle.** A wide-mouthed graduated bottle in which the percolate is collected.

percrystallization. The crystallization of a solute from a solution dialyzing through a membrane (such as collodion).

percussion. The act of striking a sharp blow. **p. cap.** A detonator or primer. **p. figure.** Strike figure. The radiating lines formed in certain minerals by striking them with a sharp hammer. **p. powder.** Fulminating powder. An explosive that ignites by percussion.

perdistillation. Distillation through a dialyzing membrane. Cf. *pervaporation.*

pereira. Pareira.

pereirine. $C_{19}H_{24}ON_2$ = 296.2. Pareirine. An alkaloid from the root of *Geissospermum laeve*, a tree of tropical America that yields the pereiro bark. A brown amorphous powder, m.119, insoluble in water, soluble in alcohol or ether; used as a quinine substitute. Cf. *geissine, vellosine.*

pereiro bark. The bark of *Geissospermum laeve*, a tree of tropical America; used medicinally as a tonic and antipyretic.

perezol. A 0.5 % alcoholic solution of pipitzahoic acid. Used as an indicator in volumetric analysis; acids, colorless; alkalis, deep orange.

perezon. Pipitzahoic acid.

perferrate. (1) A misnomer for ferrate, M_2FeO_4. (2) An intensely green-colored unstable compound of hepta- or octa-valent iron, $MFeO_4$.

perforated plate. A porcelain plate with small holes, usually inserted in a funnel and covered with filter paper for the rapid filtration of solutions.

perfringen. The gas-gangrene antitoxin.

perfume. A volatile fragrant substance resembling in odor a flower, blossom, herb, or other odoriferous substance. It may be classified as: (a) *natural*, if obtained by extraction of flower, blossom, or plant; (b) *artificial*, if a mixture of natural oils or oil constituents; (c) *synthetic*, if a mixture of synthetically produced substances. Cp. *essential oils, odors, terpenes, flavors.*

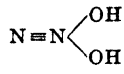
perfusion. The passage of a fluid through spaces.

pergamyn. An artificial parchment paper (German).

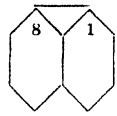
pergenol. Solid hydrogen peroxide. A mixture of sodium perborate and bitartrate which, with water, gives hydrogen peroxide.

perhydrate. (1) Ortizon. (2) Peroxy-hydrate.

perhydrol. (1) A 30 % solution of hydrogen peroxide, ten times stronger than the ordinary solution. It is known as "100 volumes" or (inaccurately) as "100 %" hydrogen peroxide (q.v.), because it evolves 100 times its volume of O_2. (2) A supposed combination of two hydroxyl groups with an inert element or compound; as,



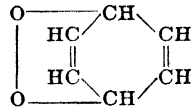
peri- *π*. A prefix derived from the Greek "about" or "around," meaning around. **p. acid.** *1*-Naphthylamine-*8*-sulfonic acid. **p. bridge.** A bond between the first and eighth carbon atom of naphthalene. **p. position.** The *1.8*-position of the naphthalene ring.



periclase. A native magnesium oxide, MgO, which occurs in aggregates of small cubes.

pericline. Albite.

pericyclo. A bond or valency that extends partly around a ring; as,



peridote. A variety of olivine used as a gem.

peridotites. A group of crystalline, igneous rocks, of which olivine is the chief constituent.

perigee. The point in the moon's orbit at which it is nearest the earth, (cf. *apogee*).

perihelion. The point of the orbit of a heavenly body at which it is nearest to the sun, cf. *aphelion.* Applied to the electron in its relation to the nucleus.

perikinetic. Concerning Brownian motion. Cf. *orthokinetic.*

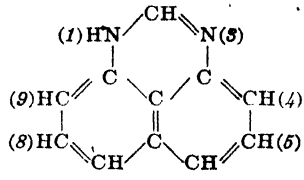
perilla alcohol. $C_{10}H_{16}O_4$ = 200.12. A colorless solid from palmarosa and naal oils. Cf. *parilla.*

perillaldehyde. $C_{10}H_{14}O$ = 150.0. $C_6H_8.CMe.CH_2.CHO$. Cf. *peryllartine.*

perilogic series. The allologic series of pyrene $C_{10}H_8$, $C_{16}H_{10}$, $C_{22}H_{12}$, etc.

perimeter. The sum of the lengths of the bounding lines of a figure.

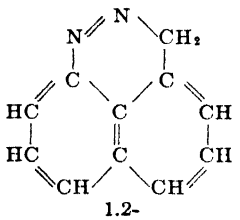
perimidine. $C_{11}H_8N_2$ = 168.1. The heterocyclic compound,



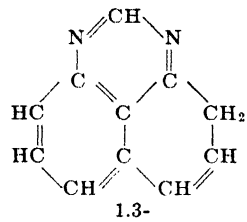
perimidyl. A group of eight isomeric radicals, $C_{11}H_7N_2$—, derived from perimidine.

perimorph. A mineral that encloses another mineral. The antonym of *endomorph.*

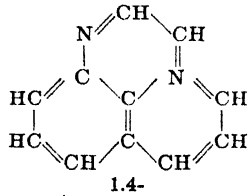
perinaphthodiazine. $C_{12}H_8N_2$ = 180.1. N-naphthodiazine. A group of isomers of naphthodiazine and naphthisodiazine:



1.2-

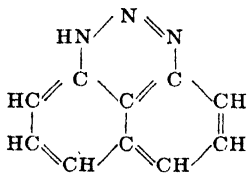


1.3-

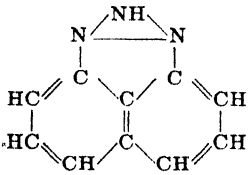


1.4-

perinaphthotriazole. $C_{10}H_7N_3$ = 169.2. π-Naphthotriazole. A series of compounds isomeric with naphthotriazole and naphthisotriazole.



α- or 1.2.3-



β- or 2.1.3-

period. (1) A regular interval or division, (as a period of time) elapsing between a regularly-recurring phenomenon. (2) A period of elements in the periodic system, q.v. (3) A family of closely-related elements with consecutive atomic numbers; as, 24 Cr — 29 Cu; or 59 Pr — 71 Lu. (4) A geologic measure. See *geologic era.* **damping-** See *damping-.* **decay-** See *period of decay.* **gold-** The elements Os, Ir, Pt, Au. **half-, half life-** See *p. of decay.* **incubating-** The time necessary for the full development of a bacterial culture. **iron-** Iron family. The elements Mn, Fe, Co, Ni, forming the central portion of the third period of the periodic system. **life-** (1) Period of decay. (2) The time during which an atom or molecule is in the activated or excited state. See *damping p., lingering p.* **long-** The 3rd, 4th, or 5th p. of the periodic system. **platinum-** The elements Os, Ir, Pt, Au, and Hg, form a part of the fifth period of the periodic system. **rare earth-** The elements with atomic numbers 58–72, cerium to hafnium, form the central part of the fifth period of the periodic system. **short-** Either of the 1st or 2nd p. of the periodic system. **silver-** The elements Ru, Rh, Pd, Ag, and Cd form the central part of the fourth period of the periodic system. **transitional-** (1) One of the trios of transitional elements, q.v., of the eighth periodic group. (2) One of the three series of elements from Ti to Ni, Zr to Pd or Hf to Au. **uranium-** The sixth period of the periodic system, which consists of the radioactive elements.

period of decay. The time required for the disintegration of one-half of a quantity of a radioactive element into its next transmutation product; see *radioactive element* (table).

periodate. A salt of periodic acid, which contains the IO_4^- radical.

periodic. (1) Pertaining to a regularly-recurring event, phenomenon, or characteristic. (2) Pertaining to the highest valency of iodine, as *p. acid.* **p. acid.** $HIO_4.2H_2O$ or H_5IO_6 = 228.0. Colorless monoclinic crystals, m.130, decomp. 140, soluble in water. Its salts are the periodates. **p. chain.** An arrangement of the chemical elements according to increasing atomic weights or numbers in a continuous sequence. It can be divided into six sections (periods), and each of these again subdivided (sub-periods). If the valencies of each element are plotted, against the atomic weights a characteristic curve is produced. In the table shown this arrangement is used to indicate the electronic structure of the atoms. Cf. *ionic number.* **p. law.** (1) Mendeleeff law. The properties of the elements change periodically when the elements are arranged in increasing order of atomic numbers. (2) Moseley's law. The properties of the elements are a periodic function of their atomic numbers as illustrated in the p. chain, p. spiral, p. system, and p. table. **p. precipitation.** *Liesegang rings.* **p. properties.** Those properties of elements, which when plotted against their atomic weights show the relationship of the elements as exemplified in the periodic table. They include, valency, atomic volumes, atomic heats, wavelengths of x-ray spectra, compressibilities. **p. spiral.** Helix Chemica. A graphical representation of the periodic system in the form of a curve, which illustrates the relationship of elements (see figure). **p. system.** A natural classification of all elements into one system, from which their properties can be deduced and unknown elements and their properties predicted. There are 92 elements from hydrogen to uranium (inclusive). The periodic system can be represented in various ways: uni-dimensionally, in the form of a chain (see *periodic chain*); two-dimensionally, as a spiral or helix in which the chain is bent so that elements with similar properties come together; three-dimensionally, as a spatial model. Besides these graphical representations there are various tables and charts which express one or more of the features of the periodic system. **p. table.** An arrangement of the periodic system as a table, which was developed independently in 1869 by D. Mendeleeff and in 1870, by Lothar Meyer and, in a crude form, by Newlands, q.v.

periodicity. (1) The occurrence of a phenomenon at regularly-recurring intervals, as of time. See *periodic properties.* (2) The occurrence of similar properties in a group of chemical elements in the periodic system.

peripheral. Situated near or at the surface, or on the circumference of a curvilinear figure.

periphery. The surface or outer part; in particular, the circumference.

periplocin. $C_{30}H_{48}O_{12}$ = 600.5. A glucoside from the bark of *Periploca graeca,* an Asclepiadaceae. A yellow amorphous powder, m.205, soluble in water or alcohol; used medicinally as a heart tonic.

periplogenin. $C_{23}H_{34}O_6$ = 390.2. The aglucone of periplocin similar in structure to strophanthidin, but having a CH_3 group instead of CHO. See *cholane derivatives.*

periscope. Altiscope. An arrangement of lenses and mirrors which enables an observer to see over intervening obstacles without being seen himself.

periscopic. Applied to lenses having a concave-convex surface, like a meniscus.

perisphere. The "atmosphere" surrounding a molecule, ion, or radical in which it makes its influence felt. Cf. *molecular diagram.*

peristalsis. The rhythmic contractions of the intestines by which their contents are propelled through, mixed with digestive enzymes, and partly absorbed.

THE PERIODIC CHAIN

Periods	At. No.	Name	Electrons in orbits K.L.M.N.O.P.	Valence or polar numbers
(1)	(2)	(3)	(4)	− (5) +
	1	Hydrogen	1	1 H 1*
	2	Helium	2.0	He
Ia	3	Lithium	2.1	Li 1*
.	4	Beryllium	2.2	Be . 2*
.	5	Boron	2.3	3 B . . 3*
t	6	Carbon	2.4	4 C . . . 4*
.	7	Nitrogen	2.5	3* 1 N 1 2 3 4 5
	8	Oxygen	2.6	2* O
Ib	9	Fluorine	2.7	1*F
T	10	Neon	2.8.0	Ne
IIa	11	Sodium	2.8.1	Na 1*
.	12	Magnesium	2.8.2	Mg . 2*
.	13	Aluminum	2.8.3	Al . . 3*
t	14	Silicon	2.8.4	4 Si . . . 4*
.	15	Phosphorus	2.8.5	3* P 1 . 3 4 5
.	16	Sulfur	2.8.6	2* S . 2 . 4 . 6
IIb	17	Chlorine	2.8.7	1*Cl 1 . 3 . 5 . 7
T	18	Argon	2.8.8.0	A
IIIa	19	Potassium	2.8.8.1	K 1*
.	20	Calcium	2.8.8.2	Ca . 2*
.	21	Scandium	2.8.8.3	Sc . 2 3*
t	22	Titanium	2.8.8.4	Ti . 2 3 4*
.	23	Vanadium	2.8.10.3	V . 2 3*4 5
.	24	Chromium	2.8.11.3	Cr . 2 3*4 . 6
.	25	Manganese	2.8.13.2	Mn . 2*3 4 . 6 7
.	26	Iron	2.8.13.3	Fe . 2 3*. . 6 7
III′	27	Cobalt	2.8.15.2	Co . 2*3 4
.	28	Nickel	2.8.16.2	Ni . 2*3
.	29	Copper	2.8.17.2	Cu 1 2*
.	30	Zinc	2.8.18.2	Zn . 2*
.	31	Gallium	2.8.18.3	Ga . . 3*
t	32	Germanium	2.8.18.4	4 Ge . . . 4*
.	33	Arsenic	2.8.18.5	3* As 1 . 3 . 5
.	34	Selenium	2.8.18.6	2* Se . 2 . 4 . 6
IIIb	35	Bromine	2.8.18.7	1*Br 1 . 3 . 5 . 7
T	36	Krypton	2.8.18.8.0	Kr
IVa	37	Rubidium	2.8.18.8.1	Rb 1*
.	38	Strontium	2.8.18.8.2	Sr . 2*
.	39	Yttrium	2.8.18.8.3	Y . 2 3*
t	40	Zirconium	2.8.18.8.4	Zr . 2 3 4*
.	41	Columbium	2.8.18.10.3	Cb . 2 3*4 5
.	42	Molybdenum	2.8.18.10.4	Mo . 2 3 4*5 6
.	43	Masurium	2.8.18.12.3	Ma . 2 3*4 . 6 7
.	44	Ruthenium	2.8.18.12.4	Ru . 2 3 4*. 6 7 8

THE PERIODIC CHAIN—(*Continued*)

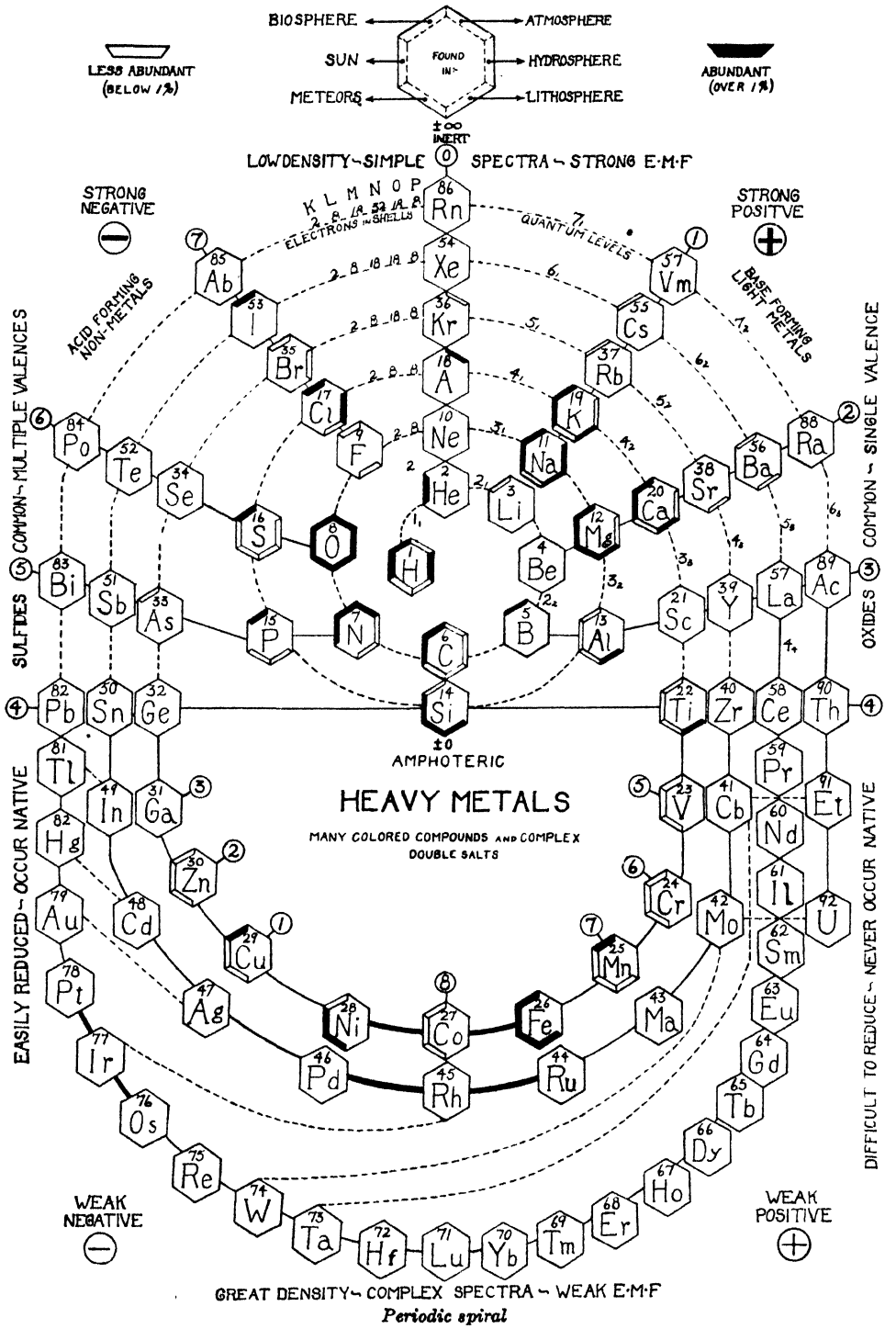
Periods	At. No.	Name	Electrons in orbits K.L.M.N.Q.P.Q.	Valence or polar numbers
(1)	(2)	(3)	(4)	− (5) +
IV′	45	Rhodium	2.8.18.14.3	Rh . 2 3*4 . 6
.	46	Palladium	2.8.18.16.2	Pd . 2*. 4
.	47	Silver	2.8.18.18.1	Ag 1*2
.	48	Cadmium	2.8.18.18.2	Cd . 2*
.	49	Indium	2.8.18.18.3	In . . 3*
t	50	Tin	2.8.18.18.4	4 Sn . 2 . 4*
.	51	Antimony	2.8.18.18.5	3 Sb . . 3 . 5*
.	52	Tellurium	2.8.18.18.6	2* Te . . . 4 . 6
IVb	53	Iodine	2.8.18.18.7	1*I . . 3 . 5 . 7
T	54	Xenon	2.8.18.18.8.0	Xe
Va	55	Cesium	2.8.18.18.8.1	Cs 1*
.	56	Barium	2.8.18.18.8.2	Ba . 2*
.	57	Lanthanum	2.8.18.18.8.3	La . 2 3*
t	58	Cerium	2.8.18.18.8.4	Ce . 2 3 4*
.	59	Praseodymium	2.8.18.20.8.3	Pr . 2 3*
.	60	Neodymium	2.8.18.21.8.3	Nd . 2 3
.	61	Illinium	2.8.18.22.8.3	Il . 2 3
.	62	Samarium	2.8.18.23.8.3	Sm . 2 3
.	63	Europium	2.8.18.24.8.3	Eu . 2 3
.	64	Gadolinium	2.8.18.25.8.3	Gd . 2 3
V″	65	Terbium	2.8.18.26.8.3	Tb . 2 3
.	66	Dysprosium	2.8.18.27.8.3	Dy . 2 3
.	67	Holmium	2.8.18.28.8.3	Ho . 2 3
.	68	Erbium	2.8.18.29.8.3	Er . 2 3
.	69	Thulium	2.8.18.30.8.3	Tu . 2 3
.	70	Ytterbium	2.8.18.31.8.3	Yb . 2 3
.	71	Lutecium	2.8.18.32.8.3	Lu . 2 3
t	72	Hafnium	2.8.18.32.8.4	Hf . 2 3 4*
.	73	Tantalum	2.8.18.32.8.5	Ta . . 3 4 5*
.	74	Tungsten	2.8.18.32.10.4	W . 2 3 4*5 6
.	75	Rhenium	2.8.18.32.12.3	Re . 2 3 4 . 6 7
.	76	Osmium	2.8.18.32.12.4	Os . 2 3 4*. 6 . 8
V′	77	Iridium	2.8.18.32.14.3	Ir . 2 3 4 . 6 7
.	78	Platinum	2.8.18.32.14.4	Pt . 2 . 4*. 6
.	79	Gold	2.8.18.32.16.3	Au 1 . 3*4
.	80	Mercury	2.8.18.32.18.2	Hg 1 2*
.	81	Thallium	2.8.18.32.18.3	Tl 1*. 3
t	82	Lead	2.8.18.32.18.4	Pb . 2*. 4
.	83	Bismuth	2.8.18.32.18.5	Bi 1 . 3*. 5
.	84	Polonium	2.8.18.32.18.6	Po . 2 . 4 . 6
Vb	85	Alabamine (Eline)	2.8.18.32.18.7	Ab(El) 1 . 3 . 5 . 7
T	86	Radon	2.8.18.32.18.8.0	Rn
VIa	87	Virginium (Verium)	2.8.18.32.18.8.1	Vm(Ve) 1
	88	Radium	2.8.18.32.18.8.2	Ra . 2*
	89	Actinium	2.8.18.32.18.8.3	Ac . 2 3
	90	Thorium	2.8.18.32.18.8.4	Th . 2 . 4*
	91	Ekatantalum	2.8.18.32.18.11.2	Et . 2 3 . 5
	92	Uranium	2.8.18.32.18.12.2	U . 2 . 4 5 6*
	93	(Transuranium, Ekarhenium)	2.8.18.32.18.13.2	
	94	(Ekaosmium)	2.8.18.32.18.14.2	

(1) *The Roman numerals indicate the period or the number of orbits of the atoms. The small letters indicate the sub-periods; thus, a—the electropositive elements* (light metals); *and b—the electronegative elements* (non-metals); *T indicates the terminals of a period* (noble gases); *and, t, the transitional elements* (carbon group); *′—the* heavy metals and *″—the* rare earth metals.

(2) *and* (3) *Show the atomic number and the name of the element.*

(4) *Indicates the distribution of the electrons in the K, L, M, N, O, P, and Q orbits. A change of an electron from one of these orbits gives rise to the corresponding radiations.*

(5) *Indicates the valency or polar numbers of the elements. The numbers to the left of the symbol indicate the number of electrons which that particular atom captures to form the octet. The number to the right of the symbol indicates the number of electrons which the atom can give up. The numbers with asterisks are the principal valencies.*

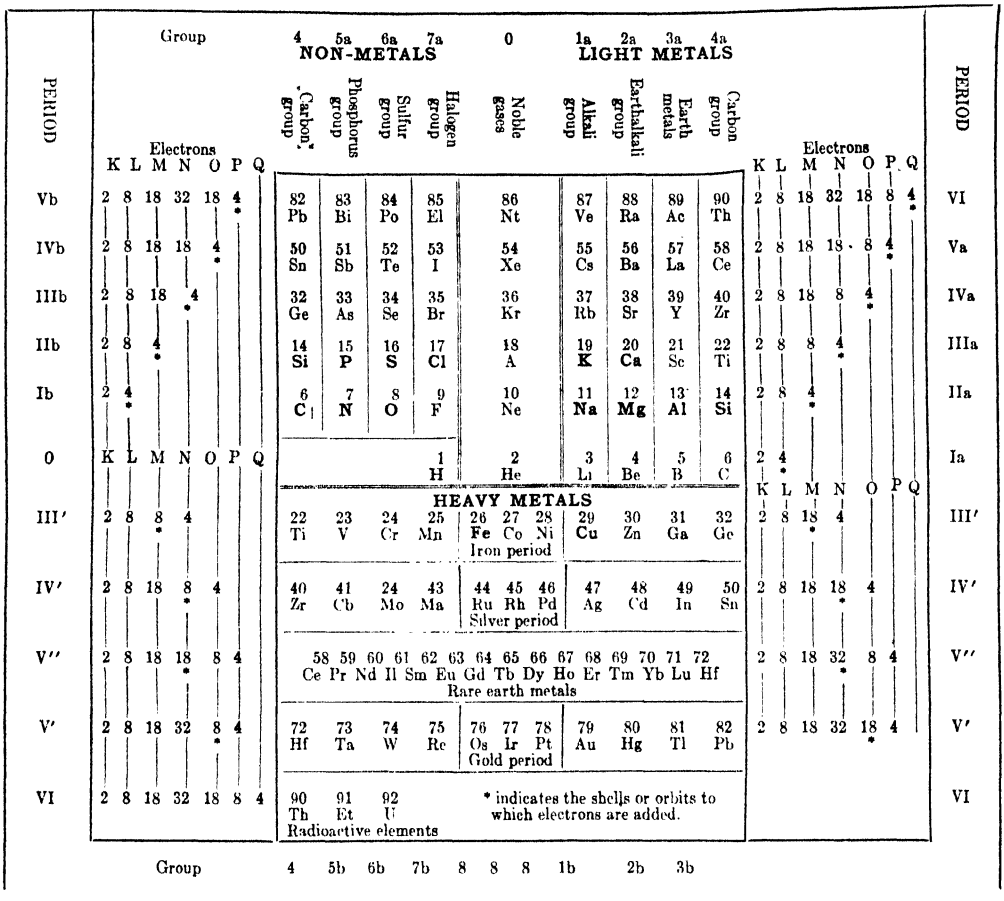


Periodic spiral

which illustrates the relationship between the chemical and physical properties and the occurrence of the elements; thus: (*see next page*)

In the upper half of the diagram: *All elements have low density (below 4.0), simple spectra, strong e.m.f., and generally a single valence.* Upper left: *Elements are acid-forming and negative, e.g., attract additional electrons.* Upper center: *Elements are inert, e.g., have a complete octet.* Upper right: *Elements are base-forming or positive, e.g., give up their valence electrons.*

In the lower half of the diagram: *All elements have greater density (above 4.0), complex spectra, weak e.m.f., and generally many valencies; they are amphoteric and may gain or lose electrons.* The abundance of the elements is shown by the hexagons as indicated at the top of the table.



Periodic system.

This new form of table is derived from the periodic spiral and indicates atomic structure, group and period relationship and the classification of the elements; thus:

In the upper half of the table: *All elements in the vertical direction are related to each other.* Group relation *predominates, and additional electrons are added to the outermost orbit; hence valence and physical and chemical properties change rapidly in passing to succeeding atomic numbers.*

In the lower half of the table: *All elements are related in the horizontal direction.* Period relation *predominates, and additional electrons are added to the second or third inner orbit; hence valence and properties do not change greatly in passing to succeeding atomic numbers.*

peristaltics. An agent or drug that increases the intestinal movements.

peristaltin. $C_{14}H_{18}O_8 = 314.2$. A glucoside from the bark of *Rhamnus purshiana*, (cascara sagrada). A yellow-brown, hygroscopic, crystalline powder; soluble in water or alcohol; used medicinally as a peristaltic.

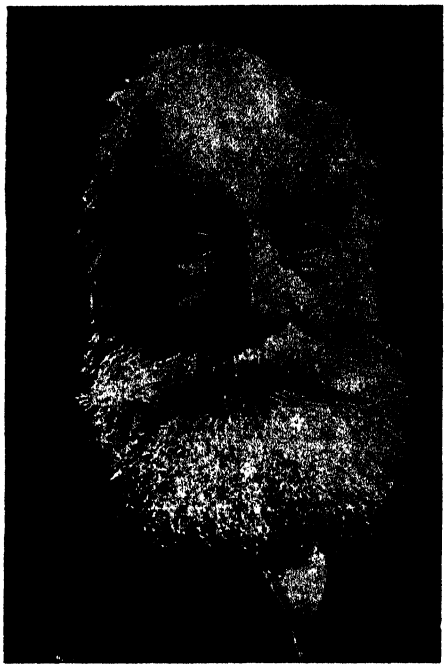
periston. A colloidal solution containing polymerised vinyl pyrrolidone (hemodyn) and inorganic salts; used to raise blood pressure temporarily, and (in Germany during World War II) as a stable blood substitute.

Perkin, Sir William Henry. 1838–1907. An English chemist noted for his work in the synthesis organic of dyes. He made the first synthetic dye, mauvein in 1856. **P.'s reaction.** The formation of unsaturated acids of the cinnamic type by the condensation of aromatic aldehydes with fatty acids in the presence of acetic anhydride; as,

$$Ar.CHO + CH_3COONa = Ar.CH{=}CH.COONa + H_2O.$$

P.'s violet. Mauvein.

perlite. Pearlite. (1) A volcanic glass. (2) A eutectic mixture of soft α-ferrite (87 %) and hard cementite (13 %) containing 0.9 % carbon, formed during the slow cooling of molten steel.



Sir William Perkin.

(From Moore, "History of Chemistry." McGraw-Hill Book Company, New York, N. Y.)

The mass contains the phases α-ferrite, cementite and graphite.

perloline. $C_{36}H_{22}O_3N_4$ = 730.3. An alkaloid from perennial ryegrass (*Lolium perenne* L.), soluble in alcohol or chloroform, slightly soluble in acetone, ether or water. Solutions in chloroform are golden-yellow, with a green fluorescence which is visible in concentrations of $1:5 \times 10^6$.

permalloy. A magnetic alloy of nickel (30–80 %) and iron.

permanent. Everlasting, fixed, and enduring. **p. gas.** A gas that cannot be liquefied or condensed by pressure alone. **p. white.** Precipitated barium sulfate.

permanganate. A salt of permanganic acid of the type, $MMnO_4$. They are dark purple in color, good oxidizing agents and many are disinfectants. **p. ion.** The negatively charged MnO_4^- radical, which imparts a purple color to a solution.

permanganic acid. $HMnO_4$ = 120.0. An acid derived from heptavalent manganese, stable only in dilute solutions; decomp. to manganese dioxide and oxygen.

permanganyl. The monovalent MnO_3^- radical. **p. chloride.** MnO_3Cl = 138.39. A green-brown liquid which emits purple fumes in moist air and explodes if heated. It is the acid chloride of permanganic acid. **p. fluoride.** MnO_3F = 121.93.

permeability. (1) The ability to pass or penetrate a substance or membrane. (2) The quantity of air flowing through a body in unit time under standard conditions of area, thickness and pressure. Cf. *porosity*, *osmosis*. **magnetic-** See *magnetic permeability*.

permeable. Pervious or porous. **semi-** Allowing the passage of some substances but not of other substances; as, a semi-permeable membrane.

permeate. To penetrate or pass through the pores of a body without rupture of its parts.

perminal. A trade name for a sodium alkylnaphthalene sulfonate; used as a wetting agent.

permissible explosive. See *explosive*.

permittivity. Dielectric constant.

permivar. An alloy of 45 % Ni, 25 % Co and 30 % Fe which has a high magnetic permeability and a low hysteresis loss; used in the cores of loading coils for telephone circuits.

permutation. (1) Substitution, *e.g.*, of radicals. (2) Transmutation.

permutite. $Na_2Al_2H_6Si_2O_8$. An artificial sodium aluminum silicate, (zeolite), obtained by melting aluminum silicate, sodium carbonate and sand together. A granular powder, used for softening water, as the sodium can be replaced by calcium, magnesium, iron, or manganese. It can be regenerated by a strong solution of sodium chloride: (a) hard water + Na-permutite = soft water + Ca-permutite. (b) Ca-permutite + NaCl = $CaCl_2$-solution + Na-permutite. **natural-** A zeolite mineral, boronite or refinite, used for water softening. Cf. *regeneration*. Also used for estimating ammonia in blood and urine.

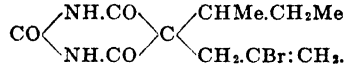
permutoid reaction. A reaction analogous to the permutite process for softening water; *i.e.*, double decomposition between a soluble and insoluble substance.

pernambuco. Lima wood, Nicaragua wood. The red wood from *Caesalpinia echinata*, a Leguminosae, used in dyeing.

pernitric acid. HNO_4. An acid of doubtful existence.

pernocton. Pernoston.

pernoston. $C_{11}H_{15}O_3N_2Br$ = 303.03. β-bromoallyl-*sec.* butylbarbituric acid, pernocton.



A colorless solid, m.132, soluble in alcohol, and used as a hypnotic preanesthetic.

Pernot furnace. A reverberatory puddling furnace with a circular inclined hearth, used in making steel.

peronine. $C_{24}H_{25}O_3N.HCl$ = 411.8. Benzylmorphine hydrochloride. A colorless, odorless powder, slightly soluble in water, soluble in alcohol; used as a narcotic.

perosis. Displacement of the ankle-joint of chickens, due to manganese deficiency.

perosmic. A compound of octavalent osmium. **p. acid.** See *osmic acid*.

Pérot lamp. A mercury-vapor lamp; used as a light source for polariscopes, spectroscopes and other optical measuring instruments.

peroffskite. The mineral $CaTiO_3$.

peroxidase. (1) An enzyme of vegetable origin that splits hydrogen peroxide into water or metal peroxides into the corresponding oxide and oxygen. (2) A substance which activates peroxides. Cf. *catalase*.

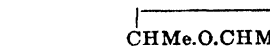
peroxide. (1) Superoxide. A derivative of hydrogen peroxide or a compound containing the bivalent —O—O— or $=O_2$ group, in which two oxygen atoms are singly linked. They liberate hydrogen peroxide with acids and are strong oxidizing agents; as H_2O_2, Na_2O_2, or BaO_2. (2) Used loosely for dioxides (q.v.) which liberate oxygen with acids. **acid-** A compound of the type $(RCO)_2O_2$. **p. of hydrogen.** Hydrogen peroxide.

peroxy- A prefix indicating an acid or its salt derived by substitution from hydrogen peroxide.

peroxydisulfuric acid. Persulfuric acid.

peroxydol. Sodium perborate.

perparaldehyde. $C_6H_{12}O_4$ = 148.1.



A thin oil, m.9°C, b.$_{12mm}$45, insoluble in water, soluble in organic solvents.

perpetuum mobile. Perpetual motion. A device that is supposed to run without power.

perphosphoric acid. $H_4P_2O_8$ = 194.03. A crystalline solid.

perrhenate. A compound of the type $MReO_4$; colorless, and except those of Ag, Tl, K, Rb and Cs, soluble in water.

perrhenic acid. $HReO_4$ = 251.32. A colorless, stable powder.

Perrin Jean. –1942. A French chemist and physicist noted for his researches in colloidal chemistry and atomic structure. **P. equation.** A mathematical equation which connects the gas laws with the distribution of particles in a colloidal system, such as an emulsion or suspension:

$$\frac{4}{3}\pi r^3 g\,(D - d)h = \frac{RT}{N}\ln\frac{n_1}{n_2}$$

where r is the radius of the particles, D their density and d the density of the medium; g, gravitational acceleration; n_1 and n_2 the number of particles per unit volume in two layers of liquid which are a distance, h, apart; N, Avogadro's number; R the gas constant; and T, the absolute temperature.

perry. A fermented beverage made from pear juice, analogous to cider from apple juice.

persalt. A salt having the highest valence number of an acid-forming element; as, perchromate, permanganate, perchlorate.

perseite. Perseitol.

perseitol. $C_7H_{16}O_7$ = 212.2. Perseite. A heptavalent alcohol, $CH_2OH(CHOH)_5CH_2OH$, from the leaves and fruits of *Laurus persea*, Lauraceae, a tropical tree. Colorless needles, m.188, slightly soluble in water or alcohol. It occurs as l- and d- optically active compounds.

perseulose. $C_7H_{14}O_7$ = 210.11. A keto-heptose, m.110, produced by sorbose bacteria from perseitol.

Pershbecker furnace. A rotating furnace, heated by wood, for roasting mercury ores.

Persian red. Indian red.

persilicic. An acid or acidic rock that contains more than 60 % of silica.

persimmon. The fruit-bearing trees *Diospyros virginiana* of North America and *D. kaki* of China and Japan (Ebenaceae).

persio. Orchil.

personal equation. The differences in reading scientific measuring instruments or in the findings of chemical operations, that are due to temperamental or other inherent qualities or habits of the observers.

persorption. The intimate and almost molecular mixture of a gas and solid due to absorption; *e.g.*, nitrogen on charcoal. Cf. *sorption.*

Persoz, Jean François. 1805–1868. A French technical chemist and noted author. **P.'s solution.** A solution of basic zinc chloride (10 gm $ZnCl_2$, 10 cc. H_2O, 2 gm ZnO) able to dissolve silk but not wool.

perspex. Trade name for a transparent polymerised methyl acrylate plastic, n_D.1.4949–1.4986.

perstoff. Diphosgene.

persulfate. A salt derived from persulfuric acid, which contains the $=S_2O_8$ radical; made by the electrolysis of sulfate solutions:

$$Na_2SO_4 + SO_4^{--} = Na_2S_2O_8 + 2(-).$$

persulfide. A sulfide that contains more sulfur than is required by the normal valency of the element; as, Na_2S_2.

persulfuric acid. $H_2S_2O_8$ = 194.14. An acid obtained by electrolyzing sulfuric acid, $(HO.SO_2.O)_2$. It occurs in lead accumulators, and is a strong oxidizing agent.

perthio. The divalent radical =S=S.

perthiocarbonates. Salts of the type Na_2CS_4 formed from a solution of carbon disulfide in alkali disulfides.

pertusarene. $C_{60}H_{100}$ = 820.78. A solid hydrocarbon from the lichen, *Pertusaria communis.*

Peru apple. Stramonium. **P. balsam.** Indian balsam. A reddish brown balsam from *Myroxylon (Toluifera) pereirae*, a Leguminosae of tropical America; used medicinally and contains 60 % cinnamein.

peruol. Benzyl benzoate.

peruscabin. Benzyl benzoate.

peruvian balsam. Peru balsam. **p. bark.** Cinchona.

peruvin. Cinnamic alcohol.

peruviol. Nerolidol.

pervaporation. The evaporation of a liquid through a dialyzing membrane, such as collodion or parchment.

pervesterol. A sterol (q.v.) isolated from the fat of algae.

pervious. Allowing the passage of fluids. Permeable; passable.

pervitine. Desoxyephedrine (q.v.).

perylene. $C_{20}H_{12}$ = 252.2. The pentacyclic hydrocarbon $C_{10}H_6{=}C_{10}H_6$, $\alpha\alpha\alpha'\alpha'$-dinaphthylene; m.274.

peryllartine. $C_{10}H_{15}ON$ = 165.1. Perillaldehyde-α-antialdoxime, $C_6H_8.CMe.CH_2.CHNOH$. A compound which is 2000 times sweeter than sugar. Cf. *perillaldehyde.*

pestle. A blunt, rounded instrument, for pounding drugs or chemicals in a mortar or ores in a stamp mill.

petalite. $LiAl(Si_2O_5)_2$. A native lithium aluminum silicate.

petalon. The hypothetical disk-shaped nucleus of helium.

pethidine. The ethyl-hydrochloride of 1-methyl-4-phenyl piperidine-4-carboxylic acid. An aspirin substitute.

Petit, Alexis Therese. 1791–1820. A French physicist, noted as an investigator of specific heats. Cf. *Dulong-Petit law.*

petitgrain oil. An essential oil distilled from the leaves and fruits of *Citrus bigardia.* A yellowish liquid resembling neroli oil, d.0.887–0.90; insoluble in water, soluble in alcohol or ether. Used in perfumery to adulterate neroli oil; contains linalool, limonene and esters. **p. citronier oil.** The essential oil from the unripe fruits of *Citrus medica*, d.0.869–0.878; it contains citral, and esters of linalool.

Petri dish. A flat, shallow, circular glass dish, used for bacterial cultures.

petrifaction. Mineralisation, silification. The process of changing organic matter into stone or stone-like substances by the gradual infiltration and replacement of the tissues by mineral matter.

petrified wood. Fossil wood that has been gradually changed into stone by the slow infiltration of silica, the minutest details of its organic structure being preserved.

petrify. To convert into stone.

Petroff reagent. A sulfonic-acid of non-paraffinic hydrocarbons. A by-product obtained in the refining of petroleum oils with fuming H_2SO_4; used as a catalyst in the manufacture of fats by Twitchell's method.

petrographical. Pertaining to the description of rocks and stones.

petrography. The branch of science that deals with rocks and stones as aggregates of minerals, and their chemical and physical examination and description. Cf. *petrology*.

petrohol. Isopropyl alcohol synthesized by hydration of propylene from petroleum cracking stills.

petrol. (1) Motor spirit or gasoline. The fraction of crude petroleum distilling between 40–150°C. It consists chiefly of C_6H_{14}, C_7H_{16}, and C_8H_{18}. (2) Petroleum ether.

petrolate. A general term for products derived from petroleum, q.v.

petrolatum. Petroleum jelly, vaselin, paraffin ointment, cosmolin, fossolin, adeps mineralis, yellow petrolatum. A purified mixture of semi-solid hydrocarbons obtained from petroleum as a yellow jelly-like mass, d.0.82–0.85, m.34–54, soluble in alcohol, ether, or chloroform. Used externally as an ointment base, for lubricating, for cleaning compounds, greasing materials, rust prevention and leather dressing. **liquid-** A colorless, non-fluorescent, odorless, and tasteless mixture of liquid hydrocarbons from petroleum, d.0.88–0.89. Used medicinally under various trade-names as an internal lubricant. **yellow-** Petrolatum. **white-** Albolene. A decolorized petrolatum used as an ointment base.

p. album. Petrolatum, white. **p. jelly.** Petrolatum. **p. liquidum.** Liquid p.

petrolene. (1) Asphalt. (2) Malthene. Those oily or soft constituents of bitumen which are soluble in petroleum spirit.

petroleum. (1) Mineral oil, rock oil, coal oil, earth oil, seneca oil, crude oil, naphtha. A native mixture of a solution of gaseous, liquid and solid hydrocarbons, forming a thick, brown or yellow oil, obtained from wells, springs, and lakes, d.0.78–0.97 (extreme limits 0.65–1.07); insoluble in water, soluble in alcohol, ether, or chloroform. (2) The fraction of crude petroleum distilling at 150–300°C. **p. asphalt.** The residues from Trinidad petroleum. **p. coke.** The residue from the distillation of petroleum; used in metallurgical processes, in carbon pencils, and in making dry batteries. It may contain vaselin or paraffin wax. **p. ether.** See *petroleum fractions*. **p. fractions.** The products obtained by the fractional distillation of petroleum:

B.P.	*Composition*
0°C, cymogen	C_4H_{10}
18–21°C, rhigolene	C_4H_{10}; C_5H_{12}
40–60°C, petroleum ether	C_5H_{12}—C_6H_{14}
60–200°C, gasolene	C_6H_{14}—$C_{10}H_{22}$
70–90°C, naphtha	C_6H_{14}—C_7H_{16}
90–120°C, ligroin	C_7H_{16}—C_8H_{18}
120–150°C, benzine	C_8H_{18}—C_9H_{20}
150–300°C, kerosene, coal oil, photogene	C_9H_{20}—$C_{16}H_{34}$
over 300°C, lubricating oils:	
light	C_{12} to C_{20}
medium	C_{16} to C_{22}
heavy	C_{18} to C_{24}
300°C, paraffin oil, liquid petrolatum, albolene, stanolax, nujol, etc.	C_{10} to C_{18}
M.P.	
38–50°C, vaselin, petrolatum, petroleum jelly	C_{20} to C_{22}
45–65°C, paraffin, parowax, cerolene	C_{23} to C_{25}
50–80°C, paraffin wax	C_{27} to C_{30}

In practice, however, the various fractions or "cuts" are:

(1) below 200°F. at 1 atm., gasolene or naphtha	2–80 %
(2) from 200–275°F. at 1 atm., kerosene or coal oil	3–25 %
(3) all vacuum fractions to 40 mm., gas oil (η below 50 sec.)	7–50 %
(4) light lubricating oil (η = 50–99)	2–15 %
(5) medium lubricating oil (η = 100–199)	3–20 %
(6) viscous lubricating oil (η exceeds 199)	0–22 %

where η is the Saybolt viscosity in seconds. **p. furnace.** An oil burner. **p. jelly.** Petrolatum. **p. naphtha.** Benzine. **p. ointment.** Petrolatum. **p. pitch.** Asphalt. **p. refining.** The industrial processes concerned with the separation of the many constituents of petroleum, including cracking, decolorizing, distilling, filtering, and skimming of the various products. **p. spirit.** Ligroin.

PETROLEUM

(Approximate typical composition)

A. Paraffin base: mainly C_nH_{2n+2} (from C_4H_{10} to $C_{35}H_{72}$); small amounts of C_nH_{2n} ($C_{31}H_{62}$ to $C_{26}H_{52}$) and C_nH_{2-x}. Sulfur occurs as thiophanes, $C_nH_{2n}S$.

	%C	%H	%N	%O	%S
Pennsylvania[1]	85	14	0.05	1.4	1.0
Midcontinent[6]	84	13	0.8	0.04	0.8
Ohio[1]	84	13	0.2	....	0.7
Canada[2]	83	13	0.15	....	0.4

B. Naphthene base (or *asphalt base*): mainly C_nH_{2n} (naphthenes and olefines); moderate

	%C	%H	%N	%O	%S
East Indian Islands[3,4]	87	12	0.3	0.3	0.4
Argentine	87	11	0.5	0.5	0.5
Roumania	86	13	...	...	0.2
Russia[4]	86	12	0.2	1.0	0.2
California[3,4]	86	11.5	1.1	...	0.8
Galicia	85	14	0.5	0.3	0.2
Texas[3,4]	85	12	0.5	0.5	1.2
Colombia[4,5]	85	12	0.5		
Japan[4]	84	13	1.0	1.0	0.5
Mexico[5]	83	11	0.5	1.5	4.0

[1] rich in paraffins; [2] rich in olefines; [3] rich in asphalts; [4] rich in naphthenes; [5] rich in aromatic hydrocarbons; [6] contains both, paraffins and naphthenes.

amounts of C_nH_{2n-x}, where x is 2, 4, 6, 8, etc. up to 20; also some aromatic hydrocarbons, little or no C_nH_{n-2}.

The World output in 1940 was 278 million tons, chiefly from U. S. > Venezuela > Russia > Roumania > Iraq > Dutch East Indies > Mexico.

petroline. A paraffin obtained by distillation of Indian petroleum.

petrology. Lithology. A branch of science that deals with the origin, (petrogeny) structure, and composition (petrography) of rocks and stones.

petromortis. Garage poison.

petroselic acid. Petroselinic acid.

petroselinic acid. $C_{18}H_{34}O_2$ = 282.37. ϵ-Octadecenic acid, $Me(CH_2)_{10}CH:CH(CH_2)_4COOH$. An unsaturated fatty acid and isomer of oleic acid, in parsley seeds.

petroselinum. (1) Parsley. The dried herb of *Petroselinum sativum*, an umbelliferous plant; used medicinally and in cooking. (2) Parsley seeds, q.v.

petrosilane. $C_{20}H_{42}$ = 282.5. A saturated hydrocarbon, m.69, in the unsaponifiable matter of parsley oil.

petrosilex. Chert. A hard siliceous rock or flint stone; used for grinding pottery materials.

petrous. Hard or stone-like.

petrox. Petroxolin.

petroxolin. Petroxolinum liquidum, liquid petrox, petrolatum saponatum liquidum. A paraffin oil that has been saponified with ammonium oleate. A yellowish-brown liquid, insoluble in water; miscible with alcohol, ether, or chloroform; used medicinally in external preparations.

Pettenkofer, Max von. 1818–1901. A German chemist, noted for his research in medical chemistry and hygiene. **P. test.** (1) A test for bile acids in urine made by dropping the material into a mixture of sugar and sulfuric acid. A crimson color indicates the presence of bile acids. (2) The determination of carbon dioxide in air by absorption in a known volume of standard baryta solution, and titration of the excess with alkali.

petzite. A native silver and gold telluride, $(Ag, Au)_2Te$.

peucedanin. $C_{16}H_{16}O_4$ = 272.1. Imperatorin. A principle derived from the root of *Peucedanum officinale*, an umbelliferous plant (hog fennel); used medicinally as a diuretic.

pewter. An alloy 83–75 % tin and 0–20 % lead; with 0–7 % antimony and 0–4 % copper, that was used extensively for household utensils; it contains no lead.

P.F. Abbreviation for phenol-formaldehyde plastic.

Pfeilring reagent. A fat-splitting catalyst made by the action of sulfuric acid on aromatic hydrocarbons and castor oil. Cf. *Twitchell.*

Pfeufer's green. A bluish-green dye obtained from the fungus, *Chlorospenium aeruginosum*, by extraction with chloroform.

pfund. German for pound.

pH, p_H. The symbol for the logarithm of the reciprocal of the hydrogen ion concentration: $pH = \log 1/C_{H^+}$.

Ph. Abbreviation for phenyl, C_6H_5—.

Ph.B. Abbreviation for British Pharmacopoeia. (B.P.)

Ph.C. Abbreviation for Pharmaceutical Chemist.

Ph.D. Abbreviation for Doctor of Philosophy.

Ph.G. Abbreviation for Graduate of Pharmacy.

phacolite. Chabazite.

phacometer. An instrument used for measuring the refractive index of a lens.

phaeo-, phæo-. See *pheo-*.

phagocytes. The cells of an organism which envelop and digest any invading microorganism or harmful cells; two types: **fixed-** those located in the connective tissue (endothelial cells); and **motile-** those that move in the blood and lymph (leukocytes).

phagocytolysis. The destruction of phagocytes by bacteria or other microorganisms.

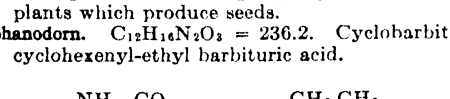
phagocytosis. The destruction of microorganisms, as bacteria or protozoa, by the phagocytes or scavengers of the body. Cf. *Metshnikoff.*

phagolysis. The destruction or dissolution of phagocytes.

phallin. A toxic protein from *Amanita phalloides*, a poisonous mushroom; it causes hemolysis.

phanerogamia. The large group of flowering plants which produce seeds.

phanodorm. $C_{12}H_{16}N_2O_3$ = 236.2. Cyclobarbital, cyclohexenyl-ethyl barbituric acid.



A white crystalline powder, m.171–174, slightly soluble in water, soluble in alcohol; used as a hypnotic.

Phar. D. Abbreviation for Doctor of Pharmacy.

Phar. M. Abbreviation for Master of Pharmacy.

pharaoh's serpents. A stick of mercuric thiocyanate, q.v. When ignited it glows and swells to a voluminous ash that resembles a moving worm or serpent, during its formation. It liberates N_2, CS_2 and Hg-vapor and leaves a gray residue of *mellon*, q.v.

pharmaceutic. Pertaining to drugs. **p. chemistry.** The analysis of drugs, microscopically and chemically; and the isolation of their active constituents.

pharmacist. An apothecary or druggist.

pharmacodynamics. A branch of science that deals with the effects of drugs on living organisms.

pharmacognosy. A branch of science that deals with the identification, physical properties and quality of crude drugs.

pharmacolite. A native calcium arsenate, $CaHAsO_4.2H_2O$.

pharmacologist. One who studies drugs and their effects on living organisms.

pharmacology. That branch of science dealing with drugs, their origin and composition (*pharmacy*), identification (*pharmacognosy*), and effects on living organisms (*pharmacodynamics*).

pharmacopeia, pharmacopœia. Lists of drugs and chemicals issued by the governments of many countries. It contains a description of each drug, its composition, tests for identification and purity, and its medicinal doses. Substances listed are called "official" or "officinal," and must have the specified degree of purity if intended for medical use.

Ph. Arg. = Farmacopoeia Nacional Argentina.
Ph. Austr. = Pharmacopoeia Austriaca.
Ph. Belg. = Pharmacopoeia Belgica.
Ph. Brit. = British Pharmacopoeia. B.P.
Ph. Chil. = Farmacopea Chilena.
Ph. Dan. = Pharmacopoeia Danica.
Ph. Españ. = Farmacopea official Española.
Ph. Fenn. = Pharmacopoeia Fennica.

Ph. Fr. = Codex Medicamentarius Gallicus.
Ph. Germ. = Deutsches Arzneibuch. D.A.
Ph. Graec. = Pharmacopoeia Graeca.
Ph. Helv. = Pharmacopoeia Helvetica.
Ph. Hisp. = Farmacopoeia official Española.
Ph. Hung. = Pharmacopoeia Hungaria.
Ph. Ital. = Farmacopoeia ufficiale del regno d'Italia.
Ph. Japon. = Pharmacopoeia Japonica.
Ph. Mex. = Nueva Farmacopoeia Mexicana.
Ph. Ndl. = Pharmacopoeia Nederlandica.
Ph. Norw. = Pharmacopoeia Norvegica.
Ph. Pol. = Polish Pharmacopoeia.
Ph. Port. = Pharmacopoeia Portuguezá.
Ph. Rom. = Pharmacopoeia Romana.
Ph. Ross. = Pharmacopoeia Rossica.
Ph. Serv. = Pharmacopoeia Servica.
Ph. Svec. = Svenska Farmacopen.
Ph. Ven. = Pharmacopoeia Venezolana.
U.S.P. = United States Pharmacopoeia.

In addition to these official lists there are in use:
N.F. = National Formulary (U. S. A.).
N.N.R. = New and Non-official remedies, (American Medical Association).
B.P.C. = British Pharmaceutical Codex.
E.P. = The Extra Pharmacopoeia (British).

The pharmacopoeias in use in different countries besides those mentioned above are:
Brazil = Ph.Fr., Ph.Port. and Ph.Hisp.
Central America = Ph.Fr., Ph.Hisp., and Ph. Mex.
China = Native druggists use the old encyclopedia, Pen-tsao-kang-mu; and foreign druggists their home-country pharmacopoeia.
Cuba = Ph.Fr., U.S.P.
Peru = Ph.Fr., U.S.P., and Ph.Hisp.
Turkey = Ph.Fr., and Ph.Germ.

Cf. *dispensatory, formulary.*

pharmacophore. An organic radical supposed to be the active group of a drug and to combine with a group of the protoplasm. (See *glucophore, osmophore, chromophore.*)

pharmacosiderite. A native arsenate of iron.

pharmacotherapy. The treatment of diseases with drugs.

pharmacy. The art of preparing drugs for medicinal use.

phase. (1) A solid, liquid or gaseous homogeneous substance, that exists as a distinct and mechanically-separate portion in a heterogeneous system; hence, any homogeneous parts of a system that are separated from one another by definite physical boundaries:

gaseous mixture	single phase
liquid solution	single phase
solid solution	single phase
two immiscible liquids	two phases
each solid	one phase.

Cf. *colloid, zones, micelle.* (2) The succession of electrical impulses of an alternating current. (3) A stage in the growth of microorganisms. (4) A subdivision of the changes occurring in protoplasm during karyokinesis, q.v. **activatory-** The active stage or the rapid growth of an organism, especially bacteria. **continuous-** External or enclosing phase. The surrounding or dispersion medium in a heterogeneous mixture. (See *colloids.*) **discontinuous-** Dispersed. **dispersed-** Internal or enclosed phase. The solute or insoluble part of a colloidal solution, as distinct from the solvent. **dispersion-** Continuous-. **enclosed-** The discontinuous or separated medium in a heterogeneous mixture. **enclosing-** Continuous-. **inhibitory-** The passive stage or slow growth of an organism. **oriented-** A misnomer for zone, q.v. **suspended-** Enclosed p.

p. converter. A device for changing the phases of an alternating electric current. **p. reversal.** The change of the components of an emulsion; thus, an emulsion of oil in water, under certain conditions, may be converted into an emulsion of water in oil. **p. rule.** Gibbs phase-rule. A mathematical generalization of the relations existing between systems in equilibrium: $P + V = C + 2$. The sum of the number of phases, P, and the variance or degrees of freedom, V, is equal to the number of components, C, plus 2. From this it follows that the degree of variability or of freedom (the variance) is $V = C + 2 - P$. The possibilities are:

V is 0 = nonvariant (a *point* on a diagram)
s ⇆ l ⇆ g
V is 1 = monovariant (a *line* on a diagram)
s ⇆ l; l ⇆ g or s ⇆ g.
V is 2 = divariant (an *area* on a diagram)
s alone; l alone or g alone.

Thus, for water:

liquid ⇆ vapor	C = 1, P = 2, and V = 1.
solid ⇆ vapor	C = 1, P = 2, and V = 1.
solid ⇆ liquid	C = 1, P = 2, and V = 1.
solid⇆liquid⇆vapor	C = 1, P = 3, and V = 0.
salt(dissolved)⇆salt (solid)	C = 2, P = 2, V = 2.

phaselin. An enzyme derived from the bean of *Dilkas mexicana*, resembling papain in action.

phaseolin. The chief protein of the navy bean, *Phaseolus vulgaris.*

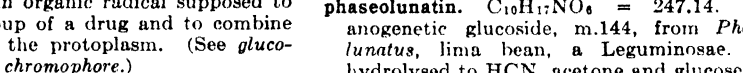
phaseoline. An alkaloid obtained from string beans, *Phaseolus vulgaris.*

phaseolunatin. $C_{10}H_{17}NO_6$ = 247.14. A cyanogenetic glucoside, m.144, from *Phaseolus lunatus*, lima bean, a Leguminosae. It is hydrolysed to HCN, acetone and glucose.

phaseomannite. Inositol.

phasine. A group of vegetable proteins derived from seeds, that agglutinate the red blood corpuscles.

phasotropy. A form of dynamic isomerism in which the hydrogen atom of azoamino compounds, amidines, and formazyl derivatives oscillates from one nitrogen to the other:



phellandrene. $C_{10}H_{16}$ = 136.1. $\Delta^{1,5}$-*p*-menthadiene, 1(7).2-p-menthadiene, *3*-iso-propyl-*6*-methylene cyclohexene. A terpene from the seeds of *Phellandrium aquitanium* (water fennel) an Umbelliferae, and a constituent of certain eucalyptus oils, elemi oil, and the oil of water hemlock. A colorless liquid, optically active, b.176.

phellonic acid. $C_{22}H_{42}O_3$ = 354.3. A constituent of cork.

phemerol. The *p-tert*-octylphenoxyethoxyethyl-dimethylbenzyl-ammonium chloride, a cationic detergent and antiseptic.

phemitone. Mebaral, mephobarbital, prominal. N-methyl-5-phenyl-5-ethylbarbituric acid; used in the treatment of epilepsy.

phen- (1) A prefix derived from "phenol" and indicating a derivation from benzene. (2) A suffix. See *-fen.*

phenacaine. Holocaine.

phenacetein. Phenacetolin.

phenacethydrazine. Pyrodin.

phenacetin. The British term for acetophenetide, q.v. **methyl-** $C_{11}H_{15}O_2N$ = 193.1. Colorless crystals, soluble in alcohol or ether; used medicinally as an antipyretic. **p. urethane.** Thermodin. Cf. *phenocoll, phesin.*

phenacetol. Phenoxy acetone.

phenacetolin. $C_{16}H_{12}O_2$ = 236.1. Phenacetein. A red powder, used as an indicator in acidimetry; yellow with acids, red with alkalis.

phenacite. Be_2SiO_4. A native silicate of beryllium, sometimes used as a gem.

phenacyl. The monovalent radical, $PhCOCH_2$—. **p. alcohol.** See *hydroxyacetophenone.* **p. bromide.** $PhCOCH_2Br$. A white powder, used as a reagent for hydroxy compounds.

phenacylidene. The divalent radical, PhCOCH=.

phenacylidin. $C_{15}H_{15}O_2N$ = 241.2. C_6H_4-(OMe)NH.CH_2COPh. A colorless powder, insoluble in water; used as an antipyretic in veterinary medicine.

phenakitiscope. An early name for the cinematograph.

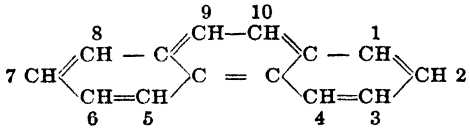
phenalgin. $C_6H_8NH_3$ = 94.1. Ammoniophenylacetanilide. Colorless crystals, soluble in alcohol; used medicinally as an antipyretic.

phenamine. Phenocoll.

phenanthrahydroquinone. (9:10)$C_{14}H_8(OH)_2$ = 210.15. *9.10*-Dihydrophenanthrene. A solid, soluble in alcohol, ether or water, m.146.

phenanthraquinone. Phenanthrenequinone.

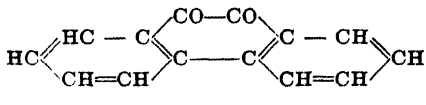
phenanthrene. $C_{14}H_{10}$ = 178.1. Phenanthrine. An isomer of anthracene obtained from coal tar:



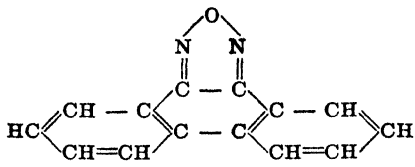
Colorless, shining scales or leaflets, d.1.063, m.99, b.340, insoluble in water, soluble in alcohol or ether; used in the synthesis of dyes and drugs. **benzo-** Chrysene. **dihydroxy-** Phenanthrahydroquinone. **hydroxy-** Phenanthrol. **methyl-*i*-propyl-** Retene. **tetrahydro-** Tetranthrene.

p. dione. Phenanthrenequinone. **p. hydroquinone.** Phenanthrenequinone.

phenanthrenequinone. $C_{14}H_8O_2$ = 208.1. Phenanthrene hydroquinone, phenanthraquinone, dioxyphenanthrene. An oxidation-product of phenanthrene. Orange yellow needles, m.205, insoluble in water, but soluble in alcohol, ether, or chloroform.



p. monoxime. $C_{14}H_9O_2N$ = 223.1. A compound derived from phenanthrenequinone by the replacement of one =CO group by =C=N.OH. Colorless crystals, m.158; used in organic synthesis. **p. dioxime.** $C_{14}H_{10}O_2N_2$ = 238.2. A compound derived from phenanthraquinone by the replacement of the two =C=O groups by two =C=N.OH radicals. **p. dioxime anhydride.** $C_{14}H_8ON_2$ = 220.1. A furazane derivative

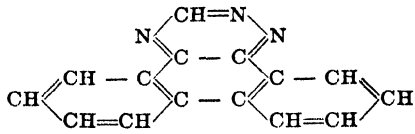


Colorless crystals, m.181.

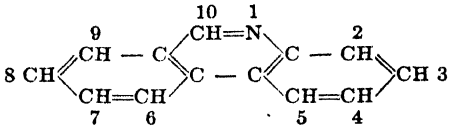
phenanthrenol. Phenanthrol.

phenanthrenone. Phenanthrone.

phenanthriazine. $C_{15}H_9N_3$ = 231.2. The hetero cyclic compound,

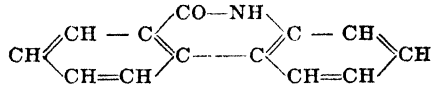


phenanthridine. $C_{13}H_9N$ = 179.1. The heterocycle compound, 3.4-benzoquinoline.



Colorless crystals, m.104, b.365; soluble in alcohol. The derivatives are sometimes designated as: 1 = n (nitrogen), 2 = α, 3 = β, 4 = γ, 5 = δ, 6 = δ', 7 = γ', 8 = β', 9 = α', 10 = μ (meso). **dihydroketo-** Phenanthridone.

phenanthridone. $C_{13}H_9ON$ = 195.07. The heterocyclic compound, dihydroketophenanthridine,



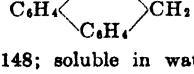
Colorless crystals, m.293; soluble in alcohol; used in organic synthesis.

phenanthrine. Phenanthrene.

phenanthrol. $C_{14}H_9OH$ = 194.1. Hydroxyphenanthrene. Colorless crystals, m.112, slightly soluble in water, soluble in alcohol or ether; used in organic synthesis.

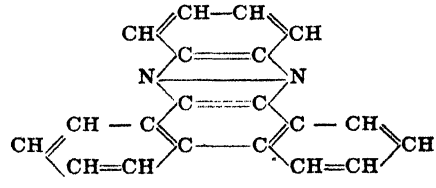
phenanthrolines. $C_{12}H_8N_2$ = 180.2. A series of heterocyclic compounds derived from phenanthrene by substituting two nitrogen atoms for two CH groups in the ring. **ortho-** or *1.10*-compound. Used as an oxidation-reduction indicator. **meta-** or pseudo- or *2,9*-compound. **iso-** or para- or *3,8*-compound.

phenanthrone. $C_{14}H_{10}O$ = 194.15.



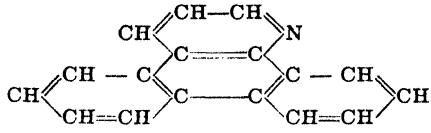
A solid, m.148; soluble in water, alcohol or ether.

phenanthrophenazine. $C_{20}H_{12}N_2$ = 280.10. The heterocyclic compound $\alpha\gamma$-dibenzophenazine, phenophenanthrazine,

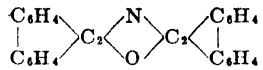


Colorless crystals, m.217, soluble in alcohol; used in organic synthesis.

phenanthroquinoline. $C_{17}H_{11}N$ = 229.1. Dibenzoquinoline. The heterocyclic compound,



phenanthroxazine. $C_{28}H_{16}ON$ = 382.1. The heterocyclic compound,

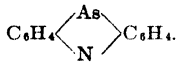


phenanthryl. Describing a group of five isomeric radicals, $C_{14}H_9$—, derived from phenanthrene.

phenanthrylene. The bivalent radical, $C_{14}H_8$—, derived from phenanthrene.

phenaphthacridone. Phenonaphthacridone.

phenarsazine. $C_{12}H_8AsN$ = 240.92. The heterocyclic compound



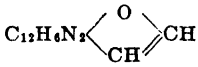
phenarsen. Dichlorophenarsine hydrochloride (q.v.).

phenate. Phenoxide, carbolate. A derivative of phenol of the type, C_6H_5OM, in which M is a monovalent metal; as, sodium, potassium.

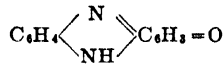
phenazine. $C_{12}H_8N_2$ = 180.1. Dibenzoparadiazine, azophenylen, *5.6*-naphthodiazine.

Yellow needles, m.170, b.360, soluble in water, alcohol, or ether; used in organic synthesis and in the manufacture of dyes. **benzo-** See *benzophenazine.* **dibenzo-** Phenanthrophenazine. **dibenzyl-** See *dibenzophenazine.* **naphtho-** Benzophenazine. **phenanthro-** See *phenanthrophenazine.*

phenazinfurane. $C_{14}H_8ON_2$ = 220.2. The heterocyclic compound derived from phenazine,



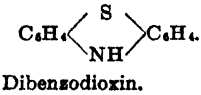
phenazone. (1) $C_{13}H_8N_2O$ = 196.2. The heterocyclic compound,



Light-green, prismatic crystals, m.156, b.360; soluble in alcohol or ether. (2) The name for antipyrine in the British Pharmacopeia.

phenazonium. Derivatives of phenazone in which one of the nitrogen atoms is pentavalent. Cf. *flavinduline.*

phenazothionium. $C_{12}H_9NS$ = 199.1. The heterocyclic compound.



phendioxin. Dibenzodioxin.

phene*. A synonym for the benzene* ring.

phenedin. Phenacetin.

phenegol. $C_{12}H_{10}O_{12}N_2S_2HgK_2$. Mercury potassium nitro-p-phenolsulfate, $Hg(PhONO_2.SO_3K)_2$. A reddish-brown powder, used medicinally as an antiseptic. See *egol.*

phenenyl. The trivalent radical, $C_6H_3\equiv$.

phenethyl. The monovalent $PhCH_2CH_2$— radical. Cf. *phenetyl.* **p. alcohol.** Benzyl carbinol.

phenethylamine. $C_8H_{11}N$ = 121.14. The amine, $PhCH_2CH_2NH_2$. **alpha-** A colorless liquid, d.0.9395, b.182; insoluble in water, alcohol, or ether. **beta-** A colorless liquid, d.0.9580, b.198; soluble in alcohol, ether, or water. Both are used as a local anesthetic and narcotic. **p-hydroxy-** Tyramine. **p-hydroxy-N-dimethyl-** Nordenine.

phenethylbenzylketone. $C_{16}H_{16}O$ = 224.2. $PhCH_2CH_2.CO.CH_2Ph$. A colorless liquid, b. 324; soluble in alcohol or ether.

phenethylene. Styrene.

phenetidine. $C_8H_{11}ON$ = 137.14. Aminoethoxybenzene, ethoxyaniline, amino-phenetole, *p*-aminophenol ethyl ether, $NH_2.C_6H_4OEt$. **ortho-** A colorless liquid, b.228; soluble in water. **meta-** A colorless liquid, b.$_{(100mm)}$ 180; soluble in water. **para-** A colorless solid, m.2.4, b.244; soluble in water. The para-compound is used in the manufacture of phenacetin and other synthetic drugs, *e.g.*, citrophen. **aceto-** Phenacetin. **acetophenone-** Malarin. **N-acetyl-** Phenacetin. **aconityl-** Apolysin. **ethylcarbonate-** Eupyrine. **methoxyacet-** Kryofine. **monocitryl-** Apolysin. **phenylglycol-** Amygdophenin. **propionyl-** Triphenin. **salicyl-** Saliphen. **salicylal-** Malakin. **valeryl-** Valeridin.

p. camphorate. Colorless crystals, used medicinally as a febrifuge. **p. salicylate.** Phenosal. **p. tartrate.** Vinopyrine.

phenetidines. A group of synthetic drugs derived from phenetidine.

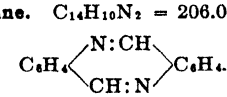
phenetidino. The monovalent radical, $EtOC_6H_4NH$—.

phenetole. $C_8H_{10}O$ = 122.1. Phenylethylether, ethoxybenzene*, Ph.O.Et. A colorless liquid, d.0.892, m.−34, b.172; insoluble in water, soluble in alcohol or ether. **acetamido-, acetylamino-** Phenacetin. **amino-** Phenetidine. **azo-** See *azophenetole.*

phenetyl. Ethoxyphenyl. The monovalent radical, $EtOC_6H_4$—. Cf. *phenyl.* **p. urea.** Sucrol.

phengite. Muscovite.

phenhomazine. $C_{14}H_{10}N_2$ = 206.09.



phenic acid. Phenol. **di-** See *diphenic acid.*

phenicate. (1) Phenate. (2) To sterilize or disinfect with phenol.

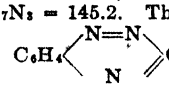
phenidine. Phenacetin.

phenil. Phenyl.

phenin. Phenacetin.

phenixin. Carbon tetrachloride.

phenmethyl. The monovalent radical, $PhCH_2$—.

phenmethyltriazine. $C_8H_7N_3$ = 145.2. The heterocyclic compound, 

Colorless crystals, m.89, b.252; soluble in alcohol or ether.

phenmiazin. Quinazoline.

phenobarbital. Luminal.

phenobarbitone. Luminal.

phenocoll. $C_{10}H_{14}O_2N_2$ = 194.12. Phenamine, amidoaceto-p-phenetidine, aminoacetyl-p-phe-

netidine, **glycocoll-p-phenetidine**, $C_6H_4(OEt)$-$NH.CO.CH_2NH_2$. Colorless needles, m.100, slightly soluble in water, soluble in alcohol or ether; used medicinally as an antipyretic. **p. salicylate.** Salocoll.

phenodin. Hematin.

phenoiazine. alpha- Cinnoline. **beta-** Phthalazine.

phenol. (1) See also *phenols*. (2) C_6H_6O = 94.1. Carbolic acid, hydroxybenzene, phenylhydroxide, PhOH, phenic acid, phenylic acid, phenylic alcohol. Colorless needles, d.1.072, m.42, b.182; slightly soluble in water, soluble in alcohol, ether, or glycerol. Used extensively as an antiseptic and disinfectant, and in the manufacture of many dyes and synthetic drugs, plastics and insulating materials. **acetamino-** q.v. **aceto-** Hydroxyacetophenone. **allyl-** Chavicol. **allylmethoxy-** Eugenol. **amino-** See *aminophenols*. **aminodinitro-** Picramic acid. **aminoethyl-** Tyramine. **amyl-** See *amylphenol*. **arsenobis-** Arsenophenol. **benzoylamino-** Hydroxy*benzanilide*. **betel-** Chavicol. **bromo-** See *bromphenols*. **chloro-** A halogenated derivative of phenol. There are many isomers; as,

Chlorophenic acid, $HO.C_6H_4.Cl$	
o-monochlorophenol	m.7, b.173.
m-monochlorophenol	m.33, b.214.
p-monochlorophenol	m.37, b.217.
Chlorophenesic acid, $HO.C_6H_3.Cl_2$	
2.3-dichlorophenol	m.57
2.4-dichlorophenol	m.45, b.210.
2.5-dichlorophenol	m.58, b.212.
2.6-dichlorophenol	m.67, b.220.
3.4-dichlorophenol	m.68, b.253.
3.5-dichlorophenol	m.68, b.233.
Chlorophenisic acid, $HO.C_6H_2.Cl_3$	
2.3.5-trichlorophenol	m.53, b.253.
2.4.6-trichlorophenol	m.68, b.244.
Chlorophenosic acid, $HO.C_6H.Cl_4$	
2.3.4.6-tetrachlorophenol	m.69, $b._{23mm}$164.
2.3.5.6-tetrachlorophenol	m.65.
Chlorophenasic acid, $HO.C_6Cl_5$	
pentachlorophenol	m.188, b.310.

diamino- See *aminophenols*. **dichloro-** See *chloro-*. **dimethyl-** Xylenol. **dimethylaminoethyl-** Hordenine. **dinitro-** Dinitrophenol. **ethyl-** Phlorol. **hexahydro-** Cyclohexanol. **hydroxy-** Dihydroxy*benzene*. **iodo-** See *iodophenol*. **iodized-** A mixture of 20 % iodine, 60 % phenol, and 20 % glycerol, used as an antiseptic. **iodo-** A group of iodized derivatives; as

Iodophenic acid, $HO.C_6H_4.I$	
o-monoiodophenol	d.1.876, m.40.4, $b._{160mm}$187.
m-monoiodophenol	m.40.
p-monoiodophenol	m.94.
Iodophenesic acid, $HO.C_6H_3.I_2$	
2.4-diiodophenol	m.72, b.100.
2.6-diiodophenol	m.68.
3.4-diiodophenol	m.83.
3.5-diiodophenol	m.104.
Iodophenisic acid, $HO.C_6H_2I_3$	
2.4.6-triiodophenol	m.156.

isopropylmethyl- Thymol. **liquefied-** Liquefied carbolic acid. Phenol kept liquid at ordinary temperature by the addition of 13 parts distilled water. **methenylamido-** Benzoxazole. **methoxy-** Guaiacol. **methoxymethyl-** Creosol. **methyl-** Cresol. **methylallyl-** Anethol. **methyl-p-amino-** Metol. **monobrom-** C_6H_4BrOH = 173.1. A brown, oily liquid used as an antiseptic. **monochlor-** C_6H_4ClOH = 128.6. A colorless liquid, used as an antiseptic. **nitro-** See *nitrophenol*. **nitroso-** Quinone monoxime. **propenyl-p.** Anol. **propyl-** Thymol. **seleno-** Selenophenol. **sulfo-** Aseptol. **tetrahydro-** Cyclohexanol. **thio-** See *thio-*. **triamino-** See *aminophenols*. **trichloro-** See *chloro-*. **trimethyl-** (2.3.5-) Isopseudocuminol. (2.4.6-) Mesitol. **trinitro-** Picric acid. **vinyl-enebis-** Stilbenediol.

p. acids. A group of organic compounds that contain both, a hydroxy group attached to a ring, and a carboxyl group:

Monobasic phenol acids.	
hydroxybenzoic acids, salicylic acid	$HO.C_6H_4.COOH$
hydroxytoluic acids	$HO.C_6H_3Me.COOH$
hydroxyphenylacetic acid	$HO.C_6H_4.CH_2.COOH$
hydroxymesitylinic acids	$HO.C_6H_2Me_2.COOH$
hydroxyphenylpropionic acid	$HO.C_6H_4.CH_2CH_2COOH$
dihydroxybenzoic acid	$(HO)_2C_6H_3.COOH$
dihydroxytoluic acids	$(HO)_2.C_6H_2Me.COOH$
dihydroxyphenylacetic acid	$(HO)_2.C_6H_3.CH_2COOH$
trihydroxybenzoic acid, gallic acid	$(HO)_3.C_6H_2.COOH$
Dibasic phenol acids.	
hydroxyphthalic acids	$HO.C_6H_3(COOH)_2$
hydroxyuvitic acids	$HO.C_6H_2Me(COOH)_2$
dihydroxyphthalic acids	$(HO)_2C_6H_2(COOH)_2$

p. bismuth. Bismuth carbolate. **p. blue.** $C_{14}H_{14}N_2O$ = 226.13. Dimethyl amino phenylimide. A blue dye, used as an indicator. **p. camphor.** A mixture of phenol and camphor, used as a germicide. **p. coefficient.** The antiseptic power of a substance compared with phenol as unity; *e.g.*, a disinfectant three times as active as phenol has a phenol coefficient of three. (Cf. *Rideal-Walker test*.) **p. derivatives.** See *phenols*. **p. ethers.** A series of compounds of the general type, Ph—O—R. **p. phthalein.** Phenolphthalein. **p. red.** Phenolsulfonephthalein. **p. sulfophthalein.** Phenol*sulfonphthalein*. **p. tricarboxylic acid.** $OH.C_6H_2.(COOH)_3$ = 226.09. A solid, decomp. 245.

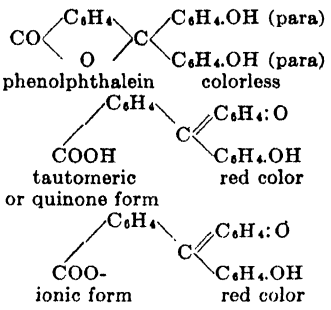
phenolase. An enzyme that oxidizes phenols.

phenolate. (1) To disinfect with phenol, or sterilize a solution by adding phenol. (2) Phenate.

phenolic. Pertaining to phenol.

phenology. The study of bird migrations, with special reference to the influence of climate.

phenolphthalein, phenothalin. $C_{20}H_{14}O_4$ = 318.2. Dihydroxydiphenylphthalide, dioxydiphenylphthalide, p_s-phthalein, phenolax, dioxytriphenylcarbinol carboxylic acid anhydride. White, odorless small triclinic crystals, d.-1.276, m.250, slightly soluble in water, soluble in alcohol or ether, used as an indicator in titrating most acids (colorless with acids, deep red with alkalis); medicinally, as a purgative; and technically, in the synthesis of dyes. The change of color is thought to be due to the formation of a colored ion:



Cf. *phenolphthaline, phthalein, phenolsulfonphthalein, indicators.* **bismuthtetraiodo-** Eudoxine. **mercurytetraiodo-** Apagallin. **sodiumtetraiodo-** Antinosin. **tetrabromo-** An indicator. **tetraiodo-** Nosophen.

phenolphthalide. A compound which contains the Ph.CO.OCR$_2$ group, in which R is an aromatic radical. Compare *fluoran, fluorescein, eosin.*

phenolphthaline. $C_{20}H_{16}O_4$ = 320.23. The water-soluble compound $(C_6H_4OH)_2$:CH.C_6H_4.COOH, m.225, used as a reagent for copper and blood. Cf. *phenolphthalein.*

phenolquinine. Quinine carbolate.

phenols. (1) Arylhydroxides, such as phenol, anethol, phenanthrol and their derivatives, particularly (2) hydroxybenzenes. A group of organic compounds which contains one or more hydroxyl group attached to an aromatic or carbon ring. They may be grouped into:

I. Monoatomic. (Hydroxybenzenes.)
phenol, phenylhydroxide. C_6H_5OH or PhOH
cresols, toluylhydroxide.. $C_6H_4(OH)Me$
xylenols, dimethylhydroxybenzene $C_6H_3(OH)Me_2$
mesitol, trimethylhydroxybenzene $C_6H_2(OH)Me_3$
durenol, tetramethylhydroxybenzene $C_6H(OH)Me_4$
thymol, carvacrol..... $C_6H_3(OH)MePr$
pentamethylphenol..... C_6Me_5OH

II. Diatomic. (Diphenols, or Dihydroxybenzenes.)
catechol, resorcinol, quinol $C_6H_4(OH)_2$
orcinol, homopyrocatechol $C_6H_3Me(OH)_2$
dihydroxyxylol..... $C_6H_2Me_2(OH)_2$
mesorcinol..... $C_6HMe_3(OH)_2$
thymoquinol..... $C_6H_2MePr(OH)_2$

III. Triatomic. (Triphenols, or Trihydroxybenzenes.)
pyrogallol, phloroglucinol. $C_6H_3(OH)_3$
methylpyrogallol..... $C_6H_2Me(OH)_3$

IV. Polyatomic. (Polyphenols, or Polyhydroxybenzenes.)
tetrahydroxybenzene.... $C_6H_2(OH)_4$
pentahydroxybenzene, quercitol $C_6H(OH)_5$
hexahydroxybenzene, inositol $C_6(OH)_6$

Cf. *naphthol, anthrol, aminophenols, phenol acids.* **di-** A p. containing two —OH groups. **poly-** A p. containing four or more —OH groups. **sulfurized-** Syntans. **tri-** A p. containing three —OH groups.

phenolsulfonate. Sulfophenylate, sulfocarbolate. A salt of phenolsulfonic acid, HO.C_6H_4.SO_3M.

phenolsulfonephthalein. $C_{19}H_{14}O_5S$ = 354.2. Phenolred. A sulfuric acid derivative of phenolphthalein, $(OHC_6H_4)_2{=}C\langle^{C_6H_4}_{O}\rangle SO_2$, generally marketed as the monosodium salt. A bright red crystalline powder; slightly soluble in water. Used in pathology as a test for the secreting power of the kidneys; and as a pH indicator changing at 7.7 from yellow (acid) to red (alkaline).

phenolsulfonic acid. $C_6H_4(OH)SO_3H$ = 174.14. A group of three isomeric acids, soluble in alcohol or water, obtained by heating phenol with concentrated sulfuric acid. **ortho-** Aseptol.

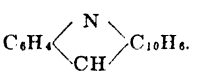
phenolsulfuric acid. Phenyl sulfuric acid.

phenomena. The plural of *phenomenon.*

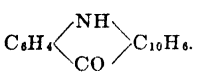
phenomenon. An event or manifestation; that which is apparent, as distinct from that which merely exists.

phenomorpholine. C_8H_9ON = 135.08. Dihydro-*1.4*-benzoxazin. The heterocyclic compound, $O\langle^{C_6H_4}_{CH_2.CH_2}\rangle NH$.

phenonaphthacridine. $C_{17}H_{11}N$ = 229.1. Benzacridine. The heterocyclic compound:



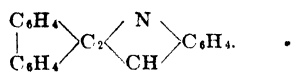
phenonaphthacridone. $C_{17}H_{11}ON$ = 245.1. Phenaphthacridone. The heterocyclic compound:



phenonaphthazine. Benzophenazine.

phenones. A series of ketones of the general type, Ph.CO.R; as, propiophenone, Ph.CO.Et; butyrophenone, Ph.CO.Pr.

phenophenanthracridine. $C_{21}H_{13}N$ = 279.1. The heterocyclic compound:



phenophenanthrazine. Dibenzophenazine.

phenopiazine. Quinoxaline.

phenoprene. $C_{10}H_{11}$ = 131.01. *2*-Phenylbutadiene-*1.4*. The unsaturated hydrocarbon CH_2:CPh.CH:CH_2.

phenopyrine. Antipyrine carbolate, antipyrine phenate. A colorless, oily liquid; insoluble in water, soluble in alcohol or ether. Used medicinally, internally as an antipyretic, externally as an analgesic.

phenoquinone. $C_6H_4O_2.2C_6H_6O$ = 296.22. A solid, m.71, soluble in water, alcohol, or ether.

phenoresorcin. Resorcinol carbolate, resorcin phenate. A mixture of phenol and resorcinol, used medicinally in skin diseases.

phenosafranine. $C_{18}H_{15}N_4Cl$ = 322.62. *3.6*-Diaminophenylphenazine chloride. An aniline dye used in photography to prevent fogging of plates. Green needles of metallic luster, soluble in water or alcohol with a red color; used as an oxidation-reduction indicator. Cf. *aposafranine.*

phenosal. $C_{17}H_{17}O_5N$ = 315.2. Phenetidine salicylate, EtO—C_6H_4—NH.CO.CH_2O—C_6H_4.COOH. Colorless crystals, slightly soluble in water, used medicinally as an antirheumatic.

phenosalyl. A mixture of phenol, salicylic acid, menthol, and lactic acid; used as an antiseptic.

phenose. $C_6H_6(OH)_6$ = 180.1. Hexahydroxyhexahydrobenzene. A colorless, amorphous, deliquescent powder; soluble in water. Cf. *inositol.*

phenoselenazine. $C_{12}H_9NSe$ = 246.28. Selenodiphenylamine. $C_6H_4\langle Se, NH\rangle C_6H_4$.

phenostal. $C_{14}H_{10}O_4$ = 242.1. Diphenyloxalate, diphenyloxalic ester, $(COOPh)_2$; used as a germicide and disinfectant.

phenosuccin. Pyrantin.

phenothalin. Phenolphthalein.

phenothiazine. $C_{12}H_9NS$ = 199.1. Thiodiphenylamine, phenthiazine. The heterocyclic compound: $C_6H_4\langle S, NH\rangle C_6H_4$. Colorless rhombic crystals, m.180, b.371, soluble in water, alcohol, ether or benzene; used in the manufacture of dyes (*e.g.*, methylene blue), and as an insecticide.

phenothiazone. $C_{12}H_7NOS$ = 213.1.

$$C_6H_4\langle S, N \rangle C_6H_3{:}O.$$

It is a very efficient insecticide for spraying orchards.

phenothioxin. $C_{12}H_8OS$ = 201.1. Phenoxthine, dibenzothioxine. The heterocyclic compound,

$$C_6H_4\langle O, S\rangle C_6H_4.$$

phenoxarsine. $C_{12}H_9AsO$ = 243.9. A compound similar to phenoxazine, but with AsH in place of NH.

phenoxaselenin. $C_{12}H_8OSe$ = 238.3. A compound analogous to phenothioxin, with Se in place of S.

phenoxatellurin. $C_{12}H_8OTe$ = 296.6. A compound analogous to phenothioxin, with Te in place of S.

phenoxazine. $C_{12}H_9ON$ = 183.1. Naphthoxazine. The heterocyclic compound,

$$C_6H_4\langle O, NH\rangle C_6H_4.$$

Colorless leaflets, m.150, soluble in alcohol or ether. Used in the synthesis of many dyes.

phenoxides. Phenates.

phenoxin. Carbon tetrachloride.

phenoxthine. Phenothioxin.

phenoxy*. The monovalent radical, PhO—, derived from phenol. Cf. *oxyphenyl.* **p. acetaldehyde.** $PhOCH_2CHO$. **p. acetone.** Phenacetol. $PhOCH_2COMe$. **p. benzene*.** Phenyl ether. **p. caffeine.** $C_{14}H_{14}O_3N_4$ = 286.11. $C_8H_9O_2N_4(OPh)$. Colorless crystals, m.145, soluble in water; used medicinally as an analgesic. **p. propandiol.** $C_9H_{12}O_3$ = 168.1. Antodyne, glycerinmonophenyl ether. $CH_2.OPh.CHOH.CH_2OH$. Colorless crystals, m.69, soluble in water or alcohol; used medicinally as an analgesic.

phenpentoxazoline. C_8H_7ON = 133.1. The heterocyclic compound, $C_6H_4\langle N{=}CH, CH_2\rangle O$.

phenphenyltriazine. $C_{15}H_9H_3$ = 207.2. 3-phenyl-phentriazine, derived from phentriazine.

phenpiazine. Quinoxaline.

phenthiazine. Phenothiazine.

phentetrol. Apionol.

phenthiazone. $C_{12}H_7NSO$ = 213.1. The heterocyclic compound, $C_6H_4\langle N, S\rangle C_6H_3{:}O$.

phenthiol. Thiophenol.

phentriazine. $C_7H_5N_3$ = 131.2. 1.2.3-benzotriazine. The heterocyclic compound,

$$C_6H_4\langle N{=}N, CH\rangle N.$$

Colorless crystals, m.75, b.238, soluble in alcohol; used in organic synthesis. **phenyl-Phenphenyltriazine.**

phenyl. Ph. The monovalent radical, C_6H_5—, derived from benzene, C_6H_6, or phenol, C_6H_5OH. **hydroxy-** The radical —C_6H_4OH from phenol. Cf. *phenoxy.*

phenylacetaldehyde. C_8H_8O = 120.1. $PhCH_2CHO$. A colorless liquid, d.1.032, b.205, slightly soluble in water, soluble in alcohol or ether. Used in perfumery for its hyacinth-like odor.

phenylacetamide. Acetanilide.

phenylacetanilide. See *acetanilide.*

phenylacetate. $C_8H_8O_2$ = 136.1. Me.COOPh. A colorless liquid, d.1.093, b.196, slightly soluble in water, soluble in alcohol or ether; used in organic synthesis.

phenylacetic acid. α-Toluic acid. **p. anhydride.** $(C_6H_5CH_2CO)_2{:}O$ = 254.2. A solid, m.72.5. **p. nitrile.** Benzylcyanide.

phenylacetylchloride. C_8H_7OCl = 154.6. A colorless fuming liquid.

phenylacetylene. C_8H_6 = 102.19. PhC:CH. A colorless liquid, d.0.937, b.139; insoluble in water, soluble in alcohol or ether.

phenylalanine. $C_9H_{11}O_2N$ = 153.10. Aminohydrocinnamic acid. An aminoacid constituent of proteins.

phenylaldehyde. Benzaldehyde.

phenylamine. Aniline.

phenylamines. A group of aromatic amino compounds:

Primary phenylamines, $Ar.NH_2$:
- aniline (1 compound)
- toluidine (3 isomers)
- xylidene (6 isomers)

Secondary phenylamines: Ar_2NH:
- diphenylamine (1 compound)
- ditolylamine (9 isomers)

Tertiary phenylamines, Ar_3N:
- triphenylamine (1 compound)
- tritolylamine (27 isomers)

phenylaniline. **N-** Diphenylamine. **ar-** Biphenylamine.

phenylarsonic acid. Benzene arsonic acid.

phenylate. (1) Phenate. (2) A compound of a metal and phenol, of the type, MOPh.

phenylation. The introduction of the phenyl group into a molecule.

phenylazide. $C_6H_5N_3$ = 119.06. Triazobenzene. A colorless liquid, d.1.098, $b._{24mm}$73.5.

phenylazo. The monovalent radical, PhN:N—. **p. aniline.** See *aminoazobenzene.*

phenylbenzamide. Benzanilide.

phenylbenzene. Diphenyl.

phenylbenzhydryl. The monovalent radical, $Ph.C_6H_4.CHOH$—.

phenylbenzoate. $C_{13}H_{10}O_2$ = 198.1. Benzophenid, phenol benzoate, benzocarbolic acid. PhCOOPh. Colorless monoclinic crystals, m.-68, b.314; slightly soluble in water, soluble in alcohol or ether.

phenylbenzoyl. The monovalent radical Ph.C_6H_4CO—. **p. benzoic acid.** $C_{20}H_{14}O_3$ = 302.11. Diphenylphthaloic acid, 4-phenylbenzophenone-2-carboxylic acid, $PhC_6H_4COC_6H_4$-COOH; used in the synthesis of dyes. **p. carbinol.** Benzoin.

phenylbenzyl. The monovalent radical Ph.$C_6H_4.CH_2$—. **p. amine.** $C_{13}H_{13}N$ = 183.2. $PhNHCH_2Ph$. Colorless crystals, m.32, b.298, soluble in alcohol; used in organic synthesis. **p. ketone.** See phenyl*propiophenone*. **p. tin chloride.** $Ph.C_6H_4CH_2SnCl_2$ = 357.71. Colorless needles, m.83.

phenylborine. C_6H_7B = 89.8. $PhBH_2$, an isolog of aniline.

phenylbromide. C_6H_5Br = 156.96. Bromobenzene,* PhBr. A colorless liquid, d.1.497, m.−30.6, b.156.2.

phenylbutyric acid. $C_{10}H_{12}O_2$ = 164.1. **alpha-** $Ph(CH_2)_3COOH$. Colorless crystals; m.42, b.-270, soluble in water. **beta-** $MeCHPh.CH_2$.-COOH. A colorless, crystalline acid; three isomeric forms: d- (m.156); l- (m.157); and r-(m.270); soluble in water. Used in organic synthesis.

phenylcarbamate. $C_7H_7O_2N$ = 137.1. The amide of benzoic acid, $PhCOONH_2$. Colorless leaflets, m.141; slightly soluble in water, soluble in alcohol or ether.

phenylcarbamido. The monovalent radical, Ph-NHCONH—.

phenylcarbinol. Benzyl alcohol.

phenylcarbylamine. Phenylisocyanide.

phenylchinaldine. $C_{16}H_{13}N$ = 219.1. Phenylquinaldine, methylquinol. Colorless crystals; soluble in water; used medicinally as an antimalarial.

phenylchinoline. Phenylquinoline.

phenylchloride. C_6H_5Cl = 112.50. Chlorobenzene,* PhCl. A colorless liquid, d.1.107, m.−45.2, b.132.1.

phenylchloroform. $C_6H_5CCl_3$ = 195.4. Benzotrichloride. A colorless liquid with a penetrating odor.

phenylcinchoninic acid. Atophan.

phenylcyanamide. $PhNH.NC$ = 118.1. Cyananilide. A solid, m.47, soluble in water, alcohol or ether.

phenylcyanate. C_7H_5ON = 119.1. Ph.CNO.

phenylcyanide. Benzonitrile.

phenyldicarbinol. Xylyl alcohol.

phenyldiethylaminoethylnitrobenzoate. A precipitant for nitrates and perchlorates.

phenyldihydrochinazolin. Orexin.

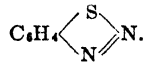
phenyldihydronaphthalene. Atronene.

phenyldimethylpyrazolone. Antipyrine.

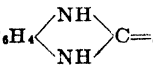
phenyldiphenylcarbinol. Benzaurine.

phenyldisulfide. $C_{12}H_{10}S_2$ = 218.3. Phenyldithiobenzene*. Ph.S.S.Ph. Colorless needles, m.60, b.310, insoluble in water, soluble in alcohol or ether.

phenylene. The bivalent radical, C_6H_4=, derived from benzene by replacement of two hydrogen atoms. Its compounds yield three isomeric derivatives: ortho-, meta-, and para-compounds. **p. blue.** Indamine. **p. diacetic acid.** $C_{10}H_{10}O_4$ = 194.1. The dibasic acids $C_6H_4(CH_2COOH)_2$; *ortho-* (m.150), *meta-* (m.-190), and *para-* (m.244). **p. diamine.** $C_6H_8N_2$ = 108.08. Diaminobenzene, benzenediamine*. $C_6H_4(NH_2)_2$. **o-** or *1.2-* m.103.8, b.252. **m-** or *1.3-* $d._{57°}$1.107, m.62.8, b.287. **p-** or *1.4-* Ursol. m.139.7, b.267. Used as a dye for hairs and furs, as an indicator, and reagent for nitrogen. *methyl-* Tolylenediamine. *phenylazo-* Chrysoidine. **p. diazosulfide.** $C_6H_4N_2S$ = 136.1. The heterocyclic compound:



Colorless crystals, m.35, b.129; soluble in alcohol. **p. dimercaptan.** $C_6H_6S_2$ = 142.18. Benzenedithiol, $C_6H_4(SH)_2$. **m-** or 1.3- Dithioresorcinol. Colorless crystals, m.27, b.243. **p-** or **1.4-** Dithiohydroquinone. Colorless crystals, m.98. **p. disazo.** The bivalent radical, —N:NC_6H_4N:N—. **p. sulfourea.** $C_7H_6N_2S$ = 150.2. Thiobenzimidazoline, p. thiourea. The heterocyclic compound,



Colorless crystals, m.298, soluble in alcohol; used in organic synthesis.

phenylethane. Ethyl *benzene*.

phenylethanol. Benzylcarbinol. **p. amine.** $C_8H_{11}NO$ = 137.10. A white powder related to and similar in action to adrenalin.

phenylether. $C_{12}H_{10}O$ = 170.1. Phenoxybenzene*. The aromatic oxide, Ph_2O. Diphenyloxide. Colorless monoclinic crystals, or an oily liquid, d.1.073 m.28, b.255, nearly insoluble in water, soluble in alcohol or ether. Used as a heat transfer agent instead of water or steam.

phenylethyl alcohol. Benzyl carbinol. **p. barbituric acid.** Luminal. **p. ether.** Phenetole. **p. hydantoin.** Nirvanol. **p. ketone.** Ethylphenylketone.

phenylethylamine. $C_8H_{11}N$ = 121.1. A secondary amine, PhNHEt, formed from amino acids.

phenylethylene. Styrene.

phenylformamide. Formanilide.

phenylformic acid. Benzoic acid.

phenylgamma acid. *2*-Phenylamino-*8*-naphthol-*6*-sulfonic acid.

phenylglucosazone. $C_{18}H_{22}O_4N_4$ = 358.3. A condensation product of phenylhydrazine and glucose. Thin yellow needles, slightly soluble in water, soluble in alcohol or ether. **alpha-** m.205. **beta-** m.145.

phenylglycine. $C_8H_9O_2N$ = 151.2. Phenylglycocoll. A phenylated aminoacetic acid, $PhNHCH_2COOH$, m.127, soluble in water, alcohol or ether; used in the synthesis of indigo.

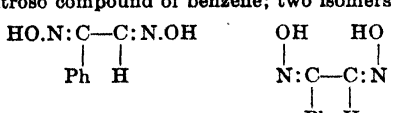
phenylglycocoll. Phenylglycine.

phenylglycocollic acid. Mandelic acid.

phenylglycol. Cinnamic alcohol.

phenylglyoxal. Benzoyl formaldehyde.

phenylglyoxime. $C_8H_8O_2N_2$ = 164.08. A diisonitroso compound of benzene; two isomers:

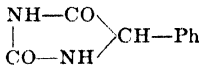


anti- m.180 amphi- m.168

phenylglyoxylic acid. Benzoyl formic acid.

phenyl-group. The monovalent C_6H_5— or Ph radical, derived from benzene.

phenylhydantoin. $C_9H_8O_2N_2$ = 176.2. The heterocyclic compound,



phenylhydrate. Phenol.

phenylhydrazide. A derivative of phenylhydrazine of the type,

Ph.NH.NH.COR or Ph.N(COR)NH_2.

beta- (symmetric) or alpha- (asymmetric). *e.g.* Ph.NH.NH.COH = formylphenylhydrazide. Ph.NH.NH.COMe = acetophenylhydrazide.

phenylhydrazine. $C_6H_8N_2$ = 108.1. Hydrazobenzene. $PhNHNH_2.\frac{1}{2}H_2O$. A colorless or pale yellow liquid, d.1.097, m.19, b.243; slightly soluble in water, soluble in alcohol or ether; used as a reagent for aldehydes and ketones, and in organic synthesis. **acetyl-** Pyrodin. **ethyl-** See *ethylphenylhydrazine*. **phthalyl-** Phthalylphenylhydrazine. **salicyl-α-methyl-** Agathin.

p. hydrochloride. Ph.NH.NH_2.HCl = 144.6. Colorless crystals, m.200, soluble in water; used as a reagent for glucose, formaldehyde, and urea. **p. levulinic acid.** Antithermin. **p. sulfonic acid.** $C_6H_8O_3N_2S$ = 188.1. Ph.NH.NH.SO_2.OH. **p. urea.** Diphenylcarbazide.

phenylhydrazone. $C_7H_8N_2$ = 120.1. Ph.NH.N:CH_2. **acetone-** See *acetone phenyl hydrazone*. **thionyl-** $C_6H_6N_2SO$ = 154.2. Ph.NH.N:S:O.

phenylhydrazones. Compounds of the type, Ph.NH.N:CHR or Ph.NH.N:CR_2, formed by the action of phenylhydrazine on aldehydes or ketones; as, benzaldehyde, p., acetone p.

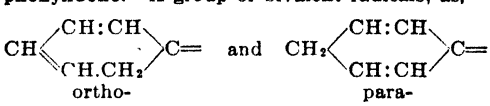
phenylhydroxide. Phenol.

phenylhydroxylamine. C_6H_7ON = 109.1. PhNHOH. Colorless needles, slightly soluble in water, soluble in alcohol or ether, m.80; used in organic synthesis.

phenylic. Pertaining to phenol or the phenyl radical. **p. acid.** Phenol. **p. alcohol.** Phenol.

phenylid. Aniline.

phenylidene. A group of bivalent radicals; as,



ortho- para-

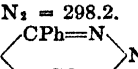
phenylindazole. See *indazole*.

phenylisocyanate. C_7H_5ON = 119.1. PhNCO, m.163, used as reagent for hydroxy and amino compounds.

phenylisocyanide. PhNC = 103.1. Phenylcarbylamine isocyanobenzene. A colorless liquid, d.0.978, b.165, decomp. by water.

phenylisonitramine. Nitranilide.

phenylketone. Benzophenone.

phenyllactazam. $C_{20}H_{14}ON_2$ = 298.2. The heterocylic compound, C_6H_4  NPh.

Colorless crystals, m.181, soluble in alcohol.

phenylmercaptan. Thiophenol.

phenylmercuric. The radical C_6H_5Hg— or PhHg—. **p. acetate.** $CH_3COOHgPh$ = 336.67. Rhombic colorless crystals, m.149. **p. chloride.** PhHgCl = 313.11. Satiny leaflets, m.251. **p. cyanide.** PhHgCN = 303.66. White rhombic prisms, m.204. **p. nitrate.** $PhHgNO_3$ = 339.66. Rhombic scales, m.180, slightly soluble in water.

phenylmethane. Toluene.

phenylmethylether. Anisole.

phenylmethylketone. Acetophenone.

phenylmustard oil. C_6H_5NCS = 135.1. Phenylisothiocyanate, thiocarbanil, phenylthiocarbonimide. A colorless liquid, d.1.138, m.−21, b.221, insoluble in water, soluble in alcohol or ether; used in organic synthesis.

phenylnaphthalene. $C_{16}H_{12}$ = 204.2. $C_{10}H_7Ph$. **alpha-** A colorless liquid, m.0, b.324; soluble in alcohol or ether. **beta-** Colorless scales, m.102, b.345; soluble in alcohol or ether.

phenylnaphthylamine. $C_{16}H_{13}N$ = 219.2. An aromatic secondary amine, $C_{10}H_7$.NH.Ph. **alpha-** Colorless needles, m.60, $b._{260mm}$.335, insoluble in water, soluble in alcohol, ether, or benzene; used in organic synthesis. **beta-** Colorless leaflets, m.107, b.395, insoluble in water, soluble in alcohol, ether, or chloroform; used as an anti-aging agent for rubber.

phenylnaphthylcarbazole. Benzonaphthindole.

phenylnaphthylketone. $C_{17}H_{12}O$ = 232.2. An aromatic ketone, $C_{10}H_7$.CO.Ph. **alpha-** Colorless rhombic crystals, m.76, b.385; insoluble in water, soluble in alcohol; used in organic synthesis. **beta-** White needles, m.82; insoluble in water, soluble in alcohol or ether.

phenylnitramine. $C_6H_6O_2N_2$ = 138.1. An aromatic nitramine: Ph.$NH.NO_2$ and isomer of diazoic acid. Colorless leaflets, m.46, explodes 98, soluble in water, alcohol or ether.

phenylnitrate. $C_6H_5NO_3$ = 135.09. $PhONO_2$.

phenylnitrone. Ph_2C:NOPh.

phenylo. Phenyl. **p. boric acid.** $C_6H_5B(OH)_2$ = 121.9. A white powder, sparingly soluble in water; used as a germicide. Cf. *borophenylic acid*. **p. salicylic acid.** $C_{13}H_{10}O_3$ = 214.2. Hydroxydiphenylcarboxylic acid, o-oxy-diphenylcarboxylic acid, $C_6H_4(OH)$—C_6H_4COOH. A white powder, soluble in water or alcohol; used as a germicide.

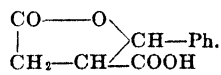
phenylogic series. The hydrocarbon series, C_6H_6, $C_{12}H_{10}$, $C_{18}H_{24}$ (diphenyl series).

phenylon. Antipyrine.

phenyloxalate. Diphenyl oxalate.

phenyloxydisulfide. $Ph_2S_2O_2$ = 250.26. A solid, soluble in ether, m.45.

phenylparaconic acid. $C_{11}H_{10}O_4$ = 206.2. An aromatic lactone:



Colorless crystals, m.109; soluble in alcohol.

phenylparaffin alcohols. A group of aromatic alcohols in which the —OH radical is situated in the side chain: as,

Ph.CH_2OH = benzyl alcohol or phenylmethylol.

$C_6H_4Me.CH_2.OH$ = tolycarbinol (three isomers).

$C_6H_3Me_2.CH_2OH$ = mesityl alcohol.

$C_6H_2Me_3.CH_2OH$ = cumobenzyl alcohol.

$C_6HMe_4.CH_2OH$ = mellityl alcohol.

phenyl-peri acid. Phenyl-*1*-naphthylamine-*8*-sulfonic acid.

phenylphenol. $C_{12}H_{10}O$ = 170.08. Ph.C_6H_4.OH. **ortho-** White crystals, m.56, b.275, soluble in water; phenol coefficient, 38. Used as sodium-o-phenyl phenate as a preservative for glues. **meta-** m.78, b.300. **para-** m.165, b.308.

phenylphosphine. C_6H_7P = 110.0. $PhPH_2$, phosphaniline. A colorless liquid, b.160, obtained by the action of hydriodic acid and phosphorus on phenyl chloride.

phenylphosphinic acid. $C_6H_7O_2P$ = 158.13. $Ph.PO.(OH)_2$. A water-soluble solid, m.158.

phenylphosphonic acid. $C_6H_7O_3P$ = 158.03. Ph-O.P(OH)$_2$.

phenylpropiolic acid. $C_9H_6O_2$ = 146.1. The unsaturated, monobasic acid, PhC:C.COOH. Colorless, long needles, m.136, slightly soluble in water, soluble in alcohol or ether; used in organic synthesis.

phenylpropionate. $C_9H_{10}O_2$ = 150.1. $CH_3.CH_2.$-COOPh.

phenylpropionic acid. α- Hydratropic acid. β-Hydrocinnamic acid.

phenylpropiophenone. See phenyl *propiophenone.*

phenylpropylketone. Butyrophenone.

phenylpyridine. $C_6H_5.C_5H_4N$ = 155.14. **alpha-** A colorless liquid, b.269, insoluble in water, soluble in alcohol or ether. **beta-** A colorless oily liquid, b.270; insoluble in water, soluble in alcohol or ether. **gamma-** Colorless scales, m.77, b.274; slightly soluble in water, soluble in alcohol or ether.

phenylquinaldine. Phenylchinaldine.

phenylquinoline. $C_{15}H_{11}N$ = 205.2. Phenylchinoline. A phenyl derivative of quinoline. **alpha-** White needles, m.84, b.360, slightly soluble in water, soluble in alcohol or ether; used medicinally for malaria. Its isomers are:

2-(alpha)	m.84, b.360.
3-	m.42, b.274.
4-	m.61.
6-	b.$_{77mm}$260.
8-	m.110, b.$_{187mm}$283.

phenylsalicylate. $C_{13}H_{10}O_3$ = 214.14. Salol, phenylis salicylas, $C_6H_4(OH)COOPh$. A colorless crystalline powder of slight aromatic odor, d.1.261, m.42, slightly soluble in water, soluble in alcohol or ether; used medicinally as an intestinal antiseptic.

phenylsalicylic acid. $C_{13}H_{10}O_3$ = 214.14. The isomer of salol, $Ph.C_6H_3(OH).COOH$. An insoluble solid, m.160.

phenylsemicarbazide. $C_7H_9ON_3$ = 151.1. Ph.-NH.NH.CO.NH$_2$. White scales, m.172, slightly soluble in water, soluble in alcohol or ether; used in organic synthesis.

phenylstannane. An organic compound of tervalent tin of the general type, Sn_nPh_{2n+2}; as, Sn_5Ph_{12}, or $Sn(SnPh_3)_4$.

phenylsulfate. A salt of phenylsulfuric acid of the general type, $PhOSO_3M$; as, potassium phenylsulfate.

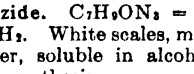
phenylsulfhydrate. Thiophenol.

phenylsulfide. $C_{12}H_{10}S$ = 186.2. Phenylthiobenzene*, diphenyl sulfide. The aromatic sulfide, Ph_2S. A colorless liquid, d.1.119, b.296, insoluble in water, soluble in alcohol or ether.

phenylsulfone. $C_{12}H_{10}SO_2$ = 218.14. Phenylsulfonylbenzene*, diphenyl sulfone, Ph_2SO_2. White needles, d.1.248, m.128, b.378.

phenylsulfonyl*. The radical $PhSO_2$—. **p. benzene*.** Phenylsulfone.

phenylsulfuric acid. $C_6H_6OSO_3H$ = 174.1. A phenolester of sulfuric acid. An unstable acid whose salts are sometimes found in urine.

phenyltetrazole. $C_7H_6N_4$ = 146.2. Benzenyltetrazoic acid.  . Colorless crystals, m.219.

phenylthiocarbonimide. Phenyl mustard oil.

phenylthiohydantoic acid. $C_9H_{10}N_2O_2S$ = 210.1. Phenyliminocarbamin thioglycollic acid. PhN:-C(NH$_2$)S.CH$_2$.COOH. White powder, m.150, insoluble in cold, soluble in hot water; used as a reagent for copper and cobalt. **ortho-** PhNH.C(:NH)S.CH$_2$.COOH. Insoluble in water or alcohol.

phenylthioisocyanate. Phenylmustard oil.

phenylthiourea. $C_7H_8N_2S$ = 152.18. $CSNH_2$-(NH).Ph, m.154, slightly soluble in water.

phenyl tin. The radical $C_6H_5Sn\equiv$ or $PhSn\equiv$. **p. bromide.** $PhSnBr_3$ = 435.49. Colorless liquid, b.$_{25mm}$185. **p. chloride.** $PhSnCl_3$ = 302.11. Colorless liquid, b.$_{25mm}$143. **p. tribenzyl.** Ph-Sn(CH$_2$Ph)$_3$ = 468.90. A colorless liquid, b.$_{6mm}$290; soluble in organic solvents, except alcohol.

phenyltoluene. $C_{13}H_{12}$ = 168.1. Diphenylenmethane, phenyltolyl. The three isomeric aromatic hydrocarbons, $Ph.C_6H_4.Me$: **ortho-** A colorless liquid, m.258; insoluble in water, soluble in alcohol or ether. **meta-** A colorless liquid, d.1.031, b.272; insoluble in water, soluble in alcohol or ether. **para-** A colorless liquid, d.1.015, m.−2, b.263; insoluble in water, soluble in alcohol or ether.

phenyltolyl. Phenyl toluene.

phenyltolylketone. $C_{14}H_{12}O$ = 196.2. Tolylphenylketone. An aromatic ketone, Ph.CO.-C_6H_4.Me. **ortho-** A colorless liquid, m.−18, b.315; soluble in alcohol or ether. **meta-** A colorless liquid, d.1.088, b.314, insoluble in water, soluble in alcohol, ether or benzene; used in organic synthesis. **para-** Colorless monoclinic crystals, m.59, b.326; insoluble in water, soluble in alcohol or ether.

phenylurea. $C_7H_8ON_2$ = 136.2. The phenylated urea, $PhNH.CO.NH_2$. Colorless monoclinic crystals, m.146; slightly soluble in water, soluble in alcohol or ether; used in organic synthesis.

phenylureido. Phenylcarbamido.

phenylurethane. $C_9H_{11}O_2N$ = 165.1. Euphorin, ethylphenylcarbamate, carbamilic ether. The ethyl ester of phenylcarbamic acid, Ph.NH.-COO.Et. A white crystalline powder of clove-like odor and taste, m.51, b.237, slightly soluble in water, soluble in alcohol or ether; used medicinally as an antirheumatic.

phenylvinylketone. Acrylophenone.

phenzoline. Orexin.

pheochrome. Cellular or structural parts of a tissue stained dark by chromium salts.

pheophorbide. $C_{35}H_{36}O_6N_4$ = 608.6. A split-product of chlorophyll obtained by saponification of pheophytin, $C_{31}H_{31}N_4(COOH)_2COOMe$.

pheophytin. $C_{55}H_{74}O_5N_4$ = 870.6. A split-product of chlorophyll obtained by treatment with oxalic acid, $C_{31}H_{31}N_4(COOH)COOMe(COOC_{20}-H_{39})$. Cf. *pheophorbide.*

pheoretin. $C_{14}H_8O_7$ = 288.1. A resinous principle extracted from rhubarb root. A yellowish-brown powder, soluble in alcohol and alkalis.

pheron. The colloidal carrier of an enzyme. It is responsible for catalytic activity. Cf. *agon.*

phesin. $C_{10}H_{10}O_5NSNa$ = 259.2. Acetphenetidine sodium sulfonate. A sulfo-derivative of phenacetin, $C_6H_3(OC_2H_5)SO_3Na(NH.COCH_3)$. A pale reddish-brown, amorphous powder, soluble in water; used as an antipyretic.

phi. φ, ϕ, Φ. The Greek letter ph. (1) An abbreviation for phenyl. A symbol denoting: (2) fluidity; (3) amphi-position in the naphthalene ring; (4) the benzene ring in indone; (5) phlogiston.

phial. A vial, or small bottle.

Philip, James Charles. 1873–1941. A British physical chemist.

philippium. A supposed rare earth metal obtained from samarskite, that proved to be a mixture of terbium and yttrium.

phillipite. A native copper and iron sulfate, $Fe_2Cu(SO_4)_4.12H_2O$; blue masses.

phillipsite. A complex clay containing Na, K and Ca.

phillygenin. $C_{21}H_{24}O_6$ = 372.19. A split-product of phillyrin.

phillyrin. $C_{27}H_{34}O_{11}$ = 534.2. A glucoside from the bark and leaves of various *Phillyrea* species. Colorless crystals, used medicinally as an antipyretic.

philosopher's stone. An imaginary substance supposed by the alchemists to transform base metals into gold, and, if taken internally, to prolong life. It is identical with the "elixir" of the iatrochemists, and the alkahest. **p. wool.** Zinc oxide.

philosophy. An appreciation of the many branches of science into one system of correlated and generalized knowledge. It differs from true science (q.v.) in its more imaginary and visionary viewpoint, and a tendency to bridge the gaps existing in our present knowledge by speculation. Thus all phenomena of nature and life may be classed into two large groups dealing with the material and mental categories in an ascending series of complexity:

Material group (objective)		*Mental group (subjective)*
ether	1st category	consciousness
electron	2nd category	perception (senses)
atom	3rd category	coordination (ideas)
molecule	4th category	thought
masses	5th category	will
organization	6th category	action (deed)

The various branches of science fall into one or the other of these categories. Those of the first group are governed by unchangeable "natural" laws; those of the second are subject to evolutionary progress, and accordingly to the changeable "human" laws governing society.

phlobabene. $C_{50}H_{46}O_{25}$ = 1046.4. A glucoside derived from various tree barks and hops that yields glucose and hopred on hydrolysis.

phlobaphene. A series of resinous oxidation-products of tannin materials, formed by boiling with acids. They are yellowish or brown substances, soluble in dilute ammonium hydroxide.

phlobatannin. Catechol tannin. The coloring matter in the rinds of many fruits.

phlogistic. (1) Inflammatory. (2) Pertaining to burning or fire.

phlogisticated air. Priestley's term for nitrogen. **de-** Oxygen.

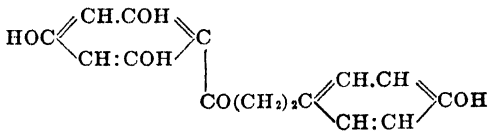
phlogiston. ϕ. The hypothetical component of inflammable substances. **p. theory.** A theory that was current shortly before the birth of modern chemistry (as marked by the work of Lavoisier and the discovery of oxygen). A mystical, all-pervading substance, phlogiston, was supposed to be the combustible principle and to escape during combustion or oxidation of a substance in the form of heat and smoke; by its presence any substance was made combustible. The name was due to Stahl, and the theory to Becher (1669). In the reduction of an oxide, phlogiston (ϕ) was replaced. Thus "calx of zinc + ϕ = zinc." Cf. *antiphlogistic theory, phlogisticated.*

phlogopite. Rhombic mica. A complex hydrated silicate containing K, Mg, Fe, and Al, belonging to the mica group of silica minerals, q.v.

phlogosine. A ptomaine in cultures of staphylococcus.

phloretic acid. $C_9H_{10}O_3$ = 166.13. *S-p*-hydroxyphenylpropionic acid, *p*-hydroxyhydrocinnamic acid, α-β-dihydrocoumaric acid. An oxidation-product of phloretin, $C_6H_4OHCHMeCOOH$, m.128, soluble in alcohol or ether.

phloretin. $C_{15}H_{14}O_5$ = 274.2. A colorless crystalline split-product of phlorizin, m.253 (de-



comp.), soluble in ether, and hydrolysed to phloroglucinol and phloretic acid.

phlorhizin. Phlorizin.

phloridzin. Phlorizin.

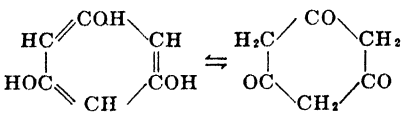
phlorizein. $C_{21}H_{30}O_{13}$ = 490.3. A red coloring matter formed by oxidation of phlorizin.

phlorizin. $C_{21}H_{24}O_{10}.2H_2O$ = 472.3. Phlorhizin, phloridzin. A glucoside derived from the bark and root of apple, cherry, pear, and other trees. It forms white silky needles, m.110, soluble in water or alcohol, and decomp. on hydrolysis into glucose and phloretin. Used medicinally as an antimalarial and tonic. Cf. *rufin.*

phlorobenzophenone. Benzophloroglucinol.

phloroglucin(e). Phloroglucinol.

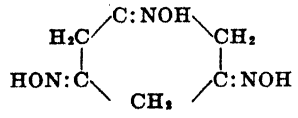
phloroglucinol. $C_6H_6O_3.2H_2O$ = 162.11. Phloroglucin, 1.3.5-trihydroxybenzene, $C_6H_3(OH)_3$, *1.3.5*-benzenetriol*, 3.5-dihydroxyphenol. White or yellowish crystals, m.217, soluble in water, alcohol or ether. Used as a reagent for HCl in gastric juice, for pentoses, lignin and pentosans, for hydrated chloral, etc. and in detecting groundwood fibre. Two tautomeric forms:



phenol form ketone form

benzo- See *benzophloroglucinol.* **hexahydro-** Phloroglucitol. **triamido-** $C_6H_9O_3N_3$ = 171.2. 2.4.6-triamino-1.3.5-trihydroxybenzene. **trinitro-** $C_6H_3O_9N_3$ = 261.1. 2.4.6-trinitro-1.3.5-trihydroxybenzene. **p. phthalein.** Gallein.

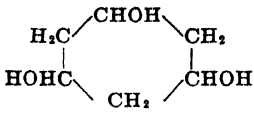
p. test. A test for pentoses: add hydrochloric acid and a small fragment of phloroglucinol. On heating a cherry-red color develops and a precipitate forms. Lignified fibers behave similarly. **p. trioxime.** $C_6H_9O_3N_3$ = 171.13.



an isomer of triamido phloroglucinol. Decomp. 140.

phloroglucite. Phloroglucitol.

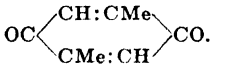
phloroglucitol. $C_6H_{12}O_3$ = 132.1. Methylene triol, cyclohexan-1.3.5-triol, hexahydrophloroglucinol, phloroglucite. The saturated compound,



Colorless crystals, m.184; soluble in water or alcohol.

phlorol. $C_8H_{10}O$ = 122.1. o-ethylphenol, C_6H_4-(OH)Et. A colorless oily liquid obtained from cresols, b.211; soluble in alcohol or ether.

phlorone. $C_8H_8O_2$ = 136.06. p-xyloquinone.



Colorless crystals, m.125. Cf. *phorone.*

phlorose. α-Glucose.

phloxin. Tetrabrom-dichloro-fluorescein. A purple aniline dye similar to eosin, used as pH indicator changing at 3.5 from colorless (acid) to magenta (alkaline).

phocenic acid. Valeric acid.

phocenin. $C_{18}H_{32}O_6$ = 324.2. Trivalerin, the valeric acid ester of glycerol. $C_3H_5(OOC.C_4H_9)_3$.

phœ- See *pho-*.

phoenicochroite. A native lead chromate, $PbCrO_4$.

phon. The International unit of loudness. When a sound is n decibels greater than corresponds with 10^{-6} watts per sq. cm., then the loudness is n phons.

phonene. A group of similar sounds.

phonic. Pertaining to sound. **infra-** The inaudible air-vibrations of wave-lengths greater than that of sound. **ultra-** The inaudible air-vibrations shorter in wavelength than sound.

phonochemical. A reaction induced or produced by sound; as, the evolution of gases from solutions.

phonodeik. An apparatus for the study of the shapes and speeds of sound waves.

phonolite. A variety of feldspar.

phonometer. Sonometer.

phonosensitive. Affected by sound.

-phore. A suffix indicating "to carry, bear or bring forth"; as, in

chromo- (chromogen)	color
gluco- (dulcigen)	sweetness
pharmaco-	pharmacologic action
osmo- (odoriphore)	odor.

phoretic. See *electron.*

phorone. $C_9H_{14}O$ = 138.2. An unsaturated ketone; di-iso-propilidene-acetone, $Me_2C:CH.CO.CH:C:Me_2$. A pale yellow liquid or yellow prisms, d.0.885, m.28, b.196, insoluble in water, soluble in alcohol or ether; used in organic synthesis. Cf. *phlorone.*

phoronomy. A formal branch of science (q.v.), dealing with motion, time and relativity.

phosgene. Carbonyl chloride. **di-** Trichloromethyl-chloroformate. **thio-** Thiophosgene.

phosgenite. $PbCl_2.PbCO_3$. Horn lead. A native carbonate and chloride of lead.

phosphagen. Guanidinophosphoric acid, phosphocreatinine. A compound of phosphorus and creatinine, which plays a part in the chemical phenomena of muscle contraction.

phospham. PN_2H = 60.0. An infusible phosphorazide; a white powder obtained by the action of ammonia on PCl_5.

phosphamic acid. Amidophosphoric acid.

phosphamide. $PO.NH.NH_2$ = 78.07. A white powder, insoluble in water, dilute acids or alkalis.

phosphaniline. Phenylphosphine.

phosphatase. An enzyme from body-organs or -fluids that splits carbohydrate-phosphate combinations. **p. test.** A test for raw milk in heated milk which depends on the presence of the active phosphatase in the former. This liberates phenol from sodium diphenyl phosphate, and the former is determined colorimetrically.

phosphate. (1) A salt of phosphoric acid containing the trivalent $PO\equiv_4$ radical; as,

M_3PO_4 = normal or tertiary phosphate
M_2HPO_4 = monoacid, monohydric, dibasic or secondary phosphate
MH_2PO_4 = diacid, dihydric, monobasic or primary phosphate
$(M, M')PO_4$ = double phosphate
$(M, M', M'')PO_4$ = triple phosphate

(2) A salt of one of the phosphoric acids; as

$M_4P_2O_6$	*hypo*phosphate
M_3PO_4	*ortho*phosphate
MPO_3	*meta*phosphate
$M_4P_2O_7$	*pyro*phosphate

acid- A mono- or dihydric phosphate; as, M_2HPO_4, MH_2PO_4, or $M_2H_2P_2O_7$. **alkaline-** A phosphate of sodium or potassium. **bone-** Calcium phosphate, $Ca_3(PO_4)_2$. **dibasic-** A compound of the type, M_2HPO_4. **dihydric-** A compound of the type, MH_2PO_4. **disodic-** Sodium acid phosphate, Na_2HPO_4. **earthy-** A phosphate of the alkaline earth metals; as, Mg or Ca. **hypo-** A salt of hypophosphoric acid of the type, $M_4P_2O_6$. **meta-** A salt of metaphosphoric acid, MPO_3. **monobasic-** An acid phosphate of the type MH_2PO_4. **monohydric-** An acid phosphate of the type M_2HPO_4. **normal-** A salt in which all hydrogen atoms of the acid have been displaced; as, Na_3PO_4, $NaPO_3$, or $Na_4P_2O_7$. **ortho-** A salt of orthophosphoric acid, M_3PO_4. **pyro-** A salt of pyrophosphoric acid, $M_4P_2O_7$. **stellar-** Calcium phosphate occurring in star-shaped crystals. **super-** See *superphosphate.* **triple-** (1) A salt of the type $MM'M''PO_4$; as, NH_4KNaPO_4. (2) A calcium, magnesium and ammonium phosphate sometimes occurring in urine.

p. of lime. Apatite. **p. rock.** A sedimentary rock containing calcium phosphate.

phosphated. Containing phosphates, as, phosphated water.

phosphatic. Pertaining to or containing phosphates; as, phosphatic slag.

phosphatides. Phospholipins. Phospholipids. A group of lipoid substances which occur in cellular structures and contain esters of phosphoric acid; as, cephalin, lecithins, etc. **amino-** Lecithins.

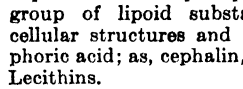
phosphatins. A group of organic phosphates in animal tissues.

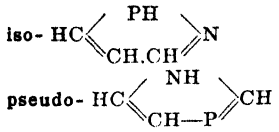
phosphazide. A compound of the type, $R_3P:N.N:NR$.

phosphazine. A compound of the type, $R_3P:N.N:CR_2$.

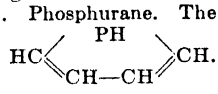
phosphazo. The divalent radical, —N:P—.

phosphazol. C_3H_4NP = 85.1. The heterocyclic compound





phosphazote. Phosphonitrogen.

phosphene. C_4H_5P = 84.1. Phosphurane. The heterocyclic compound  . Cf. *pyrrole.*

phosphenyl. The divalent radical $>PC_6H_5$. **p. chloride.** $C_6H_5PCl_2$ = 179.03. An unstable liquid, d.1.319, b.224.6. **p. oxychloride.** $C_6H_5OPCl_2$ = 194.98. A liquid, d.1.375, b.258.

phosphenylic acid. $C_6H_5.H_2PO_3$ = 158.1. Phenylphosphorous acid. A crystalline solid, m.158, decomp. on further heating, soluble in alcohol or ether.

phosphide. A binary compound of phosphorus which contains trivalent P; as, Na_3P or Ca_3P_2. **hydrogen-** Phosphorus hydrides.

phosphine. PH_3 = 34.1. See *phosphorus hydrides.* **p. oxide.** An organic derivative which contains the trivalent ≡PO group; as, Et_3PO, triethylphosphine oxide, m.53, b.243. **p. sulfide.** An organic derivative which contains the trivalent ≡PS group; as, Et_3PS, triethylphosphine sulfide, m.94.

phosphines. A group of organic compounds derived from phosphine by the replacement of one or more hydrogen atoms:

RPH_2 = primary phosphines:
- $MePH_2$ = methylphosphine, b. −14.
- $EtPH_2$ = ethylphosphine, b.25.
- $PhPH_2$ = phenylphosphine, b.160.

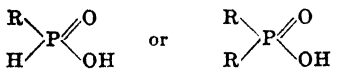
R_2PH = secondary phosphines:
- Me_2PH = dimethylphosphine, b.25.
- Et_2PH = diethylphosphine, b.85.
- Ph_2PH = diphenylphosphine, m.75, b.360.

R_3P = tertiary phosphines:
- Me_3P = trimethylphosphine, b.40.
- Et_3P = triethylphosphine, b.128.
- Ph_3P = triphenylphosphine.

R_4POH = quaternary phosphines:

See *phosphonium compounds, amines, arsines, stibine, bismuthine.*

phosphinic acid. An organic derivative of hypophosphorous acid which contains either the monovalent $—H_2PO_2$ radical, or the divalent $=HPO_2$ radical; as,



Me.HPO.OH, methylphosphinic acid.

Me_2:PO.OH, dimethylphosphinic acid, m.76.

Cf. *phosphonic acid, phospho acid.*

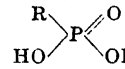
phosphinimine. A compound of the type, R_3P:NR.

phosphite. Any salt of phosphorous acid which contains the trivalent $=PO_3$ radical. *E.g.*, Na_2PO_3, *normal* sodium phosphite; Na_2HPO_3, *acid* sodium phosphite; NaH_2PO_3, *diacid* sodium phosphite.

phospho- Indicating the presence of phosphorus.

p. acid. An organic derivative of asymmetric phosphorous acid:

$P(OH)_3$ = $H—P:O(OH)_2$
symmetric asymmetric

which contains the monovalent $—PO(OH)_2$ radical; as,  . Cf. *phosphonic, phosphinic acid.*

$MePO(OH)_2$ = methylphospho-acid, m.105.

$EtPO(OH)_2$ = ethylphospho-acid, m.44.

p.-albumin. An albuminous substance which contains phosphorus. **p.-globulin.** Nucleoalbumin. **p.-lipin.** An ester of a fatty acid containing nitrogen and phosphorus radicals. **p.-nitrogen.** Phosphazote. A fertilizer obtained from urea solution and phosphate rocks. **p.-protein.** See *phosphoprotein.*

phosphoaminolipid. A complex lipid which contains phosphorus and amino-nitrogen. Cf. *phospholipid.*

phosphobenzene. Phosphorobenzene.

phosphocalcite. Pseudo*malachite.*

phosphocarnic acid. Nucleol.

phosphocerite. Rhabdophane.

phosphochalcite. Pseudo*malachite.*

phosphoglobulin. Nucleoalbumin.

phosphogypsum. A gypsum produced in the manufacture of phosphoric acid and used in cement.

phospholeum. A mixture of a phosphate or a phosphoric acid with soap, used to prevent precipitation of the latter in hard water.

phospholipid. A proposed name for phosphatide, *q.v.* Cf. *phosphoaminolipid.*

phospholipin, -lipoid. Phosphatide.

phosphomolybdic acid. $H_3PO_4.12MoO_3.12H_2O$ = 2042.3. A yellow solid used as a reagent.

phosphonic acid. A group of organic compounds of the type, $RO.P.(OH)_2$; as $C_6H_5O.P(OH)_2$, phenyl phosphonic acid. Cf. *phosphinic acid, phospho acid.*

phosphonitrogen. See *phospho-.*

phosphonitryl. The radical =PN. **p. bromide.** Phosphorus bromonitride. **p. chloride.** $PNCl_2$ = 115.9. A substance formed by the action of NH_4Cl on PCl_5. It readily polymerises at 260°C., to a substance closely resembling rubber.

phosphonium. The monovalent radical, $PH_4—$, analogous to ammonium, $NH_4—$. Cf. *-onium.* **p. bromide.** Bromophosphonium. PH_4Br. **p. compounds.** Quaternary phosphines. A group of organic compounds derived from phosphonium hydroxide, PH_4OH, by replacement of its hydrogen atoms. *E.g.*, $R_4P(OH)$, tetra-R-phosphonium hydroxide; R_4PI, tetra-R-phosphonium iodide. The halides easily dissociate. **p. chloride.** Chlorophosphonium. PH_4Cl. **p. hydroxide.** PH_4OH. **p. iodide.** Iodophosphonium, PH_4I.

phospho. The monovalent radical, $(HO)_2PO—$. Cf. *phosphonic acid.*

phosphoprotein. A group of conjugated proteins consisting of a simple protein combined with an unidentified phosphorous compound other than nucleic acid or lecithin.

phosphor. (1) The German for phosphorus. (2) A substance which phosphoresces. **p. bronze.** A hard alloy of copper (82–94 %), tin (9.5–10.8 %), zinc (1.0–2.0 %), phosphorus (0.01–0.1 %), and impurities (0.30 %). Used for suspension threads for galvanometer mirrors on account of its resistance to torque. **p. hydrogen compounds.** See *phosphorus hydrides.* **p. salt.** Microcosmic salt. **p. tin.** A white metallic alloy of phosphorus and tin, m.370.

phosphorate. An organic compound, analogous to a nitrosate, which contains the bivalent

$=P_2O_4$ radical; as, $C_6H_{10}P_2O_4$, cyclohexane phosphorate.

phosphorated. Containing phosphorus; as, p. oil.

phosphorescence. (1) The continuous emission of light from a substance without any apparent rise in temperature, produced after exposure to heat, light, or electric discharges. (2) The luminosity of a living organism; as, glow-worms or deep-sea fishes. (3) In particular, the faint green glow of white, phosphorus exposed to air, due to its slow oxidation. Cf. *luminescence, fluorescence, scattering.*

phosphorescent paint. A luminous paint.

phosphoretted hydrogen. (1) Phosphorus hydrides. (2) Phosphine.

phosphoric. Containing penta-valent phosphorus. **p. acid.** $H_3PO_4 = 98.1$. Orthophosphoric acid, the normal tribasic acid of pentavalent phosphorus. Colorless crystals, d.1.884, m.38, decomp. 213; soluble in alcohol or water. It is marketed as various aqueous solutions: 85 %—Colorless oily liquid, d.1.7, miscible with water or alcohol. 10 %—Dilute phosphoric acid. A clear colorless liquid, d.1.057. Used as a reagent. **di-** Pyro p. **hypo-** See *hypophosphoric acid.* **meta-** $HPO_3 = 80.1$. A clear, very viscous liquid. The reagent sold as "Glacial Metaphosphoric Acid, Sticks" contains 17–18 % Na_2O. **ortho-** Phosphoric acid. **pyro-** $H_4P_2O_7 = 178.11$. A colorless crystalline powder, m.61, soluble in water, alcohol, or ether. All of the above acids are derived from P_2O_5 by the addition of various amounts of water:

$P_2O_5 + H_2O = 2HPO_3$, metaphosphoric acid.
$P_2O_5 + 2H_2O = H_4P_2O_7$, pyrophosphoric acid.
$P_2O_5 + 3H_2O = 2H_3PO_4$, orthophosphoric acid.

p. anhydride. Phosphorus pentoxide.

phosphorite. (1) Apatite. (2) An organic compound analogous to a nitrosite, which contains the divalent $=P_2O_3$ radical; as, $C_6H_{10}P_2O_3$, cyclohexane phosphorite.

phosphorobenzene. $C_{12}H_{10}P_2 = 216.12$. Phosphobenzene; PhP:PPh. A pale yellow powder, m.149, insoluble in water.

phosphorometer. An optical instrument, in which the duration of a phosphorescence phenomenon is measured in terms of the rate of rotation of radiometer vanes.

phosphorous. (1) Phosphorescent. (2) Describing a compound of trivalent phosphorus. **p. acid.** $H_3PO_3 = 82.1$. Orthophosphorous acid. Yellow crystals, d.1.651, m.70, decomp. 200; soluble in water, alcohol or ether. Used as a reagent and reducing agent. **ethyl-** Ethylphosphite. **hypo-** $H_3PO_2 = 66.1$. A colorless liquid, d.1.493, m.27, decomp. by heat, slightly soluble in water. Its salts are the hypophosphites.

phosphorus. P = 30.98 and $P_4 = 123.92$. A non-metallic element of the nitrogen group, atomic number 15, with several allotropic modifications:

(1) *Ordinary, yellow, white* or *regular* p. Regular white crystals, usually compressed into yellow wax-like sticks, d.1.82, m.44, b.200, insoluble in water, and stored under water and protected from light (which changes it into the red form). Three forms of yellow p. are known, α-, β, and γ- respectively; γ- m.46.

(2) *Red, "amorphous"* p. A brownish red powder of rhombohedral crystals, d.2.2, m.72, b.350; insoluble in water or carbon disulfide. Formed by heating yellow p. to 240°C; non-poisonous and non-luminous.

(3) *Violet* p. A crystalline solid, d.2.4, m.590.

(4) *Metallic, rhombohedral* or *α-black* p. A black powder d.2.34, obtained by heating P in a sealed tube with molten lead. It is a non-conductor of electricity.

(5) *Black*, or *β*-black p. A black powder, d.2.7, m.588; it is a fairly good electrical conductor.

P. was discovered in 1669 by the alchemist H. Brandt of Hamburg, and was prepared independently by Boyle and Kunkel. It forms 3 main series of compounds, derived from tri- and penta-valent P:

valency:	
−3 PH_3, phosphine;	PH_4X, phosphonium.
+1 P_2O, p. monoxide;	H_3PO_2, hypophosphorous acid.
	M_3PO_2, hypophosphites.
+3 P_2O_3, p. trioxide;	H_3PO_3, phosphorous acid.
	M_3PO_3, phosphite.
PX_3, phosphorous-;	HPO_2, metaphosphorous acid.
	MPO_2, metaphosphite.
+4 P_2O_4, p. tetroxide;	$H_4P_2O_6$ or H_2PO_3, hypophosphoric acid.
	$M_4P_2O_6$ or M_2PO_3, hypophosphate.
+5 P_2O_5, p. pentoxide;	H_3PO_4, phosphoric acid.
PX_5, phosphoric-;	HPO_3, metaphosphoric acid.
POX_3, phosphoryl-;	$H_4P_2O_7$, pyrophosphoric acid.
	M_3PO_4, phosphate.
	MPO_3, metaphosphate
	$M_4P_2O_7$, pyrophosphate.

amorphous- See (2). **Baldwin's-** A phosphorescent form of commercial fused calcium nitrate. **black-** (1) See (4). (2) See (5). **Bologna-** A luminescent barium sulfide. **Canton-** q.v. **Homberg's-** Phosphorescent calcium chloride, made by heating lime and ammonium chloride. **metallic-** See (4). **ordinary-** See (1). **radio-** The isotope of mass 30. Cf. *radio elements.* **red-** See (2). **regular-** See (1). **rhombohedral-** See (4). **salt of-** The acid sodium ammonium phosphate, $NaNH_4HPO_4$, used for bead tests. **scarlet-** A scarlet powder, intermediate in activity between red and yellow p.; used for matches. **violet-** See (3). **vitreous-** See (1). **white-** See (1). **yellow-** See (1).

p. bromides. PBr_3, p. tribromide; PBr_4, p. tetrabromide; PBr_5, p. pentabromide. **p. bromonitride.** $PNBr_2 = 204.86$. Phosphonitrile bromide. Rhombic crystals, m.190. **p. chloride.** See *p. dichloride, trichloride, pentachloride.* **p. dichloride.** $P_2Cl_4 = 203.85$. An oily fuming liquid, decomp. by water. **p. diiodide.** $P_2I_4 = 569.76$. A yellow-reddish solid, m.110; soluble in carbon disulfide. **p. group.** The sixth group of the periodic system, composed of the elements N, P, As, Sb, and Bi. **p. halides.** The halogen compounds of p. **p. hydrides.** (1) *gaseous-* $PH_3 = 34.1$. Phosphine, phosphoretted hydrogen, hydrogen phosphide. A colorless gas of characteristic odor, poisonous, d.1.17, m. −133, b. −86; slightly soluble in water, readily soluble in alcohol or ether. (2) *liquid-* $P_2H_4 = 66.1$. A colorless liquid, d.1.01, m. −10, b.51; insoluble in water. (3) *solid-* $P_{12}H_6 = 378.5$. Colorless crystals, decomp. by heat, d.1.83; insoluble in water or

alcohol. **p. monoxide.** P_2O = 78.05. A white solid. **p. oxides.** P_2O, p. monoxide; P_2O_3, p. trioxide; P_2O_4, p. tetroxide; P_2O_5, p. pentoxide; P_4O, p. suboxide (doubtful). **p. oxychloride.** Phosphoryl chloride. **p. pentabromide.** PBr_5 = 430.6. A yellowish crystalline mass, m.100, b.106, decomp. by water; used in organic synthesis. **p. pentachloride.** PCl_5 = 208.34. Yellow rhombic crystals, fuming on exposure to air, d.3.6, m.148 (under pressure), b.160 (sublimes), decomp. by water, soluble in carbon disulfide. Used as a reagent; and in organic synthesis, as a chlorinating agent. **p. pentafluoride.** PF_5 = 126.1. A colorless irritant gas, m. −83, b. −75. **p. pentaselenide.** P_2Se_5 = 458.08. A black solid, decomp. by heat. **p. pentasulfide.** P_2O_5 = 222.4. Bright yellow or gray crystalline masses, d.2.09, m.270, b.535, decomp. by water; soluble in carbon disulfide. Used in organic synthesis. **p. pentoxide.** P_2O_5 = 142.1. An amorphous white powder, d.2.38; soluble in water with liberation of heat and formation of metaphosphoric acid. Used as a dehydrating agent for drying gases, and as a reagent. **p. suboxide.** P_4O. Probably a mixture of red phosphorus and $P_{12}H_6$. **p. tetroxide.** P_2O_4 = 126.1. Colorless orthorhombic crystals, d.2.537, m.100, b.180; soluble in water. **p. tribromide.** PBr_3 = 270.8. A colorless fuming liquid, d.2.88, m. −41, b.175, decomp. by water, soluble in ether or carbon disulfide; used in organic synthesis. **p. trichloride.** PCl_3 = 137.4. A clear fuming liquid, d.1.613, m. −112, b.76, decomp. by water, soluble in ether or carbon disulfide. Its vapors are very poisonous; used in organic synthesis. **p. triiodide.** PI_3 = 411.8. Red prisms, m.61, decomp. by heat or water; soluble in carbon disulfide. Used in organic synthesis. **p. trioxide.** P_2O_3 = 110.1. Phosphorous anhydride. Colorless monoclinic crystals, d.2.135, m.22.5, b.173; soluble in water, ether or carbon disulfide. **p. trisulfide.** P_2S_3 = 158.3. A crystalline, grayish-yellow mass, m.290, b.490, decomp. by water; soluble in alcohol, ether or alkalis. Used in organic chemistry as a reagent.

phosphoryl. The trivalent ≡P:O radical. **thio-** The radical ≡PS. **p. bromide.** $POBr_3$ = 286.8. A crystalline solid, d.0.822, decomp. by water, m.55, b.195. **p. chloride.** $POCl_3$ = 153.42. Phosphorous oxychloride. A colorless fuming liquid, d.1.711, m. −1.5, b.110. Used as a reagent and catalyst in chlorination and dehydration. **p. fluoride.** POF_3 = 104.03. A colorless, fuming liquid, b. −40. **p. nitride.** PON = 61.05. An insoluble white solid. **p. triamide.** $PO(NH_2)_3$ = 95.12. An insoluble white solid, decomp. by heat.

phosphotungstate. Phosphowolframate. A salt of phosphotungstic acid.

phosphotungstic acid. $WO_3.2H_3PO_4$ = 428.2. Phosphowolframic acid. Green crystals, soluble in water, alcohol or ether; used as a reagent for alkaloids (Scheibler's reagent) and for albumin (Salkowski's reagent).

phosphowolframate. Phosphotungstate.

phosphowolframic acid. Phosphotungstic acid.

phosphurane. Phosphene.

phosphuranolite. The mineral $(UPb)O.P_2O_5$, xH_2O.

phosphuretted. Containing phosphorus in its lowest stage of oxidation. **p. hydrogen.** (1) See *phosphorus hydrides*. (2) Phosphine.

phostonic acid. A compound of the type

phot. A unit of intensity of illumination: 1 phot = 1 lumen per square centimeter = 10,000 lux = 1000 milliphots. Cf. *photometric, lux, lumen.*

photic. Pertaining to radiations.

photics. A synonym for optics.

photo- Pertaining to light.

photo-actinic. The emission of visible and ultraviolet rays having photo-chemical activity.

photobacteria. Any light-producing or phosphorescent vegetable microorganism.

photobiotic. Pertaining to organisms that live habitually in the light.

photocatalysis. The acceleration of certain reactions when exposed to light.

photocatalyst. A substance that aids photochemical reactions; as, chlorophyll in photosynthesis.

photochemical. Pertaining to the chemical effects of light. **p. activation.** See *irradiation.* **p. catalysis.** The acceleration of a reaction by light. Cf. *p. reaction.* **p. dissociation.** The splitting of a molecule into its component atoms at low pressure and low temperature by the influence of light; as, $H_2 \rightarrow 2H$. Cf. *p. excitation.* **p. effect.** The chemical changes produced by the influence of light; as, polymerization, allotropic changes, isotropic changes, hydrolysis, oxidation, reduction, synthesis and dissociation. **p. equivalent.** The one quantum of energy, $h\nu$, absorbed by one molecule; it will activiate or excite one molecule. Hence, by measuring the total radiation, E, the number of activated molecules, n, is obtained by the simple relation $E = nh\nu$. **p. excitation.** Dissociation of excited atoms; as, $H_2 \rightarrow 2H^*$. Cf. *p. dissociation.* **p. induction.** Draper effect. The period which elapses between the exposure of reactants to light and the p. reaction which occurs as a consequence. **p. processes.** A reaction in which light energy is stored as chemical energy; as, in photosynthesis. **p. reaction.** A reaction induced, or whose speed is influenced, by light.

photochemistry. A branch of science that studies the relations between light and chemical action, particularly the transformation of radiant energy into chemical energy and the reverse. Cf. *photosynthesis, irradiation, luminescence.*

photoconductivity. The property of a substance of conducting electricity when illuminated.

photodynamic. Describing a substance that is fluorescent in light; as, chlorophyll, hemoglobin, acridine.

photoelectric cell. A generic term for a device which produces changes in an electric circuit by the action of light. There are 3 main types: (1) Photoconductive (*e.g.*, the selenium cell, q.v.). (2) Photo-emissive (*e.g.*, the alkali cell) in which an emission of electrons occurs in a vacuum or across a gas-filled space. (3) Photovoltaic (*e.g.*, the rectifier cell) which depends on contact between a metal and a semi-conductor (such as selenium). **p. effect.** Hallwach's effect. The discharge of electrons from the surface of a metal under the influence of light, leaving the metal positively charged. Cf. *excitation, Edison effect.*

photoelectricity. The transformation of light into electricity; as, in the photoelectric effect.

photoelectrometer. Photogalvanometer.

photoelectrons. The electrons emitted from the surface of a medium under the influence of light.

photoflavins. A group of 9-alkylated alloxazins.

photofluoroscope. A fluorescent screen used to make x-rays visible.

photogalvanometer. An electroscope whose swinging mirror reflects a beam of light, which can be recorded on a film. Used to measure minute quantities of light falling on a photosensitive cell, the current of which is recorded by the electroscope. Cf. *microphotometer.*

photogen. Boghead naphtha. A constituent of vegetable or animal organisms that causes their luminescence.

photograph. A picture or image produced and fixed on a chemically-sensitive surface. **micro-** An enlargement of small objects made by means of the microscope and camera. **microscopic-** A p. which shows the object in a size much less than normal.

photographic. Pertaining to methods of recording or reproducing images by the action of light on light-sensitive surfaces. **p. brightness.** See *spectral classification.* **p. chemicals.** The substances used for developing, fixing, toning and sensitizing. **p. developer.** An organic reducing agent, such as pyrocatechol or metol, used to develop an image by the reduction of the light-exposed silver salts to metallic silver. **p. film.** A transparent and flexible sheet of cellulose coated with a light-sensitive emulsion. **p. filter.** See *color filter.* **p. intensifier.** A substance by which an image is intensified, as mercuric chloride. **p. negative.** An image in which the light-values are inverted; *e.g.*, black appears white, and white appears black. **p. paper.** A paper coated with a light-sensitive chemical, as silver salts or ferrocyanides. **p. plate.** A glass plate coated with a light-sensitive emulsion (see *chromatic*). **p. positive.** An image copied from a p. negative, in which the light values appear in their true shades. **p. reducer.** A substance that reduces or bleaches the density of an image; as, ferrocyanides. **p. screens.** See *color filter.* **p. sensitizer.** A dye which, when added to the light-sensitive surface of a p. plate, film or paper, increases its sensitivity toward certain wavelengths of light (see *photosensitizer*). **p. spectrum.** The range of wavelengths (in 0.1 A.U.) which can be recorded by photography. The *ordinary* range for glass lenses and ordinary plates or films extends from ultraviolet (300) to yellow (550); the *extended* range, for quartz lenses and plates or films sensitized by dyes, extends from extreme ultraviolet (210) to infrared (920) (see illustration).

photography. The art and technic of recording visible objects by light-sensitive plates or films, and copying them on light-sensitive papers or other media. **color-** The production of colored images by physical or chemical technic other than hand-coloring.

photogravure. See *gravure.*

photohalide. A halogen salt that is sensitive to light.

photohyalography. Etching glass by a photomechanical process.

photoisomeric change. The transformation of one isomer into another by the action of light.

photolysis. Decomposition or chemical action effected by the action of light on a substance in solution. Two types:

(a) photolyte alone is active; *e.g.*, decomposition of H_2S in hexane.

(b) photolyte reacts with solvent; *e.g.*, decomposition of H_2S in water.

photolyte. A substance that is decomposed by light.

photolytic. Pertaining to the decomposition or dissociation of a substance by means of radiant energy.

photomacrograph. Macrograph. A photographic enlargement.

photomagnetism. Describing magnetic phenomena produced by the influence of light.

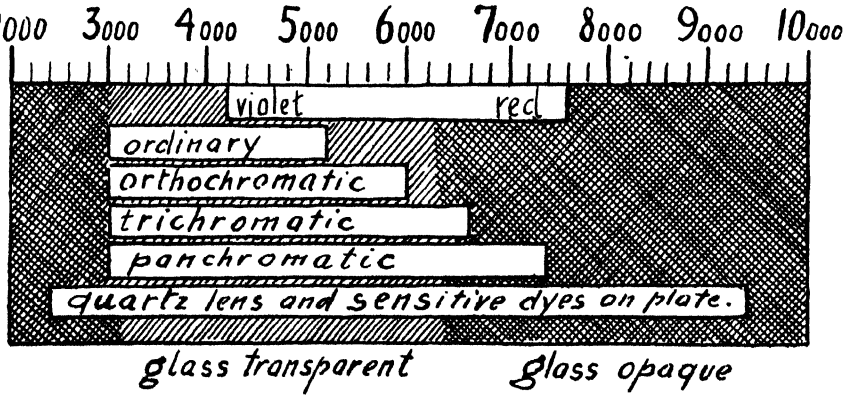
photometer. A device for measuring the intensity of light; used for the accurate determination and comparison with standards of illuminants or sources of illumination. Cf. *turbidimeter, nephelometer, dispersimeter, colorimeter, exposure meter, actinometer, leucoscope.* **micro-** See *microphotometer.* **spectro-** A device for measuring the intensity of spectral lines, generally by comparison of the densities of their photographic images.

photometric. Pertaining to the measurement of the intensity of light. **p. curve.** See *photomicrograph.* **p. standards.** The intensity of light is measured by:

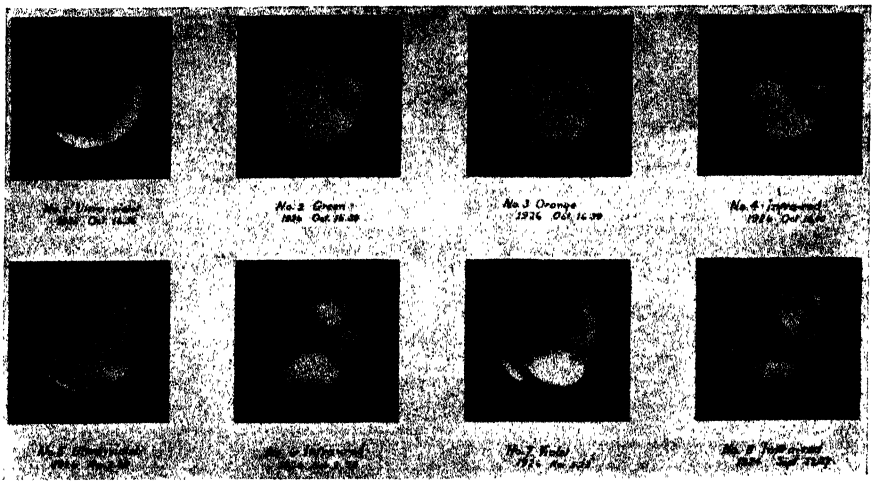
1 standard English sperm candle = 1 candle.

Standard Hefner lamp, burning amyl acetate, = 0.9 candle.

Standard Carcel lamp, burning colza oil = 9.6 candles.



Photographic spectrum.



Photosensitizers.

Application to photography through the atmosphere of a planet. Mars taken with lights of different colors by W. H. Wright at Lick Observatory.

Standard pentane lamp, burning pentane (International candle) = 10.0 candles.

For scientific work the "phot" is used for intensity, and the "lumen" for luminosity.

photometry. (1) A branch of physics dealing with the measurement of the intensity of light. (For the quality of light, see *spectroscopy, polarimetry;* for general properties of light, see *optics, radiations.*) (2) The measurement of the density of photographic images for the purpose of finding the brightness of a light source.

photomicrograph. (1) Micrograph. The magnified photograph of a microscopic object obtained by means of a microscope attached to the camera. (2) Photometric curve. The line made by a beam of light reflected from the mirror of an electroscope, and falling on a photosensitive surface; as in a polarograph or spectrophotometer.

photon. (1) A corpuscle or particle of light analogous to the electron and magneton. Light or x-rays consists of a stream of energy quanta, each quantum having energy, $h\nu$, and momentum, $h\nu/c$. (2) A structure in which the electron revolves around the proton at a distance equal to the electron radius; photon (*quantum*) = (proton + electron). Cf. *neutron, neutrino.*

photoperiodism. The rhythmic changes in the composition of the cell sap of living plants, due to the effect of light.

photophone. An instrument that transforms radiant energy into sound waves by means of selenium which alters in electrical resistance on exposure to light. Cf. *optophone.*

photophoresis. The motion of small particles under the influence of light; it is either towards (positive) or away from (negative) the light source. Cf. *radiation pressure.*

photopic. See p. *spectrum.*

photopolymerization. A condensation reaction of two or more molecules of a substance under the influence of light.

photoproduct. A substance synthesized in a living organism by the action of light; cf. precursor.

photoreaction. A chemical reaction that occurs under the influence of light.

photosensitivity. (1) The capacity of an organ or organism to be stimulated to activity by light. (2) The absorption of a certain portion of the spectrum by a chemical system. Cf. *irradiation.*

photosensitizer. A dyestuff (as aurine) which, when added to the substance of a photographic plate, increases the plate sensitiveness by absorbing the light of the wavelengths to which it best responds. Two groups:

A. halogenated fluoresceins, as
- eosin..... sensitizes for yellow-green
- erythrosin..... sensitizes for yellow-green

B. Derivatives of pyridine, quinoline and acridine,

1. *Isocyanins:*
   - pinaflavole..... green
   - orthochrome T... green
   - pinaverdol..... orange
   - pinachrome..... orange
   - acridine orange... orange
   - ethylred..... orange red, λ6500 Å.U.
2. *Carbocyanins:*
   - pinacyanole..... red λ6800
   - naphthocyanole..... deep red λ7500
   - dicyanin..... infrared λ9000
   - kryptocyanin ..... extreme red λ8000
   - mesocyanin..... infrared λ9000
   - neocyanin..... infrared λ10000
   - xenocyanin..... infrared λ10000

Cf. *photographic spectrum, chromatic plates, cyanin.* See illustration.

photosphere. The outer or radiating surface of the sun, which is probably composed of incandescent clouds in a less luminous medium (cf. *chromosphere*), and is the source of the luminous portion of the solar spectrum.

photostable. Describing a substance that is not changed by light.

photosynthesis. (1) Synthesis caused by light. (2) The most important reaction of all green plants in synthesizing glucose from carbon dioxide and water by the catalytic action of chlorophyll and absorption of light and heat:

$$6CO_2 + 5H_2O + 671{,}000 \text{ calories} = C_6H_{10}O_6 + 6O_2.$$

This is followed by the polymerization of glucose to starch.

photosyntometer. A device to demonstrate photosynthesis of plants.

phototaxis. Phototropism. The response of cells or organisms to light; as, phototropism.

phototropism. The movement of living cells or organs toward the light.

phototropy. (1) A reversible change of color induced by colored light; as, in fulgides. (2) The change in or loss of color of dyestuffs in light of a specific wave-length.

photovoltaic effect. A change in potential of an electrode due to exposure to light.

photronic cell. Photoelectric cell.

phrenosin. $C_{48}H_{93}NO_9$ = 827.72. A cerebroside isolated from brain substance; it is hydrolysed to sphingosine, phrenosinic acid and galactose.

phrenosinic acid. $C_{24}H_{48}O_3$ = 384.38. Cerebronic acid, neuro stearic acid, $Me(CH_2)_{21}$.CHOH.COOH. A hydroxy acid found in phrenosin, which combines with bacterial toxins.

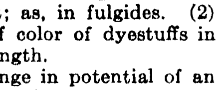
phrynin. A poisonous protein obtained from the skin secretions of toads. (See *bufonin.*)

phthalal. The tetravalent radical, $=CH.C_6H_4.CH=$.

phthalaldehyde. Phthalic aldehyde.

phthalaldehydic acid. $C_8H_6O_3$ = 150.1. Orthoaldehyde benzoic acid, o-formylbenzioc acid, $C_6H_4(CHO)COOH$. Colorless crystals, m,97; used in organic synthesis. **5.6-dimethoxy-** Opianic acid. **5.6-dioxy-** Noropianic acid.

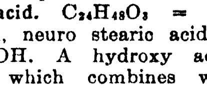
phthalamic acid. $C_8H_7O_3N$ = 165.1. Phthalaldehyde acidamide, o-carbamylbenzoic acid.

$C_6H_4(CONH_2)COOH$ or 

Colorless crystals, m.148; soluble in alcohol. **phenyl-** Diphenamic acid.

phthalamide. Phthaldiamide.

phthalanil. $C_{14}H_9O_2N$ = 223.1. *N*-phenylphthalimide.

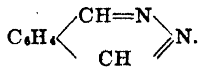


sym.- A colorless crystalline powder, m.220; soluble in alcohol or ether. **asym.-** m.208 (sublimes).

phthalanone. Phthalide.

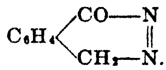
phthalate. A salt of phthalic acid containing the divalent $C_6H_4(COO)_2=$ radical; used for buffers (q.v.), standard solutions and in vacuum pumps (q.v.). **diamyl-** $C_{18}H_{26}O_4$ = 306.2. $C_6H_4(COOC_5H_{11})_2$. A colorless liquid, d.1.023, b.340; used as plasticizer. **dibutyl-** $C_{16}H_{22}O_4$ = 278.2. A colorless liquid, d.1.046; m. −35, b.340. Used as plasticizer. **diethyl-** $C_{12}H_{14}O_4$ = 222.2. A colorless liquid, d.1.119, b.290; used as plasticizer.

phthalazine. $C_8H_6N_2$ = 130.1. β-benzo-o-diazine, β-phenodiazine, 2.3-benzodiazine.



Colorless crystals, m.91, b.316, soluble in alcohol or ether. **benzo-** See *benzophthalazine.* **dihydroketo-** Phthalazone. **oxy-** Phthalazone. **tetrahydro-** $C_8H_{10}N_2$ = 134.1. The 1.2.3.4-tetrahydro derivative of phthalazine.

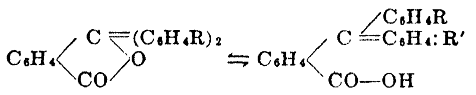
phthalazone. $C_8H_6ON_2$ = 146.06. 1-oxyphthalazine, dihydroketophthalazine.



Colorless crystals, m.183, b.337, soluble in alcohol or ether; used in organic synthesis. **benzyl-** Benzylphthalazone.

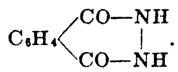
phthaldiamide. $C_8H_8O_2N_2$ = 164.2. Phthalamide, phthalic diamide. $C_6H_4(CONH_2)_2$. A crystalline powder, m.220 (decomp.); insoluble in water, soluble in alcohol.

phthaleins. A group of intensely-colored organic compounds and dyes derived from phthalophenone by the substitution of its hydrogen atoms by hydroxyl or amino groups. They are prepared by fusing phthalic anhydride with phenols, and are related to the colorless leuko-compounds (phthalines). (See *phthalein indicators, phenolphthalein, fluorescein.*)



where R is OH or NH_2, and R′ is =O or =NH in the para position. Cf. *indicators.* **cresolsulfon-** See *cresol red, cresol purple.* **phenol-** See *phenolphthalein.* **phenolsulfon-** Phenol red. **phloroglucinol-** Gallein. **resorcinol-** Fluorescin. **thymolsulfon-** Thymol blue.

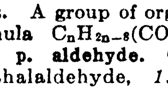
phthalhydrazide. $C_8H_6N_2O_2$ = 162.05.



3-**amino-** Luminol.

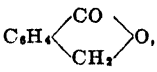
phthalic acid. $C_8H_6O_4$ = 166.1. Alizarinic acid, *1.2*-benzenedicarboxylic acid*, orthobenzene-dicarboxylic acid, $C_6H_4(COOH)_2$. Colorless rhombic crystals, d.1.58, m.213, slightly soluble in water, soluble in alcohol or ether; used in organic synthesis and in the manufacture of dyes. **iso-** Meta-. Colorless needles, m.300 (sublimes). **meta-** Isophthalic acid. **ortho-** Ordinary phthalic acid. **para-** Terephthalic acid. **tere-** or para- Terephthalic acid. **dimethoxy-** Hemipinic acid. **dimethyl-** Cumidic acid. **homo-** See *homophthalic acid.* **hydroxy-** See *hydroxyphthalic acid.* **hydroxymethyl-** Coccinic acid. **methyl-** See *xylidic* and *uvitic acid.*

p. a. series. A group of organic acids of the general formula $C_nH_{2n-8}(COOH)_2$. Cf. *aromatic acids.* **p. aldehyde.** $C_6H_4(CHO)_2$ = 134.09. Phthalaldehyde, *1.2*-benzenedicarbonal*. It exists in forms corresponding with those of phthalic acid. *ortho-* m.52. *iso-* m.89. *tere-* m.116. **p. anhydride.** $C_8H_4O_3$ = 148.07. Phthalandione.



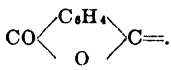
obtained by heating phthalic acid. Large white prisms, d.1.527, m.128, b.284, slightly soluble in water, soluble in alcohol or ether; used extensively in organic synthesis. *dimethoxy-* Hemipinic anhydride. **p. amide.** Phthaldiamide. **p. diamide.** Phthaldiamide. **p. nitrile.** Phthalonitrile.

phthalide. $C_8H_6O_2$ = 134.09. Isobenzofuranone, *1*-phthalanone. The heterocyclic compound,

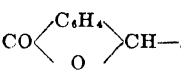


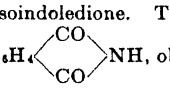
and anhydride of o-hydroxy-methylbenzoic acid. Colorless crystals, m.68, b.290; soluble in alcohol or ether. **acetoxy-** See *acetoxyphthalide*. **benzal-** See *benzalphthalide*. **benzilidene-** Benzalphthalide. **bisbihydroxyphenyl-** Phenolphthalein. **bisbihydroxytolyl-** Cresolphthalein. **diindyl-** Indophthalein. **dimethoxy-** Meconin. **xanthilidene-** Fluoran.

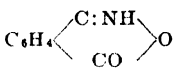
phthalidene. The bivalent radical,



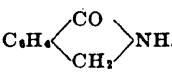
phthalidyl. The monovalent radical,



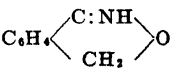
phthalimide. $C_8H_5O_2N$ = 147.1. *o*-Phthalic imide, *1.3*-isoindoledione. The heterocyclic compound,  , obtained by treating phthalic anhydride with ammonia. Colorless crystals, m.228 (sublimes); used in organic synthesis. **iso-** A tautomer of phthalamide,



phthalimidine. C_8H_7ON = 133.1. *1*-Isoindolinone. The heterocyclic compound,

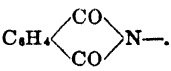


Colorless crystals, m.150, b.337, soluble in alcohol or ether; used in organic synthesis. **pseudo-** The heterocyclic compound:

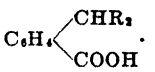


benzyl- See *benzylphthalimidine*.

phthalimido. The monovalent radical,

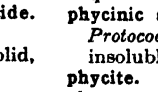


phthalines. A series of colorless compounds which, on reduction, form phthaleins.



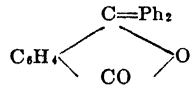
phthalizine. Phthalazine.

phthalocyanins. A group of colored compounds related to the porphyrins, (q.v.), containing 4 isoindole rings linked in a 16-membered ring of alternate C and N atoms around a central atom, usually a metal (Cu or Fe). Cf. *porphin, monastral blue*.

phthalonic acid. $C_9H_6O_8$ = 194.1. Carbobenzoylformic acid, *o*-carboxyphenyl glyoxylic acid. $COOH.C_6H_4CO.COOH.2H_2O$. White crystals, m.140, soluble in water, alcohol and ether. Cf. *terephthalonic acid*. **p. anhydride.** $C_9H_4O_4$ = 176.03.  . A solid, m.186.

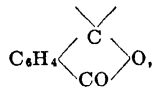
phthalonitrile. $C_8H_4N_2$ = 128.05. Dicyanobenzene, $C_6H_4(CN)_2$. **m-.** Isophthalic nitrile. Colorless crystals, m.161. **p-.** Terephthalic nitrile. Colorless crystals, m.222. **homo-** Cyanobenzyl cyanide. **iso-** m-. **tere-** p-.

phthalophenone. $C_{20}H_{14}O_2$ = 286.21. Benzoylbenzophenone, diphenylphthalein. The anhydride of the hypothetical triphenyl-carbinol-o-carboxylic acid, and parent substance of the phthaleins and phthalins:



Colorless leaflets, m.115, slightly soluble in water, soluble in alcohol or ether; used in organic synthesis. **dihydroxy-** Phenolphthalein.

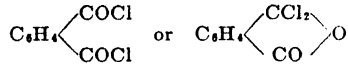
phthaloyl. The bivalent radical,

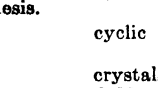


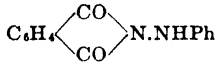
derived from phthaleins or phthalophenone.

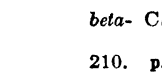
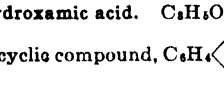
phthaluric acid. $C_{10}H_7O_4N$ = 205.1. A colorless crystalline substance, m.192.

phthalyl. The bivalent radical, $C_6H_4(CO)_2$=, derived from phthalic acid. **di-** See *diphthalyl*. **p. alcohol.** *1.2*-Xylenediol. **p. chloride.** $C_8H_4O_2Cl_2$ = 202.99. *1.2*-Benzenedicarbonyl chloride*. *ortho-* A colorless oily liquid, b.276, soluble in ether; either:



meta- m.41, b.275; *para-* m.77, b.260. **p. hydrazine.** $C_8H_6O_2N_2$ = 162.1. The heterocyclic compound,  . Colorless crystals, m.200. **p. phenylhydrazide.** $C_{20}H_{18}O_2N_4$ = 346.3. $C_6H_4(CO.NH.NHPh)_2$. Colorless crystals, m.161, used in organic synthesis. **p. phenylhydrazine.** $C_{14}H_{10}O_2N_2$ = 238.10. *alpha-*



Colorless crystals, m.178; soluble in alcohol. *beta-*  . Colorless crystals, m.210. **p. hydroxamic acid.** $C_8H_6O_3N$ = 163.05. The heterocyclic compound,  .

Colorless crystals, m.230; slightly soluble in water, soluble in alcohol or ether.

phthioic acid. $C_{26}H_{52}O_2$ = 396.35. A saturated fatty acid, m.48, from human and avian tubercle bacilli; an isomer of cerotic acid.

phthoric acid. An obsolete name for hydrofluoric acid.

phtiocol. A pigment associated with carotene, q.v.

phycinic acid. An acid obtained from the alga *Protococcus vulgaris*. White, needles, m.136; insoluble in water, soluble in alcohol.

phycite. Erythritol.

phycocerythrin. A globulin.

phycochrome. A bluish-green, chlorophyll-like pigment in various fresh water algae.

phycocyanin. A blue pigment in the Cyanophyceae, or blue-green algae; active in photosynthesis.

phycoerythrin. The red pigment of the Florideae, or brown algae; active in photosynthesis.

phycology. A branch of botany dealing with seaweeds or algae.

Phycomycetes. An order of thallophytes (q.v.); algal fungi.

phycophaein. The brown pigment of certain algae.

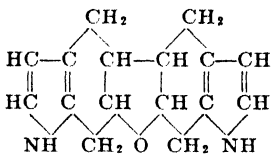
phyllanthin. $C_{30}H_{37}O_8$ = 525.3. A glucoside from *Phyllanthus niruri*, an Euphorbiaceae. Colorless needles, insoluble in water, soluble in alcohol or ether.

phyllins. The derivatives of chlorophyll.

phyllite. Chloritoid.

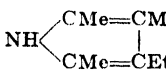
phylloerythrin. A split-product of chlorophyll occurring in the stomachs of herbiverous animals, and identical with the porphyrin of human feces. Cf. *chlorophyll-a*, *porphin ring*.

phylloporphyrin. $C_{16}H_{18}ON_2$ = 254.2. A split-product of chlorophyll:



See *porphyrin*, *porphin ring*.

phyllopyrrole. $C_9H_{15}N$ = 137.1. A pyrrole fragment of the porphin ring, q.v.,



White plates, m.69, b.87.

phylloquinones. See *vitamin K*.

phyllyrin. $C_{24}H_{34}O_{11}$ = 498.3. Colorless shining leaflets, used as an antipyretic.

phylo- See *phyllo-*.

phylum. One of the primary divisions of the animal or plant kingdom. The animal kingdom is divided into twelve, and the plant kingdom into four phyla.

physalin. $C_{72}H_{116}O_4$ = 1045.0. A carotinoid pigment found in the sepals of *Physalis alkekengi* and *Ph. franchetti*, winter cherry, and in the berries of *Lysium halmifolium*, goats thorn. A yellowish powder; slightly soluble in water, soluble in alcohol or ether.

physalite. The mineral Al_2O_3, SiO_2.

physcic acid. Physcion.

physcion. $C_{16}H_{12}O_5$ = 284.09. Physcic acid, chrysophyscin, parietin. A crystalline principle, m.207, from the lichen, *Parmelia* (*Physcia*) *parietina*.

physeteric acid. $C_{14}H_{26}O_2$ = 226.2. *5.6*-Tetradecenoic acid*, $Me(CH_2)_7CH:CH(CH_2)_3COOH$. A constituent of sardine and whale oils.

physetoleic acid. $C_{16}H_{30}O_2$ = 254.24. Hypogaeic acid. An unsaturated acid of the oleic acid series, $C_{15}H_{29}COOH$, and a constituent of tallow. A white waxy mass, m.30; insoluble in water, soluble in alcohol.

physic. (1) Medicine. (2) Cathartic. Purgative. (3) Puddling or working molten iron in order to remove impurities.

physical. Pertaining to physics or the energy-relations of substances. **p. analysis.** Testing or determining the physical properties of a material. **p. chemistry.** A branch of science that deals with the physical properties of substances and employs physical methods, either experimental or theoretical, to solve chemical problems. It is subdivided into electro-chemistry, thermo-chemistry and thermodynamics, optical methods, radiochemistry and photochemistry. **p. properties.** Properties which can change without involving a change in chemical composition; as, melting point, boiling point, density, atomic weight, atomic distance, optical refractivity, conductivity, compressibility, etc. **p. solution.** A solution from which the solute can be recovered chemically unchanged. **p. test.** A mechanical test to determine mechanical properties; as, hardness, compressibility.

physicochemical. Pertaining to physical chemistry.

physics. The science of energy. A branch of science that deals with the phenomena produced by forces acting upon matter, and the changes and transformations occurring in Nature that do not involve a change in the composition of the material. Thus, in its broadest sense it deals with the fundamental laws of the material universe. Physics is conventionally subdivided into mechanics, heat, electricity, magnetism, light, and radioactivity. A more elaborate classification is:

Theoretical Physics

The doctrine of the *cause* of physical phenomena, or the purely abstract aspect of force and motion:

1. Dynamics—The motion of bodies.
   a. kinematics, or the types of possible motions without consideration as to cause.
   b. kinetics, or the relation of motion to force.
   c. statics, or forces that produce equilibrium.
   d. energetics, or the transmission of forces.
2. Mass-Physics—The mechanics of bodies, as work and energy, gravitation, vibrations (sound).
3. Molecular-Physics—The motion of molecules as shown in the phenomena of temperature and states of aggregations.
4. Atomic-Physics—The motion of atoms, their disintegration and structure.
5. Ether-Physics:
   a. ether vibrations—radiant energy
   b. ether stress—electro-statics
   c. ether vortices—magnetism
   d. ether flow—electro-kinetics
   e. ether radiation—electric and heat waves.
6. Astro-physics: The interpretation of stellar spectra and the measurement of stellar radiations.

Practical Physics

The doctrine of the *appearance* of physical phenomena, or the experimental basis of our physical knowledge:

1. Mechanics—the relation of matter to force.
   a. dynamics—the action of forces on bodies in general.
   b. hydraulics—the forces acting on and in liquids.
   c. pneumatics—the action of forces on gases.
   d. acoustics—the production and transmission of sound waves.
2. Optics—the nature and properties of light.

3. Thermodynamics—the relationships of heat and energy.
4. Electrostatics—static or stationary electric charges.
5. Electrodynamics—moving charges, or an electric current.

Applied Physics

The study of the *effects* of physical phenomena on or their application to the welfare and comfort of man.

1. Engineering concerned with the direct welfare of man:
   a. Structural E.—the construction of buildings.
   b. Sanitary E.—The disposal of waste and refuse.
   c. Agricultural E.—the methods of increasing crops by irrigation, rapid harvesting, etc.
2. Engineering concerned with the production of objects:
   a. Mechanical E.—the construction of machines and labor-saving devices.
   b. Mining E.—the excavation of mines and the treatment of ores.
   c. Chemical E.—The production of chemicals and useful substances.
3. Engineering applied to transport and transmission:
   a. Civil E.—the construction of roads and bridges.
   b. Hydraulic E.—the utilization of water power.
   c. Steam E.—the construction and operation of steam engines and heating plants.
   d. Electrical E.—the construction and operation of electrical machines and transmissions.
   e. Railroad E.—The construction and operation of railroads and terminals.
   f. Marine E.—The construction and operation of ships and wharves.
   g. Aerial E.—The construction and operation of airships and aeroplanes, hangars and landing-fields.

classical- The branch of p. dealing with the mechanical, thermal, optical and electrical properties of matter. **modern-** The branch of p. dealing with the relations among atoms, electrons, photons, quanta and radiation.

physiochemical. Biochemical.

physiography. Physical geography. The study of the general properties of our earth and atmosphere.

physiological. Pertaining to the functions and activity of living organisms (plants, animal and man), especially in their normal condition, as opposed to their diseased (pathological) state. **p. action.** The effect of a substance on living organisms. **p. chemistry.** A branch of science that studies the chemical changes in normal living organisms (plant, animal or man); especially the chemical activity of the normal protoplasm. **p. salt solution.** (1) Normal saline. An isotonic solution of sodium chloride in water, usually 9 grams per liter. (2) A solution of salts in water resembling the salts of normal blood serum and consisting of:

0.25 gm. calcium chloride,
0.10 gm. potassium chloride,
9.00 gm. sodium chloride,
1000.00 cc. water.

physiology. A branch of science that deals with the functions and biological activities of living organisms; such as, respiration, metabolism, reproduction and growth. **animal-** The functions of the animal organism and its parts. **human-** The functions of the human organism, apart from its mental aspect. **plant-** The functions of plants and their organs. **phyto-** Plant p. **zoo-** Animal p.

physite. Erythrol.

physostigma. Calabar bean. The dried ripe seeds of *Physostigma venenosum*, a Leguminosae of Africa, which contains the alkaloids, physostigmine, eseridine and calabarine. Used in medicine as the fluid extract, as an antineuralgic and antitetanic.

physostigmine. $C_{15}H_{21}O_2N_3$ = 275.3. Eserine. An alkaloid from the seeds of *Physostigma*, q.v. Colorless crystals, m.106, darkening with age; slightly soluble in water, soluble in alcohol, ether or chloroform. Used medicinally as an antitetanic and peristaltic; also in ophthalmology and veterinary medicine. **p. benzoate.** $C_{22}H_{27}O_4N_3$ = 441.4. Eserine benzoate. Hard, white crystalline masses; soluble in water or alcohol. **p. borate.** Eserine borate. White crystalline powder; soluble in water or alcohol; used in ophthalmology. **p. citrate.** $(C_{15}H_{21}O_2N_3)_2.C_6H_8O_7$ = 1017.66. Eserine citrate. White crystalline powder; soluble in water or alcohol. **p. hydrochloride.** $C_{15}H_{21}O_2N_3.HCl$ = 311.8. Eserine hydrochloride. Colorless powder; soluble in water or alcohol. **p. salicylate.** $C_{15}H_{21}O_2N_3.C_7H_6O_3$ = 413.3. Eserine salicylate. The most frequently-used form of physostigmine. Colorless or pale yellow, shining crystals, m.178, soluble in water, or alcohol; used medicinally as a miotic, antitetanic and peristaltic. **p. sulfate.** $(C_{15}H_{21}O_2N_3)_2.H_2SO_4$ = 648.6. Eserine sulfate, physostigminae sulfas. White or pale yellow, crystalline deliquescent powder, m.140, soluble in water, alcohol, or chloroform; used medicinally as a myotic.

phyt-, phyto- A prefix derived from the Greek, indicating "plant" or "vegetable."

phytalbumin. A vegetable albumin.

phytane. $C_{20}H_{42}$ = 282.28. A saturated hydrocarbon obtained by reduction of phytol. A colorless, mobile liquid, $b._{10mm}$169, insoluble in water.

phytase. An enzyme derived from rice bran or barley that hydrolyses phytin to inositol and phosphoric acid.

phytelephas. The negrito palm, *P. macrocarpa*, of Eucador whose fruit yields corajo or vegetable ivory. Cf. *tagud nut.*

phyterythrin. The red coloring matter of plants, especially of leaves in autumn.

phytic acid. $C_6H_6O_6(H_2PO_3)_6$ = 660.42. Inositol hexaphosphoric acid. An amorphous powder, d.1.175, m.214, slightly soluble in water. It is widely distributed in plant seeds.

phytin. The calcium salt of phytic acid: (calcium inositol hexaphosphoric ester) derived from numerous seeds (hemp, sunflower, peas, beans); used as the calcium or magnesium salt as a nutrient in rickets, anemia, and tuberculosis.

phytochemistry. A branch of science that deals with chemical changes occurring in vegetable organisms or plants.

phytochrome. The general name for the coloring materials of plants necessary for their synthetic metabolism; as, chlorophyll.

phytol. $C_{20}H_{39}OH$ = 296.3. *3.7.11.15*-Tetramethyl-*2*-hexadecen-*1*-ol*. An unsaturated alcohol derived from chlorophyll, $Me[CHMe(CH_2)_3]_3CMe{:}CH.CH_2OH$. A colorless oil, d.-0.864, $b._{10mm}$203, and a polymer of isoprene.

phytolacca. Poke root. The dried root of *P. decandra*, a Phytolaccaceae; used as the fluid extract, as an alterative and emetic. **p. berries.** Poke berries.

phytolaccic acid. An acid derived from poke berries. A yellowish-brown, amorphous, gummy mass; soluble in water or alcohol, slightly soluble in ether.

phytolaccin. A neutral principle obtained from the seeds of *Phytolacca* species. Lustrous silky needles, insoluble in water, soluble in alcohol or ether; used medicinally as an alterative and laxative.

phytolaccine. An alkaloid obtained from the roots of *Phytolacca* species.

phytolaccotoxin. $C_{24}H_{38}O_8$ = 454.29. A toxic principle from *Phytolacca americana* of South Africa and America, and from the Japanese *Phytolacca acinosa*.

phytopathology. The study of the diseased conditions of plants.

phytopharmacy. The study of fungicides and insecticides.

phytopyrrole. See *chlorophyll*.

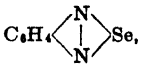
phytosterin. Phytosterol.

phytosterol. (1) $C_{26}H_{44}O.H_2O$ = 390.37. Phytosterin. An isomer of cholesterol, m.135–144 in all vegetable fats (0.5–1 %). Its presence distinguishes vegetable from animal fats which contain cholesterol. (2) Any sterol derived from plants, see *cholane derivatives*. **p. test.** A test to distinguish vegetable fats from animal fats. The saponified fats are extracted with ether, and the ether extract treated with glacial acetic acid. The melting point of the acetates formed are: phytosterol acetate, m.125–127 (vegetable fat); cholesterol acetate, m.114 (animal fat).

phytosterolin. $C_{34}H_{56}O_6$ = 560.0. A glucoside, m.275–288, that yields phytosterol on hydrolysis.

pi. π. (1) A mathematical constant which expresses the ratio of the circumference of a circle to its diameter, 3.1416; see *Ludolf's number*. (2) A symbol for peri-, q.v.

piaselenole. $C_6H_4N_2Se$ = 183.3. Isobenzoselenodiazole. The heterocyclic compound,



m.76. **iso-** Benzoselenodiazole. **tolu-** Tolupiaselenole.

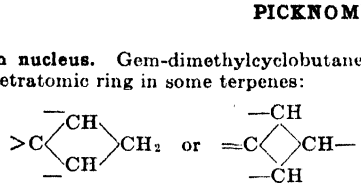
piassaba. A tough fiber obtained from *Leopoldina piassoaba* of Brazil; used for ropes. **Bahia-** A fiber from *Attalea funifera* of Brazil.

piazines. Para-diazines. A group of heterocyclic compounds having two N atoms in the para-position; as, pyrazine. Cf. *miazines, oiazines*.

piazothiole. $C_6H_4N_2S$ = 136.2. The heterocyclic thiodiazole C_6H_4  S. A colorless crystalline mass, m.44, b.206. **iso-** Benzothiodiazole.

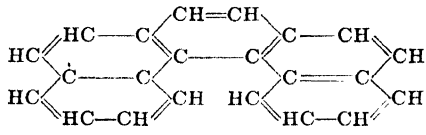
picamar. $C_{11}H_{16}O_3$ = 196.13. Propylpyrogallol-dimethylether, $C_6H_2(OMe)_2(OH)(C_3H_7)$, 1-propyl-2-hydroxy-3.4-dimethoxybenzene. A colorless liquid, b.245, used in perfumery.

picean nucleus. Gem-dimethylcyclobutane ring. A tetratomic ring in some terpenes:



picein. $C_{14}H_{18}O_7$ = 298.2. A glucoside from the leaves of the Norway spruce, *Picea excelsa*, and the bark of *Salix nigra*, willow, a Salicaceae. It is the β-glucoside of *p*-hydroxyacetophenone. White powder, m.194; soluble in water. Cf. *piceoside*.

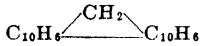
picene. $C_{22}H_{14}$ = 278.2. Dibenzo[ai]-phenanthrene. An aromatic and high-melting hydrocarbon obtained from coal tar.

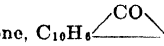


Blue fluorescent leaflets, m.364, b.519; insoluble in water or alcohol, soluble in cumene.

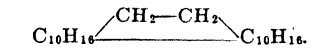
picenefluorene. $C_{21}H_{14}$ = 266.2. Dinaphthylenemethane, pycylenmethane.

An aromatic hydrocarbon:



piceneketone. $C_{21}H_{12}O$ = 280.1. The aromatic ketone, $C_{10}H_6$  .

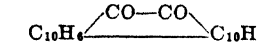
piceneperhydride. $C_{22}H_{36}$ = 300.3. The saturated aromatic hydrocarbon do-eikosin-hydropicene (=22 hydrogen-picene),



Colorless crystals, m.175; insoluble in water, soluble in alcohol.

picenic acid. $C_{21}H_{14}O_2$ = 298.11. A colorless solid, m.201.

picenoquinone. $C_{22}H_{12}O_2$ = 308.1. The ketone,



piceoside. Salinigrin ameliaroside. A glucoside of *p*-hydroxyacetophenone occurring in species of *Coniferae, Rosaceae* and *Salicaceae*. Cf. *picein*.

pichi. The woody and resinous branches of *Fabiana imbricata*, a Solanaceae of Chile. Used as the fluid extract, as a tonic and diuretic. Cf. *fabiana*.

pichurim beans. Sassafras nuts. The seeds of *Nectandra puchury*, a Lauraceae of Brazil and Venezuela; used as an aromatic. **p. camphor.** $C_{12}H_{24}O_2$ = 200.2. An aromatic substance obtained from p. beans, resembling laurel camphor. **p. fat.** The fatty matter of p. beans, containing 30 % laurostearin and p. camphor; used in flavoring extracts.

pickeringite. A native magnesia alum, $MgAl_2(SO_4)_4.22H_2O$; long fibrous masses.

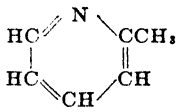
pickle. (1) A bath of dilute acids, used to remove oxides, carbonates or other scales from metals. (2) A fruit or vegetable preserved in spiced vinegar. **p. inhibitor.** A substance added to a p. (1) to restrain its corrosive action.

pickling. To clean sheet iron or metallic utensils by immersion in (usually sulfuric or nitric) acid.

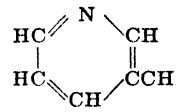
picknometer, picnometer. Pyknometer.

picoampere. 0.001 milliampere.

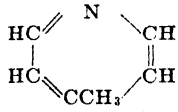
picoline. C_6H_7N = 93.1. Methylpyridine. A series of homologs of pyridine: $C_5H_4N.Me$, obtained by the dry distillation of bones and coal. **alpha-** A colorless liquid, d.0.952, m. −69, b.128,



alpha- or 2-
2-methylpyridine



beta- or 3-
3-methylpyridine



gamma- or 4-
4-methylpyridine

soluble in water or alcohol; used medicinally as a nerve sedative. Cf. *picolinic acid*, *uvitonic acid*. **beta-** A colorless liquid, d.0.977, b.144; soluble in alcohol. **gamma-** A colorless liquid, d.0.974, b.147; soluble in water. **tetrahydro-** The saturated compound, $C_5H_9N.CH_3$ = 97.1. A colorless liquid, b.132. Cf. *uvitonic acid*.

picolinic acid. $C_5H_4N.COOH$ = 123.1. Pyridine carboxylic acid*. Colorless needles, m.136; soluble in water, alcohol or ether.

picolyl. The monovalent radical, $C_5H_4NCH_2$—, derived from picoline.

picotite. The mineral MgO,Al_2O_3, with Fe and 7 % CrO_3.

picraconitine. Picroaconitine.

picradonidin. A glucoside obtained from *Adonis* species, Ranunculaceae; it has a digitalis-like action.

picramic acid. $C_6H_5O_5N_3$ = 199.1. Dinitrophenamic acid, *2*-amino-*4.6*-dinitrophenol*, 4.6.-2-picramic acid, 4.6.2.1-dinitroaminophenol, $(NO_2)_2(NH_2)C_6H_2(OH)$, 1-hydroxy-2-amino-4.6-dinitrobenzene. Colorless monoclinic crystals, m.168, insoluble in water but soluble in alcohol or ether; used in organic synthesis.

picramide. $C_6H_4N_6O_4$ = 228.1. 1.2.4.6-trinitroaniline, picrylamine, $C_6H_2(NH_2)(NO_2)_3$. Yellowish leaflets, m.186, insoluble in water or alcohol, soluble in acetic acid. **methylnitro-** Tetryl.

picramnine. An alkaloid from the bark of *Picramnia antidesma*, a Simarubaceae (Honduras bark).

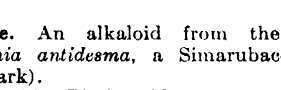
picranisic acid. Picric acid.

picrasmine. $C_{35}H_{46}O_{10}$ = 626.5. A principle from the wood of *Picrasma quassioides*, a simarubaceous tree of the Himalayas.

picrate. Carbazotate. A highly-explosive salt of picric acid, of the type $(NO_2)_3C_6H_2OM$.

picratol. Silver picrate.

picric acid. $C_6H_3O_7N_3$ = 229.1. 2.4.6-Trinitrophenol*, picranisic acid, picronitric acid,



chrysolepic acid. Lemon-colored leaflets, d.-1.767, m.122, which explode on further heating; slightly soluble in water, soluble in alcohol or ether. Used as a reagent in analytical chemistry and microscopy; to precipitate proteins; and in the manufacture of explosives and dyes. Cf. *lyddite*.

picrin. A bitter principle obtained from *Digitalis purpurea*, a Scrophylariaceae. **bromo-** Nitrobromoform.

picro- A prefix derived from the Greek, indicating "bitter."

picroaconitine. $C_{31}H_{45}O_{10}N$ = 591.4. Picraconitine. An amorphous bitter principle from the bulbs of *Aconitum napellus*, a Ranunculaceae.

picroadonidine. A bitter principle from *Adonis* species.

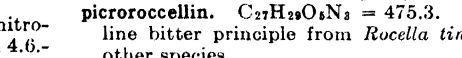
picrocarmine. A stain for microscopic specimens: 1 pt. carmine, 5 pts. ammonia, 50 pts. water, and 50 pts. saturated solution of picric acid.

picrocrocin. (1) $C_{38}H_{66}O_{17}$ = 794.49. Saffron bitter. A glucoside from saffron. (2) $C_{10}H_{14}O$ = 150.11. A ketone, b.209, from saffron. Cf. *pikrococin*.

picroerythrin. $C_{12}H_{16}O_7.3H_2O$ = 344.2. A crystalline bitter substance, m.158; soluble in water, insoluble in alcohol.

picrol. $C_6H_3O_2I_2SO_3K$ = 479.7. Di-iodoresorcin potassium monosulfonate. A colorless crystalline powder, soluble in water, alcohol or ether; used as an antiseptic.

picrolonic acid. $C_{10}H_8N_4O_5$ = 264.1. *3*-methyl-*4*-nitro-*1*-*p*-nitrophenyl-*5*-pyrazolone.



A microreagent for calcium, with which it produces rectangular crystals.

picromerite. The mineral $(K_2Mg)SO_4.xH_2O$.

picronigrosin(e). An alcoholic solution of picric acid and nigrosine. Used as a microscopic stain.

picronitric acid. Picric acid.

picropodophyllin. A crystalline principle from the *Podophyllum* species. Cf. *podophyllin*.

picroroccellin. $C_{27}H_{29}O_5N_3$ = 475.3. A crystalline bitter principle from *Rocella tinctoria* and other species.

picrosclerotine. An alkaloid from ergot.

picrotin. $C_{15}H_{18}O_7$ = 310.1. A decomposition-product of picrotoxin, m.240.

picrotone. $C_{14}H_{16}O_3$ = 232.1. A ketone derived from picrotoxin.

picrotonol. $C_{14}H_{16}O_4$ = 248.1. An α-ketol, and degradation-product of picrotoxin.

picrotoxin. $C_{30}H_{34}O_{13}$ = 602.3. A neutral principle from the fruit of *Anamirta paniculata* (or *Cocculus indicus*, fishberries) resembling strychnine in its action. White, flexible, shining needles, m.200, soluble in alcohol, water, or ether, hydrolyzed to picrotin and picrotoxinin; used in medicine.

picrotoxinin. $C_{15}H_{16}O_6.H_2O$ = 310.2. A decomposition-product of picrotoxin. Colorless crystals, m.201; soluble in water.

picryl. The monovalent radical, $C_6H_2(NO_2)_3$—, derived from picric acid. **p. amine.** Picramide. **p. chloride.** $ClC_6H_2(NO_2)_3$ = 247.54. (1) *1*-chloro-*3.5.2*-trinitro-benzene. Yellow prismatic crystals, m.81, insoluble in water, soluble in alcohol or ether; used in the manufacture of explosives. (2) *1*-chloro-*2.4.5*-trinitrobenzene, m.113.

Pictet, Amé. 1857–1937. A Swiss chemist noted for his work on vegetable alkaloids. **P. crystals.** White crystals formed when liquid sulfur dioxide evaporates, and supposed to be $SO_2.xH_2O$. **P., Raoul.** 1842– . A Swiss chemist who liquefied O, N. H and CO_2 at −140°C.

pictol. Metol.

picylene. Picenefluoren

piedmontite. The mineral, $4CaO,3(AlMn)_2O_3,6SiO_2,H_2O$.

pieso- Piezo-.

piezo- A prefix derived from the Greek, indicating "pressure."

piezochemistry. The study of chemical reactions under high pressure.

piezocontrol. The maintenance of a definite radio frequency with a quartz oscillator. Cf. *piezoelectricity.*

piezocrystallization. Crystallization under great pressure; as, in certain rocks.

piezoelectricity. A phenomenon in which an electric current is produced as the result of pressure exerted on certain crystals; such as, quartz, mica, tourmaline, and calcite. It is the reverse effect of electrostriction. Cf. *quartz oscillator.*

piezoelectron. A supposedly disk-shaped electron pressed between two petalons.

piezometer. An instrument for determining the compressibility of a substance.

pig. A cast bar or brick made of metal. **p. iron.** A crude, cast iron, molded in sand. **p. lead.** A cast bar of lead. **p. tin.** A cast bar of tin.

pigment. (1) A finely-powdered, insoluble white, black or colored material; used, suspended in a vehicle, as a paint, or ink. Classification: (a) according to source:

mineral pigments, as ochre;
animal pigments, as carmine;
vegetable pigments, as madder-lake;
synthetic or artificial pigments, *e.g.*, monastral blue.

(b) according to their chemical composition:

1. elements, as carbon black
2. oxides, as ferric oxide
3. sulfides, as cinnabar
4. hydroxides, as ferric hydroxide
5. carbonates, as lead carbonate
6. silicates, as manganese silicate
7. chromates, as lead chromate
8. sulfates, arsenates, and other inorganic salts
9. organic compounds, as prussian blue, or gamboge.

(c) according to color. (2) A coloring matter in the tissues of plants or animals; as, the chromoproteins. Cf. *cytochrome, lipochrome, bilepigments, flavones, anthocyanins.* **carotenoid-** See *carotenoids.* **p. dye.** An insoluble dye, which does not form lakes. **p. green.** A green color prepared from an iron salt and nitroso-β-naphthol.

pigmentation. The coloration or discoloration of part of a living organism by a deposit of coloring matter.

pigmented. Describing an organ or part of an organism, stained by a deposit of pigment.

pigmentolysis. The dissolution or destruction of a coloring matter in an organism.

pikrococin. $C_{16}H_{28}O_6$ = 313.2. A glucoside of safranal in saffron,

$$(C_6H_{10}O_5).CH.CH_2.CMe_2.C(CHO):CMe.CH_2.$$

Cf. *picrocrocin.*

pilchardine. A commercial blend of oils from pilchard, sardine and grey-fish.

pile. A bundle or stack. **galvanic-** Voltaic p. **thermo-** A number of sheets or bars, composed of two or more metals, that produce an electric current when heated at their junctions of contact. **voltaic-** A series of metallic disks, forming a galvanic battery.

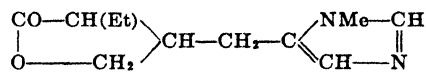
pilewort. Lesser celandine, *Ranunculus ficaria,* used as ointment.

piliganine. $C_{18}H_{24}ON_2$ = 248.3. An alkaloid from piligan, *Lycopodium saururus,* a South American club moss. A yellow amorphous powder; insoluble in water.

pill. (1) A small uncoated or coated round mass, consisting of a mixture of an active drug and inert material; used in medicine. It differs from tablets, which are compressed and disk shaped. (2) A pellet of cesium, which is introduced into a vacuum tube and "flashed" to remove all oxygen.

pilocarpidine. $C_{10}H_{14}N_2O_2$ = 194.2. An alkaloid obtained from the leaves of *Pilocarpus.* Dihydroxylnicotine, $C_5H_4N.CMe(NMe_2).COOH$. A colorless syrup-like liquid or colorless crystals; insoluble in water. **p. nitrate.** $C_{10}H_{14}N_2O_2.HNO_3$ = 257.2. Colorless crystals; soluble in water.

pilocarpine. $C_{11}H_{16}O_2N_2$ = 208.2. An alkaloid from the leaves and stalks of jaborandi (see *pilocarpus*).



Colorless needles, m.34, slightly soluble in water, soluble in alcohol. Used as its salts in medicine, as it increases saliva and sweat, constricts pupils and decreases intraocular tension. **p. hydrochloride.** $C_{11}H_{16}O_2N_2.HCl$ = 244.67. Colorless, hygroscopic needles, m.194; soluble in water or alcohol. **p. nitrate.** $C_{11}H_{16}O_2N_2.HNO_3$ = 271.2. Pilocarpinae nitras. Colorless crystals, m.178, soluble in water or alcohol, insoluble in ether; used in medicine. **p. phenate.** $C_{11}H_{16}O_2N_2.C_6H_5OH$ = 302.2. Aseptolin. A colorless oily liquid; soluble in water or alcohol. **p. salicylate.** $C_{11}H_{16}N_2O_2.C_7H_6O_3$ = 346.20. White crystals, m.120, soluble in water. **p. sulfate.** $(C_{11}H_{16}N_2O_2)_2.H_2SO_4$ = 514.33. Colorless crystals, m.133.

pilocarpus. Jaborandi. The dried leaflets of *Pilocarpus pennatifolius,* and other species, a rutaceous shrub of tropical America. It contains 0.6 % alkaloids, and is used as the fluid extract, as a diaphoretic.

pilocereine. Pilocerine.

pilocerine. $C_{30}H_{44}O_4N_2$ = 496.5. An alkaloid from a cactus, *Cereus pilocereus.*

pilosine. $C_{16}H_{18}N_2O_2$ = 286.16. An alkaloid from pilocarpus. $MeN.CH:N.CH:C.CH_2.CH.CH_2.O.CO.CH.CHOH.Ph$. White crystals, d.1.168, m.187.

pilosinine. $C_9H_{12}N_2O_2$ = 180.11. An alkaloid from pilocarpus:

$$MeN.CH:N.CH:C.CH_2.CH.CH_2.O.CO.CH_2.$$

White crystals, m.79, $b._{25mm}$300.

pilot burner. A small burner that is kept permanently alight, and is attached to a larger burner for relighting purposes.

pilot flame. The small flame of the pilot burner.

pilot plant. An experimental assembly of manufacturing equipment to try out a new process on the semi-large scale.

pimanthrene. $C_{16}H_{14}$ = 206.1. *1.7*-Dimethylphenanthrene. A hydrocarbon from copal and pimaric acid.

pimaric acid. $C_{20}H_{30}O_2$ = 302.3. An optically-active acid from burgundy pitch and galipot resin. A crystalline mass, m.148 (inactive); soluble in hot alcohol or ether (see *abietic acid*). **dextro-** m. 210. **laevo-** m.145.

pimelic acid. $C_7H_{12}O_4$ = 160.12. 1.5-pentane dicarboxylic acid, heptanedioic acid*. The sixth member of the oxalic acid series, $CH_2(CH_2CH_2COOH)_2$. A solid, m.105, b.$_{100mm}$272, soluble in alcohol or ether.

pimelinketone. Cyclohexanone*.

pimelite. A native green nickel-iron silicate, similar to meerschaum.

pimenta. Allspice, Jamaica pepper. The dried, fully grown, unripe and powdered fruit of *Pimenta officinalis*, a Myrtaceae of the tropics. Used as a condiment, for flavoring, and medicinally as an aromatic stimulant. **p. oil.** Allspice oil. A pale yellow oil distilled from the pimenta of the West Indies, d.1.05, insoluble in water, soluble in alcohol or ether. Used in perfumery and for flavoring extracts.

pimpinella. The dried roots and rhizomes of *Pimpinella saxifraga* or other species, an umbelliferous plant; used medicinally, as the fluid extract, as a diuretic.

pimpinellin. $C_{13}H_{10}O_5$ = 246.1. A bitter crystalline principle from pimpinella. Colorless needles; insoluble in water, soluble in alcohol.

Pinaceae. Pine family, a group of trees and shrubs with a resinous juice and awl- or needle-shaped leaves. The following plants of this family yield drugs:

Abies balsamea (Canada fir) ...	Canada balsam
Abies (*Tsuga*) *canadensis* (hemlock spruce)	Canada pitch
Abies (*Picea*) *excelsa* (Norway spruce)	Burgundy pitch
Agathis dammara	kauri gum
Dammara orientalis	dammar gum
Callitris quadrivalvis	sandarac
Juniperus sabina (sabina).....	savine
	oil of savine
Juniperus communis (juniper).	juniper berries
	juniper oil
Juniperus oxycedrus	cade oil
Larix laricina (hackmetack)..	tamarac
Pinus alba (white pine).....	white pine bark
	fluid extract
Pinus pumeliv (dwarf pine)...	dwarf pine needles
	oleum pini pumilionis
Pinus sylvestris (Scotch fir)...	wood tar
Pinus palustris (common pine)	turpentine
	colophony
	tar
	tar oil
Thuja occidentalis (arbor vitae)	thuja
	fluid extract

Cf. *Abies, Agathis, abietene, cedar oil, cypress oil, larixine.*

pinachrome. $C_{26}H_{29}IN_2O_2$ = 528.2. p-ethoxy quinaldine-p-ethoxy-quinoline-ethyl-cyanine. An indicator from pH 5.8 to 7.8; colorless in acid, red-violet in alkaline solutions.

pinacoid. See *pinakoid.*

pinacol. $C_6H_{14}O_2$ = 118.14. Tetramethylethyleneglycol, pinacone, 2.3-dimethyl-2.3-butanediol*, $Me_2C(OH)—C(OH)Me_2$. Colorless crystals, m.38, b.172, slightly soluble in water, soluble in alcohol. **p. condensation.** An organic reaction in which two aldehydes or two ketones are reduced and linked together, as in the formation of pinacol from acetone:

$$2Me_2CO + H_2O = Me_2COH—COHMe_2$$

p. conversion. An intramolecular transfer of a methyl group from one carbon to another carbon atom, as in the change from pinacol to pinacoline (glycol to ketone)

$$Me_2C(OH)—C(OH)Me_2 \rightarrow Me_3C.COCH_3.$$

pinacolin. $C_6H_{12}O$ = 100.1. tert.-butylmethylketone, *3.3*-dimethyl-*2*-butanone*, $Me.CO.CMe_3$. A colorless oily liquid of peppermint-like odor, b.106; very slightly soluble in water, soluble in alcohol or ether.

pinacolines. A group of ketones, which contain a tertiary alkyl group, of the type, $R.CO.CR_3$.

pinacolone. Pinacolin.

pinacols. A group of diatomic alcohols or glycols, of type $R_2C(OH).C(OH)R_2$.

pinacolyl alcohol. $C_6H_{14}O$ = 102.11. *3.3*-Dimethyl-*2*-butanol*, methyl-*tert.*-butylcarbinol, $CMe_3.CHOH.Me$. A colorless liquid, d.0.812, m.5.5, b.121, slightly soluble in water.

pinacone. Pinacol.

pinacones. See *pinacols.* **p. rearrangement.** See *pinacol conversion.*

pinacyanol. $C_{25}H_{25}N_2I$ = 480.9. A carbocyanin dye, used for sensitizing photographic plates to red, and as histological stain.

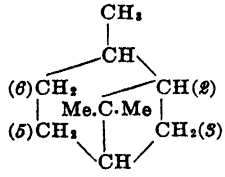
pinaflavole. An isocyanin dye, used as photosensitizer for green.

pinakoid. A prism crystal face intersecting one axis of the system, and parallel to the other two. **brachy-** A pinakoid intersecting the brachy (broad) axis. **macro-** A pinakoid intersecting the macro (long) axis.

pinakryptol. A green dye, used as a photographic desensitizer.

pinalic acid. Valeric acid.

pinan(e). $C_{10}H_{18}$ = 138.2. Bicyclo-(2:4)-heptane. The terpene hydrocarbon,



which occurs in many essential oils. Cf. *pinene.*

pinang. *Areca* nut.

pinaverdol. $C_{22}H_{21}IN_2$ = 440.0. *1.6.1'*-Trimethylisocyanin iodide. An isocyanin dye used in photography for sensitizing plates for the orange portion of the spectrum.

pinch. An approximate measure of 1 or 2 grams.

pinchbeck. A yellow alloy of copper (83 %) and zinc, (17 %), used as an imitation gold for jewellery.

pinckneyin. A glucoside from the bark of *Pinckneya pubens*, a Rubiaceae.

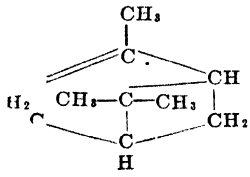
pine. A general name for coniferous trees that yield turpentine, resin, tar, and pitch. **p. camphor.** Pinol. **p. oil.** A crude turpentine obtained by distillation of pine wood. **p. cone oil.** Turpentine. **p. leaf oil.** An essential oil distilled from pine needles. **p. needle oil.** Oleum pini. An essential oil distilled from fresh pine needles, the leaves of *Pinus pumilio.*

A colorless or faintly yellow liquid of pleasant odor, d.0.865–0.875, b.165, containing pinene, limonene and bornyl acetate; used medicinally as an inhalant. **p. tar.** Wood tar. **p. tar oil.** A reddish distillate from pine tar, d.0.97, insoluble in water; used in ore flotation.

pineal gland. A conical-shaped gland in the brain. The dried and powdered glands of young cattle (1 gm. of which is equal to 7 gm. of fresh glands); used medicinally.

pineapple. The fruit of *Ananas sativus*, a Bromeliaceae; q.v. Cf. *bromelin.*

pinene. $C_{10}H_{16}$ = 136.2. Australene, laurene. 2.7.7-trimethyl-Δ^2-bicyclo [1.1.3] heptene. A terpene or hydrocarbon in many essential oils, a chief constituent in oil of turpentine, savine, and fir. A colorless aromatic liquid, d.0.859, m.−50, b.155; slightly soluble in water, soluble in alcohol or ether. **beta-** Nopinene



p. hydrochloride. $C_{10}H_{16}HCl$ = 172.65. An insoluble solid, m.134, b.210.

pinguin. Alantol.

pinicortannic acid. $(C_{16}H_{18}O_{11})_2.H_2O$. A tannin from the bark of Scotch fir, *Pinus sylvestris;* a reddish brown powder. Cf. *cortepinitannic acid.*

pinipicrin. $C_{22}H_{36}O_{11}$ = 476.4. A bitter principle from the needles or leaves of *Thuja occidentalis* and *Pinus sylvestris*, Pinaceae.

pini-pini. The dried bark of *Jatropha urens*, an Euphorbiaceae of Brazil, used medicinally.

pinitannic acid. $C_{14}H_{16}O_8$ = 312.2. A yellowish-red tannic acid obtained from the wood of *Pinus sylvestris.*

pinite. (1) $C_6H_{12}O_5$ = 164.1. Hexahydropentahydroxybenzene. A colorless substance, m.150, in the resin from *Pinus lambertiana.* Cf. *quercitol.* (2) **Pagodite. methoxy-** Quebrachitol.

pinking. See *knock.*

pinkroot. Spigelia.

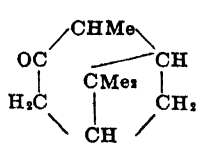
pinksalt. $(NH_4)_2SnCl_6$ = 367.5. Tin-ammonium chloride, ammonium hexachlorostannate. A pink crystalline mass, used in the textile industry as a mordant.

pinnoite. A native magnesium borate, MgB_2O_4.

pinol. $C_{10}H_{16}O$ = 152.13. Sobrerone, pine camphor, *6(8)*-methoxy-*1-p*-menthene. A terpene, from pine needles which occurs in d- and l-forms. A colorless liquid, d.0.952, b.183; insoluble in water, soluble in alcohol or ether. **p. hydrate.** $C_{10}H_{16}O.H_2O$ = 170.14. Sobrerol. The terpene Δ^6-para-menthane-diol-2.8. Acids dehydrate it to pinol; m.150, b.270, soluble in water, alcohol or ether.

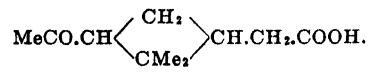
pinoline. Rosin spirit.

pinone. $C_{10}H_{16}O$ = 152.2. 6-oxypinol. The terpene ketone:



It is a constituent of many essential oils, and an isomer of α-thujone, camphor, fenchone and carone.

pinonic acid. $C_{10}H_{16}O_3$ = 184.12. An oxidation-product of pinene:



d(l)- m.99, $b._{12mm}$180. *dl*- m.105. Cf. *umbellonic acid, nopinic acid.*

pinosylvin. $C_{14}H_{12}O_2$ = 212.1. *3.5*-D.hydroxy stilbene, m.p.155. A constituent of the heartwood of the tree *Pinus sylvestris.*

pint. A measure of volume, dry and liquid. **United States-**

1 pt. = 0.5 quart = 0.125 gallon = 4 gills = 16 fl. oz.
= 28.875 $in.^3$ = 128 fl. dr. = 7680 minims.
1 pt. = 0.473167 liter = 473.17 cc.

British- Imperial-. dry- 1 dry pt. = 0.5506 cc. **imperial- British-.** 1 pt. = 20 fl. oz. = 34.6593 $in.^3$ = 568.25 cc. **Scotch-** 1 Sc. pt. = 3.0065 imp. pts.

Pintsch gas. A fuel gas made by spraying oil into a hot retort.

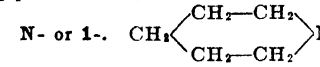
Pinus. An important genus of Coniferae (q.v.) which yield turpentine, galipot resin, pitch, tar, combopinic acid, ceropic acid, pinite, pinipicrin. Cf. *Pinaceae, Abies.*

Piobert effect. The surface markings which appear on polycrystalline specimens of iron and soft steel at or near the yield-point.

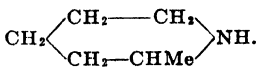
pioscope. A device for estimating colorimetrically the fat-content of milk.

pipeclay. A fine grayish-white grade of clay, similar to kaolin, used for heat-resisting apparatus, and in the plastic state, as a whitening.

pipecoline. $C_6H_{13}N$ = 99.1. Methylpiperidine.

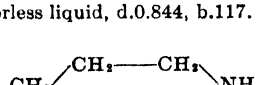
N- or 1-.  A colorless liquid, d.0.818, b.107.

α- or **2-.**



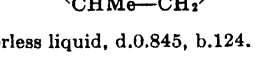
A colorless liquid, d.0.844, b.117.

β- or **3-.**



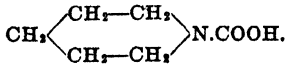
A colorless liquid, d.0.845, b.124.

γ- or **4-.**



A colorless liquid, d.0.867, b.127.

pipecolinic acid. $C_6H_{11}NO_2$ = 131.2. Piperidine-N-carboxylic acid,



Colorless crystals, m.261, soluble in alcohol.

piper. (1) Pepper. (2) A genus of Piperaceae, q.v.

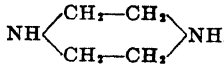
Piperaceae. The pepper family, a group of shrubs, or climbing tropical plants, all of which contain aromatic substances.

Piper betle	betel leaf
Piper cubeba	cubebs
	cubeb oil
Piper nigrum	black pepper
	white pepper
Piper longum	long pepper
Piper angustifolium	matico
Piper jaborandi	jambu
Piper methysticum	kava
Piper ovatum	piperovatine
Houttuynia californica	yerba mansa

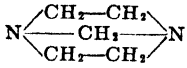
piperamide. $C_{12}H_{11}NO_3$ = 217.1. The amide of piperic acid.

piperazidine. Piperazine.

piperazine. $C_4H_{10}N_2$ = 86.2. Diethylenediamine, piperazidine, hexahydropyrazine, arthriticine, dispermin(e), ethylenimine.

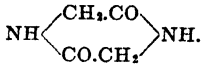


Glassy lustrous leaflets, m.105, b.145, soluble in water, alcohol or ether; used in medicine. **dimethyl-** Lupetazin. **methenyl-** $C_5H_{10}N_2$ = 98.2.



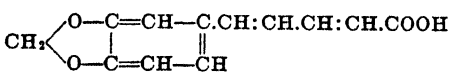
methyl- $C_5H_{12}N_2$ = 100.2. $C_4H_9N_2.CH_3$.

p. dione. $C_4H_6N_2O_2$ = 114.06. Diketopiperazine, glycine anhydride,



The anhydride of the dipeptide glycylglycine, which occurs in fibroin of silk. **p. quinate.** Sidonal. White crystals, soluble in water; used medicinally for gout and neurasthenia.

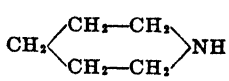
piperic acid. $C_{12}H_{10}O_4$ = 218.14. Piperinic acid, *5-(3.4*-methylenedioxyphenyl)-*2.4*-pentadienoic acid*, piperonilidene crotonic acid, *β-(3.4*-methylenedioxystyryl)acrylic acid. An unsaturated monobasic acid, derived from piperonal.



Yellow needles, m.216; slightly soluble in water, soluble in alcohol or ether.

piperidic acid. $C_6H_9O_2N$ = 103.1. γ-aminobutyric acid, $NH_2(CH_2)_3COOH$. Colorless crystals, m.183; soluble in water or alcohol. **homo-** $C_6H_{11}O_2N$ = 117.1. δ-aminovaleric acid, $NH_2(CH_2)_4COOH$. Colorless crystals, m.158; soluble in alcohol or water.

piperidine. $C_5H_{11}N$ = 85.1. Hexahydropyridine. Pentamethylene imine. A saturated heterocyclic hydrocarbon,

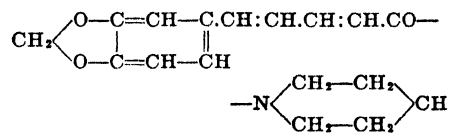


A colorless liquid, d.0.862, m.−17, b.106; soluble in alcohol, water, or ether. It is a vasodilator and a part of the structure of many alkaloids. **dimethyl-** Lupetidine. **ethylmethyl-** Copellidine. **methyl-** Pipecoline. **piperyl-** Piperine. **propyl-** Conine. **tetramethyl-N-methylbenzoxy-** Eucaine. **vinyl-** Meroquinene. **p. carboxylic acid.** Nipecotic acid. **p. dione.** Glutarimide.

piperidinium. The radical $C_5H_{10}NH_2$— derived from piperidine, with pentavalent N; as, C_5H_{10}-NH.HCl. **p. compounds.** Derivatives of p.; as, $C_5H_{10}NH(CH_3)I$.

piperidyl. The monovalent radical, $C_5H_{10}N$—, derived from piperidine. **p. urethane.** C_8H_{15}-O_2N = 157.2. $C_5H_{10}N.CO.OC_2H_5$. A colorless liquid, b.211.

piperine. $C_{17}H_{19}O_3N$ = 285.3. Piperyl-piperidine,



An alkaloid from black pepper. Colorless, monoclinic crystals, m.129, slightly soluble in water, soluble in alcohol or ether. Used medicinally as an antipyretic.

piperinic acid. See *piperic acid.*

piperitone. $C_{10}H_{16}O$ = 152.1. A ketone from eucalyptus oil.

piperolidine. $C_8H_{15}N$ = 125.13. Octahydropyrrocoline, δ-coniceine. A colorless liquid, d.0.904, *dl-* b.161. *l-* b.158.

piperonal. $C_8H_6O_3$ = 150.1. Heliotropin, 3.4-methylenedioxybenzaldehyde, piperonyl aldehyde. An aldehyde, obtained from piperine, having an intense heliotrope-like odor. CH_2:-O_2:C_6H_3.CHO. Colorless needles, m.37, b.-263; slightly soluble in water, soluble in alcohol or ether.

piperonilidene. The bivalent radical, (CH_2O_2)-C_6H_3.CH=, from piperonal. Cf. *piperic acid.*

piperonyl. The monovalent radical, $(CH_2O_2)C_6$-$H_3.CH_2$—, derived from piperine. **homo-** See *homopiperonyl.* **p. alcohol.** $C_8H_8O_3$ = 152.10. *3.4*-methylenedioxybenzyl alcohol. A solid, m.51; slightly soluble in water, soluble in alcohol or ether. **p. aldehyde.** Piperonal.

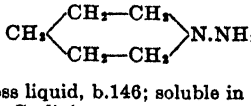
piperonylic acid. $C_8H_6O_4$ = 166.1. Methylene protocatechuic acid, methylene dioxybenzoic acid, heliotropic acid. A monobasic acid from paracoto bark, m.228.

piperovatine. $C_{16}H_{21}O_2N$ = 259.3. An alkaloid from the fruits of *Piper ovatum*, a Piperaceae of Trinidad. Colorless crystals, insoluble in water, soluble in alcohol; used medicinally.

piperyl. The monovalent radical, CH_2:O_2:-C_6H_3.CH:CH.CH:CH.CO—, derived from piperic acid.

piperylene. C_5H_8 = 68.1. Pentadiene*, Δ1.3-amenylene. The unsaturated hydrocarbon, CH_2:CH.CH:CH.CH_3, derived from piperidine. A liquid, b.40.

piperylhydrazine. $C_5H_{12}N_2$ = 100.2. Piperidylamine.



A colorless liquid, b.146; soluble in alcohol.

pipestone. Catlinite.

pipet. A graduated open glass tube used for measuring or transferring definite quantities of liquids. See *automatic, Babcock, capillary, counting, Dudley, gas, Mischer, Mohr* **p. auswaschen-** A micro-p. which *contains* a specified volume of liquid, as distinct from *delivering* it.

In order to obtain the whole of the contents therefore, the pipette must be washed out with water after it has drained.

pipette. Pipet.

pipi root. The dried root of *Petiveria alliacea*, a Phytolaccaceae. Used medicinally as a stimulant, expectorant, and diaphoretic.

pipitzahoac. The dried roots of *Perezia* species, a Mexican Compositae.

pipitzahoic acid. $C_{15}H_{20}O_3$ = 248.2. Perezon. Golden yellow needles from pipitzahoac, m.103; soluble in water, alcohol, (see *perezol*), or ether.

pipitzahoin. A colored principle from the roots of *Perezia adnate*, a Compositae, used as an indicator.

pipsissewa. Chimaphila.

piquia fat. A fat from the kernels of *Caryocar villosum*, a Caryocaraceae of Brazil (souari or butter nut); it resembles palm oil.

pisang. Malay for banana. **p. wax.** A wax from the leaves of the Java banana tree; *Musa paradisiaca*, a Musaceae, containing pisangceryl alcohol and pisangcerylic acid.

pisangceric acid. Pisangcerylic acid.

pisangceryl alcohol. $C_{31}H_{32}O$ = 200.2. A saturated alcohol, m.78.

pisangcerylic acid. $C_{24}H_{48}O_2$ = 368.37. A monobasic acid, m.71, from pisang wax.

pisanite. A native iron-copper sulfate, (Fe, Cu)$SO_4.7H_2O$.

piscidia. Jamaica dogwood. The dried bark of *P. erythrina*, used in the West Indies as a fish poison, and medicinally as a narcotic analgesic.

piscidic acid. $C_{11}H_{10}O_7$ = 254.2. A dibasic acid obtained from piscidia. Colorless needles, m.183; soluble in water, insoluble in alcohol, chloroform or benzene.

piscidin. $C_{29}H_{24}O_8$ = 500.3. A neutral principle from piscidia (dogwood); used as an anodyne.

piscose. Allulose.

pisolite. A hard compact form of aragonite.

pistacite. Epidote.

pistil. A modified leaf or leaves forming the central part of a flower.

pistomesite. $MgCO_3.FeCO_3$. A native carbonate.

pitayamine. An alkaloid from the bark of *Cinchona pitayensis*, a Rubiaceae.

pitch. (1) A heavy liquid or dark residue obtained by distillation of tar; as, pine pitch, Burgundy pitch, coal tar pitch. It forms a lustrous brittle mass when cold, and a semi-solid to syrupy mass according to the degree of heat to which it is subjected. It consists of many organic compounds which differ according to its origin. See *rosin*. (2) (verb.) To add yeast, with or without sugar, in order to start fermentation. **black-** Naval p. **Burgundy-** An aromatic oily resin, obtained by distillation of Norway spruce, *Picea excelsa*. **Canada-** The resin from *Tsuga* species. **earth-** Asphalt. **Jews-** Asphalt. **mineral-** (1) Asphalt. (2) Bitumen. **naval-** The dark solid residue from the distillation of various tars. **petroleum-** Asphalt. **Trinidad-** Asphalt.

p. blende. An impure uranite (q.v.), in which radium was discovered. Cf. *bröggerite*. **p. coal.** Specular coal. **p. stone.** A dark-colored igneous rock, similar to obsidian.

pithecolobine. An alkaloid from the bark of *Pithecolobium saman*, a leguminous tree of the East Indies. A brown oily liquid, insoluble in water.

pitocin. Hypophamine.

Pitot tube. A vertical U-tube with a moveable scale, closed at one end and containing a liquid which is used to record differences in pressure; it is often used as an anemometer.

pitressin. β-Hypophamine.

Pitrowsky test. Biuret reaction.

pittacol. Eupittonic acid.

pitticite. Scorodite.

pituitary. Hypophysis sicca. The dried cleaned, and powdered posterior lobe of the pituitary gland of the ox. A light, yellowish-gray powder, used in medicine. **p. liquid.** A standardized solution of the active principle of the anterior or the posterior lobe of the pituitary gland (hypophysis cerebri) of the ox. See *hypophamine*.

pituitrin. An extract of the pituitary, containing pitocin and pitressin; used as a vasoconstrictor. Cf. *hypophamine*.

pituri. The powdered leaves and twigs of the pituri plant, *Duboisia hopwoodii*, a Solanaceae of Australia. Used by the natives of Central Australia as a narcotic stimulant.

piturine. $C_{10}H_{16}N_2$ = 164.2. An alkaloid from pituri. An oily brown liquid resembling nicotine.

piuri. Indian yellow.

pivalaldehyde. $C_5H_{10}O$ = 86.08. Trimethylacetaldehyde, *2.2*-dimethylpropanal*, CMe_3CHO. A colorless liquid, d.0.793, m.3, b.75; used in organic synthesis.

pivalic acid. $C_5H_{10}O_2$ = 102.1. Trimethylacetic acid, *2.2*-dimethylpropanoic acid*, CMe_3COOH. Colorless crystals, $d._{50}$0.90, m.35, b.164; soluble in water, alcohol or ether. Cf. *valeric acid*.

pivalyl. The monovalent radical, $CMe_3.CO—$. **p. chloride.** CMe_3COCl, trimethylacetylchloride.

pix. The Latin name for pitch; as, **pix burgundica** (Burgundy pitch), **pix canadensis** (Canada pitch). **p. liquida.** Wood tar.

pk. (1) An abbreviation for peck. (2) The symbol for the logarithm of the reciprocal of the dissociation constant of an electrolyte (cf. pH). $pk = \log 1/k$.

place isomerism. The phenomenon exhibited by chemical substances of similar compositions, which differ in structure by the positions of radicals; as, ortho-, meta-, and para-positions of a compound.

placentin. An extract from the placenta, used in Abderhalden's test.

placer. Any alluvial or glacial deposit of sand or gravel containing gold nuggets. **p. deposit.** A gravel or sand containing gold or other precious minerals and metals. **p. mining.** The extraction of gold or other precious metals from gravel and sand by washing.

plagioclase. A general name for triclinic feldspars. Cf. *gabbro*.

plagionite. The mineral $5PbS,4Sb_2S_3$. Cf. *lead minerals*.

Planck, Max. 1858– . A German physicist, noted for his development of the quantum theory. **P. constant.** The universal constant, $h = 6.547 \pm 0.008 \times 10^{-27}$ erg-seconds, (see *quantum theory*). It connects the wave and corpuscle theory of radiations by the equations: $E = h\nu$, and $P = h\sigma$, where E is energy, P

is momentum, ν the frequency and σ the wave number.

Derived from:	
Rydberg's constant	6.547 ± *0.011*
Ionization potential	6.560 ± *0.015*
X-rays	6.550 ± *0.009*
Photoelectric effect	6.543 ± *0.010*
Wien's law	6.548 ± *0.015*
Stefan-Boltzmann law	6.539 ± *0.010*

P.'s element of action. Planck's constant. **P.'s formula.** The energy radiated from a black body is,

$$E_\lambda = C_1.\lambda^{-5}[e^{c_2/\lambda T}-1],$$

where E_λ is the intensity of energy (emissive power) at the wavelength λ expressed (in microns); e, the base of Naperian logarithms; C_1, a constant (9.226×10^3 when E is expressed in gram calories/sec./cm.,^{2} and 3.86×10^4 when E is expressed in watts/cm.^{2}), and c_2, a constant equal to 14,350; T the absolute temperature. **P.'s unit.** Planck's constant.

plane. Any surface, imaginary or real, which is flat or level with itself in all directions. **p. of symmetry.** An imaginary plane passing through a crystal so that, for each face or angle of the crystal, there is a similar face or angle on the opposite side of the plane, a line joining the two faces being perpendicular to the plane. **p. symmetric-** The cis- or maleinoid form of a geometric isomerism. **p. symmetric isomerism.** Geometrical *isomerism*.

planet. A celestial body moving around the sun in a nearly circular orbit. Cf. *meteoric*.

planetary. Pertaining to a planet. **p. atmosphere.** The gases surrounding a planet. They are chiefly:

Mercury	none
Venus	CO_2
Earth	N_2
Mars	H_2O
Jupiter	H_2
Saturn	NH_3, CH_4, H_2
Uranus	H_2, CH_4
Neptune	H_2, CH_4
Pluto	?

plant. (1) The machinery and implements used in manufacturing processes. (2) A living organism of the vegetable kingdom, which generally contains chlorophyll and photosynthesizes food; hence (unless a parasite or saprophyte) it requires only inorganic substances. Cf. *animal*. P. are grouped into four phyla or branches. Each plant generally consists of two systems:

A. Protective system
   1. of the surface: epidermis, cork, bark.
   2. of the skeleton: bast fibres, collenchyma, sclerotic parenchyma.

B. Nutritive system
   1. absorbing tissues: epithelium of roots, root hairs, etc.
   2. assimilating tissue: chlorophyll parenchyma.
   3. conducting tissue: conducting parenchyma, vascular bundles, latex cells.
   4. storage tissue: reserve tissue of seeds, bulbs, tubers, and water tissues.
   5. aerating system: intercellular spaces, stomata, and lenticels.
   6. receptacles for secretions and excretions: glands, oil, resin and mucus canals, crystal sacs.

p. acids. The organic acids in vegetable organisms; as, citric acid (lemons), tartaric acid (grapes), cinnamic acid (cinnamon), tannic acid (barks). **p. elements.** The elements known to be essential to plant growth: C, H, O, N, S, P, K, Ca, and Mg. In addition traces of Fe, Na, Si, Al, Cl, Mn, Zn, B, and F may be essential. **p. food.** Any artificial fertilizer containing the carbonates, nitrates, phosphates or sulfates of potassium, calcium magnesium, or iron. **p. pigments.** The coloring matter of plants, chiefly:

1. chlorophyll pigments; the green and reddish colors of leaves. Cf. *porphin ring*.
2. carotenoids (q.v.); the lipochromes or fatty pigments of plants.
3. flavones and flavanols (q.v.); the fairly soluble pigments of blossoms and fruits.

plantain. (1) The dried leaves of *Plansago major*, a Plantagineae; used as the fluid extract, as a diuretic. (2) The herbaceous tree *Musa sapientum paradisiaea*, a Scitaminaceae; its fruit is the Adams apple. Cf. *banana*.

plantose. An albuminous substance from rape seeds.

plaskon. Trade name for a urea- or melamine-formaldehyde plastic.

plasma. (1) The liquid part of the blood, containing fibrinogen; used in the preparation of antitoxins. (2) A green mottled variety of chalcedony. **proto-** Protoplasm.

plasmochin. $C_{19}H_{28}N_2O$ = 300.2. Aminoquin, pamaquin, plasmoquine, *8*-dimethylaminoisoamyl-*6*-methoxyquinoline. Yellow powder, insoluble in water, soluble in alcohol; used as an antimalarial.

plasmolysis. The dissolution of the protoplasm of a cell by bathing it in water or salt solutions. See *hypertonic*, *isotonic*, *hypotonic*.

plasmoquine. Plasmochin.

plaster. A paste for coating the surface of a body or substance; a material for making molds. **ahdesive-** A mixture of rosin and wax, used for coating paper or textiles. **hard burnt-** An insoluble form of anhydrite. **lead-** See *lead*. **p. of paris.** $2CaSO_4.H_2O$. The hemihydrated calcium sulfate, made by heating gypsum. It quickly solidifies in the presence of water, and is used to make molds for taking impressions of objects.

plastic. Soft or moldable, pliable. Cf. *plastics*.

plasticity. The property of being soft and tenacious, and able to be formed or shaped in any desired way.

plasticizer. A compound which keeps a substance soft and viscous and prevents the cracking of films. For lacquers the p. are the phthalates (q.v.) and trioresyl phosphate. Cf. *lacquer solvents*.

plastics. A group of synthetic or natural materials which can be shaped when soft and hardened afterwards. **casein-** P. materials made from milk; as, galalith. **cellulose-** P. materials made from nitrocellulose and camphor; as, celluloid. **phenol-** P. made by gradual condensation of phenol and formaldehyde; as, bakelite. **rosin-** Phenol-. **thermoplastic-** A p. which becomes soft and moldable when heated; as, cellulose, vinyl polymers and styrol resins. **thermosetting-** A p. which hardens when heated; as, vulcanite (rubber), phenol-aldehyde (bake-

lite) and glycerol-phthalic anhydride (glyptal) resins.

SYNTHETIC PLASTICS

1. *Phenol-aldehyde Resinoids and Resins.* Heat-hardening resins, or resinoids, used as heat-hardening plastics and heat-hardening coatings. Also oil-soluble resins and resin mixtures, used with drying oils in making varnishes, enamels, paints and nitrocellulose lacquers.
   Albertol, Amberol, Bakelite, Beckacite, Carboloid, Catalin, Celoron, Colasta, Coltrock, Condensite, Crystillin, Damarda, Dekorit, Dilecto, Duranoid, Dures, Durite, Durium, Endolac, Fibroc, Formalite, Formica, Formite, Haveg, Indur, Indurite, Juvelith, Karbolite, Leukorit, Makalot, Marblette, Micarta, Monolite, Mouldensite, Panelyte, Paranol, Phenolic, Phenolite, Mouldrite, Neolith, Neoresit, Nestorite, Redmanol, Resinit, Resinox, Spauldite, Synthane, Texolite, Vigorit.
2. *Polyalcohol-phthalic anhydride Esters (Resinoids, Resins, and Resin Mixtures).* Used in hardened forms, principally for electric insulation, but also as cements.
   Glyptal, Rezyl, Teglac.
3. *Urea-formaldehyde Resinoids, Thio urea-formaldehyde Resinoids, or Mixtures of these.* Employed in heat-hardening molding materials.
   Aldur, Bandalasta, Beatl, Beetle, Beetleware, Crystalite, Melamac, Plaskon, Plass, Prystal, Pollopas, Untye.
4. *Coumarone-indene Polymers.*
   Brofo.
5. *Vinyl Polymers.* Used for dentures, phonograph records, synthetic rubber.
   Monilith, Resovin, Vydon, Vinylite, Chloroprene, Duprene, Vinyon.
6. *Sulfonamid-aldehyde Resins.*
   Santolite.
7. *Cyclohexanone-formaldehyde Resins.*
   No trade name.
8. *Aniline-formaldehyde Resin.*
   Ciba. Head-hardening plastic.
9. *Styrol Resins.*
   Victron, Waterlite. Hot molding material.
10. *Terpene Polymers.*
    Rezinel.
11. *Sugar Resin.*
    Sakaloid.
12. *Cellulose derivatives.*
    Celluloids.
13. *Casein Materials.*
    Galaliths, etc. used for billard balls and artificial ivory.
14. *Superpolyamides.*
    Nylon.
15. *Acrylate Polymers*, for glass substitutes.
    Lucite. Perspex.

plastometer. A device for measuring the plasticity of a material by timing its flow through successive increments of length of a capillary tube.

plate. A thin sheet of metal, glass, etc. with a flat surface, *e.g.*, silver-, tin- or plate glass. **black-** Plate used for tinning, in the untinned state. **photographic-** A glass sheet covered with an emulsion containing light-sensitive silver salts. Cf. *chromatic* p. **p. amalgamation.** A method of extracting gold from finely-crushed ore by floating it over a copper surface coated with mercury.

platina. A native form of platinum, which often contains Ir, Rh, Ru, Os, Au and Ag.

platinammines. Compounds of tetravalent platinum, which contain four molecules of ammonia.

platinammonium. The tetravalent radical $Pt(NH_3)_2\equiv$. **p. chloride.** $Pt(NH_3)_2Cl_4$.

plating. (1) A process or method by which a surface is coated with a metal; as, *silver*-plating, *nickel*-plating. (2) Infecting a culture-media with a bacterial suspension. **close-** A non-electrolytic process in which sheets of metal are soldered on to the surface to be plated. **electro-** The coating of a surface with a metal by electro-deposition.

platinibromide. Bromo-platinate. A salt containing the $PtBr_6=$ radical.

platinic. A substance containing quadrivalent platinum; as, platinic chloride, $PtCl_4$. **p. acid.** H_2PtO_3 = 245.2. A white powder; soluble in alkalis (forming platinates) and acids (forming platinic compounds). *chloro-*$H_2PtCl_6.6H_2O$ = 518.1. A reddish-brown crystalline mass; soluble in water. Used as a reagent for separation of potassium from sodium; technically, for platinization; in photography, for toning; in ceramics, for metallic lusters; and in the manufacture of platinized asbestos catalysts (q.v.). **p. bromide.** $PtBr_4$ = 514.9. Platinum tetrabromide. A dark brown crystalline mass; soluble in water or alcohol. **p. chloride.** (1) Chloro-*platinic acid.* (2) $PtCl_4$ = 336.6. A reddish-brown crystalline mass; soluble in water, alcohol or ether. **p. hydroxide.** $Pt(OH)_4$ = 263.2. A red-brown powder, decomp. by heat; insoluble in water, soluble in acids or alkalis. **p. iodide.** PtI_4 = 702.9. Platinum tetraiodide. An amorphous, brownish-black powder; insoluble in water, soluble in iodide solutions, acids, or alkalis. **p. oxide.** PtO_2 = 227.2. Platinum dioxide. A black powder, m.430, decomp. by further heat; insoluble in water, soluble in acids. **p. sodium chloride.** Sodium platinichloride. **p. sulfate.** $Pt(SO_4)_2$ = 387.2. Platinum sulfate. A greenish-black, deliquescent, crystalline mass, soluble in water; used as a reagent in microchemical analysis. **p. sulfide.** PtS_2 = 259.3. Platinum disulfide. Black needles, d.5.27, decomp. by heat; insoluble in water, soluble in ammonium sulfide solution.

platinichloride. Chloroplatinate. A salt of chloroplatinic acid containing the divalent $PtCl_6=$ radical. They are double salts of platinic chloride and another chloride.

platiniferous. An ore or substance containing platinum.

platiniridium. A native alloy of platinum and iridium, often containing Rh, Ru and Cu.

platinization. A process in which a surface is coated with platinum.

platinize. To coat with metallic platinum. **p-d. asbestos.** Asbestos impregnated with a solution of a platinum salt and ignited, so that the metal is produced; used as a catalyst.

platinochloride. Chloroplatinite. A salt of chloroplatinous acid containing the divalent $PtCl_4=$ radical. They are double salts of platinous chloride and another chloride.

platinocyanide. Cyanoplatinite. A double salt of platinous cyanide and another cyanide, as

$K_2Pt(CN)_4$ or $BaPt(CN)_4$. Used in photography and for fluorescent x-ray screens.

platinoid. The alloy Cu (61 %), Zn (24 %), Ni (14 %) and W (1–2 %); used for electrical resistance coils.

platinous. Describing a compound containing divalent platinum, Pt=. **p. bromide.** $PtBr_2$ = 355.0. Platinum dibromide. A brown crystalline deliquescent mass, decomp. 200; insoluble in water. **p. chloride.** $PtCl_2$ = 266.1. Platinum dichloride. A brown crystalline mass, d.5.87; insoluble in water, soluble in hydrochloric acid or chloride solutions. **p. cyanide.** $Pt(CN)_2$ = 247.22. Platinum dicyanide. A yellow powder; insoluble in water, soluble in cyanide solutions. **p. hydroxide.** $Pt(OH)_2$ = 229.2. A black powder, decomp. by heat; insoluble in water, soluble in acids or alkalis. **p. iodide.** PtI_2 = 449.0. Platinum diiodide. A black powder, decomp. 325; insoluble in water, soluble in acids. **p. oxide.** PtO = 211.1. Platinum monoxide. A violet to black powder, decomp. by heat; insoluble in water, soluble in acids. **p. sodium chloride.** Sodium platinochloride. **p. sulfide.** PtS = 227.3 Platinum monosulfide. A black powder, d.8.89, decomp. by heat; insoluble in water, soluble in ammonium sulfide solution.

platinum. Pt = 195.23. A noble metal of the fourth period, atomic number 78, discovered or described in 1741 by Wood. It is a silver-gray metal, d.21.37, m.1755, b.4530, insoluble in water, alcohol, acids or bases, soluble in aqua regia. Used in chemistry as a catalyst; as a material for acid-proof containers (crucibles, dishes, foils), wires (for flame tests), and electrodes; and for jewelry. World production (1941) 450,000 oz. troy; U.S.S.R. 170,000, Canada 149,000, S. Africa 40,000, U.S.A. 38,000. It is shaped as foil, wire, powder (platinum black) or gray spongy mass (platinum sponge), and forms two series of compounds: platinous (valency 2) and platinic (valency 4). Each series forms many double salts. **p. alloy.** An alloy of platinum with some other noble metal; as, gold, iridium or rhodium. **p. black.** A black powder, consisting of finely-divided platinum; used in organic synthesis as a catalyst. **p. chloride.** (1) Commercial chloroplatinic acid (see *platinic acid*). (2) Platinic chloride. (3) Platinous chloride. **p. dibromide.** Platinous bromide. **p. dichloride.** Platinous chloride. **p. dicyanide.** Platinous cyanide. **p. diiodide.** Platinous iodide. **p. dioxide.** Platinic oxide. **p. disulfide.** Platinic sulfide. **p. iridium.** An alloy of 90 % platinum and 10 % iridium. **p. metals.** A group of noble metals which occur together in nature (see table), and form two groups of the periodic system. They are all catalysts in many oxidizing and reducing reactions. **p. monosulfide.** Platinous sulfide. **p. monoxide.** Platinous oxide. **p. minerals.** Platinum occurs in nature always associated with the other metals of the group, and generally in the uncombined state.

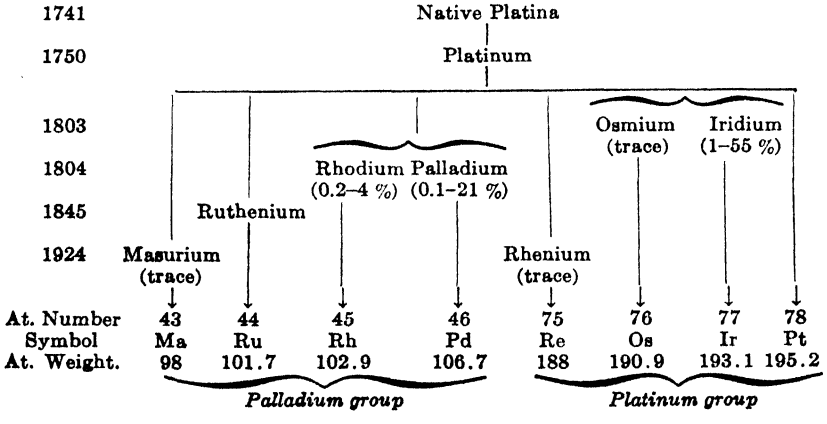
native platinum	Pt
platiniridium	(Pt,Ir)
platinum arsenide	$PtAs_2$

See also *cooperite, platina.* **p. sponge.** Metallic platinum in the form of a gray, spongy, porous mass, obtained by reduction of chloroplatinic acid. Used as a catalyst in organic reactions. **p. sulfide.** Platinic sulfate. **p. tetrachloride.** Platinic chloride. **p. yellow.** A barium chloroplatinate or other alkaline chloroplatinate, used as a coating for fluorescent screens in x-ray work.

platinum-cladding. The bonding of a layer of platinum to a thicker bar of some other metal, and working the two down to a desired thickness; used for laboratory ware.

platize. Platinize.

THE PLATINUM METALS



Plato unit. A measure of the specific gravity of wort; the number of grams of wort-solids per 100 grams of wort.

platosammine. A compound of divalent platinum, which contains two molecules of ammonia, $Pt(NH_3)_2X_2$ or $PtX_2.2NH_3$.

Plattner, Karl Friedrich. 1800–1858. A German mineralogist noted for analytical blowpipe methods. **P.'s anvil.** A small anvil used in blowpipe analysis. **P.'s process.** A method of extracting gold as gold trichloride by passing chlorine gas through the gold-bearing pulp.

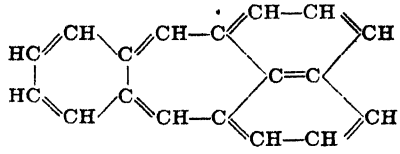
plattnerite. A native lead oxide, PbO_2.

Plausen mill. A colloid mill.

plazolite. $3CaO.Al_2O_3.2(SiO_2.CO_2).2H_2O$. A Californian calcium aluminum silicate; colorless crystals.

pleiad. A group of isotopes.

pleiadene. $C_{18}H_{12}$ = 228.1. A tetracyclic hydrocarbon with a hepta-atomic ring:



Derivatives of this compound are formed by the condensation of phthalic acid with β-naphthol.

pleio- See *pleo.*

pleochroic. Pleochromatic.

pleochroism. Pleochromatism.

pleochromatic. Pleochroic. The capacity of a substance to show more than one color; as, a fluorescent solution.

pleochromatism. Pleochroism. The capacity of certain optically-biaxial crystals to transmit polarized light, so that a complementary color is seen at right angles to the direction of the ray. This is due to absorption of the light to different extents along the several axes of the crystal. (Cf. *dichroism*—a particular case dealing with only two colors.)

pleomorphic. Occurring in more than one form.

pleomorphism. The capacity of certain crystals to crystallize in two or more different crystal systems.

pleonast. The mineral $(Mg.Fe)O.(Al.Fe)_2O_3$.

plessite. Gersdorffite.

Plessy's green. Chromic phosphate.

pleurisy foot. Asclepias.

plevacol. A compound of aminobenzoyl-eugenol-tricresol and formalin. Yellow crystals, m.-155, soluble in acetone, benzene or alcohol; used in dentistry for filling root canals.

plexiglas. Trade name for a methyl acrylate plastic.

pliers. Pincers with long jaws for holding, bending or cutting. **button-** A circular disk with a round hole, used to hold assay buttons during polishing.

Pliny the Elder. Cajus Secundus Plinius, 23–79. A Roman soldier noted for his scientific observations (Vesuvius eruption) and writings (*Historia naturalis*).

pliofilm. A transparent film made from chlorinated rubber.

pliolite. Trade name of a group of resinous materials obtained when rubber is cyclized with agents such as tin tetrachloride.

plodding. A term used in soap manufacture for the compression of the warm soap into shape in a screw compressor.

Plotnikow effect. The longitudinal scattering of (especially infra-red) rays by solid objects or fluids. Cf. *Raman effect.*

plotting. To make a graph or chart representing a relationship between two unknowns, by determining a number of pairs of values which satisfy the relation, and representing them in terms of the lengths of two lines at right angles (the coordinates), each of which represents and is graduated to correspond with one unknown.

Plucker tube. An evacuated glass tube with two electrodes, containing a gas under reduced pressure. Used in spectroscopy.

plumbagin(e). $C_{11}H_8O_3$ = 188.1. Methyljuglone, *5*-hydroxy-*2*-methyl-*1.4*-naphthoquinone. Yellow crystals, m.78–79, from the root of *Plumbago europea, P. zeylonica* and *P. rosea,* a Plumbaginaceae.

plumbago. Native graphite. Blacklead. Used in the manufacture of "lead" pencils, crucibles, and other utensils, and as a lubricant. See *-dag.*

plumbane. (1) An organic compound of lead of the type, PbR_4; as,

tetramethyl-	$PbMe_4$
tetraethyl-	$PbEt_4$
tetraphenyl-	$PbPh_4$

(2) $Pb(C_2H_5)_4$ = 323.2. Tetraethyl lead*, lead tetraethide. A colorless liquid used as an antiknock compound in gasoline. Cf. *ethyl gasoline, stannanes.*

plumbates. A series of salts derived from lead hydroxide, $Pb(OH)_4 \rightleftharpoons H_4PbO_4$, of the types: M_2PbO_3, meta-plumbates; M_4PbO_4, ortho-plumbates.

plumbic. Describing a compound of tetravalent lead. **p. ocher.** Brown *lead oxide.*

plumbiferous. An ore or material containing lead.

plumbism. Poisoning by lead.

plumbite. A salt derived from lead hydroxide, $Pb(OH)_2$, of the types, $MHPbO_2$ or M_2PbO_2.

plumbocalcite. Lead containing calcite.

plumbogummite. A native aluminum and lead phosphate.

plumbo-solvency. The degree of solubility of lead in a liquid.

plumbous. Describing a compound of divalent lead. **p. compounds.** See *lead.*

plumbum. The Latin name for lead. **p. candidum.** A former name for tin. **p. cinereum.** A former name for bismuth. **p. nigrum.** A former name for lead.

plumiera. Sucuuba bark. The dried bark of *Plumiera sucuuba,* an Apocynaceae; used medicinally as anthelminthic.

plumieric acid. $C_{20}H_{24}O_{12}$ = 456 2. A crystalline principle from plumiera.

plumierin. $C_{21}H_{28}O_{12}.H_2O$ = 488.3. Agoniadin, asonidin. A glucoside from the bark of *Plumiera* species. A white crystalline powder, m. 155 (decomp.); soluble in water.

plumose. Having a fleecy or feathery appearance. **p. growth.** A fleecy, feathery growth of bacteria on the culture medium. **p. mica.** A variety of muscovite resembling asbestos.

plural gel. A gel formed by the simultaneous gelification of a mixture of two or more sols.

pluranium. An alleged new element discovered by Osann in 1828 in a platinum ore, and probably a mixture of TiO_2, SiO_2 and ZrO_2.

plutonic. Igneous. A general name for rocks that have crystallized below the earth's surface; as, granite.

plutonium. (1) An element of atomic number 94, and atomic weight 239, obtained by bombarding ordinary uranium with neutrons. It is a transformation product of neptunium, q.v. (2) A name proposed for barium, but never adopted.

pluviometer. Rain gauge. An instrument for measuring rainfall.

pneumatic. (1) Pertaining to air. (2) Pertaining to gases. Cf. *aerodynamics.* **p. drill.** A drill operated by compressed air. **p. jig.** A device for separating minerals by an air blast. **p. trough.** A container of water in which an inverted cylinder, filled with water, is placed for the collection of gases.

pneumatics. A branch of physics dealing with the mechanical properties of gases.

pneumatology. (1) The science of respiration. (2) The science of gases.

pneumatolysis. The process by which many ore deposits were produced as a result of the liberation of gases or vapors during solidification of igneous rocks.

pneumin. Methylene creosote. A yellow, odorless, powder, insoluble in water, soluble in alcohol or ether; used medicinally.

pneumonokoniosis. A form of pneumonia produced by the inhalation of certain industrial dusts, especially coal.

pockeling. The development and expansion of circular patches on fresh surfaces of certain solutions, *e.g.*, of soap.

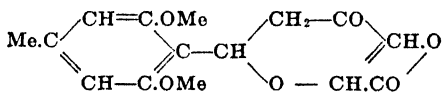
pocket. (1) A sac-shaped cavity or hole. (2) A small body of ore. (3) An enlargement of an ore-vein. (4) A unit of measure for certain commodities (as hops).

poco oil. The essential oil from *Mentha aquatica*, which is rich in linalool acetate.

podophyllic acid. $C_{15}H_{16}O_7 = 308.13$. A monobasic acid derived from podophyllin by hydrolysis.

podophyllin. A resin obtained from podophyllum which contains podophyllic acid, podophyllotoxin, and picropodophyllin. A yellow powder, insoluble in water, slightly soluble in ammonia or alcohol; used medicinally as a purgative. **picro-** $C_{12}H_{14}O_6$. An isomer of podophyllotoxin; an internal or monomolecular anhydride of podophyllic acid.

podophyllotoxin. $C_{15}H_{16}O_6 = 290.1$. The active principle of podophyllin:



A yellow powder, insoluble in water, soluble in alcohol; used medicinally.

podophyllum. Mandrake, May apple. The dried rhizome of *Podophyllum peltatum*, a Berberidaceae, which contains 3 % podophyllin. Used medicinally as the fluid extract.

podzolisation. The division of soil into 3 layers by continual leaching with rain-water. The top layer contains decaying organic matter; the centre layer the material out of which silica, iron oxide and alumina have been washed; and the bottom layer re-deposited extractives.

Poggendorff, Johann Christian. 1796–1877. A German physicist who founded scientific periodicals, and was noted for magnetic and electrical research. **P. cell.** An electrical element, which consists of an amalgamated zinc anode and carbon cathode in a solution of 12 pts. potassium dichromate, 25 pts. sulfuric acid, and 100 pts. water; E.M.F. 2.01 volts. **P. compensation method.** The determination of the potential of a cell by comparing the potential required to balance it with that required to balance a standard, in terms of the length of a resistance wire, analogously to the Wheatstone bridge, q.v.

Pohl's commutator. An electrical contact key that enables the direction of current to be reversed instantaneously; used in physiological experimental work.

poi. See *taro*.

poikilothermism. The ability of living organisms, especially lower forms of life, to adapt themselves to various temperatures.

poidometer. A rapid-action industrial weighing machine.

point. (1) That which has position but not magnitude. (2) A minute spot. (3) A numerical value on a scale. **boiling-** The minimum degree of temperature at which a liquid changes rapidly to the vapor state. **condensation-** The maximum degree of temperature at which a vapor changes to the liquid state. **critical-** The degree of temperature above which a gas cannot be liquefied by pressure only. **dew-** The degree of temperature at which the moisture of the air condenses. **end-** In titration: the stage at which a single drop of solution completes the reaction. **freezing-** The maximum degree of temperature at which a liquid changes to the solid state. **isoelectric-** See *isoelectric point*. **melting-** The minimum degree of temperature at which a solid becomes liquid. **liquefaction-** (1) Melting point. (2) Condensation point. (3) Critical point. **quadruple-** The degree of temperature at which all four phases in a two-component system can exist. **refraction-** The spot on a surface at which a ray of light is refracted. **triple-** See *triple point*.

poise. (1) The C.G.S. unit of viscosity, q.v. It equals 1 dyne per sec. per sq. cm.; or, 1.45×10^{-5} lb.-sec. per sq. ft. Cf. *Poiseuille's Law*. (2) To balance or maintain an oxidation-reduction equilibrium; as, a poising agent.

poiser. A poising agent, q.v.

Poiseuille's Law. See *viscosity*.

poising agent. Poiser. A substance which stabilizes an oxidation-reduction equilibrium; analogous to a buffer maintaining an acid-base equilibrium.

poison. (1) A substance that causes the disturbance, disease, or death of a living organism. Classifications:

A. CHEMICAL (according to composition)
  1. Inorganic poisons
    a. mineral alkalis
    b. mineral acids
    c. metallic poisons
    d. volatile non-metallic poisons (see table)
  2. Organic poisons
    a. organic acids
    b. glucosides
    c. alkaloids
    d. volatile organic poisons (see table)
    e. bacterial poisons
    f. animal poisons
B. PHYSIOLOGICAL (according to effect)
  1. Irritants
    a. true irritants
    b. corrosives
  2. Neurotics
    (cerebro-)
    a. narcotics
    (spinal-)
    b. tetanics
    (cerebro-spinal-)
    c. depressants
    d. deliriants
    e. asthenics

(2) A substance which, added to a metal or alloy, injures its quality. (3) A substance which destroys or diminishes the action of a catalyst or an enzyme. **acrid-** Irritant. **arrow-** A poisonous substance used by savages on their arrows. **bacterial-** P. produced by bacteria; as, toxins, ptomaines, food poison, q.v. **corrosive-** A substance that causes a local destruction of tissue; as, acids, alkalis.

silver nitrate. **cumulative-** A poisonous substance that is retained in the body and gradually accumulates. **fish-** A substance used by natives to stupefy fish. **narcotic-** A substance that produces a stupor or delirium. **true-** A poisonous substance that is absorbed and causes disease or death. See *arrow-*.

p. ash. Chionanthus. **p. effect.** See *M.-W.E.* and table. **p. gas.** See *p. vapor gas.* **p. ivy.** *Rhus toxicodendron.* **p. nut.** Nux vomica. **p. oak.** (1) The fresh leaflets of *Rhus toxicodendron*, an Anacardiaceae of the Atlantic States. Cf. *poison ivy.* Used medicinally as the fluid extract. (2) *Rhus diversiloba* of the Pacific Coast. Both produce highly-irritating skin inflammations, which may be avoided by alcohol rubs and ferrous sulfate applications immediately after exposure. **p. vine.** Same as *Rhus toxicodendron.* **p. vapors.**

	(1) Fatal Per cent	(2) Tolerated Per cent
acrolein	†0.001	0.00033
ammonia	0.3	0.03
aniline	.....	0.00004
arsine	†0.05	0.001
benzene	.....	0.0005
bromine	†0.1	0.004
carbon disulfide	0.001	0.0001
carbon dioxide	†30.0	2–3
carbon monoxide	†0.5	0.04
carbon tetrachloride	†0.03	0.001
chlorine	†0.10	0.0001
chloroform	†0.03	0.001
chloropicrin	†0.05	0.0001
dichlorodiethyl sulfide	.....	0.002
hydrochloric acid	†0.5	0.005
hydrocyanic acid	†0.048	0.002
hydrogen sulfide	†0.06	0.01
iodine	.....	0.0001
mercury	.....	*0.00012
nitrogen monoxide	†0.07	0.0033
nitrobenzene	.....	0.00002
phosgene	†0 02	0.0001
phosphorus trichloride	†0.00035	0.0000004
phosphine	†0.2	0.01
sulfur dioxide	†0.2	0.01
sulfur trioxide	†0.001	0.0002
toluidine	.....	0.0001

(1) † Percentage in air which is fatal in 30 minutes or less; others, dangerous after 30 minutes.

(2) Maximum safe concentration in air for humans; the percentage that can be borne for one hour.

* Exposure for 2–3 months causes poisoning.

poisoning. The diseased condition produced by a poison. **acute-** A morbid condition caused by a single excessive dose of poison. **chronic-** A morbid condition caused by many small doses of poison. **garage-** A morbid condition caused by inhalation of carbon monoxide, which accumulates in poorly-ventilated rooms in which a combustion motor is running.

poisonous dose. The amount that produces marked pathological conditions.

Poisson's ratio. The ratio of the lateral contraction to the longitudinal extension for a bar under a stress parallel to its own length.

poivrette. Ground olive stones, used as an adulterant for pepper.

poke. Phytolacca. **Indian-** Veratrum. **p. berries.** The fresh fruits of *Phytolacca decandra.* Used medicinally, as the fluid extract, as an emetic and narcotic; also as an indicator. **p. root.** Phytolacca.

Polaises reaction. See *Grignard reaction.*

polar. Pertaining to a pole. **p. bond.** The electrostatic union of two atoms established by the passage of one or more electrons from one atom to the other. *E.g.*, in NaCl one electron passes from Na to Cl and, accordingly, the charge of the sodium becomes positive and that of the chlorine negative:

(a) $Na\cdot \rightarrow .\ddot{Cl}:$

(b) $Na\ :\ddot{Cl}:$

(c) $Na^+\ \ddot{Cl}^-$

non- The electromagnetic union of two atoms established by sharing in common one or more pairs of electrons; thus, in CO_2 the two double bonds each consists of a pair of electrons.

(a) $:\ddot{O}:\leftarrow :\dot{C}:\rightarrow :\ddot{O}:$

(b) $:\ddot{O}::\dot{C}::\ddot{O}:$

(c) $O\rightleftarrows C\rightleftarrows O$

p. compound. An electrolyte, or any compound that can ionize when dissolved or fused. In general all inorganic acids, bases, and salts belong to this group, in which the atoms are supposed to be held in electrostatic union. **nonpolar-** A non-electrolyte; in general, an organic compound the atoms of which are supposed to be held in electromagnetic union by sharing a common pair of electrons. **p. formula.** See *formula.* **p. number.** See *polar-number.* **p. zone.** See *zone.*

polarimeter. Polariscope.

polarimetry. Polariscopy. The measurement of the rotation of polarized light by means of the polariscope.

polarisation. Polarization.

polariscope. Polarimeter. A device for measuring the rotation of polarized light. It consists of two Nicol prisms between which is placed a column of polarizing liquid. By rotating the Nicol prism nearest to the eye until the intensity of the light passing through the liquid equals the intensity of the comparison field, the new plane of vibration of the light can be read from the scale in degrees. See *rotation* (and illustration).

polariscopy. Polarimetry.

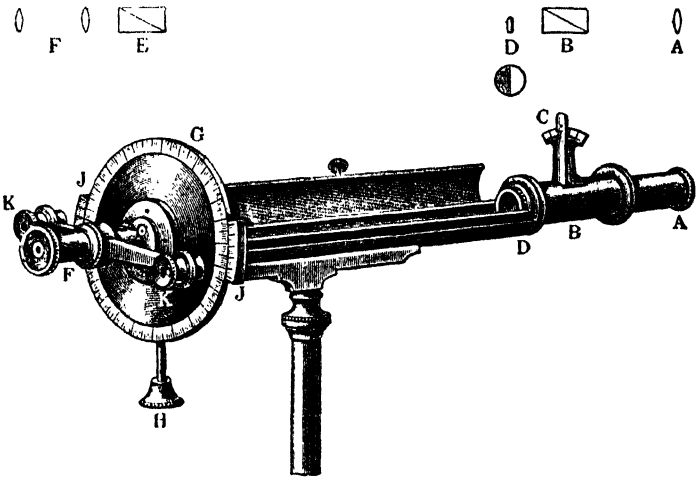
polariser. Polarizer.

polarising. Polarizing.

polarity. Describing a body having two poles, or different properties at terminal points. **atomic-** The loss or gain of one or more electrons by an atom (see *polar bond*). **chemical-** Describing a molecule that has an acid and a basic radical; as, an aminoacid, $NH_2—R—COOH$. **electrical-** The positive and negative terminal, pole, or electrode of an electrical device. **magnetic-** The north or south pole of a magnet. **molecular-** The distribution of electric charges in a molecule. See *polarization* (3).

p. formula. A formula which indicates the distribution of electric charges within the

molecule. Cf. *formula, molecular diagram, structure symbols.* **p. paper.** A filter paper impregnated with an indicator and salt that is moistened and used to distinguish the positive and negative poles of a direct electric current. *E.g.*, if on a filter paper saturated with sodium chloride and phenolphthalein solutions two (D.C.) wires are placed at a little distance apart, electrolysis takes place and the hydroxyl ion will color the phenolphthalein red; hence, the corresponding wire is the positive electrode.



Polariscope.

A. Objective facing a source of monochromatic light.
B. Nicol prism to polarize the light.
C. Adjustment for polarizer (B).
D. Diaphragm.
E. Nicol prism to analyze the light.
F. Eye-piece.
G. Scale.
H. Screw to rotate analyzer (E).
J. Movable scale
K. Magnifier to read scale.

polarization. (1) The property of certain substances to polarize light passing through them. (2) The stoppage or reversal of the voltaic current from an electrolytic cell due to the accumulation of dissociation products at the electrodes (see *overvoltage*). Cf. *Clausius-Mosotti equation, p. potential.* (3) The orientation of a molecule in an electric field (*e.g.*, the positive nucleus toward the negative pole, the electron cloud toward the positive pole); hence a distortion of the polarity. Polarization, α, is related to molecular refractivity, R, by $\alpha = 3R/4N$, where N is Avogadro's number; it is measured by $\alpha = el/I$, where e is the charge, l the distance and I the intensity of the field. Cf. *molecular refractivity, collinsics.* **cell-** The accumulation of hydrogen bubbles on the negative electrode of a battery. **circular-** Polarized light consisting of circular vibrations. **elliptic-** Polarized light, the vibrations of which are elliptical. **plane-** Polarized light, the vibrations of which are all parallel and in one plane.

p. curve. (1) The current-voltage curve obtained when the intensity of an electrolytic current is plotted against the polarizing electromotive force. (2) A polarogram q.v. **p. potential.** The reverse potential of an electrolytic cell, tending to oppose the direct potential of a battery which is effecting electrolytic decomposition in the cell. It is due to the accumulation of the dissociation products on the electrodes. Cf. *overvoltage.*

polarize. To produce polarization.

polarized light. It is assumed that polarized light consists of unilateral vibrations, swinging parallel to one another either in the same plane, ellipse or circle; whereas, non-polarized light vibrates in a number of planes (see *polarizer*). A polarized ray is thus made up of 2 rays, which are complementary in the sense that the vibrations occur in directions at right angles (the ordinary and extraordinary rays). The ordinary ray is "lost" in the polarimeter by total reflection, and the extraordinary ray emerges as light polarized in one plane only. Optically-active substances rotate this plane. Cf. *radiation, Verdet.*

polarizer. A device for polarizing light; as, a Nicol prism through which only light vibrating in one definite plane passes. The polarizer acts a filter by transmitting only parallel vibrations, thus ||||, which, on passing through an optically-active substance, are rotated either ///// or \\\\. Cf. *analyzer.*

polarizing. Causing polarization. **p. angle.** See *Brewster's law.* **p. disk.** Polaroid. A specially-prepared cellulose film containing oriented iodoquinine sulfate crystals, mounted between two glass plates. Used as a substitute for nicol prisms, in polariscopes, and for microscopes, reading glasses and windshields to avoid glare.

polar-number. Valence number. The mathematical expression of valence by assigning to each atom in a compound a positive or negative integer, so that their sum is zero. Hydrogen is 1, oxygen −2 and free elements are zero. Cf. *oxidation, reduction, valence.*

polarogram. Polarization curve. The current-voltage curve produced by a beam of light on photographic paper rotating in the polarograph. It indicates the quantity and purity of substances electrolytically reduced at specific cathodic potentials.

polarograph. An instrument which records the movements of a galvanometer by means of the image produced (on a revolving drum of light-sensitive paper) by a beam of light reflected from a mirror attached to the galvanometer needle. It records photographically, minute changes in the intensity of a current resulting from a gradually-increasing applied voltage, in electrolysis, with a dropping mercury cathode. It is used to measure cathodic electrode processes (*e.g.*, deposition or reduction of cations and

anions); reduction and hydrogenation of organic compounds; overvoltages; complexity of ions, and ionic equilibria; solubility; simultaneous qualitative and quantitative microanalysis for several constituents. It was devised by Heyrovsky, q.v.

polaroid. A polarizing disk, q.v.

pole. (1) Rod. (2) The opposite points at the ends of an axis; a pair of points that have opposite physical properties. **negative-** The cathode; an electric terminal charged with electrons. (**magnetic**) **north-** That point toward which a magnetic needle, freely suspended, will point. **positive-** The anode or electric terminal that is positively charged as a result of loss of electrons.

Polenské number. The number of cc. of 0.1 normal alkali (less the blank) to neutralize an alcoholic solution of the water-insoluble volatile fatty acids liberated on acidification of the soap made by saponification of 5 grams of a fat. (Cf. *Reichert number.*)

polianite. Pyrolusite.

policeman. A device for removing precipitates from the walls of glass vessels in quantitative analysis. **platinum-** A platinum-iridium alloy claw that fits over a glass rod, and is used to hold a quantitative filter during ignition. **rubber-** A small piece of rubber tubing fitting snugly over a glass rod. It is used to rub the precipitates off the walls of glass vessels.

polish. A preparation that is used to clean metal surfaces and make them bright and lustrous.

polishing. The act of rubbing or smoothing metal or glass surfaces. **electrolytic-** The smoothing of a metal surface by making it the anode in a suitable electrolyte (usually phosphoric acid and glycerin). The high current-density produced on the small projecting portions results in their preferential dissolution.

polishing slate. A gray or yellow slate used for polishing.

Pollack's cement. A mixture of equal weights of red lead and litharge, made into a stiff paste with gelatin. It is used for jointing metal and/or glass, and although slow-setting, has great strength.

pollantin. An antitoxin obtained by inoculating horses with pollen extract; used medicinally for immunization.

pollen. The male sex-cells or fertilizing grains of a flowering plant, which contain glucosides; *e.g.*,

ragweed p.	quercitin, isorhamnetin
bulrush p. (*Typha angustata*)	isorhamnetin
orchard grass p. (*Dactylis glomerata*)	dactylin
timothy p. (*Phleum pratense*)	dactylin

Cf. *stamen, pollantin.* **p. extract.** A solution of proteins obtained from the pollens of various plants that are believed to be the cause of hay fever; used medicinally for immunization. **fall-** An aqueous liquid obtained by the extraction of the proteins of ragweed, goldenrod, and maize. **spring-** An aqueous liquid obtained by extracting the proteins of rye, timothy, orchard grass, redtop grass, and sweet vernal grass; used for immunizing to hay fever.

pollopas. A glass-like transparent plastic, (q.v.); used as a substitute for glass.

pollucite. $Cs_2O.Al_2O_3.5SiO_2.H_2O$. Pollux. A rare native hydrated cesium aluminum silicate, which occurs in the pegmatite of the Island of Elba.

pollution. (1) Contamination. (2) The introduction of a deleterious substance into a water supply.

pollux. Pollucite.

polonium. Po = 218.2. Radio telurium, dvitellurium. The radioactive element, Ra*F*, atomic number 84, formed by disintegration of radium, and belonging to the sixth group of the periodic system. It was the first radioactive decomposition-product discovered by Madame Curie (1898).

poly-. A prefix derived from the Greek, meaning "many." (Latin: multi.)

polyamide. A polymerisation product of a carboxylic acid (*e.g.*, adipic acid) and its aminated derivative; see *nylon.*

polyacid base. A compound that yields two or more hydroxyl ions; as, $Ca(OH)_2$, $Al(OH)_3$.

polyad. Any element or radical with a valency greater than two, *e.g.*, from triad to octad.

polyadelphite. A brownish-yellow to green manganese garnet.

polyargyrite. A native silver, antimony sulfide.

polyatomic. (1) Describing a molecule which consists of three or more atoms. (2) Polybasic. (3) Polyacidic. (4) Describing an organic compound containing two or more hydroxyl groups; as, certain alcohols and sugars (glycerol, glucose).

polybasic acid. A compound that yields two or more hydrogen ions per molecule in aqueous solution; as, H_2SO_4, H_3PO_4.

polybasite. Ag_9SbS_6. A native silver and antimony sulfide, containing copper.

Polycarpeae. A group of families of Phanerogams comprising: Nymphaeaceæ Ranunculaceae, Magnoliaceae, Myristicaceae, Menispermaceae, Berberidaceae, Lauraceae.

polyceptor. An amboceptor that binds different complements.

polychloral. Hydronal.

polychrom. Esculin.

polychromatic. Showing more than one color, particularly if viewed by polarized light. **pseudo-** Pseudodichromatic, pseudodichroic. Showing more than one color when viewed by polarized light, but otherwise colorless.

polychromatophile. A cell or tissue that can be stained differentially with dyes.

polycrase. Euxenite.

polycyclic. Polynucleated. Describing a molecule that contains two or more atomic rings: as, naphthalene, phenanthrene. Cf. *ring systems.*

polydymite. A native nickel cobalt sulfide, $(Ni, Co)_4S_5$.

polyene. A compound containing many double bonds; as, the carotenoids. **p. grouping.** A system of double bonds which are associated with color reactions; as, in carotene.

polyethylene glycols. A polyglycol derived from ethylene glycol.

polygalic acid. Polygalin.

polygalin. $C_{32}H_{54}O_{18}$ = 726.6. Polygalic acid. An active principle obtained from *Polygala senega.* Cf. *senega.*

polygamarin. A crystalline bitter principle from *Polygala amara*, a Polygalaceae.

polygen. An element that has two or more valencies, and thus forms two or more series

of compounds; as, iron (ferrous and ferric), or chlorine (chlorides, chlorites, and chlorates). Cf. *periodic chain.*

polygenetic. Producing more than one phenomenon. **p. dye.** A coloring material that gives two or more different shades with different mordants. Cf. *monogenetic.*

polyglycols. A dihydroxyether formed from two or more glycol molecules by dehydration. *E.g.*, $(CH_2OH.CH_2)_2O$, diethylene glycol; $CH_2OH.CH_2$ / $MeCHOHCH_2$ >O, ethylene-2-propylene glycol.

polygon. A plane figure bounded by 3 or more sides.

Polygonaceae. The buckwheat family, a group of herbs or woody plants, some of which are used as drugs:

Rheum species	rhubarb
Rumex crispus	rumex
Rumex hymenosepalus	canaigre
Rumex acetosella	sheeps sorrel
Polygonum hydropiper	water pepper
Polygonum bistorta	bistort
Polygonum erectum	knot grass

Cf. *lepathinic acid, nepalin, nepodin, polygonin.*

polygonatum. Solomon's seal.

polygonin. $C_{21}H_{20}O_{10}$ = 432.15. A glucoside from *Polygonatum cuspidatum*, a liliaceous plant of Japan and China.

polygraph. A device for recording the arterial and venous pulse waves, and other pulsations of the body surface, simultaneously. Used as a "lie-detector."

polyhalite. $K_2SO_4.MgSO_4.2CaSO_4.2H_2O$. A native hydrated sulfate of calcium, magnesium and potassium from Stassfurt.

polyhydrate. A compound that contains more than two molecules of water.

polyhydric. A compound that contains more than two hydroxyl groups.

polyhydrone. $(H_2O)_x$. A polymer of hydrone (q.v.).

polymer(e). A member of a series of polymeric compounds.

polymeric. Related molecularly to an isomeric compound, but having a multiple of its molecular weight; as, acetylene and benzene, formaldehyde and paraformaldehyde. See *polymerism.*

polymericular weight. The molecular weight of a polymerized molecule of an element.

polymeride. A member of a series of polymeric compounds; a polymer.

polymerisation. Polymerization.

polymerism. The phenomenon exhibited by certain organic compounds having the same percentage composition, but different molecular weights, the heavier being multiples of the lighter. In such compounds the same elements are present in the same percentages, but the number of atoms and sometimes the structures are different; thus, C_2H_2, C_4H_4, C_6H_6, C_8H_8 are polymeric compounds. See *polymerization.*

polymerization. (1) A reaction in which two or more molecules of the same substance combine to form a compound, from which the original substance may or may not be regenerated (as, $3CH_2CHO = (CH_2)_3C_3H_3O_3$), the new molecular weight being a multiple of that of the original compound. Cf. *molecular association, hydrone.* **aromatic-** The formation of an aromatic compound from two or more molecules of an aliphatic compound; as, benzene from acetylene, or hexamethylbenzene from crotonylene. **carbohydrate-** The formation of monosaccharides from formaldehyde: $6HCHO = C_6H_{12}O_6$ (see *photosynthesis*). **co-** The structural arrangement (*e.g.*, of rubber) in which 2 or more different monomers or types of group are present in alternate sequence in a chain. **condensed-** A polymerization in which atomic displacement occurs to some extent, as in aldol polymerization and benzoin formation. **photo-** See *photopolymerization.* **true-** A union of two or more similar molecules in which the atoms remain in similar relative positions; as, hexaphenylethane from triphenylmethyl.

polymerize. To cause or undergo polymerization

polymers. (1) A series of compounds having the same percentage composition, and containing different numbers of the same atoms. (2) Compounds formed from two or more similar molecules; as, dimer, trimer, tetramer.

polymeter. (1) A measuring device that measures two or more different physical properties simultaneously. (2) A hygrometer, thermometer and barometer mounted on the same board.

polymethylene. See *cycloparaffins.* **p. glycols.** A polyglycol derived from methylene glycol, $CH_2(OH)_2$ or from its anhydride (formaldehyde); thus; $CH_2OH.O.CH_2OH$ dimethyleneglycol, $CH_2OH.(O.CH_2)_2CH_2OH$ trimethyleneglycol. **p. tetra sulfide.** Thiokol.

polymignite. A native lime-niobium oxide containing numerous metallic oxides.

polymorph. A substance which occurs in two or more different forms.

polymorphism. The property of certain substances of crystallizing in two or more different systems. *E.g.: dimorphism*, crystallizing in two systems, as carbon (diamond-isometric, graphite-hexagonal); *trimorphism*, crystallizing in three systems, as sulfur; *tetramorphism*, crystallizing in four systems, as phosphorus. See *isomorphism.*

polynucleated. Polycyclic.

polyoxy- A prefix indicating more than three oxygen atoms. **p. methylene.** A condensation-product of formaldehyde, $(CH_2O)_x$. Cf. *paraformaldehyde.*

polypeptides. Compounds of two or more amino-acids, which contains one or more peptide groups, —CO.NH—. *E.g.:*

dipeptides: NH_2—R—CO.NH—R—COOH; as, anserine, carnosine, glycylglycine, alanylglycine.
tripeptides: NH_2—R—CO.NH—R—CO.NH—R—COOH; as, glutathione, diglycylglycine, glutamylcysteylglycine.
tetrapeptides: NH_2—R—CO.NH—R—CO.NH—R—CO.NH—R—COOH; as, triglycylglycine, alanyl-glycyl-leucyl-glycine.

The higher polypeptides resemble the peptones and proteins. An artificial octo-decapeptide (a synthetic protein with 18 molecules of amino acids) has been prepared; the number of different octo-decapeptides, by changing the sequence of the amino acids only, has been calculated to be 6,402,373,705,728,000. This does not include the many additional possibilities due to optical activity; hence, it is possible that each living organism has its own particular type of proteins, q.v.

polyphase. Having more than one phase; as, an alternating electric current.

polyphosphides. Compounds of monovalent metals having the formula M_2P_n; as, K_2P_n.

Polyporaceae. A genus of spore-forming fungi, consisting of 2000 species, among which are the edible *Boletus*.

polypyknotic. Consisting of two independent components of different densities.

polyquinoyl compound. An organic compound containing four or more =CO groups. *E.g.*, diquinoyl, $C_2H_2(CO)_4$; triquinoyl, $(CO)_6$.

polysaccharides. Polysaccharoses. A group of carbohydrates containing more than three molecules of simple sugars. The general formula is: $(C_6H_{10}O_5)_x$ for polyhexoses, and $(C_5H_8O_4)_x$ for polypentoses. They are theoretically derived from mono-, di- or trisaccharides by abstraction of water. To this group belong starch, dextrin, glycogen and inulin, which hydrolyse to monosaccharides in a series of steps (staircase reaction). See *sugars, carbohydrate.*

polysaccharose. Polysaccharide.

polysilicate. See *silicate.*

polystichalbin. $C_{22}H_{26}O_9$ = 434.3. A constituent of filix extract, insoluble in water, soluble in hot alcohol.

polystichin. $C_{22}H_{24}O_9$ = 432.3. An acid obtained from the roots of *Aspidium* or *Polystichum* species (Filices).

polystichinin. $C_{18}H_{22}O_6$ = 366.2. A constituent of aspidium extract.

polystichinol. $C_{21}H_{30}O_9$ = 426.3. A constituent of aspidium extract.

polystichocitrin. $C_{15}H_{22}O_9$ = 346.2. A constituent of aspidium extract.

polystichoflavin. $C_{24}H_{30}O_{11}$ = 494.2. A constituent of the rhizome of *Aspidium spinulosum.* Cf. *polystichum.*

polystichum. The dried roots of *Polystichum* (*Aspidium*) *spinulosum* and *Filix mas* (male fern); used medicinally, as the fluid extract, as an anthelmintic.

polystyrene. Polymerized styrene (q.v.) derived from petroleum; used as a basis for synthetic rubber and as an insulator.

polysulfide. A binary compound of sulfur, which contains more sulfur than is required by the normal valency of the metal; Na_2S is the normal sulfide, and Na_2S_2, Na_2S_3, Na_2S_4, and Na_2S_5, the polysulfides of sodium. They are considered coordination compounds of neutral sulfur atoms attached to the sulfur ion. **p. ion.** An electrically-charged group of atoms which contain two or more sulfur atoms; as, AsS_2^-, AsS_3^-, AsS_4^{---}, AsS_4^{---}.

polyterpenes. A group of compounds which contain two or more terpene molecules of the general type, $(C_{10}H_{16})_x$.

polythionate. A salt of a polythionic acid (q.v.) of the general type, $M_2S_xO_6$, in which x is 2, 3, 4 or 5.

polythionic acid. Thionic acids. A group of sulfur acids of the general type, $H_2S_xO_6$, where x is 2, 3, 4, 5 or 6. *E.g.*,

$H_2S_2O_6$ = dithionic acid, $HO.SO_2.SO_2.OH$

$H_2S_3O_6$ = trithionic acid, $HO.SO_2.S.SO_2.OH$

$H_2S_4O_6$ = tetrathionic acid, $HO.SO_2.S.S.SO_2.OH$

$H_2S_5O_6$ = pentathionic acid, $HO.SO_2.S.S.S.SO_2.OH$

$H_2S_6O_6$ = hexathionic acid, $HO.SO_2.S.S.S.S.SO_2.OH$.

polytrophic. A bacterium or microorganism that produces two or more different types of fermentation.

polytropy. A form of polymorphism, q.v.

polyuronide. A substance which yields a uronic acid or acids on hydrolysis.

polyvalent. Describing an element that has more than one valency. Cf. *multivalent, polygen.* **p. vaccine.** A suspension of two or more species of the same microorganism in a liquid.

polyvinyl. Describing a compound containing a number of vinyl, $—CH:CH_2$, groups in a polymerised form. **p. acetate.** $(CH_2.CHOOC.Me)_n$. A transparent thermoplastic solid, insoluble in water or mineral oils, soluble in most organic solvents; used as a heat-sealable adhesive, binder, plastic and size. **p. alcohol.** $(CH_2:CHOH)_n$. A cream-colored powder, soluble in water, insoluble in most organic solvents; used as an adhesive, emulsifier and sizing agent for paper.

polyzime. A malt extract containing the enzyme constituents in an active or activated state.

pomace. The pressed residue from the extraction of apple juice in cider manufacture; used as a cattle-food.

pomade. A perfumed ointment, especially for the hair.

pomegranate. Granatum. The dried bark of the stems and roots of *Punica granatum*, a Punicaceae. It contains the alkaloids pelletierine, isopelletierine, and pseudopelletierine; used as the fluid extract, as an anthelmintic and teniafuge. Cf. *coccon, granatine, granatotannic acid.* **p. tannin.** Ellagitannic acid.

Pompey red. Ferric oxide.

Ponder's stain. A solution of 0.02 gm. toluidine blue in 1 cc glacial acetic acid, 2 cc absolute alcohol and 97 cc water.

ponite. A form of rhodocrosite containing iron.

pontianac. A resin of the copal type, used in the paint industry. Cf. *jelutong.*

pontocaine. Brand of tetracaine hydrochloride.

pontol. A mixture of secondary and tertiary alcohols, used as denaturant for ethanol.

poonahlite. A hydrated calcium aluminum silicate from Poonah, India.

poor gas. A group of combustible gases from the blast furnace (Siemen's and Martin's furnace); also Mond gas and regenerator gas.

Pope, Sir William Jackson. 1870–1939. An English chemist noted for his work on crystallography and organic chemistry.

poplar buds. Balm of Gilead buds. The air-dried, winter-leaf buds of *Populus nigra*, a Salicaceae, which have a pleasant aromatic odor; used medicinally as the fluid extract. **p. b. oil.** An essential oil from p., d.0.895–0.905, b.255–265, soluble in alcohol and containing humulene, sesquiterpenes and a paraffin.

poplox. A sodium silicate; see *intumescence.*

poppy. Mawseed. The plant *Papaver somniferum*, a Papaveraceae. **California-** Eschscholtzia. **red-** Corn poppy, corn rose. The flower-petals of *Papaver rhoeas*, used as an anodyne expectorant. **p. capsules.** Papaveris fructus. The dried, fully grown, unripe fruit of *Papaver somniferum*, a Papaveraceae; used medicinally. **p. seed oil.** A pale, yellow fixed oil from the seeds of *Papaver* species, m.5; insoluble in water, soluble in alcohol. Used as a lubricant for fine machinery.

populin. $C_{20}H_{22}O_8.2H_2O$ = 426.3. Benzoyl salicin, $C_{13}H_{17}O_7.C_7H_6O$. A glucoside from the bark of aspen species. A light white powder, m.180, soluble in water, alcohol or ether, which yields benzoic acid and salicin on hydrolysis. Used medicinally as an antipyretic.

populoid. The combined principles from the bark of *Populus tremuloides* (American aspen) or *P. tremula* (European aspen). Used medicinally as a bitter tonic, astringent and mild antipyretic.

porcelain. A white, semiopaque, dense, waterproof substance obtained by strongly heating and sintering a mixture of kaolin, feldspar and quartz; m. 850–1400. Used for many utensils (dishes, crucibles, etc.), as well as for objects of art (ceramics) and in dentistry (teeth). Cf. *sillimanite.* **high fusing-** m.1340 (2440°F). **low fusing-** m.930 (1700°F). **medium fusing-** m.1260 (2300°F). All melting points are approximate. **p. burner.** A bunsen burner made of porcelain. **p. clay.** Kaolin. **p. color.** A pigment used to color porcelain, especially a metallic oxide. **p. glaze.** See *glaze.* **p. jasper.** *Porcellanite.* **p. mill.** A grinding machine made of porcelain, for either wet or drying grinding. **p. utensils.** See *casserole, crucible, combustion boat, evaporating dish, funnel, mortar, retort, spatula.*

porcellanite. Porcelain jasper. A fused or sintered clay and shale, which occurs at the borders of burned coal seams.

pore. A minute opening on a surface.

porosimeter. An instrument for the determination of the porosity of a substance, as a brick. It measures the volume of liquid absorbed, or of air transmitted in a given time.

porosity. A condition in which a solid body is penetrated by minute open spaces filled with either liquids or gases. P. is expressed as the percentage of open-space volume with respect to the total volume. Cf. *permeability.* **apparent-** The volume of open pore space per unit total volume. **true-** The volume of both open and sealed pore spaces per unit total volume.

porous. Having interstices or minute cavities; penetrated by small open spaces.

porpezite. Palladium gold.

porphin ring. A heterocyclic structure consisting of 4 pyrrole rings united by methylene groups, in the center of which may or may not be a metal (Fe or Mg). It is a structural part of chlorophyll and hemoglobin, and is probably a flat molecule in which a slight oscillation of the metal will cause a rhythmic shift of all double bonds, thus making it a dynamic molecule. See diagrams drawn to scale, using Pauling's atomic distances. **aza-** See *tetra-aryl-.*

porphyric acid. Euxanthone.

porphyrin. An iron-free decomposition-product of hematin, as, hemoporphyrin $C_{16}H_{18}N_2O_3$; or a magnesium-free decomposition-product of chlorophyll; as, phylloporphyrin, $C_{16}H_{18}N_2O$ (q.v.).

porphyrine. $C_{21}H_{25}O_2N_3$ = 351.2. An alkaloid from the bark of *Alstonia constricta,* an Apocynaceae. A colorless substance, m.97, soluble in acids (blue fluorescent solution). Cf. *alstonine.*

porphyrite. A coarse-grained igneous rock.

porphyrization. Reduction to a fine powder; pulverization.

porphyropsin. The pigment of the eyes of freshwater fish.

porphyroxine. $C_{19}H_{23}O_4N$ = 329.19. An alkaloid of opium, m.135.

porphyry. An igneous rock in which relatively large, bright red crystals are set in a finer grained or glassy dark red ground-mass.

porpoise oil. A yellow fixed oil from porpoises.

porporino. (1) Hematoporphyrin. (2) A decorative imitation of gold, which consists of an alloy of mercury, tin, and sulfur.

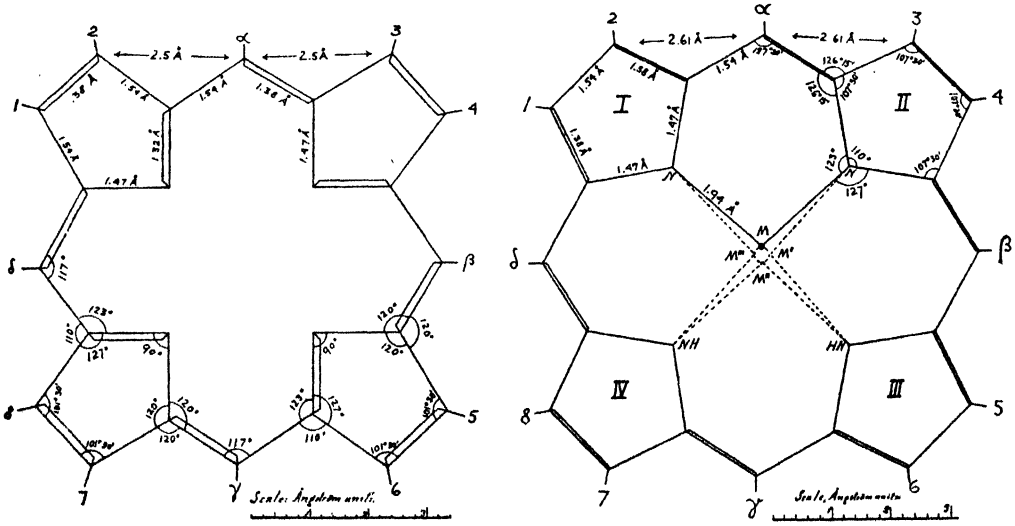
portland cement. A hydraulic cement, obtained by burning a mixture of lime and clay and pulverizing the resulting clinker. A greenish-gray powder which consists of basic calcium silicates, calcium aluminates, and calcium ferrites. If mixed with water it solidifies to an artificial rock. It derives its name from its similarity to Portland stone. See *cement.*

Portland stone. A yellowish-white limestone from the Isle of Portland.

Portsmouth accelerator. P.O.T.G. Phenyl-*o*-tolyl guanidine, used as an accelerator in the vulcanization of rubber.

posion. A proposed name for anion. Cf. *negion.*

positive. (1) Not negative. (2) Greater than zero. **p. crystal.** A crystal whose refractive



Porphin ring drawn to scale.
Left: With 12 double bonds. Right: With 10 double bonds and central metal.

PORPHIN DERIVATIVES

	M	1.3.5.8	2.4	7	6	γ
Chlorophyll group						
$C_{31}H_{34}N_4Mg$ etiophyllin	Mg	Me	Et	Et	—	—
$C_{31}H_{34}N_4O_2$ pyrroporphyrin	—	Me	Et	Pra	—	—
$C_{32}H_{34}N_4O_3$ rhodoporphyrin	—	Me	Et	Pra	COOH	—
$C_{43}H_{36}N_4O_4$ phylloporphyrin	—	Me	Et	Pra	—	Me
$C_{33}H_{34}N_4O_3$ phylloerythrin	—	Me	Et	Pra	—CO.CH$_2$—	
$C_{34}H_{32}N_4O_5Mg$ chlorophyllin (?)	Mg	Me	Et	Pra	=C.O.CO.CH— | OMe | OH	
$C_{55}H_{72}N_4O_5Mg$ chlorophyll a	Mg	Me	Et	Phy	—CH—CO— | COOMe	
$C_{55}H_{70}N_4O_6Mg$ chlorophyll b	Mg	Me	2—Et 4—CHO	Phy	—CH—CO— | COOMe	
Hemoglobin group						
$C_{30}H_{30}N_4O_4$ deuteroporphyrin	—	Me	—	Pra		—
$C_{30}H_{30}N_4O_4FeCl$ deuterohemin	FeCl	Me	—	Pra		—
$C_{32}H_{38}N_4$ *etioporphyrin III	—	Me	Et	Et		—
$C_{34}H_{32}N_4O_4FeCl$ hemin	FeCl	Me	Vin	Pra		—
$C_{34}H_{32}N_4O_4FeO$ hematin	FeO	Me	Vin	Pra		—
$C_{34}H_{32}N_4O_4FeOH$ protohematin	FeOH	Me	Vin	Pra		—
$C_{34}H_{34}N_4O_4$ protoporphyrin	—	Me	Vin	Pra		—
$C_{34}H_{36}N_4O_4FeCl$ mesohemin	FeCl	Me	Et	Pra		—
$C_{34}H_{38}N_4O_6$ hematoporphyrin	—	Me	Hyd	Pra		—
$C_{34}H_{38}N_4O_4$ mesoporphyrin IX	—	Me	Et	Pra		—
$C_{36}H_{38}N_4O_8$ coproporphyrin	—	Me	Pra	Pra		—
$C_{38}H_{38}N_4O_{16}$ uroporphyrin	—	Me	Iso	Iso		—
$C_{38}H_{38}N_4O_{16}Cu$ turacin	Cu	Me	Iso	Iso		—
Bile Pigments						

$C_{33}H_{36}N_4O_6$ bilirubin (protoporphyrin in which the alpha —CH= group is replaced by —OH and O=)

Me is $-CH_3$ (methyl)
Iso is —CH(COOH)COOH (isosuccinic acid)
Phy is $-CH_2CH_2COOC_{20}H_{39}$ (phytyl)
Hyd is —CHOH.CH_3 (hydroxyethyl)
Pra is $-CH_2CH_2COOH$ (propionic acid)
Et is —CH_2.CH_3 (ethyl)
Vin is —CH:CH_2 (vinyl)

* Etioporphyrin I is 1.3.5.7—Me, 2.4.6.8—Et. Etioporphyrin II is 1.4.5.8—Me, 2.3.6.7—Et. Etioporphyrin IV is 1.4.6.7—Me, 2.3.5.8—Et.

index for the extraordinary ray is greater than that for the ordinary ray. **p. electron.** A positron, q.v. **p. element.** A light-metal or the element of the upper right and lower left of the new periodic table. An element that will yield its valence electrons to another element and thereby, become positively charged. An element which has, in general, less than four electrons in its outer valency shell. **p. group.** A radical or group of atoms that is positively charged and base-forming; as, NH_4^+. **p. nucleus.** The center of an atom. It is assumed to be extremely small in comparison with the sphere occupied by the electrons surrounding it, and to be composed either of tightly-packed electrons, hydrogen and helium kernels or made up of (*1Z*) neutrons, (*2Z*) protons and (*Z*) electrons, where *I* is the isotopic weight and *Z* the atomic number. The positive nucleus of the atom is thought to be responsible for the atomic weight, atomic number, and radioactive properties of the element. Suggested names: *proton* (Rutherford), *hydrion* (Soddy), *centron* (Lodge), *ambron, merron, uron, prime, hylon,* and *prouton.* **p. ore.** An ore that has been exposed and properly worked on four sides. (Cf. *possible ore.*) **p. radical.** An atom or group of atoms that has lost one or more electrons and becomes positively charged. **p. rays.** A stream of positively-charged molecules shooting from the anode toward the cathode in a discharge tube. If the cathode is perforated, these rays can be made visible behind it by means of a fluorescent screen. See *canal rays.* **p. ray analysis.** See *mass spectrograph.* **p. reaction.** A reaction which produces the effect sought.

positron. Oreston, positive electron. A subatomic particle or fundamental "building stone" of matter, having a positive charge and a mass of $\frac{1}{1800}$ of a hydrogen atom. Cf. *particle, nucleus.*

posode. A proposed name for anode. Cf. *negods.*

posologic. Pertaining to medicinal doses.

posology. A branch of medicine and pharmacology that deals with the dosage of drugs; viz., the form, quantity and frequency of administering medicines.

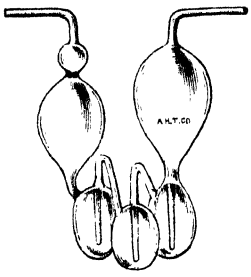
possible ore. An ore that may exist out of sight, or below the lowest workings of a mine. (Cf. *positive ore.*)

postulate. An assumption, not capable of proof: (1) An indisputable pre-requisite; (2) stipulated condition; (3) a demand. Cf. *axiom.*

potable. That which is drinkable without injury to health.

potarite. A native compound of palladium and mercury, erroneously known as allo-palladium (q.v.).

potash. (1) Potassium hydroxide. (2) Potassium carbonate. **black-** A commercial grade of caustic *soda*, containing 5 % NaOH with iron oxide and sodium carbonate as impurities. **caustic-** Potassium hydroxide. **salvosal-** Potassium salol ortho-phosphite.



Potash bulb

p. alum. Kalinite. **p. bulb.** A glass apparatus which consists of three or more variously-shaped bulbs, filled with potassium hydroxide solution (see illustration). Used for the absorption of carbon dioxide in organic elementary analysis. **p. feldspar.** Orthoclase. **p. glass.** See *glass*. **p. mica.** Muscovite. **p. water.** Potassic water. **p. waterglass.** See water*glass*.

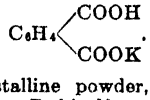
potassa. Potassium hydroxide. **p. sulfurata.** Potassium sulfide.

potassamide. NH_2K = 55.2. A substitution compound of ammonia; a white solid (if pure) or, if impure, yellowish-brown inflammable substance, m.271, sublimes 400.

potassic. Containing potassium. **p. water.** Potash water. An aerated mineral water in which the potassium ions are in excess of the sodium ions.

potassii. The Latin for "of potash."

potassium. K = 39.096. Kalium. An alkali metal and element, atomic number 19. A silver-white, soft, wax-like substance, d.0.87, m.62, b.720, which reacts violently with water. Since it rapidly oxidizes in air, it is always stored under a layer of coal oil. Potassium occurs abundantly in its salts, as sylvenite, kainite and carnallite in Stassfurt (Germany) and Alsace. It is widely distributed in smaller quantities in feldspars, rocks and soils, and was first prepared electrolytically in 1807 by Davy. Its salts are all soluble in water and yield the colorless potassium ion, K^+. Potassium is typical of the alkali-metals, and forms only one series of compounds, valency of one. It is prepared by electrolysis and is used as a reagent and reducing agent in many chemical reactions. It is slightly radioactive in the metallic state, and emits a weak β-radiation. **p. acetate.** $KC_2H_3O_2$ = 98.1. Potassii acetas, diuretic salt. CH_3COOK. White, deliquescent powder, d.1.8, m.292, soluble in water or alcohol, insoluble in ether; used as a reagent, in buffer solutions, and medicinally. *acid-* $KH(C_2H_3O_2)_2$ = 158.2. Colorless needles, m.148, decomp. 200. **p. acetotungstate.** A double salt of potassium acetate and tungstate used in photographic toning solutions. **p. acetylsalicylate.** $KC_9H_7O_4.2H_2O$ = 254.19. White crystals, m.65. **p. acid carbonate.** P. bicarbonate. **p. acid chromate.** P. dichromate. **p. acid phthalate.** $KHC_8H_4O_4$ = 204.15. P. phthalate,



A white crystalline powder, used as buffer. **p acid sulfate.** P. bisulfate. **p. acid tartrate.** P. bitartrate. **p. alloys.** The liquid or semi-solid mixtures of potassium with sodium:

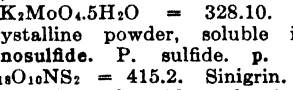
90 %K 10 %Na	80 %K 20 %Na	70 %K 30 %Na	60 %K 40 %Na	50 %K 50 %Na
m.17°C	−10°C	−3°C	5°C	11°C

p. aluminate. $K_2Al_2O_4.3H_2O$ = 250.5. A colorless crystalline powder, soluble in water, insoluble in alcohol. **p. aluminum sulfate.** $KAl(SO_4)_2.12H_2O$ = 474.4. Potash alum. kalinite. A double salt of potassium and aluminum sulfate; large rhombic, colorless crystals, readily soluble in water. Used extensively as a mordant. **p. amino chromate.** $CrO_2(OK).NH_2$ = 155.13. Stable red crystals. **p. aminonaphthol.** Helthin. **p. ammonium tartrate.** $KNH_4C_4H_4O_6$ = 205.17. A white powder, very soluble in water. **p. amyl sulfate.** $KC_5H_{11}SO_4$ = 206.2. A mixed ester or salt. A white granular mass, soluble in water, slightly soluble in alcohol. **p. anthranilate.** $KC_7H_6O_2N$ = 175.2. The p. ester of anthranilic acid, $C_6H_4(NH_2)COOK$. A white crystalline powder; soluble in water. **p. antimonate.** $KSbO_3$ = 207.3. P. stibnate. A white crystalline powder, slightly soluble in water, soluble in alkalis. *pyro-* See *p. stibnate*. **p. antimonyltartrate.** $KSbOC_4H_4O_6.\frac{1}{2}H_2O$ = 332.3. Tartar emetic. Colorless octahedral crystals, d.2.6; slightly soluble in water. **p. argentocyanide.** $KAg(CN)_2$ = 199.00. A substance which occurs in solutions of silver cyanide in potassium cyanide solution, used as a silver-plating solution. **p. arsenate.** K_3AsO_4 = 256.3. Normal p. arsenate. Colorless crystals, soluble in water or alcohol; used as a reagent for detecting tannic acid and opium alkaloids. *acid-* KH_2AsO_4 = 180.1. Colorless crystals, d.2.851, m.228, soluble in water, insoluble in alcohol; used in medicine as an alterative and reconstructive. **p. arsenite.** $KAsO_2$ = 146.1. A grayish-white powder; soluble in water. Used as a reagent, for detecting Ceylon cinnamon oil; medicinally, as a tonic and stomachic; and as a reducing agent, in the manufacture of mirrors. **p. aurate.** $AuO.OK,3H_2O$ = 322.4. Soluble yellow needles. **p. aurichloride.** $AuCl_3,KCl,2H_2O$ = 414.2. Soluble plates. **p. auricyanide.** $Au(CN)_3KCN, H_2O$ = 358.4. A soluble colorless solid. **p. aurocyanide.** AuCN.KCN = 288.3. Colorless plates. **p. benzoate.** $KC_7H_5O_2.3H_2O$ 214.2. The p. salt of benzoic acid, Ph.COOK. A white crystalline powder, soluble in water or alcohol; used medicinally as a mild antiseptic. **p. benzodisulfonate.** $K_2C_6H_4(SO_3)_2$ = 314.3. The p. salt of benzene disulfonic acid, $C_6H_4(SO_3K)_2$. Small colorless crystals, soluble in water, used in organic synthesis. **p. biborate.** P. tetraborate. **p. bicarbonate.** $KHCO_3$ = 100.1. Acid p. carbonate, potassii bicarbonas, saleratus (*sal aeratus*). Colorless, transparent, monoclinic crystals, d.2.17; decomp. by heat, soluble in water. Used as a reagent in titrating arsenous and antimonous oxides; in the manufacture of potassium salts and inorganic synthesis; and in medicine. **p. bichromate.** P. dichromate. **p. bifluoride.** See *p. fluoride. acid-*. **p. biiodate.** See *p. iodate, acid-*. **p,**

binoxalate. P. bioxalate. **p. bioxalate.** KHC_2O_4 = 96.1. P. binoxalate, salt of sorrel, salt of lemons, salt acetosella. White crystals or monoclinic prisms; soluble in water. Used as a reagent, in medicine, in the manufacture of ink and stain removers, in photography, and for cleaning wood and metal. **p. biphosphate.** See *p. phosphate.* **p. bisaccharate.** $KC_6H_9O_8$ = 248.1. The mono-p. salt of saccharic acid. $(CHOH)_4(COOH)COOK$. Yellowish crystals, soluble in water; used in medicine. **p. bismuth tartrate.** $KBi_3C_4H_2O_9.4H_2O$. A granular white powder, soluble in water and used as antiluetic. **p. bisulfate.** $KHSO_4$ = 136.2. Potassii bisulfas, p. acid sulfate, sal enixum. Colorless crystals, m.197 (decomp.), and soluble in water; used as a reagent and in the manufacture of effervescent drinks. **p. bisulfite.** $KHSO_3$ = 120.17. P. acid sulfite. A white crystalline powder, decomp. 190, soluble in water; used as an antiseptic and disinfectant. **p. bitartrate.** $KHC_4H_4O_6$ = 188.1. Potassii bitartras, cream of tartar, depurated tartar. A colorless crystalline powder; slightly soluble in water. Used in volumetric analysis, as a reagent, and medicinally as a refrigerant and diuretic. **p. black.** Suint ash. **p. borates:** $K_2B_2O_4$, p. metaborate; $K_2B_4O_7$, p. tetraborate. **p. borofluoride.** KBF_4 = 126.0. White crystals, soluble in alcohol. **p. borotartrate.** A mixture of p. metaborate and p. bitartrate. A white crystalline powder, d.1.832, slightly soluble in water. Used medicinally as an antiseptic, and in photography to retard the action of developers. **p. bromate.** $KBrO_3$ = 167.0. Colorless rhombohedral crystals, d.3.24, m.434, decomp. 703; soluble in water, alcohol or ether. Used as a reagent (Koppeschaar solution) for titrating phenol and oxalic acid, and as a standard in iodometry. **p. bromide.** KBr = 119.0. Potassii bromidum. White regular crystals, $d._{15}$°2.68, m.740; soluble in water or alcohol. Used as a reagent, in photography, and medicinally as a nerve sedative and antispasmodic. **p. bromo-o-oxybenzoate.** P. bromosalicylate. **p. bromosalicylate.** $KC_7H_4O_3Br$ = 255.1. P. bromo-o-oxybenzoate, $C_6H_3Br(OH)COOK$. White crystals, soluble in water; used medicinally as a hypnotic and antirheumatic. **p. butyrate.** $KC_4H_7O_2$ = 126.1. C_3H_7COOK. A white deliquescent crystalline powder, soluble in water. **p. cacodylate.** $KC_2H_6O_2As.H_2O$ = 194.1. The p. salt of cacodylic acid, Me_2AsO_2K. Small white crystals, soluble in water; used medicinally as a tonic. **p. camphorate.** $K_2C_{10}H_{14}O_4$ = 276.3. Colorless deliquescent crystals, soluble in water; used medicinally as an antiseptic. **p. carbonate.** K_2CO_3 = 138.2. Potassii carbonas, sal tartar, potash. Colorless monoclinic crystals or hygroscopic powder, d.2.2, m.900 (decomp.), soluble in water, insoluble in alcohol. Used as a reagent, as a flux for silicates and insoluble sulfates, as a neutralizing agent, in photography, and in medicine as an antiacid and mild caustic. *acid-* See *p. bicarbonate.* **p. carbonyl.** $K_6(CO)_6$ = 402.63. Grey or red explosive crystals. **p. chlorate.** $KClO_3$ = 122.6. Potassii chloras, p. oxymuriate. Colorless monoclinic crystals, d.2.34, m.357, decomp. 400; soluble in water, slightly soluble in alcohol. Used as a reagent for alkaloids, phenols, indican; as an oxidizing agent; in forensic and ultimate analysis; medicinally as a diuretic and cardiac stimulant; pharmaceutically in the manufacture of mouth washes and tooth pastes; and commercially in the manufacture of explosives, fulminators, and pyrotechnics. **p. chloraurate.** $KAuCl_4,2H_2O$ = 774.3. **p. chloraurite.** $KAuCl_2$ = 307.3. **p. chloride.** KCl = 74.6. Potassii chloridum. White, regular crystals, d.1.984, m.776 (sublimes); soluble in water, alcohol or ether. Used as a reagent, in the determination of fluosilicic acid, as a constituent of fertilizers and in explosives. **p. chlorochromate.** $KClCrO_3$ = 174.7. Red crystals, decomp. by water; used as an oxidizing agent. **p. chloroplatinate.** K_2PtCl_6 = 486.2. Platinic potassium chloride. Yellow regular crystals, d.3.291, decomp. by heat, slightly soluble in water; used as a reagent. **p. chloroplatinite.** K_2PtCl_4 = 415.24. Platinous potassium chloride. Red crystals, soluble in water. **p. chromate.** K_2CrO_4 = 194.2. Yellow, rhombohedral crystals, d.2.732, m.971, soluble in water, insoluble in alcohol. Used as a reagent and indicator in volumetric analysis, as a mordant, and as an oxidizing agent in organic synthesis. *acid-* P. dichromate. *chloro-* Potassium chloro-chromate. **p. chromic sulfate.** $KCr(SO_4)_2.12H_2O$ = 499.42. Chrome alum, chromium p. sulfate. Red or green, cubic or octahedral crystals, d.1.83, m.89, soluble in water; used as mordant. **p. chromicyanide.** $K_3Cr(CN)_6$ = 325.4. A yellow insoluble solid. **p. cinnamate.** $KC_9H_7O_2$ = 186.1. A white crystalline powder, soluble in water. **p. citrate.** $K_3C_6H_5O_7.H_2O$ = 325.27. Potassii citras. Colorless crystals, d.1.198, decomp. 230, soluble in water or alcohol; used medicinally as a diaphoretic and diuretic. *monobasic-* $KH_2(C_6H_5O_7)$ = 230.15. White crystals, soluble in water. **p. cobalticyanide.** $K_3Co(CN)_6$ = 332.36. A solid, d.1.906, soluble in water, decomp. by heat. **p. cobaltinitrite.** $K_3Co(NO_2)_6$ = 452.33. Cobaltic p. nitrite. Yellow tetragonal crystals, decomp. 200, slightly soluble in water, insoluble in alcohol or ether; used as a reagent. **p. cobalt malonate.** $KCo(C_3H_2O_4)_2$ = 341.17. Pink crystals, d.2.234, soluble in water. **p. cobalt sulfate.** $K_2SO_4.CoSO_4, 6H_2O$ = 437.4. Soluble plates. **p. copper lead nitrite.** $K_2CuPb(NO_2)_6$ = 645.00. Square or rectangular black crystals, produced by the triple nitrite reaction for potassium. **p. cuprocyanide.** $KCu(CN)_2$ = 154.69. A solution of copper cyanide in potassium cyanide solution, used for copper plating. **p. cyanate.** KCNO = 81.12. Colorless needles, d.2.048, soluble in water or alcohol; used in organic synthesis. **p. cyanide.** KCN = 65.12. White regular crystals or sticks, d.1.52, soluble in water or alcohol. Used as a reagent, in metallurgy for the extraction of gold (*cyanide process*), in photography, in medicine, and as an insecticide. **p. dichromate.** $K_2Cr_2O_7$ = 294.2. P. bichromate, p. acid chromate. Yellowish-red triclinic or monoclinic crystals, d.2.692, m.396 (decomp.), soluble in water, insoluble in alcohol. Used as a reagent for alkaloids, for standardizing volumetric solutions, as a general oxidizing agent, in cleansing solutions (with H_2SO_4), in electric batteries, medicinally as a bactericide, caustic and astringent, in photography, and in the dye, textile, tanning, printing, bleaching and oil industries. **p. dihydrogen phosphate**

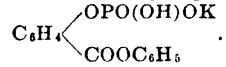
KH_2PO_4. See *p. phosphates.* **p. disulfate.** $K_2S_2O_7$ = 254.32. White needles, d.2.27, m.210 (decomp.) soluble in water. **p. dithionate.** P. hyposulfate. **p. dithio oxalate.** $K_2C_2O_2S_2$ = 198.32. A solid, used as reagent for nickel. **p. ethyl sulfate.** $KC_2H_5SO_4$ = 164.1. Monoclinic white crystals, d.1.843, soluble in water or alcohol. **p. ethyl xanthate.** $KC_3H_5OS_2$ = 160.28. A white powder, used as a collector in flotation. **p. ferrate.** K_2FeO_4 = 198.05. P. perferrate. A purple solid, stable in alkaline solution, rapidly decomposed in acid solution. **p. ferric ferrocyanide.** $KFe'''Fe''(CN)_6.H_2O$. Prussian blue. A blue, insoluble precipitate from ferric ion and ferrocyanide. **p. ferric oxalate.** $K_3Fe(C_2O_4)_3.3H_2O$ = 491.19. Brown crystals, decomp. 230, slightly soluble in water. **p. ferric sulfate.** $K_2SO_4,Fe_2(SO_4)_3,24H_2O$ = 1006.60. Iron alum. Soluble violet crystals. **p. ferricyanide.** $K_3Fe(CN)_6$ = 329.1. Red prussiate of potash, ferric potassium cyanide. Ruby-red, monoclinic crystals, d.1.81, decomp. by heat; soluble in water or alcohol. Used as a reagent for ferrous salts, as a reducing agent and indicator in volumetric analysis, as a reagent in organic chemistry and synthesis, in the manufacture of prussian blue, in the textile industry, and in photography for blueprint paper and other light-sensitive papers. **p. ferrite.** $K_2Fe_2O_4$ = 253.90. A yellow solid. **p. ferrocyanide.** $K_4Fe(CN)_6.3H_2O$ = 422.4. Yellow prussiate of potash, ferrous p. cyanide. Yellow monoclinic crystals, d.1.853, soluble in water, insoluble in alcohol. Used as a reagent for ferric ion, copper, and other metals, in quantitative analysis, in organic chemistry, in electro-plating in the textile industry, in the manufacture of prussian blue, for hardening steel, and in photography. **p. ferrous ferricyanide.** $K_2Fe''Fe'''(CN)_6$ = 357.9. A white precipitate produced by the addition of ferrous sulfate to a cold neutral solution of p. ferrocyanide. It is oxidized to β-soluble prussian blue. **p. fluorescein.** $K_2C_{20}H_{10}O_5$ = 408.3. The p. salt of fluorescein. A yellowish-red powder; soluble in water to form a pink solution with a green fluorescence. **p. fluoride.** KF = 58.1. A colorless crystalline, hygroscopic powder, $KF.2H_2O$, d.2.481, m.860, soluble in water. Used as a preservative, in ant powders, as a disinfectant, and in etching glass. *acid-* KF.HF = 78.1. P. bifluoride, Fremy's salt. Colorless crystals, soluble in water; used as an antiseptic and antizymotic, and in the etching of glass. **p. fluosilicate.** K_2SiF_6 = 220.5. Colorless hexagonal crystals, d.2.665, insoluble in water, soluble in hydrochloric acid. **p. formate.** $KCHO_2$ = 84.2. The p. salt of formic acid, H.COOK. Colorless deliquescent crystals, d.1.91, m.197, soluble in water. **p. glycerinate.** $KC_3H_5O_4$ = 144.1. A white deliquescent powder, soluble in water. **p. glycerophosphate.** $K_2C_3H_7O_3PO_3$ = 264.4. Hygroscopic white crystals, soluble in water. It is sold as a 50–75 % solution; used medicinally as a nerve tonic, and as a reagent. **p. hippurate.** $KC_9H_8O_3N.H_2O$ = 235.2. Colorless crystals, slightly soluble in water, soluble in alcohol. **p. hydrate.** P. hydroxide. **p. hydride.** KH = 40.11. White volatile needles, formed when potassium is heated in a stream of hydrogen gas. **p. hydrogen phosphate.** K_2HPO_4 = 174.25. Large crystals, used as a buffer. See *p. phosphates.* **p. h. sulfide.** P. hydrosulfide. **p. hydroxide.** KOH = 56.11. Potassii hydroxidum, potash, p. hydrate, caustic potash, kalilauge. White rhombohedral crystals or deliquescent sticks, d.2.044, m.360 (sublimes), soluble in water, alcohol or ether. It absorbs carbon dioxide from the air and must be kept in tight containers. Used as a reagent in analysis, for neutralization, and in large quantities in the manufacture of soft soap, oxalic acid and glass. Cf. *lapis causticus, vienna caustic.* **p. hydrosulfide.** KSH = 72.1. P. hydrogen sulfide. Colorless hygroscopic crystals m.455, soluble in water. **p. hydrotartrate.** P. bitartrate. **p. hypochlorite.** KClO = 90.6. Colorless crystals, decomp. by heat; soluble in water. Cf. *Eau de Javelle.* **p. hypophosphite.** KH_2PO_2 = 104.1. Potassii hypophosphis, diacid potassium phosphate. White, opaque plates or deliquescent powder; soluble in water or alcohol, insoluble in ether. Used as a nerve tonic. **p. hyposulfate.** $K_2S_2O_6$ = 238.3. P. dithionate. Colorless crystals, d.2.28, soluble in water, decomp. by heat. **p. hyposulfite.** $K_2S_2O_3$ = 190.3. P. thiosulfate. Colorless hygroscopic crystals, soluble in water. **p. indigosulfate.** $K_2C_{16}H_8O_8N_2(SO_3)_2$. A dark-blue powder, soluble in water; used in dyeing textiles. **p. indigosulfonate.** P. indigosulfate. **p. indoxylsulfonate.** Indican (2). **p. iodate.** KIO_3 = 214.02. Colorless, regular, deliquescent crystals, d.3.975, m.560 (decomp.), soluble in water, insoluble in alcohol; used as a reagent for volumetry, and medicinally as an antiseptic. *acid-* KHI_2O_6 = 389.8. P. biiodate. Colorless crystals, slightly soluble in water, soluble in dilute acids; used in volumetric analysis. **p. iodide.** KI = 166.02. Potassii iodidum. Colorless regular crystals, d.3.115, m.680, b.723, soluble in water, alcohol, or ether. Used as a reagent, in volumetric analysis, as a solvent for iodine and iodides, medicinally as an antiseptic and alterative, and in photography. *tri-* See *p. triiodide.* **p. iodohydrargyrate.** Mercuric p. iodide. **p. iodotetrachloride.** $KICL_4$ = 307.86. **p. ion.** The positively-charged potassium atom, K^+; a potassium atom that has lost one negative electron. **p. isovalerate.** $KC_5H_9O_2$ = 140.17. White or yellowish hygroscopic crystals, very soluble in water. **p. lactate.** $KC_3H_5O_3$ = 128.2. A colorless or yellowish syrupy liquid; soluble in water. **p. lithium tartrate.** $KLi(C_4H_4O_6).H_2O$ = 221.09. White monoclinic crystals, d.1.610, soluble in water; used as an antirheumatic. **p. malate.** $K_2C_4H_4O_5$ = 210.3. A colorless syrupy liquid; soluble in water. **p. magnesium chloride.** $KCl, MgCl_2, 6H_2O$ = 277.90. A colorless solid, decomp. by heat. **p. manganate.** K_2MnO_4 = 197.13. Dark-green, rhombohedral crystals, decomp. 190, soluble in water. *per-* See *p. permanganate.* **p. manganic sulfate.** $K_2SO_4.Mn_2(SO_4)_3, 24H_2O$ = 1004.8. Mangan alum. Green crystals, soluble in water. **p. manganicyanide.** $K_6Mn_2(CN)_{12}$ = 656.6. A soluble red solid. **p. manganocyanide.** $K_4Mn_2(CN)_{12}, 6H_2O$ = 842.9. A soluble red solid. **p. mercuric iodide.** Mercuric p. iodide. **p. mercuric thiosulfate.** Mercuric p. thiosulfate. **p. metabisulfite.** $K_2S_2O_5$ = 222.32. P. pyrosulfite. White soluble plates, decomp. by heat. **p. metaborate.** $K_2B_2O_4$ = 163.8. P. borate. A white powder, soluble in water.

p. metaphosphate. KPO_3. See *p. phosphates.* **p. metasilicate.** K_2SiO_3. See *p. silicates.* **p. methane disulfonate.** $(KSO_3)_2CH_2$ = 252.34. Monoclinic crystals, d.2.376, soluble in water. **p. methylsulfate.** $KMeSO_4$ = 150.2. P. methyl sulfuric ester. A white crystalline powder; soluble in water or alcohol. **p. molybdate.** $K_2MoO_4.5H_2O$ = 328.10. A white, microcrystalline powder, soluble in water. **p. monosulfide.** P. sulfide. **p. myronate.** $KC_{10}H_{18}O_{10}NS_2$ = 415.2. Sinigrin. A colorless crystalline glucoside salt from black mustard seeds. Soluble in water or alcohol, and decomposed by myrosin into glucose, potassium bisulphate and allyl thiocyanate. **p. naphthalene-*1,5*-disulfonate.** $K_2C_{10}H_6O_2S_2.2H_2O$ = 336.40. White powder, d.1.797, soluble in water. **p. nickel sulfate.** $K_2SO_4,NiSO_4,6H_2O$ = 437.10. A blue solid, d.2.12. **p. nitranilate.** $K_2C_6O_8N_2$ = 306.22.



potassium dinitro dihydroxy benzoquinone. A greenish-yellow crystalline powder, slightly soluble in water, soluble in alcohol. **p. nitrate.** KNO_3 = 101.1. Saltpeter, potassii nitras, nitre, sal prunella. Colorless prismatic or rhombohedral crystals, d.2.109, m.337 (decomp.), soluble in water, insoluble in alcohol or ether. Used as a reagent, as an oxidizing flux, as an oxidizing agent, medicinally as a diaphoretic and diuretic, and in pyrotechnics, gunpowder, fertilizers and preservatives. **p. nitrite.** KNO_2 = 85.1. Colorless, deliquescent prismatic crystals or sticks, d.1.915; soluble in water or alcohol. Used as a reagent for cobalt, amino-acids, phenols, iodine, and many other organic compounds; as a reducing agent and in organic synthesis; in the manufacture of aniline dyes, diazo dyes, and other dyes; and medicinally, as a heart tonic. Cf. *Indian yellow.* **p. nitroso hydroxylamine sulfonate.** $K_2SO_3N(OH)NO$ = 218.24. **p. oleate.** $KC_{18}H_{33}O_2$ = 320.5. A yellow mass, soluble in water or alcohol; used medicinally as a soap. **p. osmate.** $K_2OsO_4.2H_2O$ = 369.3. P. perosmate. Dark purple or garnet-red crystals, soluble in water. They decompose in a warm and moist atmosphere; used as a reagent for nitrogen, and medicinally as a sedative. **p. oxalate.** $K_2C_2O_4.H_2O$ = 184.2. Colorless monoclinic crystals, d.2.08, decomp. by heat, soluble in water. Used as a reagent, in photography, and in the manufacture of stain- and ink-removers. *acid-* KHC_2O_4 = 128.11. Monoclinic crystals, d.2.0, slightly soluble in water. *acid- (hemihydrate)* $KHC_2H_4.\frac{1}{2}H_2O$ = 137.12. Trimetric crystals. *acid- (monohydrate)* $KHC_2H_4.H_2O$ = 146.2. Rhombic crystals. *tetra-acid-* $KH_3(C_2O_4)_2.2H_2O$ = 254.15. Triclinic crystals, d.1.836. **p. oxide.** K_2O = 94.2. Burnt potash, calcined potash. Colorless octahedral crystals, or grayish powder, d.2.656; soluble in water. Used extensively as a reagent, and in the manufacture of potassium salts. Cf. *p. peroxide.* **p. oxymuriate.** P. chlorate. **p. palladichloride.** K_2PdCl_4 = 397.7. Palladio p. chloride. A red, soluble solid, decomp. by heat. **p. palladochloride.** K_2PdCl_4 = 326.7. Palladous p. chloride. Greenish-brown prisms, soluble in water, decomp. by heat. **p. parawolframate.** P. tungstate. **p. pentasulfide.** K_2S_5 = 238.50. A yellowish granular mass, soluble in water, m.220. **p. perborate.** KBO_3 = 98.0. A soluble solid. **p. percarbonate.** $K_2C_2O_6.H_2O$ = 216.3. A colorless powder, decomp. by water (forming bicarbonate and oxygen) and acids (forming hydrogen peroxide and carbon dioxide). Used as a reagent, in microscopy, in photography (antihypo), and as a bleaching agent. **p. perchlorate.** $KClO_4$ = 138.6. Colorless rhombic crystals, d.2.524, m.610, slightly soluble in water, insoluble in alcohol. Used as a reagent and oxidizing agent, in pyrotechnics, medicinally as an antipyretic and sedative, and as a source of oxygen. **p. perferrate.** P. ferrate. **p. periodate.** KIO_4 = 230.0. A colorless, rhombic, crystalline powder, d.3.168, m.582, slightly soluble in water; used as a color reagent for manganese **p. permanganate.** $KMnO_4$ = 158.0. Potassii permanganas, p. hypermanganate. Deep purple, lustrous, rhombic needles, d.2.703, decomp. 240, soluble in water. Used as a reagent in volumetric analysis, as an oxidizing agent, in bleaching and disinfecting, for mordants, in the synthesis of dyes, and in photography; medicinally, as an external antiseptic and disinfectant, and for external application to snake bites. **p. perosmate.** P. osmate. **p. peroxide.** K_2O_2 = 110.2 or K_2O_4 = 142.2. A yellow powder, rapidly decomp. when exposed to air and moisture, soluble in alcohol; used as a strong oxidizing agent and oxidizing flux. **p. perruthenate.** $KRuO_4$ = 204.8. Black crystals; slightly soluble in water. **p. persulfate.** KSO_4 = 135.2 or $K_2S_2O_8$ = 270.4. Anthion. Colorless prismatic crystals, decomp. by heat, slightly soluble in water. Used as a strong oxidizing agent, in photography (anthion), and medicinally as a disinfectant. **p. phenolsulfonate.** $KC_6H_4(OH)SO_3.H_2O$ = 230.2. P. sulfocarbolate. *ortho-* Colorless crystals, d.1.734, m.400, soluble in water or alcohol; used medicinally as an intestinal antiseptic. *para-* Rhombic crystals, d.1.87. **p. phenylate.** PhOK = 132.1. P. phenate. Colorless crystals, soluble in water; used as an antiseptic. **p. phosphates.** (1) K_3PO_4 = 212.3. Normal ortho- or tribasic p. phosphate. Colorless rhombic crystals; slightly soluble in water, insoluble in alcohol. (2) K_2HPO_4 = 174.3. P. hydrophosphate, dipotassium phosphate, monoacid phosphate. Colorless crystals; soluble in water. (3) KH_2PO_4 = 136.2. Monobasic p. phosphate, dihydrophosphate, Sörensen's potassium phosphate. Colorless tetragonal crystals, d.2.338, m.96, decomp. by heat, soluble in water, insoluble in alcohol. Used as a reagent, and in the preparation of buffer solutions for *p*H determinations. (4) $K_2P_2O_7.3H_2O$ = 306.27. P. pyrophosphate. Colorless crystals, d.2.33; soluble in water. (5) KPO_3 = 118.14. P. metaphosphate. Colorless crystals, insoluble in water. **p. phosphide.** K_3P_5 = 233.2. An unstable yellow solid. **p. phosphite.** (1) K_2HPO_3 = 158.0. White powder, decomp. by heat; soluble in water, insoluble in alcohol. (2) K_3PO_3, normal phosphite. (3) KH_2PO_3, monobasic or dihydrophosphite. **p. phthalate.** (1) $C_6H_4(COOK)_2$. (2) See *p. acid phthalate.* **p. picraminate.** $KC_6H_4O_5N_3$ = 223.2. P. dinitroaminophenate, $C_6H_2(OK)(NH_2)(NO_2)_2$. A dark brown crystalline powder; soluble in

water, insoluble in alcohol. **p. picrate.** $KC_6H_2O_7N_3$ = 267.1. Potassium trinitrophenate, $C_6H_2(NO_2)_3OK$. Yellow crystals, d.1.852, slightly soluble in water, insoluble in alcohol; used in explosives. **p. piperinate.** $KC_{12}H_9O_4$ = 256.2. A yellow powder, slightly soluble in water. **p. platinibromide.** K_2PtBr_6 = 752.9. **p. platinichloride.** P. chloroplatinate. **p. platinobromide.** K_2PtBr_4 = 593.0. An unstable solid. **p. platinochloride.** P. chloroplatinite. **p. platinocyanide.** $K_2Pt(CN)_4.3H_2O$ = 431.5. An unstable solid. **p. plumbate.** $K_2PbO_3.3H_2O$ = 387.45. Colorless crystals; soluble in water. **p. plumbite.** K_2PbO_2 = 317.3 or $KHPbO_2$ = 279.21. **p. propionate.** $KC_3H_5O_2$ = 112.2. Small colorless crystals; soluble in water. **p. pyroantimonate.** P. stibnate. **p. pyroborate.** P. tetraborate. **p. pyroborate.** P. tetraborate. **p. pyrophosphate.** See *p. phosphates* (4). **p. pyrosulfate.** $K_2S_2O_7$ = 254.3. A white crystalline powder, d.2.27; soluble in water. **p. pyrosulfite.** P. metabisulfite. **p. rhodanate.** Potassium thiocyanate. **p. ruthenate.** K_2RuO_4 = 244.0. A brownish-black powder, soluble in water. *per-* See *p. perruthenate.* **p. salicylate.** $KC_7H_5O_3$ = 176.2. A white crystalline powder, soluble in water or alcohol; used medicinally as an antirheumatic and antipyretic. **p. salol orthophosphite.** Salvosal potash. The potassium salt of salol-o-phosphorous acid:



. Colorless crystals, soluble in cold water; it is used medicinally for influenza and gout. **p. santonate.** $KC_{15}H_{19}O_4$. H_2O = 320.3. Colorless syrupy liquid; soluble in water. **p. selenate.** K_2SeO_4 = 221.4. A colorless crystalline powder, soluble in water. **p. silicate.** K_2SiO_3 = 154.5 or $K_2Si_2O_5$ = 214.3. Potash-waterglass. Transparent glass-like masses, soluble in water, insoluble in alcohol. See also *p. tetrasilicate.* **p. silicate solution.** Potash-waterglass. An aqueous, syrup-like solution of potassium silicate, 30–38°Bé; miscible with water in all proportions. Used for fire-proofing textiles, wood, and cardboard; as a cement and glue; in bleaching; and in the manufacture of soap. **p. silicofluoride.** K_2SiF_6 = 220.5. A white powder, soluble in water; used in the manufacture of metallic silicon. **p. silver cyanide.** $KAg(CN)_2$ = 199.0. Colorless regular crystals, soluble in water or alcohol. **p. sodium antimonyl tartrate.** $KNa(SbO)C_4H_3O_6$ = 346.88. White powder, soluble in water. **p. sodium carbonate.** $KNaCO_3(H_2O)$ = 230.20. A white solid, readily soluble in water. **p. sodium tartrate.** $KNaC_4H_4O_6$ = 210.1. $+4H_2O$ = Rochelle salt. $+3H_2O$ = Seignette salt. A colorless crystalline double salt, soluble in water. Used as a reagent (in Fehling's solution), as a depilatory, and medicinally. **p. sozoiodol.** $C_6H_2I_2(SOH)OK$ = 431.8. P. diiodo-p-sulfonic acid phenate. Used medicinally, as a desiccant for eczema. **p. sozoiodolate.** $C_6H_2I_2(SOK)OH$ = 431.8. P. diiodo-p-phenolsulfonate. A colorless, odorless, crystalline powder, soluble in water; used medicinally as a dusting powder for skin diseases. **p. stannate.** K_2SnO_3 = 244.9. Colorless crystals, soluble in water; used in the textile industry as a mordant. **p. stannosulfate.** $K_2Sn(SO_4)_2$ = 388.8. P. stannous sulfate, Marignac salt. Colorless crystals, soluble in water; used as a reagent for mercury and bismuth salts, and in volumetric analysis. **p. stearate.** $KC_{18}H_{35}O_2$ = 322.5. A white crystalline powder, soluble in hot water or alcohol. **p. stibnate.** (1) $K_2H_2Sb_2O_7.6H_2O$ = 543.8. P. pyroantimonate. A granular, white powder, slightly soluble in water; used as a reagent for sodium salts. (2) P. antimonate. **p. succinate.** $K_2C_4H_4O_4$ = 194.3. A white powder, soluble in water; used medicinally. **p. sulfate.** K_2SO_4 = 174.3. Potassii sulfas, normal p. sulfate, tarcanum, sal de duobus, tartarus vitriolatus. White rhombic or hexagonal crystals, d.2.663, m.1076 (sublimes), soluble in water, insoluble in alcohol. Used as a reagent, medicinally in place of saline, in fertilizers, and in the manufacture of artificial mineral waters and baths. *acid-* $KHSO_4$ = 136.2. Monobasic or monoacid p. sulfate. Colorless monoclinic or rhombic crystals, d.2.24, m.200, soluble in water. *pyro-* See *p. pyrosulfate.* **p. sulfide.** K_2S = 110.3. P. monosulfide. Brown crystals, d.2.13, soluble in water or alcohol. **p. sulfides:** K_2S, K_2S_2, K_2S_3, K_2S_4, K_2S_5. Commercial "p. sulfide" is usually a mixture of some or all of these. **p. sulfite.** $K_2SO_3.2H_2O$ = 194.3. A white crystalline powder, decomp. by heat, soluble in water. Used as a reagent, in the textile industry as a mordant, and medicinally, as an antiseptic and laxative. *acid-* $KHSO_3$ = 120.2. P. bisulfite. Colorless needles, decomp. by heat; soluble in water. **p. sulfocarbolate.** P. phenylsulfonate. **p. sulfocarbonate.** K_2CS_3 = 186.2. Orange, hygroscopic crystals, soluble in water; used medicinally in skin diseases. **p. sulfocyanate.** P. thiocyanate. **p. sulfocyanide.** P. thiocyanate. **p. sulfophenylate.** P. phenylsulfonate. **p. tannate.** $KC_{14}H_9O_9$ = 360.1. A brown powder, soluble in water. **p. tartrate.** *d-* $K_2C_4H_4O_6.\frac{1}{2}H_2O$ = 235.3. Tartarus, soluble tartar, sal vegetal, normal p. tartrate. Colorless monoclinic crystals, d.1.9715, soluble in water; used as a reagent, and medicinally as a refrigerant and laxative. *sodium-* P. sodium tartrate. *dl-* $K_2C_4H_4O_6$ = 226.23. Monoclinic crystals, d.1.984. *d-acid-* $KHC_4H_4O_6$ = 188.14. Rhombic crystals, d.1.956. *dl-acid-* Monoclinic crystals, d.1.954. **p. tellurate.** $K_2TeO_4.5H_2O$ = 359.7. Colorless crystals, soluble in water; used medicinally. *acid-* $KHTeO_4$ = 231.6. Colorless crystals; soluble in water. **p. tellurite.** K_2TeO_3 = 253.3. A colorless amorphous powder, soluble in water. **p. tetraborate.** $K_2B_4O_7.5H_2O$ = 324.3. Potassium borate. Colorless hexagonal prisms; soluble in water. **p. tetraoxalate.** $KH_3C_4O_8.2H_2O$ = 254.1. A double salt of oxalic acid and monoacid p. oxalate, $(COOH)_3COOK$. Colorless monoclinic prisms, soluble in water; used as a standard in volumetric analysis. **p. tetrasilicate.** $K_2Si_4O_9$ = 334.6. A solid, soluble in water, insoluble in alcohol. **p. thiocyanate.** KCNS = 97.2. P. sulfocyanide, p. sulfocyanate, p. rhodanate. Colorless deliquescent prisms, d.1.906, m.162, soluble in water or alcohol. Used as a reagent for ferric salts (red), copper (blue) and silver (white) salts, and other compounds. **p. thiocyanide.** P. thiocyanate. **p. thiosulfate.** $K_2S_2O_3.H_2O$ = 208.36. Very soluble prisms, insoluble in alcohol. **p. triiodide.** KI_3 = 419.86. Prismatic crystals

d.3.50, m.45 (decomp.); soluble in a solution of p. iodide. **p. tungstate.** $K_6W_7O_{24}.6H_2O$ = 2015.0. P. parawolframate, $3K_2O.7WO_3.6H_2O$. White crystalline powder; soluble in water. **p. uranium oxalate.** $K_4U(C_2O_4)_4.5H_2O$ = 836.62. Yellow monoclinic crystals, d.2.563. **p. urate.** $K_2C_5H_2O_3N_4$ = 244.5. A white powder, soluble in water. **p. valerate.** $KC_5H_9O_2$. = 140.2. A white crystalline powder, soluble in water; used medicinally as a nerve sedative. **p. wolframate.** $K_2WO_4.5H_2O$ = 416.4. A white, hygroscopic, crystalline powder, soluble in water, insoluble in alcohol: used in preparing bronzing solutions. **p. xanthate.** KS_2COEt = 160.28. A salt decomposed by acid into alcohol and carbon disulfide; hence the structure $SC\begin{matrix}SK\\OEt\end{matrix}$. Light yellow prisms, d.-1.558, decomp. 200, very soluble in water. Used as a flotation agent, as a soil fumigant, and as a chemical reagent in the separation of nickel and cobalt. **p. zincate.** K_2ZnO_2 = 175.7. A colorless amorphous powder, soluble in alkalis.

potato. The rhizome of *Solanum tuberosum.* **sweet-** The rhizome of *Ipoemoea batatus.* **p. culture.** A slice of potato used as culture medium for bacteria. **p. gum.** Euphorbia. gum. **p. spirit.** Fusel oil. **p. starch.** See *starch.*

potency. (1) mathematical: Power; the magnitude or dimension, or the number of times a number is multiplied by itself. *Eg.*,

10^{11} = 100,000,000,000
10^{10} = 10,000,000,000

and so on, to:—

10^{-1} = 0.1
10^{-2} = 0.01
10^{-3} = 0.001 and so on.

(2) therapeutic: The strength or power of activity of a drug. (3) homeopathic: The dilution of a remedy in a neutral medium corresponding with the mathematical potency.

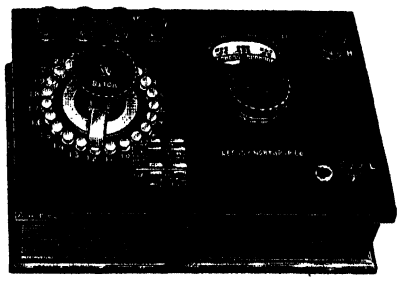
potential. (1) Stored-up energy or power capable of performing work. (2) Voltage:

low-	less than 301 volts.
medium-	from 301–651 volts.
high-	greater than 651 volts.

absolute- See *mercury cathode.* **electric-** Electromotive force. **electrolytic-** See *electroaffinity.* **hydrogen-** See p_H. **ionic-** See *ionic.* **magnetic-** Magnetomotive force. **oxido-reduction-** See r_H. **pseudo-** The electrokinetic potential set up between ions adsorbed on the surface of a solid immersed in a liquid, and those in the bulk of the liquid. **super-** Overvoltage.

p. difference. The difference in voltage between the electrodes of a battery, vacuum tube or thermocouple. With an electrical cell it is the difference between the electrode potentials of the electrodes. **p. energy.** (1) The heat capacity of a compound. (2) The energy of a body due to its position (as a lifted weight, or water in a high storage tank). **p. mediator.** A substance used to accelerate the establishment of an equilibrium in measurements of oxidation-reduction potentials. Cf. *poiser.*

potentiometer. A low-resistance instrument for the accurate determination of small differences in electric potentials by Poggendorff's method q.v. Cf. *galvanometer, hydrogen-ion recorder.*



Potentiometer.

potentiometric titration. A method of quantitative analysis in which the electric potential of an electrode immersed in the solution to be titrated is continually determined until a rapid change corresponding with the end of the reaction is reached. Cf. *hydrogen-ion determination, Hildebrand electrode, conductometric analysis.*

P.O.T.G. Portsmouth accelerator.

pothole. A natural cavity in the earth surface that is usually more deep than wide, and is often filled with a deposit of salts; as, sodium carbonate. It may be formed by the grinding action of pebbles carried in a stream of water.

potstone. Talc.

potters' clay. A pure, plastic clay, free from iron, (see *pipeclay*). **p. lead.** Alquifou. **p. ore.** Alquifou.

pottery. Ware made from clay, molded while soft and moist, baked and hardened by heat. *E.g.*,

earthenware: relatively soft and fusible, and: (a) unglazed, (b) glazed, (c) lustrous, (d) enameled;

stoneware: hard, infusible and containing more silica. (See *porcelain.*)

pounce. Powdered cuttlefish bones; formerly used for drying ink.

pound. lb., #. A unit of weight in the English system. The weight in vacuo of a platinum cylinder known as the Imperial Standard Pound. Cf. *pfund.* **apothecaries'** = 12 oz. = 96 drams = 288 scruples = 5760 grains = 0.37 kg. or 373.24177 grams. **avoirdupois-** = 16 oz. = 7000 grains = 0.453 kg. or 453.592338 grams = 16 fluid oz. **gee-** Slug. **troy-** (for gold and silver etc.) = 5760 grains = 16 oz.

pound per square inch. A unit of pressure (see *atmosphere*).

pound-mol. The number of pounds of a gas numerically equal to its molecular weight. Its volume is 359 cubic ft.

poundal. The British unit of force. F.P.S. system (cf. *C.G.S.* and *M.K.S. systems*). The force that will impart, in one second, a velocity of one foot per second to a mass of one pound; 1 poundal = 1 pound accelerated 1 foot per second each second = 13825.5 dynes.

pour. The flow of a liquid under gravity. **p. point.** (1) The lowest temperature at which an oil will flow under standard conditions. (2) The temperature at which an alloy is cast.

powder. (1) An aggregation of ground, loose material in small solid particles. (2) Any explosive used in blasting and gunnery. **algaroth-** Precipitated antimonous oxychloride.

antiseptic- A finely-ground antiseptic substance, for external application to wounds. **baking-** See *baking powder*. **bleaching-** See *bleaching*. **dusting-** See *dusting*. **effervescent-** A mixture of salts that develops carbon dioxide when dissolved in water. **flameless-** An explosive that produces little or no muzzle-flash. **insect-** (1) See *insect powder*. (2) A mixture of drugs used as an insecticide. **Seidlitz-** A mixture of Rochelle salt, sodium bicarbonate and tartaric acid, used to make an effervescent saline water. **smokeless-** Any explosive with little or no smoke-formation when burning.

powellite. $CaMoO_4.CaWO_4$. A native calcium molybdate and tungstate; small yellow tetragonal prisms.

powellizing. Hardening wood by impregnating with a saccharin solution.

power. (1) Potency. (2) The time-rate of doing work: $P = dW/dT$, or $P = WT^{-1} = ML^2T^{-3}$; where W = work, T = time, M and L are the absolute units of mass and length respectively. (3) See *diopter*.

power transmission. Methods: (1) mechanical or direct; (2) hydraulic or by water columns; (3) pneumatic or compressed air; (4) steam in pipes; (5) electricity, through wires.

power units. See *watt, kilowatt, horsepower*.

pozzolana. (1) Puzzolane, q.v. (2) A substance which is mixed with lime mortar in addition to, or in partial substitution for, sand, in order to increase its strength. **artificial-** Burnt clay, granulated slag, certain clinkers and burnt oil-shale. **natural-** Volcanic ash and celite.

pozzolanic action. Chemical actions, as the result of which insoluble compounds are formed in cement.

P.P. Abbreviation for the pellagra-preventing factor of vitamin B, q.v.

P.P.D. Piperidine pentamethylene dithiocarbonate; used as an accelerator in the vulcanization of rubber

p.p.m. Abbreviation for parts per million. Cf. *e.p.m.*

Pr. (1) Symbol for praseodymium. (2) Abbreviation for propyl: Pr^{α}, n-Pr—alphapropyl (normal propyl). Pr^{β}, i-Pr—betapropyl (isopropyl).

Prager-Jacobson classification. The system of grouping organic compounds in 4877 divisions, employed in Beilstein's Handbuch.

pragmoline. Acetylcholine bromide.

Prandtl number. An expression of the temperature distribution in a fluid. It equals the specific heat at constant pressure × kinematic viscosity/thermal conductivity. (Cf. *Reynolds number*.)

prase. (1) Greenish. (2) A gray-green chalcedony.

praseodymia. The earth corresponding with the element praseodymium.

praseodymium. Pr = 140.92. A rare earth metal, atomic number 59. A greenish-yellow, metallic element, d.6.48, m.940, slowly decomp. in water. It was separated in 1885 by Auer von Welsbach from the earth didymia, and it occurs in cerite and other rare earth minerals. The principal valency is three, and its salts are generally green in color. **p. acetate.** $Pr(C_2H_3O_2)_3.3H_2O$ = 372.04. Green needles, very soluble in water. **p. chloride.** $PrCl_3$ = 247.3. Green needles, d.4.017, m.818; slightly soluble in water. **p. oxalate.** $Pr_2(C_2O_4)_3.10H_2O$ = 726.00. Light green crystals, insoluble in water. **p. oxides:** (1) Pr_2O_3 = 329.8. Praseodymium trioxide. A yellowish-green amorphous powder, d.7.07. (2) Pr_2O_4 = 345.8. Praseodymium tetroxide. A black powder, d.5.98. (3) Pr_2O_5 = 361.8. Praseodymium peroxide. **p. peroxide.** P. oxide (3). **p. phosphate.** $PrPO_4$ = 235.9. A green powder, used as green coloring in ceramics. **p. sulfate.** $Pr_2(SO_4)_3$ = 570.0 and $Pr_2(SO_4)_3.8H_2O$ = 714.2. A green crystalline powder; soluble in water. **p. sulfide.** Pr_2S_3 = 378.0. A brown amorphous powder, d.5.402, decomp. by heat, insoluble in water.

praseolite. A green alteration-product of iolite.

Prechtl, Johann, Joseph Ritter von. 1778–1854. An Austrian technologist and chemist, noted as author of a technical encyclopedia. Cf. *Pregl*.

precious. Valuable, rare. **p. garnet.** Almandite. **p. metals.** The noble metals, gold, platinum and silver. **p. opal.** An opal exhibiting a play of delicate colors. **p. stone.** A mineral used as a gem.

precipitable. Describing a soluble ion that can be made insoluble by the presence in solution of some other ion.

precipitant. A substance or reagent which, when added to a solution, causes the formation of an insoluble substance. **group-** A reagent that will precipitate several related substances; as, H_2S or NH_4OH. (See *qualitative analysis*.)

precipitate. (1) To cause a substance to become insoluble, and settle from a solution. (2) The deposit of an insoluble substance from a solution after the addition of a precipitating reagent, as a result of a chemical reaction. Cf. *policeman, schwellenwert*. **banded-** Periodic precipitation. **black-** Mercurous oxide. **group-** The sediment formed after the addition of a group precipitant: it may consist of a number of substances having related properties. (See *qualitative analysis*.) **periodic-** See *periodic precipitate*. **red-** Red *mercuric oxide*. **white-** Ammoniated *mercury*, NH_2HgCl. **yellow-** Yellow *mercuric oxide*.

precipitated. Settled out; caused to become insoluble. **p. bone.** A by-product in the manufacture of glue from bones, consisting chiefly of dicalcium phosphate. **p. chalk.** Calcium carbonate produced by precipitation. **p. phosphate.** Dicalcium phosphate obtained from phosphate rock or processed bone. **p. vapor.** The settlement of solid particles from gases or vapors on the walls of a container (see *rhythmic deposition*).

precipitation. The process of making certain soluble substances (ions or salts) insoluble by the addition of a reagent, evaporation, freezing, or electrolysis. **co-** The simultaneous settling out of more than one compound; as in gravimetric analysis, the contamination of calcium oxalate with magnesium oxalate. **electrostatic-** The use of an electric potential to cause the settlement of the charged moisture globules which constitute a fog, or the dust particles which constitute a smoke (see *Lodge-Cottrell process*). **fractional-** The separation of substances by precipitating them in increasing order of solubility. **group-** Making a series of substances of similar properties insoluble, by the addition of a single reagent, usually in excess.

precipitin. An immunizing substance formed in the blood-serum of animals or humans, that is capable of precipitating the bacteria whose cultures have been employed in the immunizing treatment. See *Ehrlich's side-chain theory*.

precipitinogen. A substance which, on injection into animals or humans, will cause the formation of precipitins.

precipitum. The deposit of bacteria formed by the action of precipitins.

precision instrument. An accurately-graduated glass or other measuring instrument, certified by the manufacturer, but not tested at a government bureau. They differ from certified instruments. See also *standardized* buret, flask, pipet and thermometer.

precursor. (1) A substance synthesized in the dark by an organism, and differing from a photoproduct in that it is decomposed by light. (2) A substance that forms the raw material for the synthesis of protoplasm in the living animal body. (3) A substance which precedes the formation of another compound; cf. *provitamin.*

prefixes. Syllables placed before a name to indicate certain atoms, structures or properties. **order of-** In branched hydrocarbons the p. may be arranged either alphabetically or according to complexity. The former is the more usual.

Pregl, Fritz. 1868–1930. An Austrian chemist, noted for his development of quantitative microanalysis and spot tests. Nobel prize winner in 1923.

pregnane. $C_{21}H_{36}$ = 288.2. A tetracyclic hydrocarbon and cholane derivative, q.v. **p. diol.** $C_{21}H_{36}O_2$ = 320.2. A sterol, m.233, from urine of pregnant women. **p. dione.** $C_{21}H_{32}O_2$ = 316.2. A ketone derivative of p. diol.

pregnanolone. $C_{21}H_{34}O_2$ = 318.2. A corpus luteum hormone. Cf. *cholane derivatives.*

pregnene. $C_{21}H_{34}$ = 286.2. $\Delta^{5:6}$-pregnane. A cholane derivative, q.v. **p. diol** $C_{21}H_{32}O_2$ = 316.2. A corpus luteum hormone.

pregrattite. A variety of muscovite from Pregratten, Tyrol.

prehnite. A hydrous silicate of calcium and aluminum, $H_2Ca_2Al_2(SiO_4)_3$.

prehnitene. $C_{10}H_{14}$ = 134.2. Prenitol, 1.2.3.4-tetramethylbenzene.* An isomer of durene. A colorless liquid, d.0.901, m. −4, b.204; insoluble in water.

prehnitic acid. $C_{10}H_6O_8$ = 254.05. 1.2.3.4-benzene tetracarboxylic acid.* Colorless crystals, decomp. 237. Cf. *mellophanic acid.*

prehnitilic acid. *2.3.4*-Trimethyl benzoic acid.*

preignition. See *knock.*

premier alloy. A heat-resisting alloy of 61 % Ni, 25 % Fe, 11 % Cr and 3 % Mn.

premier jus. The edible oils obtained by rendering the tissues surrounding the kidneys of the cow.

prenitic acid. Prehnitic acid.

prenitol. Prehnitene.

preparation. (1) A chemical process for the production of a chemical compound. (2) A chemical compound. (3) The treatment of ores; as, ore concentration or ore dressing. (4) A pharmaceutical product or mixture of drugs. **p. dish.** A glass dish with glass cover, used as a receptacle for microscope slides or cover glasses. **p. jar.** A large glass jar with glass cover, used as a receptacle for museum specimens. **p. of salts.** See *salts.*

prescription. A written direction for compounding or administering a drug. **p. balance.** A delicate scale used in the weighing of small quantities, but less sensitive than an analytical balance.

preservative. A substance that prevents decay and decomposition of organic liquids or foods. They include sulfites, fluorides, benzoates, salicylates, borates and formaldehyde, but their use is limited or prohibited in many countries. **histological-** P. used for biological specimens; as, Bouin's, Carl's, Flemming's, Kahle's and Zenker's solution. **wood-** P. used for lumber; as, creosote, tar, aczol.

press. A device which applies pressure. **cork-** A corrugated wheel rotating in a corrugated elliptical frame, used for softening corks by pressure. **filter-** See *filter.* **plant-** A device which consists essentially of a piston in a perforated cylinder; used to express juices from plant materials.

pressing paper. A coarse filter paper, used for drying specimens.

presspahn. Wall-boards, made by hydraulic pressure from wood pulp.

pressure. Strain or stress produced by the meeting of opposite forces; such as, pushing, thrust or compression. **atmospheric-** The weight of the atmosphere; the pressure exerted by the gaseous envelope on the earth surface. It is measured in atmospheres. 1 atm. = 14.7 pounds per in.^{2} = 1,012,630 dynes per cm.^{2} = 760 mm. column of mercury. **critical-** The pressure required to condense a gas at the critical temperature. **disruptive-** See *disruption.* **electrical-** Electromotive force. **fugitive-** The variations at atmospheric pressure in the vicinity of explosions. **high-** A p. above one atmosphere. **low-** A p. below one atmosphere. **negative-** A pressure that is less than one atmosphere, *i.e.*, a suction. **normal-** One atmosphere = 760 mm. Hg. **osmotic-** See *osmosis.* **partial-** The pressure exerted by a single gaseous constituent in a gas mixture. (See *Dalton's Law.*) **radiation-** See *radiation.* **solution-** The molecular force of a solid that tends to go into solution; hence, a measure of the attractive forces (coordinate bonds) between the molecules of solute and solvent. **standard-** See *normal-.* **total-** The sum of the partial pressures of the constituents of a gas mixture.

p. blower. Any device used to produce an air blast or current of air. **p. bottle.** A heavy-walled glass container. **p. filter.** (1) A filtering device, which consists of a porous porcelain cylinder through which the solution to be filtered is pumped. (2) A filterpress. **p. gauge.** A device for measuring the pressure of gases or liquids. They include, principally, mechanical instruments (coiled tubes or diaphragms) or hydrostatic devices (mercury columns). Cf. *manometer.* **p. tubing.** Thick-walled rubber tubing used for vacuum pumps.

prest-o-lite. A commercial brand of acetylene gas, compressed in small cylinders.

prestone. A registered trade-mark for ethylene glycol anti-freeze.

preventol. A chlorinated phenol, used as a preservative for adhesives.

prezymogen. The cell substance of a living cell, that forms the zymogens.

pribramite. (1) A variety of sphalerite from Pribram, Bohemia. (2) A variety of göthite.

priceite. A mineral, $3CaO,4BO_3,6H_2O$.

prickly ash bark. Xanthoxylum.

prickly ash berries. Xanthoxyli fructus. The dried fruits of *Xanthoxylum* species, a Rutaceae; used as a carminative and alterative.

prickly-pear. Opuntia, Indian fig. The edible dried fruit of a cactus species (*Opuntia*); used as a source of alcohol for motor fuel.

Priest photometer. An optical device for grading the colors of oils.

Priestley, Joseph. 1733–1804. An English-born American chemist, noted for his discovery of oxygen, gas experiments, and writings.

Joseph Priestley.

prill. Small particles of metal found in assay work.

primary. The first or simplest form. **p. alcohol.** An organic compound characterized by the $-CH_2OH$ group. **p. amine.** An organic compound characterized by the $-CH_2NH_2$ group. **p. battery.** A combination of substances constituting a voltaic cell, that produces a potential by the chemical changes undergone by its constituents. **p. carbon atom.** A carbon atom at the end of a carbon-carbon chain; or a carbon atom attached to one other carbon atom only. **p. color.** One of a number of simple colors, combinations of which are supposed to produce all the other possible shades of color (see *Helmholtz's theory*). **p. current.** The inducing current of an induction coil, q.v. **p. nucleus.** An organic cyclic compound which has only hydrogen atoms attached to the ring. **p. oxide.** A hypothetical unstable oxide formed during an oxidation reaction, and having the characteristics of a peroxide which loses oxygen. See *induced reactions*. **p. reaction.** The principal or fastest reaction in a composite system of reactions. **p. valence.** See principal *valence*.

prime. A proposed name for the positive nucleus.

primer. (1) Detonator, percussion cap. (2) An explosive cartridge containing the detonator.

primeverose. $C_{11}H_{20}O_{10}$ = 312.15. A disaccharide, hydrolysing to glucose and xylose, from the glucosides of cowslips and primrose.

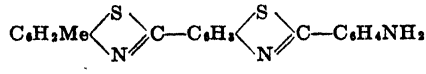
primeverosidase. An enzyme which hydrolyzes primrose glucoside to primeverose.

priming. (1) The escape into the condenser as a result of splashing, bumping etc. of a liquid being distilled. The distillate is thus contaminated with it. (2) P. sugar. **p. powder.** Fulminating powder. **p. sugar.** A sugar added to a finished beerto- impart body or briskness as a result of after fermentation. Glucose or invert sugar is used. **p. tube.** Primer.

primula. Cowslip. The dried herb of *Primula officinalis*, a Primulaceae.

primulaverin. A glucoside from the root of primula. Cf. *primverin*.

primulin. (1) A crystalline substance from the root of *Primula officinalis*. (2) A primrose-colored azo dye, which consists of the alkali salts of primulin bases. **p. bases.** A group of sulfur dyes obtained by heating p-toluidine and sulfur with amines. They contain the ring structure:



primulite. A crystalline sugar from the roots of *Primula officinalis* and identical with volemitol.

primverase. An enzyme from the root of *Primula officinalis*.

primverin. A glucoside from the root of *Primula grandiflora*. Cf. *primulaverin*.

Prince Rupert drops. Pear-shaped droplets of glass, obtained by allowing molten glass to fall into water. On breaking off the tip, they shatter explosively into a fine powder.

Prince's metal. A brass consisting of zinc (25 %) and copper (75 %).

principal. The main or chief function, leading or first; as, p. quantum number, p. valence. Cf. *principle*. **p. axis.** (1) The optical axis of a crystal. (2) The longest axis of a crystal. **p. series.** A type of spectrum in which the lines are related by:

$$\frac{1}{\lambda} = n = N\left[\frac{1}{(1+S)^2} - \frac{1}{(m+P)^2}\right],$$

and which generally contains the strongest lines. See *Rydberg equation, sharp and diffuse series, Bohr's atom*. **p. valence.** That valence of an element in which it has the largest number of stable compounds.

principle. (1) A theory or assumption; a fundamental concept; as, the p. of Chatelier, p. of Pauli, p. of valency. Cf. *principal*. (2) A substance on which the characteristic effect of a vegetable drug or mixture depends. **acid-** The organic acids of a vegetable drug. **active-** The substance on which the physiological effect of a drug depends, as *e.g.*, alkaloids, glucosides, tannins. **basic-** Alkaloid. **bitter-** Amaroids. **neutral-** A glucoside, salt, ester, or essential oil. **odorous-** Essential oil. **proximate-** Active p. **resinous-** Resin. **sweet-** Glucoside. **toxic-** The poisonous constituent of a drug.

printer's ink. See *ink*.

printer's liquor. A solution of ferrous acetate.

printing. The mechanical reproduction of reading matter or designs. See *letterpress, lithography, gravure*.

prism. (1) A crystal or solid figure whose faces are parallelograms parallel to the axis, and whose ends are triangular or polygonal faces parallel and similar to one another. They may belong either to the tetragonal, hexagonal, orthorhombic, monoclinic, or triclinic systems. (2) A triangular glass rod or hollow glass vessel, used to produce a spectrum. **Nicol-** Two similar triangular pieces of Iceland spar cemented together to form a prism. It splits a ray of light into two portions, polarized and reflected, and is used in polariscopes to obtain polarized light. **spectrum-** A polished triangular glass rod used in spectroscopes.

prismatic. Formed or shaped like a prism. **p. colors.** Rainbow colors. The monochromatic tints produced by the unequal refraction of the constituent rays of light when passing through a prism. See *spectrum*.

pristane. $C_{18}H_{38}$ = 254.3. Iso-octadecane. A hydrocarbon from the liver oil of sharks.

privine. The 2-(1-naphthylmethyl)-imidazoline; its hydrochloride is used as a vasoconstrictor.

proactinomycin. An antibiotic substance from *Nocardia gardneri*, a species of actinomycetes.

proagglutinoid. An agglutinoid that has greater attraction for the agglutinogen than the agglutinin.

probability. A mathematical treatment of a series of numbers or observations, to find the limits of error or the degree of approximation to the truth. Let M be the total number of cases in a series; m, the number of cases in one group; and n, the number of cases in another group, then $n + m = M$ and $\frac{m}{M} : \frac{n}{M}$ is the proportion of the parts to the whole. The probability is $\frac{m}{M} + 2\sqrt{\frac{2mn}{M^3}}$ or $\frac{m}{M} - 2\sqrt{\frac{2mn}{M^3}}$. This means that if in 100 observed cases (M), there were 25 cases (m) of one type, and 75 (n) cases of the other type, then in any other series of similar experiments there may be observed as many as $\frac{25}{100} + 2\sqrt{\frac{2 \times 25 \times 75}{100^3}} = 0.25 + 0.1225 = 0.3735$; hence 37 *cases of m* (as MAXIMUM), and as few as $\frac{25}{100} - 2\sqrt{\frac{2 \times 25 \times 75}{100^3}} = 0.25 - 0.1225 = 0.1275$; that is 13 *cases of m*, (as MINIMUM). Correspondingly, there will be 63 to 87 cases of n.

procaine. $C_{13}H_{20}O_2N_2.HCl$ = 272.7. Novocaine, p-aminobenzoyl-diethylaminoethanol hydrochloride, ethocaine, kerocaine, syncaine, neocaine, $NH_2.C_6H_4.COOCH_2CH_2.NEt_2.HCl$. Colorless, odorless crystals, m.154, soluble in water or alcohol; used medicinally as a local anesthetic. Cf. *percaine*. **p. base.** $C_{13}H_{20}N_2O_2$ = 236.7. Novocaine base, *β*-diethylaminoethyl-*p*-amino-benzoate, *p*-aminobenzoxydiethylamino ethane. A white granular powder, m.61, insoluble in water, soluble in alcohol, ether or benzene. **p. hydrochloride.** Procaine. **p. nitrate.** Colorless crystals, m.100, soluble in water.

procellose. $C_{18}H_{32}O_{16}$ = 504.25. A trisaccharide from cellulose, m.210, hydrolyzed to glucose.

process. A method used in the manufacture or treatment of substances. **type-** The principal operations involved in a chemical plant; as, conditioning, energizing and reacting. **unit-** (1) A chemical operation carried out on a non-laboratory scale. (2) The successive individual operations necessary for the production of a definite compound; as, crushing, grinding, separating, leaching, dissolving, concentrating, evaporating, distilling, mixing. *E.g.*,

TRANSPORTING of solids—rail, cable, conveyors, elevators, chutes.
of liquids—pipes, ditches, canals, flumes.
of gases—pipes, flues, chutes.
SEPARATING solids from solids—Screens, graders, jigs, concentration tables, flotators, magnetic separators.
solids from liquids—Filters, driers, centrifuges, settlers, classifiers, presses, thickeners.
solids from gases—Dust chambers, filter bags, precipitators.
liquids from liquids—Thickeners, centrifuges, stills.
liquids from gases—Separators, condensers.
gases from gases—Diffusers, compressors, stills.
CONDITIONING—Crushers, grinders, mixers, kneaders, digesters, sprayers, compressors, gasifiers, driers.
ENERGIZING—Power plant (water, coal, gas, oil, electricity). Heating equipment. Cooling equipment. Electrical equipment.
REACTING—Vats, Tanks, Retorts, Stills, Roasters, Towers, Furnaces, Chambers.

p. tankage. A fertilizer made from nitrogenous waste material by the action of acid or alkali and pressure. Cf. *nitrogenous tankage*.

prochlorite. A mineral containing pennine and chlorite.

prodag. A semi-colloidal suspension of graphite in water, used as a mould wash in metal casting and in rubber curing. Cf. *aquadag*.

prodorite. An acid-resisting concrete which contains pitch.

producer. An apparatus for the manufacture of illuminating and fuel gas, by passing air over red-hot coke. **p. gas.** A combustible gas; a mixture of nitrogen, carbon monoxide, and small quantities of CO_2, H_2, and CH_4 obtained by passing steam and air over coal at 1000°C.

product. The substance manufactured. **reaction-** Reactant. The compound formed by a reaction. **substitution-** A derivative, q.v. **split-** A decomposition product.

proenzyme. The substance of the living cell that produces the enzymes.

proferment. The substance of the living cell that produces the ferments (see *zymogen*).

profile paper. Coordinate paper.

proflavine. $C_{13}H_{11}N_3SO_4$ = 307.1. Trade name for *2.8*-diamino acridine. A reddish-brown crystalline powder, soluble (with fluorescence) in water or alcohol; used as an antiseptic and for sleeping sickness.

progesterone. $C_{21}H_{30}O_2$ = 314.2. Progestin, lutoosterone C, luteal hormone. A hormone from corpus luteum, white crystals, occurring in two isomeric forms: *alpha-* m.128, *beta-* m.121, They produce progestational changes in the uterus. For structure see *cholane*.

progestin. *α-* and *β*-Progesterone, secreted by the corpus luteum; injected intramuscularly for disorders of pregnancy and menstruation.

progression. Series. Any series of related increasing or decreasing numbers. *E.g.*, arithmetic- (1.2.3.4 . . .); geometric- (1.2.4.8 . . .); harmonic ($\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ . . .) progressions (q.v.).

progynon. German for theelin.

proidonite. The mineral, SiF_4.

projection nucleus. See *nucleus*.

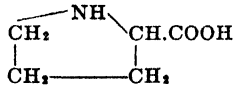
pro-knock. A substance which induces knocking in an internal combustion engine. Antonym: anti-knock, q.v.

prolactin. A hormone from the anterior pituitary, which causes mammary glands of mammals and crop glands of pigeons to secrete milk.

prolamine. A group of proteins from cereals; soluble in dilute alcohol, insoluble in water or absolute alcohol. **p. from oats.** Contains cystidine and histidine. **p. from sorghum.** Contains no tryptophane.

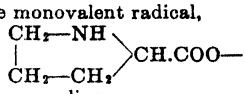
prolan. A hormone from the anterior pituitary gland.

proline. $C_5H_9O_2N$ = 115.1. Alpha- or 2-pyrrolidine carboxylic acid.



An amino-acid and protein split-product, which does not react with nitrous acid or ninhydrin.

prolyl. The monovalent radical,



derived from proline.

promin. The soluble didextrose sulfonate of 4′.4 diaminodiphenyl sulfone. It is said to be active against tubercle bacilli in guinea pigs.

promizole. 4,2′-Diamino-phenyl-5′-thiazole sulfone, a possible remedy for human tuberculosis.

promoter. (1) Catalyst accelerator. A substance which, when added to a catalyst will hasten its effect on a reaction (opposed to catalyst poison). (2) In flotation: see *collector*.

proof spirit. A dilute alcohol, d.0.91984 at 60°F., which consists of 49.24 % by weight of absolute alcohol in distilled water. **over-proof-** A spirit which is x over-proof contains in 100 volumes (100 − x) volumes of proof spirit. **under-proof-** x under-proof means that 100 volumes of the spirit mixed with sufficient water will yield 125 volumes of proof spirit.

propadiene*. C_3H_4 = 40.0. Allene, dimethylene methane. A dialkene or diolefine containing two double bonds, $H_2C{=}C{=}CH_2$. **dioxo-** Carbon suboxide.

propaesin, propæsin. $C_{10}H_{13}O_2N$ = 179.11. Propesin, propyl-p-aminobenzoate, $NH_2C_6H_4{\cdot}COOC_3H_7$. A white crystalline powder, m.76, slightly soluble in water, soluble in alcohol or ether; used medicinally as a sedative.

propalanine. Aminobutyric acid.

propaldehyde. Propion aldehyde.

propamidine. The 4:4′-diamidino 1:3-diphenoxypropane, $NH{:}C(NH_2).C_6H_4.O.(CH_2)_3.O.C_6H_4.(NH_2)C{:}NH$. It is used as a surgical antiseptic.

propanal*. Propion-aldehyde. Cf. *propenal, proponal*. *2.2*-**dimethyl-*** Pivaldehyde. *2*-**methyl-*** Isobutyraldehyde.

propanamide*. Propionamide. *2*-**hydroxy-*.** Lactamide.

propane*. C_3H_8 = 44.1. The third member of the methane series. A colorless gas, $d_{(air=1)}$ 1.558, m. −195, b. −39, slightly soluble in water, soluble in alcohol or ether. **acetyl-** Propylmethylketone. **bromo-*** Propyl bromide, **chloro-*** Propyl chloride. **diamino-** P. diamine*. **dihydroxy-*** Propanediol. **epoxy-*** Propylene oxide. **hydroxy-** Propanol. **imino-** Propylenimine. **iodo-*** Propyl iodide. **methoxy-*** Methylpropyl ether. **nitronitroso-** Propyl pseudonitrol. **phenyl-** Cumene. **trichloro-*** Trichlorohydrin. **trihydroxy-** Glycerol.

p. carboxylic acid. Butyric acid. **p. diamide*.** Malonamide. **p. diamine*.** $C_3H_{10}N_2$ = 74.09. Trimethylenediamine, propylene diamine, $NH_2(CH_2)_3NH_2$. A ptomaine from beef-broth cultures of coma bacillus. A colorless liquid, b.135.5, used as reagent for mercury. **p. dicarboxylic acid.** Glutaric acid. **p. dinitrile*.** Malononitrile. **p. dioic acid*.** Malonic acid. **p. tricarboxylic acid.** Tricarballylic acid.

propanediol*. $C_3H_8O_2$ = 76.1. Dihydroxypropane. **1.2-** or *α*- Propyleneglycol, $MeCHOH.CH_2OH$. A colorless liquid, d.1.051, b.188. **1.3-** or *β*-. Trimethyleneglycol, $CH_2OH.CH_2.CH_2OH$. A liquid, d.1.053, b.215, soluble in water, alcohol or ether. **3-chloro-*** *α*-Chlorohydrin.

propanedione*. 1.2-Pyruvaldehyde.

propanetriol*. Glycerol.

propanoic acid*. Propionic acid.

propanol*. C_3H_8O = 60.1. **normal-** 1-Propyl alcohol. $CH_3.CH_2.CH_2OH$. A colorless liquid, d.0.799, b.97; soluble in water. **iso-** or 2-propyl alcohol. $CH_3.CHOH.CH_3$. A colorless liquid, d.0.780, b.82; soluble in water, alcohol or ether. **chloro-*** Propylene chlorhydrin. **diethoxy-*** See *diethylglycerol, diethyline*. **diiodo-*** Iothion. **epoxy-*** Glycidol. **methyl-** Butyl alcohol. **phenyl-** Phenetyl alcohol. **trichloromethyl-** Chloretone.

propanolon acid. $C_3H_4O_4$ = 104.1. Oxypyroracemic acid. A hydroxyketo acid, $CH_2OH.CO.COOH$.

propanone*. Acetone. **dihydroxy-** Dihydroxyacetone. **diphenyl-** Benzylketone. **hydroxy-** Acetol.

propargyl. The monovalent radical, $HC{\equiv}C.CH_2{-}$, derived from propargyl alcohol. **bi-** or **di-** Bipropargyl.

propargylacetate. $C_5H_6O_2$ = 98.1. The propargyl ester of acetic acid, $MeCOOC_3H_3$. A colorless liquid, d.1.005, b.124; soluble in alcohol or ether.

propargylalcohol. C_3H_4O = 56.1. Propinol. The unsaturated alcohol, $CH{\equiv}C.CH_2OH$. A colorless liquid, d.0.972, b.114; soluble in water, alcohol or ether.

propargylic acid. Propiolic acid.

propäsin. Propaesin.

propenal. Acrolein. Cf. *propanal, proponal*.

propene*. C_3H_6 = 42.1. **1,2-** or $\Delta^{1(2)}$- Propylene. **1,3-** or $\Delta^{1(3)}$- Cyclopropane. **bromo-*** Allyl bromide. **chloro-*** Allyl chloride. **dichloro-*** Allylene dichloride.

p. dicarboxylic acid. Glutaconic acid. **p. oxide.** Propylene oxide. **p. thiol*.** Allyl mercaptan. **p. tricarboxylic acid.** Aconitic acid.

propenol. Allyl alcohol. **phenyl-** Cinnamic alcohol.

propenyl. (1) The monovalent group, $CH_3.CH{:}CH{-}$, derived from propylene. (2) Glyceryl. **p. benzene.** Allyl benzene. **p. hydrate.** Glycerol. **p. phenol.** Anol. **p. trinitrate.** Nitroglycerin.

propenylidene. The bivalent radical, $CH_3.CH{:}C{=}$, derived from propylene.

propeptone. Hemialbumose.

properties. The characteristics of a substance. **additive-** (1) P. which depend on the quantity of matter; as, mass, volume, heat capacity. (2) P. of a molecule which can be calculated from constituent atoms; as, molecular weight. Cf. *constitutive-*. **atomic-** P. which depend on a characteristic of the atom; as, spectrum lines. Cf. *molecular-, molar-*. **chemical-** The chemical behavior of a substance; as, its reactions. Cf. *physical-*. **constitutive-** (1) P. which depend upon the quality of matter; as, melting point, atomic weight. (2) P. which cannot be calculated from constituent atomic types, but which are due to constitution; as, optical rotatory power. Cf. *additive-*. **electric-** The electrical phenomena exhibited by a substance. **extensive-** P. depending on quantity, as, inertia, momentum, electric capacity, heat capacity. Cf. *intensive-*. **general-** P. which are inherent in all matter; as, elasticity, gravity, capacity for energy. Cf. *special-*. **intensive-** P. depending on quality; as, crystalline form,

solubility, atomic weight, boiling point. Cf. *extensive-*. **magnetic-** The magnetic phenomena exhibited by a substance. **mechanical-** The general physical properties of a substance; as, density, weight, hardness, strength. **molal-** P. depending upon the amount of substance; as, m. boiling point elevation and m. freezing point depression. **molar-** P. depending on size, form, or weight of a substance; as, mechanical p. Cf. *atomic-, molecular-*. **molecular-** P. depending on molecules; as, isomerism, physiological effect. Cf. *atomic-, molar-*. **physical-** Physical phenomena (q.v.) shown by a substance, which remains unchanged so long as there is no change in molecular composition; *e.g.*, mechanical, thermal, electrical, magnetical and radiant properties. **radiant-** The light and color characteristics of a substance. **special-** P. exhibited to varying extents by some matter, but not by all matter; as color, transparency, hardness, solubility, acidity. Cf. *general-*. **thermal-** The phenomena of a substance due to absorption or liberation of heat; such as, melting and freezing, boiling and condensing.

prophetin. $C_{20}H_{36}O_7$ = 388.4. A glucoside from *Ecballium officinale* and *Cucumis prophetarum*, Cucurbitaceae; slightly soluble in water, soluble in alcohol or ether.

prophoretin. $C_{20}H_{36}O_4$. An amorphous, resin-like split-product of prophetin.

prophylactic. Anything that prevents or contributes to the prevention of disease; a preventive.

prophylaxis. Preventive treatment.

propilidene. Propylidene.

propine. Allylene. **p. dicarboxylic acid.** Glutinic acid.

propinol. Propargyl alcohol.

propinyl. The monovalent radical, $—C_3H_3$.

propiolaldehyde. C_3H_2O = 54.0. Propynal*. An unsaturated aldehyde, CH:C.CHO. An oily liquid, b.61.

propiolic acid. $C_3H_2O_2$ = 70.0. Carboxy-acetylene, propargylic acid, acetylene carboxylic acid, propynoic acid*, CH:C.COOH. A colorless liquid, m.6, b.144, soluble in water, alcohol or ether. **methyl-** Tetrolic acid. **phenyl-** Ph.C:C.COOH. Colorless crystals, m.136; soluble in water or alcohol.

p. acid series. See *acetylene acids*. **p. alcohol.** C_3H_4O = 56.05. *2*-Propyn-*1*-ol. A liquid, CH:C.CH_2OH, $d_{21°}$.0.963, m. −17, b.-114. Soluble in water.

propiolyl. The monovalent radical, HC:C.CO—, derived from propiolic acid.

propion. (1) Propione. (2) Propionyl. **p. aldoxime.** C_3H_7ON = 73.1. Propionic aldoxime, EtCH:NOH. Colorless crystals, d.-0.926, m.21, b.131. **p. amide.** C_3H_7ON = 73.1. Propionic amide, propionyl amine, propanamide*, $EtCONH_2$. Colorless leaflets, d.-1.0335, m.79, b.213; soluble in water, alcohol or ether. **p. anilide.** $C_9H_{11}ON$ = 149.1. Propionyl aniline. EtCONHPh. Colorless leaflets, m.104; slightly soluble in water soluble in alcohol or ether.

propionaldehyde. C_3H_6O = 58.1. Propanal*, propaldehyde, propyl aldehyde, propionic aldehyde. The saturated aldehyde, $MeCH_2CHO$. A colorless liquid, d.0.807, m. −81, b.48; soluble in water, alcohol, or ether. **dihydroxy-** Glyceraldehyde. **dimethyl-** Pivaldehyde.

propionamide. Propion.

propionate. (1) A salt of propionic acid of the general type C_2H_5COOM. (2) An ester of the general type C_2H_5COOR.

propione. $C_5H_{10}O$ = 86.1. Propion, *3*-pentanone*, diethylketone. EtCOEt. A colorless liquid, b.101, soluble in water, alcohol or ether; used medicinally as a hypnotic.

propionic acid. $C_3H_6O_2$ = 74.1. Carboxy-ethane, propanoic acid*, pseudacetic acid. The saturated fatty acid, $MeCH_2COOH$. A colorless liquid, d.0.987, m. −20, b.141; slightly soluble in water, soluble in alcohol or ether; **acetyl-** Levulinic acid. **amino-** Alanine. **aminohydroxy-** Serine. **aminohydroxyphenyl-** Tyrosine. **aminoindyl-** Tryptophane. **benzoyl-** Benzoyl propionic acid. **carbamyl-** Succinamic acid. **dihydroxy-** Glyceric acid. **dimethyl-** Pivalic acid. **dioxyphenyl-** Hydrocaffeic acid. **epoxy-*** Glycidic acid. **hydroxy-** (1) Lactic acid. (2) Hydracrylic acid. **keto-** Pyruvic acid. **phenol-** Hydrocoumaric acid. **phenyl-** (1) Hydratropic acid. (2) Hydrocinnamic acid.

p. aldehyde. Propionaldehyde. **p. anhydride.** $C_6H_{10}O_3$ = 130.11. Propionyl oxide, propanoic anhydride*. $(MeCH_2CO)_2O$. A colorless liquid, d.1.017, b.168, decomp. by water or alcohol.

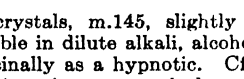
propionitrile. Ethylcyanide.

propiono. Propionyl.

propionyl. Propiono. The monovalent radical, $MeCH_2CO—$, derived from propionic acid. **p. chloride.** C_3H_5OCl = 92.52. Propanoyl chloride*. A liquid, $C_2H_5.COCl$, $d._{20°}$1.065, b.80. **p. phenetidine.** Triphenin. **p. salicylic acid.** $C_{10}H_{10}O_4$ = 194.1. C_6H_4(O—OC.CH_2-Me)COOH. White shining scales, m.95, insoluble in water, soluble in alcohol or ether; used medicinally as an antirheumatic.

propiophenone. $C_9H_{10}O$ = 134.1. $MeCH_2COPh$. **β-phenyl-** $C_{14}H_{12}O$ = 196.09. Phenylbenzyl-ketone, α-benzylacetophenone, $PhCH_2COPh$. A colorless solid, m.60, b.322, used in organic synthesis.

proponal. $C_{10}H_{16}O_3N_2$ = 212.2. Di-*iso*-propyl-barbituric acid.



Colorless crystals, m.145, slightly soluble in water, soluble in dilute alkali, alcohol or ether; used medicinally as a hypnotic. Cf. *propanol*.

proportion. A ratio; a numerical comparison of a part to the whole. **definite-** Proust's law, law of definite proportions: The same compound always consists of the same elements combined together in the same proportions by weight; hence, in any one compound the percentage of its constituents is unalterably fixed. **equivalent-** Compounds of the elements A and C must be formed according to the scheme: m atoms A, n atoms C. Compounds of the elements B and C must be composed of: x atoms B, y atoms C. Compounds of the elements A and B must contain p atoms A, q atoms B. But x, y, m, n, p, q, are whole numbers, usually small. Hence p, q, are either the same as m, x, or whole multiples of them, usually small. **multiple-** Law of multiple proportions. If two elements combine in more than one p., the molecules of one compound must be formed by adding a whole number of atoms of one or

both elements to one or more molecules of the other compound.

p. limit. The least proportion of a substance which can be detected in another specified substance.

propoxy. The monovalent radical, $MeCH_2CH_2O$—, derived from propanol.

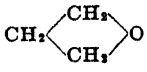
propyl. Pr or C_3H_7—. The monovalent radical, $MeCH_2CH_2$—, derived from propane. Alpha-propyl (Pr^{α}), normal propyl, (n-Pr). *iso-* The monovalent radical, Me_2CH—, derived from isopropane. Beta-propyl (Pr^{β}). Isomeric propyl, (i-Pr).

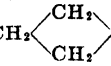
p. acetate. $C_5H_{10}O_2$ = 102.1. The propyl ester of acetic acid, MeCOOPr. A colorless liquid, d.0.891, b.102; slightly soluble in water, soluble in alcohol or ether. **p. acetylene.** C_5H_8 = 68.1. The unsaturated alkaline or acetylene hydrocarbon, PrC:CH. A colorless liquid, b.48; insoluble in water, soluble in alcohol or ether. **p. alcohol.** Propanol.* **p. aldehyde.** Propionic aldehyde. **p. amine.** C_3H_9N = 59.1. *normal-* Aminopropane, propaneamine*, $PrNH_2$. A colorless, refractive liquid, d.0.719, b.49, soluble in water; used medicinally as a sedative. *iso-* A liquid, soluble in water, Me_2CHNH_2, b.32. **p. amine hydrochloride.** $PrNH_2.HCl$ = 95.6. Colorless deliquescent crystals, soluble in water; used medicinally. **p. amine sulfate.** $(PrNH_2)_2.H_2SO_4$ = 216.2. Colorless crystals, soluble in water; used in medicine. **p. aniline.** $C_9H_{13}N$ = 135.2. The secondary amine PhNHPr. A colorless liquid, d.0.949, b.222; soluble in alcohol or water. **p. benzene.** C_9H_{12} = 120.14. The aromatic hydrocarbon, PhPr, phenylpropane. A colorless liquid, d.0.862, b.158; insoluble in water, soluble in alcohol or ether. **p. benzoate.** $C_{10}H_{12}O_2$ = 164.2. The propyl ester of benzoic acid, PhCOOPr. A colorless liquid, d.1.032, b.229; sparingly soluble in water, soluble in alcohol or ether. **p. benzoic acid.** $C_{10}H_{12}O_2$ = 164.2. $C_6H_4PrCOOH$. *ortho-* Colorless leaflets, m.58, b.272; soluble in water, alcohol or ether. *para-* Colorless crystals, b.140; slightly soluble in water, soluble in alcohol or ether. **p. bromide.** C_3H_7Br = 123.0. Bromopropane*. A colorless liquid, d.1.364, b.71; slightly soluble in water, soluble in alcohol. **p. butyrate.** $C_7H_{14}O_2$ = 130.2. The propylester of butyric acid, PrCOOPr. A colorless liquid, d.0.879, b.143; soluble in alcohol or ether. **p. carbamate.** $C_4H_9O_2N$ = 103.1. The propylester of carbamic acid, NH_2COOPr. Colorless prisms, m.53, b.194; very soluble in water, alcohol or ether. **p. carbinol.** *1-*Butanol*. **p. carbylamine.** iso-Me_2CHNC = 69.09. A liquid, b.87. **p. chloride.** C_3H_7Cl = 78.53. *normal-* $MeCH_2CH_2Cl$. 1-chloropropane*. A colorless liquid, d.0.895, b.46; slightly soluble in water, soluble in alcohol or ether. *iso-* MeCHClMe. 2-chloropropane, secondary, or propyl-2-chloride. A colorless liquid, d.0.859, b.37; slightly soluble in water, soluble in alcohol or ether. **p. cyanide.** C_4H_7N = 69.1. *normal-*Butyronitrile. PrCN. A colorless liquid, d.0.794, b.118; soluble in water, alcohol or ether. *iso-* Me_2CHCN = 69.1. A liquid, b.107. **p. ether.** $C_6H_{14}O$ = 102.1. Propyloxide, propoxypropane*. Pr_2O. A colorless liquid, d.0.744, b.90.7, soluble in water, alcohol or ether. iso- Isopropyl oxide. A colorless liquid, $d_{15°}$0.7247, m. −60, b.67.5, insoluble in water, soluble in all other liquids; used as solvent for gums, waxes, and asphalt. **p. formate.** $C_4H_8O_2$ = 88.1. The propyl ester of formic acid, HCOOPr. A colorless liquid, d.0.901, b.81, slightly soluble in water, soluble in alcohol or ether. **p. hydroxylamine.** C_3H_9ON = 75.1. *β-* PrNHOH. *α-* $PrONH_2$. **p. iodide.** C_3H_7I = 170.0. 1-iodopropane*, PrI. A colorless liquid, d.1.748, b.102; sparingly soluble in water, soluble in alcohol or ether; used in organic synthesis. **p. isocyanide.** *normal-* PrNC. *iso-* Me_2CHNC. **p. ketone.** Butyrone. **p. mercaptan.** C_3H_8S = 76.1. Hydrosulfopropane, propyl hydrosulfide, PrSH. A colorless liquid, b.67; slightly soluble in water, soluble in alcohol or ether. **p. nitramine.** $C_3H_8O_2N_2$ = 104.1. $PrNHNO_2$. A colorless liquid, d.1.103, m. −21, b.130; slightly soluble in water, soluble in alcohol or ether. **p. nitrate.** $C_3H_7NO_3$ = 105.1. A colorless liquid, d.1.063, b.119, soluble in alcohol or ether. **p. nitrite.** $C_3H_7NO_2$ = 89.1. A colorless liquid. d.0.935, b.57; soluble in alcohol or ether. **p. nitrolic acid.** $C_3H_6O_3N_2$ = 118.08. The solid, $MeCH_2C(NO_2).NOH$, m.74, soluble in water, alcohol ether. **p. phenyl ketone.** Butyrophenone. **p. pseudonitrol.** $C_3H_6N_2O_3$ = 118.0. Nitronitrosopropane. $Me_2C.(NO)NO_2$. **p. pyridine.** $C_3H_7.C_5H_4N$ = 121.14. *alpha-* A liquid, b.166, *beta-* A liquid b.158. *gamma-* A liquid, b.177. **p. sulfide.** $(C_3H_7)_2S$ = 118.2. Propylthioether, *1-*propylthiopropane*, Pr_2S. A colorless liquid, d.0.814, b.141; insoluble in water, soluble in alcohol or ether. **p. thiocyanate.** (*iso-*) C_3H_7NCS = 101.15. P. mustard oil. A liquid, b.137. **p. thioether.** See *p. sulfide.* **p. urea.** $C_4H_{10}ON_2$ = 102.1. $NH_2.CO.NHPr$. A colorless crystalline powder, m.107; soluble in water.

propylen. The monovalent radical, $CH_3CH:CH$—, derived from propylene. **p. aldehyde.** Acetonic aldehyde.

propylene. C_3H_6 = 42.1. (1) Propene*. The unsaturated hydrocarbon, $MeCH:CH_2$, a homolog of ethylene and isomer of cyclopropene. A colorless gas, $d_{(air=1)}$1.498. b. −37; soluble in water, alcohol or ether. (2) The bivalent radical, —CHMe.CH_2—. Cf. *propylidene.* (3) The monovalent radical $CH_2.CH:CH$—. Cf. *propylen.*

p. aldehyde. Crotonaldehyde. **p. bromide.** $C_3H_6Br_2$ = 201.89. 1.2-Dibrompropane*. A colorless liquid, d.1.931, b.131; slightly soluble in water, soluble in alcohol or ether. **p. chlorohydrin.** C_3H_7ClO = 94.52. (1) Chloro*iso*propyl alcohol, *1-*chloro-*2-*propanol*, Me.CHOH.CH_2Cl. A colorless liquid, d.1.115, b.126. (2) *2-*Chloropropyl alcohol, Me.CHCl.CH_2OH. A colorless liquid, d.1.103, b.134. **p. chloride.** $C_3H_6Cl_2$ = 113.0. 1.2-dichloropropane*. A colorless liquid, d.1.166, b.97, slightly soluble in water, soluble in alcohol or ether; used alone or with carbon dioxide as an insecticidal fumigant for food-stuffs. **p. dichloride.** P. chloride. **p. diamine.** Propane diamine*. **p. ether.** C_6H_6O = 58.06. A liquid, b.35, soluble in water alcohol, or ether. **p. glycol.** Propanediol. **p. oxide.** C_3H_6O = 58.1. Propeneoxide. **1.2-** Epoxypropane*. The heterocyclic compound, Me.CH—CH_2 (with O bridging) A colorless liquid, d.0.859, m.35; soluble in water, alcohol or ether. **1.3-** Trimethyleneoxide. The heterocyclic compound,



p. sulfide. C_3H_6S = 74.10. The heterocyclic compound,  . Trimethylene sulfide.

propylenimine. C_3H_7N = 57.1. Iminopropane, $MeCH_2CH{:}NH$.

propylidene. Propilidene. The divalent radical, $MeCH_2CH{=}$, derived from propane. **p. bromide.** 1.1-Dibromopropane*. **p. chloride.** 1.1-Dichloropropane*.

propyloic- A prefix indicating the radical $—CH_2.CH_2.COOH$ on a side-chain. Cf. *methyloic.*

propynal*. Propiolaldehyde.

propyne*. Allylene. **bromo-*** Propargyl bromide.

propynoic acid*. Propiolic acid.

propynol*. Propargyl alcohol.

propyrin. Pyrenol.

propytal. *5.5*-Propylbarbituric acid.

prorennin. Rennase.

pros- A prefix derived from the Greek, indicating "by," "near" or "at." **p. position.** The 2.3-position of the naphthalene ring.

prosapogenin. $C_{50}H_{80}O_{14}$ (?). A non-sugar hydrolytic product of saponin, decomp. 208, and hydrolysing to endosapogenin and $C_6H_{10}O_7$.

prosopite. A native, hydrated calcium aluminum fluoride.

prospecting. Searching for or exploring new ore deposits.

prostate. A gland at the neck of the bladder in male animals. **p. powder.** The dried and powdered glands of animals.

prosthesis. Replacement or substitution.

prosthetic group. (1) The group formed by a substance that is combined with a simple protein to form a complex protein; as, the chromophoric group in chromoproteins. (2) The group formed by an organic radical not derived from an amino-acid, that enters into the complex molecule of a conjugated protein, q.v.

protactinium. Pa = 230. Proto-actinium. A radioactive disintegration-product between uranium and actinium and an isotope of ekatantalum; atomic number 91. It is the genetic link between the uranium and actinium series, and was discovered in 1918 by Hahn and Meitner. It has a half-life value of 32,000 years.

protagon. $C_{160}H_{303}O_{35}N_5P$. A crystalline substance obtained from red blood corpuscles and brain matter. Cf. *pseudocerebrin.*

protamin. A group of simple proteins occurring in the sex cells of fishes; such as, salmine and sturine. Cf. *protein.*

protamine. $C_{16}H_{32}O_2N_9$ = 382.35. An amine isolated from spermatozoa and fish spawn.

protan. A compound of casein and tannic acid. A brown powder, insoluble in water; used as an intestinal astringent.

protargol. A compound of silver and albumin; a bulky, light brown powder (8.3 % Ag), soluble in water or glycerin; used as a bactericide.

protargyl. Protyle.

proteacin. Leucodrin.

protean. A group of derived proteins, q.v.

protease. A proteolytic enzyme that splits proteins to proteoses and peptones. **gastric-** Pepsin. **pancreatic-** Erepsin. Trypsin. **vegetable-** Bromelin. Papain.

protective colloid. A substance that forms a covering envelope for colloidal particles, and stabilizes them towards the coagulating effects of electrolytes. Cf. *cone.*

proteid. An obsolete term for protein.

proteidin. An immunizing substance developed in the organism from complex proteins and bacteriolytic enzymes, which dissolves bacteria.

protein. One of a group of nitrogenous organic compounds of high molecular weight that ranges between 34,000 and 200,000, (generally multiples of 16–17,000), and which occur in vegetable and animal matter. They yield several aminoacids on hydrolysis and are formed by the activity of plants. They serve as food for animal and man, and are assimilated in the form of aminoacids and reconstructed in the protoplasm. Cf. *polypeptide, isoelectric point, proteinate, protein salt.*

MOLECULAR WEIGHTS OF PROTEINS

	From chemical data	Osmotic pressure	Ultra centrifuge
casein	12,800	33,600	98,000
edestin	29,000	49,500	212,000
hemoglobin	16,660	34,300	67,000
egg albumin	33,800	36,000	34,000
serum albumin	78,000	73,000	75,000

alcohol-soluble- Prolamines. Gliadins. **bacterial-** A toxic protein formed by bacteria. **coagulated-** A simple protein that has been so altered by heat or chemical agents as to become insoluble. **compound-** Conjugated protein. **conjugated-** A group of complex proteins consisting of a protein-molecule and a non-protein molecule. **defensive-** A protein formed in an organism as a protection against bacterial invasion. (See *alexin, immunity.*) **derived-** A decomposition product of proteins that is intermediate in complexity of structure between proteins and aminoacids. **synthetic-** See *polypeptide.*

CLASSIFICATION OF PROTEINS

[A] (Adopted by the American Physiological Society and the American Society of Biological Chemists)

I. SIMPLE PROTEINS.—Substances that yield only α-aminoacids or their derivatives on hydrolysis.

a. albumins—Soluble in water or dilute salt solution, and coagulable by heat.
- ovalbumin..... from egg white
- serum albumin..... from blood serum
- lactalbumin..... from milk
- vegetable albumin.... from plant tissues

b. globulins—Insoluble in water, soluble in salt solutions, and coagulated by heat.
- ovoglobulin..... from eggs
- serum globulin..... from blood serum
- edestin..... from hemp seed
- amandin..... from fruit kernels

c. glutelins—Insoluble in neutral solvents, soluble in dilute acids or bases, and coagulated by heat.
- glutenin..... from wheat

d. prolamines (or gliadins)—Soluble in 80 % alcohol, insoluble in water, absolute alcohol, or neutral solvents.
zein..... from corn
gliadin..... from wheat
hordein..... from rye
bynin..... from malt
e. albuminoids—Insoluble in all neutral solvents.
elastin..... from ligament
collagen..... from tendon
keratin..... from horn and hoofs
f. histones—Soluble in water, or dilute acids, precipitated by or insoluble in ammonia, not coagulated by heat.
globin..... from hemoglobin
scombrone..... from mackerel sperm
thymus histone.... from thymus gland
g. protamines—Soluble in water, uncoagulable by heat. Simplest proteins or polypeptides.
salmine..... from salmon sperm
sturine..... from sturgeon sperm
clupeine..... from herring sperm

II. CONJUGATED PROTEINS.—Substances that consist of protein combined with some other substance (the prosthetic group or molecule).
a. nucleoproteins—Compounds of one or more proteins with a nucleic acid.
cytoglobulins..... from cytoplasm
nucleohistones..... from cell nuclei
b. glycoproteins—Compounds of protein with carbohydrates.
mucins..... from mucus
osseomucoids..... from bones
tendomucoids..... from tendon
ichthulins..... from carp eggs
helicoproteins..... from snails
c. phosphoproteins—Compounds of proteins with a phosphorus compound other than lecithin or nucleic acids.
caseins..... from milk
ovivitellins..... from egg yolk
d. chromoproteins (hemoglobins)—Compounds of proteins with a chromophoric group (Cf. *pigments*)
hemoglobins... from mammalian blood
hemocyanins... from invertebrate blood
chlorophylls... from green plants
e. lecithoproteins—Compounds of proteins with lecithins.
f. lipoproteins—Compounds of proteins with fatty acids.

III. DERIVED PROTEINS—Primary and secondary split-products of proteins.
a. proteans—Insoluble products due to the action of water or enzymes.
myosan..... from myosin
edestan..... from edestin
b. metaproteins—Products resulting from the action of acids or bases.
c. coagulated proteins—Resulting from the action of heat or alcohol on proteins.
d. proteoses—Products resulting from further hydrolysis. They are soluble in water, and not coagulated by heat, and are precipitated by saturating their solutions with ammonium or zinc sulfate.
e. peptones—Soluble in water, non-coagulable by heat, not precipitated by saturating their solutions with ammonium sulfate.
f. peptides—A compound of two or more amino-acids possessing one or more —CO.NH— or peptide groups.

[B] (Adopted by the chemical and physiological societies of England)
I. Simple proteins:
1. protamins (same as American I.g)
2. histones (same as I.f)
3. albumins (same as I.a)
4. globulins (same as I.b)
5. glutelins (same as I.c)
6. alcohol-soluble proteins (same as I.d)
7. scleroproteins (same as I.e)
8. phosphoproteins (same as II.C)
II. Conjugated proteins:
1. glucoproteins (same as II.b)
2. nucleoproteins (same as II.a)
3. chromoproteins (same as II.d)
III. Hydrolysis products:
1. infraproteins (same as III.b)
2. proteoses (same as III.d)
3. peptones (same as III.e)
4. polypeptides (same as III.f)

proteinase. An enzyme that hydrolyses proteins. **acid-** Pepsin. **alkali-** Trypsin.

proteinate. A compound formed from a protein and a base, Prot. COOM; as, sodium caseinate. Cf. *isoelectric point, protein-salt.*

protein-salt. A compound of a protein with an acid, $X.NH_2Prot.$; as, casein hydrochloride. Cf. *proteinate.*

proteoclastic. Proteolytic. Protein-splitting, or hydrolyzing proteins.

proteolysis. The conversion of proteins into soluble peptones by decomposition or hydrolysis of the protein molecule.

proteolytic. Proteoclastic.

proteose. A group of derived proteins, q.v.

protheite. A variety of pyroxene.

protiodide. An iodide which contains the minimum amount of iodine; an *-ous* compound; cf. *biniodide.*

protista. The lowest and most primitive forms of life, which consist of single-cell organisms, part plant, part animal in nature.

protistology. A branch of science that deals with unicellular organisms.

protium. The hydrogen isotope of mass 1.0, as compared with deuterium and tritium.

proto- A prefix derived from the Greek, indicating "first." **p. salt.** An obsolete term for a compound that contains the smallest amount of the negative radicals or atoms of the same positive element; as, HgI, mercurous iodide or mercury protiodide; and HgI_2, mercuric iodide or mercury biniodide.

protoactinium. Protactinium.

protobastite. A variety of enstatite.

protobitumen. A partially-reduced carbohydrate, which on further reduction yields oil; as, algarose (synthetic) and algarite (natural). It is formed by the oxidation of mineral oil.

protocatechol. (1) Catechol. (2) Pyrocatechol.

protocatechualdehyde. $C_7H_6O_3$ = 138.1. 3.4-Dihydroxybenzaldehyde, dihydroxybenzenecarbonal,* protocatechoic aldehyde. $C_6H_3(OH)_2CHO$. Colorless leaflets, m.153, slightly soluble in water, soluble in alcohol or ether. **methyl-** Vanillin. **methylene-** Piperonylic acid.

protocatechuic acid. $C_7H_6O_4$ = 154.03. 3.4-Dihydroxybenzoic acid. $C_6H_3(OH)_2COOH$. Colorless crystals, d.1.542, decomp. 199, soluble in water, alcohol or ether; used as a developer in

photography. It occurs in the oil of shepherd's-purse. **p. alcohol.** Protocatechuyl alcohol. **p. aldehyde.** Protocatechualdehyde.

protocatechuyl alcohol. $C_7H_8O_3$ = 140.06. Protocatechuic alcohol, 3.4-dihydroxybenzylalcohol, $C_6H_3(OH)_2.CH_2OH$. **methylaminomethyl-** Adrenalin.

protochloride. An obsolete term to indicate the compound containing less chlorine than the normal chloride of the same element.

protocotoin. $C_{16}H_{14}O_6$ = 302.2. A principle from paracoto bark. Cf. *cotein.*

protocurarine. An alkaloid derived from curare.

protofluorine. A hypothetical element of atomic weight 2.1, assumed to exist in certain nebulae, and placed between hydrogen and helium in the periodic table. Cf. *coronium, nebulium.*

protohydrogen. A hypothetical element, assumed to exist in certain bright stars and nebulae, and to have an atomic weight of 0.081, *i.e.*, less than that of hydrogen.

protolysis. A reaction in which a proton is transferred from an acid to a base.

proton. Prouton, uron. (1) Originally the positive nucleus, q.v., of an atom (Rutherford, Bohr). (2) The nucleus of the hydrogen atom, *e.g.*, the hydrogen-ion, H^+. (3) A particle of mass one and one positive charge, considered to be a "building stone" of atomic nuclei; thus, a *proton* and *electron* in immediate contact make a *neutron;* if at a distance equal to that of the electron radius, a *photon.*

p. acceptor. A substance which gains a hydrogen ion; as, a base. **p. bombardment.** The transmutation caused by fast-moving protons:

$$C^{12} + H^1 \rightarrow (N^{13})^* \xrightarrow{\gamma} N^{13} \quad \textit{10 min.}$$

$$B^{11} + H^1 \rightarrow (C^{12})^* \xrightarrow{\gamma} C^{12} \quad 10^{-18}\ \textit{sec.}$$

where an excited isotope is formed which yields γ-rays. Cf. *radioelements, radioactivity.* **p. donor.** A substance yielding a hydrogen ion; as an acid. **p. number.** The whole-numbered isotopic weight, which may be assumed to be the number of hydrogen nuclei or protons and neutrons. Cf. *atomic structure.* **p. reaction.** (1) Neutralization. Cf. *prototropy.* (2) Nuclear reactions.

protones. A group of hydrolyzed products of protamines.

protophile. A weak base which unites with a proton. Cf. *acid* (3).

protophilia. Hydrophilia. The tendency of a molecule to unite with hydrogen-ions (protons). See *hydrogenium ions.*

protophyllin. A colorless substance, chlorophyll hydride, that changes to green chlorophyll by the action of carbon dioxide.

protophyta. A single-celled plant; such as, the bacteria, yeasts, and single-celled algae. Cf. *diatoms, protozoon.*

protopine. $C_{20}H_{19}O_5N$ = 353.2. Macleyine, fumarine. An alkaloid obtained from opium, chelidonium, and corydalis species. Colorless crystals, m.207.

protoplasm. Protoplasma bioplasm. A viscid colloidal material, the physical basis of all life, q.v., it consists, in the living condition, of a dynamic system of proteins, fats, and carbohydrates, reacting with each other. It forms a jelly-like material with water as the continuous phase, in which various structural elements can be observed under the microscope: a network (spongioplasm) and in the more fluid portion (hyaloplasm), a nucleus with nucleoplasm, chromatin, and linin (see *cell, micelle, zone*).

P. is assumed to be alive as long as its balance of internal reactions within and between the structural elements is maintained. Any outside matter that tends to react with the atomic group (side chains, as, $—NH_2$ or —COOH of proteins; —CHO or $—CH_2OH$ of carbohydrates, etc.) will disturb the equilibrium of reactions; the p. is now less reactive, and becomes paraplasm and finally, dead matter.

protoplasma. Protoplasm.

protoporphyrin. A constituent of hemoglobin and of the brown pigment of egg-shells. It occurs widely, but in small quantities in nature, and has been synthesized. It contains a nucleus of four pyrrole rings. Cf. *phylloporphyrin.*

protosal. $C_{11}H_{12}O_6$ = 240.1. Glycerin salicylic formic ester, $CH_2—OOC.C_6H_4OH$. A colorless

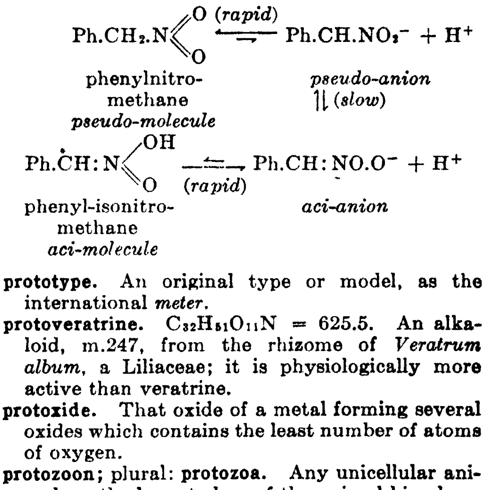
```
CH2—OOC.C6H4OH
|
CH—OOC.H
|
CH2OH
```

oily liquid, d.1.344; insoluble in water, soluble in alcohol or ether. Used medicinally as an antirheumatic.

protosulfate. The sulfate of a series of sulfates that contains the smallest amount of SO_4 radical.

prototropic. Pertaining to reactions which are influenced by H^+ or protons.

prototropy. Pseudoacidity, mobile H-tautomerism, mobile proton tautomerism. A case of ionotropy (q.v.) in which a detached H atom causes a molecule to exist as tautomeric ions. Cf. *anionotropy, e.g.,*



prototype. An original type or model, as the international *meter.*

protoveratrine. $C_{32}H_{51}O_{11}N$ = 625.5. An alkaloid, m.247, from the rhizome of *Veratrum album,* a Liliaceae; it is physiologically more active than veratrine.

protoxide. That oxide of a metal forming several oxides which contains the least number of atoms of oxygen.

protozoon; plural: **protozoa.** Any unicellular animal, or the lowest class of the animal kingdom; as, ameba, infusoria, and paramecia. Cf. *protophyta.*

protractor. An instrument for measuring angles.

protuberance. A projecting part. **solar-** The giant streamers of incandescent gases on the sun's surface. Cf. *coronium, corona.*

protyl. Propargyl. The monovalent radical, $—CH_2.C⋮CH$.

protyle. Archyl, protargyl, pantogen, or urstoff. The hypothetical substance from which all chemical elements are derived. Cf. *hydrogen.*

Proust, Louis Joseph. 1755–1826. A French chemist, noted for the law of definite propor-

tions. **P.'s law.** The law of constant proportions q.v.

proustite. Ag_3AsS_3. Ruby silver. A native silver sulfarsenite; hexagonal ruby-red crystals.

Prout, William. 1785–1850. An English physician, noted for his hypothesis. **P. hypothesis** (1815). All elements are multiples of a protyle or of hydrogen. (See *atomic structure.*) This speculative view of over a century ago has attained importance by a more recent ratification of the theory, based on: (a) natural disintegration, as shown by radioactive elements yielding helium; and (b) artificial disintegration, as by the yields of hydrogen and other products on electron bombardment. Cf. *radioelements.*

prouton. A suggested name for proton.

provitamin. A precursor to a vitamin. *E.g.*, p.A. Carotene. p.D. Sterols. (*e.g.*, ergosterol, epiergosterol, dihydrocholesterol) which are converted into vitamin D (q.v.) by exposure to ultra-violet or cathode rays. Cf. *β-carotene.*

proximate. The ultimate or nearest approach. **p. analysis.** Quantitative analysis (q.v.), rationally interpreted. (Cf. *water* analysis.) **p. principle.** The active principle of a drug; as an alkaloid or glucoside.

prozane. Triazane(2).

prulaurasin. $C_{14}H_{17}NO_6$ = 295.19. A racemic mandelonitrile glucoside, m.122, from cherry laurel, *Prunus leurocerasus.*

prunasin. $C_{14}H_{17}NO_6$ = 295.19. A *d*-mandelonitrile glucoside, m.147, from *Prunus padus.*

prune. Prunus. The partly dried fruit of *Prunus domestica*, a Rosaceae; used as a food, and medicinally, as a mild laxative.

prunetol. Genistein.

prunol. Ursolic acid.

prunus. Prune. **p. amygdalus.** Almond. **p. domestica.** Prune. **p. spinosa.** Blackthorn. **p. virginiana.** Wild cherry.

prussian blue. A group of complex salts formed by oxidation of the white precipitate obtained from a solution of ferrous sulfate and potassium ferrocyanide. Used as dyes in inks and cotton printing, and for paper, but now largely superseded by aniline dyes. **insoluble-** Turnbull's blue. **native-** Vivianite. **α-soluble-** True prussian blue, alpha-potassium ferric ferrocyanide, $4FeK[Fe(CN)_6].7H_2O$. A deep blue powder, giving a blue colloidal solution with water. **β-soluble-** beta-potassium ferric ferrocyanide. $FeK[Fe(CN)_6].H_2O$. **x-soluble-** A more stable variety of the β-form. Cf. *milori blue.*

prussian red. Colcothar.

prussiate. (1) Cyanide. (2) Ferrocyanide. (3) Ferricyanide. **red-** Potassium ferricyanide. **yellow-** Potassium ferrocyanide.

prussic acid. Hydrocyanic acid.

prussine. Cyanogen.

ps. Abbreviation for pseudo.

ψ. (1) The Greek letter "psi." (2) Abbreviation for pseudo.

pseud-, pseudo-, *ps-*, or ψ- A prefix derived from the Greek indicating "false" or "similar to." This prefix was proposed by Baeyer to designate substances derived from a hypothetical parent-substance or a tautomeric form.

pseudacetic acid. Propionic acid.

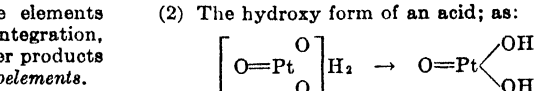
pseudaconine. $C_{27}H_{41}O_8N$ = 523.4. A decomposition product of pseudaconitine.

pseudaconitine. $C_{36}H_{51}O_{12}N$ = 689.4. Acetylveratryl-ψ-aconine, ψ-aconitine. A crystalline alkaloid, m.211, derived from *Aconitum ferox.*

pseudoacid. (1) An organic compound which has acidic properties and forms salts, but which does not contain the carboxyl radical, —COOH. The acid character of ψ-acids is due to a —OH group attached to a nitrogen atom, as in the iso-nitroso compounds:

$$\underset{\text{nitro-}}{R.CH_2NO_2} \rightarrow \underset{\text{isonitroso}}{R.CHN(:O)OH} \rightarrow \underset{\text{isonitroso ion}}{R.CHN(:O)O^-} + H^+.$$

(2) The hydroxy form of an acid; as:



true acid pseudo acid

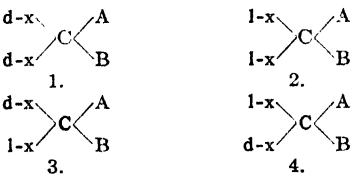
Cf. *prototropy.*

pseudoaconitine. Pseudaconitine.

pseudoallyl. Isopropenyl.

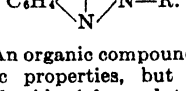
pseudoalum. A group of double sulfates of aluminum and a divalent metal, $MAl_2(SO_4)_4.24H_2O$, in which M may be manganese, ferrous, magnesium, zinc or copper. Cf. true *alum*, $M_2Al_2(SO_4)_4.24H_2O$, where M is a monovalent metal.

pseudoasymmetry. A form of optical isomerism in which a non-asymmetric carbon atom becomes asymmetric owing to the presence of d- and l-asymmetric groups; as,



where (*d*-X) and (*l*-X) represent a similar optically-active dextro- and levo-radical; as, —CH(OH)COOH. In 1 and 2 the central carbon atom is not asymmetric, as the optical rotations of the two radicals are alike; in 3 and 4 the carbon atom is pseudo-asymmetric, for the two radicals have different rotations.

pseudoazimides. Indodiazoles, q.v. A group of organic compounds of the type,



pseudobase. An organic compound that normally has no basic properties, but becomes basic in presence of acids, (cf. *amphoteric*).

pseudobrookite. The vitreous mineral $2Fe_2O_3.3TiO_2$.

pseudobutylene. *ε*-Butene*.

pseudocellulose. Hemicellulose.

pseudocerebrin. $C_{44}H_{92}O_8N$ = 762.9. A compound formed by hydrolysis of protagon by alkali.

pseudocholestene. $C_{27}H_{46}$ = 370.4. The hydrocarbon corresponding with allocholesterol. Cf. *cholane derivatives.*

pseudocodein. $C_{18}H_{21}O_3N$ = 299.2. An alkaloid resembling codein.

pseudoconhydrine. See *conhydrine.*

pseudocumene. C_9H_{12} = 120.14. Cumol, *as*- or 1.2.4-trimethylbenzene, $C_6H_3Me_3$. A colorless liquid, d.0.879, m. −57, b.170; insoluble in water. **hexahydro-** See *hexahydro cumene.*

pseudocumidine. $C_9H_{13}N$ = 135.2. 2.4.5-trimethylaniline, $C_6H_2(NH_2)Me_3$. 1-amino-2.4.5-

trimethylbenzene. Colorless needles, m.66, b.-234; soluble in water.

pseudocumyl. A monovalent radical, $Me_3C_6H_2$—, derived from pseudocumene; as, **a-** or 2, 3, 5-; **s-** or 2, 4, 5-; and **v-** or 2, 3, 6-.

pseudocurarine. A non-poisonous alkaloid found in *Nerium oleander*, an Apocynaceae.

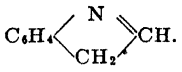
pseudocyanate. A compound having the —ONC radical. Cf. *fulminate.*

pseudocyanic acid. The acid HONC. Cf. *fulmic acid, pseudoisocyanic acid.*

pseudodichroism. Pseudopolychroism.

pseudogalena. Sphalerite.

pseudoindole. C_8H_7N = 117.1. Indolenine, 1-isobenzazole. The heterocyclic compound,

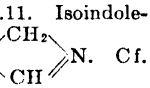


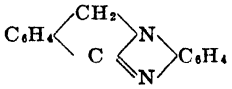
pseudoindoxyl. See *indoxyl.*

pseudoindyl. A group of seven isomeric, monovalent, radicals, C_8H_6N—, derived from pseudoindole.

pseudoisatin. Isatin.

pseudoisocyanic acid. The acid, HOCN. Cf. *pseudocyanic acid.*

pseudoisoindole. C_8H_7N = 117.11. Isoindolenine, 2-isobenzazole.  Cf. *pseudoindole.* **p. benzimidazole.** $C_{14}H_{10}N_2$ = 316.1. Benzylenebenzimidazole. The heterocyclic compound,



pseudoisomerism. Isomerism between two molecules containing the same number and same kind of atoms, but having different linkages between the atoms due to a different valency of one of them; as, cyanide and isocyanide. See *isomerism.*

pseudoisotope. A radioactive element resembling an isotope in its reactions, but having a different atomic number.

pseudomalachite. See *malachite.*

pseudomerism. Dynamic isomerism in which a molecule reacts, under given conditions, according to one structure; and under different conditions according to an isomeric structure.

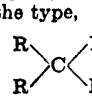
pseudomonotropy. A form of allotropy in which the transition temperature from one allotropic form to the other is below the melting point of the substance.

pseudomorph. A crystal that appears in general outline to belong to one system, but actually consists of an aggregate of minute crystals which belong to another crystal system.

pseudomorphy. A phenomenon exhibited by some crystals of appearing outwardly of one system, but possessing a different structure internally. **chemical-** Pseudomorphism caused by chemical substitution or alteration. **physical-** Pseudomorphism caused by a change in allotropic form.

pseudonarcissine. An alkaloid from the bulbs of *Narcissus pseudonarcissus*, an Amarylladaceae.

pseudonitrol. A group of organic nitro-nitroso compounds of the type,

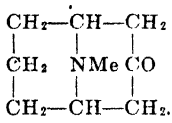


as, propylpseudonitrol or nitro-nitrosopropane, $Me_2C(NO)NO_2$.

pseudonitrosite. A group of organic nitro-nitroso compounds in which the two radicals are attached to different carbon atoms, —C(NO)—C(NO_2)—. Cf. *nitrols.*

pseudonuclein. Nucleoalbumin.

pseudopelletierine. $C_9H_{15}NO.2H_2O$ = 189.16. N-methyl granatanine,



An alkaloid from the root-bark of the pomegranate. Prismatic plates, m.48, b.246, soluble in water or alcohol. Cf. *pelletierine.*

pseudophenanthroline. *4,7*-Naphthisodiazine.

pseudophysostigmine. $C_{15}H_{21}O_2N_2$ = 277.19. An alkaloid from calinuts or false calabar beans. A white crystalline powder; soluble in alcohol or ether.

pseudopolychroism. See *polychromatic.*

pseudoraceme. A crystal of an organic compound composed of equal mixtures of the dextro- and levo-compounds.

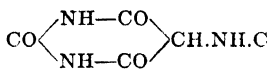
pseudosolution. A colloidal suspension or emulsion.

pseudotannin. A group of tannin split-products that have lost the capacity to convert hide into leather.

pseudotropine. See *tropine.*

pseudourea. CH_4N_2O = 60.1. Isourea. NH_2-C(:NH).OH.

pseudouric acid. $C_5H_6N_4O_4$ = 186.1. *5*-Carbamidobarbituric acid.



pseudoxanthine. (1) An isomer of xanthine, q.v. (2) A leukomaine from muscle tissue resembling xanthine in its properties but not in its composition.

pseudozoogloea. A clump of living bacteria that resembles a primitive animal, protozoon, under the microscope.

psi- The Greek letter ψ, Ψ. A symbol for: (1) pseudo-; (2) specific function, or the electric field in Schrödinger's atom; (3) lbs. per sq. in.

psicaine. $C_{21}H_{27}NO_{10}$ = 453.23. d-ψ-cocaine bitartrate. $(COOH.CHOH)_2NMe.C_7H_{10}(COOMe)O.COPh$. White crystals, soluble in water, used as a local anesthetic.

psilomelane. A hydrated pyrolusite, or native manganic hydroxide, $Mn(OH)_3$.

psoraline. Caffeine.

PSP. Phenolsulfonephthalein.

psychotrine. $C_{28}H_{36}O_4N_2$ = 464.4. An alkaloid in ipecac.

psychrometer. See *hygrometer.* **sling-** A whirling hygrometer (q.v.) in a metal frame with a leather strap.

psychrometric chart. A chart on which the temperature of drying is plotted against the weight of water-vapor removed per unit weight of dry air. It gives the weights of water-vapor required to saturate unit weight of dry air to various extents at various temperatures.

psylla alcohol. Psyllic alcohol. **p. wax.** A solid wax obtained from the leaf louse, *Psylla alni.*

psyllic acid. $C_{32}H_{65}COOH$ = 492.51. Psyllostearylic acid. A fatty acid, m.95, from psylla wax. Cf. *lacceroic acid.* **p. alcohol.** $C_{32}H_{67}OH$ = 480.53. Psyllostearyl alcohol. A solid, m.69.5, from psylla and bees-wax.

psyllostearyl alcohol. Psyllic alcohol.

psyllostearylic acid. Psyllic acid.

pt. Abbreviation for: (1) pint; (2) part.

Pteridophyta. A main division of Cryptogamia, which includes Filices (ferns), Equisetaceae (horsetails) and Lycopodiaceae (club mosses).

pterin. A yellow purine-type pigment from mammalian tissues. Cf. *rhodopterin.*

pterocarpine. An alkaloid from red sandalwood, *Pterocarpus santalidus*, a Leguminosae.

ptomaine. Animal alkaloid, cadaveric or putrefactive alkaloid. A group of amino compounds which result from the decomposition of proteins or dead animal matter by microorganisms. *E.g.*,

Name	*Occurrence*
aminovaleric acid	putrefying fibrin and meat
amylamine	codliver oil, putrid yeast
anthracine	anthrax bacillus
aselline	codliver oil
betaine	mussel, human urine
butylamine	codliver oil
cadaverine	putrefying animal tissues and bacterial cultures
cancerine	pathological urine
caproylamine	putrid yeast
choline	decomposing animal tissues and bacterial cultures
collidine	putrid pancreas
diethylamine	putrefying fish
dihydrolutidine	codliver oil
eczemine	
ethylamine	putrefying yeast, wheat flour
ethylidendiamine	putrefying fish (haddock)
gadinine	putrefying fish (haddock)
hexylamine	putrid yeast
hydrocollidine	putrefying fish and animal tissues
hydrocoridine	agar culture of bacterium album
kreotoxine	meat
methylamine	putrefying fish
methylguanidine	putrefying horse flesh
morrhuic acid	codliver oil
morrhuine	codliver oil
muscarine	decomposing haddock
mydaleine	putrefying human organs
mydatoxine	putrefying human organs
mydine	putrid human tissues
mydilotoxine	poisonous mussel
neuridine	putrefying flesh
neurine	putrefied flesh
parvoline	putrefying mackerel and horse flesh
peptotoxine	decomposing proteins
phlogosine	cultures of staphylococcus
propylamine	cultures of human feces
putrescine	putrefying fish
pyocyanine	cultures of bacillus pyocyanus
saprine	putrefying liver and spleen
sepsine	decaying yeast
spasmotoxine	cultures of tetanus bacillus
susotoxine	cultures of hog-cholera bacillus
tetanine	cultures of tetanus bacillus
tetanotoxine	cultures of tetanus bacillus
triethylamine	putrefying fish
trimethylamine	herring-brine
trimethylenediamine	beef-broth cultures of comma bacillus
typhotoxine	cultures of Eberth's bacillus
tyrotoxicone	poisonous cheese, cream and milk

ptyalase. Ptyalin, salivary amylase, salivin. The enzyme of the saliva, that hydrolyzes starch to dextrin, maltose, and glucose; and sucrose to dextrose and levulose. Cf. *amylase, diastase.* **p. unit.** The quantity of p. that will digest 1 gm. starch under standard conditions; as, 37°C., 30 minutes, pH 6.7, in presence of 0.05 % NaCl.

ptyalin. Ptyalase.

puberonic acid. Puberulonic acid.

puberulic acid. $C_8H_6O_6$ = 198.0. A metabolic product of molds, *e.g.*, *Penicillium puberulum.* Almost colorless crystals, m.317. It is toxic to certain bacteria.

puberulonic acid. $C_8H_4O_6$ = 196.0. A metabolic product of molds, *e.g.*, *Penicillium puberulum.* Bright yellow prisms, m.298. It has some of the properties of a pseudo-acid, and is toxic to certain bacteria.

pucherite. A native bismuth vanadate, $BiVO_4$.

puddle, puddling. (1) The conversion of cast iron into wrought iron by fusion in a reverberatory furnace, with constant stirring to bring it in to contact with the haematite lining of the furnace, where oxidation of the carbon to carbon monoxide takes place, the gas rising through the molten iron. (2) Clay, moistened and well-worked.

puering. Bating. The cleaning of depilated hides in the leather industry.

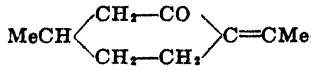
Pukall filter. A hollow cylinder of porous unglazed clay; used to filter solutions or water and render them sterile from microorganisms. Cf. *Berkefeld filter.*

pukateine. $C_{17}H_{17}O_3N$ = 283.3. An aporphine alkaloid found in a New Zealand laurel, *Laurelia Novæ Zealandiæ.* Cf. *laureline, corytuberine.*

pulegium. The Labiatae *Hedeoma pulegoides* (American p.) and *Menthae pulegium* (European p.).

pulegol. $C_{10}H_{18}O$ = 154.2. 3-menthenol. An aromatic alcohol contained in the essential oils of *Mentha pulegium*, a Labiatae.

pulegone. $C_{10}H_{16}O$ = 152.2. 3-$\Delta^{4(8)}$-menthenone. An aromatic ketone in oil of hedeoma.



A colorless liquid, d.0.932, b.221, insoluble in water, miscible with alcohol or ether. It

causes fatty infiltration of liver, heart and kidney.

Pulfrich refractometer. An optical device for measuring the refractive index, especially of oils and fats.

pulmoform. $C_{15}H_{16}O_4$ = 260.0. Methylene diguaiacol, $CH_2(C_6H_3.OMe.OH)_2$. A yellow tasteless powder, insoluble in water. Used medicinally as an antiseptic.

pulmones sicci. The dried and powdered lungs of animals, used medicinally.

pulp. Any soft or semi-liquid mixture of solid particles and liquids; as, the finely-divided wood fibres suspended in water used for making paper. See *paper pulp.*

pulpwood. The raw material for paper manufacture, generally the trunks of spruce, hemlock and balsam fir (cf. *wood pulp*).

pulque. The fermented sap of an *Agave* species, which is a moderately intoxicating drink, popular in Mexico. Cf. *mescal.*

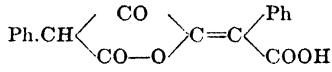
pulsatilla. Pasque flower. The dried herb of *Anemone pulsatilla* and other species, a ranunculaceous plant; used medicinally as the fluid extract, as an alterative and sedative.

pulse. The edible seeds of leguminous plants; as, peas.

pulverization. The reduction of a substance to a powder.

pulverizing. Powdering.

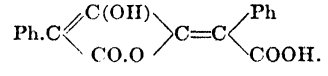
pulvic acid. $C_{18}H_{12}O_5$ = 308.1. The monolactone of diphenylketipic acid:



Colorless crystals, m.214. Cf. *pulvinic acid.*

pulvinate. (1) Convex- or cushion-shaped; as a colony of bacteria. (2) A salt of pulvinic acid.

pulvinic acid. $C_{18}H_{12}O_5$ = 308.1. 2.3-dihydroxy-1.4-diphenylmuconic acid-γ-lactone,

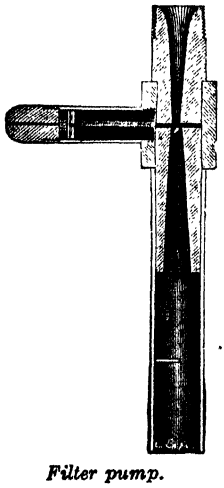


Cf. *pulvic acid.* ***p.p'*-dihydroxy-** Atromentin.

pulvis. The Latin term for powder.

pumice. Pumice stone. A light porous stone of volcanic origin, which consists o the silicates of aluminum, sodium, and potassium; used as an abrasive, and as a base for catalysts.

pump. A machine for drawing or forcing liquids or gases from one container into another. **acid-** See *acid.* **air-** See *air.* **backing-** A low-power pump used to produce a partial vacuum in preparation for a high-power pump. **filter-** A device attached to a water faucet at A, which is used to produce a partial vacuum or suction (through B) during filtration. **Hickmann-** See *vacuum p.* **mercury-** See *Sprengel p.* **suction-** Filter p. **Töpler-** A mercury pump, which removes air by entrainment between drops of mercury falling in a tube. **vacuum-** See *vacuum.*



Filter pump.

pumpkin seed. Pepo. The dried ripe seeds of several varieties of *Cucurbita pepo.* Used medicinally as the fluid extract as an anthelmintic; it contains a resin.

punctiform. A minute bacterial colony, near the limit of natural vision.

pungent. Sharp or biting, as a pungent odor or pungent taste.

punicic acid. $C_{18}H_{32}O_2$ = 280.27. An isomer of eleostearic acid, m.43.5, from the seed oil of *Punica granatium* (pomegranate) a Punicaceae.

punicine. (1) Pelletierine. (2) A purple coloring matter obtained by oxidation of the colorless juices of shell-fish.

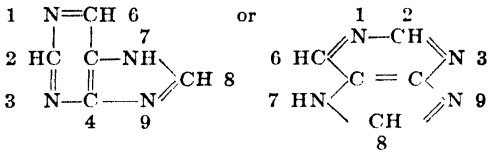
pure. Free from contamination; as, **bacteriologically-** Contains no live bacteria. **chemically-** Containing no other substance. Cf. *chemicals.*

purgatin. Purgatol.

purgative. An agent that causes the evacuation of the bowels; as, magnesium sulfate, castor oil.

purgatol. $C_{18}H_{12}O_7$ = 340.1. Purgatin, anthrapurpurin diacetate, $C_{14}H_5O_2(OH)(C_2H_3O_2)_2$. An orange, crystalline powder, m.177; insoluble in water, soluble in dilute alkalis. Used medicinally as a purgative.

purine. $C_5H_4N_4$ = 120.1. The heterocyclic compound



Colorless monoclinic needles, m.212, soluble in water, alcohol, ether or toluene. **endogenous-** q.v. **exogenous-** q.v. **p. alkaloids.** Purine bases. **p. bases.** The alkaloids derived from purine; as theobromine, theophylline, caffeine, adenine. **p. bodies.** A compound that contains the purine-ring; a compound derived from purine by the substitution of its hydrogen atoms; as,

6-oxypurine	hypoxanthine or sarcine
2,6-dioxypurine	xanthine
6-aminopurine	adenine
2-amino-6-oxypurine	guanine
2,6,8-trioxypurine	uric acid
3.7-dimethyl xanthine	theobromine.

Many of these purine bodies are found as hydrolytic products of nucleoproteins, and they occur in animal waste-products. **p. dione.** Xanthine. **p. ring.** The heterocyclic arrangement of the atoms in the molecule of purine, q.v. **p. skeleton** The p. ring **p. trione.** Uric acid.

purinometer. A device for estimating the purine bodies in urine; a small buret with a glass stop-cock having a closed bore which forms a small compartment.

purinone. Hypoxanthine.

Purkinje, Johannes Evangelista. 1787–1850. A Hungarian physiologist noted for his studies or color. **P. effect.** Optical sensation in-

creases with increasing intensity of light more rapidly for the red than for the other spectral colors. **P. shift.** The shift in the maximum of the luminosity curve of the spectrum visible to the light-adapted human eye, as compared with the dark-adapted eye.

purone. $C_5H_8O_2N_4$ = 156.1. 2.8-Dioxy-1.4.5.6-tetrahydropurine. A reduction-product of uric acid produced by electrolysis.

purple. (1) A mixed color comprising red and blue rays, with an excess of red. (2) A red coloring matter of the purple snail. **visual-** The photosensitive material of the retinal rods of the eye. It sensitises the eye to dim light, and contains vitamin A. Cf. *rhodopsin*. **p. carmine.** Murexide. **p. of cassius.** A red colored substance obtained by adding alkali to a mixture of solutions of stannous, stannic and gold chlorides; a colloidal form of tin oxide with adsorbed gold. Used in the manufacture of ruby glass and red enamels for porcelains. **p. copper.** Bornite.

purpureo. Describing a group of metal ammines of tetra-, tri-, or bivalent metals with NH_3-molecules and negative radicals; as, (a) $[Co(NH_3)_5X]X_2$; (b) $[Co(NH_3)_4X_2]X$; X is a halogen or other negative radical, as NO_3. Group, (a), is termed chloro-pentammine; (b), chloro-tetrammine; as, $[Co(NH_3)_5Cl]Cl_2$—chloropentammine cobaltichloride (purpureo cobaltichloride), or $[Co(NH_3)_4Cl_2]Cl$—chlorotetrammine cobaltichloride. There are also double salts; as, $[Co_2(NH_3)_{10}Cl_2](NO_3)_4$—chloropentammine cobaltinitrate.

pupuric acid. $C_5H_4N_5O_6$ = 266.2. An oxidation-product of uric acid, related to alloxantin. Cf. *murexide*.

purpurin. $C_{14}H_8O_5$ = 256.1. Trihydrooxyanthraquinone, oxyalizarin 6, 1.2.4-trihydroxy-5.10-dioxyanthracene. A red coloring matter, obtained from the glucoside of madder or synthetically. Red needles, m.256, decomp. by further heat, soluble in water, alcohol or ether. **anthra-** See *anthrapurpurin*. **flavo-** See *flavopurpurin*.

purpuroxanthene. Xanthopurpurin.

purpuroxanthic acid. $C_{15}H_8O_6$. A substance in madder.

purree. *Indian* yellow.

purreic acid. (1) $C_{19}H_{16}O_{10}.3H_2O$ = 458.2. A monobasic acid from Indian yellow. Small, light yellow crystals of first sweet, later bitter, taste; slightly soluble in water, soluble in alcohol or ether. (2) Euxanthic acid.

purrenone. Euxanthone.

purrone. Euxanthone.

pus. A liquid product of inflammation of infected wounds, which consists of leukocytes with microorganisms and serum. **blue-** A blue pus produced by the *Bacillus pyocyaneus*. Cf. *cyopin, pyocyanin*.

pustulant. An agent that produces pustules or small inflammations of the skin; as, croton oil. Cf. *vesicant*.

putrefaction. The progressive chemical decomposition of organic matter, especially proteins, produced generally by anaerobic bacteria. See *decay*.

putrefactive alkaloids. Ptomaines.

putrescence. Partial or complete rottenness or putrefaction.

putrescent. Having an offensive and stupefying odor; as, a material that is undergoing putrefaction.

putrescine. $C_4H_{12}N_2$ = 88.1. Tetramethylenediamine, butylenediamine, 1.4-butanediamine*, $NH_2CH_2.CH_2.CH_2.CH_2NH_2$. A ptomaine which results from the decay of animal tissues and the action of certain bacteria; a colorless, ill-smelling liquid.

putrid. Rotten or putrefactive.

putrine. $C_{10}H_{21}N_3O_3$ = 234.2. A base in putrid pancreas.

putty. A mixture of 11 parts chalk and 3 parts of raw linseed oil with or without 5 parts of basic lead carbonate; used for setting glass and filling holes and cracks. **iron-** See *iron*. **p. powder.** A powder made by heating tin in air, removing the dross, and igniting the product of the action of nitric acid on the residue; used as a polishing powder, and in white enamel and opal glass.

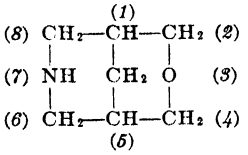
puzzolane. A silicate-rich but lime-poor cement which occurs native in Puzzuoli (Italy). It was used by the Romans. Cf. *pozzolana*.

P.V.A. Abbreviation for polyvinyl alcohol plastics.

Py. An abbreviation for the pyridine ring.

pycnometer. Pyknometer.

pydine. $C_7H_{13}NO$ = 127.1. A bicyclic compound consisting of a combined piperidine and pyrane ring:



pyelography. A branch of radiography in which certain organs (as, kidney) are made opaque to x-rays by previous administration of a suitable compound; as, iopax.

pyknometer. A small graduated glass vessel of definite volume with a glass stopcock, with or without a thermometer, used to weigh a definite volume of liquid in order to determine its specific gravity: W/V = D, where W = weight, V = volume and D = density or specific gravity.


Pyknometer.

pyo- A prefix derived from the Greek, indicating "pus."

pyoctanin. Pyoktanin.

pyocyanase. An antibiotic substance produced by *Pseudomonas aeruginosa*, a non-spore-forming bacterium.

pyocyanin. A blue, antibiotic pigment from *Pseudomonas aeruginosa*.

pyogenic. A microorganism that produces, pus especially in wounds.

pyogenin. A substance derived from pus cells, to which the formula $C_{16}H_{128}O_{19}N_2$ has been ascribed.

pyoktanin. Dahlia violet. Methyl violet or methyl-aniline violet used as an antiseptic. **p. blue.** Methyl violet. **p. yellow.** Auramine.

pyoluene. $C_5H_9O_2SN$ = 133.2. Oxymethylallyl-sulfocarbamide; used medicinally as a bactericide.

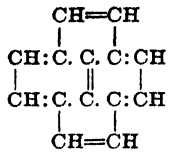
pyosin. $C_{57}H_{116}O_{15}N_2$ (?). A protein derived from pus cells, m.238.

pyoxanthin. A brown pigment derived from pyocyanin.

pyoxanthose. A yellow pigment derived from pyocyanin by oxidation.

pyr- See *pyro-*.

pyracene. $C_{14}H_8$ = 176.1. The hydrocarbon

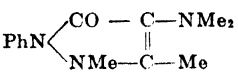


pyracetic acid. Pyroligneous acid.

pyraconitine. $C_{32}H_{41}NO_9$ = 583.32. An alkaloid, m.171, from aconite.

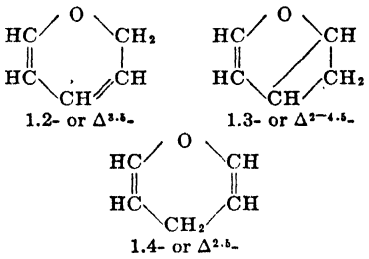
pyramid. A polyhedron whose base is a polygon and whose faces are triangles, with a common vertex, and the sides of the polygon as bases. Cf. *crystal systems.*

pyramidon. $C_{13}H_{17}ON_3$ = 217.2. Dimethylaminoantipyrine, 1-phenyl-2.3-dimethyl-4-dimethylamino-5-pyrazolone, amidopyrine.



Small colorless crystals, m.108, sparingly soluble in water, soluble in alcohol, ether, or benzene; used medicinally as an antipyretic. It exists in the α- and β-forms, which have different solubilities.

pyran. C_5H_6O = 82.1. A group of heterocyclic compounds,



1.2- or $\Delta^{3,5}$- 1.3- or $\Delta^{2,4,5}$-

1.4- or $\Delta^{2,5}$-

benzo- See *benzopyran.* **dibenzo-** See *dibenzopyran.* **diketo-** Glutaconic anhydride. **keto-** Pyrone. **naphtho-** See *naphthopyrane.*

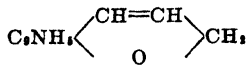
p. dione. Glutaconic anhydride.

pyranil black. A black sulphur dye.

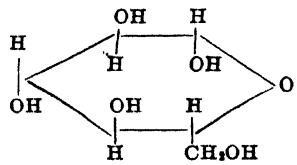
pyranol. (1) Sodium acetyl salicylate. (2) Chlorinated diphenyl.

pyranone. Pyrone.

pyranoquinoline. $C_{12}H_9ON$ = 182.1. The heterocyclic compound

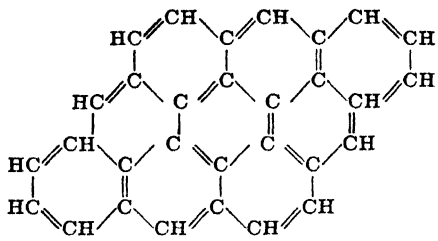


pyranose. The cyclic form of glucose; *e.g.*,



pyranoside. A glucoside having a pyran ring; as, adenosine. Cf. *furanoside.*

pyranthrene. $C_{30}H_{16}$ = 376.2. The hydrocarbon:



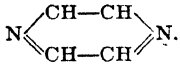
pyranthrone. $C_{30}H_{14}O_2$ = 706.1. Dibenzoanthrone, dioxypyranthrene. White solid.

pyrantin. $C_{12}H_{13}O_3N$ = 219.2. p-ethoxyphenylsuccinimide, phenosuccin, $EtO.C_6H_4.N(COCH_2)_2$. Colorless needles, m.155, slightly soluble in water, insoluble in ether; used as an antipyretic.

pyranyl. A group of monovalent radicals, C_5H_5O—, derived from pyran.

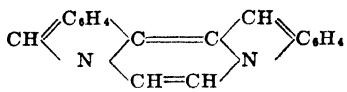
pyrargyrite. $3Ag_2S.Sb_2S_3$. Acrosite, aerosite. A dark red silver ore.

pyrazine. $C_4H_4N_2$ = 80.1. Paradiazine, piazine, 1.4-diazine, q.v.,

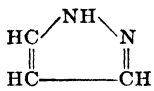


An isomer of pyrimidine and pyridazine. Colorless crystals, m.47, b.118, soluble in water, alcohol or ether. Cf. *phenazine, benzophenazine, antipyrine.* **dimethyl-** Ketine. **hexahydro-** Piperazine. **tetraphenyl-** Amaron.

pyrazinodiisoindole. $C_{18}H_{12}N_2$ = 256.1. The pentacyclic compound,

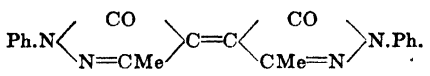


pyrazole. $C_3H_4N_2$ = 68.1. α-pyrromonazole-1.2.diazole

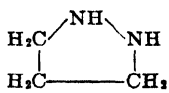


Colorless needles, m.70, b.187, soluble in water, alcohol or ether. **dihydro-** Pyrazoline. **iso-** *1.2*-Isodiazole. **tetrahydro-** Pyrazolidine.

p. blue.

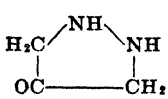


pyrazolidine. $C_3H_8N_2$ = 72.1. Tetrahydropyrazole,

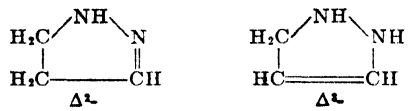


A diazine which does not occur in the free state. **keto-** Pyrazolidine. **phenyl-** N-phenylpyrazolidine. A colorless liquid, b.160.

pyrazolidone. $C_3H_6ON_2$ = 86.1. Ketopyrazolidine. The heterocyclic compound



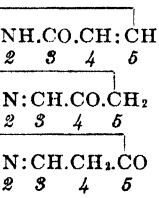
pyrazoline. (1) $C_3H_6N_2$ = 70.1. Dihydropyrazole.



A colorless liquid, b.144, soluble in water or alcohol. (2) Antipyrine. **keto-** Pyrazolone.

pyrazolinium. A pyrazoline with pentavalent nitrogen. Cf. *piperidinium.*

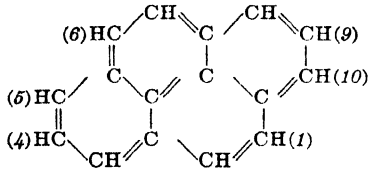
pyrazolone. $C_3H_6ON_2$ = 84.13. Ketopyrazolines. The heterocyclic compounds:



A solid, m.165 (sublimes), soluble in water alcohol or ether. **iodomethylphenyl-** Midrol. **3-methyl-** Butyrolactazam. **phenyldimethyl-** Antipyrine. **phenyldimethyl-5-salicylate.** Salipyrine. **phenyldimethyl-4-amidomethane sulfonate.** Melubrin. **phenyldimethylamino-** Pyramidone.

pyrazolyl. The monovalent radical, $C_3H_3N_2$—, derived from pyrazole. There are four isomers.

pyrene. (1) $C_{16}H_{10}$ = 202.2. Benzo[def]-phenanthrene. A tetracyclic hydrocarbon from coal tar,



Colorless monoclinic crystals, m.148, b. exceeds 360; insoluble in water, slightly soluble in alcohol, soluble in ether. (2) Trade name for carbon tetrachloride used as a fire extinguisher. Cf. *pyrex.*

pyreneite. A grayish-black andralite (iron garnet, q.v.).

pyrenol. Pyrenum, propyrin, sodium thymol benzoate. A mixture of thymol and sodium benzoate and salicylate. A white crystalline powder, soluble in water or alcohol; used medicinally as an expectorant, antispasmodic, antipyretic and antineuralgic.

pyrenum. Pyrenol.

pyrethrin. The active principle of pyrethrum.

pyrethrol. $C_{21}H_{34}O$ = 302.3. Pyretol. An alcohol from the leaves of *Chrysanthemum cinerariaefolium* (insect powder). Silky white lustrous needles, m.222; insoluble in water, slightly soluble in alcohol, soluble in ether.

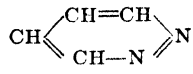
pyrethrone. A ketone from pyrethrum, that forms pyrethrol.

pyrethrum. (1) Insect powder. (2) Pellitory root. The dried root of *Anacyclus pyrethrum*, a Compositae, used as local irritant. **p. camphor.** $C_{10}H_{16}O$ = 152.1. A terpene from the essential oil of *Chrysanthemum parthenium*, a Compositeae.

pyretol. Pyrethrol.

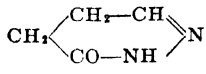
pyrex. (1) A heat-resistant glass used for chemical utensils and household dishes. (2) A trade name for carbon tetrachloride, used as a fire extinguisher. Cf. *pyrene.*

pyridazine. $C_4H_4N_2$ = 80.047. 1.2- or *o*-diazine, q.v.,



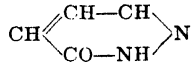
A colorless liquid, d.1.111, m.−8, b.206; soluble in water, alcohol or ether.

pyridazinone. $C_4H_6ON_2$ = 98.1. A dihydroketopyridazine,

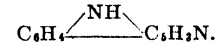


A colorless liquid, b.170; soluble in alcohol.

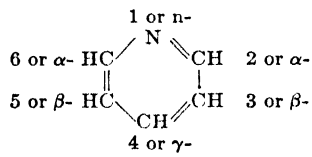
pyridazone. $C_4H_4ON_2$ = 96.1. 3-ketopyridazine.



pyridindole. $C_{11}H_8N_2$ = 168.1. A group of heterocyclic compounds:



pyridine. C_5H_5N = 79.1. The heterocyclic compound,



It occurs in coal tar, bone oil and many vegetable distillation products, including tobacco smoke. A colorless liquid, $d._{15}^{0}$0.9893, m.−42, b.115; soluble in water, alcohol or ether. Used medicinally as an antiseptic, as a denaturant for alcohol, as a solvent for rubber and paint, and chemically, as a reagent for acetone and blood. **allyl-** See *allylpyridine.* **benzyl-** See *benzylpyridine.* **dihydroketo-** Pyridone. **dimethyl-** Lutidine. **ethyldimethyl-** Parvoline. **ethylmethyl-** (1) Aldehydine. (2) Collidine. **hexahydro-** Piperidine. **hydroxy-** See *oxynicotinic acid.* **methyl-** Picoline. **methylethyl-** Aldehydine. **oxy-** Pyridone. **propyl-** Conyrine. **tetramethyl-** Parvoline. **trimethyl-** Collidine.

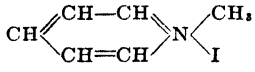
p. bases. The homologs of pyridine, $C_nH_{2n-5}N$:

C_6H_7N	methyl-p.....	picolines
C_7H_9N	dimethyl p.....	β-lutidines
	ethyl p.....	α-lutidines
$C_8H_{11}N$	trimethyl p.....	γ-collidines
	ethylmethyl p.....	α, β-collidines, aldehydine
	propyl p.....	conyrine
$C_9H_{13}N$	tetramethyl p.....	parvulines
	ethyldimethyl p.....	parvolines
$C_{10}H_{15}N$	diethyldimethyl p.....	ethylcollidine, coridine
$C_{11}H_{17}N$.....		rubidine
$C_{12}H_{19}N$.....		viridine

p. carboxylic acid. 1- or **alpha-** Picolinic acid. **2-** or **beta-** Nicotinic acid. **3-** or **gamma-** Isonicotinic acid. **p. dicarboxylic acid. 1.2-** Quinolinic acid. **1.3-** Lutidinic

acid. **1.4-** Isocinchomeronic acid. **1.5-** Dipicolinic acid. **2.3-** Cinchomeronic acid. **2.4-** Dinicotinic acid. **p. pentacarboxylic acid.** $C_{10}H_5O_{10}N$ = 299.10. $C_5N(COOH)_5$, +2- or $3H_2O$. A soluble acid, decomp. 220. **p. sulfonic acid.** $C_5H_4NSO_3H$ = 159.1. Colorless needles, soluble in water, alcohol or ether; used in organic synthesis. **p. thiocyanate reaction.** The production of a precipitate by certain metals (*e.g.*, Zn, Ni, Co) in the presence of pyridine and ammonium thiocyanate; used in gravimetric and microanalysis. **p. tricarboxylic acid.** $C_5H_2N(COOH)_3.2H_2O$ = 247.12. **1.2.3.4-** Carbo*cinchomeronic acid.* **1.-3.4.5-** Berberonic acid. **1.2.4.5-** m.235. **1.2.4.6-** m.227 (decomp.). **1.2.3.5-** m.323. **1.2.3.6-** m.71, b.130.

pyridinium. A series of compounds derived from pyridine, in which the heterocyclic nitrogen atom is pentavalent; *e.g.*,



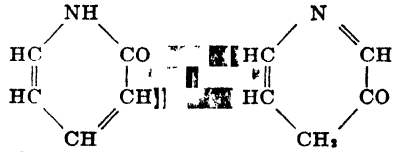
Cf. *piperidinium.*

pyridium. Phenyl-azo-diamino pyridine. A urinary antiseptic.

pyridol. Hydroxypyridine. The hydroxy-form of pyridone,

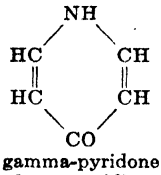
$$HO.C_5H_4N \rightarrow O:C_5H_5N.$$

pyridone. C_5H_5ON = 95.1. Ketopyridine, oxypyridine, pyridol; a group of heterocyclic ketones or quinones:



alpha-pyridone
1-oxy-pyridine
m.106
b.281

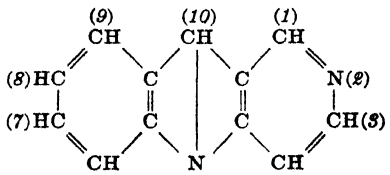
beta-pyridone
2-oxy-pyridine
m.124



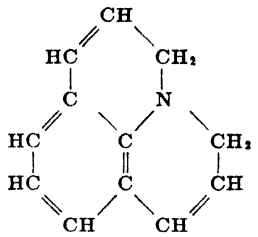
gamma-pyridone
3-oxy-pyridine
m.148

pyridopyridine. $C_8H_6N_2$ = 130.06. 1.5-Naphthyridine, 1.5-benzodiazine, q.v. An isomer of cinnoline, quinazoline and quinoxaline.

pyridoquinoline. $C_{12}H_8N_2$ = 180.1; and $C_{12}H_{11}N$ = 169.1. A group of heterocyclic compounds containing one or two nitrogen atoms and consisting of a quinoline and pyridine ring fused together, as



2.5-pyridoquinoline ($C_{12}H_8N_2$)

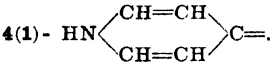


4.3.5-pyridoquinoline ($C_{12}H_{11}N$)

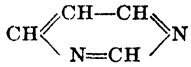
pyridoxine. Adermin, vitamin B_6. 2-Methyl-3-hydroxy-4,5-di(hydroxymethyl) pyridine. Its need in human nutrition has not been established. **p. hydrochloride.** The commercially-available form of pyridoxine.

pyridyl. The monovalent radical, C_5H_4N—, derived from pyridine. It is **c-pyridyl, if** substitution has taken place on the carbon atom of the ring; or **n-pyridyl, if** substitution has taken place on the nitrogen atom of the ring. **ter-** q.v. **p. amine.** Aminopyridine.

pyridylidene. The bivalent radical C_5H_5N=, derived from pyridine; as,



pyrimidine. $C_4H_4N_2$ = 80.047. 1.3- or *m*-diazine, q.v., metadiazine, miazine,

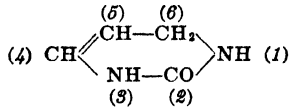


An isomer of pyrazine and pyridazine. Colorless crystals of pungent odor, m.22, b.124; soluble in water, alcohol, or ether. **dihydroketo-** Pyrimidone. **2.6-dioxy-** Uracil. **methyldioxy-** Thymine. **2-oxy-6-amino-** Cytosine. **2.4.6-trioxy-** See *barbituric acid.*

p. bases. Compounds in nucleo proteins: dioxy-, uracil; methyldioxy-, thymine; oxyamino-, cytosine; tetraoxy-, alloxan; trioxy-, barbituric acid.

p. dione. Uracil. **p. tetrone.** Alloxan. **p. trione.** Barbituric acid.

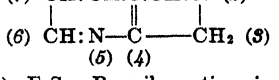
pyrimidone. $C_4H_6N_2O$ = 98.06. Dihydroketopyrimidine.



4-amino- Cytosine.

pyrimidyl. The monovalent radical, $C_4H_3N_2$—, derived from pyrimidine.

pyrindol. $C_7H_6N_2$ = 118.1. *2.4*-Pyrrolopyridine. The heterocyclic compound:



pyrite. (1) FeS_2. Brassil, native iron sulfide. Yellow, shining crystals, commonly known as fool's gold. (2) Native iron sulfide.

pyrites. A generic name for a group of sulfide minerals; as, iron pyrites FeS_2, copper-pyrite or chalcopyrite, tin-pyrite or stannite. **arsenical-** Mispickel. **arseno-** Arsenopyrite. **auriferous-** A p. containing gold. **capillary-**

Millerite. **cobalt-** Smaltite. **copper-** The yellow ore, $CuFeS_2$. **coxcomb-** Marcasite. **iron-** Pyrite. **magnetic-** Pyrrhotite. **nickel-** Millerite. **radiated-** Marcasite. **spear-** Marcasite. **tin-** Stannite. **white iron-** Marcasite.

pyro- (1) Pyr- A prefix derived from the Greek, which indicates a connection with heat or fire; as pyroligneous acid, pyrometer. (2) Pyroxylin.

pyroacetic acid. Crude acetic acid made from wood distillation products. **p. spirit.** Acetone.

pyroacid. An acid produced by the loss of 1 mol. of H_2O from 2 mol. of an orthoacid (q.v.), *e.g.*, by heat. Cf. *pyroarsenic, pyrophosphoric acids.*

pyroantimonate. Any salt derived from pyroantimonic acid; as, $K_2H_2Sb_2O_7$, acid potassium pyroantimonate.

pyroantimonic acid. The hypothetical acid, $H_4Sb_2O_7$. Its sodium salt is insoluble.

pyroarsenate. A salt of pyroarsenic acid.

pyroarsenic acid. $H_4As_2O_7$ = 266.1. Diarsenous acid, $As_2O_3(OH)_4$. A tetrabasic acid obtained by heating arsenic acid to 180°C.

pyrobitumen. A constituent of shale oil; converted into bitumen by heat.

pyroborate. A salt derived from pyroboric acid as, borax, $Na_2B_4O_7$.

pyroboric acid. The dibasic acid, $H_2B_4O_7$.

pyrocatechin. Pyrocatechol.

pyrocatechoic acid. *2.3*-Dihydroxybenzoic acid.

pyrocatechol. (1) $C_6H_6O_2$ = 110.08. Catechol, pyrocatechin, *o*-dihydroxy-benzene, 2-hydroxyphenol, *1.2*-benzenediol*. Colorless leaflets, d.1.344, m.105, b.245, soluble in water, alcohol, or ether. Used as an antiseptic and antipyretic, as a developer in photography, and as a weak reducing agent. Cf. *resorcinol, hydroquinol.* (2) Protocatechols. A group of diatomic phenols derived from catechol; as, homopyrocatechol, $C_6H_3Me(OH)_2$.

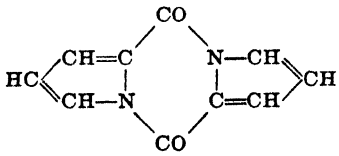
pyrocatechu aldehyde. $C_7H_6O_3$ = 138.05. **o-.** *2.3*-Dihydroxybenzaldehyde, $(HO)_2C_6H_3.CHO$. White crystals, m.108, b.235, used in organic synthesis.

pyrochlore. The blue, vitreous mineral, $(CaFe, Ce)O,(Nb,Ti,Th)O_2,H_2O$.

pyrochroite. An amorphous native manganous hydroxide, $Mn(OH)_2$.

pyrochromate. Dichromate.

pyrocoll. $C_{10}H_8O_2N_2$ = 186.2. An anhydride of pyrrole carboxylic acid.



Yellow leaflets, m.269; insoluble in water, soluble in alcohol or ether.

pyrocomane. 1.4-Pyrone.

pyrocondensation. A union of molecules brought about by heat; as, the formation of biuret from urea.

pyrodextrin. A brown tasteless decomposition-product of starch, obtained by heat.

pyrodin. $C_8H_{10}ON_2$ = 150.2. Hydracetin, phenacethydrazine, acetylphenylhydrazine, $PhNH.NH.OCMe$. A colorless crystalline powder m.130, soluble in alcohol, slightly soluble in ether or water; used medicinally as an antipyretic, and analgesic.

pyroelectricity. Thermal deformation. A thermoelectric phenomenon, shown by crystals which become electrically charged if heated.

pyrogallate. Any salt or ether of pyrogallol.

pyrogallic acid. Pyrogallol.

pyrogallol. $C_6H_6O_3$ = 126.1. Pyrogallic acid, 1.2.3-trihydroxybenzene, *1.2.3*-benzenetriol.* A light, white odorless, powder, needles or leaflets $d._{40}°1.463$, m.133, decomp. 293; very soluble in water, alcohol, or ether. Used as a reagent, chiefly to absorb oxygen, as a weak reducing agent, as a photographic developer; and medicinally, as an antiparasitic. **acetyl-** Gallacetophenone. **methylmethoxy-** Iridol. **propyl-*p*-dimethyl-** Picamar. **trimethoxy-** $C_6H_3(OMe)_3$ = 168.1. Pyrogallol trimethyl ether. A colorless crystalline powder, m.47, b.235; soluble in alcohol or ether.

p. carboxylic acid. *2.3.4*-Trihydroxybenzoic acid. **p. monoacetate.** $C_9H_8O_4$ = 168.1. Eugallol, $CH_3COO.C_6H_3(OH)_2$. A thick, dark-yellow, syrupy liquid, readily soluble in water; used medicinally for skin diseases. **p. phthalein.** Gallein. **p. salicylate.** Saligallol. **p. triacetate.** $C_{12}H_{12}O_6$ = 252.1. Lenigallol, $(CH_3COO)_3C_6H_3$. A white, insoluble powder, used as an antiseptic.

pyrogen. Any foreign substance in a medicinal injected into the blood stream which produces fever.

pyrogen dyes. Sulfur dyes.

pyrogenic. A reaction that occurs only at a high temperature; a reaction induced by heat.

pyrographitic oxide. $C_{22}H_2O_4$ = 330.02. A fine black powder produced by heating graphitic acid.

pyrokomane. 1.4-Pyrone.

pyroligneous. Pertaining to the distillation of wood. **p. acid.** Wood vinegar. Pyracetic acid. Impure acetic acid obtained by the destructive distillation of pine tar and wood. **p. alcohol.** Methanol. **p. spirit.** Methanol.

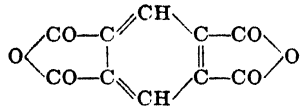
pyrolusite. MnO_2. Polianite. A native manganese dioxide, Cf. *psilomelane.*

pyrolysis. The decomposition of organic substances by heat.

pyrolythic acid. Cyanuric acid.

pyromagnetic. Pertaining to heat and magnetism.

pyromellitic acid. $C_{10}H_6O_8.H_2O$ = 272.12. Benzene-1.2.4.5-tetracarboxylic acid.* $C_6H_2(COOH)_4$. Colorless triclinic tablets, m.275, soluble in water or alcohol. Cf. *mellophanic, prehnitic acids.* **p. anhydride.** $C_{10}H_2O_6$ = 218.0. The heterocyclic compound,



pyrometallurgy. That branch of metallurgy requiring heat treatment.

pyrometer. An instrument for measuring high temperatures (generally above 500°C.) by mechanical, electrical or optical means. Cf. *thermometer, thermocouple.* Methods:

(a) *mechanical* thermocouples—which record temperature through a system of levers that magnify the stress or distortion of two joined metal strips.

(b) *electrical* thermocouples—which indicate the temperature by measuring the current produced in a metal-metal junction, with a sensitive millivolt-meter.

(c) *resistance* thermometers—which record temperature by measuring the change in resistance of a conductor exposed to the heat.

(d) *optical* pyrometers—which measure the quality and intensity of the light emitted from a hot body or glowing material by comparison with some standard source of light.

(e) *radiation* pyrometers—which measure the heat radiated by a hot body, usually by a thermocouple.

pyrometric. Pertaining to high temperature. **p. cone.** Seger cone. **p. gage.** See *gage*.

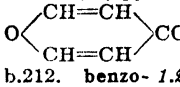
pyrometry. A branch of physics dealing with the measurement of high temperatures.

pyromorphite. $3Pb_3(PO_4)_2.PbCl_2$. Green lead ore, a native chlorophosphate of lead, of the apatite group.

pyromucic acid. $C_4H_3O.COOH$ = 112.1. Furan-2-carboxylic acid, furoic acid. Colorless monoclinic crystals, m.132, slightly soluble in water, soluble in alcohol or ether; used in the manufacture of *furoates*. β- Fucusoic acid.

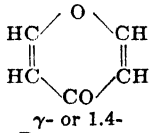
pyromucyl. 2-Furoyl. The monovalent radical, O.CH:CH.CH:C.CO—, derived from pyromucic acid. Cf. *furoyl*. **bi-** Furil. **p. chloride.** $C_4H_3O.COCl$ = 130.48. Furoyl chloride, 2-furan carbonyl chloride. A colorless liquid, m.0, b.60.

pyrone. $C_5H_4O_2$ = 96.1. Pyrocomane, pyrokomane, γ-pyrone. An isomer of coumalin,

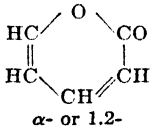


Colorless crystals, m.32, b.212. **benzo-** *1.2-* Coumarin. *1.4-* Chroman. **dibenzo-** Xanthone. **hydroxy-** Kojic acid. **p. α- carboxylic acid** $C_5H_3O_2.COOH$ = 140.06. Komanic acid. A soluble solid, derived from chelidonic acid, decomp. 250. **p. dicarboxylic acid.** Chelidonic acid.

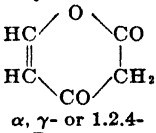
pyrones. A series of heterocyclic compounds derived from alpha- or gamma-pyrone, which occur in numerous natural coloring materials, and in synthetic dyes and drugs. They are derived from:



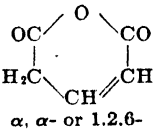
γ- or 1.4- Pyrocomane



α- or 1.2- Coumalin



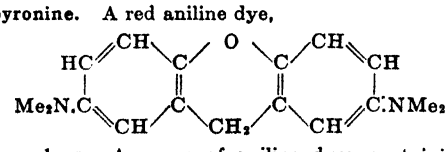
α, γ- or 1.2.4- Pyronone



α, α- or 1.2.6- Glutaconic anhydride.

benzo- Chromones. **dibenzo-** Xanthones.

pyronine. A red aniline dye,



p. dyes. A group of aniline dyes containing the chromophore, =R  R=.

pyronone. $C_5H_4O_2$ = 112.0. α,γ-pyrone. An isomer of glutaconic anhydride; see *pyrones*. **methylaceto-** Dehydracetic acid.

pyrope. An aluminum garnet, q.v.

pyrophore. A carrier of fire; as, pyrophoric.

pyrophoric. Producing sparks when filed or rubbed, or burning spontaneously in air, *e.g.*, finely-divided metals or alloys. **p. alloy.** A chromium-iron-cerium alloy, used in mechanical gas lighters. **p. lead.** The pyrophoric lead-carbon mixture obtained on heating lead tartrate. **p. reaction.** A reaction that causes flame; *e.g.*, $KMnO_4$ and H_2SO_4 placed in a beaker will set fire to filter paper.

pyrophorus. Having pyrophoric properties.

pyrophosphate. A salt of pyrophosphoric acid; as, $M_4P_2O_7$, $M_2H_2P_2O_7$.

pyrophosphite. A salt of pyrophosphorous acid: as, $M_4P_2O_6$, $M_2H_2P_2O_6$.

pyrophosphoric acid. $H_4P_2O_7$ = 178.1. A tetrabasic acid; colorless crystals, m.61, soluble in water.

pyrophosphorous acid. $H_4P_2O_5$ = 146.03. A tetra-basic acid of trivalent phosphorous. Colorless needles, m.38; soluble in water (decomp.).

pyrophosphoryl. The tetravalent radical $\equiv P_2O_3$, derived from pyrophosphoric acid. **p. chloride.** $P_2O_3Cl_4$ = 251.86. $(Cl_2PO)_2O$. A colorless fuming liquid b.250; hydrolyzed by water to orthophosphoric acid and hydrochloric acid.

pyrophyllite. The mineral $Al_2O_3.4SiO_2.H_2O$, resembling talc and montmorillonite. Used as filler for paper, paint, rubber and textiles; as a polishing agent for foods (rice, peanuts, etc.); in lubricants and toilet preparations. Cf. *image stone*.

pyroracemamide. $C_3H_5O_2N$ = 87.1. The amide of pyroracemic acid, $Me.CO.CO.NH_2$. A colorless crystalline powder, m.124.

pyroracemic acid. Pyruvic acid.

pyroracemic aldehyde. Pyruvic aldehyde.

pyrosal. Salipyrine.

pyrosine. Erythrosin.

pyrostilbnite. Kermesite.

pyrosulfate. A salt of pyrosulfuric acid; as, $M_2S_2O_7$, or MHS_2O_7.

pyrosulfuric acid. $H_2S_2O_7$ = 178.0. Disulfuric acid. A fuming crystalline substance obtained by freezing Nordhausen acid.

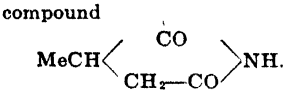
pyrosulfuryl. The divalent radical $=S_2O_5$, derived from pyrosulfuric acid. **p. chloride.** $S_2O_5Cl_2$ = 215.06. Sulfur pentoxy dichloride. The chloride of pyrosulfuric acid. A heavy, mobile, fuming liquid, d1.844, $b._{730mm}$ 150.7; hydrolyzed by water to H_2SO_4 and HCl.

pyrotartaraldehyde. $C_5H_8O_2$ = 100.06. Methylsuccinaldehyde, $CHO.CH_2.CHMe.CHO$. Colorless crystals.

pyrotartaric acid. $C_5H_8O_4$ = 132.1. Methyl succinic acid, methylbutanedioic acid,* pyrovinic acid. A dibasic acid, $MeCH(COOH)CH_2COOH$. Colorless, triclinic crystals, d.1.411, m.112; soluble in water, alcohol or ether. For isomers see *ethylmalonic acid*. *n-* Glutaric acid. **hydroxy-** Citramalic acid. **p. aldehyde.** Pyrotartaraldehyde.

pyrotartrate. A salt of pyrotartaric acid.

pyrotartrimide. $C_5H_7O_2N$ = 113.7. The heterocyclic compound



A colorless crystalline powder, m.66.

pyrotechnics. The production and manufacture of fireworks.

pyroterebic acid. $C_6H_{10}O_2$ = 114.08. *4*-methyl-*2*-pentenoic acid,* $Me_2C{:}CH.CH_2COOH$. Colorless crystals, m.207.

pyrothioarsenate. A compound of the type, $M_4As_2S_7$.

pyrotritaric acid. Uvic acid.

pyrouric acid. Cyanuric acid.

pyrovanadic acid. The tetrabasic acid $H_4V_2O_7$. Cf. *vanadic acid.*

pyrovinic acid. Pyrotartaric acid.

pyroxene. $CaO,MgO,2SiO_2$. A white, dark green or black silicate, which may contain iron or chromium.

pyroxenite. Websterite.

pyroxylic spirit. Methanol.

pyroxylin. Pyroxylinum, soluble gun cotton, collodion cotton, trinitrocellulose, collodium, colloxylin. A group of substances obtained by nitrating cellulose and dissolving in a solvent of high boiling point, which consists of cellulose trinitrate, $C_6H_7O_5(NO_3)_3$, and tetranitrates, $C_6H_6O_5(NO_3)_4$. Used medicinally for artificial skin-covering, collodion, and in the manufacture of artificial silk, leather, oil cloth, and varnishes. See *rayon.*

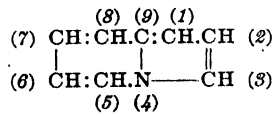
pyrrhosiderite. Göthite.

pyrrhotine. Pyrrhotite.

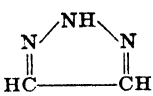
pyrrhotite. FeS. Pyrrhotine. Magnetic pyrite. A magnetic iron sulfide, which usually contains nickel.

pyrrilium. Pyrylium.

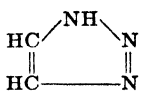
pyrrocoline. C_8H_7N = 117.1. *8*-pyrrolopyridine. The heterocyclic compound



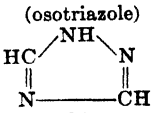
pyrrodiazole. $C_2H_3N_3$ = 69.1. A group of pentatomic triazoles:



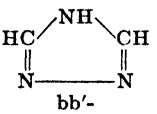
aa'-
1.2.5-
(osotriazole)



ab-
1.2.3-

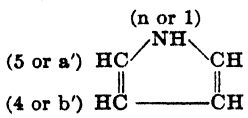


ab'-
1.2.4-



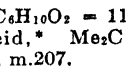
bb'-
1.3.4-

pyrrole.* C_4H_5N = 67.1. Azole. The heterocyclic ring compound,



A colorless liquid, $d_{20°}$0.9481, b.130, insoluble in water, and soluble in alcohol or ether. It is a constituent of bone oil, and its derivatives are used as antiseptics. Cf. *porphin ring.* **cyan-** See *cyanopyrrole.* **dibenzo-** Carbazole. **dihydro-** Pyrroline.* **dimethylethyl-** Kryptopyrrole. **tetrahydro-** Pyrrolidine.*

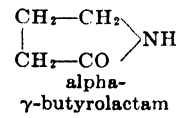
p. α-carboxylic acid. $C_4H_4N.COOH$ = 111.08. A solid, decomp. 191, soluble in water, alcohol or ether.

pyrrolidine.* C_4H_9N = 71.1. Pentazane, butylene imide, tetramethyleneimine, tetrahydropyrrole,  . The base of proline and some alkaloids. A colorless liquid, d.0.852, b.88; soluble in water, alcohol or ether. **keto-** Pyrrolidone. **methyldiketo-** Succinimide. **pyridyl methyl-** Nicotine.

p. alkaloids. See *nicotine group.* **p. carboxylic acid.*** Proline. **p. dione.*** Succinimide.

pyrrolidinium. A derivative of pyrrolidine contain pentavalent nitrogen. Cf. *piperidinium.*

pyrrolidone. C_4H_7O = 71.1. A group of ketopyrrolidines,

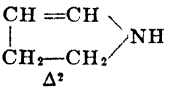


alpha-
γ-butyrolactam

beta-

pyrrolidyl. The monovalent radical, C_4H_8N—, derived from pyrrolidine.

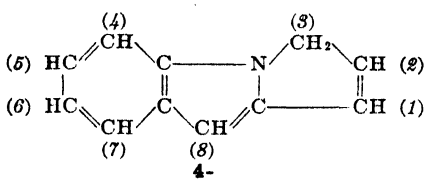
pyrroline*. C_4H_7N = 69.1. Dihydropyrrole,



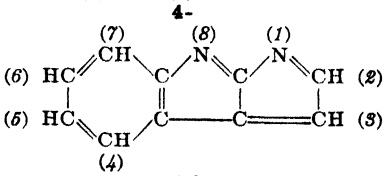
A colorless liquid, $d_{20°}$.0.910, b.90; very soluble in water, alcohol or ether.

pyrrolinium. A derivative of pyrroline containing pentavalent nitrogen. Cf. *piperidinium.*

pyrroloindole. $C_{11}H_9N$ = 155.1 and $C_{10}H_8N_2$ = 154.0. A compound with a fused pyrrole and indole nucleus; hence consisting of a benzene-ring and two pyrrole rings. There are *e.g.:*



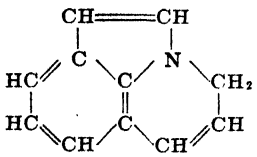
4-



1.8-

pyrrolopyridine. $C_7H_6N_2$ or C_8H_7N. A compound with a fused hexa- and pentatomic ring, each of which has one nitrogen; thus **2.4-** Pyrindole. **8-** Pyrrocoline.

pyrroloquinoline. (1) $C_{11}H_9N$ = 155.1. The heterocyclic compound:

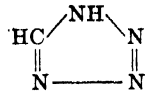


(2) Any tricyclic system containing a quinoline and a pyrrole ring.

pyrrolylene. Bivinyl.

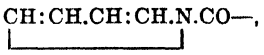
pyrromonazole. **alpha-** Pyrazole. **beta-** Glyoxaline.

pyrrotriazole. CH_2N_4 = 70.2. The pentatomic tetrazole:



A colorless crystalline powder, m.156.

pyrroyl. The monovalent radical,



derived from pyrrole carboxylic acid.

pyrryl. The monovalent radical, C_4H_4N—, derived from pyrrole. **C-** If the substituting radical is attached to a carbon atom. **N-** If the substituting radical is attached to the nitrogen atom. **p. methyl ketone.** C_6H_7ON = 109.1. **alpha-** $C_4H_4N.CO.Me$. Colorless crystals, m.90, b.200.

pyruric acid. Cyanuric acid.

pyruvaldehyde. Pyruvic aldehyde.

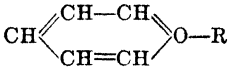
pyruvic acid. $C_3H_4O_3$ = 88.1. Pyroracemic acid, keto-acetic acid, acetylformic acid, *2*-oxopropanoic acid*, Me.CO.COOH or *2*-hydroxy propenoic acid*, α-hydroxyacrylic acid, CH_2:-COH.COOH. A colorless crystalline powder or liquid, d.1.288. m.13.6, b.165 (decomp.), soluble in alcohol, water or ether. It is a distillation-product of racemic acid or ether, and is an intermediate product in the metabolism of proteins, fats and carbohydrates.

pyruvic aldehyde. $C_3H_4O_2$ = 72.1. Pyroracemic aldehyde, ketoacetaldehyde, acetylformyl, methyl glyoxal, propanolon, propanedione pyruvaldehyde, *2*-oxopropanal*. MeCO.CHO.

pyruvonitrile. CH_3COCN = 69.03. Acetylcyanide, 2-oxopropanenitrile*. A colorless liquid, b.93, decomp. in water.

pyrvolidine. An alkaloid from the leaves of the wild carrot, *Daucus carota*, an umbelliferous plant.

pyrylium. Describing a series of compounds derived from pyran, in which the oxygen atom is supposed to be tetravalent:



pyx. (1) Trial of the pyx. The periodical testing of coins issued by the British Mint. (2) Pix. **p. liquida.** Wood tar.

Q

Q. (1) Describing the seventh and outermost shell or orbit of electrons in the atom. Cf. *periodic system.* (2) Symbol for quantity of electricity.

q. Symbol for heat entering a system.

q.v. quod vide (which see).

qt. An abbreviation for quart.

Qu. Abbreviation for quinine.

quadrant. (1) The quarter of a circle; an arc of 90 degrees. (2) The distance from the pole to the equator = 10^7 meters or one-quarter meridian. (3) See *Henry.*

quadratic. A cubical, tetragonal-shaped crystal. Cf. *crystal systems.*

quadri- A prefix from the Latin, indicating four or fourfold (also *tetra-*).

quadribasic. Describing a compound that has four hydrogen atoms replaceable by a base or metal; as, H_4SiO_4. **q. acid.** An acid whose molecules require four molecules of a monatomic base for its neutralization.

quadrilateral. Describing a four-sided figure.

quadrimolecular. Pertaining to four molecules. **q. reaction.** A reaction in which four similar molecules react with one another.

quadrivalent. Having four different valencies; as, bromine with a valency of 1, 3, 5, and 7. Cf. *tetravalent.*

quadroxalate. An obsolete term for bioxalate, or salt of the type, MOOC.COOH.

quadroxide. A binary compound of oxygen that contains four oxygen atoms.

quadruple point. The temperature at which four phases are in equilibrium; *e.g.*, a saturated solution containing excess of salt, (phases: a solid, solvent, solution, and vapor). Cf. *triple point.*

quaker buttons. Nux vomica.

qualitative. Pertaining to the kind or type. **q. analysis.** The methods and procedures by which the constituents of a substance are detected. **q. reaction.** A reaction that detects a substance in a mixture of substances.

quality. The degree of purity of a substance. In general this can be classified as:

C.P. = Chemically pure, tested, analyzed.

U.S.P. or B.P. = Conforming to the tests of the respective pharmacopoeia.

A.R. = analytical reagent. Suitable for use in analysis.

pure = An ordinary commercial grade.

technical = A somewhat impure grade.

crude = An unrefined grade.

quanta. Plural for quantum, q.v.

quantitative. Pertaining to the amount or percentage. **q. analysis.** The methods and procedures by which the amount of a constituent in a material is determined. **q. reaction.** (1) A reaction that determines the amount of a substance in a mixture of substances. (2) A reaction that proceeds almost to completion.

quantity. The amount, active mass, or concentration of a substance; usually expressed in gram-molecules per liter. **physical-** The magnitude or numerical value of a phenomenon. They fall into two classes: *Extensive* magnitudes, when the quantity has an additive effect; as, mass, volume, entropy. *Intensive* magnitudes, when the quantities added increase the intensity of the effect; as, temperature, density, magnetic permeability.

q. of electricity. The amount of electricity required to produce at unit distance (1 cm.) a repulsion of unit force (1 dyne) in a vacuum. This quantity corresponds with 1 international coulomb = 1/3600 ampere-hours = 1/96500 faraday = 3×10^9 electrostatic units.

quantivalence. The combining power or strength of an element or radical, expressed in terms of the number of hydrogen atoms with which it will unite (see *valence*).

quantivalent. Describing an atom that can combine with two or more hydrogen atoms. Cf. *multivalent.*

quantization. A change from a normal atom to an excited atom; that is, electrons in the normal energy level are raised to a higher energy level by the absorption of energy. *E.g.*, C in the normal state has electrons $2s^22p^{33}P$ but 1.6 volts excites it to the state $2s2p^{35}S$. Cf. *quantum notation.*

quantum. Plural: quanta. Ergon. A unit amount of energy, ϵ, set free or bound during the emission or absorption of radiations. It is proportional to ν, the atomic frequency number of the radiation, and is given by the simple relation $\epsilon = h\nu$, where h is Planck's constant, 6.55×10^{-27} erg-seconds. The following relations exist: $\epsilon = hc/\lambda$, where λ is the wavelength of the radiation involved; and $p = h/\lambda$, where p is the momentum of the guided particle. Cf. *orbit, energy level.* This interaction between material particles and radiant quanta is shown by the following phenomena:

1. *Photoelectric effect:* the incident qu. are wholly absorbed; some tear an electron from the atom, others appear as the kinetic energy of the electron.
2. *Fluorescence:* some increase the energy level of electrons; some increase the thermal energy, which is re-emitted as qu. of lower frequency.
3. *Compton effect:* The qu. encounters a free electron, shoots it out with a definite velocity, and is itself re-radiated at lower frequency.
4. *Raman effect:* The qu. alters the energy of the system and is re-radiated at a different frequency (resulting in an absorption spectrum).

See *scattering, shift.*

q. efficiency. The number of molecules transformed in a photolytic reaction per quantum of actinic light absorbed. **q. group.** A number which defines spectroscopic terms, and represents a resultant of the orbital numbers of an atom. Cf. *Stoner quanta.* **q. mechanics.** See *wave mechanics.* **q. notation.** The normal energy levels are indicated by a quantum number (*see table*), and a given spectrum line is indicated by the change from one energy level

QUANTUM NUMBERS AND ENERGY LEVELS

(1)	(2)	(3)	(4)	(5)
K	K	1(1, 1)	K	H 1^2S_1
L_3	L_I	2(1, 1)	L_{11}	Li 2^2S_1
L_2	L_{II}	2(2, 1)	L_{21}	Li 2^2P_1
L_1	L_{III}	2(2, 2)	L_{22}	Li 2^2P_2
M_5	M_I	3(1, 1)	M_{11}	Na 3^2S_1
M_4	M_{II}	3(2, 1)	M_{21}	Na 3^2P_1
M_3	M_{III}	3(2, 2)	M_{22}	Na 3^2P_2
M_2	M_{IV}	3(3, 2)	M_{32}	Na 3^2D_2
M_1	M_V	3(3, 3)	M_{33}	Na 3^2D_3
N_7	N_I	4(1, 1)	N_{11}	K 4^2S_1
N_6	N_{II}	4(2, 1)	N_{21}	K 4^2P_1
N_5	N_{III}	4(2, 2)	N_{22}	K 4^2P_2
N_4	N_{IV}	4(3, 2)	N_{32}	K 4^2D_2
N_3	N_V	4(3, 3)	N_{33}	K 4^2D_3
N_2	N_{VI}	4(4, 3)	N_{43}	K 4^2F_3
N_1	V_{VII}	4(4, 4)	N_{44}	K 4^2F_4
O_5	O_I	5(1, 1)	O_{11}	Rb 5^2S_1
O_4	O_{II}	5(2, 1)	O_{21}	Rb 5^2P_1
O_3	O_{III}	5(2, 2)	O_{22}	Rb 5^2P_2
O_2	O_{IV}	5(3, 2)	O_{32}	Rb 5^2D_2
O_1	O_V	5(3, 3)	O_{33}	Rb 5^2D_3
P_3	P_I	6(1, 1)	P_{11}	Cs 6^2S_1
P_2	P_{II}	6(2, 1)	P_{21}	Cs 6^2P_1
P_1	P_{III}	6(2, 2)	P_{22}	Cs 6^2P_2
Q	Q	7(1, 1)	Q_{11}	87 7^2S_1

(1) *Siegbahn, 1918:* Subscripts are in inverse order of intensity; 1 indicates the sub-series of most intense emission, and of lowest frequency.

(2) *Bohr and Coster, 1924,* "letter system": Subscripts denote the order in which the energy levels are filled in the sequence of atomic numbers.

(3) *Bohr and Coster, 1923, "number system":* The number outside the parenthesis is the *total* quantum number; the first of the two numbers in parenthesis is the *azimuthal*, and the second the *inner* quantum number.

(4) *Sommerfeld, 1924:* The *azimuthal* and *inner* quantum numbers are the subscripts.

(5) *Russell and Saunders "alkali-series term system":* Indicates the optical term into which each x-ray term probably merges when reduced to the alkali metal of the period to which an element belongs. Read "two doublet S one" "two doublet P one" etc.

(Adapted from International Critical Tables, vol. VI, 1929.)

to another, thus K-L_{22} or L_{22}-M_{33}. Generally Greek letters are used to indicate the intensity of the lines, the strongest line being α_1 thus (cf. tables):

	Intensity
$K\alpha_1$ due to K-L_{22}	100
$K\alpha_2$ due to K-L_{21}	50
$K\beta$ due to K-M_{21}	35
$K\nu$ due to K-$N_{21,22}$	15

q. number. The integer n, which indicates the energy level of the electron orbit or the number of quanta: $n = E/h\nu$, where E is the total radiation. Cf. *Bohr's atom, Rydberg's equation, hydrogen atom.* **q. relation.** Let λ be the wavelength in ÅU., ν the frequency ($\times 10^{12}$ per second), $h\nu$ the quantum per molecule ($\times 10^{-12}$ erg); then Q, the quantum energy of one mol matter in Kg. cal. ($9.06 \times 10^{23}\ h\nu$) is numerically:

	λ	ν	$h\nu$	Q
red	7500	400	2.62	37.8
yellow	5900	508	3.33	48.6
blue	4900	612	4.01	57.9
violet	4550	659	4.32	62.3
ultraviolet	3950	759	4.97	71.8
ultraviolet	2000	1500	9.9	142

q. state. See *energy levels.* **q. theory.** Energy changes take place in pulsations, not gradually, and always in multiples of a definite quantity, the quantum of energy, ϵ. The mathematical treatment of this concept follows three forms: (a) Matrix theory, *q.v.*, of Born, Heisenberg and Jordan. (b) Wave mechanics, q.v., of Schrödinger, *q.v.*, de Broglie, etc. (c) Transformation theory, *q.v.*, of Dirac, and Jordan. **q. unit.** Planck's constant.

quarentoxide. An oxide of a divalent metal of the type, M_4O; as, Cu_4O.

quarry. An open or surface working for minerals, as building stone, clay, slate, or limestone. Cf. *mine, outcrop.*

quart. Qt. The fourth part of a gallon:
1 quart = 0.946333 liters = 57.75 cubic inches = 2 pints.
dry- The equivalent of 1.1012 liter. **imperial-** The equivalent of 1.13586 liter or 69.3185 cubic inches; 2.5 lbs. of distilled water occupy 1 quart. **liquid-** The equivalent of 0.946 liter.

quartation. Inquartation. The separation or "parting" of silver from gold by dissolving the silver in nitric acid. This separation is quantitative when the alloy contains ¼ gold and ¾ silver and, if necessary, sufficient silver must be added to the alloy before the separation can be made.

quarter. (1) One-fourth part. (2) An English measure of capacity, generally used for grain. It contains 8 bushels. **q. wave plate.** A plate of transparent material (*e.g.*, mica) used in petrological determinations of refractive index; so-called because it produces a phase-difference of ¼ of a wave-length of light between the two emergent beams.

quartering. A method of sampling coal or similar products by dividing a heap of it into approximately equal quarters, mixing opposite quarters, re-dividing the mixture into quarters, and continuing these operations until a sample of suitable size results.

quartile. See *frequency.*

quartz. Silicon dioxide, silica. A glassy and sometimes well crystallized form of silica, SiO_2 which occurs as quartz, rock crystal, amethyst, citrine, and smoky quartz, or in massive forms in veins, as rose or milky quartz. When pure, native quartz occurs in colorless hexagonal crystals, d.2.66, hardness 7, mean refractive [redacted] 573°C index 1.55. It occurs in two forms $\alpha \rightleftharpoons \beta$, is stable at any temperature below 870°C., and above 1200°C. changes to cristobalite. See

QUANTUM RELATION OF RADIATION AND ENERGY

Type	Wavelength λ in Å.U.	Wavenumber per cm.	Frequency ν per sec.	Erg per quantum $h\nu$	Cal. per einstein $Nh\nu$	Electron volts EV
	(1)	(2)	(3)	(4)	(5)	(6)
x-rays	1	1×10^8	3×10^{18}	1.96×10^{-8}	2.84×10^8	12,337
	10	1×10^7	3×10^{17}	1.96×10^{-9}	2.84×10^7	1,234
	12.3	8×10^6	2.7×10^{17}	1.59×10^{-9}	2.5×10^6	1,000
	100	1×10^6	3×10^{16}	1.96×10^{-10}	2.84×10^6	123
ultraviolet	500	200,000	6×10^{15}	3.93×10^{-11}	570,000	25
	1,000	100,000	3×10^{15}	1.96×10^{-11}	284,500	12.3
	1,234	81,000	2.7×10^{15}	1.59×10^{-11}	250,000	10
	2,000	50,000	1.5×10^{15}	9.82×10^{-12}	142,300	6.17
	3,000	33,333	1×10^{15}	6.55×10^{-12}	94,840	4.11
violet	4,000	25,000	7.5×10^{14}	4.12×10^{-12}	71,120	3.09
blue-green	5,000	20,000	6×10^{14}	3.93×10^{-12}	57,000	2.47
orange	6,000	16,666	5×10^{14}	3.27×10^{-12}	47,400	2.06
red	7,000	14,286	4.3×10^{14}	2.81×10^{-12}	40,600	1.76
	8,000	12,500	3.7×10^{14}	2.42×10^{-12}	35,500	1.54
near infrared	10,000	10,000	3×10^{14}	1.96×10^{-12}	28,450	1.23
	12,337	8,100	2.7×10^{14}	1.59×10^{-12}	25,000	1.000
infrared	100,000	1,000	3×10^{13}	1.96×10^{-13}	2,845	0.12
	1,000,000	100	3×10^{12}	1.96×10^{-14}	284	0.01

The relationship between various types of radiation and energy is illustrated by an example: *e.g.*, bluegreen light: (1) Its wave length, λ, is 5000 Å.U.; (2) The wave number is 20,000 waves per centimeter; (3) The frequency, ν, is 6×10^{14} waves per second; (4) Its energy per photon, or $h\nu$, is $(6.55 \times 10^{-27}) \times (6 \times 10^{14}) = 3.93 \times 10^{-12}$ erg. (5) The heat energy per mole of activated molecules, $Nh\nu$, is obtained by multiplying the energy of one photon (4) by the number of photons to activate one mole (N, Avogadro's number $= 6.06 \times 10^{23}$) and dividing by the number of ergs per gm. cal. (4.185×10^7). (6) The energy of the photon, in electron volts, is 2.47.

silica. The colored varieties are used as semi-precious stones. The native varieties are:

rock crystal.....colorless, well-formed, hexagonal crystals.
amethyst.....a red-violet, * transparent variety.
catalinite.....a green, red, and brown mottled variety.
cats eye.....a green and brown variety.
citrine.....a yellow variety.
rose quartz.....a pale rose variety.
milky quartz....an opalescent variety.
smoky quartz...a gray variety.

It is very resistant to acids, m.1750, and is used for chemical apparatus. The transparent varieties (rock crystals) are used for piezoelectric plates, oscillators, lenses and other optical apparatus, as they are transparent to ultraviolet rays. Fused quartz of great transparency is used for many optical and electrical instruments, and quartz threads are used for delicate suspensions because of their great elasticity.

q. apparatus. Chemical utensils made from fused rock crystal that are highly resistant to sudden temperature changes and will not crack; as, beakers, crucibles, dishes, flasks, retorts, test tubes, and tubings. They differ from the domestic fused silica ware, in that they are transparent. **q. lamp.** Mercury vapor lamp. **q. lens.** (1) A concave or convex lens cut from rock crystal, which is transparent to ultra-violet rays. (2) A lens made from fused quartz. **q. oscillator.** A section cut from a q. crystal; used to tune radio circuits, as it shows sharply-tuned resonance. **q. resonator.** Q. oscillator. **q. rock.** Quartzite.

quartzite. A white or yellow impure quartz.

quassia. Bitter wood, bitter ash. The dried wood of *Picrasma excelsa* (Jamaica q.) or *quassia amara* (Surinam q.), a South American Simarubaceae. It contains 0.03 % of quassin, and is used as a bitter tonic, hop substitute and vermicide. **q. wood.** Quassia.

quassic acid. $C_{36}H_{38}O_{10} = 558.30$. A glucoside from quassia.

quassin. $C_{10}H_{12}O_3 = 180.1$. A bitter principle from Jamaica or Surinam quassia. Colorless crystals, m.210, slightly soluble in water, soluble in alcohol; used as a tonic.

quassoid. The total bitter principles of quassia; used medicinally as a febrifuge and bitter tonic.

quaternary. (1) The last and most recent geologic epoch q.v. (2) A compound containing four

different elements or four types of atoms; as $NaHSO_4$. **q. amines.** Organic derivatives of NH_4OH in which the hydroxyl group and the four hydrogen atoms are replaced by radicals, as NMe_4I. **q. carbon atom.** A carbon atom that is linked to four other carbon atoms.

quebrachamine. An alkaloid from quebracho. Colorless crystals, m.142; insoluble in water, soluble in alcohol or ether.

quebrachine. $C_{21}H_{26}N_2O_3$ = 354.3. An alkaloid from quebracho bark. Colorless or slightly yellow crystals, m.214, insoluble in water, soluble in hot alcohol or hot ether; used as an antiperiodic and tonic. **hypo-** $C_{21}H_{26}O_2N_2$ = 338.26. A yellow or brown amorphous powder from quebracho bark, insoluble in water, soluble in alcohol or ether. **q. hydrochloride.** $C_{21}H_{26}O_3N_2.HCl$ = 390.7. A colorless crystalline powder, slightly soluble in water or alcohol; used medicinally for asthma.

quebrachite. Quebrachitol.

quebrachitol. $C_7H_{14}O_6$ = 194.11. Methoxypinite, *l*-inosite methyl ether, quebrachite, bornesitol. Colorless crystals, d.1.54, m.191, $b._{6mm}210$. Cf. *pinite.*

quebracho. Aspidosperma. The dried bark of *Aspidosperma quebracho blanco*, a South American tree; used medicinally as a tonic and antiasthmatic. **q. blanco.** The dried and powderized bark of *Aspidosperma quebracho-blanco.* It contains tannins and a number of alkaloids: aspidospermine, hypoquebrachine, quebrachamine, quebrachine. **q. colorado.** The dried wood of *Schinopsis* species, which contains fisetin. **q. extract.** A liquid or solid extract from the heart-wood of quebracho, containing 35 % to 65 % tannin; used in the tanning industry. **q. gum.** The dried juice of *Schinopsis lorentzii*, an Anacardiaceae of Argentine, used for tanning.

quebrachomine. An alkaloid from quebracho.

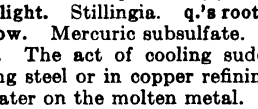
queen-of-the-meadow. (1) The dried root of *Eupatorium purpureum*, a Compositae; used medicinally as the fluid extract, as an astringent and diuretic. Cf. *euparin.* (2) Meadow sweet.

queen's delight. Stillingia. **q.'s root.** Stillingia. **q.'s yellow.** Mercuric subsulfate.

quenching. The act of cooling suddenly; as in tempering steel or in copper refining, the pouring of water on the molten metal.

quercetagetin. $C_{15}H_{10}O_8$ = 318.08. A yellow crystalline principle, m.318, derived from African marigold. See *flavone.*

quercetin. $C_{15}H_{10}O_7$ = 302.16. Meletin, sophoretin, quercetinic acid, flavin,



tetrahydroxyflavanol. A yellow dye obtained by decomposition of quercitrin, a rhamnoside from oak bark. A brown powder, d.1.58, m.312; slightly soluble in water, soluble in alkalis. **hydroxy-** Myricetin. Cf. *rhamnetin.*

quercetinic acid. Quercetin.

quercic, quercinic acid. Quercin (2).

quercimetin. Quercitrin.

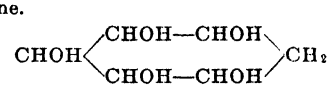
quercin. (1) $C_6H_{12}O_6$ = 180.1. A bitter crystalline carbohydrate, from oak bark and acorns. (2) $C_{15}H_{12}O_8.2H_2O$ = 308.1. Quercic acid, quercinic acid, oaktannin. A light brown or yellow powder from the wood of *Quercus* species. Cf. *quercitannic acid.*

quercitannic acid. $C_{28}H_{28}O_{14}$ = 588.22. A tannin from oak bark; it is hydrolysed to oak-red.

quercite. Quercitol.

quercitin. (1) A glucoside in ragweed pollen. (2) Quercetin.

quercitol. $C_6H_{12}O_5$ = 164.1. Cyclohexanpentol*, quercite, acorn sugar, pentahydroxycyclohexane.



A colorless, crystalline substance of sweet taste found in oak bark, d.1.585, m.224 (decomp.), soluble in water, slightly soluble in alcohol, insoluble in ether; an isomer of pinitol.

quercitrin. $C_{21}H_{22}O_{12}.2H_2O$ = 502.3. Quercimetin, quercitrinic acid. A rhamnoside of quercitron bark, oak bark, tea leaves, hops, horsechestnut and other plants. Yellow crystals, m.160–200, insoluble in water, slightly soluble in alcohol and alkalis. It is hydrolysed by acids to isodulcitol and quercetin, and is used in their manufacture.

quercitrinic acid. Quercitrin.

quercitron. The coarse, powdered bark (25 % tannin) of *Quercus tinctoria*, a Cupuliferae of North America; used in tanning leather and in dyeing wool and silk.

quercus. The dried bark of *Quercus alba* (white oak), a Cupuliferae. Used medicinally as the fluid extract, as an astringent; technically, in the tanning industry.

Quevenne's iron. Reduced iron.

quickening liquid. A solution of mercuric nitrate or cyanide, used in electroplating.

quicklime. A calcined material, the major part of which is calcium oxide or hydroxide in natural association with a lesser amount of magnesium oxide; capable of being slaked with water.

quicksilver. Mercury. **horn-** A native mercurous chloride.

quick-vinegar process. A method of manufacturing vinegar by passing weak alcohol slowly through vats filled with wood-shavings, which are covered with *Bacterium aceti.*

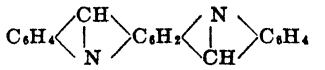
quillaia. Quillaya, quillaja, soap bark, Panama bark. The bark of *Quillaja saponaria*, a Rosaceae of South America, containing saponins. Used for washing, as a foam producer in soft drinks, as an emulsifier, and in shampoos.

quillaic acid. $C_{19}H_{30}O_{10}$ = 418.3. A saponin from the bark of *Quillaja saponaria.*

quina. Cinchona bark.

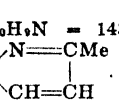
quinacetine. $C_{27}H_{31}N_3O_2$ = 429.4. An alkaloid from cinchona bark. **q. sulfate.** $(C_{27}H_{31}N_3O_2)_2H_2SO_4.H_2O$ = 974.8. An odorless, colorless powder, soluble in water. Used medicinally as an antipyretic and anodyne.

quinacridine. $C_{20}H_{12}N_2$ = 280.2. A series of pentacyclic compounds which consist of three benzene rings and two pyridine rings fused together; as,



quinacrine. $C_{23}H_{30}ClN_3O$ = 401.98. Mepacrine; the 2-chloro-5-[ω-diethylamino-α-methylbutylamino] -7-methoxyacridine. **q. hydrochloride.** $C_{23}H_{30}ClN_3O.2HCl.2H_2O$ = 508.91. Yellow powder; used as an antimalarial.

quinaldic acid. 2-Quinoline carboxylic acid. **hydroxy-** Kynurenic acid.

quinaldine. $C_{10}H_9N$ = 143.13. α-Methylquinoline,  . A colorless liquid, d.1.186, m. −8, b.244, slightly soluble in water, soluble in alcohol or ether; used medicinally. **naphtho-** See *naphthoquinaldine.* **oxy-** See *oxyquinaldine.* **phenyl-** See *phenylquinaldine.*

quinaldinium compounds. Derivatives of quinaldine in which the nitrogen atom is pentavalent; as, quinaldinium methyl iodide, $C_{10}H_9N(CH)_3I$.

quinalizarin. $C_{14}H_{12}O_2$ = 212.1. *1.2.5.8*-Tetrahydroanthraquinone. A spot test reagent for beryllium; the violet color of an alkaline solution changes to deep blue.

quinamicine. $C_{19}H_{24}N_2O_2$ = 312.3. An alkaloid from cinchona bark.

quinamidine. $C_{19}H_{24}N_2O_2$ = 312.3. An isomer of quinamicine.

quinamine. $C_{19}H_{24}N_2O_2$ = 312.3. A crystalline alkaloid from cinchona bark. Cf. *apoquinamine.*

quinanaphthol. $C_{20}H_{24}N_2O_2(OHC_{10}H_6SO_3H)_2$ = 786.49. Quinaphthol, chinaphthol, quin ne-beta-naphtholmonosulfate. A yellow crystalline powder, m.185, soluble in water or alcohol; used medicinally.

quinane. $C_{20}H_{24}N_2$ = 292.21. Desoxyquinine. The heterocyclic hydrocarbon obtained by reduction of quinine.

quinaphthol. Quinanaphthol.

quinaseptol. Diaphthol. **q. silver.** Argentol.

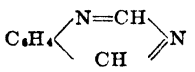
quinasitinic acid. $C_9H_7NO_4$ = 193.1. Amidobenzoylglyoxalic acid. $C_6H_4(NH_2).CO.CO.COOH$.

quinate. A salt of quinic acid, as urea quinate. **q. of urotropine.** Quinotropine.

quinazerin. Quinizarin.

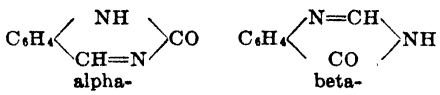
quinazine. Quinoxaline.

quinazoline. $C_8H_6N_2$ = 130.06. Phenmiazine, benzopyrimidine 1.3-benzodiazine, q.v. The heterocyclic compound



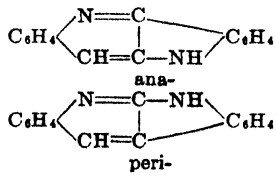
Colorless crystals, m.48, b.243. **dihydroketo-** Quinazolone. **diketotetrahydro-** Benzoyleneurea. **ketodihydro-** Quinazolone. **methyl-** $C_9H_8N_2$ = 144.1. 2-Methylquinazoline. A colorless crystalline powder, m.35, b.238; soluble in alcohol. **oxy-** Quinazolone.

quinazolone. $C_8H_6N_2O$ = 146.1. Oxyquinazoline, ketodihydroquinazoline. Cf. *quinoxalone.* The heterocyclic compounds:

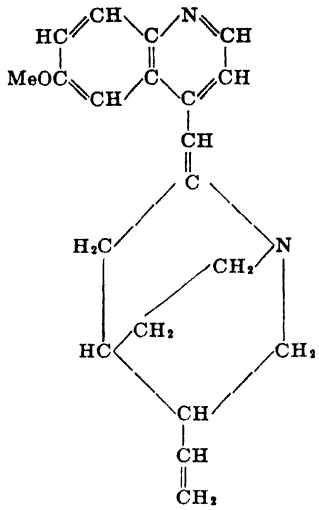


quince seeds. The dried seeds of *Pyrus cydonia,* a rosaceous tree. Used medicinally as the mucilage, as a demulcent.

quindoline. $C_{15}H_{10}N$ = 204.1. The heterocyclic compounds:



quinene. $C_{20}H_{22}N_2O$. Koenig's term for the heterocyclic parent compound of the quinine alkaloids:



quinetum. A mixture of the alkaloids of the cinchona bark in the same proportions as they occur in nature. Cf. *quinium, quinoidine.*

quinhydrone. $C_{12}H_{10}O_4$ = 218.14. A compound of quinone and hydroquinone. $C_6H_4O_2.C_6H_4(OH)_2$. A dark green powder; soluble in hot water, alcohol or ether, m.171, subliming. **q. electrode.** A reversible electrode consisting of a platinum wire in a saturated solution of quinhydrone, which gives a well-defined potential in acid and neutral solutions, and is used as a standard in pH determinations. Quinhydrone dissociates in solution to quinone and hydroquinone; hence it establishes the equilibrium: $C_6H_4O_2 + 2H^+ + 2e \rightleftharpoons C_6H_4(OH)_2$. If E is the E.M.F., read against a saturated calomel electrode at 18°C. the pH value is given by $2.03 + E/0.0577$.

quinhydrones. A series of compounds or mixtures of quinones and hydroquinones, which are formed as intermediate products in the reduction of quinones.

quinia. Quinine.

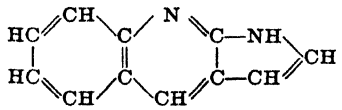
quinic acid. $C_7H_{12}O_6$ = 192.1. Kinic acid, hexahydrotetrahydroxybenzoic acid. The monobasic acid, $C_6H_7(OH)_4.COOH$, in cinchona bark. Colorless monoclinic crystals, d.1.637, m.162 (decomp.), soluble in water, alcohol or ether; used medicinally for gout.

quinicine. $C_{20}H_{24}N_2O_2$ = 324.20. An amorphous alkaloid, m.60, isomeric with quinine and quinidine, obtained from cinchona bark.

quinidamine. $C_{19}H_{24}N_2O_2$ = 312.3. An alkaloid from cinchona bark.

quinidine. $C_{20}H_{24}N_2O_2$ = 324.2. An alkaloid from the bark of cinchona species: the dextro isomer of quinine. Colorless monoclinic prisms, m.168, insoluble in water, soluble in alcohol, ether or chloroform. Used medicinally as a cardiac rhythm regulator and similarly to quinine. **q. hydrochloride.** $C_{20}H_{24}N_2O_2.HCl$ = 360.8. White prisms, soluble in water, alcohol or ether. **q. sulfate.** $(C_{20}H_{24}O_2N_2)_2.H_2SO_4$ = 746.4. A colorless crystalline powder, soluble in water; used as a quinine substitute.

quinindole. $C_{11}H_8N_2$ = 168.02. A series of heterocyclic compounds:



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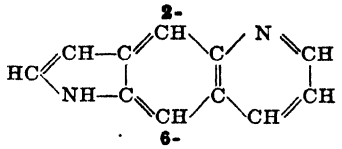

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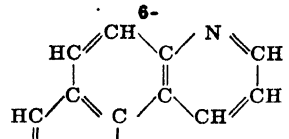

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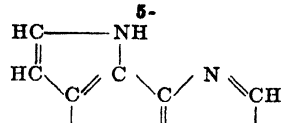
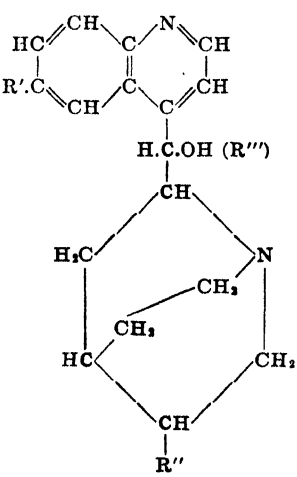


8-

quinine. $C_{20}H_{24}O_2N_2$ = 324.3. Quinina, quinia, chinine, *Qu*. A levorotatory alkaloid from the bark of *Cinchona* species. Colorless, long silky needles, m.175, slightly soluble in water and soluble in alcohol or ether. Used medicinally as a stimulant, and in malarial fever. Its dextrorotatory isomer is quinidine. **beta-** Quinidine. **desoxy-** Quininone. **eu-** Quinine ethylcarbonate. **salicyl-** Saloquinine.

q. alkaloids. A group of alkaloids from cinchona bark, related to quinine. The structure ascribed to quinine contains four asymmetric carbon atoms which are indicated by bold type, **C**.



The structure of the different alkaloids is indicated by substituting the following atoms or groups for the radicals:

R′ R″	*levo*-isomer	*dextro*-isomer
H (*1*)	cinchonine	cinchonidine
H (*2*)	hydrocinchonidine	hydrocinchonine
OH (*1*)	cupreine	cupreidine
OH (*2*)	hydrocupreine	hydrocupreidine
OCH_3 (*1*)	quinine	quinidine
OCH_3 (*2*)	hydroquinine	hydroquinidine
OCH_3 (*3*)	ethylquitenine	ethylquitenidine
OC_2H_5 (*2*)	optochine	optochinidine
OC_5H_{11} (*2*)	eucupine	(eucupidine)
OC_8H_{17} (*2*)	vuzine	(vuzidine)

(*1*) is —CH:CH_2; (*2*) is —CH_2.CH_3; (*3*) is —$COOC_2H_5$.

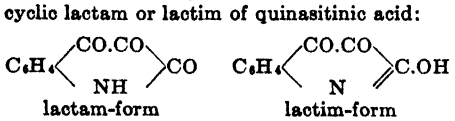
q. acetate. $QuC_2H_4O_2$ = 384.3. A fine white crystalline powder, soluble in water or alcohol; used as a diuretic and in malaria. **q. acetylsalicylate.** *Qu*.$CH_3COO.C_6H_4.COOH$. Quinine aspirin, xaxaquin. A white crystalline powder, used medicinally. **q. aesculinate.** Escoquinine. A yellow amorphous powder, insoluble in water; used medicinally. **q. albuminate.** Yellow scales, soluble in acids; used as a tonic. **q. anisate.** $Qu_2C_{10}H_{12}O.2H_2O$ = 832.7. Anetholquinine. Colorless crystals; soluble in alcohol or ether. **q. antimonate.** QuH_3SbO_4 = 513.2. Q. stibnate. A white powder, insoluble in water; used medicinally as an antirheumatic. **q. arrhenate.** $Qu_2AsO(OH)_2CH_3$ = 788.7. Q. methylarsenate. A colorless crystalline powder, m.140; insoluble in cold, slightly soluble in hot water. **q. arsenate.** $Qu_2H_3AsO_4.8H_2O$ = 934.8. Colorless crystals, soluble in hot water; used medicinally as a tonic. **q. arsenite.** $Qu_2H_2AsO_3$ = 773.6. A white powder; slightly soluble in water, soluble in alcohol. **q. aspirin.** Q. acetyl salicylate. **q. benzoate.** $QuC_7H_6O_2$ = 446.3. Colorless crystals, slightly soluble in water, soluble in alcohol; used medicinally. **q. borate.** QuH_3BO_3 = 386.3. A white crystalline powder, soluble in water or alcohol. **q. bromate.** $QuHBrO_3$ = 453.3. Colorless crystals, soluble in water or alcohol. **q. camphorate.** $QuC_{10}H_{16}O_4$ = 556.4. A white powder; insoluble in water, soluble in alcohol or ether. **q. carbolate.** Phenolquinine. A white powder; slightly soluble in water, soluble in alcohol. **q. carbonate.** $QuH_2CO_3.H_2O$ = 404.4. Colorless needles; soluble in water or alcohol, insoluble in ether. **q. chlorate.** $QuHClO_3$ = 408.8. White crystals; soluble in water or alcohol. (Dangerous, as it explodes when heated.) **q. chromate.** $QuH_2CrO_4.2H_2O$ = 478.4. Yellow needles; insoluble in water. **q. cinnamylate.** $Qu.C_9H_8O_2$ = 472.3. White crystals; soluble in water. **q. citrate.** $Qu_2C_6H_8O_7.7H_2O$ = 966.7. Colorless crystals; soluble in hot water or alcohol. **q. eosolate.** $Qu_2C_9H_7O_{12}S_2$ = 1051.7. Q. trisulfoacetylcreosote. A quinine compound used in medicine. **q. ethylcarbonate.** $QuEt_2CO_3$ = 442.3. Euquinine. A light powder of very fine needle-shaped crystals, m.89, slightly soluble in water, soluble in alcohol, ether or chloroform. Used as a tasteless quinine substitute in medicine. **q. ferricyanide.** $QuH_3Fe(CN)_6$ = 539.6. Yellow crystals, slightly soluble in water. **q. ferrosulfate.** A brown powder, slightly soluble

in water; used medicinally as a tonic. **q. formate.** $Qu CH_2O_2$ = 370.3. White glassy needles, soluble in water or alcohol, insoluble in ether. **q. glycerophosphate.** $Qu_2H_2PO_4C_3H_7O_2.4H_2O$ = 892.6. Kineurine. A white powder, soluble in hot water or alcohol; used medicinally as a tonic. **q. hydrochloride.** $Qu HCl$ = 360.8. Colorless silky needles, m.156; soluble in water, alcohol, or ether. **q. hydroiodide.** $Qu HI$ = 452.2. A yellow powder; soluble in alcohol. **q. hypophosphite.** $Qu HPO_2.2H_2O$ = 424.3. Small white silky needles, decomp. when heated and form PH_3; soluble in water, alcohol, or chloroform. **q. iodate.** $Qu HIO_3$ = 500.2. Colorless needles; slightly soluble in water, soluble in alcohol. **q. ligosinate.** An orange-yellow powder; insoluble in water, soluble in alcohol. **q. nitrate.** $Qu HNO_3$ = 387.4. Colorless crystals; soluble in water or alcohol. **q. phenolsulfonate.** $Qu C_6H_4(OH)SO_3H$ = 498.4. Quinine sulfocarbolate. A yellow amorphous mass; slightly soluble in water, soluble in alcohol. **q. quinate.** $Qu C_7H_{12}O_6.2H_2O$ = 552.4. A white or yellowish crystalline powder; soluble in water or alcohol. **q. salicylate.** Saloquinine. **q. santonate.** $Qu C_{15}H_{20}O_4$ = 588.5. A yellow powder; soluble in alcohol. **q. stearate.** $Qu C_{18}H_{36}O_2$ = 608.6. Colorless crystals, soluble in alcohol; used for sunburns. **q. stibnate.** Q. antimoniate. **q. succinate.** $Qu_2C_4H_6O_4.8H_2O$ = 910.8. Colorless needles; slightly soluble in water, soluble in alcohol. **q. sulfate.** $Qu_2H_2SO_4.7H_2O$ = 872.8. The most frequently-used quinine salt. Colorless silky needles, m.205, slightly soluble in water, soluble in alcohol, ether, or very dilute acids. Used medicinally as an antipyretic, antiperiodic and antimalarial. ***iodo-.*** Herapathite. **q. s. periodide.** Herapathite. **q. sulfoguaiacolate.** Sulfoguaiacin. Yellow leaflets; soluble in water; used as an antiseptic. **q. sulfoiodoiodate.** $Qu_2(H_2SO_4)_2(HI)_2I_4.3H_2O$ = 1760.26. Dichromatic crystals which polarise light similarly to tourmaline. **q. synthesis.** Skraup's reaction. **q. tannate.** $Qu(C_{14}H_{10}O_9)_2.8H_2O$ = 1434.7. A yellowish-white powder; partly soluble in alcohol. **q. trisulfoacetylcreosote.** Q. eosolate. **q. urea hydrochloride.** Urea quinine. A mixture of urea and quinine hydrochloride; a white powder, soluble in ether. **q. valerate.** $Qu C_5H_{10}O_2.H_2O$ = 444.4. White lustrous crystals; slightly soluble in water, soluble in alcohol.

quininic acid. $C_{11}H_9NO_3$ = 203.14. The monobasic acid, MeO.C_9H_5N.COOH. Yellow prisms, m.280 (decomp.), slightly soluble in water or ether, soluble in alcohol; used in organic synthesis.

quininone. $C_{20}H_{22}N_2O_2$ = 322.3. Rabe's name for the ketone of quinine (q.v.) in which the connecting CHOH group, (R‴), is replaced by the CO radical, while R′ is OCH_3 and R″ is $CH{:}CH_2$.

quinisatin. $C_9H_5NO_3$ = 175.1. The heterocyclic lactam or lactim of quinasitinic acid:

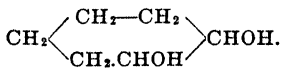


lactam-form lactim-form

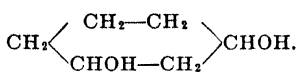
A colorless crystalline powder, m.257.

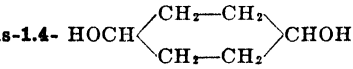
quinite. Quinitol.

quinitol. $C_6H_{12}O_2$ = 116.1. Quinite, *1,4*-cyclohexanol, cyclohexanediol. A group of diatomic alcohols occurring in several cis- and trans- forms, forming colorless crystals. **cis-1,2-**



m.75, b.225. **trans-1,2-** m.100, b.225. **cis-1,3-.** Resorcitol. m.65. **trans-1,3-** m.89.



cis-1,4-  m.102.

trans-1,4- m.140. **iso-1,4-** A colorless liquid, b.220.

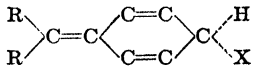
quinium. Crude quinine which contains the alkaloids of cinchona bark. An amorphous white mass, used in the manufacture of quinine and its salts. Cf. *quinetum, quinoidine.*

quinizarin. $C_{14}H_8O_4$ = 240.13. 1,4-Dihydroxyanthraquinone, quinazerin. A colorless solid, m.280; insoluble in water, soluble in alcohol or ether.

quinizine. Antipyrine.

quinoa. The dried seeds of *Chenopodium quinoa*, a Chenopodiaceae of Peru and Chile; used as a food and yields a starchy flour.

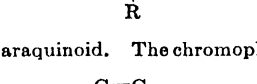
quinocarbonium. A salt of organic compounds of the quinone type:



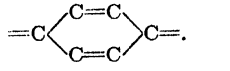
The dotted line indicates the carbonium valence.

quinochromes. Blue fluorescent products formed by the oxidation of vitamin B_1 with permanganate. Cf. *thiochrome.*

quinogens. An intermediate compound in the condensation of α-diketones to quinones, of the type:



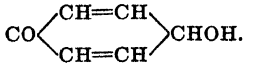
quinoid. Paraquinoid. The chromophoric group,



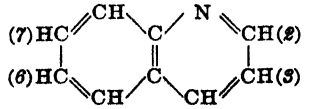
Cf. *hemiquinoid.*

quinoidine. A brown amorphous mass which consists of the non-crystallizable alkaloids of cinchona bark; used medicinally. Cf. *quinium.*

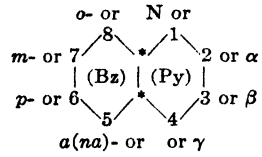
quinol. $C_6H_6O_2$ = 110.05. Hydroquinone, 4-hydroxy-p-benzenone. A tautomeric or keto-form of hydroquinol,



quinoline. C_9H_7N = 129.1. 1-Benzazine, chinoline. A decomposition-product of quinine, and a distillation product from bone oil and petroleum, which consists of the heterocyclic compound:



A colorless refractive oil, d.$_{20}$°1.0944, m. −20, b.238, aromatic odor; slightly soluble in cold water, soluble in hot water, alcohol, ether, benzene, or chloroform. Used as a solvent for resins, camphor, and terpenes, and medicinally, as an antiseptic. The derivatives are indicated by:



position:
1 or n- or Py-n-
2 or α or Py-1- or alpha
3 or β or Py-2- or beta
4 or γ or Py-3- or gamma
5 or a or Bz-4- or ana
6 or p or Bz-3- or para
7 or m or Bz-2- or meta
8 or o or Bz-1- or ortho

amino- Aminoquinoline. **aminophenylmethyl-** Flavaniline. **benzo-** Benzoquinoline. **chloro-** Chloroquinoline. **dibenzo-** Phenanthroquinoline. **dimethyl-** Kryptidine. **hydroxy-** Quinolinol. **iso-** 2-Benzazine, leucoline. A heterocyclic compound in which the nitrogen atom is in the 2-position. A colorless crystalline mass, m.23, b.240; slightly soluble in water. **methoxy-** Plasmoquin. **methoxytetrahydro-** Kairine. **α-methyl-** Quinaldine. **γ-methyl-** Lepidine. **α-oxy-** Carbostyril. **tetrahydro-** $C_9H_{11}N$ = 133.1. 1.2.3.4-tetrahydroquinoline. A colorless liquid, b.244.

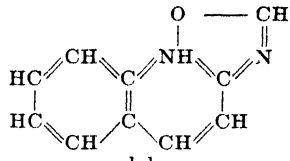
q. acids. $C_9H_6N.COOH$ = 173.1. There are seven mono-carboxylic acids of quinoline which are named according to the position of the carboxyl radical:
ortho- or 8-quinoline carboxylic acid, m.187.
meta- or 7-quinoline carboxylic acid, m.249.
para- or 6-quinoline carboxylic acid, m.291.
ana- or 5-quinoline carboxylic acid, m.369.
alpha- or 2-quinoline (quinaldic acid), m.156.
beta- or 3-quinoline (quinaldic acid) m.171.
gamma- or 4-quinoline (cinchoninic acid) m.254.
q. aldehyde. $C_9H_6N.CHO$ = 157.12. alpha- or 2-. A colorless crystalline powder, m.71; soluble in water. **q. alkaloids.** See *alkaloids*. **q. blue.** Cyanine. **q. dyes.** A group of dyestuffs, photographic sensitizers and indicators which contain the quinoline ring. See *cyanine*. **q. hydrochloride.** $C_9H_7N.HCl$ = 165.6. A colorless crystalline powder, m.94; soluble in water, alcohol, or ether. **q. red.** $C_{25}H_{19}N_2Cl$. 1.1′-Benzilidene-2.2′-quinocyanine chloride. A quinoline dye. **q. rhodanate.** Q. thiocyanate. **q. salicylate.** $C_9H_7N.C_7H_6O_3$ = 267.2. White crystals, soluble in water, glycerin, alcohol or ether; used as an antiseptic. **q. tartrate-** $(C_9H_7N)_2(C_4H_6O_6)_4$ = 987.5. A white powder, m.125, soluble in water, alcohol, or ether; used as an antiseptic. **q. thiocyanate.** $C_9H_7N.HCNS$ = 188.2. Q. rhodanate. A yellowish crystalline mass, m.137, slightly soluble in water, soluble in alcohol; used as a bactericide.

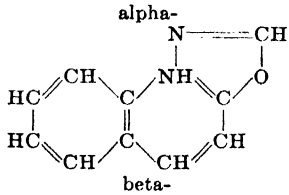
quinolinic acid. $C_7H_5O_4N$ = 167.1. Pyridine. 2.3-dicarboxylic acid*, $C_5H_3N(COOH)_2$. Colorless monoclinic crystals, m.190 (decomp.); insoluble in water, slightly soluble in alcohol, soluble in ether.

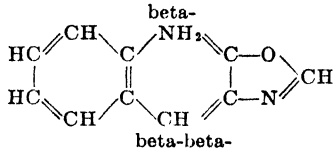
quinolinium compounds. Derivatives of quinoline in which the N-atom is pentavalent; they are analogous to pyridinium and quinaldinium compounds.

quinolinol. C_9H_7NO = 145.06. Hydroxyquinoline. **2-** Carbostyryl. **4-** Kynurine. **5-**m.224. **6-** m. 193, b.360. **7-** decomp. 238. **8-** Oxin. m.76, b.267; used as a precipitant for aluminum.

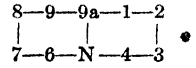
quinolinoxazole. $C_{10}H_6ON_2$ = 172.1. Chinolinoxazole. The heterocyclic compounds:


alpha-


beta-


beta-beta-

quinolizine. C_9H_9N = 131.1. A group of heterocyclic compounds consisting of two pyridine rings, with a common N-atom.



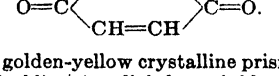
The single saturated C atom is marked 9a.

quinolone. Carbostyril.

quinolyl. Quinoyl. The monovalent radical, C_9H_6N—, derived from quinoline. There are seven possibilities of substitution (see *quinoline*).

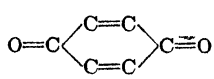
quinondiimine. Quinone diimine. See *quinone*.

quinone*. $C_6H_4O_2$ = 108.1. Benzoquinone, paradioxybenzene, benzenone, dihydrodiketo benzene.



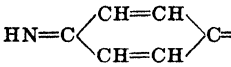
It forms golden-yellow crystalline prisms, d.1.31, m.116 (sublimes), slightly soluble in water, soluble in alcohol or ether; used as a reagent, **anthra-** See *anthraquinone*. **benzo-** Quinone. **dimethyl-** Xyloquinone. **dinitrohydroxy-** Nitranilic acid. **hydro-** Quinol. **meri-** Meriquinone. **methyl-** Toluquinol. **naphtho-** Naphthoquinone. **tetrachloro-** Chloranil.

q. chlorimide. C_6H_4ONCl = 141.53. A solid, m.116 (subliming), soluble in ether or alcohol, slightly in water. **q. compounds.** A series of organic dioxy-derivatives of ring-compounds that are characterized by the grouping,

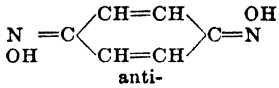


They are usually yellow in color, and are used as dyestuffs. **q. dichlorimide.** $C_6H_4N_2Cl_2$ =

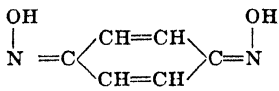
175.0. A solid m.164 (decomp.) soluble in ether. **q. diimine.** $C_6H_6N_2$ = 106.2.



m.124 (decomp.). **q. dioximes.** $C_6H_6N_2O_2$ = 138.10.

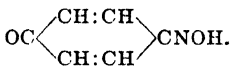


anti-



syn-

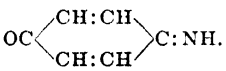
Decomp. 240. **q. diphenylmethane.** Fuchsone. **q. imine.** Quinonimine. **q. monoxime.** $C_6H_5NO_2$ = 123.1. Quinoxime.



Cf. *nitrosophenol*, of which it is the stabler tautomeric form. **q. pigments.** See *quinones*.

quinones. A group of yellow organic compounds characterized by the quinone grouping; as, brasilin, atrometin.

quinonimine. C_6H_5NO = 107.1.



quinonoid. The quinone structure. Cf. *quinone compounds, quinoid.*

quinonyl. The monovalent radical, $C_6H_3O_2$—, derived from quinone.

quinopyrine. Chinopyrine. A combination of antipyrine and quinine hydrochloride; very soluble in water. Used to treat malaria by sub-cutaneous injection.

quinoquinoline. 1.10-Naphthodiazine.

quinoral. Chinoral.

quinosol. Chinosol, potassium oxyquinoline sulfate. A yellow powder; soluble in water. Used as a preservative of anatomical specimens. Cf. *superol.*

quinotannic acid. $C_{14}H_{16}O_9$ = 328.12. Cinchonatannin. A tannin from cinchona bark; a light yellow powder, soluble in water.

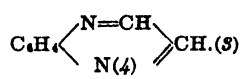
quinotropine. Urotropine quinate, chinotropine, hexamethylene amine quinate. A compound of urotropine and quinic acid, used medicinally.

quinovic acid. $C_{32}H_{48}O_6$ = 528.37. A white crystalline powder, soluble in chloroform or ammonium hydroxide.

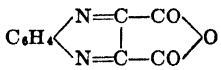
quinovin. $C_{30}H_{48}O_8$ = 536.37. Kinocin, chinovin. A glucoside from cinchona bark, m.235.

quinovose. A stereoisomer of rhamnose; a glucoside in cinchona bark.

quinoxaline. $C_8H_6N_2$ = 130.06. Benzo-p-diazine, quinazine, phenpiazine, 1.4-benzodiazine, q.v.

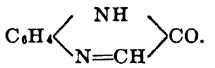


A colorless crystalline powder, m.30.5, b.226, slightly soluble in water, soluble in alcohol; used in organic synthesis. **benzo-** See *benzoquinoxaline.* **naphtho-** Naphthisodiazine. **oxychlorodiphenyl-** Luteol. **tetrahydro-** $C_8H_{10}N_2$ = 134.2. 1.2.3.4-Tetrahydro-quinoxaline. Colorless crystals, m.97, b.289; soluble in alcohol. **q. dicarboxylic acid.** $C_8H_4N_2(COOH)_2$ = 218.2. 2.3- or ab-. Colorless crystals, m.190; soluble in water or alcohol. **q. dicarboxylic anhydride.** $C_{10}H_4O_3N_2$ = 200.1. The heterocyclic compound,

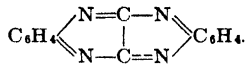


Colorless crystals, m.251.

quinoxalone. $C_8H_6ON_2$ = 146.1. The heterocyclic compound, (Cf. *quinazolone*)



quinoxalophenazine. $C_{14}H_8N_4$ = 232.2. The heterocyclic compound,



quinoxalyl. The monovalent radical, $C_8H_5N_2$—, derived from quinoxaline.

quinoxime. Quinone monoxime.

quinoyl. Quinone group.

quinque- Quinqui-. Pertaining to five.

quinquemolecular. Pertaining to five molecules. **q. reaction.** A reaction in which five similar molecules react with one another.

quinquevalent. (1) Having five different valencies. (2) Pentavalent. **q. nitrogen.** See *-onium.*

quinqui-. Quinque-.

quintal. (1) A unit of weight in the English system, equal to 100 pounds (av.). (2) A unit of weight in the metric system equal to 100 kilograms or 220.49 pounds, (av.).

quintavalent. Quinquevalent.

quintenyl. Amyl.

quintessence. A concentrated extract of any substance; as, an essential oil.

quintuple point. The temperature of a system at which five phases exist in equilibrium; as, salt a, salt b, double salt, solution and vapor. Cf. *triple-, quadruple point.*

quitenidine. $C_{19}H_{22}O_4N_2$ = 342.19. An oxidation product of quinidine. Cf. *chitenine.*

quotient. A number obtained as a result of a division. **albumen-** The number obtained by dividing the percentage of blood albumen by the percentage of total albumen. **D-** The ratio of glucose to nitrogen in urine.

q.v. An abbreviation for: (1) quantum vis—as much as you wish; and (2) quod vide—which see.

R

R. An abbreviation for: (1) organic radical, as R′ monovalent; R″ divalent; R′ ″ trivalent, etc. (2) The **gas** constant, R = 82.07 cc. atm. per degree = 1.9885 cal. per degree = 8.316 joules per degree. (3) Reaumur degree, °R. (4) Rankine degree, °R. **R acid.** 2-Naphthol-3.6-disulfonic acid. **2R acid.** 2-Amino-8-naphthol-3.6-disulfonic acid. **R salt.** Sodium salt of R acid.

r. Abbreviation for: (1) racemic, (2) radius. The symbol for the *röntgen* or **x**-ray intensity unit.

r_H. Reduction intensity, oxido-reduction potential, q.v.

ρ. The Greek letter rho. (1) The symbol for the mathematical constant 0.47693 62762. (2) The *pros-* or **2.3**-position of naphthalene. (3) the symbol for *rhe*, the absolute unit of viscosity.

Ra. The symbol for radium.

ra. Abbreviation for radioactive; as *ra*Cl = radiochlorine, *ra*Na = radiosodium.

rabble. An iron bar resembling a hoe, for stirring a molten metallic bath.

rabbling. The stirring or scraping of a charge of ore in a reverbatory furnace with an iron scraper.

rabelaisin. A poisonous glucoside from *Rabelaisia philippinensis*, a plant of the Philippines; used by the natives as an arrow poison.

*ra*C. Radiocarbon.

RaC′. Radium C′.

racahout. Starch or meal prepared from the edible acorn and used, mixed with sugar and flavoring, as an invalid food.

racemate. A salt of a racemic acid; generally of r-tartaric acid.

racemation. Racemization.

raceme. An optically-inactive compound that consists of equal quantities of dextro- and levo-compounds.

racemic. r- or *dl*-. Inactive, but separable into dextro- and levorotatory compounds. **r. acid.** (1) $C_4H_6O_6$ = 150.05. Paratartaric acid. The dibasic acid HOOC.CHOH.CHOH.COOH, an optically-inactive isomer of tartaric acid. Colorless triclinic crystals, m.205, soluble in water, alcohol or ether. It occurs in nature with d-tartaric acid. Cf. meso-*tartaric acid.* (2) An equimolecular mixture of d- and l-acids; it is optically-inactive. **r. compound.** A crystal which consists of an equal number of optically-active d- and l-molecules, but can be separated into its active constituents. Cf. *meso-compound.* **r. mixture.** An optically-inactive mixture of equal quantities of a dextro- and levo-compound.

racemism. The union of dextro- and levo-rotatory molecules to produce an inactive substance.

racemization. Racemation, racemisation. The transformation of optically-active substances into optically-inactive substances or mixtures. **auto-** The spontaneous transformation of an optically-active molecule into an optically-inactive molecule. **partial-** An incomplete racemic transformation, which affects only one or a few asymmetric groups in a molecule.

racemize. To convert an optically-active substance into an optically-inactive substance.

racemized. Describing a substance or mixture that has been separated into its optically-active constituents.

racephedrine. Racemic ephedrine. **r. hydrochloride.** Ephetonin. The hydrochloride of racemic ephedrine.

*ra*Cl. Radiochlorine.

rackarock. An explosive which is made on the spot as required; a mixture of $KClO_3$ and nitrobenzene, sometimes with picric acid.

racking. (1) The separation of ores by washing on an inclined plane (rack). (2) The final stage in brewing, when the liquor is clarified and run off ready for delivery. (3) The almost complete separation of solid glycerides from cod-liver oil by cooling.

raddle. Hematite.

radian. (1) An arc of a circle that is as long as the radius of the circle. (2) The angle subtended at the centre by the arc of a circle equal to the radius of the circle: $180°/\pi = 57.29578° = 57°17'45'' = 206265'' = 1$ radian, and $1° = 0.017453$ radians.

radiant. Diverging from a common center in all directions. **r. energy.** A dynamic disturbance of the ether that diverges from a common center and manifests itself as heat, light, or electricity (see *spectrum*). **r. flux.** See *flux*. **r. heat** Heat waves. **r. matter.** (1) The residual gas in a vacuum tube which has become luminous by the passage of a current of electricity. (2) Radio-active matter. **r. state.** (1) The condition of emitting light; as, incandescence, luminescence, fluorescence. (2) Crooke's fourth state of matter.

radiate. To spread from a common center.

radiated. An arrangement of crystals in the shape of rosettes.

radiated pyrite. Marcasite.

radiation. (1) The transmission of energy through space, unassociated with the motion of material particles, and without loss or change, —*electromagnetic* **r.** or *wave theory;* it accounts for interference, diffraction, refraction and polarization. (2) The emission of material particles moving at high velocity, *corpuscular* **r.** or *corpuscle theory;* it accounts for the photoelectric and Compton effects, the sharp spectral lines and the shift of wave length of x-rays scattered by electrons. (3) Sometimes, the transfer or diffusion of energy through matter, as heat waves or sound waves. Cf. *ray, irradiation, absorption, light.* **corpuscular-** A stream of particles; as, α-rays or canal rays, which consist of positively-charged atomic nuclei; or β-rays or cathode rays which consist of negatively-charged particles or electrons moving with the velocity of light. **cosmic-** A penetrating r. of very short wave length which reaches the earth from all directions of space, day and night, with equal intensity. It is assumed that its origin is the interstellar or intergalactic space, and its cause the transformation of matter into energy; *e.g.*, the energy liberated when four hydrogen atoms form a helium nucleus. Cf. *packing effect, mass-energy cycle.* **electromagnetic-** An electric field, E, oscillating at right angles to the direction of

propagation which is accompanied by a similar magnetic field, H, at right angles to the direction of both. The distance of points with a similar magnitude of E and H is the *wave length*, λ; the number of oscillations in unit time at a given point is the *frequency*, ν. The *velocity*, c, with which the waves travel through empty space is uniform for all radiations; hence $\nu = c/\lambda$. Cf. *light*. The *number of waves* per cm, is the wave-number, $n = 1/\lambda$, where λ is in cm.; or $n = 10^8/\lambda$, where λ is in A.U. See *Planck's constant*. The types of e.r. are shown in the diagram and table. It is assumed that all substances above the absolute zero of temperature send out e.r. at the cost of their own heat energy, the intensity of r. increasing with a rise in temperature and the radiations becoming shorter in wave length. Cf. *Rydberg formula, spectrum, Bohr atom.* **immaterial-** The vibratory disturbance of a medium; as, sound waves in air or electromagnetic waves in ether. **infraphotic-** See *electromagnetic-*. **K-, L, M . . .** See under *K, L, M*, etc. **material-** Corpuscular-. **mechanical-** Those material r. which cause a vibration or oscillation of molecules; as, infraphonic, sound, ultraphonic, and heat waves. **monochromatic-** A single colored r., which consists of waves of equal or approximately equal wave length. **photic-** See *electromagnetic-, light.* **polarized-** An electro-magnetic radiation in which the direction of the electromagnetic field of the waves is parallel; that is, the plane of the waves is parallel. In *plane* p. the plane remains constant; in *circular* p. the plane rotates, the vector describing a screw-like motion; in *elliptical* p. the plane rotates and also changes in quantity, the vector describing a helix wound around a rod of elliptical diameter. **solar-** (1) The r. of the sun which reaches the surface of the earth; its intensity is the "solar constant,"—the amount of energy per unit area and time: 1.938 cal. per min. per $cm.^2 = 1.35 \times 10^6$ erg per sec. per $cm.^2 = 1.81$ horse power per min. per $m.^2$ (2) The total radiation from the sun's surface, which is calculated to be 3.79×10^{33} ergs per sec. $= 5.43 \times 10^{27}$ cal. per min. or 5.08×10^{23} horsepower per minute. This quantity equals 89,500 cal. per min. per $cm.^2$; or 84,000 horse power per min. per $m.^2$ of the sun's surface. **ultraphotic-** See *electromagnetic-*.

r. constants. See *Planck's formula, Stefan-Boltzmann equation.* **r. effect.** The phenomena produced when r. falls on matter or is intercepted by a body. The effects of r. may be:

A. Physical,		*(Photophysical)*
1. mechanical		radiation pressure
2. thermal		pyroelectric thermionic thermallochromy
3. electrical		photoelectric
4. optical		luminescence fluorescence allochromy.
B. Chemical,		*(Photochemical)*
1. photographic	}	activation excitation ionization
2. phototechy		
3. photolysis		
4. oxidation and reduction		
5. synthesis, polymerization		
C. Biological		*(Photobiological)*
1. photosynthesis	}	irradiation
2. phototropy		
3. phototaxis		

r. hypothesis. See *r. theory* of chemical reaction. **r. pressure.** The force exerted by light on particles that it strikes; as, in the comet's tail, which is pushed away from the sun's direction. Cf. *radiometer*. On the earth surface r. pressure is exceedingly small; thus sunlight falling at right angles exerts a pressure of only 4.5×10^{-5} dynes (the weight of 1/28,000 cc. air). In the interior of a star it may assume enormous proportions; thus for the interior of the Sun, 8.5×10^{14} dynes per $cm.^2$ (a pressure of 83×10^7 atm.). **r. temperature.** See *radiator*. **r. theory of chemical reaction.** The application of the quantum theory to chemical reactions on the following assumptions: (a) Before a molecule can react, the electrons of its constituent atoms must become excited. (b) The energy, E, per gram molecule required to activate the molecule (the critical increment) may be calculated from the temperature coefficient of the reaction rate, K, by $\frac{d \log_2 K}{dT} = \frac{E}{RT^2}$. (c) Each molecule is activated by one quantum; hence, the total energy absorbed is, $E = Nh\nu$, where N is Avogadro's number or the number of molecules. Cf. *irradiation, radiometer*.

radiator. A body heated to incandescence, which emits an increasing amount of energy as the temperature is increased. **perfect-** Black body. A material absorbing all radiant energy (*i.e.*, reflecting no light) and transforming it into heat. Its emitting power is large and proportional to its temperature. The *total energy* of its radiation is proportional to the fourth power of its absolute temperature (Stefan's law). The *wave length* having maximum intensity is 0.289/T (Wien's law). The *intensity* of the radiations for any wave-length is found by Planck's equation.

radical. (1) A group of atoms that passes unchanged through a chemical reaction and behaves as a single atom; as, $(NH_4)^+$ or $(SO_4)^{=}$. The following symbols are used to indicate the more common radicals:

Ac	acetyl, CH_3CO— (also acetic or acyl)
Am	ammonium, NH_4— (or amyl)
Bu	butyl, C_4H_{10}—
Bz	benzoyl, C_6H_5CO—
Cy	cyan, CN—
Et	ethyl, C_2H_5—
Me	methyl, CH_3—
Ox	oxalic, $(COO)_2$=
Ph or φ, ϕ	phenyl, C_6H_5—
Pr	propyl, C_3H_7—

Compare also *Organic radicals*, q.v., and published by the chemical societies.
Other abbreviations frequently used are,

R	for radical
M	for any metal, usually monovalent
X	for any halogen or acid radical.

(2) A free radical, q.v. **acid-** An electronegative group of atoms that does not decompose in ordinary chemical reactions. See *acid radicals*. **acyl-** Ac. An acid organic radical of the general type R.CO—. **alkyl-** Al. An aliphatic organic radical; as, Me. or Et. **aryl-** Ar. Any aromatic organic radical; as, Ph. or Bz. **free-** In general, an unsaturated molecule, particularly a substance existing only in equilibrium with its

compounds; as, triphenyl methyl in equilibrium with its dimer hexaphenylethane, methyl in equilibrium with tetramethyl lead. **organic-** An unsaturated group of atoms which confers characteristic properties on a compound containing it, or which remains unchanged during a series of reactions; as —COOH carboxyl, or —CHO aldehyde radical. See *organic radicals, structure symbols.* **r. weight.** The sum of the atomic weights of the elements in the r.

radio- A prefix derived from the Latin which indicates a connection with rays or radiations. **r. chlorine.** *ra*Cl. See *chlorine.* **r. elements.** See *radioelements*, and table.

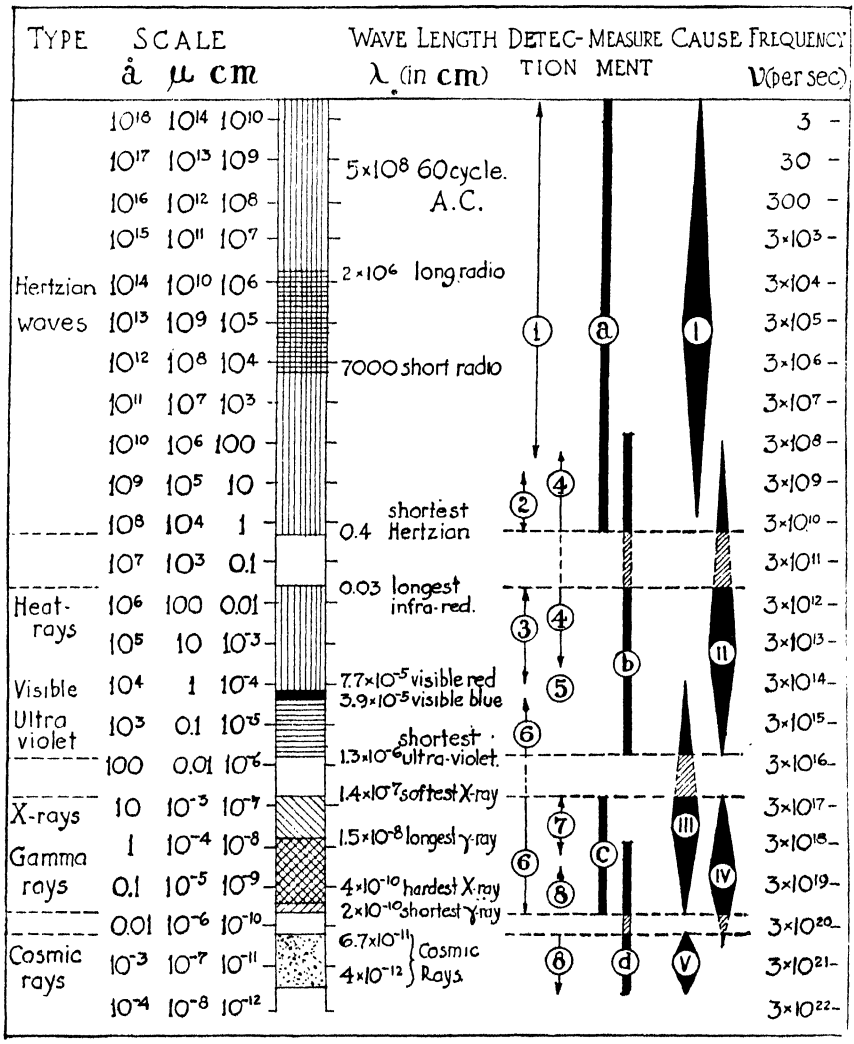
radioactinium. RaAc. A radioactive-disintegration product, atomic weight 226, atomic number 90, formed by the disintegration of actinium. It is an isotope of thorium and has a life period of 28.1 days and then disintegrates to actinium x.

radioactive. Having the property of giving off rays. **r. constant.** The factor, (λ), indicating the life period of a radioactive element in the equation, $\frac{dn}{dt} = \lambda n$, or $n = n_0 e^{-\lambda t}$; where n_0 is the number of atoms originally present, n, the number of atoms present after time t, and e the base of natural logarithms. **r. decay.** The speed of disintegration, given by:

$$N_1 = N_0 e^{-\lambda t} \quad \text{or} \quad N_1/N_0 = e^{-\lambda t}$$

where N_0 number of atoms originally present
N_1 number of atoms remaining after t time
λ radioactive transformation constant
e base of nat. log., 2.71828

r. disintegration. The breaking up of an atom of a radioactive element as indicated by the arrows in the figure. Thus a horizontal arrow indicates the loss of a helium nucleus (alpha-radiation); the element therefore becomes more electropositive and the atomic weight decreases by four. An inclined arrow indicates the loss of an electron (beta-radiation); the element therefore becomes more



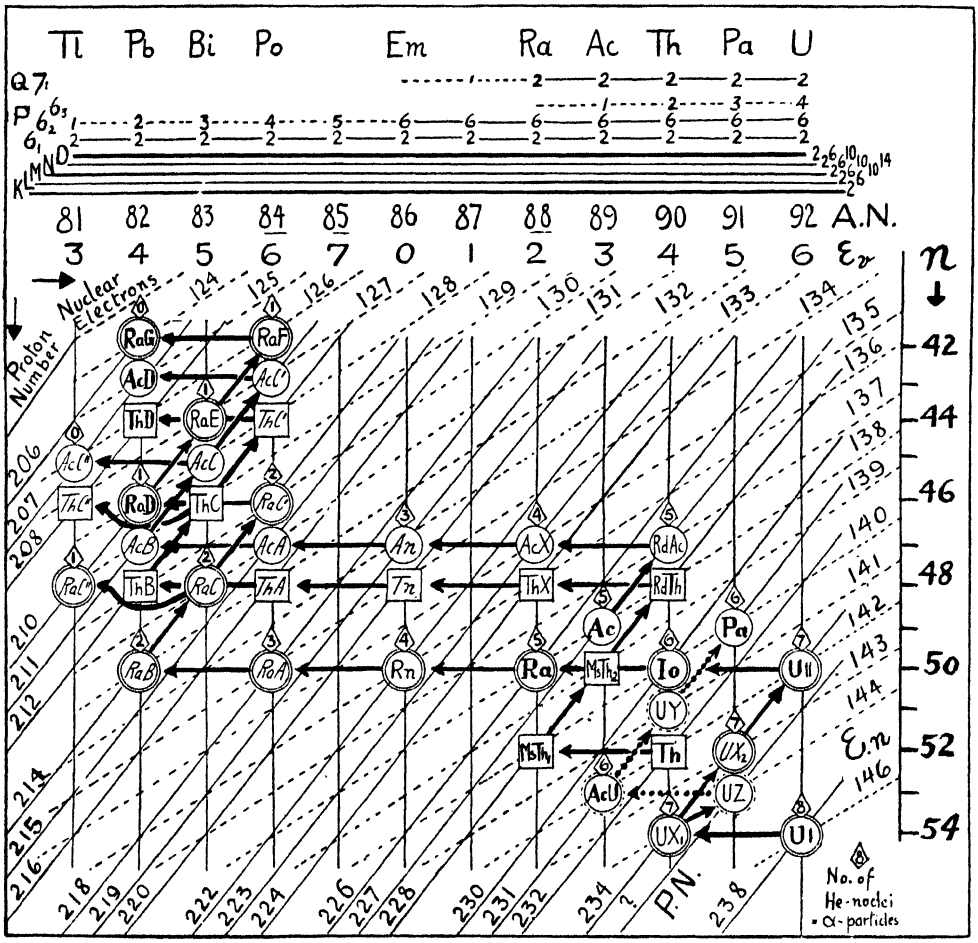
Electromagnetic radiations
showing wavelengths and methods of measurement.

ELECTROMAGNETIC SPECTRUM

Wavelengths		Type	Generation or cause	Detection	Measurement
In centimeters	In other units				
(1)	(2)	(3)	(4)	(5)	(6)
		Infraphotic radiations			
5×10^{3}	5000 km	Electric waves	I	1	a
2×10^{6}	20 km	long radio waves	I, II	1	a
5×10^{4}	500 m	long broadcast	II	1	a
2×10^{4}	20 m	short broadcast	II	1	a
1×10^{3}	10 m	short radio	II	1	a
1×10^{-2}	0.01 mm	shortest Hertzian	III	1, 2, 4	a, b
3×10^{-2}	0.03 mm	longest infrared	IV	3, 4	b
7.7×10^{-5}	7700 Å	shortest infrared	IV	3	b
		Photic radiations			
7.7×10^{-5}	7700 Å	longest visible	V	5	b
	7700-6470	red			
	6470-5860	orange			
	5860-5350	yellow			
	5350-4920	green			
	4920-4220	blue			
	4220-3900	violet			
3.9×10^{-5}	3900 Å	shortest visible	V	5, 6	b
3.9×10^{-5}	3900 Å	longest ultraviolet	VI	6	b
	3200-3000	tan-producing			
	3000-2700	anti-rachitic			
	2200-1800	Schumann rays			
	1200-130	Lyman rays			
1.3×10^{-6}	130 Å	shortest ultraviolet	VI	6	b
		Ultraphotic radiations			
1.4×10^{-6}	1000 Å	longest x-ray	VII	6, 7	c
	14 Å	soft rays			
	0.03 Å	hard rays			
1.4×10^{-8}	1.4 Å	longest gamma ray	VIII	6, 7	c, d
	0.5-0.06Å	therapeutic gamma			
3×10^{-10}	0.03 Å	shortest x-rays	VII	6, 7	c, d
1×10^{-10}	0.01 Å	shortest gamma rays	VIII	6, 7	c, d
8×10^{-12}	0.0008 Å	longest cosmic ray	IX	8	d
3×10^{-13}	0.00003 Å	shortest cosmic ray	IX	8	d

(1) *The wave lengths are given uniformly in centimeters.*
(2) Other units are: km. = kilometer, m. = meter, mm. = millimeter, Å = ångström units.
(4) *The generation or cause of these radiations is as follows:*
I—Coil rotating in magnetic field.
II—Oscillating triode valve, spark gap, etc.
III—Spark gap discharge.
IV—Heat radiations (chemical reactions).
V—Radiation from hot bodies and ionized gases.
VI—Radiations from very hot bodies and ionized gases.
VII—Emitted by sudden stoppage of fast-moving electrons.
VIII—Emitted when atomic nuclei disintegrate (radioactivity).
IX—Condensation of matter and transformation into energy.
(5) *The detection of the various radiations is shown by:*
1—Electric resonance in a receiving set (coherer, rectification and amplification).
2—Nichols' radiometer.
3—Bolometer.
4—Thermometer or thermocouples.
5—Selenium cell.
6—Photographic plate and phosphorescence.
7—Photoelectric effect.
8—Ionization of gas.
(6) *The measurement is accomplished by*
a—Quality of resonant electric circuit.
b—Interferometers or gratings.
c—Crystal diffraction.
d—Absorption coefficients.

electro-negative and the atomic weight remains the same. *artificial-* or *synthetic-* The breaking up of an element which has been exposed to bombardment with particles (protons, neutrons, deutons, etc). See *radioelements, nuclear reactions.* **r. earth.** Soil containing one microgram of radium per pound; used medicinally for external packs. **r. elements.** The elements of high atomic weight, which disintegrate spontaneously with the emission of various rays. There are three series beginning with uranium, actinium, and thorium (see table), and three types of radiation: (1) The emission of alpha-particles, or helium nuclei, lowers the atomic weight of the element by four and the atomic number by two. (2) Beta-particles, or negative electrons, increase the atomic number by one, as the element becomes more positive, but the atomic weight remains the same. (3) Gamma-rays, or x-rays, are a secondary phenomena caused by the beta-rays striking an obstacle. For synthetic or artificial r. elements, see *radio elements, nuclear reactions.* **r. equilibrium.** A state of balance in a mixture of radioactive elements consisting of products of such long life-periods that their radiations and compositions may be considered constant; or, the decay may be balanced by the formation of fresh products, as in the transformation of radon into helium. **r. indicator.** Radiothor. A r. substance, used to detect small quantities of its isotope in chemical analysis. It is mixed in minute amounts with the isotope, and the resulting mixture behaves as a single chemical substance, although the former



Radioactive disintegration

showing the uranium, actinium, and thorium series, and the relation existing between atomic weight, valency, rays and isotopes.

◎ = uranium-radium family; □ = thorium family; ○ = actinium family; ← α-rays, the atom loses one helium nucleus; ↗ β-rays, the atom loses one electron.

A, B..... Average life of isotope is over a year
A, B..... Average life of isotope is between one hour and a year
A, B..... Average life of isotope is less than one hour

The following relations exist: $A = e - n = (p - n)/2$, and $e = p - A = (n + A)$, where A is the *atomic number*, e the number of *nuclear electrons*, p the number of *protons* and n the number of *neutrons*.

RADIOACTIVE ELEMENTS AND CONSTANTS (1931)*

(1) Element	(2) Symbol	(3) Proton number	(4) Atomic number	(5) Half period T	(6) Average life τ	(7) Decay constant λ in (sec.)$^{-1}$	(8) Range R_{15}	(9) Absorption μ	(10) Rays	(11) Isotope of
Uranium family										
Uranium I	UI	238	92	4.4×10^9 yr.	$6.3.10^9$ yr.	5×10^{-18}	2.67	.....	α	U
uranium X_1	UX_1	234	90	24.5d.	35 4d.	3.28×10^{-7}	.....	460	β	Th
uranium X_2	UX_2	234	91	1.14m.	1.64m.	0.00101	.....	18	β	Pa
uranium Z	UZ	234	91	6.7h	9.7h.	2.87×10^{-5}	.....	270-36	β	Pa
uranium II	UII	234	92	3×10^5 yr.	4.3×10^5 yr.	7.4×10^{-14}	3.12	.....	α	U
uranium Y	UY	231 or 230	90	24.6h.	35.5h.	7.8×10^{-6}	.....	300	β	Th
Ionium-radium family										
Ionium	Io	230	90	8.3×10^4 yr.	1.2×10^5 yr.	2.6×10^{-12}	3.19	.....	α	Th
radium	Ra	226	88	1590 yr.	2295 yr	1.38×10^{-11}	3.39	312	α	Ra
radon	Rn	222	86	3.825d.	5.518d.	2.097×10^{-6}	4.12	.....	α	Em
radium A	RaA	218	84	3.05m.	4.40m.	3.78×10^{-3}	4.72	.....	α	Po
radium B	RaB	214	82	26.8m.	38.7m	4.31×10^{-4}	.....	890	β	Pb
radium C	RaC	214	83	19.7m.	38.5m.	5.86×10^{-4}	4.1	50	α, β	Bi
radium C'	RaC'	214	84	ca.10^{-6}s.	10^{-6}s.	10^6	6.96	.....	α	Po
radium C''	RaC''	210	81	1.32m	1.9m.	8.7×10^{-3}	.....	.....	β	Tl
radium D	RaD	210	82	22 yr.	31.7 yr.	1.0×10^{-9}	.....	5500	β	Pb
radium E	RaE	210	83	4.9d.	7.07d.	1.63×10^{-6}	.....	45.5	β	Bi
radium F	RaF	210	84	140d.	202d.	5.73×10^{-8}	3.87	.....	α	Po
radium G	RaG	206	82	∞	∞	0	.....	.....	...	Pb
Actinium family										
actinium uranium	AcU	.....	..	ca. 10^8 to 10^9 yr.	?	?	.....	.....	...	U?
uranium XY	See uranium family									Th
protactinium	Pa	231	91	3.2×10^4 yr.	4.6×10^4 yr	6.86×10^{-12}	3.67	126	α	Pa
actinium	Ac	227	89	13.5 yr.	19.4 yr.	1.63×10^{-9}	.....	?	β	Ac
radioactinium	RdAc	227	90	18.9d.	27.3d.	4.24×10^{-7}	4.68	175	α	Th
actinium X	AcX	223	88	11.2d.	16.2d.	7.14×10^{-7}	4.37	?	α	Ra
actinon	An	219	86	3.92s.	5.66s.	0.177	5.79	.....	α	Em
actinium A	AcA	215	84	2.10^{-3}s.	0.00288s.	347	6.58	.....	α	Po
actinium B	AcB	211	82	36m.	51.9m.	3.21×10^{-4}	.....	1000	β	Pb
actinium C	AcC	211	83	2.16m.	3.12m.	5.35×10^{-3}	(5.51)	} 29	α, β	Bi
actinium C'	AcC'	211	84	ca. 5.1^{-3}s.	ca. 10^{-3}s.	ca. 14.0	(6.5?)		α	Po
actinium C''	AcC''	207	81	4.76m.	6.87m.	2.43×10^{-3}	.....		β	Tl
actinium D	AcD	207	82	∞	∞	0	.....	.....	...	Pb
Thorium family										
thorium	Th	232	90	1.8×10^{10} yr.	2.5×10^{10} yr.	1.2×10^{-18}	.....	.....	α	Th
mesothorium 1	$MsTh_1$	228	88	6.7 yr.	9.7 yr.	3.26×10^{-9}	.....	?	β	Ra
mesothorium 2	$MsTh_2$	228	89	6.14h.	8.84h.	3.14×10^{-5}	.....	40	β	Ac
radiothorium	RdTh	228	90	1.90 yr.	2.74 yr.	1.16×10^{-8}	.....	420	α	Th
thorium X	ThX	224	88	3.64d.	5.25d.	2.20×10^{-6}	.....	.....	α	Ra
thoron	Tn	230	86	54.5s.	78.7s.	0.0127	.....	.....	α	Em
thorium A	ThA	216	84	0.14s.	0.20s.	4.95	.....	.....	α	Po
thorium B	ThB	212	82	10.6h.	15.3h.	1.82×10^{-5}	.....	153	β	Pb
thorium C	ThC	212	83	60.5m.	87.3m.	1.91×10^{-4}	.....	14.4	α, β	Bi
thorium C'	ThC'	212	84	10^{-6}s.	10^{-6}s.?	10^9(?)	.....	.....	α	Po
thorium C''	ThC''	208	81	3.1m	4.47m.	3.73×10^{-3}	.....	21.6	β	Tl
thorium D	ThD	208	82	∞	∞	0	.....	.....	...	Pb

* The names, symbols and constants are those preferred by the "International Radium-Standards Commission. *J. A. Chem. Soc.*, 1931, **53**, 2437.

(1), (2) Other synonyms are *Brevium*, Bv for UX_2; *emanation*, Em or *niton*, Nt, for the isotopes Rn, Ac, and Tn; *uranium-lead*, Pb^{206}, for RaG; *actinium-lead*, Pb^{207}, for AcD; *thorium lead*, Pb^{208}, for ThD; *polonium*, Po, for RaF; also the symbols *RaAc* for RdAc and *RaTh* for RdT.

(3) Proton number, or isotopic weight, is the number of hydrogen nuclei.

(4) Atomic number is the charge on the kernel, or the number of electrons.

(5) Half period, T, is the time in which the quantity of radioactive substance is reduced to one half. yr. = year d. = day, h. = hour, m. = minute, s. = second.

(6) Average life, τ, is the average life of radioactive atoms.

(7) Decay constant, λ, is given in seconds, $\tau = 1/\lambda$. 1 Year = 3.155693×10^7 seconds.

(8) Range in cm. of the radiations in air at 15°C., 760 mm.

(9) Absorption coefficient, μ, in aluminum, the thickness of which is measured in cm.

(10) Rays, or type of decay.

may always be detected by its radioactivity. **r. substance.** A substance that contains a radioactive element. **r. units.** See *radium units.*

radioactivity. The phenomenon of spontaneous disintegration of elements accompanied by the emission of rays. It is shown usually by elements of atomic weight higher than lead, and is not affected by chemical or physical influences. **artificial-** Induced r. **induced-** Artificial-, synthetic r. A temporary r. caused in an element of lower atomic number than lead by bombardment with particles. Cf. *radioelements, nuclear reactions, radiosodium.* **supra-** The type of r. characteristic of hypothetical elements with atomic numbers higher than 92. Cf. *transuranium, hypon.* **synthetic-** Induced.

radiobiology. A branch of science that studies the effects of radiations, especially of light, on living organisms.

radiochemistry. A branch of science dealing with radioactive elements and their reactions. Cf. *nuclear chemistry.*

radioelements. (1) The elements of atomic numbers, 82 to 92, lead to uranium. Other elements however, may be slightly radioactive (as potassium). (2) Synthetic or artificial r. An element of low atomic number which is made temporarily radioactive by exposure to high velocity protons, deuterons, neutrons or alpha-particles; as,

$$_5B^{10} + {}_2He^4 \rightarrow {}_0n' + {}_7N^{13} \text{ (radio nitrogen)}$$
$$_{12}Mg^{24} + {}_2He^4 \rightarrow {}_0n' + {}_{14}Si^{27} \text{ (radio silicon)}$$
$$_{13}Al^{27} + {}_2He^4 \rightarrow {}_0n' + {}_{15}P^{30} \text{ (radio phosphorus)}$$

In each case the r. formed is short-lived and breaks up:

$$ra\text{N or } {}_7N^{13} \rightarrow {}_6C^{13} + e^+$$
$$ra\text{Si or } {}_{14}Si^{27} \rightarrow {}_{13}Al^{27} + e^+$$
$$ra\text{P or } {}_{15}P^{30} \rightarrow {}_{14}Si^{30} + e^+.$$

Cf. *nuclear reaction, proton bombardment, radiosodium.*

RADIOELEMENTS

Production (1)	Radio-element (2)	Half-life (3)	Energy (4)	End-product (5)
Positron emitters = (PE)				
$\alpha + {}_3Li^6$	$_4B^9$	1 m.	0.3	$_4Be^9$
$d + {}_5B^{10}$	$_6C^{11}$	21 m.	1.3	$_5B^{11}$
$p + {}_6C^{12}$, $d + {}_6C^{13}$	$_7N^{13}$	10.3m.	1.25	$_6C^{13}$
$d + {}_7N^{14}$	$_8O^{15}$	2.1m.	1.7	$_7N^{15}$
$d + {}_8O^{16}$, $\alpha + {}_7N^{14}$	$_9F^{17}$	1.2s.	2.1	$_8O^{17}$
$\alpha + {}_9F^{19}$	$_{11}Na^{22}$			$_{10}Ne^{22}$
$\alpha + {}_{12}Mg^{24}$	$_{14}Si^{27}$	14.5m.		$_{13}Al^{27}$
$\alpha + {}_{13}Al^{27}$	$_{15}P^{30}$	3.2m.	3.	$_{14}Si^{30}$
Electron emitters = (EE)				
$d + {}_3Li^7$	$_3Li^8$	0.5s.	10	$_4Be^8$
$\alpha + {}_3Li^7$, $d + {}_4Be^9$	$_4Be^{10}$	~10 yrs.	0.3	$_5B^{10}$
$d + {}_5B^{11}$	$_5B^{12}$	0.02s.	11	$_6C^{12}$
$d + {}_6C^{13}$, $n + {}_7N^{14}$	$_6C^{14}$		1	$_7N^{14}$
$d + {}_7N^{15}$, $n + {}_9F^{19}$	$_7N^{16}$	10s.	6	$_8O^{16}$
$n + {}_9F^{19}$	$_8O^{19}$	40s.		$_9F^{19}$
$d + {}_9F^{19}$, $n + {}_{11}Na^{23}$	$_9F^{20}$	12s.	5	$_{10}Ne^{20}$
$n + {}_{12}Mg^{26}$	$_{10}Ne^{23}$	38s.		$_{11}Na^{23}$
$d + {}_{11}Na^{23}$, $n + {}_{13}Al^{27}$	$_{11}Na^{24}$	15 hr.	1.7	$_{12}Mg^{24}$
$n + {}_{12}Mg^{26}$	$_{12}Mg^{27}$	10m.	0.6	$_{13}Al^{27}$
$n, d + {}_{13}Al^{27}, \alpha + {}_{12}Mg^{25}$	$_{13}Al^{28}$	2.3m.	3.3	$_{14}Si^{28}$
$n, d + {}_{14}Si^{30}$, $n + {}_{15}P^{31}$	$_{14}Si^{31}$	2.4 hr.	1.85	$_{15}P^{31}$
$n + {}_{16}S^{32}$, $d + {}_{15}P^{31}$	$_{15}P^{32}$	15d.	1.7	$_{16}S^{32}$
$n + {}_{17}Cl^{35}$	$_{17}Cl^{36}$	50m.	2	$_{18}A^{36}$

(1) The general form of production is by bombardment with

p, protons: $_1H^1 + {}_aN^m = {}_{(a+1)}N^{(m+1)}$ (PE)

d, deuterons: $_1H^2 + {}_aN^m = {}_0n^1 + {}_{(a+1)}N^{(m+1)}$ (PE)
$_1H^2 + {}_aN^m = {}_1H^1 + {}_aN^{(m+1)}$ (EE)

n, neutrons: $_0n^1 + {}_aN^m = {}_1H^1 + {}_{(a-1)}N^m$ or
$_2He^4 + {}_{(a-2)}N^{(m-3)}$ (EE)

α, alpha-particles: $_2He^4 + {}_aN^m =$
$_0N^1 + {}_{(a+2)}N^{(m+3)}$ (PE)
$_2He^4 + {}_aN^m =$
$_1H^1 + {}_{(a+1)}N^{(m+3)}$ (EE)

(2) The radioelement of short life is either a (PE) = *positron emitter*, and changes to an element of next lower atomic number: $_aN^m \rightarrow {}_{(a-1)}N^m + e^+$; or an (EE) = *electron emitter*, and changes to an element of next higher atomic number:
$$_aN^m \rightarrow {}_{(a+1)}N^m + e^-$$

(3) Half-life, in s.-seconds, m.-minutes, hr.-hours, d.-days, yr.-years.

(4) Maximum energy, in MEV.

(5) The final and stable end-product.

radiogenic. Produced by radioactive action; as, uranium lead.

radiogram. (1) Röntgenogram. (2) Laue pattern. (3) Skiagraph.

radiograph. Röntgenogram. They have been divided into *exographs* (taken with x-rays), and *gammagraphs* (taken with γ-rays).

radiography. Skiagraphy. Photography with x-rays. **mass-** The routine X-ray examination of large numbers of persons by the reproduction of an x-ray image on a fluorescent screen, on a much-reduced scale, on a photographic film; used in tuberculosis studies.

radiolead. (1) The natural radioactive mixture of lead isotopes in minerals. (2) Radium G, PbRa, RaΩ or Pb^{206}. A radioactive disintegration-product of radium F and an isotope of lead.

radiolite. A variety of natrolite.

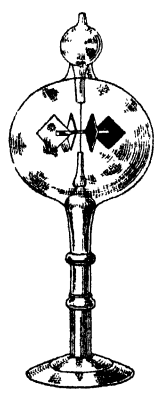
radiology. A branch of science that studies radioactivity and radioactive elements.

radiolucent. Offering some resistance to the passage of x-rays. Cf. *radiopaque, radioparent.*

radioluminescence. Fluorescence caused by radioactive rays striking an obstacle or screen treated with a suitable substance.

radiometallography. The examination of the structure of metals, especially steel, by photography with radioactive substances and fluorescent screens.

radiometer. (1) An instrument for measuring the penetrating power of radioactive rays. (2) An apparatus which measures the mechanical effect of light, q.v. (3) A bolometer. (4) A thermocouple. Cf. *radiator.*



Radiometer (2).

radiomicrometer. A delicate thermopile, used to detect small changes in the intensity of a radiation.

radion. An obsolete term for a particle thrown off by a radioactive element (see *alpha-particles, beta-particles*). Cf. *radon.*

radionitrogen. See *nitrogen.*

radiopaque. Impervious to the passage of x-rays. Cf. *opaque, radiolucent, radioparent.*

radioparent. Allowing the passage of x-rays freely. Cf. *transparent, radiopaque, radiolucent.*

radioscope. An electroscope used to detect radioactive substances.

radiosodium. See *sodium.*

radiostol. Viosterol.

radiotellurium. Polonium.

radiotherapy. Radium therapy.

radiothor. Radioactive indicator.

radiothorium. RaTh. A radioactive element, atomic number 90; disintegration-product of mesothorium-2. It is an isotope of thorium, and disintegrates to thorium-x.

radiovision. The transmission of pictures by wireless telegraphy. Cf. *television, teleopsis.*

radish. The root of *Raphanus sativus*, a Cruciferae, used as a vegetable. Its coloring matter is an indicator.

radium. Ra = 226.05. A radioactive element, atomic number 88; a disintegration-product of ionium. It is a homotope of barium, and isotope of thorium X, actinium X and mesothorium 1, which disintegrates to radon and helium, and was discovered in 1898 by Dr. and Madame Curie. It is a gray powder, m.700, decomp. by water, and forms a series of salts. It is extremely toxic, and deposits in the bones of organisms. **RaA, RaB, RaC,** etc. See *radioactive elements;* also table of radioactive elements and radium units. **r. bath water.** Water which contains 4 micrograms of radium per 200 cc. and is colored with fluorescein; used medicinally. **r. bromide.** $RaBr_2$ = 385.8. A colorless crystalline powder, soluble in water, alcohol or ether (sublimes, 900). Used medicinally, usually in admixture with $BaBr_2$. **r. carbonate.** $RaCO_3$ = 286.0. A white amorphous powder; insoluble in water, decomposed by acids. It is marketed as a mixture with $BaCO_3$. **r. chloride.** $RaCl_2$ = 296.5. A yellowish crystalline powder, m.1650; soluble in water. Used medicinally as a mixture with $BaCl_2$. **r. compress.** An oiled silk bag, which contains finely-ground radium ore and barium sulfate; used in the treatment of rheumatism and neuralgia. **r. drinking water.** A distilled water which contains 1 microgram radium in 30 cc; used medicinally. **r. emanation.** Radon. **r. F.** Polonium. **r. G.** Radio-lead. **r. sulfate.** $RaSO_4$ = 322.0. A white powder; insoluble in water or acids. It is marketed as a mixture with $BaSO_4$. **r. therapy.** Curie therapy. The use of radioactive substances in the treatment of disease. It is used either externally or internally. **r. units.** The amount of radium, or its activity, is usually expressed in: (1) Micrograms of radium (0.001 mg.). (2) Curies, (q.v.) millicuries, and microcuries; the emanation from 1 gram, 1 milligram, and 1 microgram of radium, respectively. (3) Mache units (q.v.), a concentration of radium emanation corresponding with $\frac{1}{2500}$ microcurie. Cf. *urane.*

radius. Any line from the center to the circumference of a circle:

$$\text{radius} = \tfrac{1}{2}\ \text{diameter} = \text{circumference}/\pi$$

radix. The Latin term for root. **r. sarsale.** Sarsaparilla.

radon. Rn = 222. Niton, radium emanation. The element of atomic number 86; the last member of the series of noble or inert gases. It occurs in radioactive minerals, and is produced as a result of radioactive disintegration. Discovered by Mme. Curie in 1898 (niton), and isolated by Dorn in 1901. It has a life of 5.5 days, and liquefies at −153°C to a colorless liquid, b. −65°C. The liquid solidifies at −71°C, d.9.97, and glows with a blue light which turns orange at lower temperatures.

***ra*F.** Radiofluorine.

RaF. Radium F.

raffia. Raphia.

raffinase. An enzyme that hydrolyzes raffinose, and appears to be identical with invertase. Cf. *melibiase.*

raffinate. A refined oil produced in the fractionation of crude lubricating oils.

raffinose. $C_{18}H_{32}O_{16}.5H_2O$ = 594.4. Melitriose, melitose. A carbohydrate derived from sugar beets, cottonseed, eucalyptus and other plants, which is hydrolysed to fructose, glucose and galactose. Colorless monoclinic needles, d.-1.465, m.119, soluble in water or alcohol.

RaG. Uranium-lead.

Ragsky test. The toxicological detection of chloroform by the reaction:

$$\underset{}{6CHCl_3} \rightarrow \underset{a}{C_6Cl_6} + \underset{b}{3Cl_2} + \underset{c}{6HCl};$$

a is deposited as white needles, *b* detected by iodide-starch paper and *c* absorbed by $AgNO_3$ solution.

ragweed. The dried leaves and flowers of *Ambrosia artemisiaefolia;* used as the fluid extract, as an astringent and styptic.

ragwort. Senecio.

raies ultimes. Ultimate lines. The strongest lines of a spectrum; those most easily and most persistently obtained from a given element, and used to identify it.

raised growth. A thick and heavy bacteria growth, with abrupt or terraced edges.

raisin. The dried ripe fruit of *Vitis vinifera* (grapes), a Vitaceae; used as food. **r. seed oil.** Grape seed oil. A yellow oil expressed from ground r. seeds, d.0.92-0.93. Used in foods, as a lubricant, and in soap making.

ralstonite. The mineral, $[3Al(OH,F)_3,(Na_2,Mg)F_2.2H_2O$.

Raman, Sir Chandrasekhara Venkata. 1888– . An Indian physicist and Nobel Prize winner. **R. effect.** The scattering of monochromatic light accompanied by a change in wavelength, due to the absorption of energy quanta by the scattering medium. Cf. *scattering, luminescence.* **R. lines.** The shift of wavelengths of spectrum lines of scattered light from a medium illuminated with monochromatic light. They indicate molecular structure and the type of atomic bonds. **R. spectrum.** The characteristic line patterns produced on a photograph taken at right angles through a substance illuminated with a quartz mercury lamp.

RAMAN LINES

Wavelength shift in cm.$^{-1}$	Bond	Type of compound
900	C—C	paraffins
1374	C=C	olefines
600, 1700	C=O	fatty acids
1050, 1250, 1360	C—O	primary alcohols
3400	O—H	water or methanol
3300	N—H	amines
1050	C—N	cyanides
739, 657	C=S	thioacids
2573	S—H	mercaptans

ramie. Rhea fiber. The bastfiber from *Boehmeria tenacissima*, a plant of the nettle family. It is used for weaving grass-cloth or Canton linen, and consists of almost pure cellulose. **false-** China grass from *B. nivea.*

ramigenic acid. $C_{16}H_{20}O_6$ = 308.2. An acid produced by the mould fungus, *Penicillium Charlesii.*

rammelsbergite. A native nickel arsenide, $NiAs_2$.

Ramsay, Sir William. 1852–1916. A British chemist who discovered the noble gases and

Sir William Ramsay.

some radioactive elements. **R.-Shields equation.** A relation which indicates the degree of association of molecules:

$$\gamma(MV)^{\frac{2}{3}} = K(t_c - t - 6)$$

where γ is the surface tension, MV the molecular volume, t_c the critical temperature, t the temperature of the liquid; K is 2.12 ergs per degree for a normal liquid. Cf. *Morgan* equation. **R.-Young equation.** An expression of the relation existing between the pressure, p, and absolute temperature, T, of a gas or homogeneous liquid, the volume being constant: $p = (kT - c)$, where k and c are constants. **R. and Young law.** The ratio of the boiling points of chemically analogous compounds at the same pressure is independent of the pressure: $A/B = A'/B'$, where A is the boiling point of compound a, B the boiling point of b at pressure x, A′ the boiling point of a, and B′ the boiling point of b at pressure y, hence $a_x/b_x = a_y/b_y$.

Ramsden ocular. See *ocular.*

rancid. Having the peculiar tainted smell of oily substances which have begun to spoil. Rank and sour from chemical decomposition; as rancid butter.

rancidity. A condition of partly-decomposed fats or oils, due to the formation of free fatty acids.

Raney's alloy. An alloy (Ni 30, Al 70) used in place of Devarda's alloy (q.v.) for the determination of nitrates by reduction to ammonia. **R. catalyst.** Ni_2H.(?) R. nickel. A highly-active, finely-divided nickel catalyst, prepared by dissolving the Al out of R. alloy by alkali; used for hydrogenating organic compounds.

Rankine scale. A thermometer scale based on absolute zero of the Fahrenheit scale; $-460°F = 0°R$; or $(t_F + 460) = x°R$. It corresponds with the Kelvin scale based on the Centigrade scale.

rankinite. $3CaO.2SiO_2$. A natural calcium silicate from Ireland; it is a constituent of high-lime blast furnace slags.

Ranunculaceae. The crowfoot family, a group of herbaceous or shrubby plants with an acrid juice. Some of the species are:

Cimicifuga racemosa	black cohosh
Hydrastis canadensis	golden seal
Actaea alba	white cohosh
Actea spicata	helleborin
Coptis trifolia	gold thread
Helleborus niger	black hellebore
Helleborus viridis	green hellebore
Xanthorrhiza apiifolia	yellow root
Anemone pulsatilla	pasque flower
Adonis vernalis	false hellebore
Ranunculus bulbosus	butter cup
Delphinium staphisagria	stavesacre
Delphinium consolida	larkspur seeds
Nigella damascena	nigella
Nigella sativa	nigella
Aconitum napellus	monkshood
Anemone hepatica	liverwort
Paeonia officinalis	peony

Cf. *aconite alkaloids, Clematis, Delphinium, macrocarpine, thalicitrine.*

ranunculine. An alkaloid from *Ranuncula* species. It is a cardiac poison.

Raoult, François Marie. 1830–1901. A French chemist noted for his generalizations in physical chemistry. **R.'s law.** (Cf. *Blagden's Law, Coppet's law.*) The lowering of the freezing point or of the vapor pressure of a solution is proportional to the amount of substance dissolved in the solution:

$$\frac{p_0 - p}{p_0} = \frac{n}{N + n} = \frac{aM}{bm},$$

where p is the vapor pressure of the solution; p_0, that of the pure solvent; n, the number of molecules of dissolved substance; N, the number of molecules of solvent; a, the weight in grams of the solute of molecular weight, m; b, the weight in grams of the solvent of molecular weight, M. It is thus possible to determine the molecular weight of a substance from the lowering of the vapor-pressure of its solution.

*ra***P.** Radiophosphorus.

rape seed oil. Colza oil, rape oil. A brown, viscous, fixed oil expressed from the seeds of rape, *Brassica napus*, a Cruciferae. It has an unpleasant odor, $d._{25}^{25}$0.906–0.910, solidifies at −2 to −10°C, m.20, soluble in alcohol, ether or chloroform. Used as a lubricant, in the heat treatment of steel, and in the manufacture of rubber substitutes.

raphia. Raffia. A fiber peeled from the leaves of *Raphia pedunculata*, a palm of Madagascar; used for making mats and basketry.

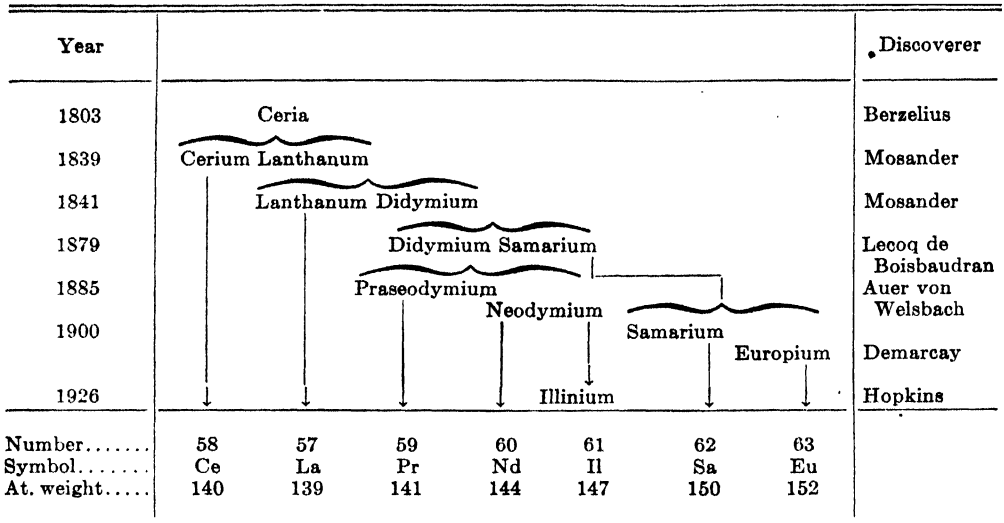
raphides. Small crystals of calcium oxalate in plants.

rapic acid. Rapinic acid.

rapinic acid. $C_{18}H_{34}O_2$ = 282.27. An unsaturated, monobasic acid and isomer of oleic acid, probably identical with petroselinic acid, in rape seed oil.

rare. Not common. **r. earths.** (1) The oxides of the r. earth metals; as, ceria, holmia. (2)

1. RARE EARTH METALS OF THE CERIA GROUP



In a wider sense, the oxides of Sc, Y, La and even of Hf, Zr, Th. **r. earth metals.** The metallic elements, atomic numbers 57 to 71, of the periodic system. They are grouped in two classes, the ceria earths and yttria or gadolinite earths, and are closely similar in physical and chemical properties, forming one group in the periodic system. The rare earth group differs from all other groups of the periodic system because its elements have consecutive atomic numbers. (See tables.) **r. e. minerals.** The rare earth metals generally occur associated with one another as phosphates and silicates; *e.g.*,

zircon..... $ZrSiO_4$
thorite..... $ThSiO_4$
monazite..... $CePO_4$
gadolinite..... $Be_2FeYt_2Si_2O_{10}$
cerite..... $H_3(Ca,Fe)Ce_2Si_2O_{13}$
orthite..... $AlOHCa_2(Al,Fe,Ce)_2(SiO_4)_3$

Each of these minerals is always accompanied by a number of the other rare earths. Cf. *bastnasite, fergusonite, fluocerite, rowlandite, rutherfordite, samarskite, sipylite, xenotime, yttriotantalite.*

rare gases. The noble gases (He, Ne, A, Kr, and Xe).

rarefaction. The act of making less dense, either by increasing the volume without changing the amount of gas, or by decreasing the amount of gas in a certain volume; as, with a vacuum pump.

rarefied. Describing a gas at lower pressure than atmospheric.

rasmosin. A resin from the root of *Cimicifuga racemosa*, a Ranunculaceae.

rasorite. $Na_2B_4O_7.4H_2O$. Kernite. A hydrated sodium borate found native in California. Colorless monoclinic crystals, d.1.908, hardness 2.5.

raspberries. The fresh ripe fruits of *Rubus idaeus*, a Rosaceae; used as food and in pharmaceutical preparations.

raspberry leaves. The dried leaves of *Rubus* species; used as the fluid extract, as an astringent.

rat. White rat, *Rattus norvegicus*, used in animal experiments. **r. unit.** (1) The minimum quantity of pituitary hormone which will cause the formation of one or more corpora lutea within 96–100 hrs., when injected subcutaneously in six doses, twice daily for three days, in female white r. 30 days old. (2) A method of expressing the vitamin A potency of a substance in terms of its therapeutic effect on rats.

ratafia. A cordial prepared by crushing and steeping fruit kernels.

ratany. Krameria.

ratholite. Pectolite.

rate. The relative degree of speed. **r. of decomposition, r. of formation.** The velocity of a chemical, reaction expressed in mols per second per cc. or in mols per hour per liter.

ratio. Proportion.

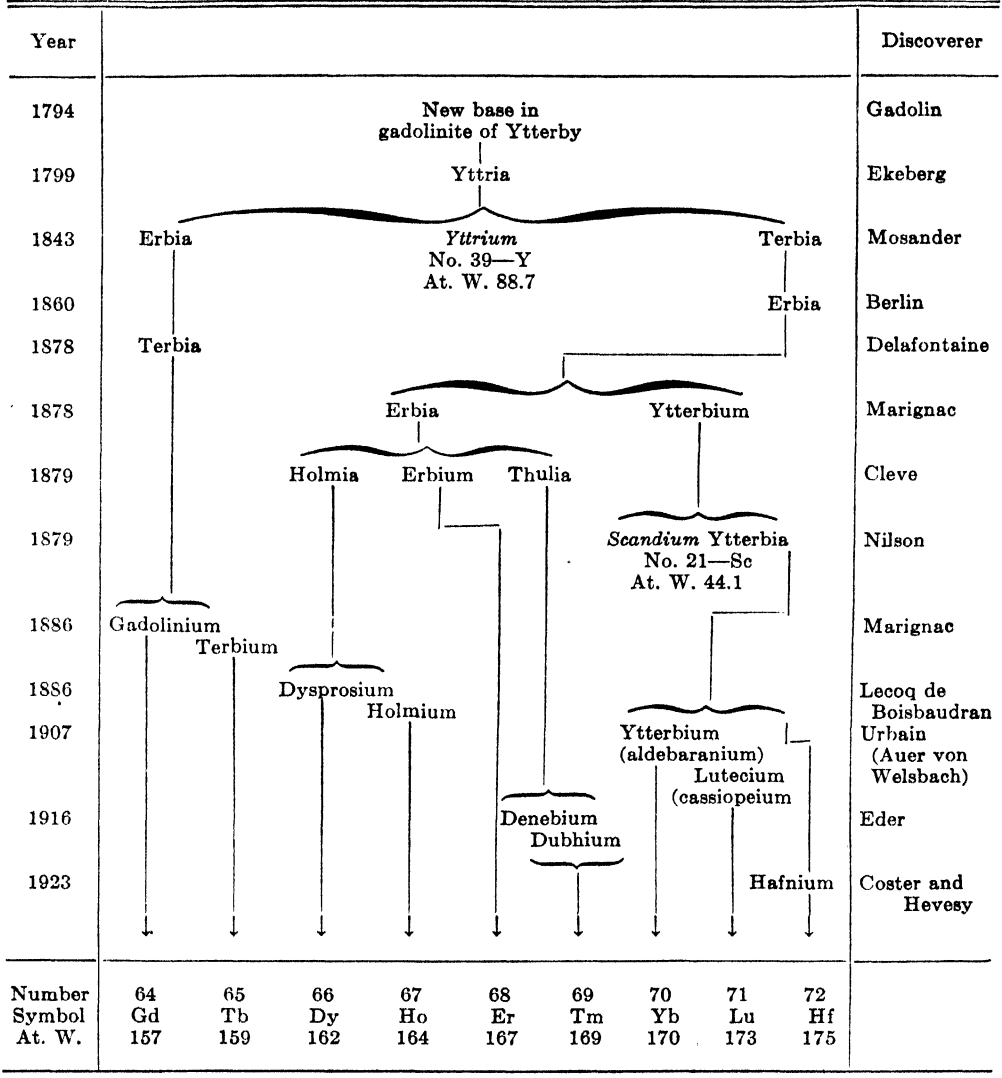
ration. The daily allowance of food and drink.

rational. Based on reasoning and not on direct experience. **r. analysis.** The expression of analytical results in such a way that the method of combination of the elements is indicated (*e.g.*, water analysis), as compared with ultimate analysis in which their quantities are returned. Thus, clay would be expressed in terms of calcium silicate, rather than as Ca, Si and O. Cf. *ultimate.* **r. formula.** A combination of chemical symbols that indicates the way in which the atoms are probably linked in the molecule. It is less elaborate than the structural formula, and more definite than the empirical formula. In a rational formula; such as, $Fe_2(SO_4)_3$, NH_4OH, C_2H_5OH, CH_3COOH, the atoms are grouped into one or more radicals. **r. units.** See *ultimate units.*

rattlesnake root. Senega. **r. venom.** The poisonous proteins from the fangs of *Crotalus* species. (Antidote: external application of potassium permanganate.)

Raulin's solution. A culture fluid for fungi, molds, etc. consisting of 70 gm. sucrose, 4 gm. tartaric acid, 4 gm. ammonium nitrate, 0.6 gm. ammonium phosphate, 0.25 gm. ammonium sulfate, 0.07 gm. potassium silicate, 0.6 gm. potassium carbonate, 0.4 gm. magnesium

2. RARE EARTH METALS OF THE YTTRIA GROUP

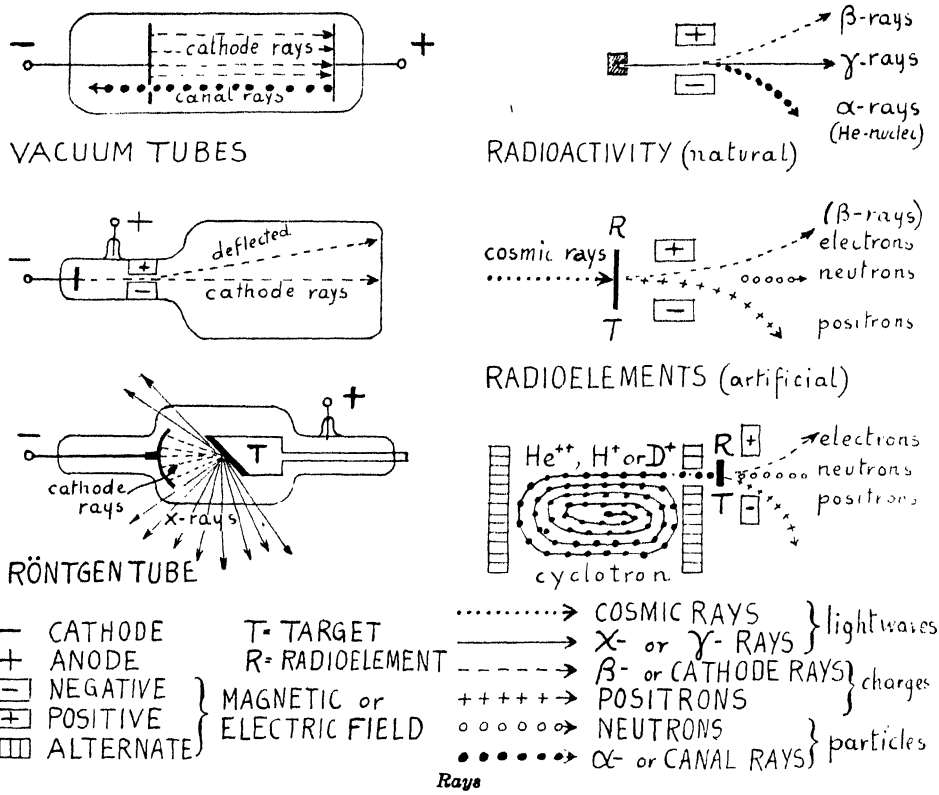


carbonate, 0.07 gm. zinc sulfate and 0.08 gm. ferric sulfate per liter.

rauwolfine. $C_{20}H_{26}N_2O_3.2\frac{1}{2}H_2O$ = 387.2. An alkaloid, decomp. 235, from the bark of *Rauwolfia caffra*, an Apocynaceae.

raw. Crude or unfinished. **r. material.** A material from which useful substances or compounds can be made. **r. ore.** An ore in the state in which it is won.

ray. A pencil or beam of light, heat, or rapidly-moving particles. Cf. *radiation*, and illustration. **absorbed-** A light ray transformed into heat (molecular motion) by passing through matter. **actinic-** Chemically-active light, especially ultra-violet light. **alpha-** Alpha-particles. Positively-charged helium nuclei moving at great velocity and produced by the disintegration of radioactive elements. They are similar to canal rays. **Becquerel-** The x-rays produced as a result of the disintegration of radioactive elements; they affect a photographic plate. **beta-** Negatively-charged electrons, moving at great velocity and produced by the disintegration of radioactive elements. They are identical with cathode rays. **Blondlot-n-*Rays*.** **canal-** Positively-charged particles, similar to alpha-particles, but produced by an electric discharge through an evacuated tube having a perforated cathode through which the particles pass. **cathode-** Negatively-charged particles or electrons, moving at great velocity at right angles to the cathode of a vacuum tube and causing the emission of x-rays whenever they strike a solid. They are similar to the beta-rays of radioactive substances. **chemical-** Actinic-. **cosmic-** Millikan rays, ultra-gamma or ultra-x-rays. Radiations of extremely short wave lengths coming from all directions of space toward the earth's surface. **extraordinary-** See *ordinary-*. **gamma-** The x-rays produced by the impact of the beta-rays emitted by radioactive elements against a solid. **hard-** X-rays of short wavelength; they have greater penetrating powers than the



Rays
showing methods of production and relationships.

soft-. **heat-** See *infrared-*. **infrared-** The radiations beyond the red portion of the visible spectrum; they have greater wave lengths than this portion, and are heat radiations. **K-** See *K-radiations*. **L-** See *L-radiations*. **Lenard-** Residual cathode rays that pass from the vacuum tube into the atmosphere through specially-prepared windows of thin metal foils. **M-** See *M-radiations*. **Millikan-** See *cosmic-*. **molecular-** See *molecular rays*. **n-** Blondlot rays. A non-luminous radiation emitted from certain flames, that produces fluorescence when it strikes certain substances. **negative-** Cathode- or beta-. **od-** The radiations of living organisms. Cf. *scotography*. **ordinary-** See *ordinary*. **phonic-** Sound waves. **photic-** Visible light rays. **positive-** Canal- and alpha-. **Röntgen-** X-rays. **secondary-** Radiation produced after a primary ray strikes matter. **soft-** Any x-ray of long wavelength that has low penetrating powers. **ultimate-** See *raies ultimes*. **ultragamma-** See *cosmic r.* **ultraviolet-** The radiations from the portion beyond the violet end of the visible spectrum; they are of shorter wavelength than visible violet and produce fluorescence. **u.v.-** Ultraviolet-. **w-** R. between u.v.- and **x-**. **x-** Röntgen rays. A form of non-luminous radiation, usually produced by cathode rays striking a solid. It is assumed to be the ether disturbance caused by the bombardment of the negative electrons when they collide with the molecules of the solid substance. Cf. *x-rays*.

Ray, Sir Prafulla Chandra 1861–1944. A Hindu chemist, noted for his work on the organic nitrites and history of chemistry.

Rayleigh, (John, William Strutt) Lord. 1842–1919. An English physicist, noted for the discovery of the noble gases, and determinations of the densities of gases. **R., Lord Robert John** 1875– . An English physicist noted for his work on radioactivity and optics.

rayolanda. Trade name for a chemically-modified viscose rayon.

rayon. Artificial silk or any artificial substance whose chief ingredient is cellulose or one of its derivatives. Thread, yarn or fiber, made from cellulose derived (*e.g.*, from wood or cotton) chemically treated. Four main types: (1) **acetate r.** The acetic ester of cellulose. It is prepared by treating the cellulose of cotton or wood pulp with acetic anhydride, acetic acid and concentrated sulfuric acid in presence of a catalyst, precipitating with water and dissolving in acetone, from which it is spun. Trade names are celanese and lustron. (2) **cuprammonium r.** (**glanzstoff** or Pauly) is made by dissolving cotton or wood pulp in an ammoniacal copper solution, which is ejected through fine orifices into a setting bath of dilute sulfuric acid. (3) **nitrocellulose r.** (Chardonnet) is prepared by treating cotton with nitric and sulfuric acid, dissolving the resulting trinitrocellulose in alcohol and ether (collodion solution) and ejecting through fine nozzles into water or warm air. The inflammable filaments are in turn denitrated by treatment with sodium hydrosulfide. (4) **viscose r.**; the commonest process of making r. involves soaking bleached spruce pulp or cotton linters in 18 % caustic soda solution, treating the soda cellulose

with carbon disulfide (**xanthation**) dissolving in caustic soda (**viscose**), and finally forcing the viscose through fine outlets into a setting and bleaching bath. The total World output of rayon in 1940 was 450,000 tons; the U. S. and Japan were the biggest single producers.

razor stone. Novaculite.

Rb. The symbol for rubidium.

rd. An abbreviation for rod.

Re. The symbol for rhenium.

Ré. Abbreviation for Réaumur.

react. To enter into a chemical combination.

reactants. The original molecules that act upon one another to form a new set of molecules (resultants).

reacting. Undergoing a reaction. **r. weight.** Equivalent weight.

reaction. (1) That force which tends to oppose a given force (Newton's Laws). (2) The acidity (q.v.) or alkalinity of a solution. (3) Any chemical change, or the transformation of one or more molecules (reactants) into other kinds of molecules (resultants). Reactions may be grouped into: (1) *synthetic* (combination and addition); (2) *analytic* (decomposition and dissociation); (3) *metathetic* (an interaction of molecules as neutralization, precipitation, substitution, displacement). Modern theory places r. in two types:

I. **Proton-** or *acid/base-*, where a hydrogen ion is either liberated or bound:

$$A \rightleftharpoons B + H^+.$$

This equilibrium is maintained by buffers (q.v.), and measured by p_H-values. Cf. *displacement series.*

II. **Electron-** or *oxidation/reduction-*, where an electron is transferred from one atom to the other:

$$A \rightleftharpoons B + e \qquad \text{or} \qquad H + e.$$

This equilibrium is maintained by poisers (q.v.), and measured by r_H-values. Cf. *redox series.* Another division is: (A) reactions in which there is no change of valence of the participating atoms, and (B) reactions that involve a change of valence, and are generally spoken of as oxidation and reduction or electronation reactions. The general types of reactions are:

A. Reactions involving no oxidation and reduction.

1. Addition

(molecules combine to form a more complex molecule: $K_2O + SO_3 = K_2SO_4$)

2. Decomposition

(molecules break apart into simple molecules: $NH_4Cl = NH_3 + HCl$)

3. Metathesis

(interaction between molecules: $NaCl + AgNO_3 = AgCl + NaNO_3$)

4. Neutralization

(the interaction of an acid and base to form a salt and water:

$$M(OH) + HN = MN + HOH;$$

M is a metal, and N a nonmetal or acid radical.)

5. Hydrolysis

(the action of water on a compound, generally the reverse reaction of neutralization;

$$HOH + MN = MOH + HN)$$

B. Reactions involving oxidation and reduction (electronation). There is an increase in the valence number of one element, and a corresponding decrease in the valence number of another element; or one or more electrons pass from one atom to the other.

1. Combination

(element molecules unite and form a compound;

$$H_2 + Cl_2 = 2HCl)$$

2. Dissociation

(a compound molecule splits into element molecules: $2HI = H_2 + I_2$)

3. Displacement

(an element molecule interacts with a compound molecule; $Fe + CuSO_4 = Cu + FeSO_4$)

4. Substitution

(an element molecule interacts with a compound molecule: $Cl_2 + CH_4 = CH_3Cl + HCl$)

5. Restitution

(the reverse reaction of substitution:

$$2PbO + PbS = 3Pb = SO_2)$$

6. General oxidation and reduction

(interaction among molecules in which some atoms are oxidized and others reduced:

$$4HCl + MnO_2 = Cl_2 + MnCl_2 + 2H_2O)$$

C. Organic reactions are similar to inorganic reactions. According to Falk they take place by the intermediate formation of an addition compound, and if the reaction is catalytic, the catalyst is one of the components of the addition compound.

(a) The majority are metathetical reactions of the type:

$$BX + HA = BA + HX,$$

in which B is a base, metal or hydrogen, X the hydroxyl radical or a halogen, A a nonmetal or acid group. Thus (a) neutralization:

$$BOH + HA = BA + H_2O$$

(b) Friedel-Crafts reaction:

$$RX + HPh = RPh + HX,$$

where X is either OH or Cl, and the catalyst either $AlCl_3$, $ZnCl_2$, H_2SO_4 or HCl.

(c) Aldol condensation:

$$R.CHO + H_2CA_2 = R.CH{:}CA_2 + H_2O,$$

where A is a negative group on the alpha-carbon, and the catalyst is either zinc chloride, hydrochloric acid or an alkali.

(d) Esterification:

$$ROH + HA = RA + H_2O,$$

where R is an alkyl or aryl radical, and the catalyst either zinc chloride, sulfuric acid or hydrochloric acid.

(e) Etherification:

$$ROH + HOR' = ROR' + H_2O$$

(f) Amide formation:

$$AcOH + HNH_2 = AcNH_2 + HCl$$

where Ac is an acyl radical, and OH can be replaced by Cl, or the NH_2 group by an NR_2 group.

(g) Amine formation:

$$ROH + HNH_2 = RNH_2 + H_2O$$

where R is either an aryl or alkyl radical.

(h) Nitrocompound formation:

$$NO_2.X + HPh = NO_2Ph + HX$$

in which X is either OH, OEt, OSO_2H, or an acyl radical.

(i) Nitrosocompound formation:

$$NO.X + HPh = NOPh + HX$$

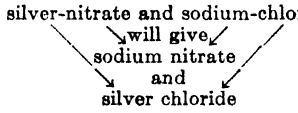
in which X is either OH, Cl or an OR group.
(j) Diazotization:

$$NO.X + H.NHR = ON:NHR + HX$$

where X is either OH or Cl, and R either an aryl or alkyl radical.

acid- A test for the presence of hydrogen ions or an acid; as, blue litmus turning red. **alkaline-** A test for the presence of hydroxyl ions or bases; as, red litmus turning blue. **amphoteric-** The reaction of a substance that has both acid and alkaline properties. **analytic-** R. which break down molecules. **analytical-** R. used in determining the quantity and/or quality of matter. **balanced-** A reversible reaction, which goes to completion in neither direction. **bimolecular-** A reaction of the second order. **Bunsen-** See *Bunsen.* **catalytic-** A reaction whose rate is accelerated by a catalyst. Cf. *induced-.* **chain-** See *chain, trigger.* **color-** A r. involving a change in color. **complete-** A chemical change that proceeds to completion; as, the precipitation of an insoluble compound. **complex-** Composite r. **composite-** A chemical change in which more than one reaction occurs simultaneously. **concurrent-** A chemical change that consists of a series of connected reactions, that could not occur separately. **condensation-** A reaction in which atoms are removed from two or more molecules, the residues combining to form a single molecule. **counter-** Reversible reaction. **coupled-** A concurrent reaction. **diazo-** See *diazo.* **endothermic-** A reaction in which heat is consumed. **exothermic-** A reaction in which heat is liberated. **flame-** See *Bunsen.* **group-** A typical reaction of a certain group of elements; as, in qualitative analysis. **heat of-** See *heat.* **heterogen(e)ous-** A composite r. **incomplete-** Balanced r. **induced-** A reaction that is accelerated by an inductor or promoter. **ionic-** An instantaneous reaction between ions in solution. **irreversible-** A reaction that proceeds to completion and cannot be reversed. **main-** The principal reaction. **metathetical-** A reaction in which there is an exchange of groups. **micro-** See *micro.* **molecular-** In general, a slow reaction occurring between molecules and not ions. **monomolecular-** A reaction of the first order. **negative-** The absence of r. **neutral-** A r. which is neither acid nor basic. **nuclear-** See *nuclear.* **opposing-** The reverse reaction in a balanced reaction. **photo-** See *photo.* **positive-** A r. which is definite. **primary-** The principal or main reaction that occurs in a composite system of reactions. **principal-** Primary r. **pyrogenic-** See *pyrogenic.* **qualitative-** q.v. **quantitative-** q.v. **reversible-** An incomplete r. A reaction that proceeds under certain conditions from right to left as well as from left to right. **secondary-** Subsidiary r. **side-** A reaction simultaneous with the principal reaction, and occurring between the same reactants but forming different products. **simultaneous-** Side r. **staircase-** See *staircase.* **subsidiary-** A reaction which occurs between the resultants of a reaction. **successive-** A reaction made up of a number of component reactions which occur in succession, the reactants being in turn the resultants of the preceding reaction. **sympathetic-** Induced reaction. **synthetic-** A reaction in which simple molecules combine to form a more complex molecule. **topochemical-** See *topochemistry.* **trigger-** q.v.

r. control. (1) The factors controlling the speed of a reaction are concentration (amount of substance present) and energy relations (potential energy, electromotive force and free energy). A reaction can be accelerated by: (a) *Mechanical* means, by increasing the number of molecules coming in contact with one another; by increasing the surface by subdivision (colloidal state) or mechanical catalysers, increasing the pressure of gases, or in general, increasing the concentration of the reactants and removing the resultants. (b) *Thermal* means, by increasing the velocity of the molecules by heating, and, thus, increasing the frequency of molecular collisions and the speed of the reaction. (c) *Electrical* means, by electrolysis and electrolytic displacement. (d) *Optical* means, by activation, excitation or irradiation. (2) Reaction, in the sense of acidity, is controlled by buffer solutions (q.v.). **r. equations.** An expression of a chemical change: (A) *Graphical* method, a popular illustration of the exchange taking place:



(B) *Molecular* method, which indicates the weight relations of the reacting substances:

$$AgNO_3 + NaCl = AgCl + NaNO_3$$

(C) *Ionic* method, a generalized statement of the actual change, or representing action as it takes place between ions of dissociated reacting molecules:

$$Ag^+ + Cl^- = AgCl.$$

r. isochore. An equation that indicates the relation of temperature to the equilibrium constant (K) at constant volume (or pressure, of a gas): $\frac{d(\ln K)}{dT} = -\frac{U}{RT^2}$. (ln K) is the natural logarithm of K at absolute temperature, T; U, the decrease in total energy or heat quantity at this temperature; R, the gas constant. By integration this decrease in energy can be calculated from the equilibrium constants, K_1 and K_2, at the temperatures, T_1 and T_2, respectively.

$$(\ln K_2) - (\ln K_1) = \frac{U}{R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right).$$

The maximum work at any temperature can thence be determined. **r. isotherm.** An equation that indicates the maximum external work or diminution in free energy that can be obtained from a given chemical reaction at constant temperature and volume: $A = RT \log K - RT\Sigma v \log C$, where A is the decrease in free energy and $RT\Sigma_v \log C$ represents the concentration. (See also *mass action, equilibrium.*) It holds for ideal gases only. A is a measure of the affinity of the reaction. **r. law** If a system in equilibrium undergoes a restraint a change tends to take place, which, if it is a possible change, partly annulls the constraint. **r.**

order. A division of reactions into several types:

First order, mono- or unimolecular reactions—a reaction in which only one molecule reacts: A = one or more products. The velocity of such reactions is expressed by

$$\frac{dx}{dt} = k(a - x)$$

where a is the initial amount of substance, x, the amount that has changed after time, t, and k is the velocity constant. This expression on integration becomes

$$k = \frac{1}{t} \ln \frac{a}{a - x}, \text{ or } k = \frac{1}{t_2 - t_1} \ln \frac{a - x_1}{a - x_2}$$

when x_1 and x_2 are the amounts that have changed after times t_1 and t_2, respectively.

Second order, bi- or di-molecular reactions—reaction in which two molecules undergo a change:

2A = one or more products; or
A + B = one or more products.

The velocity is expressed by $dx/dt = k(a - x)(b - x)$, which, on integration, becomes

$$k = \frac{1}{(a - b)t} \ln \frac{(a - x)b}{(b - x)a},$$

$$\text{or } k(a - b) = \frac{1}{t_2 - t_1} \ln \frac{a - x_2}{b - x_2} - \ln \frac{a - x_1}{b - x_1}$$

However, if a = b, then

$$k = \frac{1}{t} \cdot \frac{x}{a(a - x)}$$

Third order, tri- or termolecular reactions—a reaction in which three molecules undergo a change:

3A = one or more products.
2A + B = one or more products.
A + B + C = one or more products

The velocity of these reactions is $dx/dt = k(a - x)(b - x)(c - x)$, and on integration, if a = b = c

$$k = \frac{1}{2t} \left[\frac{1}{(a - x)^2} - \frac{1}{a^2} \right]$$

Fourth order, tetra- or quadrimolecular reactions—a reaction in which four molecules undergo a change:

4A =	one or more reaction-products
3A + B =	one or more reaction-products
2A + B + C =	one or more reaction-products
A + B + C + D =	one or more reaction-products

r. promoter. Promoter. **r. sensitivity.** That dilution at which a reaction may be carried out and still give identifiable end-products. **r. velocity.** Velocity constant. The time rate at which molecules change or are transformed in a chemical reaction. (See *reaction order.*)

reactivation. The rendering active again of a catalyst or serum which has become inactivated. Cf. *revivification.*

reactivity. The capacity to react.

reading telescope. A one-tube telescope placed below a meter scale, through which the image of the scale in a mirror is read. The slightest deflection of the mirror can be determined, and is often used in very delicate measurements; as, sensitive galvanometer measurements.

reagent. A substance used for the detection or determination of another substance by chemical or microscopical means; especially those substances or their solutions which are used in qualitative or quantitative analysis. Reagents may be divided into:

1. precipitants—which produce an insoluble compound.
2. solvents—which are used to dissolve water-insoluble materials.
3. oxidizers—which are used in oxidation.
4. reducers—which are used in reduction.
5. fluxes—which are used to lower the melting points of substances.
6. Colorimetric reagents—which are analogous to 1., but produce coloured soluble compounds.

(See also *volumetric solutions*, *standard solutions*, *normal solutions.*) **r. solution.** The aqueous solution of a r. substance used in the laboratory; usually about 10 % concentration.

realgar. As_2S_2. Ruby sulfur, red arsenic, red orpiment. A red or orange native arsenic disulfide; monoclinic prisms.

rearrangement. Molecular conversion, migration, or transposition. An intramolecular change, or reaction in which the atoms or atomic groups of the molecule redistribute themselves or arrange themselves in a different manner. Cf. *pinacol*, *enol-ketone*, *semidine.*

Réaumur, René Antoine Ferchault de. 1683–1757. A French natural philosopher, noted chiefly for his invention of a thermometer scale. **R. degree.** °R or °Ré. A thermometer scale based upon the freezing point of water = 0°R. and the boiling point of water = 80°R.; hence, 80°R. = 100°C.

recalescence. An increase in the emission of visible light during the cooling of molten metals; the brighter glow of a molten substance at certain temperatures. It is explained by thermally excited electrons falling back to a lower energy level in the atom. Cf. *luminescence.*

recalescent point. The temperature at which evolution of heat occurs during the cooling of steel. It is lower than the decalescent point (*q.v.*) by an amount which is a measure of the hysteresis of steel.

recarbonize. To restore the carbon content of steel after decarbonizing.

recarburize. Recarbonize.

receiver. A vessel in which the products of a distillation are collected.

receptacle. A receiving-vessel.

receptors. A radical or atom on the surface of the protoplasmic, colloidal molecule that fixes drugs or poisons and thereby renders them effective. Compare *Ehrlich side-chain theory.*

reciprocal. The quotient, r, obtained by dividing unity by a number, n: $r = 1/n$; hence any function or expression so related to another that their product is unity: $rn = 1$. **r. ohm.** The unit of conductivity, mho, q.v. **r. salt pair.** Two salts which may act either as the reactants or resultants of a reaction; as,

$$NaCl + KNO_3 \rightleftharpoons NaNO_3 + KCl$$

reciprocating motion. Motion to and fro in a straight line, like that of the piston of a steam engine.

reciprocity law. Bunsen and Roscoe law.

recoil. Return motion. **r. atom.** The atom of a radioactive substance in the process of expelling an α-particle. On account of the high velocity with which the helium nucleus is shot off, the residue of the atom recoils. **r. radiation.** A radiation produced by bombarding gaseous atoms with alpha-particles, and having its source in the action of the recoil atom. Cf. *Wilson tracks.*

reconstituted milk. Reconstructed milk.

reconstructed milk. A beverage obtained by emulsifying unsalted butter in a solution of skimmed milk powder. Gelatin is sometimes added as a stabilizer.

recovery. The extraction of valuable constituents from a raw material, by-product, or waste-product; as, copper extracted from ores, silver precipitated from photographic wastes.

recrystallization. Repeated crystallizations for the purpose of purification.

recrystallize. To purify a substance by repeated crystallization.

rectification. (1) The redistillation of a liquid for the purpose of purification. (2) The transformation of an alternating- into a direct-current. (3) The evaluation of the length of a curved line.

rectified spirit. Spirits of wine. Redistilled alcohol, which contains 84 % by weight of absolute alcohol, is 50°O.P., and has a specific gravity of 0.8382 at 60°F. Cf. *proof spirit.*

rectifier. An electric valve which converts alternating current to direct current; *e.g.*, aluminum r., quartz r., electron valve or transformer. **Dryr-** An asymmetric conductor consisting of a disc of lead sulfide waxed on one side and making contact on both sides with tin foil. **r. cell.** Photo-electric cell.

rectorite. A white aluminum silicate, similar to kaolinite.

recuperator. Regenerator.

red. The least refracted portion of the visible spectral colors. **r. acid.** *1.5*-Dihydroxy-naphthalene-*3.7*-disulfonic acid. **r. antimony.** Kermesite. **r. arsenic.** Realgar. **r. bark.** Red *cinchona.* **r. bole.** Red ocher. **r. brass.** An alloy of 78–83 % copper, 7–9 % zinc, 6–10 % lead, 4–2 % tin. **r. cedar.** Juniper. **r. chalk.** Red ocher mixed with clay. See *red hematite.* **r. chrome.** Lead chromate. **r. cobalt.** Erythrite. **r. copper ore.** Cuprite. **r. couch grass.** Carex. **r. hematite.** See *hematite.* **r. iron ore.** Hematite. **r. lead.** Lead tetroxide. **r. lead ore.** Crocoisite. **r. liquor.** A solution of aluminum acetate, used in dyeing. **r. manganese.** Rhodonite. Rhodochrosite. **r. mercury iodide.** Mercuric iodide. **r. mercury oxide.** Mercuric oxide. **r. metal.** A copper alloy. **r. mustard.** Sinapis nigra. **r. ocher.** Reddle, red bole. A red, often impure, variety of hematite, used as a pigment. **r. oil.** Commercial oleic acid. **r. orpiment.** Realgar. **r. oxide.** Iron sesquioxide. **r. oxide of zinc.** Zincite. **r. pepper.** Capsicum. **r. phosphorus.** See *phosphorus.* **r. pigments.** See *antimony red, carmine, chrome red, realgar, red ocher, venetian red, and vermilion.* **r. precipitate.** Mercuric oxide. **r. prussiate.** Ferricyanide. *r.p. of potash.* Potassium ferricyanide. *r.p. of soda.* Sodium ferricyanide. **r. root.** Sanguinaria. **r. sensitive plate.** A photographic plate that has been made orthochromatic by the addition of a sensitizer, as neocyanine or kryptocyanine, to the emulsion. **r. silver ore.** Pyrargyrite. Proustite. *dark-* Pyrargyrite. *light-* Proustite. **r. stone.** Ferric oxide. **r. vitriol.** Bieberite. **r. zinc ore.** Zincite.

reddingite. A native iron and manganese phosphate from Redding, California.

reddingtonite. A native chromium sulfate.

reddle. Hematite.

redistillation. Repeated distillation of a liquid.

Redonda phosphate. A rich phosphate ore from the West Indies, 40 % P_2O_5.

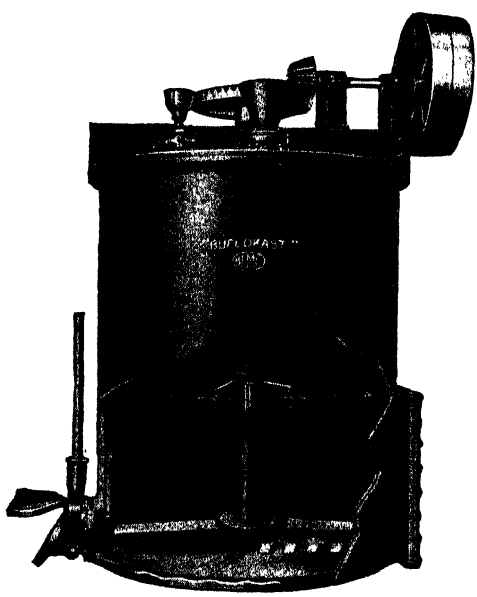
redox. Reduction-oxidation or electronation. **r. equilibrium.** Describing a reaction which is poised at a definite r_H-value. Cf. *poising agent, oxido-reduction potential.* **r. indicator.** See *indicator.* **r. series.** A table of oxidizing and reducing reactions arranged in order of intensity.

redruthite. Cu_2S. A black mineral.

reduce. To add one or more electrons to an atom (electronate). Hence: (a) to decrease the valence number of an atom by means of a corresponding increase in the valence number of another atom (which is oxidized); (b) to deprive of oxygen or to produce the metallic state; (c) to add hydrogen to an element or compound. Antonym: *oxidize.*

reduced. (1) Brought or restored to metallic form. (2) Brought to a lower stage of oxidation, q.v. **r. iron.** Finely-powdered metallic iron obtained by heating ferric oxide in a current of hydrogen. **r. oil.** Crude petroleum from which the hydrocarbons of lower boiling-points have escaped by evaporation, or have been removed by distillation.

reducer. (1) Reducing agent. (2) A solution which decreases the intensity of a photographic



Reducer.

image, as a fresh mixture of equal parts of 10 % sodium thiosulfate and 3 % potassium ferricyanide solutions. (3) A cast iron kettle,

with a power-driven stirring device, used in large scale reductions. **Jones-** An apparatus for reducing ferric iron to ferrous iron by passing the solution through granulated zinc. Cf. *reductor.*

reducible. Capable of being reduced.

reducin. $C_{12}H_{24}N_6O_8$. A leukomain derived from urochrome.

reducing agent. Reducer. A substance that is readily oxidized (loses a valence electron) and, thereby, reduces another substance (which gains a valence electron). The common reducing agents are nascent hydrogen, hydrogen sulfide, sodium sulfite, stannous chloride, hydriodic acid, ferrous chloride, sodium amalgam, sulfur dioxide, formaldehyde and zinc dust. Cf. *oxidizing agents.* **r. flame.** The luminous portion or inner cone of the blowpipe flame or the bunsen burner in which there is an excess of unburnt carbon or hydrocarbon gas, which acts as a reducing agent on the minerals or substances brought into contact with it. **r. furnace.** A shaft furnace in which ores are reduced to metals. **r. sugar.** A mono- or di-saccharide (as, glucose or fructose) that reduces copper or silver salts in alkaline solutions. Cf. *Fehling's solution.*

reductase. An enzyme that acts as a reducing agent.

reductic acid. See *reductones.*

reduction. (1) Making less or smaller. Converting to a fine state. Reproducing on a smaller scale. (2) Describing a chemical reaction in which one or more valence electrons are added to an atom. This process is the exact reverse of oxidation, and both occur concurrently. Types of reduction are illustrated in the following particular cases. (3) In particular: (A) The removal of oxygen from a compound; as, a change from CuO to Cu (the copper atom gains two electrons), from R.COOH to R.COH, from $MClO_3$ to MClO. (B) The addition of hydrogen to an element or compound; as, a change from Mg to MgH_2, from CH:CH to $CH_3.CH_3$, from R.CHO to $R.CH_2OH$. (C) The change from a state of higher valence to one of lower valence; as, from the ferric to the ferrous state or to metallic iron, from the cupric to the cuprous state or to metallic copper, from chlorine to a chloride. These reactions are written:

$$Fe^{+++} + 1(-) = Fe^{++}$$
$$Fe^{++} + 2(-) = Fe$$
$$Cu^{++} + 1(-) = Cu^{+}$$
$$Cu^{+} + 1(-) = Cu$$
$$Cl_2 + 2(-) = 2Cl^{-}$$

In these equations the symbol (−), denotes an electron, or negative charge which will neutralize a positive charge. The atom which gains the electron is reduced, while the atom which loses it is oxidized. Compare *oxidation, electronation, redox.* **r. intensity.** r_H. See *oxido-reduction potential.* **r. oxidation.** See *redox.* **r. potential.** The potential obtained when a platinum electrode is immersed in a solution containing an ion that is being reduced.

reductones. Apparent vitamin C. Reductic acid. Reducing substances present in dehydrated foods, or produced by the action of hot alkali on carbohydrates. They react very similarly to ascorbic acid, and therefore interfere with its determination by the titration method.

reductor. (1) An apparatus used for a reducing reaction; as, **Blair-** or **Jones-** (q.v.). A glass apparatus for the rapid determination of phosphorus in steel. (2) A metal or metal amalgam, which can act as a reducing agent.

Redwood number. A unit which measures viscosity in terms of rate of flow from a standard Redwood viscometer. It is standard in Great Britain for oils.

Reech's theorem. The ratio of the adiabatic to the isothermal elasticity of a fluid equals the ratio of the specific heats at constant pressure and at constant volume. For monatomic gases this ratio is 1.66.

refikite. $C_{20}H_{16}O_2$. A white, soft, native resin, in lignite.

refine. To free from impurities.

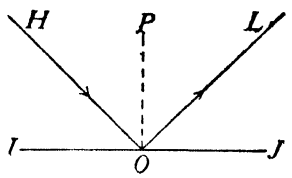
refined. Purified or freed from foreign matter.

refinery. (1) A building or apparatus used for refining purposes. (2) A shallow hearth furnace for making wrought iron.

refining heat. The temperature, 655°C., that imparts fineness of grain and toughness to steel.

reflected. Thrown back.

reflection. The rebounding of light, heat or sound radiations from a surface in the same



Reflection.
I = *reflecting* surface
H = incident ray
L = *reflected* ray
P = perpendicular, or normal.
HOP = angle of incidence
POL = angle of *reflection*

form, and unchanged both in quality and quantity.

reflector. (1) A mirror. (2) A device used to cast back light, heat or sound radiations.

reflux. A backward flow or return of a current. **r. condenser.** A vertical or inclined condenser, from which the condensed liquid flows back into the distilling vessel. **r. valve.** A check valve.

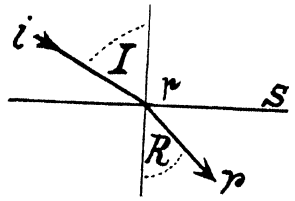
Reformatzky reaction. A condensation reaction between ketones and alpha-bromo-aliphatic acids in the presence of zinc or magnesium:

$$R_2CO + BrCH_2COOR + Zn \rightarrow$$
$$R_2C(OZnBr)CH_2COOR + H_2O \rightarrow$$
$$(ZnO.HBr) + R_2C(OH)CH_2COOR$$

refract. To change the direction, deviate or bend.

refraction. The deflection or change of direction impressed on rays of light obliquely incident on, or passing through a boundary between, two transparent media, or traversing a medium of varying density. Cf. *light, diffraction.* **atomic-** See *refractivity.* **double-** Birefringence. The property of having more than one refractive index, according to the direction of the traversing light. It is possessed by all except isometric crystals; by transparent substances which have undergone internal strains (*e.g.*, glass); and by substances which have different struc-

tures in different directions (*e.g.*, fibres). **electrical-** See *Kerr effect.* **specific-** See *refractivity.* **index of-** See *refractive index.*



Refraction.
i = incident ray
r = *refracted* ray
p = point of incidence
I = angle of incidence
R = *angle of refraction*
s = *refracting surface*

refractive. Refringent. Pertaining to refraction. **r. constant.** The sum of the refractivities of the pure constituents of a solution, each multiplied by the ratio of its mass per unit volume of solution to its own density when pure. **r. index.** (n.) The ratio of the velocity of light in a certain medium compared with its velocity in air under the same conditions. It is measured by the ratio of the sine of the incident angle to the sine of the angle of refraction; hence, n = sin i/sin r. In practice it is estimated by immersion of the crystal in a series of liquids of known n until a liquid is found in which the crystal is invisible. Such liquids are:

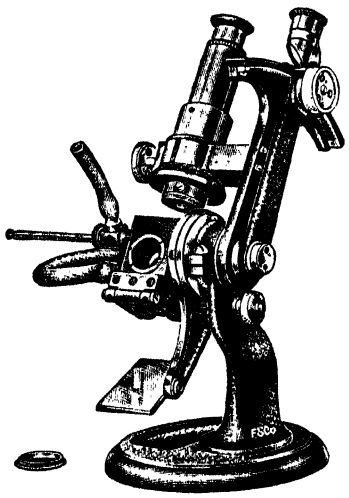
Liquid	n_D at 23°C
methyl alcohol	1.3279
water	1.3328
acetone	1.3598
hexane	1.3750
heptane	1.3868
ethylene chloride	1.4417
chloroform	1.4430
trimethylene chloride	1.4470
cineol	1.4552
glycerol	1.4671
decahydronaphthalene	1.4750
iso-amyl phthalate	1.4870
tetrachloroethane	1.4912
xylene	1.4957
benzene	1.4982
pentachloroethane	1.5006
anisole	1.5150
chlorobenzene	1.5218
trimethylene bromide	1.5220
ethylene bromide	1.5353
o-nitrotoluene	1.5440
nitrobenzene	1.5506
xylidine	1.5559
tri-o-cresyl phosphate	1.5560
bromobenzene	1.5578
o-toluidine	1.5700
aniline	1.5840
bromoform	1.5940
quinaldine	1.6088
iodobenzene	1.6168
cinnamaldehyde	1.6190
quinoline	1.6239
α-chloronaphthalene	1.6318
α-bromonaphthalene	1.6569
methylene iodide	1.7400

Absolute r. i. This refers to a vacuum, and equals: n × 1.0029.

refractivity. The phenomenon of light changing its direction when passing at an angle through media of different densities; it is expressed as (n − 1), where n is the refractive index. **atomic-** The refractive power of an atom calculated from the refractivity of its compounds by multiplication of the refractive index by the atomic weight. **molecular-** The refractive power of a molecule calculated either by adding the atomic refractivities of its constituents, or by dividing the specific refractivity by the molecular weight. These are the same where no allowance must be made for unsuspected peculiarities in the molecular structure. **specific-** The refractivity of a substance calculated from its refractive index:

$$\frac{n^2 - 1}{n^2 + 2} \cdot \frac{1}{d}, \quad \text{or} \quad \frac{n^2 - 1}{n^2 + 2} v.$$

n is the refractive index, d, the density and v, the specific volume. *s. r. power.* The expression, $\frac{n - 1}{d}$, which is almost independent of temperature.



Refractometer.

refractometer. An instrument for determining the refractive index of a substance.

refractories. The plural of refractory. See tables.

refractoriness. The degree of resistance of a material to softening and melting on the application of heat. Usually this is arbitrarily obtained by direct comparison with Seger cones (q.v.). **r. under load.** The degree of resistance to deformation shown by a refractory when subjected to stress at a definite temperature or over a range of temperatures.

refractory. Any material that is slow to melt and resists the action of heat; as, brick, silicon carbide or other linings for furnaces. **r. cements.** Materials used to hold r. bricks together. (a) *straight-* such as fire clay, silica, sillimanite and magnesite which have high refractoriness (>1650°C.) but poor bonding strength. (b) *synthetic-* (1) Vitrifying at about 9000°C., as portland cement, glass, feldspar, fusible clays, which have a very good bonding strength; (2)

REFRACTORIES

Name	Temperature of failure under load in °C	Bulk density	Porosity per cent	Fusing point, °C
alundum, Al_2O_3	1550[c]	2.6	.....	1750–2000
bauxite brick, $Al_2O_3.TiO_3$	1350[a]	1.6	46–50 %	1750–2000
chrome brick, $Cr_2O_3.Al_2O_3.MgO$	1450[b]	2.8–3.2	.....	1850–2050
fire clay brick, $SiO_2.Al_2O_3$	1500[a]	1.7–2.1	20–30 %	1500–1750
magnesite brick, MgO	1550[b]	2–2.8	24–40 %	2150–2165
silica brick, SiO_2	1600[b]	2–2.2	18–43 %	1685–1800
silicon carbide, SiC	1650[c]	2.0–2.6	17–34 %	2200–2240
zirconia brick, ZrO_2	1510[a]	3.4–4	19 %	2000–2600

[a] The material *softens* under a load of 25 pounds per square inch.
[b] The material *shears* under a load of 25 pounds per square inch.
[c] The material shows *no failure* under a load of 25 lbs., per square inch.

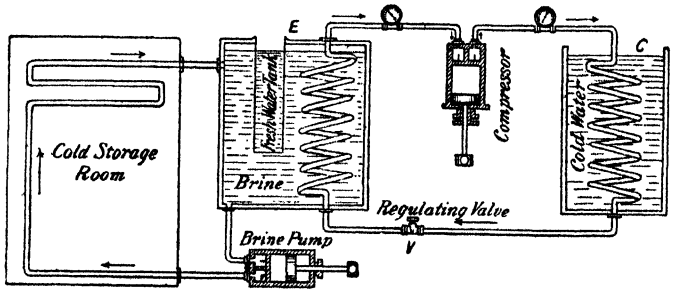
	Density	Melting point, °C
aluminum oxide	4.0	2050
chromium oxide	4.0	1990
magnesium oxide	3.2	2800
silicon oxide	2.6	1710
zirconium oxide	5.8	2950

air-setting, mixtures of refractories and fluxes of good bonding strength.

refrigerant. (1) An agent that causes a sense of cold; used medicinally. (2) An agent used to obtain a low temperature; as, a freezing mixture, *q.v.* **mechanical-** A non-corrosive liquid of suitable vapor pressure, used in refrigeration; it should be non-toxic and non-inflammable, *e.g.*

	B.P., °C	T_c, °C	P_c, atm.
Hydrogen	−252	−234	20
Air	−181	−140	39
Nitrous oxide	− 89	38.8	77.5
Carbon dioxide	− 78.2	31	73
Hydrogen sulfide	− 60	100	88.7
Ammonia	− 35	130	115
Dichlorodifluoromethane	− 30		
Sulfur dioxide	− 10	155	78.9
Butane	1		
Chloroform	61	260	54.9
Water	100	365	194

refrigeration. The production of cold, or the lowering of the temperature of a body by conducting away its heat; as in an ice machine or a series of compressors. The circuit consists of compressing a gas, cooling it and letting it expand into a low-pressure pipe system where it absorbs the heat, and is pumped out and compressed again. It is used to liquefy gases, solidify liquids, crystallize salts from solutions, regulate and control reactions, nitrations, oxidations, etc., separate impurities from gases, preserve foods and in air conditioning (see illustration).



Refrigeration
(Tower, Smith, Turton & Cope, "Physics.")

refringent. Refractive.

refuse. Waste; as garbage or sewage.

regelation. The fusion of ice under pressure, followed by the solidification of ice particles into one solid mass.

regenerate. To renew or produce again. Cf. *activation, accumulator.*

regeneration. The repair or renewal to the original state; as, of an electric battery, or a catalyst. Cf. *revivification, permutite, Weldon process.*

regenerative. Capable of being utilized anew. **r. furnace.** A furnace in which the fuel gases have been preheated by passing through channels heated by the waste gases. **r. heating.** The conservation of heat by utilizing the temperature of waste gases to heat the incoming fuel gases or air.

regenerator. A series of chambers filled with a checker work of bricks, through which the flue and fuel gases of a furnace are alternately directed.

Regnault, Henri Victor. 1810–1878. A French chemist, noted for his researches in physical and organic chemistry. **R. cell.** A voltaic cell, which consists of an anode of amalgamated zinc and a cathode of cadmium in a solution of 1 part

H_2SO_4, 1 part $CaSO_4$ and 12 parts H_2O, and which yields 0.34 volt. **R. value.** The weight of a cubic-meter of hydrogen: 89.87 grams. Cf. *krith.*

Reguir cell. An electric accumulator (1.4 volt), which consists of an anode of copper and a cathode of lead oxide in a solution of $CuSO_4$ and H_2SO_4.

regular system. The cubic system of crystal forms, q.v.

regulator. (1) Buffer solution. (2) A substance used in flotation for pH control; as, soda, lime, sulfuric acid.

regulus. (1) A small compact mass of metal obtained at the bottom of the crucible on reduction of ores. (2) A compound of one or more metals with sulfur. They are usually brittle and crystalline and have a dull greasy luster.

Reich, Ferdinand. 1799–1882. A German mining engineer noted as discoverer of indium (with Richter, 1863).

Reichenbach, Carl Freiherr von. A German chemist and industrialist noted for his theory of od-rays.

Reichert number. The number of cubic centimeters of 0.1 normal alkali required to neutralize the volatile, water-soluble acids liberated on acidification of the soap produced by saponification of ten grams of a fat. **R.-Meissl number, Reichert-Wollny number.** Similar to the R. number, referred to *five* grams fat and determined according to specified procedures. (Cf. *Polenské number.*)

Reid, E. Emmet. 1872– . American chemist noted for organic research.

Reimer's reaction. A reaction of phenols and chloroform in alkaline solutions with the formation of phenol aldehydes.

Reinecke's acid. Tetrathiocyanodiammonochromic acid. $\left[\begin{matrix}(NH_3)_2\\ Cr\\ (SCN)_4\end{matrix}\right]H$; used as a reagent in the isolation of organic bases: (e.g., proline, histidine, choline from proteins). **R. salt.** The ammonium salt, $[(NH_3)_2Cr(SCN)_4]$-NH_4H_2O, used similarly to R's. acid; also as reagent for mercury, with which it gives a red color or precipitate.

reinforced. Made stronger. **r. concrete.** A concrete with a steel foundation and structure used for buildings. **r. wine.** A wine to which alcohol has been added.

reinite. The native iron tungstate, $FeWO_4$.

Reinsch test. The detection of small quantities of arsenic by depositing it from solution as a black stain on metallic copper.

relative. Dependent upon or connected with some other phenomenon. **r. weight.** Atomic weight.

relativity. Einstein's theory. The conception that matter, space and time are relative and not absolute; that all physical phenomena are the result of conditions depending upon their position in or relation to the universe. Hence, to consider any single phenomenon or physical action in terms of its reaction or relation to other phenomena. **general-** Mass exerts an attraction on light; hence: (a) large bodies, as the sun, deflect light waves; and (b) spectral lines coming from atoms on the surface of very massive stars are shifted toward the red. **special-** Energy (E) possesses mass, hence the mass (M) of a body increases slightly when its energy content is increased. $M = E/c^2$, where c is the velocity of light which is an absolute constant of nature. Cf. *mass-energy cycle.*

relay. A sensitive electro-mechanical device which, when operated by a comparatively weak current, as from an photoelectric cell, will cause a corresponding action in a more powerful circuit.

remedy. An agent that cures or prevents disease.

remolinite. Atacamite.

Remsen, Ira. 1846–1927. An American chemist noted as teacher and writer.

Ira Remsen.

renal. Pertaining to the kidneys. **r. test.** A diagnostic test of the functions of the kidneys by administering phenolsulfonephthalein and determining colorimetrically the quantity which appears in the urine.

render. (1) To melt down; to clarify. (2) The removal of fat from animal tissues by heat.

renes. An extract from the kidneys of sheep, pigs, or calves. **r. siccii.** The dried and powdered kidneys of the sheep or pigs; used medicinally.

renin. Hypertensin. A pseudoglobulin present in fresh kidneys after intravenous injection of saline extract; soluble in water, insoluble in alcohol. It maintains a normal blood pressure. **anti-** A substance having the same origin as, but opposite in effect to r. Cf. *rennin.*

rennase. Rennin, prorennin, chymogen, caseinase, lab ferment, chymosin. An enzyme of the gastric juice from the fourth stomach of calves. It hydrolyses caseinogen, and coagulates milk with formation of curd and whey; is used in the manufacture of cheese.

rennet. A preparation of the lining of the stomach of the calf, used as a source of rennase.

rennin. Rennase. Cf. *renin.*

rensselaerite. A variety of talc.

repand. Wrinkled; as a bacterial culture with an uneven or wavy surface.

repercolation. A second or repeated percolation.

replace. To cause the substitution or exchange of an atom or group of atoms by another atom or radical.

replaceable. An atom or group of atoms that can readily be exchanged for another atom or group of atoms.

replacement. (1) The substitution of an atom or radical by another atom or radical:

$$M + HX = MX + H, \quad \text{or} \quad X + HA = HX + A.$$

(2) In mineralogy, the change from one mineral to another by gradual substitution.

repulsion. The opposite of attraction, or the tendency of two bodies to move away from each other.

resacetophenone. $C_8H_8O_3$ = 152.06. 2.4-dihydroxy acetophenone, $MeCO.C_6H_3(OH)_2$. White needles, m.147. **methyl-** Peonol.

resaldol. $C_{16}H_{14}O_5$ = 286.11. Resorcinolbenzoylcarbonicacid ethylester, 2.4-dioxybenzoyl-o-benzoicacid ethylester, $(OH)_2.C_6H_3.CO.C_6H_4.COOC_2H_5$. A yellow amorphous powder; insoluble in water, soluble in alkalis. Used medicinally as an intestinal antiseptic.

resalgin. $C_{29}H_{30}O_{12}N_4$ = 626.2. Antipyrine resorcylate, antipyreticin, $(C_{11}H_{12}O_4N_2)_2C_7H_6O_4$. A colorless, crystalline powder, m.110, soluble in water, alcohol, ether or chloroform; used medicinally as an antiseptic. **beta-** Resorcylalgin.

research. (1) The scientific investigation of a new phenomenon. (2) A literary search, followed by experimental investigation or verification.

CHEMICAL RESEARCH

World activity may be shown by: The number of chemical papers published per million inhabitants (A); *the percentage of the total number of published works* (B). *Thus for 1932:*

	A Intensity	B Quantity
Germany	125.4	26.9 %
Holland	87.0	2.09 %
Switzerland	75.2	1.06 %
Austria	73.8	1.65 %
Great Britain, Canada and Australia	71.3	13.5 %
United States	62.5	25.8 %
France	62.0	12.0 %
Sweden	61.5	1.27 %
Hungary	34.1	9.93 %
Finland	29.8	0.36 %
Denmark	25.1	0.30 %
Czechoslovakia	22.8	1.07 %
Italy	21.0	3.03 %
Japan	17.8	3.71 %
Norway	13.1	0.12 %
Latvia	11.1	0.07 %
Russia	10.4	3.4 %
Belgium	10.1	0.28 %
Poland	6.6	0.68 %
Chile	5.5	0.08 %
Argentine	4.7	0.16 %
Rumania	4.4	0.26 %
Spain	4.0	0.29 %
Brazil	0.6	0.06 %
China	0.13	0.17 %

reseda oil. Mignonette oil. A fragrant oil, used as a flavoring and scent, extracted from plants of the Reseda genus, such as mignonette.

resenes. The constituents of resins, insoluble in alkalis. They contain O; but not as OH, COOH, lactone or ester. The most valuable varnish resins (as, dammar, copal, dragon's blood) are rich in r.

reservoir. A receptacle for storage purposes.

residual. That which remains or is left. **r. affinity.** See *affinity*. **r. gas.** The small amount of gas that remains at low pressure in an evacuated apparatus, *e.g.*, a vacuum tube.

residue. The remainder; those portions that are left. *E.g.*, the ash after an ignition, or the insoluble part after filtration. **spray-** See *spray*.

resilience. The property of returning to its former shape after a body has been distorted within its elastic limits. It is measured by the work done per unit volume in distorting a body to the elastic limit, or in producing rupture.

resilient. Elastic, or rebounding.

resin. A class of inflammable, amorphous, vegetable products of secretion or disintegration, usually formed in special cavities of plants. Generally insoluble in water and soluble in alcohol, fusible and having a conchoidal fracture. They are the oxidation or polymerization products of the terpenes, and consist of mixtures of aromatic acids and esters which are insoluble in water, soluble in alcohol, ether or essential oils. The official (U.S.P.) resins are: *benzoin, guaiac, mastic* and *resin;* other (non-official) resins are *copal, dammar, dragon's blood, elaterium, lac, sandarac.* (Cf. *plastics, resin, resinoid, balsam, gum.*) **alkyd-** R. made from phthalic anhydride and glycerol. **artificial-** See *plastics*. **gum-** R. containing gum, capable of softening in water. **oil reactive-** A synthetic phenol-formaldehyde product which dissolves in oil, reacts with it and forms a quick hardening varnish. **oil soluble-** R. not reacting with an oil but soluble in it. **oleo-** Balsams. A viscous or semi-liquid mixture of r. with essential oils. **synthetic-** See *plastics, resinification*. **vinyl-** A synthetic polymerization product of vinyl compounds, Cf. *vinylite*.

NATURAL RESINS AND BALSAMS

1. true resins

Coniferae:	
Abies, Picea, Pinus, etc. species	colophony
Agathis dammara	Manila copal
Agathis australis	kauri
Callitris species	sandarac
Leguminosae:	
Hymenaea species	Brazilian copal
Trachylobium species	copal
Burseraceae:	
Protium species	dammar
Canarium strictum	black dammar
Canarium commune	Manila elemi
Dipterocarpaceae:	
Shorea species	sal dammar
Anacardiaceae:	
Pistacia lentiscus	mastic
Rhus vernicifera	Japan lacquer
Liliaceae:	
Dracaena draco	dragon's blood
Xanthorrhoea hastilis	black boy
Zygophyllaceae:	
Guaiacum officinale	guaiacum
Convulvulaceae:	
Exogonium purga	jalap
Moraceae:	
Ficus species	shellac

2. gum-resins

Burseraceae:	
Boswellia carteri	olibanum
Commiphora myrrha	myrrh
Commiphora mukul	bdellum

Guttiferae:	
Caulophyllum tacamahaca...	tacamahac
Garcinia hanburii.....	gamboge
Umbelliferae:	
Dorema ammoniacum.....	ammoniacum
Ferula asafetida.....	asafoetida
Ferula galbaniflua.....	galbanum
Convulvulaceae:	
Convulvulus scammonia.....	scammony
Anacardiaceae:	
Mangifera indica.....	mango gum
S. oleo-resins or balsams	
Coniferae:	
Abies, Pinus, etc. species...	crude turpentine, Canada balsam, pitch, etc.
Leguminosae:	
Copaiferae species.....	copaiva balsam
Myroxylon pereira.....	Peru balsam
Myroxylon toluifera.....	tolu balsam
Burseraceae:	
Commiphora opobalsamum..	balm of Gilead
Hamamelidaceae.	
Liquidambar orientalis.....	Levant storax
Liquidambar styraciflua.....	American storax
Styraceae:	
Styrax officinale.....	storax resin
Styrax benzoin.....	benzoin
Other families:	
Dipterocarpus species.....	gurjun
Melanorrhoea usitata.....	theetsee
Opopanax species.....	opopanax
Populus balsamifera.....	tacamahac
Vateria indica.....	white dammar

r. acids. A group of organic acids derived from resins; as, pimaric, sapinic, colophonic and sylvic acids. **r. of copper.** An obsolete term for cuprous chloride.

resina. (1) Latin for resin. (2) Rosin.

resinamines. Insoluble, amorphous, solid bases from low-temperature, tar, which have the properties of resins in that they fuse to glassy masses and are deposited from solution as tough films.

resinate. Any salt of a resin acid mixture.

resinene. A generic name for neutral resins.

resineon. An essential oil, distilled from black tar oil, b.148; used medicinally as an antiseptic.

resinification. (1) The process of oxidation or polymerization of essential oils by which they become solid and form resins. (2) The artificial condensation of phenol with formaldehyde, or similar processes, by which resin-like substances are formed. Cf. *plastics.*

resinoic acid. The generic name for acidic resins.

resinoid. A substance that resembles a resin in its physical properties, but differs by having a heat-hardening character, *i.e.*, changing from a soluble and fusible solid to an insoluble and infusible solid on heating. Cf. *plastics.*

resinol. (1) In resole. (2) The non-crystalline constituents of tar, which are soluble in sodium hydroxide solution and can be precipitated from a solution in an organic solvent by addition of light petroleum. Cf. *resinotannol.*

resinotannol. A colored alcohol of resin esters which gives the tannin reaction. Cf. *resinol.*

resinous. Having resin-like properties.

resistance. (1) Opposition to force or external conditions. (2) The reciprocal of conductance, measured in ohms; the opposition that a conductor offers to the passage of an electric current (see *ohm, mho*). **body-** See *immunity.* **external-** The opposition to the passage of an electric current outside the source of current; as in wires, lamps, rheostats, or moving machinery. **internal-** Electrical resistance within the generating device. **specific-** See *specific resistance.*

Approximate electrical resistance of metals, compared with Cu = 1.0

chromel A	47.8
constantan	26.6
German silver	18.0
lead	12.8
tin	8.28
nickel	7.78
iron	5.70
platinum	5.65
zinc	3.62
aluminum	1.61
gold	1.38
copper	1.00
silver	0.92

r. box. An arrangement of rheostat coils in rows, mounted in a compact container. By the insertion of plugs any degrees of resistance may be obtained. **r. capacity.** The cell-constant, K, obtained from the ratio of the measured conductivity of a solution in the cell, K_2, to its known specific conductivity, K_1, hence: $K = K_1/K_2$. It is the factor for correcting the observed conductivity for peculiarities in the shape of the cell. **r. coil.** A spool of wire for increasing the r. in a circuit. **r. gage.** See *gage.* **r. to infection.** See *immunity.* **r. wire.** A nichrome wire for heating units, or r. devices having a definite r.:

Wire gage	Feet per pound	Ohm per foot
2	5	.005
6	12.5	.013
8	20	.020
11	40	.041
14	80	.083
18	200	.212
22	500	.531

r. thermometer. See *pyrometer.*

resistivity. The specific resistance, $\rho = Ra/l$, where R is the resistance, a the cross section and l the length of the material.

resistor. A metal (as chromium or manganese) which becomes hot on the passage of an electric current; used in electrical heating devices or rheostats, q.v. **age-** A substance which when added to rubber inhibits its oxidation; *e.g.*, aromatic diamine antioxidants.

resocyanin. $C_{10}H_8O_3$ = 176.1. 4-oxy-β-methylcoumarin, β-methylumbelliferone. A colorless crystalline powder, m.185; used in perfumery.

resoflavin. $C_{14}H_8O_4(OH)_2$ = 286.05. A yellow dye derived from resorcinol.

resole. A compound formed by the condensation of a phenol with an aldehyde in presence of a catalyst and alkali; they are hardened by heat. Cf. *bakelite, novolak.*

resolution. (1) Mesotomy. The cleavage or separation of a racemic mixture into its optically-active components. Cf. *racemization, inversion.* (2) The separation of spectral lines into a number of component lines by intense electric or magnetic fields; Cf. *Stark effect.*

resolving power. The power of a lens to produce a detailed and distinct image of an object at certain distances.

resonance. (1) The vibrations set up by sound or electromagnetic waves in a material which is capable of vibrating with the same or a multiple frequency. Cf. *luminescence, fluorescence.* (2) Describing an atom which emits rays of the same wave length as it has previously absorbed. (3) Mesomerism. The phenomenon which occurs when an atom takes up a spatial position intermediate between two other theoretically-possible positions.

resonant. Producing sound.

resonator. (1) An instrument used to intensify sound waves or electro-magnetic oscillations by resonance in a suitable material. (Cf. *quartz oscillator.*) (2) A chromophoric or fluorophoric constellation (q.v.) of electrons which absorbs rays of certain wavelengths; hence, the electronic arrangement of a chromophore or fluorophore.

resopal. A synthetic resin used for switches and illumination accessories.

resopyrine. A derivative of resorcinol and antipyrine. Minute rhombic crystals, insoluble in water; used medicinally.

resorcin. Resorcinol. **r. blue.** A microchemical stain.

resorcinol. $C_6H_6O_2$ = 110.1. Resorcin, *1.2*-benzenediol,* metadihydroxybenzene, $C_6H_4(OH)_2$. A diatomic phenol, colorless tablets, d.1.282, m.116, b.276; very soluble in water, alcohol, or ether. Used as a reagent for many organic compounds, as a reducing agent, in the manufacture of fluorescein, eosin, and many other dyes, synthetic drugs, and photographic developers; medicinally, as an external dehydrant, antiseptic, antiferment, and bactericide. **acetamido-** Dihydroxy-acetanilide. **dimethoxy-** $C_6H_4(OMe)_2$ = 138.1. A colorless liquid, d.-1.080, b.214, slightly soluble in water, soluble in alcohol or ether; used in organic synthesis. **dimethyl-** Xylorcinol. **dithio-** *1.3*-Phenylene mercaptan. **hexahydro-** *1.3*-Cyclohexanediol. **hexyl-** Hexylresorcinol. **methyl-** Orcinol. ***p*-nitrobenzeneazo-** $(HO)_2C_6H_3N{:}N.C_6H_4NO_2$. A sensitive reagent for Mg, 0.1 mg. of which in 5 cc. gives a blue color. **propyl-** Divarinol. **trimethyl-** Mesorcinol. **trinitro-** Styphnic acid. **r. carbolate.** Phenoresorcin. **r. monoacetate.** Euresol. **r. phenate.** Phenoresorcin. **r. phthalein.** See *fluorescein.* **r. yellow.** Tropeolin.

resorcitol. *1.3*-Quinitol.

resorcyl. The monovalent radical of resorcinol, $-C_6H_4.OH$ (1.3-hydroxybenzene).

resorcylalgin. Beta-resalgin, antipyrine resorcylate. An isomer of resalgin, m.115; soluble in water, alcohol, or ether.

resorcylate. A salt of one of the resorcylic acids.

resorcylic acid. $C_7H_6O_4$ = 154.1. Resorcinol carboxylic acid, dihydroxybenzoic acid, $C_6H_3(OH)_2COOH$. A group of triatomic, monobasic acids in which the two OH groups are in the *meta-* position; thus:

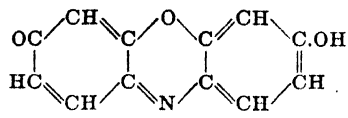
α- or 3.5-dihydroxybenzoic acid, q.v.
β- or 2.4-dihydroxybenzoic acid, q.v.
γ- or 2.6-dihydroxybenzoic acid, q.v.

propyl- Divaric acid.

resorption. The absorption of excreted material, including the products of inflammation.

resorpyrine. Resopyrine.

resorufin. $C_{12}H_7O_3N$ = 213.1. Oxyphenazone, oxyphenoxazone. The heterocyclic compound:



Used to detect halogens, as its intense fluorescence in alkaline solution is destroyed by Cl or Br.

respiration. The process of breathing, by which air is inhaled (inspiration) and expelled (expiration) from a living organism. In mammals respiration depends on the chemical equilibrium between the hemoglobin, (*HG*), oxygen, carbon dioxide, and sodium bicarbonate, as a result of which: (1) in the lungs (where an excess of oxygen exists) the hemoglobin is transformed to oxyhemoglobin; and (2) in the tissues (where an excess of carbon dioxide exists) the oxyhemoglobin releases the oxygen and removes the carbon dioxide:

$$\begin{array}{ccc} NaHCO_3 + O_2 + & & CO_2 + O_2 + H_2O + \\ & \overset{(2)}{\rightleftharpoons} & \\ HG\text{—}COOH & \overset{(1)}{\rightleftharpoons} & HG\text{—}COONa \\ (2)\ \uparrow\downarrow\ (1) & & (2)\ \downarrow\uparrow\ (1) \\ & \overset{(2)}{\rightleftharpoons} & \\ O_2.HG.COOH & \overset{(1)}{\rightleftharpoons} & O_2.HG.COONa \\ + NaHCO_3 & & + CO_2 + H_2O \end{array}$$

The sodium bicarbonate in blood acts as a buffer.

respirator. Inspirator, inhalor. A gas-mask or screen of fine wire or gauze with or without adsorbing or chemical reagents, worn over the mouth or nose to protect the wearer from dust, smoke, poisonous or irritating gases. **automatic-** A gas mask.

respiratory. Pertaining to respiration. **r. metal.** The metals Fe, Mn, Cu Zn and Mg, which are constituents of chromoproteins. See *pigment.* **r. quotient.** The ratio of the volumes of inhaled oxygen to expelled carbon dioxide, $(O_2)/(CO_2)$.

restitution. The reverse reaction of substitution *i.e.*, the restoration of the original compounds. An element is either oxidized or reduced to the free state in this process (cf. *substitution*).

restorative. An agent that aids in renewing or promoting a healthy physical condition.

resublimed. Purified by repeated sublimation.

resultants. The products of a chemical reaction; reaction-products. Cf. *reactants.*

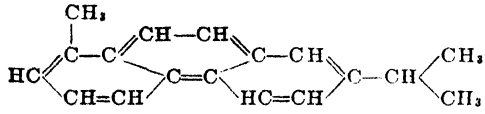
resuscitation. The restoration of consciousness or life in one apparently dead from asphyxiation or suffocation. **r. gas.** A mixture of approx. 93 % O_2 and 7 % CO_2, used for artificial respiration.

retamine. $C_{15}H_{26}ON_2$ = 250.2. An alkaloid from the young shoots of *Retama sphaerocarpa;* long needles, m.162, insoluble in water.

retardation. A slowing-up of a chemical reaction; a negative catalysis.

retarder. A substance added to a reacting mixture to prevent the reaction from becoming too vigorous; as the addition of potassium bromide to photographic developers to prevent over-development. Cf. *accelerator, promoter, catalytic poison.*

retene. $C_{18}H_{18}$ = 234.23. Methylisopropylphenanthrene. A hydrocarbon from pine tar. Lustrous leaflets, d.1.13, m.98, b.390, slightly soluble in water, soluble in alcohol or ether.



retention. The holding or retaining of a substance or property.

retentivity. The holding-back or retardation of a property.

Retger's law. The physical properties of mixed crystals vary in proportion with their percentage composition.

reticulated. Retiform. Resembling network.

reticulin. The protein of the fibers of reticular tissue not digested by pepsin or trypsin; it does not yield gelatin on boiling.

retiform. Reticulated.

retina. The portion of the eye on which the image is focussed by the lens. It consists of a number of bundles of sensitive rods and cones, which carry the sensation to the brain.

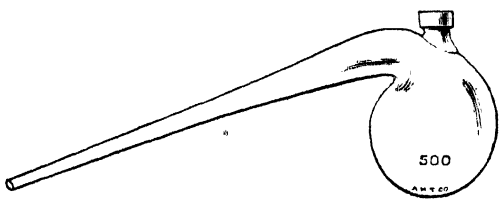
retinene. A yellow protein pigment formed in the eye retina by the action of light on rhodopsin (q.v.). It subsequently forms vitamin A, which in turn forms more rhodopsin.

retinite. The amorphous grey native substance, $C_{12}H_{18}O$. **r. resins.** A group of hard, brittle, light-brown resins from brown coal. They contain no wax (cf. *bituminous resins*), and are derived from amber.

retinol. $C_{32}H_{16} = 400.1$. Resinol, codol, resinoil. A liquid hydrocarbon obtained by distilling pitch or rosin. A yellow liquid, b.280, insoluble in water, soluble in alcohol; used medicinally as an antiseptic.

retonation. A wave propagated backwards through the burned gases from the starting point of an explosion.

retort. A distilling vessel of glass, iron, or other material. Originally a flask with a bent neck (alembic).



Retort.

retro- A prefix derived from the Latin, indicating *backward*.

retrogression. A reversal, or the reverse reaction.

retronecine. $C_8H_{13}NO_2 = 155.1$. A basic hydrolysis product of retrorsine.

retronecinic acid. $C_{10}H_{16}O_6 = 232.12$. An acid hydrolysis-product of retrorsine.

retrorsine. $C_{18}H_{25}NO_6 = 351.2$. An alkaloid from *Senecio retrorsus*, a Compositae.

retting. Loosening the fibre of vegetable materials by the action of moisture and enzymes or bacteria. Compare *coir*, *flax*.

retzbanyite. Native lead bismuth sulfide.

reussinite. A resin-like, reddish-brown hydrocarbon in certain coal deposits.

reverberatory. Flickering or blowing downwards. **r. furnace.** An oven in which the flames, but not the fuel, come into contact with the material to be heated, by reflection from a sloping roof. Cf. *furnace*.

reversible. Pertaining to restoration of the original condition; retracing or reversing. **r. action.** The re-establishment of an original condition. **r. cell.** An accumulator or an electric cell which after discharge of its current, can be restored to an active state by the application of an external current. **r. colloid.** See *colloid*. **r. electrode.** An electrode which owes its potential to ionic changes of a reversible nature. (See *electrode*.) **r. reaction.** A reaction that establishes an equilibrium, or which can be made to proceed from right to left or from left to right: $A + B \rightleftharpoons C + D$.

revert. To change back; *e.g.*, from a more soluble to a less soluble form, as the H_3PO_4 of superphosphate.

revertose. $C_{12}H_{22}O_{11} = 342.2$. A disaccharide produced by the action of maltase on glucose solution.

revive. (1) To restore the original activity; *e.g.*, of a catalyst. (2) To reduce a metallic ore or oxide to the metal.

revivification. The restoration of the active condition. **r. of carbon.** The reactivation of carbon by: (a) burning in the absence of air; (b) washing with acids to remove its ash; (c) washing with an alkaline solution.

Rey, Jean. 1630. An alchemist who carried out experiments on metallic oxides.

Reynold's number. An expression of fluid flow in a pipe, viz: (velocity of flow × diameter of pipe)/coefficient of kinematic viscosity of the liquid.

RG acid. *1*-Naphthol-*3.6*-disulfonic acid.

rH or r_H. (1) The symbol for oxido-reduction potential, $r_H = \log \frac{1}{p_{H^2}}$, where p_{H^2} is the hydrogen pressure in atmospheres, cf. p_H. (2) rH factor. A factor present in certain human blood erythrocytes, which enables them to act as antigens when injected into certain animals and to stimulate the production of immune antibodies in man. It is of importance in selecting blood for transfusion.

Rh. The symbol for rhodium.

rhabdophane. Phosphocerite. The mineral (Ce, Di,La)$_3$(PO$_4$)$_2$.

Rhamnaceae. Buckthorn family, a group of shrubs or small trees from which the following drugs are derived:

Rhamnus cathartica	buckthorn
Rhamnus frangula	frangula
Rhamnus purshiana	cascara sagrada
Ceanothus americanus	New Jersey tea
Gouania domingensis	chewstick

Cf. *colletin*, *cathartin*.

rhamnase. An enzyme from fungi that hydrolyses rhamnose.

rhamnegin. $C_{12}H_{10}O_5 = 234.1$. A glucoside from buckthorn berries.

rhamnetin. $C_{16}H_{12}O_7 = 316.1$. A methyl ester of quercetin and a split-product of xanthorhamnin; used as a yellow coloring material.

rhamnicogenol. A pentahydroxymethylanthranol occurring as primeveroside in purgative buckthorn and other *Rhamnus* species.

rhamnicoside. $C_{26}H_{30}O_{15}.4H_2O = 652.3$. A glucoside from the stem bark of purgative buckthorn, *Rhamnus cathartica*, a Rhamnaceae. Cf. *Chinese green*.

rhamnin. A fluid extract of *Rhamnus frangula* containing rhamnetin. **xantho-** Xanthorhamnin.

rhamninose. $C_{18}H_{32}O_{14}$ = 470.25. A trisaccharide from Persian berry, *Rhamnus infectoria*, which hydrolyses to two rhamnose and one glucose residue, $[\alpha]_D$ − 41°.

rhamnite. Rhamnitol.

rhamnitol. $C_6H_{14}O_5$ = 166.14. A methylpentite, $Me(CHOH)_4—CH_2OH$, obtained by reduction of rhamnose. Colorless crystals, m.121, soluble in water or alcohol.

rhamnofluorin. A constituent of *Rhamnus* species.

rhamnogalactoside. A series of glucosides that are hydrolysed to rhamnose and galactose; as, robinin and xanthorhamnin.

rhamnoglucoside. A glucoside that is hydrolysed to rhamnose and glucose; as, hesperidin, rutin, and sophorin.

rhamnol. $C_{20}H_{36}O$ = 292.3. An alcohol, m.132, from cascara sagrada.

rhamnomannoside. A glucoside that is hydrolysed to rhamnose and mannose; as, baptisin, frangulin, and strophanthin.

rhamnose. $C_6H_{12}O_5.H_2O$ = 182.1. A methylpentose from rhamninose and various glucosides. $Me(CHOH)_4CHO.H_2O$, isodulcite. Colorless crystals, d.1.471, m.92, soluble in water, slightly soluble in alcohol or ether. It is formed by hydrolysis of glucosides. Cf. *quinovose*.

rhamnoside. (1) A glucoside that is hydrolysed to rhamnose. (2) $C_{21}H_{20}O_9$. A split-product of the glucoside, rhamnoxanthin, which occurs in the rhamnus species.

rhamnosterin. $C_{18}H_{28}O_2$ = 276.3. A constituent of *Rhamnus* species.

rhamnoxanthin. A crystallizable glucoside from *Rhamnus frangula*.

Rhamnus. A genus of trees and shrubs; many have a purgative bark or fruit. **R. cathartica.** Buckthorn berries. The dried fruits of *Rhamnus cathartica*. **R. frangula.** See *frangula*. **R. purshiana.** See *Cascara sagrada*.

rhatanin. $C_{40}H_{43}O_3N$ = 585.4. Angelin, geoffrayin, andirin. A glucoside of rhatany root and other drugs; crystalline needles, m.280.

rhatany. Krameria.

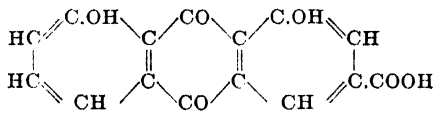
rhe. The absolute unit of fluidity. It is the reciprocal of the unit of viscosity, or centipoise.

rhea fiber. Ramie.

rheadine. $C_{21}H_{21}O_6N$ = 383.18. An alkaloid from opium; small white prisms, m.246.

rheic acid. $C_{20}H_{16}O_9$ = 400.1. An amorphous red powder. Cf. *chrysophanic acid*.

rhein. $C_{15}H_8O_6$ = 284.1. Rheinic acid. *1,9*-Dihydroxyanthraquinone-*3*-carboxylic acid. A monobasic diketonic acid obtained from senna leaves, rhubarb and lichens; golden-yellow prisms, m.162.



rheinic acid. Rhein.

rhenate. A compound of the type M_2ReO_4. **per-** A compound of the type $MReO_4$. They are all colorless, soluble in water (except Ag, Tl, K, Rb and Ce).

rhenic acid. The dibasic unstable acid H_2ReO_4 which changes to $HReO_4$. **per-** The acid $HReO_4$ formed on dissolving R_2O_7 in water.

rhenium. Re = 186.31. Dvi-manganese. The element of atomic number 75, a noble metal of the platinum group discovered by Noddack in 1924, by means of its x-ray spectrum, in platinum ores, gadolinite and columbite. It is probably identical with uralium. Used as a catalyst to dehydrogenate alcohols to aldehydes or ketones at 450–550°C. It has two isotopes, mass 185 and 187, and valencies of 7, 6, 4, and 3, d. 21.0, m.3440 ± 60°A; soluble in nitric acid, slowly in sulfuric acid, insoluble in HCl and HF. **r. chloride.** (1) $ReCl_7$ = 434.8. R. heptachloride. Green volatile crystals which are hydrolyzed in water. (2) $ReCl_6$ = 399.3. R. hexachloride. Brown volatile crystals. (3) $ReCl_4$ = 328.3. R. tetrachloride. Brownish-crystals. (4) $ReCl_3$ = 292.68. Hexagonal, dark red crystals, soluble in water. **r. fluoride.** ReF_6 = 300.31. Pale yellow-green crystals, m.25.6. **r. oxides:** (1) Re_2O_8. R. peroxide. A bluish-white solid, soluble in water and acids. (2) Re_2O_7. R. heptaoxide. A yellow solid, m.200, b.450, soluble in water forming perrhenic acid. (3) ReO_3. Red solid which changes to Re_2O_7. (4) ReO_2. R. dioxide. A black powder formed by heating $NaReO_4$ in hydrogen. (5) Re_2O_8. A blue solid. **r. sulfide.** Re_2S_7.-H_2O. R. heptasulfide. A black powder, insoluble in acids or alkalis but oxidized by HNO_3.

rheochrysin. $C_{22}H_{22}O_{10}$ = 446.2. A glucoside from rhubarb. Cf. *rheopurgin*.

rheoid. The combined principles from the root of *Rheum officinale*, rhubarb; used medicinally as a tonic and alterative.

rheology. The science of the deformation and flow of matter, *e.g.*, elastic, viscous and plastic. Cf. *softener*.

rheometer. (1) A galvanometer. (2) An instrument for measuring the velocity of the blood current.

rheopexy. A form of thixotropy (q.v.), in which solidification occurs as the result of a regular gentle motion instead of vigorous shaking.

rheopurgin. A constituent of rhubarb which decomposes into 4 glucosides (cf. *rheochrysin*, *rhein*).

rheoscope. An instrument for detecting an electric current.

rheostan. The alloy Cu(52), Zn(18), Ni(25), Fe(5). It is used for rheostats.

rheostat. An instrument for regulating the resistance of an electric current. Cf. *resistance box*.

rheotannic acid. $C_{28}H_{26}O_{14}$ = 562.2. Rhubarb tannin. A yellow powder, soluble in water.

rheotome. A current breaker.

rheum. Rhubarb.

rhigolene. The first condensation-product of the fractional distillation of petroleum, b.21, which consists largely of butane and pentane. Used in atomizers to produce coldness of the skin before surgical operations; also as a solvent.

rhinanthin. A glucoside obtained from the seeds of *Alectorolophus hirsutus* or *Rhinanthus major*, Scrophulariaceae.

rhinemetal. An alloy of 97 % tin and 3 % copper, d.7.35, m.300.

rhinestone. A colorless, highly-refractive glass cut as a brilliant and used as a semi-gem.

rhizocholic acid. An oxidation-product of cholic acid.

rhizoid. Describing a bacterial growth of an irregularly-branched or root-like character.

rhizome. An underground plant stem that partly performs the functions of a root, and is characterized by the presence of leaf bases. The following rhizomes are official and used medicinally:

Arnica	Hydrastris
Aspidium	Leptandra
Calamus	Menispermum
Caulophyllum	Podophyllum
Cimicifuga	Sanguinaria
Convallaria	Serpentaria
Cypripedium	Spigelia
Geranium	Triticum
Ginger	Valerian
	Veratrum viride

rhizonic acid. $C_{10}H_{12}O_4$ = 208.1. *6*-Hydroxy-*4*-methoxy-isoxylic acid. White crystals, m.232. **iso-***4*-Hydroxy-*6*-methoxy-isoxylic acid. White crystals, decomp. 156, soluble in alcohol or ether, decomp. by boiling water.

rhizosphere. The soil in the immediate neighborhood of a growing root system.

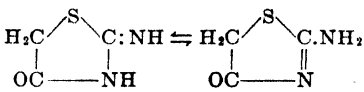
rho. The Greek letter, *ρ* or P. **r. 1.** Theelin. **r. 2.** Progesterone.

rhodacene. $C_{30}H_{20}$ = 380.2. A pyrolytic product from acenaphthene. A dark violet crystal mass with greenish metallic luster, m.339, isomeric with chalcacene, into which it changes on strong illumination in dilute solution.

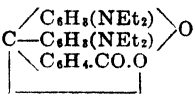
rhodalline. Allyl sulfocarbamide.

rhodamic acid. Rhodanine.

rhodamine. (1) $C_3H_4ON_2S$ = 116.1. Rhodamic acid, 4-keto-2-thiothiazolidine. The heterocyclic compound,



(2) A group of red dyes closely allied to the fluoresceins, obtained by condensation of phthalic anhydride with *p*-alkylated aminophenols. **tetraethyl-** $C_{28}H_{30}N_2O_3$ = 442.2.



It is colorless, but its salts are red dyes with an oxonium or quinoid structure.

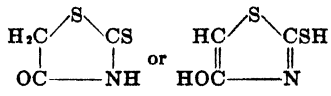
rhodan. The monovalent radical, —SCN. (See *thiocyanate.*)

rhodanate. Thiocyanate.

rhodanic acid. (1) Rhodanine. (2) Thiocyanic acid.

rhodanide. Thiocyanate.

rhodanine. $C_3H_3ONS_2$ = 133.1. Rhodanic acid, 4-keto-2-thio-m-thiazolidine.



***p*-dimethylaminobenzilidene-** $(C_3HNOS_2):CH.C_6H_4.NMe_2$. A sensitive reagent for silver, with which it gives a flocculent red precipitate.

rhodanizing. Plating with rhodium (especially on silverware) to prevent tarnishing.

rhodanometry. (1) The use of free cyanogen to determine the absorption values of oils; the cyanogen behaves analogously to iodine. (Cf. *iodine number.*) (2) Thiocyanometry. Titration with thiocyanate solutions to determine silver, mercury, etc.

Rhode test. A color reaction for proteins. Concentrated H_2SO_4 and dimethyl aminobenzaldehyde give a purple color.

rhodeite. Rhodeol.

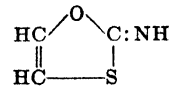
rhodeol. $C_6H_{14}O_5$ = 166.1. Rhodeite, rhodeitol. A pentatomic alcohol, $CH_3(CHOH)_4CH_2OH$, that is oxidised to rhodeose.

rhodeoretin. Convolvulin.

rhodeose. $C_6H_{12}O_5$ = 164.1. A methylpentose glucoside and isomer of fucose in jalap roots.

rhodiene. $(C_{10}H_{16})_x$. A hydrocarbon from *Rhodium lignum*, rose wood.

rhodime. C_3H_3ONS = 101.1. 2-thiozolimine. The heterocyclic compound,



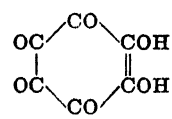
rhodinol. $C_{10}H_{19}OH$ = 156.2. 2.6-dimethyl-octene-2-ol-8. An unsaturated alcohol, $Me_2C:CH.CH_2.CH_2.CHMe.CH_2.CH_2OH$, a constituent of citronella and geranium oils; used in artificial or synthetic oil of rose.

rhodite. Rhodium gold.

rhodium. Rh = 102.91. A metal of the platinum group, atomic number 45. It is a grayish-white ductile metal, d.12.44, m.1920, insoluble in water or acids; it occurs in the platinum ores and gold gravels of South America. It was discovered by Wollaston (1804), and its usual valency is three. Used for plating it has a permanent brilliant silver-like polish, which is superior to chromium-plating. Used in alloys, in the manufacture of thermo-elements and astronomical measuring instruments; also for plating jewelry and silverware. **r. black.** Finely-divided r. metal obtained by precipitation of rhodium salt solutions by formaldehyde; used as a catalyst. **r. cesium alum.** $Rh_2(SO_4)_3,Cs_2(SO_4),24H_2O$ = 128.10. Yellow octagonal crystals, m.110, and soluble in water. **r. chloride.** $RhCl_3.4H_2O$ = 281.34. R. sesquichloride. A brownish-red, deliquescent powder, decomp. 475; slightly soluble in water. **r. gold.** Rhodite. A native alloy which contains 57–66 % gold and 34–43 % rhodium. **r. hydroxide.** $Rh(OH)_3$ = 153.92. A black amorphous powder, decomp. by heat, insoluble in water or alcohol, soluble in alkalis. **r. nitrate.** $Rh(NO_3)_3.2H_2O$ = 325.0. A red, crystalline deliquescent powder; soluble in water, insoluble in alcohol. **r. oxides:** (1) RhO = 118.9. R. monoxide. A gray powder; insoluble in water, alcohol or ether. (2) Rh_2O_3 = 253.8. R. sesquioxide. A gray amorphous powder obtained by heating r. with barium peroxide; insoluble in water or alcohol. (3) RhO_2 = 134.9. R. dioxide. A brown powder; insoluble in water or alcohol. **r. sulfate.** $Rh_2(SO_4)_3.12H_2O$ = 710.2. A light yellow, crystalline powder; soluble in water. **r. sulfide.** RhS = 135.0. A bluish, amorphous powder, decomp. by heat; insoluble in water or alcohol.

rhodizite. A white or green native calcium borate.

rhodizonic acid. $C_6H_2O_6$ = 170.1. A dihydroxy-diquinone that acts as a dibasic acid.



Its sodium salt is used as spot-test reagent for Ba and Sr (reddish-brown).

rhodochrosite. $MnCO_3$. Red manganese. A native manganese carbonate.

rhododendrin. $C_{16}H_{22}O_7$ = 326.2. A constituent of *Rhododendron chrysanthemum*, an Ericaceae.

Colorless crystals, m.187; soluble in hot water or alcohol.

rhododendrol. $C_{10}H_{12}O_2$ = 164.1. A constituent of *Rhododendron chrysanthemum*. Colorless crystals, m.80.

rhodol. Metol.

rhodolite. A variety of garnet.

rhodonite. $MnSiO_3$. Red manganese, manganese spar. A native manganese silicate.

rhodopterin. A purple oxidation-product of pterin (q.v.).

rhodopsin. The protein pigment of the visual purple (q.v.) in the retina of the eye. Cf. *retinene*.

rhodopurpurin. Rhodovibrene.

rhodotannic acid. $C_{14}H_8O_7$ = 286.1. A tannin derived from the leaves of *Rhododendron ferrugineum*.

rhodovibrene. Rhodopurpurin. A purple carotenoid pigment produced by bacteria.

rhodoviolascene. $C_{42}H_{60}O_2$(?). A carotenoid pigment derived from purple bacteria.

rhodoxanthin. $C_{40}H_{50}O_2$ = 562.35. Thujorhodin. A carotenoid (q.v.) and red isomer of xanthophyll in the red berries of *Taxus baccata* (yew), the leaves of the Russian pond weed, *Potomogeton patans*, and of arbor vitae, *Thuja orientalis*.

rhoduline. A group of aniline dyes of the safranine type; used in textile printing.

Rhoeadales. An order of plants comprising the families: *Papaveraceae*, *Cruciferae*, *Resedaceae*.

rhoeadic acid. Papaveric acid.

rhoeadine. $C_{21}H_{21}O_6N$ = 383.2. A crystalline alkaloid obtained from *Papaver rhoeas*, a Papaveraceae.

rhoeagenine. An isomer of rhoeadine.

rhoetzite. Kyanite.

rhomb. Rhombic. **r. spar.** A rhombic form of dolomite.

rhombic. A crystal with three unequal axes all at right angles; as, iodine, sulfur, or copper sulfate. (See *crystal systems*.) **r. dodecahedron.** A crystal of the isometric system which has twelve faces; each face parallel to one axis and having equal intercepts on the other two neighboring faces. **r. mica.** Phlogopite. **r. quartz.** An obsolete term for feldspar. **r. spar.** A form of dolomite. **r. system.** In crystallography, the orthorhombic system.

rhombohedral. A crystal of the trigonal system having a vertical axis of threefold symmetry and three horizontal axes of twofold symmetry. **r. system.** A modified trigonal system of crystals which have three horizontal axes of twofold symmetry in place of the threefold symmetry of the hexagonal system. Cf. *crystal systems*.

rhombohedron. A crystal form bounded by six faces of rhombic outline.

rhotanium. An alloy of palladium and rhodium.

rhubarb. Rheum. The dried rhizomes and roots of *Rheum officinale*, and other Rheum species of the family Polygonaceae. It contains rheopurgin, chrysophanic acid, rhein, tannic acid, and other principles; used medicinally as a laxative and gastric tonic, and as the fluid extract, syrup, tincture, powder, and tablets. Cf. *aporhetin*, *erythroretin*, *pheoretin*. **r. tannin.** A rheotannic acid.

Rhus. A genus of trees and shrubs of the Anacardiaceae, cashew family. *R. aromatica*. The bark of a shrub of North America. Used as the fluid extract, as a tonic and stimulant. *R. coriaria*. Sumac. *R. cotinus*. Fustic. *R. diversiloba*. The poison oak of the Pacific Coast. *R. glabra*. Sumac berries. The dried ripe fruit of *R. glabra*; used as the fluid extract, as an astringent. *R. toxicodendron*. The poison oak of the Atlantic States, or poison ivy.

rhusin. Rhusoid. The combined powdered principles from *Rhus glabra*, used medicinally.

rhusoid. Rhusin.

rhythm. Occurrence at regular intervals, as a sound, or wave-motion.

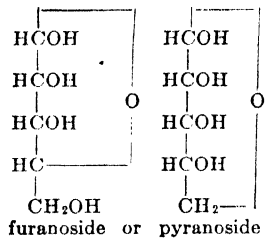
rhythmic. Occurring at regular intervals. **r. deposition.** Precipitation or condensation in gas or vapor mixtures at periodic intervals, such as are produced when two vials of HCl and NH_4OH are placed in a closed bell jar. **r. precipitation.** Periodic precipitation. Precipitation in bands or zones in a colloid, as in Liesegang's rings, q.v.

ribichloric acid. $C_{14}H_8O_9$ = 320.1. An acid constituent from *Galium aparine*, goosegrass, a Rubiaceae.

riboflavin. See *lactoflavin*.

ribonic acid. $C_5H_{10}O_6$ = 166.1. A pentabasic acid, $CH_2OH(CHOH)_3COOH$, derived from ribose.

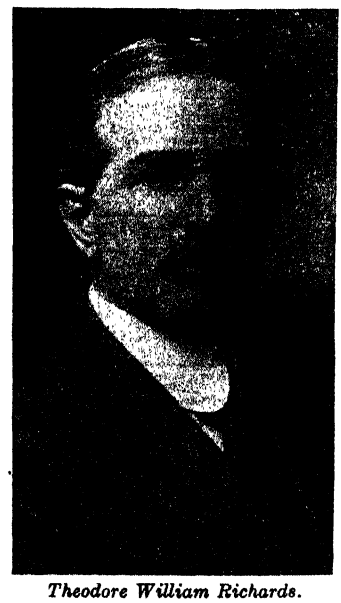
ribose. $C_5H_{10}O_5$ = 150.1. A pentose sugar constituent of some nucleic acids, $CH_2OH(CHOH)_3CHO$. It may exist as:



furanoside or pyranoside

r. ketohose- Allulose.

rice. The seeds or grains of *Oryza sativa* which contain mainly starch (rice flour). Used as a food, and finely-powdered as a dusting powder.



Theodore William Richards.

rich. High in content or of great percentage. **r. gas.** The second group of combustible gases obtained by the distillation of coal and coke; as, illuminating gas and coke-oven gas. **r. iron.** Having a high silicon content.

Richards, Theodore William. 1868–1928. An American chemist noted for his atomic weight determinations and experiments in physical chemistry.

richellite. A native iron, calcium phosphate from Richelle, Belgium.

Richter, Jeremias Benjamin. 1762–1807. A German chemist noted for his work on volumetric analysis and on stoichiometrical principles.

Jeremias Benjamin Richter.

R.'s law. Wenzel's law. Each equivalent weight of an acid will completely neutralize an equivalent weight of a base. **R., Victor von** 1842– . A German chemist noted as author of chemical textbooks.

ricin. An albuminous toxin of castor oil beans, the seeds of *Ricinus communis;* it agglutinates red blood corpuscles.

ricinate. Ricinoleate. A salt of ricinoleic acid.

ricinic acid. Ricinoleic acid.

ricinine. $C_{12}H_{12}O_2N_2$ = 216.1. An alkaloid from the leaves and seeds of the castor oil plant, *Ricinus communis*.

ricinoleate. Ricinate. A salt of ricinoleic acid.

ricinoleic acid. $C_{18}H_{34}O_3$ = 298.36. Ricinic acid, *12*-hydroxy-*9*-octadecanoic acid*, *10*-hydroxyoleic acid, elaeodic acid, $Me(CH_2)_5CHOH.CH:CH(CH_2)_7COOH$. A fatty acid from castor oil. A yellow, thick mass, d.0.945, m.17, b.$_{15mm}$250, insoluble in water, partly soluble in alcohol or ether. Its alkali salts are very soluble and detoxify antigens.

ricinolein. $C_{57}H_{104}O_9$ = 932.83. Glyceryl ricinoleate, triricinolein. The glycerol ester of ricinoleic acid, a constituent of castor oil (80 %).

Ricinus. The castor oil plant, *R. communis*, an Euphorbiaceae, whose seeds yield castor oil and ricinine.

rickardite. Cu_2Te_3. A copper mineral.

Rideal-Walker test. The determination of the value of an antiseptic from the amount required to prevent the growth of certain organisms (as *B. typhosus*) under standard working conditions. Phenol is taken as the standard of comparison. **R-W. value.** Phenol coefficient. Cf. *germicide*.

riebeckite. An oxide earth which contains Fe, Si, and Na.

riffles. (1) Small waves. (2) A corrugated surface. (3) A sampler, q.v.

rigidity. The state of being inflexible or stiff. **r. modulus.** Modulus of elasticity.

rimnic acid. An acid resin, the chief constituent of rimu resin.

rimose. Describing a bacterial culture which shows fissures and cracks.

rimu resin. A rose-red resin obtained from the rimu or red pine of New Zealand, *Dacrydium cupressinum*, a Coniferae.

ring. (1) A circular structure. (2) A closed chain of atoms. (3) A system of rings; as, the porphin r., cholane r. See also *ring structures*. **bacterial-** A growth of bacteria on the surface of culture media, which adheres to the glass forming a rim. **benzene-** See *benzene ring*. **fused-** Two or more r. having at least two atoms each in common. Cf. *spirane*. **heterocyclic-** A misnomer for heteroatomic r., or a heterocycle. See *ring structures*. **homocyclic-** A misnomer for homoatomic or carboatomic r. or homocycle. See *ring structures*. **Liesegang's-** See *rhythmic precipitation*. **Newton's-** See *Newton*.

r. breakage. The disruption of an atomic ring, or the change from an aromatic to an aliphatic compound. **r. closure.** Ring formation. **r. compound.** A compound in which the atoms of the molecules form a ring or closed chain; as, a cyclic compound. **r. formation.** Exo-condensation. The closing of an atomic chain; the change from an aliphatic to an aromatic compound. **r. reaction.** R. test. A chemical reaction (precipitate or color change) at the boundary between two liquids one of which has been superimposed as a layer on the other. Cf. *horismascope*. **r. structures.** The manifold atomic arrangements in aromatic compounds, the molecules of which may contain one, two, or more rings connected or joined by simple or double bonds or by a single atom (spiro compound). Classification (*Patterson*):

A. The compound consists of a SINGLE RING:
   1. Carbon atoms only..... Carbocyclic
      three atoms—cyclopropane
      four atoms—cyclobutane
      five atoms—cyclopentane
      six atoms—benzene, cyclohexane
   2. Carbon and some other atom(s). Heterocyclic
      The heterocyclic atoms are principally O, S, Se, Te, N, P, As, Sb, Si, Sn, Fe, Hg.

B. The compound consists of TWO or MORE RINGS; each of five or more atoms, but it does not contain an atomic bridge, a crossed valence bridge or a free spiro union.
   1. Carbon atoms only; *e.g.*,
      indene, *6*, 5.
      naphthalene, 6, 6.
      fluorene, 6, 6, 5.
      anthracene, 6, 6, 6.
      chrysene, 6, 6, 6, 6.
      dibenzanthracene, 6, 6, 6, 6, 6.

2. Carbon and other atom(s) *e.g.*,
one nitrogen..... indole, 6, 5.
cinnoline, 6, 6.

C. The compound consists of two rings joined by an ATOMIC BRIDGE or valence bridge; as, terpenes and derivatives.

D. The compound consists of TWO or MORE ATOMIC BRIDGES, as hexamethylenetetramine.

E. The compound consists of one or more SPIRO UNIONS.

r. symbol. A graphical representation of an atomic ring, as skeleton symbols or structure symbols. **r. system.** An arbitrary representation on a plane surface of the geometrical arrangement of atoms in the molecule of an aromatic substance. **r. test.** Ring reaction.

Ringer, Sidney. 1835–1910. An English physiologist noted for his experiments on the physical properties of protoplasm. **R. fluid, R. solution.** An isotonic solution of 0.7 % sodium chloride, 0.03 % potassium chloride and 0.025 % calcium chloride in water; used in physiological experiments. Cf. *saline, salt solution, Locke's solution.*

rinkite. The mineral $3NaF,4CaO,6(Ti,Si)O_2$, Ce_2O_3.

Rinmann's green. A pale-green mass, probably cobalt zincate, $CoZnO_2$, obtained by melting zinc compounds with a trace of cobalt salts. It is an identification test for zinc compounds in blowpipe analysis.

rinneite. A Stassfurt salt, $FeCl_2.3KCl.NaCl$.

rio arrowroot. Tapioca.

Rio Tinto process. The extraction of copper from its ores after oxidation by atmospheric exposure.

ripener. An agent that is used to ripen fruits which have been shipped unripe for better preservation. The fruits, such as dates, persimmons, bananas, avocados, etc., are placed in a chamber at 65°F. and exposed to ethylene gas, 1:1000, the gas being renewed each day.

ripening. (1) The natural process undergone by fruits, which consists of progressive hydrolytic changes by the action of enzymes: the fruit becomes sweeter, tannins and organic acids disappear, proteins are hydrolyzed, starch changes to sugar and some sugars form esters and the characteristic flavor develops. The cell wall undergoes changes, and the color generally deepens. (2) The gradual formation of light-sensitive centers in the emulsion of a photographic plate. (3) A process of fermentation (as of tobacco), in which organic catalysts may be used to produce maturity. (4) A stage in the manufacture of rayon in which the solution attains, naturally or otherwise, the necessary properties for successful spinning. **artificial-** Ripener.

ripidolite. The green or white mineral $(Al,Cr)_2O_3,5(Mg,Fe)O,3SiO_2,4H_2O$.

riptography. Analysis by a volumetric method in which a solution is titrated with a precipitating agent, and the properties of the clear layer obtained after shaking and allowing to settle, are measured.

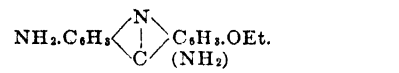
risic acid, rissic acid. $C_{11}H_{12}O_7$ = 256.09. *2*-carboxy-*4,5*-dimethoxy-phenoxy acetic acid. $C_6H_2(OMe)_2COOH.OCH_2COOH$. A split-product of rotenone; a lower homolog of derric acid. White crystals, m.262.

Ritz formula. An equation connecting the wave-number, n, of a line in a series of the spectrum with the universal series constant, N.

$$n = A - \frac{N}{[m + \mu + (d/m^2)]^2}$$

where m is an integer and A, μ and d are constants.

rivanol. $C_{15}H_{15}ON_3$ = 253.3. 2-ethoxy-6.9-diaminoacridine, ethodin,



A yellow crystalline powder, used as a local antiseptic in the treatment of abscesses and wounds. It is less toxic and more antiseptic than trypaflavine.

rivotite. A native, basic copper antimony carbonate.

Rn. The symbol for radon.

roan. Sheepskin tanned with sumach. Cf. *skiver.*

roast. (1) To heat with access of air. (2) The product obtained by heating substances, especially ores, in air. **r. gases.** The gases formed on roasting ores, especially sulfides. They consist mainly of sulfur dioxide and arsenious fumes, mixed with air and the gases of the fuel used.

roaster. Roasting furnace.

roasting. Oxidation of ores in a current of air in a furnace heated by wood, coal or oil. Roasting removes the sulfur and arsenic, and makes the ores more porous and, therefore, ready for chlorination or hyposulfitization. **r. furnace.** A long firebrick furnace; ore is fed into one end and gradually, by means of raffles or rakes, shuffled toward the firebox, and removed after about three hours of roasting. **r. temperature.** The temperature necessary for roasting depends upon the composition of the ore. The following temperatures indicate the reactions taking place:

100°C.....	water boils (removal of moisture)
250°C.....	Ag_2O decomposes
350°C.....	Sulfides begin to burn, and $CuSO_4$ is dehydrated
600°C.....	$FeSO_4$ decomposes to Fe_2O_3
653°C.....	$CuSO_4$ becomes basic
655°C.....	Ag_2SO_4 melts
702°C.....	Basic $CuSO_4$ decomposes to CuO
807°C.....	Ag_2SO_4 decomposes
1050°C.....	CuO forms Cu_2O
1100°C.....	Fe_2O_3 forms Fe_3O_4

robin. An albuminous toxin or poisonous nucleoprotein from the bark of the locust tree, *Robinia pseudacacia*, a Leguminosae of North America; used medicinally as an emetic and purgative.

robinin. A coloring material extracted from the heartwood of *Robinia pseudacacia*, locust.

robinose. $C_{18}H_{32}O_{14}$ = 472.2. A trisaccharide occurring with camphor in *Robinia* species; it hydrolyses to two molecules of rhamnose and one of glucose.

Robinson, Sir Robert 1886– . An English chemist noted for organic research.

Robiquet, Henri Edme. 1822–1860. A French chemist noted for work on fermentation and photography. The son of **R., Pierre Jean.** 1780–1840. A French chemist, noted as an analyst of vegetable materials.

Robison, Robert. 1884–1941. A British biochemist noted for his work on yeast and fermentation. **R. ester.** Glucose-6-phosphate, produced in the fermentation of sugar by yeast. Cf. *Neuberg ester.*

roburite. An explosive which consists of 87 % ammonium nitrate, 11 % dinitrotoluene, and 2 % chloronaphthalene.

Roccella. A genus of lichens, as *R. tinctoria,* litmus plant.

roccellic acid. $C_{20}H_{30}O_7$ = 372.15. A dibasic acid from *Roccella fuciformis,* a fungus or lichen. Colorless scales, m.178, soluble in hot alcohol, insoluble in water.

roccellin. Orseillin.

rochelle salt. Potassium sodium tartrate.

Rochleder, Friedrich. 1819–1874. An Austrian chemist noted for his work on plant analysis.

rock. Any native aggregation of mineral matter, an essential part of the earth crust. **basic-** See *basic r.* **igneous-** See *igneous.* **primary-** Rock that has not undergone weathering and disintegration. **secondary-** R. that has been altered by disintegration.

r. asphalt. Sandstone or limestone impregnated with asphalt. **r. breaker.** A machine that crushes rock. **r. candy.** Crystallized sucrose. **r. cork.** A variety of asbestos. **r. crystal.** A transparent and colorless variety of quartz. **r. gas.** Natural gas. **r. meal.** Calcium carbonate deposited from water. **r. milk.** A fine quality r. meal. **r. oil.** Petroleum. **r. quartz.** Quartz. **r. ruby.** A red variety of garnet. **r. salt.** Common table salt. Sodium chloride obtained in the solid form by mining; as distinguished from sea salt, which is obtained by evaporation. **r. sand.** The debris of abraded rock. **r. silk.** A variety of fine asbestos. **r. tallow.** Hatchettenine. **r. tar.** A crude petroleum. **r. wool.** A fibrous substance made by blowing a jet of steam against a small stream of molten lime and siliceous rock. Cf. *slag wool.*

rod. (1) Pole, perch. A unit of length in surveying: 1 rod = 25 links = 5½ yards = ¼ chain = 5.02921 meters. (2) A stick-shaped bacillus. **square r.** A unit of area in surveying, (272.25 sq. yards). Cf. *rood.*

rodinal. $NH_2C_6H_4.OH$ = 109.1. p-Aminophenol; used as a photographic developer.

Rœntgen. See *Röntgen.*

Roese-Gottlieb method. A method of determination of fat used in the analysis of milk, dairy products, flour, etc., in which the moist food is shaken with a mixture of ethyl ether and petroleum ether, and the separated ethereal layer evaporated in a weighed vessel.

Roesler's process. A method for separating copper and silver from gold by fusion with sulfur or antimony sulfide to obtain copper and silver sulfides.

Rohrbach's solution. An aqueous solution (d.-3.58) of barium and mercuric chlorides; used for determining the density of minerals by the suspension method.

Röhrig tube. A separating device for fat extraction, consisting of a 87.5-cc. glass tube with delivery tube so placed that the center line coincides with the 23-cc. surface of ether-water layer.

Roman cement. A cement made by heating clay and limestone. **R. ocher.** A native, deep orange variety of ocher. **r. vitriol.** Cupric sulfate.

romanium. An alloy of aluminum with a small percentage of tungsten, copper and nickel.

romeite. $5CaO.3Sb_2O_5$. A native calcium antimoniate.

rongalite. $CH_2O.NaHSO_2.H_2O$. An addition-produet of formaldehyde. Used in the textile industry as a substitute for sodium hyposulfite.

Röntgen, Wilhelm Konrad. 1845–1923. A German physicist noted for the discovery and description of x-rays in 1895. **r. rays.** X-rays. **r. ray analysis.** X-ray analysis. **r. tube.** See *x-ray tube.* **r. unit.** The international unit of *x-ray intensity,* q.v.

Wilhelm Konrad Röntgen.

röntgenogram. Radiogram. An x-ray photograph.

röntgenography. Radiography.

röntgenology. A branch of physics that deals with the study of x-rays.

rood. A surface measure, 1 rood = 1210 sq. yards; 40 roods = 1 acre. Cf. *rod.*

root. An underground portion of a plant that absorbs moisture and salts and conducts them to the leaves. It also maintains the plant in position, and may serve as a storage for reserve materials. Cf. *rhizome.* Several roots are used medicinally; official roots (U.S.P.) are:

Althaea	Glycyrrhiza	Rhubarb
Apocynum	Inula	Rumex
Asclepias	Ipecac	Sarsaparilla
Belladonna	Krameria	Senega
Bryony	Lappa	Stillingia
Calumba	Pareira	Sumbul
Gelsemium	Phytolacca	Taraxacum
Gentian	Pyrethrum	

Roozeboom, Hendrick Willem Bakhuis. 1854–1907. A Dutch chemist noted for his practical application of the phase rule.

ropiness. Stickiness or stringiness of an organic liquid (also beer, milk or bread) caused by the action of microorganisms of the B. mesentericus group (e.g., Acetobacter R.).

ropy. Possessing a sticky or stringy consistency.

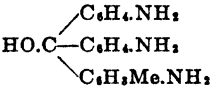
Rorrison's oil thief. A heavy glass tube with a valve, used for taking oil samples.

Rosaceae. Rose family, a group of herbs, shrubs or trees, several of which yield drugs and edible fruits.

Prunus virginiana	wild cherry bark
Prunus domestica	prune
Prunus persica	peach leaves
Pyrus malus	apple tree bark
Pyrus cydonia	quince seeds
Prunus amygdalus amara	bitter almonds, bitter almond oil
Prunus amygdalus dulcis	sweet almonds, sweet almond oil
Pyrus (Sorbus) aucuparia	sorbus
Quillaja saponaria	soap bark
Rosa gallica	red rose
Rosa damascaena	attar of roses
Rubus species	blackberry root

Rubus idaeus	raspberry
Crataegus oxyacantha	English hawthorn
Prunus laurocerasus	cherry laurel
Fragaria vesca	strawberry
Gillenia stipulacea	American ipecac
Agrimonia eupatoria	agrimony
Brayera anthelmintica	kousso
Potentilla anserina	silverweed
Potentilla canadensis	five-finger grass
Potentilla tormentilla	tormentil

rosaniline. $C_{20}H_{21}N_3O$ = 319.3. A triphenyl dye obtained by heating aniline and toluene with nitrobenzene:



Red needles, soluble in water or alcohol, insoluble in ether. Its hydrochloride is fuchsin. **r. hydrochloride.** Fuchsin.

rosanilines. Fuchsin or magenta dyes. The salts and derivatives of rosaniline.

Roscoe, Sir Henry Enfield. 1833–1915. An English chemist noted for his writings on inorganic and organic chemistry.

roscoelite. A vanadium-mica ore of California.

Rose process. The separation of gold from its ores by fusion of the zinc precipitates and aeration to oxidise the baser metals. These are removed as a borax-silica flux.

Rose, Friedrich. 1839– . A German chemist, noted for work on cobalt ammonia compounds. **R., Gustav** 1798–1873. A German chemist noted for his system of crystallography. **R., Heinrich** 1795–1864. A German chemist, and originator of the use of H_2S in qualitative analysis. Both were sons of **R., Valentin (the younger).** 1762–1807. A German chemist, noted for analytical methods (CO_2, As, P. etc.) and sons of **R., Valentin (the elder).** 1736–1771. A German chemist who first prepared *rose metal.*

rose. The dried petals of *Rosa gallica*, a Rosaceae. Used as the fluid extract as a tonic, and in perfumery. **cabbage-** The flower petals of *Rosa centifolia*, used for rose-water. **Christmas-** Black hellebore. **corn-** Red *poppy.* **dog-** The ripe fruit of *Rosa canina*, used for making pill-masses. It contains invert sugar, citric and malic acids.

r. bengal(e). Diiodoeosin. A red dye, used as adsorption indicator in the titration of chlorides by silver nitrate. **r. copper.** Rosette copper. **r. metal.** Rose's metal. An alloy of low melting-point: 2 pts. bismuth, 1 pt. tin and 1 pt. lead; m. 94. **r. oil.** An essential oil obtained by cold extraction of rose petals; used in perfumery. **r. quartz.** A pink variety of quartz, used as a gem. **r. vitriol.** Cobaltous sulfate.

rosein. Fuchsin.

roselite. A native hydrated oxide containing Ca, Co, Mg, and As.

rosellane. Rosite.

rosemary. Rosmarinus. **wild-** Labrador tea. **r. oil.** The volatile oil distilled from the fresh flowering tops of *Rosmarinum officinalis*, a Labiatae.

Rosenstein process. [Ludwig R. 1886– . American chemist.] A method of making hydrochloric acid from chlorine and water gas: $2Cl_2 + 2H_2O + CO \rightarrow CO_2 + 4HCl$.

Rosensthiel's green. Barium manganate.

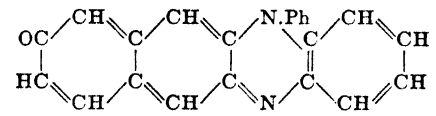
roseo-compound. One of the red cobalt ammines of the type, $Co(NH_3)_5X_3.H_2O$.

roseoquinine. A red color produced on adding fresh potassium ferricyanide solution to a solution of thalleo-quinine, q.v.

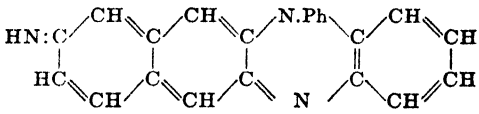
rosette. A disk with a centrally-arranged pattern of crystals. **r. copper.** A disk of copper formed on the surface of molten copper by sudden cooling with a spray of water.

rosin. Colophony. The resin remaining after distilling turpentine from the exudation of various species of pine; e.g., *Pinus palustris.* It contains abietic acid (80–90 %) and its anhydride. A yellow, brittle mass; insoluble in water, soluble in alcohol, ether, or chloroform. It is used as an insulating material for sizing paper and in plasters. **r. jack.** A yellow variety of sphalerite. **r. oil.** A blue fluorescent oil obtained by the destructive distillation of rosin and pitch; used as a lubricant. Cf. *retinol.* **r. spirit.** A mixture of hydrocarbons obtained in the destructive distillation of rosin. **r. tin.** A reddish variety of cassiterite.

rosindone. $C_{22}H_{14}N_2O$ = 322.12. Rosindulone. An aniline dye; red crystals, m.224, soluble in water.



rosinduline. $C_{22}H_{16}N_2$ = 321.26. An aniline dye, m.199; soluble in water.



r. scarlet. A red dye used as an oxidation-reduction indicator.

rosindulone. Rosindone.

rosinoil. Retinol. Cf. *rosin* oil.

rosinol. Retinol.

rosinweed. The dried root of *Silphium laciniatum.* A tonic and expectorant.

rosite. Decomposed anorthite.

rosmarinus. The dried leaves and plants of *Rosmarinus officinalis*, rosemary, a Labiatae. Used medicinally as the fluid extract, and as an aromatic in perfumery.

rosolic acid. $C_{20}H_{16}O_3$ = 304.2. Corallin, trioxytrimethylphenylmethane. Red scales with a green metallic luster, m.270 (decomp.), slightly soluble in water, soluble in hot alcohol or ether; used as an indicator and in the manufacture of aniline dyes. Cf. *aurin.*

rosterite. A light red variety of beryl.

rosthornite. $C_{24}H_{40}O$ = 344.3. A brown resin, d.1.076, found native in Carinthia.

rostone. A synthetic stone made from finely-ground shale or other alumino-silicate, mixed with slaked lime, moistened with 18–22 % H_2O, and pressed into shape.

rot. To decay or decompose.

rotamerism. Geometric *isomerism.*

rotameter. A non-recording indicator of the rate of flow of a fluid.

rotary. (1) Rotatory. (2) Revolving. **r. kiln.** A long drum, usually inclined, which rotates and can be heated. **r. movement.** A circling or twining motion.

rotate. To turn or twist.

rotation. The act of turning around an axis, or turning with a circular motion. **magnetic-** The optical activity of a liquid placed between magnetic poles. **molecular-** The quotient of the molecular weight by the specific rotation of a substance. **specific-** The arc through which a substance rotates the plane of polarized light when one gram of it is dissolved in one cc. of water and the length of the layer examined is one decimeter. It is given by:

$$[\alpha]_D^t = \frac{a}{ld},$$

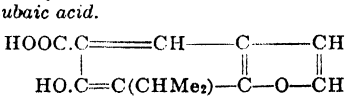
where α is the observed angle of rotation; l, the length of the layer of liquid in decimeters; d, the grams of substance in one cubic centimeter; and $[a]_D$ the specific rotation when the examination is made with the sodium flame (D line of the spectrum), at t°C. Cf. *polariscope.*

rotational. Pertaining to rotation.

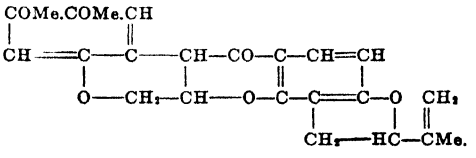
rotatory. Optically-active; capable of turning the plane of polarized light. **r. dispersion.** The ratio of the specific rotations of a substance observed with lights of two different wavelengths. **r. power.** Specific rotary power.

rotaversion. The rearrangement of a cis- to a trans-isomer, or vice versa.

rotenic acid. $C_{12}H_{12}O_4$ = 220.09. Isotubaic acid. White crystals, m.182, derived from rotenone. Cf. *tubaic acid.*



rotenone. $C_{23}H_{22}O_6$ = 394.15. Derrin. Tubatoxin, nicouline. A crystalline, insecticidal principle, m.163, from *derris root* (q.v.), *cube root* (q.v.) and *Cracca* (*Tephrosia*) *vogelii;* insoluble in water, soluble in ether.



It is harmless to birds and mammals, but 30 times as toxic as lead arsenate (to silkworms), 25 times as toxic as KCN (to goldfish), and 15 times as toxic as nicotine (to aphids). It crystallizes with many organic solvents, as:

rotenone-acetic acid....	$2C_{23}H_{22}O_6.CH_3COOH$
rotenone-benzene.....	$C_{23}H_{22}O_6.C_6H_6$
rotenone-carbon tetrachloride.....	$C_{23}H_{22}O_6.CCl_4$
rotenone-chloroform....	$C_{23}H_{22}O_6.CHCl_3$

rothic acid. $C_{14}H_{12}O_7$ = 292.1. A split-product of nucitannin.

rothoffite. A native, brown garnet, which contains magnesium, iron and calcium.

rotor. (1) The rotating portion of a piece of machinery, as distinct from the stationary portion (stator) around or inside which it revolves. (2) The spinning top of an ultracentrifuge; see *McBain's centrifuge.*

rotoscope. A stroboscopic instrument for the observation of rapid mechanical motion. Cf. *chronoteine.*

rotten. The state resulting from natural decomposition, or rot. **r. stone.** (1) Terra cariosa. A light, friable mineral from Derbyshire, England, which consists of fine grains of silica formed from the decomposition of siliceous limestone; used as a polishing material. (2) Tripoli.

rottisite. A native, hydrated nickel silicate.

rottlera. Kamala.

rottlerin. $C_{33}H_{30}O_6$ = 380.2. Mallotoxin, kamalin. The yellow coloring material of kamala. Minute crystalline leaflets of satin-like luster, m.200; soluble in ether or alkalis producing a dark red color.

Rouelle, Guillaume François. 1703–1770. A French chemist noted for his definitions of acids, bases and salts, and as the first physiological chemist.

rouge. (1) A dye made from safflower mixed with talc; used as a cosmetic. (2) A cosmetic which produces a flush of the skin. (3) Colcothar.

roughage. Fibrous material in food, usually fibrous cellulose, which stimulates the digestive and excretory organs by frictional contact with the alimentary tract.

Roussin's salt. Dark-colored salts of the type $K[Fe_4(NO)_7S_3]$, formed when nitric oxide is passed through a suspension of precipitated ferrous sulfide in a solution of potassium sulfide.

R.O.V. Refined oil of vitriol (95–96 % H_2SO_4).

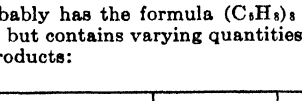
Rowland, Henry Augustus. 1848–1901. An American physicist, noted for his electrical and optical researches. **R.'s value.** The wavelength of any Fraunhofer line in the solar spectrum, as determined by Rowland.

rowlandite. A native silicate of yttrium, which contains cerium, lanthanum and thorium.

Royal Society of London. A society founded in 1662 for the furthering of natural and physical sciences.

Ru. Symbol for ruthenium.

rubber. Caoutchouc, elastica, india rubber. An elastic substance obtained from the coagulated milky juice (*latex*) of *Hevea* (Para rubber) and *Ficus* (India rubber) species. It contains the hydrocarbon unit



It probably has the formula $(C_5H_8)_8$ = 544.0, d.0.92, but contains varying quantities of oxidation products:

	High Grade	Low Grade
Hydrocarbons.....	90–93 %	25 %
Resins.....	2–4 %	60 %
Water, impurities, etc...	3–8 %	15 %

It is soluble in chloroform, carbon disulfide, ether or benzene. On destructive distillation it yields isoprene, dipentene and other hydrocarbons. The world output in 1940 was 1,280,000 long tons, coming from British Malaya > Dutch East Indies > Ceylon. Cf. *elastomer.* **guayule r.** Guayule. **hard r.-** Econite, vulcanite. **microporous r.** Mipor. **synthetic r.** Elastomer.

r. accelerators. See *accelerators.* **r. goods.** Articles prepared by mixing various substances

with r. and subjecting to vulcanization, (q.v.) acceleration (q.v.) and aging, q.v. **r. sources:**

Euphorbiaceae:
- *Hevea brasiliensis*..... **Para rubber**
- *Manihot*..... Cearea r., q.v., Manicoba.
- *Micrandra*..... Venezuelan r.
- *Sapium*..... Bolivian r., Columbian r.

Moraceae:
- *Ficus elastica*..... **India rubber**
- *Castilloa*..... Mexican r., West Indian r.

Apocynaceae:
- *Funtumia*..... African r. Ire, silk r.
- *Landolphia*..... vine r., Madagascar r.
- *Clitandra*..... Central African r.
- *Willoughbeia*..... Borneo r., Java r.
- *Hancornia*..... Mancabeira r.

Asclepiadaceae:
- *Asclepias*..... milkweed r.

Compositae:
- *Parthenium argentatum*... guayule r., q.v.

rubbone. $C_{10}H_{16}O$ (approx.). An orange-yellow viscous gum, produced by the atmospheric oxidation of rubber. Used in baking varnishes for the lacquer industry to accelerate the oxidation of polymerized linseed oil.

rubeane. $C_2H_4N_2S_2$ = 120.2. Rubeanhydride, carbon disulfhydrate. The diamide of thioxalic acid,

$$\begin{matrix} NH_2.C:S \\ | \\ NH_2.C:S \end{matrix}$$

obtained by heating hydrogen sulfide and cyanogen. Red crystals, soluble in water, alcohol or ether, used as a micro-test for copper. Cf. *flavcanhydride*.

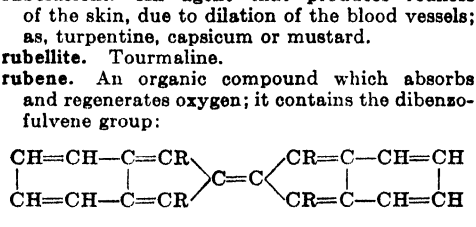
rubeanhydride. Rubeane.

rubeanic acid. Rubeane.

rubefacient. An agent that produces redness of the skin, due to dilation of the blood vessels; as, turpentine, capsicum or mustard.

rubellite. Tourmaline.

rubene. An organic compound which absorbs and regenerates oxygen; it contains the dibenzofulvene group:



diphenylditolyl- $C_{44}H_{30}$ = 558.2. White crystals, m.375, having a violet fluorescence. **tetraphenyl-** Rubrene.

ruberite. Cuprite.

ruberythric acid. Rubianic acid.

ruberythrinic acid. Rubianic acid.

rubia. Madder. The dried root of dyer's madder, *Rubia tinctorium*, a Rubiaceae.

Rubiaceae. The madder family, a group of herbs, shrubs or trees that yield important drugs, including quinine and coffee.

roots:
- *Cephaelis ipecacuanha*... ipecac, emetine
- *Cephaelis acuminata*..... Carthagena ipecac, psychotrine.
- *Chiococca racemosa*..... cahincic acid
- *Rubia tinctorum*..... madder, alizarin

bark:
- *Cinchona* species..... Peruvian bark quinine alkaloids
- *Coryanthe yohimbe*..... yohimbehe
- *Remijia pedunculata*..... cuprea bark
- *Cephalanthus occidentalis*. pond dogwood

herbs:
- *Mitchella repens*..... squaw vine
- *Galium aparine*..... cleavers

seeds:
- *Coffea arabica*..... coffee

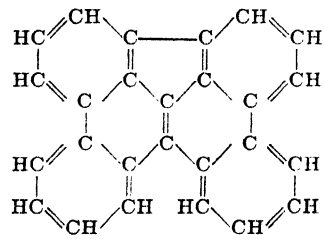
extract:
- *Gardenia lucida*..... kambi
- *Ourouparia gambir*..... gambir

Cf. the *alkaloids:* cheiramidine, cheiramine, mitragynine, mitraversine, palicourine; *glucosides:* danain, pinckneyin; and *coloring matter:* crocin.

rubianic acid. $C_{26}H_{28}O_{14}$ = 564.22. Ruberythric or ruberythrinic acid. A glucoside from rubia, that hydrolyses to glucose and alizarin. Yellow, silky prisms, m.259.

rubicelle. Spinel.

rubicene. $C_{26}H_{14}$ = 326.1. The aromatic hydrocarbon:



Deep red needles, m.305, insoluble in water.

rubidine. $C_{11}H_{17}N$ = 163.14. A pyridine base, q.v.

rubidium. Rb = 85.48. An alkali metal and element, atomic number 37, discovered by Bunsen (1861). It occurs as a soft, white metal resembling potassium, d.1.52, m.38, b.696, decomp. in water or alcohol, soluble in ether. It is found in small quantities in Stassfurt salts, in lepidolite, leucite and mineral waters. **r. acetate.** $RbC_2H_3O_2$ = 144.4. Colorless crystals; soluble in water. **r. alum.** Aluminum rubidium sulfate. **r. ammonium bromide.** $RbBr.4NH_4Br$ = 545.4. A white or slightly yellowish crystalline powder, soluble in water; used medicinally as a hypnotic. **r. bichromate.** Rubidium dichromate. **r. bitartrate.** $RbHC_4H_4O_6$ = 234.4. Colorless prisms; soluble in water. **r. bromide.** RbBr = 165.4. Regular, colorless crystals, d.3.35, m.683, soluble in water, alcohol, or ether; used medicinally as a nerve sedative. **r. carbonate.** Rb_2CO_3 = 230.90. Colorless deliquescent crystals, m.837, soluble in water, alcohol or ether. **r. chloride.** RbCl = 120.91. A colorless crystalline powder, d.2.20, m.710; soluble in water or alcohol. **r. chromate.** Rb_2CrO_4 = 286.9. Yellow crystals; soluble in water or alcohol. **r. dichromate.** $Rb_2Cr_2O_7$ = 386.9. Orange-red crystals; soluble in water. **r. fluoride.** RbF = 104.4. A white, crystalline powder; soluble in water. **r. fluosilicate.** Rb_2SiF_6 = 312.94. White octahedral crystals, d.3.338, slightly soluble in water. **r. hydride.** RbH = 86.45. Colorless needles, d.2.0, decomp. 300. **r. hydroxide.** RbOH = 102.5.

A grayish-white deliquescent powder, d.3.20, soluble in water, alcohol or ether; used in the manufacture of glass and rubidium salts. **r. iodate.** $RbIO_3$ = 260.4. Colorless prisms; soluble in water. **r. iodide.** RbI = 212.4. Colorless cubical crystals, d.3.02, soluble in water; used medicinally as an alterative. **r. ion.** The monovalent cation, Rb^+. **r. nitrate.** $RbNO_3$ = 147.5. Colorless hexagonal crystals, d.3.09; soluble in water or alcohol. **r. oxide.** Rb_2O = 186.9. Colorless octahedral crystals, d.3.72; soluble in water, alcohol or ether. **r. perchlorate.** $RbClO_4$ = 184.91. Colorless crystals. **r. peroxide.** Rb_2O_2 = 202.9. Yellow needles, d.3.65, m.600, decomp. by water. **r. platinichloride.** Rb_2PtCl_6 = 578.9. Yellow crystals, soluble in water, but not in alcohol. **r. sulfate.** Rb_2SO_4 = 266.96. Large, colorless, rhombic crystals, d.3.61, m.1051, soluble in water or alcohol; used medicinally as a cathartic. **r. sulfide.** $Rb_2S.4H_2O$ = 275.0. Colorless crystals; soluble in water or alcohol. **r. sulfite.** Rb_2SO_3 = 250.9. A colorless crystalline powder; soluble in water. **r. tartrate.** $Rb_2C_4H_4O_6$ = 318.8. Colorless crystals; soluble in water. *acid-* $RbHC_4H_4O_6$ = 234.48. White prisms, d.2.282, slightly soluble in water.

rubijervine. $C_{26}H_{41}O_2N$ = 401.34. An alkaloid from *Veratrum album* and *V. viride*, Liliaceae; m.236.

rubine. Fuchsin.

rubitannic acid. $C_{14}H_{22}O_{12}.\frac{1}{2}H_2O$. A tannin from the leaves of *Rubia tinctorium*.

rubixanthin. $C_{40}H_{55}OH$ = 552.4. An orange carotinoid (q.v.) pigment from *Rosa rubiginosa*.

rubrene. $C_{41}H_{28}$ = 518.22. Phenyl ethinyl diphenylmethane, tetraphenyldibenzodifulvene. A red and fluorescent, solid hydrocarbon, m.331. When illuminated in contact with air it forms **oxyrubrene,** $C_{41}H_{28}O_2$, which dissociates when heated, to $C_{41}H_{28}$ and O_2. This reversible oxidation is unique. Cf. *hemoglobin, rubene.* **r. bromide.** A solid having the highest melting point (500°C) of any known organic compound.

rubrocyanine. Ruhrgasol.

rubroglaucine. $C_{16}H_{12}O_5$ = 284.0. A red pigment related to auroglaucine, q.v.

rubrones. A group of substances prepared by bubbling air or oxygen through a solution of rubber in presence of cobalt linoleate as catalyst. Used in paints and varnishes, and for molding purposes.

rubrum scarlatinum. Scarlet R.

Rubus. (1) A genus of shrubs and herbs of the order Rosaceae, (q.v.). (2) Blackberry, cloudberry, dewberry, fingerberry. The dried bark of the rhizomes of Rubus species, which contain tannin; used as an astringent.

Rubus chamaemorus	cloudberry
Rubus fructicosus	English blackberry
Rubus idaeus	raspberry
Rubus villosus	American blackberry

ruby. Al_2O_3. A clear, red, transparent corundum; used as a gem. It is similar to sapphire. **artificial-** A red crystalline "gem" made by fusing chromium sesquioxide and powdered alumina at a high temperature.

r. alamandine. Spinel. **r. arsenic.** Realgar. **r. balas.** Spinel. **r. blende.** A red variety of sphalerite. **r. copper.** Cuprite. **r. glass.** A dark red glass, that has been colored by the addition of a small quantity of gold held in colloidal suspension. The ordinary red glass is colored by selenium. **r. mica.** Goethite. **r. silver.** Proustite. **r. spinel.** Spinel. **r. sulfur.** Realgar.

Rudolfi's equation. The degree of ionization, α, related to the dilution, v: $\frac{\alpha^2}{(1-\alpha)\sqrt{v}}$ = constant. (See also *dilution law, Ostwald's law.*)

rue. Ruta. The dried shrubby plant, *Ruta graveolens*. It is used as a condiment and contains rutic and rutinic acid. **r. oil.** Oleum rutae. An essential oil from the leaves of *Ruta graveolens*. A greenish liquid, d.0.837, b.230, insoluble in water, miscible with alcohol. It contains methyl-nonylketone and lauric aldehyde.

ruflanic acid. Quinizarin sulfonic acid, *1.4*-dioxyanthraquinone-*2*-sulfonic acid. A white crystalline powder, used as reagent for the separation of amino acids.

rufigallic acid. $C_{14}H_8O_8,2H_2O$ = 340.16. *1.2.-3.5.6.7*-Hexahydroxyanthraquinone, $C_{14}H_2O_2(OH)_6$. Orange-reddish needles; insoluble in water, soluble in alcohol, acids or alkalis. Used as dye, and sublimes if heated.

rufigallol. $C_{14}H_8O_8$ = 322.2. *1.2.3.6.7.9*-Hexahydroxyanthraquinone. Red crystals.

rufin. $C_{21}H_{20}O_8$ = 400.2. A resinous mass obtained by heating phlorizin; soluble in alkalis (red color).

ruflopin. $C_{14}H_8O_6$ = 272.13. Tetrahydroxyanthraquinone. An orange crystalline powder; soluble in alcohol.

rufol. $C_{14}H_{10}O_2$ = 210.1. 1.5-Dihydroxy-anthracene, 1.5-anthradiol, 1.5-anthracenediol*. Yellow needles; soluble in alcohol (blue fluorescence); decomp. 265.

Ruhmkorff, Heinrich Daniel. 1803–1877. A German electrician, who invented electrical devices. **R. coil.** An induction or spark coil.

ruhrgasol. A mixture of CO_2, CO, H_2, N_2 and C_3- and C_4- aliphatic hydrocarbons (35 % by vol. of C_3H_6) recovered from coke-oven gas, and used as an auto-fuel in Germany.

rule. (1) An empirically-found relationship of physical and chemical properties; as, *Crum Brown rule.* Cf. *theory, law hypothesis.* (2) A

Benjamin Thompson, Count Rumford.

ruler. **phase-** See *phase* rule. **slide-** See *slide rule.*

rum. An alcoholic distillation from fermented molasses. **bay-** See *bay-rum.*

rumbatron. A device to produce high-speed electrons for molecular bombardment, q.v. Cf. *cyclotron.*

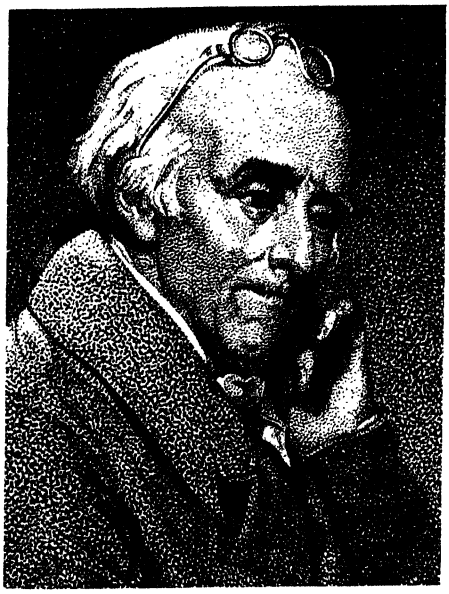
rumex. Yellow dock, yellow jasmine. The dried roots of *Rumex crispus*, a Polygonaceae. Used medicinally as the fluid extract.

Rumford, Count. 1753–1814. Benjamin Thompson, an American scientist noted for his work on the nature of heat, and co-founder of the Royal Institution of London.

rumicin. $C_{15}H_{10}O_4$ = 254.08. Yellow crystals, m.182, from the roots of *Rumex crispus.* It resembles chrysophanic acid.

Runge, Friedlieb Ferdinand. 1795–1867. A German chemist, noted as a writer and discoverer of aniline. Cf. *aniline.*

Rupert's drops. See *Prince Rupert's drops.*



Benjamin Rush.

Rush, Benjamin, 1745–1813. An American physician and pioneer in chemical education, noted as the first American author and professor of chemistry.

Russell-Saunders notation. See *quantum numbers.*

russellite. $Bi_2O_3.WO_3$ = 698.0. A mineral, which occurs sparingly as yellow pellets, in concentrates of tungsten ores in Cornwall, England.

russium. Rs. The undiscovered ekacesium, supposed to be radioactive. (Chem. News, 1927, p. 310.) Cf. *verium.*

rust. (1) An iron oxide mixed with hydroxides and carbonates, that forms on the surface of iron exposed to moisture and air. (2) A red fungus on grain.

rust-proofing. Plating a metal with a less corrodable metal, as tin, cadmium or zinc (see *galvanizing, sherardizing*).

ruta. Rue.

Rutaceae. Rue family. A group of plants that yield acrid resinous principles and essential oils.

root:	
Xanthoxylum senegalense...	artarine
herb:	
Peganum harmala.....	harmel
barks:	
Xanthoxylum americanum..	prickly ash bark
Galipea (Cusparia) officinalis	angostura bark
Ptelea trifoliata.....	wafer ash bark
leaves:	
Barosma betulina.....	buchu
Pilocarpus jaborandi.....	jaborandi
Ruta graveolens.....	rue
fruits:	
Aegle marmelos.....	bael fruit
Xanthoxylum species.....	prickly ash fruit

Cf. *casimirin, carana, curry, skimmianine, xanthopicrin.*

ruthenate. A compound of the type, M_2RuO_4, in which M is a monovalent metal. They are dark-red colored salts, soluble in water, and derived from hexavalent ruthenium. **per-** A compound of the type $MRuO_4$; as, $NaRuO_4$ which forms dark green crystals, soluble in water.

ruthenic. A compound derived from tetravalent ruthenium; as, $RuCl_4$.

ruthenious. Ruthenous. A compound derived from divalent ruthenium: as, **r. chloride.** $(RuCl_2)_x$ = $(172.61)_x$. Ruthenium dichloride. A dark blue solid, insoluble in water.

ruthenium. Ru = 101.7. A rare metallic element of the platinum group, atomic number 44. It occurs as a gray or silver-like, brittle metal, d.12.06, which melts in the electric arc; insoluble in water or acids. It appears to have every positive valency from 1 to 8, and forms coordination compounds and also double salts. **r. bromide.** $RuBr_3$ = 341.7. Dark hygroscopic crystals; soluble in water.

+2; Ru^{++}, ruthenious.....	blue
+3; Ru^{+++}, ruthenic.....	gray
+4; RuO_3^{--}, ruthenite.....	yellow
+6; RuO_4^{--}, ruthenate.....	orange-red
+7; RuO_4^{-}, perruthenate.....	green
+8; RuO_5^{--}.....	red

r. carbonyl. $Ru(CO)_x$. Orange crystals. **r. chloride.** (1) *di-* Ruthenious chloride. (2) *tri-* $RuCl_3$ = 208.1. Ruthenic chloride. Ruthenium sesquichloride, Ru_2Cl_6. Deliquescent, brown crystals, soluble in water, decomp. by alcohol; used medicinally as an antiseptic, and industrially as a catalyst. (3) *tetra-* $RuCl_4$ = 196.70. Orange crystals, soluble in water. **r. fluoride.** RuF_5 = 196.70. Dark green crystals, d.2.963, m.101, b.270, decomp. in water. **r. hydrochloride.** $RuCl_4.2HCl$ = 320.6, or H_2RuCl_6. Chlororuthenic acid. Orange crystals, soluble in water. **r. hydroxide.** (1) $Ru(OH)_3$ = 192.8. A black powder; insoluble in water, slightly soluble in alkalis. (2) $Ru_2O_3.xH_2O$. Ruthenic hydroxide. A yellow powder, slightly soluble in water. (3) $RuO_2.xH_2O$. R. tetrahydroxide. Black powder, insoluble in water. **r. minerals.** R. is found in nature associated with the platinum metals, and occurs as:

native ruthenium.....	Ru
laurite.....	RuS_2

r. oxide. (1) RuO_2 = 133.8. R. dioxide. A violet crystalline powder d.7.2, insoluble in water, alcohol or ether. It is formed by the action of oxygen upon hot ruthenium. (2) Ru_2O_3 = 251.44. R. sesquioxide. A brown powder; insoluble in water, alcohol or ether. (3) RuO_4 = 165.7. R. tetroxide. A rhombic, yellow crystalline powder, d.3.28, m.25, b.-100; insoluble in water, alcohol or ether. (4) Ru_2O_5 = 283.40. R. pentoxide. A black powder. (5) Ru_2O_9 = 550.80. R. monoxide. A black powder, insoluble in water. **r. oxychloride.** $Ru(OH)Cl_2$ = 189.63. Ruthenium red. A red powder. *ammoniated-* $Ru(OH)Cl_2.3NH_3.H_2O$ = 258.75. A brown-red powder; soluble in water. Used as a reagent for pectin, plant mucin, gums, and as a microscope stain. **r. red.** R. oxychloride. **r. sesquichloride.** R. chloride. **r. sesquioxide.** R. oxide (2). **r. silicide.** RuSi = 129.76. Metallic prisms, d.5.40, insoluble in water. **r. sulfide.** RuS_2 = 165.82. Laurite. Gray cubic crystals, d.6.99, insoluble in water. **r. tetroxide.** R. oxide (3).

ruthenous. Ruthenious.

Rutherford, Daniel. 1749–1819. A Scotch botanist who discovered nitrogen in 1772. **R., Lord Ernest.** 1871–1937. A British physicist, (born in New Zealand) noted for his research on radioactive transformation, disintegration of nitrogen, and the structure of the atom. **R. atomic theory.** An atom consists of a small positive nucleus with A free positive charges in its nucleus (A is the atomic number), surrounded by a system of A electrons in outer levels. In addition the nucleus is made up of equal numbers of positive and negative charges, which balance one another. The weight of the atom is centered in the nucleus.

rutherfordite. A mixed native phosphate of cerium, lanthanum and didymium.

rutic acid. (1) $C_{10}H_{20}O_2$ = 172.15. A monobasic acid from rue. (2) Capric acid.

rutile. TiO_2. A native titanium oxide, in dark tetragonal crystals. It is a source of titanium compounds. Cf. *brookite, sagenite.*

rutin. (1) $C_{27}H_{32}O_{16}$ = 612.25. A hydroxyflavone gluco-rhamnoside from cowslip, tomato, tobacco, California poppy and herb-of-grace. Yellow needles m.190. (2) Barosmin.

rutinic acid. $C_{25}H_{28}O_{15}$ = 568.3. The coloring material of rue, *Ruta graveolens.*

rutonal. $C_{11}H_{10}N_2O_3$ = 218.1. Phenyl methyl barbituric acid. White crystals, m.227.

Rydberg, Johannes Robert. 1854–1919. A Swedish physicist, noted for his theories. **R.'s formula.** An equation which relates ν, the frequency vibration of the light, to the numbers of the initial and final orbits of electrons:

$$\nu = k\left(\frac{1}{n^2} - \frac{1}{n'^2}\right),$$

where n is the number of the inner, and n′ that of the outer orbit in a given jump. **R. fundamental constant.** The value N = 109678.8, in the expression $N = V_0/c$, where c is the velocity of light and V_0 is R. frequency constant. **R. fundamental frequency constant.** The value, $V_0 = 3.28880 \times 10^{15}$ sec.$^{-1}$ in the expression, $V_0 = cN$. Cf. *Ritz formula.* **R. number.** Ordinal number. **R. relation.** The atomic number, A, is related to the frequency, ν, of the characteristic radiation by, $\nu = \frac{3}{4}V_0(A - n)^2$, where n is a constant nearly equal to unity.

rye. The grain of *Secale cereale*, used in making bread. **spurred-** Ergot.

S

S. The symbol for: (1) Sulfur. (2) Entropy. (3) Black (German: Schwarz) in color names. **S acid.** 1-Amino-8-naphthol-4-sulfonic acid. **2S acid.** 1-Amino-8-naphthol-2.4-disulfonic acid. **S. yellow.** Naphthol yellow.

s. An abbreviation for: (1) symmetrical, (2) secondary, (3) second. (4) Symbol for solubility. **s state.** See *state.*

σ. The Greek letter "sigma." (1) The symbol for $\frac{1}{10000}$ second. (2) A prefix indicating the syn-position. (3) The symbol for stopping power.

Σ. The Greek capital letter "sigma." (1) The symbol for summation. (2) **Σ reaction.** The Wassermann test for syphilis.

∫. The symbol for integration. Cf. *f* = function.

S.A.E. See *S.A.E. classification.*

SDO. Synthetic drying oil, q.v.

S.U.P. *p*-Benzoyl-*p*-aminobenzoyl-*1*-amino-*8*-naphthol-*3.8*-sodium sulfonate, an effective conductor for colloids; a substance which supplies to colloidal particles the electrons necessary to stabilize the system.

S.T. An abbreviation for surface tension. **S.T.-37.** A solution of hexylresorcinol in glycerol and water; it has a surface tension of 37 dynes and is used as a germicide on account of its great ability to penetrate the microscopic crevices of bodies. It is claimed that this solution destroys bacteria in 15 seconds.

S.T.P. An abbreviation for standard temperature and pressure.

Sa. The symbol for samarium (U. S. A.); *Sm* in European practice.

sabadilla. Cevadilla, Indian barley. The dried ripe seeds of *Veratrum sabadilla* or *Schoenocaulon officinale*, a poisonous Liliaceae of Mexico and Central America, used to destroy vermin. It contains veratrine, cevadine and sabadine.

sabadilline. $C_{34}H_{52}O_8N$ = 523.6. Cevadilline. An alkaloid from sabadilla. Cf. *cevilline.*

sabadine. $C_{29}H_{51}O_8N$ = 541.0. An alkaloid obtained from sabadilla and veratrum; short colorless needles, m.238.

sabadinine. $C_{27}H_{45}O_8N$ = 511.5. An alkaloid from sabadilla; colorless needles, m.160, soluble in alcohol.

sabal. Saw palmetto berries. The partly dried, ripe fruit of *Serenoa serrulata* (*Sabal serrulata*), a Palmaceae. Used medicinally as the fluid extract, as a tonic sedative. **s. fiber.** The split leaves from *Sabal palmetto*, thatch palm; used for matting.

sabalol. The active principle of sabal.

Sabatier, Paul. 1854–1941. A French chemist, noted as pioneer in the hydrogenation of vegetable oils and Nobel Prize winner (1912).

sabatrine. $C_{51}H_{86}O_{17}N$ = 984.9. An alkaloid from sabadilla seeds.

sabbatia. American centaury. The dried herb of *Sabbatia angularis*, a Gentianaceae; used medicinally as a febrifuge. Cf. *erythrocentaurin.*

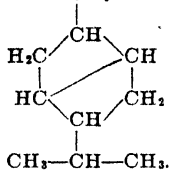
sabbatin. A glucoside from *Sabbatia elliottii*, quinine flower.

Paul Sabatier.

sabina. Savine.

sabina oil. Savine oil.

sabinane. $C_{10}H_{18}$ = 138.14. The terpene



It gives the radical thujyl. **6-keto-** Thujone.

sabinene. $C_{10}H_{16}$ = 136.2. A hydrocarbon from savine oil. A colorless liquid, d.0.840, b.163, insoluble in water, soluble in alcohol or ether.

sabinic acid. $C_{12}H_{24}O_3$ = 216.3. λ-Hydroxylauric acid, *12*-hydroxydodecanoic acid*, $HO(CH_2)_{11}COOH$, from savine and juniper oils.

sabinol. $C_{10}H_{16}O$ = 152.2. 6-Hydroxysabinene. An alcohol from savine oil.

sabromin. $Ca(C_{22}H_{41}O_2Br_2)_2$ = 1034.41. Calcium dibrombehenate. A white powder, insoluble in water, alcohol or acetone, soluble in ether; used medicinally as a hypnotic.

saccharamide. $C_6H_{12}O_6N_2$ = 208.1. The amide of saccharic acid, $(CHOH)_4(CONH_2)_2$.

saccharase. Invertase.

saccharate. Sucrate. (1) A salt of saccharic acid. (2) A compound of a saccharide and a metallic oxide; as, $CaO.C_{12}H_{22}O_{11}.H_2O$, monocalcium saccharate.

saccharetin. $(C_8H_7O_0)_n$. The yellow encrusting matter of sugar cane; it is probably a phlobaphen.

saccharic acid. $C_6H_{10}O_8$ = 210.11. Tetrahydroxyadipic acid. The dibasic acid, $(CHOH)_4(COOH)_2$, obtained on oxidation of dextrose and other hexoses. It is very soluble in water, alcohol or ether. Cf. *saccharinic acid, ascorbic acid, mucic acid.*

saccharide. (1) A compound of an organic base with sugar; as, casein saccharide. (2) See *monosaccharides, disaccharides, polysaccharides, carbohydrates.*

saccharification. (1) Conversion into sugar. (2) Impregnation with sugar solutions; as, occasionally in malting.

saccharify. To convert starches into sugar.

saccharimeter. A device for determining the amount of sugar in a solution; as, a polariscope, hydrometer, or fermentation tube. Cf. *saccharometer.*

saccharimetry. The determination of the optically-active sugar content of a solution from its optical activity.

saccharin, saccharine. $C_7H_5O_3NS$ = 183.1. Gluside, sykose, benzosulfimide, benzoylsulfonic imide, saccharinose, sulfobenzoic acid imide, saccharinol, glucid, saccharol, sulfinid, guarantose, saxin, agucarina, 1-benzosulfonazol-2(1)-one. The anhydride of o-sulfaminbenzoic acid: $C_6H_4\langle^{SO_2}_{CO}\rangle NH$. A white crystalline powder, m.220 (decomp.), slowly soluble in water, and 400 times sweeter than cane sugar; used as a sugar substitute and sweeting agent. **soluble-** The sodium salt of saccharin. It is often s. mixed with $NaHCO_3$. **s. sodium.** (1) Soluble s. (2) A lactone of a saccharic acid.

saccharinic acid. $C_6H_{12}O_6$ = 180.09. A group of acids obtained by oxidation of sugars (24 possible isomers). **gluco-** Glucosaccharic acid, 2-methylpentanetetrol carboxylic acid. $CH_2OH.(CHOH)_2.CHMe.COOH$, obtained from glucose and fructose (8 isomers). **iso-**

$$CH_3OH.CHOH.CH_2.COH(CH_2OH).COOH$$

from milk sugar and cellulose (4 isomers), **meta-** $CH_2OH(CHOH)_2CH_2.CHOH.COOH$ (8 isomers). **para-** $CH_2OH.CH_2.COH(COOH).CHOH.CH_2OH$, from galactose and milksugar (4 isomers). These all form lactones when their aqueous solutions are evaporated. Cf. *saccharic, saccharonic,* and *ascorbic acids.*

saccharinose. A brand of saccharin.

saccharobiose. Sucrose.

saccharol. Saccharin.

saccharolactic acid. Mucic acid.

saccharometer. A fermentation tube.

saccharomyces. Yeasts (q.v.) which ferment sugar. **S. unit.** S.U. A unit of vitamin H (q.v.) activity.

saccharon. $C_6H_8O_6$ = 176.1. The lactone of saccharonic acid.

saccharonic acid. $C_6H_{10}O_7$ = 194.1. A group of acids, $HOOC.CMeOH.(CHOH)_2.COOH$, obtained by oxidation of sucrose. Large colorless crystals, soluble in water.

saccharose. Sucrose.

saccharum officinarum. Sugar cane.

S.A.E. classification [Soc. of Automotive Engineers]. The grouping of steel alloys by numbers which indicate their composition. The first number shows the alloying metal or the type of steel:

1—carbon
2—nickel
3—chromium and nickel (nickel-chrome)
4—molybdenum (moly)
5—chromium (chrome-carbon)
6—chromium and vanadium
7—tungsten
9—silicon and manganese

The second number is the percentage of the principal alloying metal; and the third and fourth numbers, the percentage of carbon. Thus the classification: "*SAE* 2320" indicates a nickel steel containing 3 % nickel and 20 % carbon. A similar classification is in use by the U. S. War Department, abbreviated W.D. instead of S.A.E. **S.A.E. number.** A measure of the relative viscosity of lubricating oils, related to the Saybolt universal viscosity as follows:

S.A.E. number	Saybolt seconds	
	130°F	210°F
10	90–120	
20	120–185	
30	185–255	
40	255–	–75
50	.....	75–105
60	.....	105–125
70	.....	125–150

safety. The avoidance of hazards, q.v. **s. lamp.** Miner's lamp. **s. tube.** A device used to oppose the effects of sudden pressures or sudden flows of liquids.

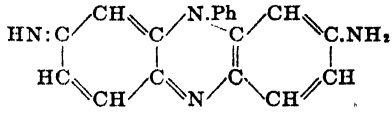
safflorite. (Fe, Co)As_2. A native, rhombic iron cobalt arsenide.

safflower. Carthamus.

saffron. Crocus. The dried stigmas of *Crocus sativus,* an Iridaceae, containing the glucoside crocetin. Used as a yellow coloring material in foods and confectionary, and as a dye, carminative and emmenagogue. **American-, bastard-, false-** Carthamus. **Indian-** Turmeric. **meadow-** Colchicum. **s. bronze.** Orange *tungsten.* **s. glucoside.** Crocetin. **s. of mars.** Ferric subcarbonate. **s. substitute.** Dinitrocresol.

safranal. $C_{10}H_{14}O$ = 150.1. An aldehyde occurring in saffron as the glucoside pikrococin: $CHO.C:CMe.CH:CH.CH_2.CMe_2$.

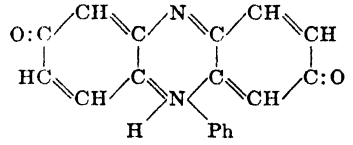
safranine. $C_{18}H_{14}N_4$ = 286.1. Phenosafranine. A phenazine dye. It is used as a stain in microscopy and the textile industry.



safranines. Derivatives of safranine or its salts, as safranine hydrochloride, methylsafranine.

safraninol. $C_{18}H_{13}ON_3$ = 287.2. A derivative of safranine, in which the :NH group is replaced by the keto-oxygen, :O.

safranol. $C_{18}H_{12}O_2N_2$ = 288.2.



safrene. $C_{10}H_{16}$ = 136.1. A terpene obtained from sassafras oil.

safrole. $C_{10}H_{10}O_2$ = 162.13. Allylpyrocatecholmethylene ether, shikimol, 1-allyl-3.4-methylenedioxy-benzene, $C_6H_3(OCH_2O).CH_2.CH:CH_2$-(3:4.1). A constituent of sassafras oil, camphor wood and other plants. A clear colorless oil, d.1.14, m.10, b.233, insoluble in water and soluble in alcohol; used as an anodyne and in synthetic perfumes. **iso-** $C_6H_3(OOCH_3).CH:CH.CH_3$. A liquid, b.251, soluble in ether, insoluble in water.

safron. Saffron.

safrosin. $C_{22}H_8O_5Br(NO_3)_2$. A scarlet-red dye, chiefly dinitrodibromofluorescein; used in dyeing silk and wool.

sagapenum. A gum resin from *Ferula persica*, an umbelliferous plant.

sagaresitannol. $C_{24}H_{27}O_4$ = 379.3. An acid resin obtained from sagapenum. It yields oxypicric acid on oxidation.

sage. Salvia. **s. brush.** Artemisia. **s. oil.** The essential oil of *Salvia officinalis*, d.0.915–0.925, soluble in alcohol, and containing cineol, thujone and pinene.

sagenite. Silica containing rutile.

sago. (1) A starch extracted from the pith of various palms, chiefly the *Metroxylon Rumphii* of India and the East Indian islands; used as a food. (2) The pith of several palms and tree ferns; as, Palmaceae, (q.v.), Cyatheaceae (tree ferns) and Cycadaceae.

Sahli's stain. A solution of borax and methylene blue in water; used to stain nerve tissues and cell nuclei.

sahlite. Augite containing iron.

Sainte-Claire Deville, Etienne Henri. 1818–1881. A French chemist noted for mineralogical and inorganic research (dissociation).

Saint Ignatius bean. Ignatia.

Saint John's bread. Carob beans.

saiodine. Sajodin.

sajodin. $Ca(C_{22}H_{42}O_2I)_2$ = 974.1. Calcium monoiodobehenate. A light yellow powder, insoluble in water; used medicinally.

saké, saki. A Japanese beer prepared from rice, water, tané-koji, and saké yeast. It is a transparent, yellow, aromatic liquid with pleasant taste, and contains 13–14 % ethyl alcohol and 0.9 % sugar.

Sakurai, Joji. 1858–1939. A Japanese chemist noted for organic research and teaching.

S.-Landsberger apparatus. A device for rapidly determining approximate molecular weights by the vapor pressure method.

sakuranin. $C_{22}H_{24}O_{10}$ = 448.19. A glucoside, m.212, from sakura, the Japanese cherry tree.

sal. The Latin for salt. **s. acetosella.** Potassium binoxalate. **s. aeratus.** Potassium bicarbonate. **s. alembroth.** Ammoniated mercury. **s. amarum.** Magnesium sulfate. **s. ammoniac.** Ammonium chloride. **s. carolinum facticum.** An artificial Carlsbad salt. **s. communis.** Sodium chloride. **s. de duobus.** Potassium sulfate. **s. enixum.** Potassium bisulfate. **s. epsom.** Magnesium sulfate. **s. ethyl.** Ethyl salicylate. **s. fossile.** Sodium chloride. **s. glauberi.** Sodium sulfate. **s. marinum.** Sodium chloride. **s. mirabile.** Sodium sulfate. **s. perlatum.** Sodium phosphate. **s. prunella.** A concentrated and refined saltpeter, made by fusing to remove moisture and then molding into a cake; used for meat curing. **s. rupium.** Rock salt. **s. sapientiae.** Mercuric ammonium chloride. **s. sedatirum.** Borax. **s. soda.** Sodium carbonate. **s. tartari.** Potassium carbonate. **s. volatile.** Ammonium carbonate.

salacetol. $C_{10}H_{10}O_4$ = 194.1. Salantol, salicylacetol, acetosalicylic ester, $C_6H_4(OH)COOCH_2COMe$. Colorless or pink needles, m.71, slightly soluble in water or alcohol; used medicinally as a substitute for salol.

salamandaridine. An alkaloid obtained from the poisonous skin secretion of the salamander species. Cf. *samandaridine.*

salamander. A truncated cone of plumbago, by which a crucible can be heated uniformly.

salamanderine. $C_{34}H_{60}O_5N_2$ = 576.5. A poisonous alkaloid derived from the skin of the salamander species. Cf. *samandarine.*

salamide. Salicylamide.

salantol. Salacetol.

salazolon. Salipyrine.

saldanine. An alkaloid from *Datura arborea*, a Mexican shrub. It is a local anesthetic.

salep. The tubers of *Orchis mascula, O. latifolia* and other Orchidaceae, used as demulcents and as a highly-nutritive food. Cf. *arrowroot.*

saleratus. Potassium bicarbonate (sal aeratus).

salethyl. Ethylsalicylate.

salhypnone. $C_{15}H_{12}O_4$ = 256.1. Benzoylmethylsalicylate, $C_6H_4(OCOPh)COOCH_3$. Colorless needles, m.113, insoluble in water, soluble in alcohol or ether; used as a mild antiseptic.

salic. Containing alumina. **s. minerals.** Those igneous rocks which contain more alumina than iron. Cf. *alferric.*

salicin. $C_{13}H_{18}O_7$ = 286.2. Saligenin. A glucoside from the bark of *Populus tremula* (American aspen), *Spiraea* species and *Salix* species (willows). Colorless leaflets, d.1.43, m.201 (decomp.); soluble in water or alcohol, insoluble in ether or chloroform. It hydrolyzes to glucose and salicyl alcohol; the latter is oxidized to salicylic acid:

$$(OH)_4C_6H_7.OO.C_6H_4CH_2OH = C_6H_4(OH)CH_2OH + C_6H_4(OH)COOH$$

Used as a reagent for nitric acid, and medicinally, as an antipyretic and ton,c. **benzoyl-**Populin.

salicoside. Salicin.

salicyl. The monovalent radical, $HO.C_6H_4$—i derived from salicylic acid. Cf. *salicylyl.*

salicylacetol. Salacetol.

salicylal. (1) Salicylaldehyde. (2) The bivalent radical, $C_6H_4(OH)CH{=}$(1.2-position).

salicylalcohol. $C_7H_8O_2$ = 124.1. Saligenin, saligenol, o-hydroxybenzyl alcohol, $C_6H_4(OH)\text{-}CH_2OH$. A hydrolysis product of salicin. Rhombic, colorless needles, d.1.61, m.86, b.100, soluble in water, alcohol or ether; used medicinally as an antipyretic. ***p*-amino-** Edinol.

salicylaldehyde. $C_7H_6O_2$ = 122.1. Salicylicaldehyde, salicylal, o-hydroxybenzaldehyde, $C_6H_4(OH)CHO$. A colorless, aromatic liquid, d.1.167, m. −7, b.196.5, used in perfumery; slightly soluble in water, soluble in alcohol or ether. It is a reagent for acetone. **methoxy-** Vanillin. **s. glucose.** Helicin.

salicylamide. $C_7H_7O_2N$ = 137.1. Salamide, o-hydroxybenzamide, $C_6H_4(OH)CONH_2$. Colorless transparent leaflets, m.138, b.270, slightly soluble in water, soluble in alcohol or ether; used medicinally as an antipyretic and analgesic. **salicylyl-** Disalicylamide.

salicylanilide. Salifebrin. A compound of salicylic acid and acetanilide. A colorless powder, insoluble in water, soluble in alcohol; used medicinally as an antipyretic.

salicylase. An enzyme that oxidizes salicylaldehyde to salicylic acid.

salicylate. A salt of salicylic acid $C_6H_4(OH)\text{-}COO.M$; M is a monovalent metal.

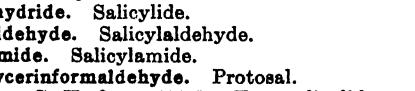
salicylic acid. $C_7H_6O_3$ = 138.1. o-Hydroxybenzoic acid, $C_6H_4(OH)COOH$. Colorless needles, m.158, slightly soluble in water, soluble in alcohol or ether. Used as a reagent for ferric salts, nitrites, formaldehyde and other organic substances, as a preservative for foods, and as a bactericide, antifermentative and antirheumatic agent. **acetamidoethyl-** Benzacetin (1). **acetamidomethyl-** Benzacetin (2). **acetyl-** See *acetyl*. **o-amino-** $C_7H_7O_3N$ = 153.1. 1-Amino-2-hydroxy-3-benzoic acid, $C_6H_3(NH_2)OH.CO\text{-}OH$. A gray, amorphous, odorless powder, insoluble in water, alcohol or ether; used medicinally as an antirheumatic. **arsino-** See *arsino*. **homo-** Cresotic acid. ***5*-hydroxy-** Gentisic acid. **methoxymethyl-** Everninic acid. **methyl-** Cresotic acid. **methylcarboxyl-** Spiracin. **nitro-** Nitrosalicylic acid. **phenyl-** q.v. **phenylo-** q.v. **propionyl-** q.v. **salicylo-** Diplosal. **sulfo-** q.v.
s. anhydride. Salicylide.

salicylic aldehyde. Salicylaldehyde.

salicylic amide. Salicylamide.

salicylicglycerinformaldehyde. Protosal.

salicylide. $C_{28}H_{16}O_8$ = 480.2. Tetrasalicylide, an anhydride of salicylic acid:



Colorless crystals, m.260.

salicylol. $C_7H_8O_2$ = 124.06. A colorless fragrant liquid from various plants; used in perfumery.

salicylonitrile. C_7H_5ON = 119.1. o-Hydroxybenzylnitrile, $C_6H_4(OH)CN$. Colorless crystals, m.98; soluble in water.

salicylosalicylic acid. Diplosal.

salicyl-p-phenetidine. Saliphen.

salicylquinine. Saloquinine.

salicylresorcinol. $C_{13}H_{10}O_4$ = 230.1. The ketone of salicylic acid and resorcinol, trihydroxybenzophenone, $C_6H_4(OH).CO.C_6H_3(OH)_2$ (1.2.4). Colorless leaflets, slightly soluble in water, soluble in alcohol or ether; used as an antipyretic and antiseptic.

salicylyl. The monovalent radical, $C_6H_4(OH)\text{-}CO\text{—}$ (1.2 position). Cf. *salicyl*.

salifebrin. Salicylanilide.

saliformine. $C_{13}H_{18}O_3N_4$ = 278.16. Urotropine-salicylate, hexamethylenesalicylate, forminesalicylate, $C_6H_{12}N_4.C_6H_4(OH)COOH$. A white crystalline powder, soluble in water or alcohol; used medicinally as an antiseptic and solvent for uric acid.

salify. To form a salt.

saligallol. Pyrogallolsalicylate. A resinous solid, used externally in a solution in acetone.

saligenin. (1) Salicyl alcohol. (2) Salicin. **homo-** Methyl hydroxy benzene.

saligenol. Salicyl alcohol.

salimenthol. $C_{17}H_{24}O_3$ = 276.2. Samol, mentholsalicylate, $C_6H_4(OH)COOC_{10}H_{19}$. A colorless liquid, insoluble in water, soluble in alcohol; used medicinally as a local anodyne and analgesic.

salimeter. A hydrometer used to determine the density of salt solutions.

salinaphthol. Betol.

saline. (1) Salt-like in character. (2) A salt-spring or well. (3) The taste of common salt. (4) Containing sodium chloride. **normal-** A sterilised 0.9 % solution of common salt in water. **s. solution.** A 0.6 % solution of sodium chloride, used as a physiological salt solution.

salines. Salt springs or salt lands.

salinigrin. $C_{13}H_{16}O_7$ = 284.2. A glucoside from the bark of *Salix nigra*, willow; probably identical with piceoside.

salinity. (1) A comparative indication of the concentration of salts in natural waters; as sea water. (2) The number of grams of salt in 1 kg. seawater, when bromides and iodides have been converted to chlorides, the carbonates to oxides, all organic matter destroyed and the mass heated to 450°C for 72 hours. It is related to chlorinity by: S = 0.03 + 1.805 Cl.

salinimeter. An hydrometer for determining the salt content of brine or sea water. Cf. *salimeter*.

salinometer. An instrument in which the electrical conductivity of a water is used to control its acidity, alkalinity or salt content. Cf. *salinimeter*.

saliphen. $C_{15}H_{15}O_3N$ = 257.2. Saliphenin, salicyl-p-phenetidine, $C_6H_4(OEt)NHC_6H_4(OH)CO$. A colorless crystalline powder, m.140, insoluble in water, soluble in alcohol, acetone or ether; used medicinally as an antifebrilic and antipyretic.

saliphenin. Saliphen.

salipyrine. $C_{18}H_{18}O_4N_2$ = 326.2. Antipyrine-salicylate, salpyrin, pyrosal, tyrosal, salazolon, $C_{11}H_{12}ON_2.C_6H_4(OH)COOH$. A coarse white crystalline powder, or hexagonal crystals, m.91, slightly soluble in cold water, soluble in hot water, alcohol or ether, decomp. by acids or alkalis; used medicinally as an antipyretic and antiseptic.

saliretin. $C_{14}H_{14}O_3$ = 230.2. A yellowish resinous substance from salicin.

saliseparin. Smilacin.

salit. Borneol salicylate.

salitannol. $C_{14}H_{10}O_7$ = 290.1. A condensation-product of salicylic acid and gallic acid. A white amorphous powder, insoluble in water or ether, soluble in alcohol; used medicinally as an antiseptic.

saliter, salitre. Sodium nitrate.

salithymol. $C_{17}H_{18}O_3$ = 270.2. Thymolsalicylate, $C_6H_4(OH)COOC_{10}H_{13}$. A colorless, crystalline powder, insoluble in water and soluble in alcohol; used medicinally as an antiseptic.

saliva. The clear, alkaline secretion of the glands in the mouth. It contains digestive enzymes, such as ptyalin and certain salts (potassium thiocyanate) besides proteins (albumin, globulin). The chemical composition is greatly modified by food, and some of the constituents appearing after improper diet, may cause the formation of "tartar" on the teeth. Cf. *sputum*.

salivin. Ptyalin.

Salix. The willows, a genus of trees and shrubs, Salicaceae, whose bark is a source of salicin. **S. alba.** The European or white willow. Its bark is used as a tonic. **S. fragilis.** The brittle willow, snap willow. Its bark is used as an astringent and febrifuge. **S. nigra.** The pussy willow, American-, black-, or swamp willow. Its bark is used medicinally as a tonic, antipyretic and sedative.

Salkowski's solution. A solution of phosphotungstic acid; used to test for albumose in urine.

Salle index. See *germicide*.

salmak. Ammonium chloride.

salmiac. Ammonium chloride.

salmine. $C_{30}H_{57}O_6N_{14}$ = 709.9. A protamine derived from the spermatozoa of the salmon.

salochinine. Saloquinine.

salocoll. $C_{17}H_{21}O_5N$ = 331.2. Phenocollsalicylate $C_6H_4(OC_2H_6)NHCOCH_2.CH_2C_7H_6O_3$. Colorless small needles, soluble in hot water; used medicinally as an antirheumatic.

salol. Phenylsalicylate. **acetamido-** Salophen. **acetyl-** Spiroform. **acetylamino-** q.v. **chloro-** q.v. **nitro-** q.v. **tribrom-** Cordol.

salolphosphinic acid. Salvosal.

salophen. $C_{15}H_{13}O_4N$ = 271.1. Acetyl-p-amidosalol, acetamidosalol, acetyl-p-aminophenyl salicylate, [phenetsal, $C_6H_4(OH)COOC_6H_4NH(COCH_3)$. Small, white scales, m.188, soluble in hot water, alcohol or ether; used medicinally as an intestinal antiseptic and antipyretic.

saloquinine. $C_{27}H_{28}O_4N_2$ = 444.24. Salicylquinine, salochinine, quinine salicylate, $C_6H_4(OH)COOC_{20}H_{23}ON_2$. A colorless crystalline powder, m.130, soluble in alcohol or ether, almost insoluble in water; used medicinally.

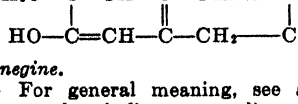
salosalicylide. Disalicylide.

salpyrine. Salipyrine.

salseparin. Smilacin.

salseparisin. Parillin.

salsoline. $C_{11}H_{15}NO_2$ = 193.12. An alkaloid from *Salsola Richteri*, a Cactaceae.



Cf. *carnegine*.

salt. (1) For general meaning, see *salts*. (2) Common salt, halite or sodium chloride. **bakers'-** Ammonium carbonate. **bay-** Sodium chloride from sea water. **bitter-** Magnesium sulfate. **Carlsbad-** A mixture of sodium and potassium sulfate, sodium bicarbonate and sodium chloride. **common-** Sodium chloride. **diuretic-** Potassium acetate. **Epsom-** Magnesium sulfate. **Everitt's-** Potassium ferricyanide. **Glauber's-** Sodium sulfate. **Homberg's-** Boric acid. **iodized-** Sodium chloride, with a trace of iodide, for table purposes. **microcosmic-** Sodium ammonium acid phosphate, $NaNH_4HPO_4.5H_2O$. **Mohr's-** Ferrous ammonium sulfate. **Monsel's-** Ferric subsulfate. **peptic-** A mixture of sodium chloride and pepsin. **phosphor-** Microcosmic s. **Plimmer's-** Sodium antimony tartrate. **Preston's-** An aromatized ammonium carbonate used as smelling s. **Rochelle-** Potassium sodium tartrate. **rock-** Sodium chloride. **Schlippe's-** Sodium thioantimonate. **sea-** Sodium chloride from sea water. **Seignette's-** Potassium sodium tartrate. **Sorrel-** Potassium bioxalate. **spirits of-** Commercial hydrochloric acid. **Stassfurt-** See *Stassfurt s.* **sweet-** Sodium chlorite. **table-** Sodium chloride.

s. cake. Impure sodium sulfate; a by-product of the Leblanc soda process. **s. deposits.** Saline residues. The accumulation of salts resulting from the evaporation of natural waters such as occurs at Stassfurt (q.v.) and in the desert. They consist chiefly of the carbonates, chlorides, sulfates, and borates of sodium, potassium, calcium and magnesium. **s. glaze.** See *glaze*. **s. hydrates.** The solid phases which consist of salt and water; hence any crystal with one or more molecules of water of crystallization. **s. ice.** Frozen brine, m. −6°F. or −21°C. A 2.5 lb. euteotic mixture has the same refrigerating effect as 1 lb. solid carbon dioxide (dry ice). **s. of amber.** Succinic acid. **s. of lemon.** Potassium binoxalate. **s. of phosphorus.** Sodium ammonium acid phosphate. **s. of sorrel.** Potassium bioxalate. **s. of tartar.** Acid potassium tartrate. **s. of tin.** Stannous chloride. **s. of wormwood.** Potassium carbonate. **s. of vitriol.** Zinc sulfate. **s. peter.** Potassium nitrate. **s. solution.** Saline solution.

salting. Treating with salt; usually NaCl. **s. in.** The mutual increase in the solubilities of an electrolyte and an organic compound when added to the same solvent; hence more of each substance dissolves when both are present. The reverse is, **s. out.** (1) The precipitation of proteins by the addition of salts. (2) In general, the separation of a substance from its solution by adding soluble salts.

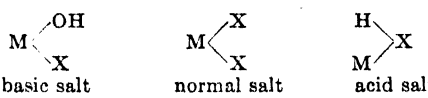
saltpeter, saltpetre. Potassium nitrate. **Chile-** Sodium nitrate. **German-** Ammonium nitrate. **Norge-** or **Norway-** Calcium nitrate.

salts. A group of substances that result from the reaction between acids and bases; a compound of a metal or positive radical and a non-metal or negative radical:

$$\underset{\text{base}}{M.OH} + \underset{\text{acid}}{H.X} = \underset{\text{salt}}{M.X} + \underset{\text{water}}{H_2O}$$

acid- A compound of a base and acid radical that contains unreplaced hydrogen atoms from the acid; as, $NaHSO_4$, or NaH_2PO_4. **acidulous-** A salt that has an acid reaction to litmus or similar indicators. **alkaline-** A salt that has a basic reaction to litmus or similar indicators. **amphoteric-** A salt that has both acid and basic reactions. **basic-** A compound of a base and acid radical that contains unreplaced hydroxyl radicals of the base; as $Bi(OH)Cl_2$. **binary-** A compound of two bases and one acid radical; as, $NaKSO_4$. **complex-** Salts which are made up of more than one simple acid or metallic radical, but which ionize in solution into only two types of ions. Thus potassium ferrocyanide: $K_4Fe(CN)_6 \rightleftharpoons 4K^+ + Fe(CN)_6^{----}$ Cf. *Werner's theory*. **double-** A molecular

combination of two salts; as, in alums, M_2SO_4.$M_2(SO_4)_3.24H_2O$. They crystallize together from solution, but when dissolved they decompose into their constituent salts, (cf. *complex salts*). **ethereal-** An ester, q.v. **mixed-** Salts of two or more metals; as, $NaKSO_4$. **neutral-** A salt whose solution has a neutral reaction, as potassium chloride. **normal-** A compound of a base and acid that have completely neutralized each other:



basic salt normal salt acid salt

The reaction in water may be neutral, alkaline, acid, or amphoteric. **oxy-** A compound of a base with an oxy-acid radical. **triple-** A salt containing three metals; as, triple chloride.

salubrol. $C_{23}H_{24}O_2N_4Br_4$ = 708.4. Methylene-diantipyrine tetrabromide, tetrabrommethylene-diantipyrine. An orange-yellow powder, m.155; insoluble in water, soluble in alcohol. Used medicinally as a harmless dusting powder.

salufer. Sodium silicofluoride.

salumin. Aluminum salicylate.

salvarsan. A German brand of *arsphenamine.*

salve. See *ointment.*

salvia. Sage, save. The dried leaves of *Salvia officinalis*, a Labiatae. It contains an essential oil, resin, tannin, and bitter principles; used as a spice, and medicinally as the fluid extract. Cf. *sclareol.* **s. oil.** Sage oil.

salvianin. Monardein. The coloring matter from *Salvia coccinea.*

salviol. $C_{10}H_{16}O$ = 152.1. Thujone. An eleoptene from the essential oil of *Salvia* species. A colorless liquid, b.201, insoluble in water, soluble in alcohol.

salvosal lithia. Lithium salol-o-phosphite. **s. potash.** Potassium salol-o-phosphite.

sama condition. Sama-zustand. A temperature-difference in complete equilibrium, that is, no thermal flow; as, gases at low pressures in a gravitational field. Stellar nebulosities with a temperature gradient of $13' \times 10^{-6}$ degree/cm. at a pressure of 10^{-4} mm. are in equilibrium.

samaderin. $C_{29}H_{34}O_{11}$ = 558.2. A bitter principle from the bark and fruit of *Samadera indica.*

samandaridine. $C_{20}H_{31}ON$ = 301.3. An alkaloid from *Salamandra maculosa*, a salamander. Cf. *salamandaridine.*

samandarine. $C_{52}H_{80}O_2N_4$ = 792.8. An alkaloid from the skin secretion of *Salamandra* species (salamanders). Cf. *salamanderine.*

samandatrine. $C_{21}H_{37}O_2N_2$ = 365.4. An alkaloid from the secretions of *Salamandra atra*, an Alpine salamander.

samaric. Pertaining to trivalent samarium. **s. bromide.** $SmBr_3.6H_2O$ = 498.27. Green crystals, d.2.971; soluble in water. **s. chloride.** (*anhydrous*) $SmCl_3$ = 256.80. Greenish-yellow crystals, d.4.46, m.686; soluble in water or alcohol. (*hydrate*) $SmCl_3.6H_2O$ = 364.89. Green, trigonal crystals, d.2.383, soluble in water. **s. hydroxide.** $Sm(OH)_3$ = 201.45. A colorless powder insoluble in water. **s. nitrate.** $Sm(NO_3)_3.6H_2O$ = 444.55. Pale yellow, triclinic prisms, d.2.375, soluble in water. **s. oxalate.** $Sm_2(C_2O_4)_3.10H_2O$ = 745.02. Colorless crystals, insoluble in water. **s. sulfate.** $Sm_2(SO_4)_3.8H_2O$ = 733.18. Yellow, monoclinic crystals, d.2.93, slightly soluble in water. **s. sulfide.** Sm_2S_3 = 396.8. A yellowish powder, d.5.729, m.1900.

samarium. Sm (Sa) = 150.43. A rare earth metal and element, atomic number 62, discovered by Boisbaudran (1879). A grayish-white metal, d.7.7, m.1350; soluble in acids. Samarium has a valency of two or three, and forms green and pink colored salts. Cf. *samaric, samarous.* **s. oxide.** Sm_2O_3 = 348.8. A white powder; insoluble in water, soluble in acids.

samarous. Bivalent samarium. **s. chloride.** $SmCl_2$ = 221.33. Red-brown needles, m.740; soluble in water with the formation of hydrogen. **s. sulfate.** $SmSO_4$ = 246.4. An orange-colored powder, insoluble in water.

samarskite. A lustrous, velvet-black, native columbate and tantalate of uranium, cerium and yttrium metals, which includes samarium.

sama-zustand. Sama condition.

sambucus. Elder flowers. The dried flowers of *Sambucus* species, elder family; used medicinally as the fluid extract. **s. juice.** Elderberry juice. An extract from the fruit of *Sambucus* species; used medicinally as a diuretic and alterant.

sambunigrin. $C_{14}H_{17}NO_6$ = 295.14. A glucoside, m.152, from the leaves of the elder, *Sambucus nigra*, which hydrolyses to glucose and *l*-mandelonitrile.

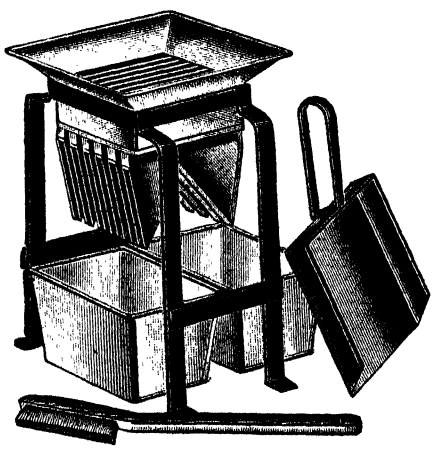
samin. $C_{13}H_{14}O_5$ = 250.1. A hydrolysis product of sesamolin. Colorless needles, m.103, soluble in chloroform.

samneh. Rendered butterfat from Palestine.

samol. Salimenthol.

samphire. The common name usually applied to *Crithmum maritimium* (Umbelliferae), an English herbal. Its fleshy leaves are used as a pickle.

sample. A representative portion of a substance, systematically taken for the purpose of judging its quality by analysis.



Sampler.

sampler. Riffles. A device for splitting automatically aggregates of crushed ore, coal, cement, or other materials preparatory for analysis. See illustration. or

sampling. Selecting something to be tested approved. The taking of a sample.

sand. Grains or particles of disintegrated siliceous rock, chiefly of quartz. **Calais-** An extremely fine sand found near Calais; used to polish platinum ware. **silver-** A fine sand, washed

with hot acids and water and used for grinding up with substances prior to their extraction.

s. bath. A vessel filled with sand in which vessels or instruments are heated in order to obtain a uniform distribution of heat. It is used similarly to the water-bath, but for higher temperatures. **s. blast.** A stream of sand projected by compressed air or steam, and used as an abrasive, metal cutter, or for frosting glass. **s. paper.** An abrasive made by coating stout paper or thin cloth with glue, and dusting fine sand on it. It is intermediate in effect between glass and emery paper.

sandalwood. White sandalwood, santalum, white sanders. The heart-wood of *Santalum album*, a Santalaceae. Used medicinally as the fluid extract, as a diuretic and antiseptic; and as a source of sandalwood oil and incense. **red-** Red sanders, ruby wood. The heartwood of *Pterocarpus santalinus*, a Leguminosae; used as a coloring material. See *santalin*, *santol*, *pterocarpin*. **yellow-** Yellow sanders. A yellow variety of sandalwood; used as a coloring material.

s. oil. *East Indian-* The essential oil of white sandalwood, d.970–0.985, containing santalol, santalin and its esters. *West Indian-* The essential oil from *Amyris balsamifera*, a Rutaceae.

sandarac(h). Gum juniper, sandarach. The resinous substance which exudes from *Callitris quadrivalvis* (*Thuja articulata*), a pine of N.W. Africa.

sandaracolic acid. $C_{44}H_{64}O_4(OH)COOH$ = 718.6. A resinous acid from sandarac.

sandix. Orange-red, orange mineral. A native minium, or lead oxide of a lighter color than usual; used as a pigment.

Sandmeyer's reaction. The replacement of an amino group by a halogen, or the transformation of diazocompounds into halogen compounds by treatment with cuprous halogen salts:

$$Ph.N{:}N\,Cl + Cu_2Cl_2 = PhCl + N_2 + Cu_2Cl_2$$

sandoptal. $C_{11}H_{16}N_2O_3$ = 224.2. 5-Allyl-5-isobutyl barbituric acid. Colorless crystals, soluble in water; used as a hypnotic.

sandstone. A sedimentary rock, which consists of coherent grains of sand.

sang de boeuf. A red pottery glaze produced by the reduction of copper oxide.

sanguinaria. (1) Blood root, red root, tellerwort. The dried rhizomes and roots of *Sanguinaria canadensis*, a Papaveraceae. It contains the alkaloids, sanguinarine, homochelidonine, protopine and chelerythrine (see *opium alkaloids*); used medicinally as an emetic and expectorant. (2) A dark green bloodstone with red spots. (3) Hematite.

sanguinarine. $C_{20}H_{15}O_4N$ = 333.2. An alkaloid from the root of *Sanguinaria canadensis* and *Stylophorum diphyllum*. White needles, m.213, insoluble in water, soluble in alcohol or acids with red color. **s. nitrate.** $C_{20}H_{15}O_4N.HNO_3$ = 396.2. Orange-yellow crystals, soluble in water or alcohol; used as a tonic and cardiac stimulant. **s. sulfate.** $(C_{20}H_{15}O_4N)_2H_2SO_4$ = 764.4. An orange-red crystalline powder, soluble in water or alcohol.

sanguis draconis. Dragon's blood.

sanicle. Sanicula.

sanicula. Wood march, sanicle. The herb and root of *Sanicula europaea*, an umbelliferous plant. It contains tannin and is used as an astringent.

sanidine. A glassy form of orthoclase.

sanocrysin. A preparation containing 37.4 % gold; used in the treatment of pulmonary tuberculosis.

sanoform. $C_8H_6O_2I_2$ = 404.0. Methyldiiodosalicylate. $C_6H_2I_2(OH)COOMe$. A colorless crystalline powder, m.110, insoluble in water, soluble in alcohol or ether; used medicinally as a dusting powder.

santal. Santalenic acid. **oil of-** Sandalwood oil.

santalal. $C_{15}H_{24}O$ = 220.2. An aldehyde, $C_{14}H_{23}.CHO$, in sandalwood oil.

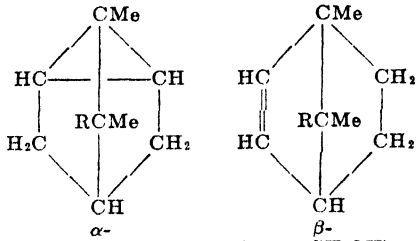
santalene. $C_{15}H_{24}$ = 204.19. A terpene occurring in three forms; *α-* d.0.913, b.252. *β-* d.-0.894, b.$_{7mm}$126. *γ-* d.0.936, b.$_{10mm}$120.

santalenic acid. $C_{15}H_{24}O_5$ = 274.1. Santalic acid. Santalin. The coloring material of red sandalwood. A red powder, m.104, insoluble in water, soluble in alcohol or ether.

santalic acid. Santalenic acid.

santalin. Santalenic acid.

santalol. (1) $C_{15}H_{24}O$ = 220.2. A terpene from sandalwood. A colorless liquid. (*α-*) Arheol.



α- *β-*

(**R is** $—CH_2.CH_2.CH{:}CHMe.CH_2OH$).

d.0.979, b.300. (*β-*) d.0.973, b.309. Used in the treatment of urethritis. (2) Santyl. **s. methyl ester.** Thyresol.

santalum. Sandalwood.

santalyl. The radical $C_{15}H_{23}$—. **s. carbonate.** Carbosant. **s. chloride.** $C_{15}H_{23}Cl$ = 238.64. A colorless liquid, d.1.040, b.$_{10mm}$155. **s. salicylate.** Santyl.

santene. C_9H_{14} = 122.11. A liquid hydrocarbon, d.0.869, b.142.

santenol. $C_9H_{16}O$ = 140.2. *1.4*-Methylene-*2.2*-dimethylcyclohexene-*2*. A colorless crystalline powder, d.0.987, m.98, b.196.

santobrite. C_6Cl_5ONa = 288.3. Sodium pentachlorophenate. A preservative.

santochlor. *p*-Dichlorobenzene.

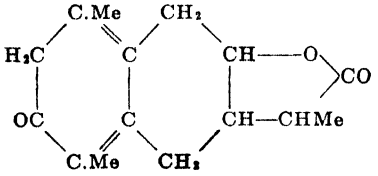
santol. $C_8H_6O_2$ = 150.0. A colorless crystalline substance from red sandalwood.

santomerse. An alkylated aryl sulfonate preparation having surface-active properties.

santonic acid. (1) $C_{15}H_{18}O_3$ = 302.14. An acid from santonica, m.171, b.$_{11mm}$285. (2) $C_{14}H_{20}O_5$ and other formulas. **apo-** $C_{14}H_{20}O_3$ = 236.14. White crystals, m.164. **hydroxy-** $C_{14}H_{20}O_6$ = 284.14. Colorless crystals, decomp. 215. **s. lactone.** Santonin.

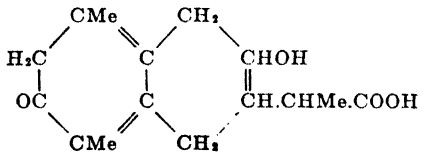
santonica. Levant worm-seed, cina, xantholine, semen cinae. The dried flower heads of *Artemisia pauciflora*, a Compositae. It contains santonin, artemisin, essential oils, resins and gums; used medicinally as a vermifuge and diuretic. Cf. *cinaebene*.

santonin. $C_{15}H_{18}O_3$ = 246.22. The lactone of santoninic acid. A neutral, non-glucosidal bitter principle from santonica. Colorless, odor-



less shining leaflets, d.1.187, m.170 (sublimes and decomp.); insoluble in water, soluble in alcohol, ether or chloroform. Used medicinally as an anthelmintic. Cf. *myosin*. **oxy-Artemisin.**

santoninic acid. $C_{15}H_{20}O_4$ = 264.2.



Santonic acid. Colorless crystals, d.1.251, m.179.

santoninoxime. $C_{15}H_{18}O_2(NOH)$ = 261.2. The oxime of santonin. White, silky needles, m.217, slightly soluble in water; used as an anthelmintic.

santyl. $C_{22}H_{28}O_3$ = 340.3. Santalyl salicylate, santalol, $C_6H_4(OH)COOC_{15}H_{23}$. A yellowish oily liquid, d.1.07, b.$_{22mm}$126, insoluble in water; used medicinally as a urinary antiseptic. **s. methylester.** Thyresol.

s.ap. An abbreviation for apothecaries' scruple = ℈.

sap. (1) The liquid juices of a plant, especially the circulating liquids which assist growth. (2) The surface portions of a rock that are softened by weathering.

sapamine. A higher fatty-acid N-carboxyl ester of symmetrically-substituted ethylenediamines; as, diethylamino-ethyloleamide.

sapine. $C_5H_{14}N_2$ = 102.2. A non-toxic isomer of cadaverine.

Sapindales. An order of plants which comprises the families Anacardiaceae Aquifoliaceae, Aceraceae, and Sapindaceae.

sapiphores. The groups or radicals in an organic compound which produce a sweet or bitter taste. The sweet taste comes from a suitable combination of factors in the compound; the bitter from an unsuitable one. Cf. *glucophore*.

sapo. A soap prepared from olive oil and sodium hydroxide.

sapogenin. $C_{14}H_{22}O_2$ = 222.2. Sapogenol. A decomposition-product of saponin. Colorless needles, m.257; insoluble in water, soluble in alcohol or ether.

sapogenol. Sapogenin.

saponaria. Soaproot, soapwort, bruisewort. The herb and root of *S. officinalis*, a Caryophyllaceae which contains saponin and sapotoxin; used medicinally.

saponarin. $C_{21}H_{24}O_{12}$ = 468.19. A glucoside, m.232, from saponaria.

saponetin. $C_{40}H_{66}O_{15}$ = 786.5. A crystalline principle from saponaria.

saponification. The conversion of an ester into an alcohol and acid salt; in particular, that of fats into soaps by means of alkalis:

$$(R.COO)_3G + 3NaOH = 3R.COONa + G(OH)_3$$
fat soap glycerol

The hydrolysis of a glycerol-ester (fat) to a free alcohol (glycerol) and ester salt (soap). **s. equivalent.** The quantity of fat (in grams) that is saponified by one liter of normal alkali:

Sap. Equ. = 56108/Sap. Number.

s. number. The quantity of potassium hydroxide (in milligrams) necessary to saponify 1 gm of a fat or oil. **s. value.** S. number.

saponifier. The alkali used to hydrolyze fats or oils.

saponify. To hydrolyze an ester to form a soap.

saponin. $C_{32}H_{54}O_{18}$ = 726.5. A glucoside from soapwort, quillaia and other plants. A white amorphous powder, soluble in water; the solution foams like soap when shaken. Used medicinally and technically as a foam producer; it has toxic properties, and is also used as an antiseptic. **sasanqua s.** $C_{78}H_{118}O_{22}.3H_2O$. A glucoside from the seeds of *Camelia sasanqua*, a Theaceae, decomp. 222; it hydrolyzes to pentose, and 3 mols. of galactose and prosapogenin.

saponins. A group of amorphous glycosides that produce foaming solutions. They occur in *Saponaria* species, Hippocastanaceae, and other species of plants.

saponite. A native, hydrous silicate of magnesium and aluminum.

sapota. The dried fruit of the bully tree, *Achras sapota*, a Sapotaceae of South America. It contains tannin; used medicinally as an antiperiodic. Cf. *chicle*.

Sapotaceae. A natural order of tropical shrubs and trees, many of which bear edible berries, and are sources of saponin.

Mimuseps globosa....	..... balata, chicle.
Bumelia retusa.....	..... balata wood

Cf. *butternut, illipe, maclayine, sapotin*.

sapotalene. $C_{13}H_{14}$ = 170.1. *1.2.7*-Trimethylnaphthalene. Colorless crystals, insoluble in water.

sapotin. $C_{29}H_{52}O_{20}$ = 720.5. A glucoside from the seeds of *Achras* or *Sapota sapotilla;* colorless crystals, m.240.

sapotinetin. $C_{17}H_{32}O_{10}$ = 396.3. A decomposition product of sapotin.

sapotoxin. $C_{17}H_{26}O_{10}$ = 390.3. A toxin from the bark of quillaja, soap bark.

sappan wood. Sibucao. The wood of *Caesalpinia sappan*, a Philippine Leguminosae; used as a dye.

sapphire. A native, clear, blue corundum, Al_2O_3, used as a gem. **Brazilian-** Tourmaline. **water-** Iolite.

saprine. $C_5H_{14}N_2$ = 102.2. A ptomaine from decaying meat.

sapropelic coal. A coal which contains microscopic oil-bearing algae.

sapropelitic. Resembling coal or asphalt.

saprophyte. A vegetable microorganism living in air, soil or water, which feeds on dead or decaying animals or plants. It differs from parasites, which feed upon living organisms.

saprophytic. Feeding on dead vegetable or animal organisms.

saran. Trade name for a polyvinylidene chloride; used to flameproof fabrics.

Sarcina. A genus of *Coccaceae* (Schizomycetes) which forms bale-like packs. See *bacteria* (figure).

sarcine. Hypoxanthine.

sarcocol. A gum resin from *Penaea sarcocolla* an African Penaeaceae.

sarcocollin. $C_{13}H_{23}O_6$ = 275.2. A constituent of sarcocol.

sarcolactate. A salt of sarcolactic acid, which contains the monovalent MeCHOHCOO— radical.

sarcolactic acid. $C_3H_6O_3$ = 90.1. p-Lactic acid, Me.CHOH.COOH. A colorless liquid, soluble in water, alcohol or ether. See *lactic acid.*

sarcolite. An aluminum silicate, which contains lime and sodium, belonging to the melilite group.

sarcosine. $C_3H_7O_2N$ = 89.08. Methylglycine, sarkosine, methylaminoacetic acid, MeNH.CH_2.COOH. Colorless, rhombic crystals, m.-210, soluble in water or alcohol; used medicinally as an antirheumatic. **dimethyl-** Betaine.

sard. A brown variety of sardonyx.

sardine oil. The fatty oil expressed from sardines, and used as leather dressing.

sardinianite. $PbSO_4$. A monoclinic variety of anglesite.

sardonyx. A variety of chalcedony; a reddish-brown slightly translucent stone. Used as a semiprecious stone, as it takes a high polish. Cf. *sard.*

sarkine. Hypoxanthine.

sarkokaulin. $C_{13}H_{24}O_2$ = 212.19. An alcohol, m.78, from the wax of the candle bush, *Sarcocaulon burmani*, a Leguminosae of So. Africa.

sarkosine. Sarcosine.

sarracenine. An alkaloid from the roots of *Sarracenia* species, fly-trap or pitcher plant; white needles, soluble in alcohol or ether.

sarsaparilla. Radix sarsae. The dried root of *Smilax medica* and other species, Liliaceae. It contains several glucosides, (smilacin, parillin) resin, saponins, and essential oils; used medicinally as a tonic. **American-, false-** The root of *Aralia nudicaulus*, an Araliaceae. **Indian-** The root of *Hemidesmus indicus*, an Asclepiadaceae. **Jamaica-** Sarsaparilla.

sarsasaponin. A glucoside from sarsaparilla or smilax, used as an emetic and expectorant.

sassanqua. See *saponin.*

sassafras. The dried bark of the root of *Sassafras variifolium*, a lauraceous tree of North America. It contains an essential oil, resin, tannin and wax; used as the fluid extract, as a carminative. **Australian-** Atherospermine.

s. nuts. Pichurim beans. **s. oil.** Oleum sassafras. The volatile oil distilled from the root of s. (*bark*). An essential oil from the bark of *S. officinalis*, d.1.065–1.095, containing safrole, eugenol, camphor, pinene and phellandrene. **s. pith.** The dried pith of sassafras species. White, spongy, cylindrical pieces, used as mucilage for inflammations of the air and digestive passages.

sassa gum. A red gum from *Albizzia fastigiata*, a leguminous tree of Abyssinia.

sassoline. Sassolite.

sassolite. $B(OH)_3$. Sassoline. A native boric acid; occurs in triclinic, lustrous scales at the fumaroles.

sassy bark. Mancona bark, casca bark, doom bark. The bark of *Erythrofloeum guinense*, a Leguminosae of Central and Western Africa, used by natives as ordeal poison. It is a cardiac tonic and narcotic. Cf. *erythrophloeine, muavine.*

satin spar. A satin-like compact variety of calcite. **s. white.** A mixture of calcium sulfate and aluminum hydroxide, produced by the co-precipitation of lime and aluminum sulphate in presence of water; used as a pigment for coating paper.

saturable. Able to be saturated.

saturate. (1) To cause all the atoms of a molecule to become saturated by having all bonds linked up, so that only single bonds exist. (2) To dissolve sufficient substance, either solid or gaseous, in a solution, so that no more of that substance can be dissolved.

saturated. Completely satisfied. **super-** See *supersaturated.* **s. compound.** An organic compound with no free valence, and in which there are neither double nor triple bonds. **s. hydrocarbons.** Paraffins. **s. solution.** A solution that contains so much dissolved substance that no additional quantity can be dissolved at that temperature.

saturation. (1) Complete neutralization of an acid or base. (2) Complete or maximum absorption of a substance by a solvent. (3) Complete satisfaction of the valency bonds in a molecule. (4) A property of color, q.v. Cf. *hydrogenation.* **super-** See *supersaturation.* **s. current.** The maximum current that can pass as a silent discharge through a gas or vapor without decomposing it. The medium is then completely ionized. **s. isomerism.** Isomerism between two compounds, one of which is saturated, and the other unsaturated; as, acetone, $CH_3.CO.CH_3$, and allyl alcohol, CH_2:$CH.CH_2OH$. **s. point.** (1) The concentration at which a solution is saturated with a particular substance. (2) In color printing, the stage at which one color becomes dominant at the expense of the other colors present.

saturnism. Lead poisoning.

saturnus. The alchemical name for lead.

saunders. Sandalwood.

saussurite. An impure form of labradorite.

save. Salvia.

savine. Sabina. The fresh tops of *Juniperus sabina*, an evergreen shrub. It contains essential oil, tannin, and resin; used medicinally as the fluid extract, as a diuretic vermifuge, and aromatic. Cf. *juniperic acid.* **s. oil.** Oleum sabinae. An essential oil from *Juniperus sabina.* A colorless or yellow liquid, d.0.903, which contains pinene, cadinene, sabinene, and sabinol; used medicinally.

savory. The herb *Satureia hortensis* (summer s.) and *S. montana* (winter s.), used as an aromatic and carminative. They contain carvacrol.

saw palmetto berries. Sabal.

saxicoles. A group of lichens.

saxifrage. Pimpinella.

saxin. A brand of saccharin.

Saybolt seconds. A relative unit of viscosity; the time necessary for a specified volume of a liquid to flow through the orifice of a S. viscosimeter at a definite temperature. Cf. *Engler, centipoises, SAE number, rhe.*

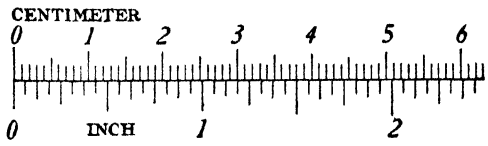
Sb. The symbol for antimony, derived from the Latin stibium.

Sc. The symbol for scandium.

scalar. Any quantity which has magnitude but no direction; e.g., density, volume, mass, work. Cf. *vector.*

scale. (1) A thin, plate-like crystal or flake-like leaflet. (2) A crust of metallic oxides formed on the surface of metals. (3) Boilerstone, or the incrustat on of insoluble salts formed by the evaporation of water. (4) Markings at regular intervals, either on instruments

(meter, yard, thermometer) or on drawings and graphs; as,



(5) A balance used for relative rough weighings.

conversion- A graph which consists of two or more parallel scales, that can be used for the rapid solution of proportional problems. (Cf. *thermometer scales, nomograph.*

s. copper. Copper in thin flakes. **s. stone.** Wollastonite.

scaling index. A measure of the degree of corrosion of a metal in a liquid; the gain in weight in mgrms. per sq. cm. under specified conditions.

scalpel. A small curved knife.

scammonin. $C_{34}H_{56}O_{16}$ = 720.5. A glucoside derived from scammony.

scammony. The dried root of *Convolvulus scammonia* a Convolvulaceae of Syria and Asia minor. It contains the glucoside scammonin, a gum and a resin; used medicinally as a cathartic and anthelmintic, **Mexican-** Ipomoea.

scandia. Scandium oxide.

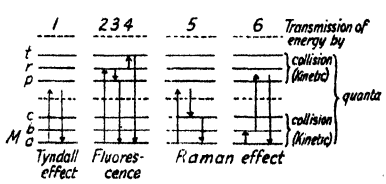
scandium. Sc = 45.10. A rare metal of the aluminum group, atomic number 21. It was predicted by Mendelejeff (as ekaboron), and discovered in 1879 by Nilson. It is a gray metal, m.1350, soluble in acids; valency, three. **s. acetylacetonate.** $Sc(MeCOCHCOMe)_3$ = 342.26. White plates, m.187, b.215, soluble in water. **s. chloride.** $ScCl_3$ = 151.5. Colorless flakes, subliming at 800°C; very soluble in water, alcohol, or ether. **s. hydroxide.** $Sc(OH)_3$ = 96.12. A colorless amorphous powder; insoluble in water. **s. oxalate.** $Sc_2(C_2O_4)_3.H_2O$ = 448.28. White crystals, m.140, insoluble in water. **s. oxide.** Sc_2O_3 = 138.2. Scandia. A colorless amorphous powder, d.3.864; insoluble in water or alcohol, soluble in acids. **s. sulfate.** $Sc_2(SO_4)_3$ = 378.41. A colorless crystalline powder, d.2.574; soluble in water.

scapolite. Wernerite. A white or green calcium, aluminum, sodium silicate containing chlorine.

scarlet. Scarlet R, Biebrich red, aminoazotoluolazo-β-naphthol, $MeC_6H_4N:NC_6H_3MeN:NC_{10}H_{15}OH$. A dark red aniline dye; a dark brown powder, insoluble in water, soluble in chloroform or oils. Used medicinally in ointments.

scatol. Skatole.

scattering. (1) Dispersing. (2) The spitting of molten metals on pouring. **light-** The emission of light from a particle or molecule under illumination, due to resonance and excitation (cf. *luminescence*):



TYNDALL EFFECT, where M_0, the initial and final state of the scattering medium and $h\nu$ and $h\nu\theta$ the incoming and scattered quantum respectively, remain unchanged, except for the new direction of motion at an angle θ; hence:

1. $M_0 + h\nu = M_0 + h\nu\theta$

FLUORESCENCE, where the scattered light is of shorter or longer frequency as compared with the incident light:

2. (absorption) $M_a + h\nu_{ar} \rightarrow M_r$
3. (collision) $M_r \rightarrow M_p + \text{Kin. E.}$
   (emission) $M_p \rightarrow M_a + h\nu_{ap}$
   where the difference (ar) to (ap) represents the shift toward the red (Stokes lines)
4. (collision) $M_r + \text{Kin. E.} \rightarrow M_t$
   (emission) $M_t \rightarrow M_a + h\nu_{at}$
   where $h\nu_{at}$ are anti-Stokes lines.

RAMAN EFFECT, where only a portion of the incoming quanta are used for excitation:

5. $M_a + h\nu_0 \rightarrow M_c + h\nu_1$
   where $h\nu_0 - h\nu_1 = E_c - E_a = h\nu_{ac}$
6. $M_a + \text{Kin. E.} \rightarrow M_b$
   $M_b + h\nu_0 \rightarrow M_a h\nu_2$
   where $h\nu_2 - h\nu_0 = E_b - E_a = h\nu_{ab}$, in which case $h\nu_{ac}$ and $h\nu_{ab}$ correspond with the Raman lines.

COMPTON EFFECT, where a quantum of high frequency (x-rays) dislodges an electron from the scattering substance:

$$E + h\nu_0 \rightarrow E_{fast} + h\nu_1$$

scavenger. A substance used to purify; as, metallic Li which will remove C, S, P, O, N and other impurities from alloys and metals.

Schäffer's acid. Armstrong's acid. Beta-naphtholsulfonic acid, $(6)HSO_3.C_{10}H_6.OH(2)$, or 2-hydroxynaphthalene-6-sulfonic acid; used in organic synthesis.

schapbachite. A native sulfide of lead, bismuth and silver, $PbS.Ag_2S.Bi_2S_3$.

Scheele, Carl Wilhelm. 1742–1786. A Swedish apothecary noted for his discovery of oxygen, chlorine, ammonia, manganese, and barium. **S.'s green.** An acid copper arsenite, $CuHAsO_3$, used as pigment.

scheelite. A native calcium tungstate, $CaWO_4$.

scheelium. An obsolete name for tungsten.

scheererite. A solid mineral hydrocarbon, m.45, b.92.

Scheibler, Carl. 1827–1899. A German chemist noted for developments in the sugar industry. **S.'s reagent.** A solution of phosphotungstic acid. It forms a yellow precipitate with the sulfates of the alkaloids.

scheme. A diagram, graph, flow-sheet, or an outline of a subject.

schieferspar. A flake-like variety of calcite.

Schiff, Hugo. 1834–1915. A German organic chemist. **S.'s bases.** A series of condensation products of aromatic amines and aliphatic aldehydes of the type, $R.N:CHR$; as: $PhNH_2 + OCH.Ph = PhN:CHPh + H_2O$. **S.'s reagent.** Thioacetic acid. **S.'s solution.** A solution of 0.2 gm. rosaniline, and 15 cc. sulfurous acid in 200 cc. water; used as a test for aldehydes. **S.'s test.** A test for aldehydes, which restore the red color of a magenta solution that has been bleached with sulfur dioxide.

schiller spar. Bronsite.

schinus oil. An essential oil from the pepper tree, *Schinus molle*, an Anacardiaceae of North America, d.0.850, containing phellandrene, pinene and carvacrol.

schist. A crystalline rock that can be split into scales or flakes.

schistic. Not aschistic (q.v.).

schizomycetes. Schizophyta, fission fungi, bacteria. A large group of plant microorganisms that belong to the chlorophyll-free or fungi class. They are commonly known as bacteria, and are divided into:

family 1—Coccaceae, round or spherical in shape—
genus I—Streptococci, forming bead-like chains.
genus II—Micrococci, forming grape-like clusters.
genus III—Sarcina, forming bale-like packs.
genus IV—Planococcus, like II but mobile.
genus V—Planosarcina, like III but mobile.
family 2—Bacteriaceae, cylindrical or rod-like in shape.
family 3—Spirillaceae, curved or S-like in shape. See *bacteria*.

Schizophyta. Schizomycetes.

schlempe. Vinasse.

schlieren. The region of changing refraction in an otherwise optically-homogeneous medium, (gas or liquid); *e.g.*, heat waves seen over a hot surface, or the threads seen on mixing glycerol and water.

Schlippe, Carl Friedrich von. 1799–1874. A German-born Russian chemist. **S.'s salt.** Sodium sulfantimonate, $Na_3SbS_4.9H_2O$.

Schlotterbeck reaction. The synthesis of ketones from aldehydes: $R.CHO + CH_2N_2 \rightarrow R.CO.CH_3 + N_2$. Cf. *Nierenstein reaction*.

Schmoluchowski's equation. The average length, A, of the path of a particle in a dispersed system (in μ) is:

$$A = 2.37\sqrt{K.\frac{RT}{N}.\frac{t}{\eta r}}.$$

where R = gas content, N = Avogadro's number, T = absolute temperature, t = period of vibration of the particle, η = viscosity of the medium, r = radius of the particle.

schneebergite. $CaSbO_3$. A native calcium antimonite.

Schneider's furnace. A retort for the distillation of zinc from zinc-lead ores.

schœ- See *Schoe-*.

Christian Friedrich Schoenbein.

Schoenbein, Christian Friedrich. 1799–1868. A German chemist noted as discoverer of ozone and work on catalysis, nitrocellulose and hydrogen peroxide.

Schoenherr process. A nitrogen fixation method in which the air circulates spirally around an electric arc about six meters long.

schöenite. $K_2SO_4.MgSO_4.9H_2O$. A Stassfurt salt (q.v.) which consists of hydrated potassium magnesium sulfate.

Schöllkopf's acid. (1) *1*-Naphthol-*4.8*-disulfonic acid. (2) *1*-Naphthylamine-*4.8*-disulfonic acid. (3) *1*-Naphthylamine-*8*-sulfonic acid.

schorl. Tourmaline.

Schörlemmer, Carl. 1834–1900. A German chemist, noted for his textbooks.

schorlomite. A titanium garnet, (q.v.); a native silicate of titanium, iron and calcium.

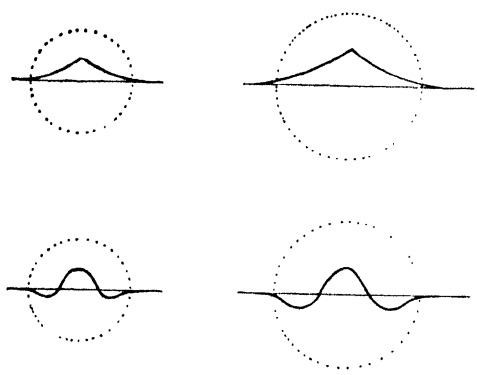
Schotten, Carl. 1853–1910. A German organic chemist noted for his synthetic methods. **S.'s reaction.** Acylation in alkaline solution with benzoyl chloride.

schou oil. A gelatinous product of the oxidation of soy bean oil, used as emulsifying agent in the margarine industry.

schraufite. $C_{11}H_{16}O_2$. A fossil resin in Carpathian sandstone.

schreibersite. $(FeNiCo)_3P$. A mixed phosphide, in certain meteorites.

Schrödinger, Erwin. 1887– . A German physicist noted for his atomic concepts. **S. atom.** Pulsating or fluctuating atom. A co



Schrödinger atoms.

cept of atomic structure based on wave mechanics, q.v. The atom is regarded as a sphere of electricity which may vary slightly in its density, but which may pulsate (corresponding with Bohr's orbits) throughout the whole in either a simple or complex manner. Radiation may be absorbed or liberated by these fluctuations (energy levels). The emission of electrons is regarded as the "breaking off" of a part of the vibrations. **S. equation.** Wave equation. The differential equation

$$\frac{\partial^2\psi}{\partial x^2} + \frac{\partial^2\psi}{\partial y^2} + \frac{\partial^2\psi}{\partial z^2} + \frac{8\pi^2 m}{h^2}(W - V)\psi = 0,$$

which determines the statistical charge density $\psi(x, y, z)$ or the probability that the electron may be in the volume (x, y, z). Cf. *Heisenberg principle*.

Schrötter apparatus. Calcimeter.

Schulze's rule. The precipitating effect of an ion varies with its valency.

Schumann rays. The extreme ultra-violet portion of the spectrum which affects a photographic plate. Cf. *radiation, ultra-violet*.

Schütz-Borrisow rule. Enzyme activity is proportional to the square root of the amount of enzyme present: $x = tK\sqrt{c}$, where x is the amount of substance digested, t = 24 hours, K is a constant, and c the concentration of the enzyme.

Schwarz, Karl Leonhard Heinrich. 1824–1890. A German industrial chemist, noted for volumetric methods.

schwatzite. A tetrahedrite containing mercury.

Schweinfurt green. Cupric subacetate.

Schweitzer, Mathias E. 1818–1860. A German chemist. **S's reagent.** An ammoniacal solution of cupric hydroxide, which dissolves cellulose. It is prepared by adding KOH to a solution of $CuSO_4$ and NH_4Cl, and dissolving 3 gm. of the moist, filtered precipitate in 1000 cc. of 20 % NH_4OH.

schwellenwert. Liminal value, threshold value. The minimum quantity of electrolyte required to precipitate a colloidal solution.

sciadopitene. $C_{20}H_{32}$ = 272.3. A diterpene, m.95.5, from the wood oil of *Sciadopitys verticillata*, the parasol-pine, or umbrella fir of Japan.

science. Systematized and verifiable knowledge reached by observation, measurement and/or experiment. Science primarily describes, measures and coordinates facts, but does not explain their ultimate cause (philosophy, q.v.). It is conveniently classified into:

FORMAL BRANCHES OF SCIENCE

Logic	ideas and concepts
Mathematics	numbers and magnitudes
Geometry	space and extension
Phoronomy	motion, time and relativity

NATURAL BRANCHES OF SCIENCE

(a) experimental:

Physics	energy transformations
Chemistry	matter transformations

(b) descriptive:

Astronomy	the universe
Geology	the earth

BIOLOGICAL BRANCHES OF SCIENCE

Botany	structure and functions of plants
Zoology	structure and functions of animals
Anthropology	man
Psychology	human behavior
Economics	human relationship
Sociology	human society

scientific. Based upon systematized and verifiable facts or experience. Antonym: empirical.

scientist. One engaged in the study of a branch of science.

scilla. Squill.

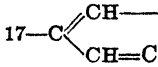
scillain. (1) An amorphous glucoside obtained from the bulbs of *Scilla maritima*, squill. (2) Scillipicrin.

scillarabiose. $C_{12}H_{22}O_{10}$ = 326.1. A disaccharide obtained by acid hydrolysis of scillaren. It hydrolyzes to rhamnose and *d*-glucose.

scillaren. $C_{37}H_{54}O_{13}$ = 706.4. A glucoside from squill, *Scilla maritima*, a yellowish powder, m.230–240, hydrolyzing to scillaradin and scillarabiose. It is a cardiac tonic and diuretic. **s. B.** A mixture of glucosides of greater physiological activity than s.

scillarenase. A hydrolytic enzyme attacking scillaren.

scillaridin. $C_{35}H_{32}O_8$ = 380.0. A cardiac glucoside related to scillin. **s. A.** 14-OHΔ5:6.-



17—C; A cholane (q.v.) diglycone.

scillin. A yellow, crystalline glucoside from the bulbs of *Scilla* species.

scillipicrin. Scillain. A yellow, amorphous glucoside from the bulbs of *Scilla maritima;* used as a diuretic.

scillitin. $C_{17}H_{28}O_6$ = 325.19. A bitter principle, m.154, from the bulbs of *Scilla maritima*, squill. A brownish-black mass, used medicinally as a diuretic.

scillitoxin. A brown, amorphous glucoside from squill; used medicinally.

scintillascope. Spinthariscope.

scintillation. (1) Burning with brilliant sparks, as an iron wire in oxygen. (2) The emission or production of sparks or points of light; as, in a spinthariscope.

scission. (1) The splitting of a molecule; as, the breaking of a carbon atom from a chain. (2) Ring breakage. The opening of an atomic ring. (3) Fission, the division of a living cell (see *cell division*).

Scitaminaceae. An order which includes the *Musaceæ* or banana family, a group of tropical plants from which various important drugs are obtained:

Zingiber officinale	ginger
Alpinia officinarum	galanga
Curcuma zedoaria	zedoary
Curcuma longa	turmeric
Elettaria cardamomum	cardamom seed
Amomum melegueta	grains of paradise
Maranta arundinaceae	arrowroot
Musa sapientum	banana, plantain

sclareol. $C_{54}H_{88}O_3$ = 759.5. A tertiary unsaturated polyhydric alcohol, the principal constituent of oil of sage and similar to sterols.

sclerethryrin. A red coloring matter in ergot.

sclero-, sklero- A prefix derived from the Greek, which indicates hard or solid. **s-lac.** A suggested name for the hard resin of commercial shellac.

sclerometer. An instrument for determining the hardness of materials from the pressure on a moving diamond point necessary to produce a scratch.

scleron. A light, non-corrodible alloy of aluminum with Si, Cu, Fe, Mn, Zn and Li.

scleroproteins. A group of proteins in animal skeletons.

scleroscope. An instrument for determining the hardness of substances from the extent to which a steel ball rebounds after being dropped from a certain height. *Cf. Shore hardness.*

sclerotic acid. Sclerotinic acid, ergotic acid. A yellowish-brown substance from ergot.

scolecite. $CaAl_2Si_3O_{10}.3H_2O$. A white or yellow mineral.

scoliodonic acid. $C_{24}H_{36}O_2$ = 358.3. A highly-unsaturated acid from hiragashira oil, q.v.

scombrin. A protamine from mackerel sperm, containing 88.8 % arginine.

scombron. A histone from immature mackerel sperm.

scoparin. $C_{20}H_{20}O_{10}$ = 420.2. A yellow crystalline principle from scoparius.

scoparius. Spartium. Broom tops. The dried tops of *Cytisus scoparius*, a Leguminosae. It

contains sparteine and scoparin; used medicinally, as the fluid extract, as a diuretic and purgative.

scopine. $C_8H_{13}NO_2$ = 155.1. *2,3*-Epoxytropan. A product of hydrolysis of scopolamine, and isomer of scopoline.

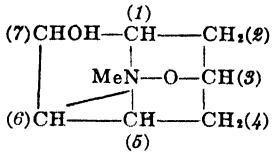
scopola. The dried rhizome of *Scopola carniolica*, (Solanaceae). It contains the belladonna alkaloids; used medicinally. Cf. *atroscine*.

scopolamine. *d*-Hyoscine. *l*-Atroscine. **s. hydrochloride.** Hyoscine hydrochloride.

scopoleine. $C_{17}H_{21}O_4N$ = 303.2. A crystalline alkaloid from several *Scopola*, *Duboisia*, and *Atropa* species.

scopoletin. $C_{10}H_8O_4$ = 192.06. Chrysatropic acid, gelsemic acid, 7-hydroxy-6-methoxycoumarin, β-methylesculetin. Colorless crystals, m.204.

scopoline. $C_8H_{13}O_2N$ = 155.1. A decomposition-product of scopolamine (hyoscine). Colorless crystals, m.110, b.242; soluble in water or alcohol.



scopomannite. Stable scopolamine. A solution of scopolamine hydrobromide in water containing 10 % mannitol.

scopometer. An optical instrument with an optical wedge for visual measurement of turbidity or opalescence by observing the disappearance of an illuminated target.

scopometry. A branch of nephelometry (q.v.); matching colors or turbidities by comparing an illuminated line against a field of constant intensity.

scorbutanin. Vitamin C.

scorification. The roasting, fusion, and oxidation of gold and silver ores with lead and borax glass in a shallow clay vessel in a muffle; used in the assay of ores.

scorifier. A shallow clay vessel with a thick bottom; used in assaying gold and silver ores.

scorodite. $Fe_2O_3.As_2O_5.4H_2O$. Pitticite. A native, hydrated ferrous arsenate.

scorodites. A group of minerals of the general formula, $M_2O_3.N_2O_5.xH_2O$; M is ferric iron or aluminum, and N is arsenic or phosphorus.

scotogram. Scotograph.

scotograph. Scotogram, skotogram, skiagraph. An image produced on a photographic plate in the dark by human radiations.

scotographic. Affecting a photographic plate in the dark.

scotography. Skiagraphy. The study of human radiations, radioactivity, aura, or od-rays, q.v.

scotoma. A spot within the visible field in which there is no vision.

scouring. (1) Corroding; as by certain ores that attack furnaces. (2) Cleaning; as, removing the grease or stain from a vessel. **s. cinder.** A basic slag that attacks the lining of a shaft furnace. **s. rush.** Equisetum.

scraper. A tool for cleaning surfaces.

scraping. The cleaning of surfaces with a sharp-edged tool.

scrapping. Breaking up metal castings, etc. with explosives or mechanically.

screen. (1) A sieve of wire cloth, textile or perforated metal plates, used to sort material according to the sizes of its particles. (2) A stretched cloth or prepared surface on which light or images are projected. (3) An apparatus with *circular* apertures as compared with a sieve (*square* apertures). **fluorescent-** A plate coated with calcium tungstate or barium thiocyanate; used to make visible ultra-violet rays, x-rays and other rays which ordinarily are invisible to the eye. **revolving-** A steel cylinder, usually inclined, with round holes, for separating materials passing through it.

s. analysis. The separation of a material into portions which consist of particles of definite sizes, by means of a series of screens of graded sizes.

screening effect. An assumption that a definite relationship exists between the effective nuclear charge of an atomic nucleus and the charge on its surrounding electrons; *i.e.*, in any atom the inner orbital electrons act as screens between the nucleus and the outer orbital electrons, and thus decrease the effective nuclear charge of the latter. Hence the innermost orbital electrons exert the *largest*, and the outermost the *smallest* screening effect. Cf. *Pauling structure, Lucas theory*.

scrophularia. Figwort, rosenoble. The herb of *S. nodosa*, a Scrophylariaceae, used as a diuretic and anodyne. **water-** Bishop's leaves. The leaves of *S. aquatica*, used externally for poultices.

Scrophulariaceae. Figwort family. A large group of herbs and shrubs that contain glucosides and several important drugs.

Leaves:	
Digitalis purpurea	foxglove digitalin
Curanga amara	curangin
Euphrasia officinalis	eyebright
Verbascum thapsus	mullein
Herbs:	
Veronica officinalis (speedwell)	veronica
Scrophylaria nodosa (figwort)	scrophularia
Chelone glabra (balmony)	chelonine
Rhizome:	
Veronica (*Leptandra*) *virginica*	leptandra

scrubber. A device for washing or absorbing gases; used extensively in chemical plants for purification dissolving, or reacting gases in or with liquids.

scruff. The dirt or impurities on the surface of an object. Cf. *scurf*.

scruple. ℈. A unit of apothecaries' weight: 1 scruple = 20 grains = 1.295978 grams = 0.3 drachms or drams.

scullcap. Scutellaria.

scum. The impurities that rise to the surface of molten materials. Cf. *oly, froth*.

scurf. Material which flakes off; dross. Cf. *scruff*.

scutellaria. Scullcap, helmet flower. The dried plant of *Scutellaria lateriflora*, a Labiatae of North America. It contains scutellarin and an essential oil; used medicinally, as the fluid extract, as an antispasmodic and tonic.

scutellarin. $C_{10}H_8O_5$ = 176.1. A non-toxic crystalline principle from the leaves of scutellaria. Yellow needles, m.199; insoluble in water, soluble in alcohol, ether or chloroform.

scyllitol. $C_6H_6(OH)_6$ = 180.09. An isomer of inositol and constituent of the soap plant,

Helinus ovata, a Rhamnaceae, of South Africa; used as an emetic by the Zulus.

Se. The symbol for selenium.

sea salt. (1) Sodium chloride obtained by evaporating sea water. (2) The residual mixture of salts on evaporating sea water. **s. water.** See *hydrosphere, water.* **s. weed.** Kelp. **s. wrack.** Fucus.

seal. A quantity of water, mercury, wax, oil, or other substance placed around joints or connections to prevent the ingress of air. **vacuum-** The mercury surrounding joints or stopcocks.

sealing wax. A colored and scented mixture of resins and shellac; used for sealing purposes.

seam. A stratum or bed of a mineral or ore.

sebacic acid. $C_{10}H_{18}O_4$ = 202.19. Ipomic acid, decanedioic acid*, *1.8*-octane-dicarboxylic acid, $COOH(CH_2)_8COOH$. Colorless leaflets, m.133, $b._{100mm}295$; soluble in water, alcohol or ether.

sec. (1) An abbreviation for second, a unit of time. (2) An abbreviation for secondary. (3) Dry.

secale cereale. Rye. **s. cornutum.** Ergot.

secaline. Trimethylamine.

secalonic acid. $C_{14}H_{14}O_6$ = 278.1. A yellow, crystalline coloring material found in ergot.

secalose. A carbohydrate from rye. A white, hygroscopic powder. Cf. *trifructosan.*

Secchi, Angelo. 1818–1876. An Italian Jesuit and astronomer, noted for spectrum analysis and polaroscopic experiments.

sechometer. A hand-driven induction apparatus.

secohm. A unit of self inductance; 1 ohm per second.

seconal sodium. Sodium 5-allyl-5-(1-methyl-butyl) barbiturate, a short-acting barbiturate.

second. sec. The $\frac{1}{86}$ part of a minute; 1/86,-164.09 of a sidereal day; 1(24 × 60 × 60) of a mean solar day. 1 second = 1000σ (sigma) = 3.168876 × 10^{-8} year. **s. ionization constant.** See *ionization constant.*

secondary. (1) Second in order. (2) Next in importance. **s. alcohol.** An organic compound which contains the bivalent =CHOH radical. **s. amine.** An organic compound containing the bivalent =NH radical. **s. carbon atom.** A carbon atom that is directly attached to two other carbon atoms. **s. metal.** Metal recovered from scrap, sweepings, skimmings, drosses, etc. This does not imply inferiority, but distinguishes from primary m., (made directly from an ore). **s. mineral.** A mineral that is formed from a primary mineral; as, a sulfate formed by oxidation of the sulfide. **s. reaction.** Subsidiary *reaction.* **s. x-rays.** The scattered radiations emitted from a substance exposed to x-rays. They are characteristic of the substance, and are used for analytical purposes.

secretin. A polypeptide containing P, tyrosine, etc., from the intestinal mucosa of the pig, and from plants; slightly soluble in water, insoluble in alcohol. It acts on the secretion of the pancreas and liver, and excites peristalsis. Cf. *hormone.*

secretion. The formation and separation of a definite substance, other than a waste material, from a living organism or organ; as, resins from plants, serum from wounds, hormones from glands.

section. A thinly-cut piece of a substance for microscopic study. **histological-** A thin cut of a plant or animal tissue. **metallographic-** A thin cut of an alloy or metal.

sector. The area included between an arc an two radii.

sectrometer. A vacuum tube titrimeter for potentiometric titrations, in which a cathode ray tube replaces the micro-ammeter and the end-point is a sudden permanent change in the shadow angle on a fluorescent screen. Cf. *titrimeter, potentiometer.*

securite. An explosive not ignited by fire-damp and used in mines. It contains ammonium nitrate and oxalate, and di-nitrobenzene.

sedanolid. $C_{12}H_{18}O_2$ = 194.14. The lactone of sedanolic acid, a constituent of celery seeds, *Apium graveolens.*

sedanonic anhydride. $C_{12}H_{18}O_3$ = 210.14. A white powder from celery seeds.

sedatin. Valeridin.

sedatine. Antipyrine.

sedative. An agent that has a calming effect, and counteracts stimulation, irritation or excitement; as, bromides. Antonym: stimulant.

sediment. A deposit of an insoluble material, especially if settled by gravitation. Cf. *precipitate, sedimentation settling.*

sedimentary rock. A rock formed by the accumulation of grains or fragments of rock carried by water or air.

sedimentation. The precipitation or settling of insoluble materials from a suspension, either naturally (by gravity) or artificially (by a centrifuge). **rate of-** See *settling, Stokes' law.* **free s.** S. in which the particles exert no mutual interference. Stokes' law then applies. **hindered s.** The opposite of free s.

sedoheptose. $C_7H_{14}O_7$ = 210.1. A heptoketose from *Sedum* species.

sedormid. The registered trade-mark for allyl-isovalerylurea, a hypnotic.

sedum. The herb of *Sedum acre*, a Crassulaceae, which contains alkaloids, carbohydrates, and a mucilage; used externally for wounds.

Seebeck, Thomas Johann. 1770–1831. A German physicist; discoverer of thermoelectricity and the magnetism of cobalt and nickel.

seed lac. See *lac.*

seeds. The product of fertilized and developed ovules of plants. They are usually rich in proteins, carbohydrates and oils, and are an important source of food; *e.g.*, those of Gramineae (grains) and Leguminosae (peas and beans). Some of the seeds are official, medicinally. (See *fruits.*)

Bitter almond	Nutmeg
Black mustard	Physostigma
Cacao	Staphisagria
Cardamom	Stramonium
Colchicum	Strophanthus
Linseed	Sweet almond
Nux vomica	White mustard

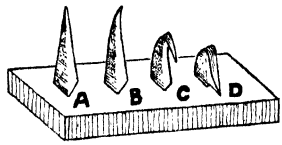
seekay wax. C.K. *wax.*

seepage. (1) The percolation or oozing of a fluid through a porous material; also the fluid which collects as a result of it. (2) The separation of two phases.

Sefström, Nils Gabriel. 1787–1845. A Swedish chemist and mineralogist, noted for the discovery of vanadium.

Seger, Hermann A. 1839–1893. A German technologist noted for ceramic research. **s. cones.** Pyrometric cones. Small pyramids of various clay and salt mixtures; used to indi-

cate the temperature of a furnace. Each cone softens at a definite temperature, ranging form 500°C to 2000°C.



Seger cones.

seggar. Clay boxes in which ceramics are kilned.

segregate. To separate.

Seidlitz powder. An effervescent mixture of potassium sodium tartrate, sodium bicarbonate and tartaric acid; used for making an alkaline mineral water.

Seignette's salt. Potassium sodium tartrate.

seismometer. An instrument for recording shocks (*e.g.*, due to distant earthquakes).

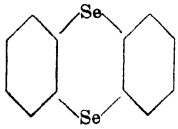
sekisanine. $C_{34}H_{34}O_9N_2$ = 614.3. Dimethylhydroxy-lycorine. A physiologically-inactive alkaloid from the bulbs of *Lycoris radiata*, an Amaryllidaceae; colorless prisms. Cf. *lycorine*.

s. mixte. A natural mixture of NaCl and $MgSO_4.7H_2O$, deposited in the salt lakes of the Volga regions, U.S.S.R.

selacholeic acid. $C_{24}H_{46}O_2$ = 366.3. Nervonic acid, 6.15-tetracosenoic acid*. A fatty acid, $Me(CH_2)_7CH:CH(CH_2)_{13}COOH$, from shark liver oil.

selachyl alcohol. $C_{21}H_{42}O_3$ = 342.3. A liquid glyceryl ether, $C_{18}H_{35}OC_3H_5(OH)_2$, from shark liver oil. Cf. *batyl, chimyl*.

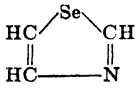
selenanthrene. $C_{12}H_8Se_2$ = 310.4.



Cf. *thianthrene*.

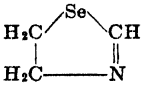
selenate. A salt of selenic acid, M_2SeO_4.

selenazole. C_3H_3NSe = 132.18. The pentatomic ring,

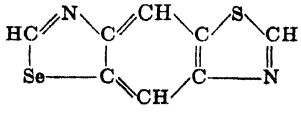


It is known only as its derivatives.

selenazoline. C_3H_5NSe = 134.18. The pentatomic ring compound,



selenazolobenzothiazole. The heterocyclic compound,



selenic. A compound of tetravalent or hexavalent selenium. **s. acid.** $H_2SeO_4[xH_2O]$ = 145.2. An isolog of sulfuric acid. Colorless, hexagonal prisms, d.2.95, m.58, b.260; soluble in water, alcohol or ether. Its salts are the selenates.

selenide. A binary compound of divalent selenium of the type, M_2Se; or an organic compound containing divalent selenium, =Se. **di-** A compound of the type R.Se.Se.R. Cf. *disulfide*. **hydro-** A compound containing the monovalent HSe— radical. Cf. *selenyl*.

seleninic acid*. An organic compound having a $—SeO_2H$ radical; as, $PhSeO_2H$, benzene seleninic acid. Cf. *selenonic acids*.

selenino. The monovalent radical, (HO)OSe—, derived from selenious acid. Cf. *selenono*.

selenious. Selenous. A compound containing divalent or tetravalent selenium; as, $SeCl_2$, SeO_2. **s. acid.** H_2SeO_3 = 129.2. A colorless crystalline powder, d.3.065, decomp. by heat, soluble in water, alcohol or ether. Its salts are the selenites. **s. oxide.** Selenium dioxide.

selenite. (1) A salt of selenious acid of the general type, M_2SeO_3. (2) $CaSO_4.2H_2O$. A native gypsum.

selenium. Se = 78.96, or Se_8 = 631.68. A nonmetal of the sulfur group, and element atomic number 34. It occurs in several modifications: (a) *metallic*. A hexagonal, gray, crystalline powder, d.4.80, m.217, b.690; insluble in water, carbon disulfide, or alcohol, soluble in ether or conc. sulfuric acid. (b) *crystalline*. A dark red, monoclinic, crystalline powder, d.4.47, m.180–200; soluble in carbon disulfide. (c) *amorphous* or liquid (*i.e.*, supercooled): A red amorphous powder obtained by precipitation, $d._{20}$*4.26, m.100, soluble in carbon disulfide. (d) *colloidal*. A red solution, which slowly deposits amorphous selenium. Selenium was discovered in 1817 by Berzelius in the lead chambers of a sulfuric acid plant. It burns with a blue flame and garlic-like odor to its dioxide, SeO_2. It has a valency of 2, 4, and 6, and forms the following series of compounds:

valence number:	−2	0	+4	+6
ion or radical:	Se^{--}	Se	SeO_3^{--}	SeO_4^{--}
name of compounds:	selenides	selenium (element)	selenite	selenates

——Oxidation——→
←——Reduction——

The electrical resistance of metallic selenium decreases with the intensity of illumination, and it is used for s. cells (q.v.) and the optophone (q.v.); also for making red glasses, enamels and glazes, and in insecticides (selocide).

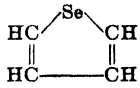
s. bromide. (1) Se_2Br_2 = 318.2. S. monobromide. A dark red liquid, m. −46. (2) $SeBr_2$ = 239.0. S. dibromide. A brown liquid. (3) $SeBr_4$ = 398.8. S. tetrabromide. Orange-red crystals; soluble in carbon disulfide. **s. cell.** An arrangement of metallic s. plates enabling electricity or sound to be transmitted by means of light, or vice versa; the electrical resistance of the cell varies according to its exposure to light of different intensities. Used in telephotography and radiophotography. **s. chloride.** (1) Se_2Cl_2 = 229.4. S. monochloride. Brown crystals. (2) $SeCl_2$ = 150.1. S. dichloride, selenous chloride. A brown oily liquid. (3) $SeCl_4$ = 221.0. S. tetrachloride, selenic chloride. Yellow crystals. **s. dibromide.** See *s. bromide*. **s. dichlo-**

ride. See *s. chloride.* **s. diethyl.** $SeEt_2$ = 137.3. Ethylselenide, $Se(C_2H_5)_2$. A colorless liquid, b.108; insoluble in water, soluble in ether. **s. dimethyl.** $SeMe_2$ = 109.3. Methylselenide, $Se(CH_3)_2$. A colorless liquid, b.58; insoluble in water, soluble in ether. **s. dioxide.** See *s. oxide.* **s. hydride.** Hydrogen selenide. **s. iodide.** (1) Se_2I_2 = 412.2. S. monoiodide. A brown solid, m.65; decomp. by water. (2) SeI_4 = 586.9. S. tetraiodide, selenic iodide. A green solid, m.77, decomp. by water. **s. monobromide.** See *s. bromide.* **s. monochloride.** See *s. chloride.* **s. monoiodide.** See *s. iodide.* **s. nitride.** Se_2N_2 = 186.4. An amorphous yellow solid, explodes at 200°C; insoluble in water, soluble in carbon disulfide. **s. oxide.** SeO_2 = 111.2. S. dioxide, selenious acid anhydride. A colorless, crystalline powder, d.-3.954, sublimes at 260°C, m.390, decomp. by further heat; soluble in water, alcohol, ether, acids or alkalis. **s. oxides.** A group of organic compounds which contain the divalent =SeO radical; as Me_2SeO. **s. oxychloride.** Selenyl chloride. **s. sulfide.** SeS = 111.3. A yellow solid, d.$_0$°3.06, m.118, insoluble in water, soluble in ether or carbon disulfide.

seleno. The divalent atom, =Se. Cf. *sulfo, telluro, keto.* **s. diphenylamine.** Phenoselenazine. **s. furan.** See *selenofuran.* **s. naphthene.** Benzoselenofuran.

selenocyano. The monovalent radical NCSe—.

selenofuran. C_4H_4Se = 131.2. Selenophene. The pentacyclic compound,



A colorless mobile liquid, m. −38, b.109.9; insoluble in water, soluble in acetone or benzene. It resembles thiophen and burns in air with a blue flame, forming selenium.

selenoid. Solenoid. A hollow cylinder, wound with resistance wire and used for producing fields of electric force.

selenole. See *piaselenole, tolupiaselenole.*

selenomercaptan. An organic compound of the type R.SeH.

selenonic acids*. A group of organic compounds which contain the monovalent —SeO_3H radical, analogous to sulfonic acids; as $MeSeO_3H$, methane selenonic acid. Cf. *seleninic acid.*

selenonium. Tetravalent selenium, as in $RSeH_3$. Cf.-*onium.*

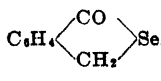
selenono. The monovalent radical, HO_3Se—, derived from selenic acid. Cf. *selenino.*

selenonyl. The divalent radical —SeO_2—. Cf. *sulfuryl.*

selenophene. Selenofuran.

selenophenol. C_6H_6Se = 157.25. PhSeH. A colorless liquid, d.1.487, b.183.

selenophthalide. C_8H_6OSe = 197.2. The heterocyclic compound,



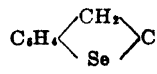
Colorless crystals, m.58; soluble in alcohol.

selenopyronine. Selenoxanthene.

selenotungstate. A salt containing the green =WSe_4 radical; as, $(NH_4)_2WSe_4$. **di-** A salt containing the red =WSe_2O_2 radical; as, $(NH_4)_2WSe_2O_2$.

selenous. Selenious.

selenoxanthene. Selenopyronine. $C_{13}H_{10}Se$ = 245.2.



selenoxanthone. 9-Keto selenoxanthene.

selenurea. $NH_2.CSe.NH_2$. **pseudo-** HSe.C:-$NH.NH_2$.

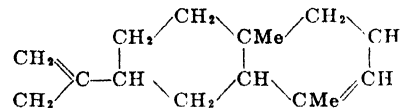
selenuretted. A substance impregnated or combined with hydrogen selenide.

selenyl. (1) The monovalent radical HSe—. (2) The divalent radical, =SeO. **s. chloride.** $SeOCl_2$ = 166.1. Selenium oxychloride. A colorless liquid, m.10, b.180, decomp. by water.

self-inductance. The e.m.f. produced in a circuit by a unit rate of variation of the current passing through it.

self-induction. A change in the magnetic field of a conductor, produced by a variation in the current passing through it.

selinene. $C_{15}H_{24}$ = 204.2. A sesquiterpene from celery seed oil. A colorless liquid, b.$_{16mm}$135, d.0.914; soluble in alcohol.



sellaite. MgF_2. A native magnesium fluoride.

selocide. An insecticide made by dissolving selenium in potassium ammonium sulfide solution equivalent to 30% $(KNH_4S)_5Se$. For sprays it is diluted 100–200 times with soap water.

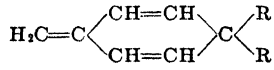
selwynite. Yellow *ocher.*

semecarpus. Marking nut, Oriental cashew nut, acajou nut. The fruit of *S. anacardium,* an East Indian Anacardiaceae. Its acrid juice is used as a black stain.

semen. The fecundating fluid of the male. See ***Florence test.***

semi- A prefix derived from the Latin, indicating "half" = hemi (Greek) = demi (French).

semibenzenes. A group of compounds of the type:



semicarbazide. CH_5ON_3 = 75.1. Hydrazine carboxamide, aminourea, carbamyl hydrazine. An amide and hydrazide of carbonic acid, $NH_2.NH.CO.NH_2$. Colorless, fine prisms, 1 2 3 4 m.96; soluble in water, alcohol, ether or benzene Used as a reagent for aldehydes and ketones, and in organic synthesis. **4-amino-** Carbohydrazide.

s. hydrochloride. $CH_5ON_3.HCl$ = 111.5. Amidourea hydrochloride. Colorless prisms, m.175, soluble in water or alcohol, insoluble in ether; used in organic synthesis, and as reagent for aldehydes and ketones.

semicarbazido. The monovalent group, $NH_2.CO.NH.NH$—.

semicarbazone*. A condensation-product of aldehydes or ketones and semicarbazide, of the general type $R_2C:N.NH.CO.NH_2$; as, $(CH_3)_2C:N.NH.CONH_2$, propane (or acetone) semicarbazone.

semicoke. A fuel made from coal by low temperature carbonization at 1100°F.; it burns smokelessly with very little ash.

semiconductor. A substance which allows the passage of current in one direction only, and therefore, can be used as a rectifier; *e.g.*, cuprous sulfate, galena.

semidines. A group of aromatic amines of the type, $R.C_6H_4.NH.C_6H_4.NH_2$. According to the position of the NH_2-group, they are termed ortho- or para-semidines. **s. rearrangement.** A special type of benzidine re-arrangement (q.v.) in which only one half of the molecule is supposed to rotate; as,

$$R.C_6H_4.NH.NH.C_6H_4.R \rightarrow R.C_6H_4.NH.C_6H_3RNH_2.$$

semi-drying oils. Fatty oils which thicken slowly on exposure to light and air.

semi-metal. An obsolete name for an element (such as arsenic), which is midway in properties between metals and non-metals.

seminase. An enzyme in alfalfa.

seminose. d-Mannose.

semiopal. A native silica.

semipermeable. Permitting the passage of certain molecules, and hindering the passage of others. **s. membrane.** A diaphragm or septum through which certain substances pass, while others are retained; as a cell membrane, parchment, or artificially-treated porous cups. (See *osmosis.*)

semiprecious. A gem or metal used for decorative purposes, which is inferior to the precious grades.

semisilica brick. A fire-brick made from a siliceous clay, or from a mixture of fireclay and ganister, and containing 80–92 % silica.

semisolid. Soft and slowly flowing; as, asphalt.

semivalence. A mono-electronic link between two rigid systems, built up from two octets or two closed electronic systems. It is characteristic of unstable, intermediate, addition compounds formed during certain reactions, and is less stable than the ordinary non-polar bond (bi-electronic link).

Semmler, Friedrich Wilhelm. 1860–1931. A German organic chemist noted for his work on the constitution of essential oils.

senarmontite. A native antimony trioxide, Sb_2O_3.

seneca oil. Petroleum.

senecifolic acid. $C_{10}H_{16}O_6$ = 232.1. The acid product of hydrolysis of senecifoline.

senecifolidine. $C_{18}H_{25}NO_7$ = 367.2. An alkaloid from *Senecio latifolius.* Rhombic plates, m.212.

senecifoline. $C_{18}H_{27}NO_8$ = 385.22. An alkaloid from *Senecio latifolius,* a Compositae of South Africa. Colorless rhombic plates, m.194, soluble in ether or chloroform. **s. hydrochloride.** $C_{18}H_{27}NO_8.HCl$ = 421.68. White crystals, m.260, soluble in water.

senecifolinine. $C_8H_{11}NO_2$ = 153.1. A basic hydrolysis product of senecifoline.

senecine. An amorphous, alkaloid from *Senecio vulgaris.*

senecio. Life root, ragwort squaw-weed. The dried herb of *Senecio aureus;* used as the fluid extract, as a tonic and diuretic. **s. alkaloids.** A group of alkaloids from s.; as, jacobine, necine, retronecine, retrorsine, senecifoline, senecifolidine, senecionine.

senecioic acid. $C_5H_8O_2$ = 100.06. Isopropylidene acetic acid, β-methyl-α-butenoic acid, β-methylcrotonic acid, $Me_2C{=}CH.COOH$. An isomer of tiglic acid.

senecionine. $C_{18}H_{25}NO_6$ = 351.2. An alkaloid from *Senecio vulgaris,* groundsel, a Compositae.

senega. Senega snakeroot. Rattlesnake root. The dried root of *Polygala senega,* a Polygalaceae. It contains senegin and polygalin; used medicinally as the fluid extract.

senegenin. $C_{26}H_{44}O_6$ = 452.4. Senegeninic acid. A dibasic acid hydrolysis product of senegin. A colorless powder, m.272.

senegeninic acid. Senegenin.

senegin. (1) $C_{32}H_{52}O_{17}$ = 708.4. A saponin derived from senega. (2) $C_{20}H_{32}O_7$ = 384.2. A hydrolysis product of (1). Cf. *senegenin.*

seneski. A natural coke resulting from the intrusion of igneous basaltic rock into a coal seam. It contains 20 % ash, and is used to produce water gas.

senna. The dried leaflets of *Cassia acutifolia* (Alexandria s.) or *Cassia angustifolia* (India s.), a leguminous plant. It contains glucosides, acids and resins; used as the fluid extract, as a cathartic. **American-** The leaves of *C. marilandica.* **wild-** See *globularesin.*

sennatin. An active principle from senna leaves.

sensibilizer. (1) An agent that renders an enzyme active. (2) An amboceptor.

sensitive. (1) Responding readily to a test or force. (2) See *anaphylaxis.*

sensitiveness. (1) The degree of accuracy of a test or instrument; the most exacting conditions under which it responds. (2) The speed with which light acts on a photographic plate. (3) The property of explosives to explode by mechanical shock.

sensitization. (1) In biochemistry, the process of rendering a cell sensitive to the action of a complement by treating it with a specific amboceptor. (2) In photography: (a) the coating of a surface with light-sensitive emulsions; as, silver salts; (b) rendering the photographic emulsion more sensitive by the addition of dyes which absorb certain portions of the spectrum. (3) The treatment or impregnation of paper with chemicals in such a way that ink writing cannot be eradicated without producing a telltale stain or mark.

sensitizer. (1) A trace of a substance, other than the catalyst, which promotes a catalytic action. (2) In biology: Amboceptor, opsonin, or tropin. A specific substance which occurs in small quantities in serum, and in larger quantities during immunization. Cf. *Ehrlich side-chain theory.* (3) In photography, an aniline dye that increases the sensitiveness of the emulsion to certain lightwaves. See *photosensitizer.*

separating fluid. A liquid used to separate materials of different density, q.v.

separator. A device or machine for separating materials of different densities by the aid of air or water. It differs from a concentrator in that the latter saves one material and rejects the rest; whereas, the separator saves both materials. (See *centrifuge, electric precipitator accumulator.*)

separatory funnel. A tap-funnel or device for separating two immiscible liquids (see illustration).

sepia. The dried inky juice of a cuttlefish or squid; used as a pigment or dye. Cf. *chromogen.*

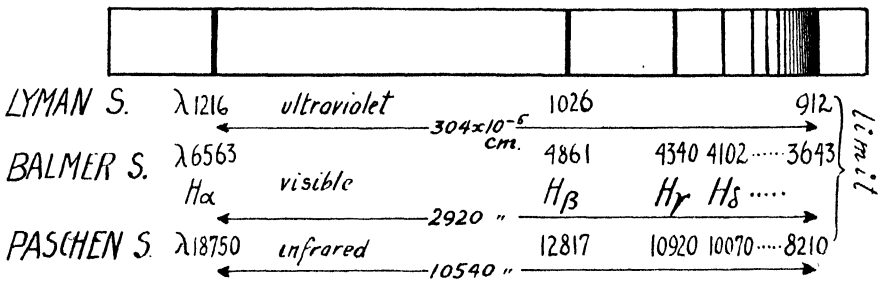
Separatory funnel.

sepiolite. A native hydrated magnesium silicate similar to meerschaum (q.v.).
sepsine. $C_5H_{14}N_2O_2$ = 134.1. A ptomaine from decaying yeast.
sepsis. Poisoning produced by microorganisms or putrefactive substances. Cf. *asepsis.*
septavalent. Septivalent, heptavalent. Possessing a valency of seven; as Cl in perchlorates, Mn in permanganates.
septic. Pertaining to putrefaction.
septicemia. Blood poisoning. A morbid condition caused by the presence of pathogenic bacteria and their waste products in the blood.
septivalent. Septavalent.
septurit. A molecular compound of sulfanilamidine and hexamine. Used to treat infected wounds.
sequiatannic acid. Sequoia tannin.
sequoia tannin. $C_{21}H_{20}O_{10}$ = 432.2. A tannin from the cones of *Sequoia gigantea*, the mammoth tree of California. A red-brown powder, soluble in water or alcohol.
seralbumin. The albumin of the blood.
serendipty. Intelligent curiosity. Ability to make unexpected discoveries.
serenoa. Sabal.
serge blue. Methylene blue.
sericin. $C_{15}H_{25}O_8N_5$ = 323.5. Silk gelatin, silk glue. An amorphous substance obtained from silk, q.v.
sericite. A flaky form of muscovite, causing silicosis.
series. A succession or a group of compounds, objects or numbers, arranged systematically according to a rule. See *progression.* **aliphatic-** See *aliphatic compounds.* **alkane-** See *methane s.* **alkene-** See *ethylene s.* **alkine-** See *acetylene s.* **analogous-** See *analogs.* **aromatic-** See *aromatic compounds.* **Balmer-** The hydrogen lines, H_α, H_β, H_γ . . . , which correspond with an electron transition from the third, fourth, fifth, . . . , orbit to the second orbit. Cf. *hydrogen atom, Bohr theory.* **benzene-** See *benenze series.* **chemical-** See *s. of compounds.* **diffused-** The spectrum lines resulting from a transition from the p state to the d state; they are denoted by 1p-md, where m is the integer denoting the order in the series. **displacement-** q.v. **electrical-** (1) See *electromotive force.* (2) See *s. of cells.* **ethylene-** See *olefines.* **fatty-** See *methane series.* **fuzzy-** The spectrum lines caused by transit from the outermost or f orbit, q.v. **galvanic-** See *galvanic battery.* **geologic-** See *geologic era.* **homologous-** A group of compounds differing from one another by a definite radical or atomic group; as, CH_2. **homotopic-** The elements in a group or family of the periodic system. **isologous-** See *isologous.* **isotopic-** The isotopes of an element. **isomorphous-** See *isomorphism.* **isotropic-** See *isotopes.* **isosteric-** See *isosteres.* **K-** See *K radiations.* **Lyman-** The hydrogen lines in the ultra-violet portion of the spectrum, due to a transition of electrons from the second, third, . . . orbit to the first orbit. Cf. *energy levels.* **methane-** See *methane series.* **Paschen-** The hydrogen lines in the infra-red portion of the spectrum, due to a transition of electrons from the fourth, fifth, . . . orbit to the third orbit. Cf. *energy levels.* **periodic-** See *periodic system.* **principal-** The spectrum lines caused by a transition from the p state to the lowest or s state; it is denoted by 1s-mp, where m indicates a particular line in the series; as 1s-3p; the third line. Some of these lines are produced by a bunsen flame. Cf. *Rydberg's formula, Bohr atom, orbital state, spectrum.* **radioactive-** See *radioactive elements.* **sharp-** The spectrum lines produced by an electronic transition from the p state to the s state; they are denoted by 1p-ms.

s. notation. See *quantum numbers.* **s. of cells.** A galvanic or electric s. in which the electric cells are arranged successively so that the anode of one is connected with the cathode of the other:

$$+ - <> - <> - <> - -.$$

It differs from connection in "parallel." **s. of compounds.** A group of compounds of an element, whose valency is the same throughout. Thus, elements that possess more than one valency form a corresponding number of series of compounds; *e.g.*, iron forms the ferrous and ferric series of salts, sulfur forms the sulfide, sulfite or sulfate series of compounds. **s. of lines.** See *Balmer-, Lyman, Paschen s., quantum theory, atomic structure, Ritz formula.*



Hydrogen spectrum showing series of lines.

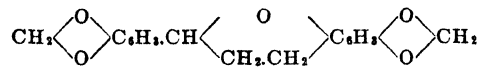
serine. $C_3H_7NO_3$ = 105.1. α-Amino-β-hydroxypropionic acid, hydroxyalanine, $CH_2OH.CHNH_2.COOH$. A colorless crystalline powder from sericin and horn. It is a constituent of many proteins, m.246 (decomp.), insoluble in alcohol or ether.
serogan. The follicle-stimulating sex hormone from pregnancy urine.
serology. The study of immunity reactions in serum; or the action of sera.
seroreaction. A reaction which occurs in a serum as a result of immunization.
serozyme. Thrombogen.
serpentaria. Virginia snakeroot. The dried rhizome and roots of *Aristolochia serpentaria* and other species of the Aristolochiaceae family; used medicinally as a tonic and stimulant.
serpentine. $Mg_3Si_2O_7.2H_2O$. A hydrous magnesium silicate; green massive or lamellar oxides. in rocks. It often contains ferrous masse. Cf *ophiolite.*

serum. [plural: sera.] (1) The clear liquid portion of a body fluid. (2) The clear, amber, alkaline fluid of the blood from which the cellular elements have been removed by clotting. It contains the salts, soluble proteins and carbohydrates; used in biochemical and therapeutic work. (See *immune serum, normal serum, immunity.*) **milk-** Whey.

s. albumin. A protein, molecular weight 45,000, from s. and nephritic urine. **s. globulin.** A protein closely associated with s. albumin.

sesame oil. Benne oil. The oil extracted from the seeds of *Sesamum indicum* and other species, Pedaliaceae, d_{25}°0.917; used as an olive oil substitute. Cf. *bromipin, iodipin, Villavecchia* test.

sesamin. $C_{18}H_{16}O_6$ = 312.0. The aromatic ether:



Colorless crystals, d.1.305, m.122.7, slightly soluble in alcohol. Sesame oil contains 1 % of s.

sesamol. $C_7H_6O_3$ = 138.1. A phenolic hydrolysis-product of sesamolin; it is responsible for the Baudouin color test.

sesamolin. $C_{20}H_{18}O_7$ = 450.1. A substance in sesame oil (0.3 %), m.93.6, which hydrolyzes to sesamol and samin.

sesqui- A prefix derived from the Latin and indicating "one and one-half"; *i.e.*, the proportion of two of one radical or element to three of another.

sesquicarbonate. A compound of carbonic acid and a base in the proportion of three to two, *i.e.*, an acid salt of carbonic acid. **s. of soda.** $NaHCO_3.Na_2CO_3.2H_2O$. Sodium sesquicarbonate. Snowflake crystals. The double salt, used extensively in industry as a neutralizing agent, in the manufacture of soap, glass, paper and cleansers.

sesquichloride. A compound of chlorine and metal in the proportion of three to two; as, Fe_2Cl_3.

sesquioxide. A binary compound of oxygen and a metal in the proportion of three to two; as, Al_2O_3, Fe_2O_3.

sesquisalt. A compound of an acid and base in the proportion of three to two: as, $Fe_2(SO_4)_3$.

sesquisoda. A molecular mixture of $NaHCO_3$ and Na_2CO_3.

sesquiterpenes. A group of terpenes of the general formula, $C_{15}H_{24}$ or $(C_{10}H_{16})_2$; as, cadinene, clovene, santalene.

SESQUITERPENES

$C_{15}H_{24}$	atractylene	gujene
	cadinene	patschoulene
	cannibene	santalene
	caryophyllene	selinene
	cedrene	zingiberene
	clovene	
$C_{15}H_{26}$	elemene	ferrulene

set-off. The transfer of ink from a printed to an unprinted surface by direct contact; it arises from the slow drying of the ink.

setting. The hardening of semi-liquid mixtures on crystallization (as cement or plaster of paris), n condensation (as organi mixtures).

settler. A separator or tank in which insoluble material from a solution is deposited and sinks to the floor.

settling. The precipitation of insoluble materials held in suspension in a liquid, and their gradual accumulation at the bottom of the vessel by gravitation. **hindered-** S. which is prevented by some factor other than specific gravity **rate of-** The velocity of fall of particles in a liquid. If the solid falls so slowly that the liquid flows past it in stream lines, the velocity is expressed by Stokes' law. If the particle is large and causes eddying motion in the liquid, the velocity, v, is expressed by:

$$v = k\frac{\sqrt{D(S-s)}}{s},$$

where D is the diameter of the particle, S and s the specific gravity of solid and liquid, respectively, and k a constant (9.3 for spheres, 9 for irregular particles). Cf. *Stokes' law.*

set-up. The working arrangement of instruments, glass-ware and other implements properly connected and ready for the performance of a chemical experiment or determination.

sewage. The domestic waste from lavatories, kitchens, bathrooms, stables, and industrial plants.

sewerage. A system of pipes for carrying off excreta and waste-materials.

sewer gas. The gases arising from decomposition of sewage.

sexiphenyl. $C_{36}H_{26}$ = 458.2. Hexaphenyl, a hydrocarbon which consists of a chain of six benzene rings, $Ph(C_6H_4)_4Ph$. Colorless crystals, m.475, b.350; insoluble in water.

sexivalent. (1) Having six different valencies. (2) Hexavalent.

sextate. Methyl cyclohexanol acetic ester.

sextol. Cyclohexanol.

seybertite. A complex hydrated native iron, calcium, aluminum silicate.

sfax. A variety of esparto (q.v.) from North Africa, near Sfax.

shale. A fine-grained sedimentary rock, with splintery uneven fractures. Cf. *slate.* **alum-** q.v. **oil-** q.v. **s. naphtha.** A petroleum obtained from shale. **s. oil.** A crude oil obtained from bituminous shales by destructive distillation. Its chief constituent is *kerogen.* Cf. *oil shale, gabianol.* **Esthonian-** Kukersite. **s. spirit.** The lower-boiling fractions obtained on distilling shale oil.

shallu. Durra.

shearing. Side-cutting or a lateral motion; as in grinding. (Differing from a vertical motion, as crushing.)

sheave. A grooved pulley-wheel.

sheep. The herbiverous mammal, *Ovis aries*, providing, meat, wool, leather and endocrine glands. **s. dip.** An antiseptic dipping fluid for sheep. It usually contains arsenic or phenols and cresols. **s. laurel.** Kalmia. **s. sorrel.** The dried herb of *Rumex acetosella;* used medicinally, as the fluid extract, as a refrigerant and diuretic.

sheerness. The combined qualities of transparency, surface gloss and smoothness, as applied to rayon articles.

Sheffield plate. Copper goods plated with a thicker layer of silver than for electroplate. A sheet of silver is laid on a sheet of copper, and both are fused together by heat. The silver-

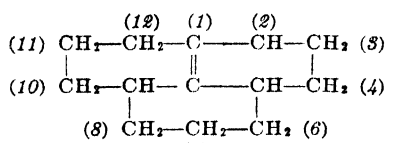
surfaced copper is then rolled out and worked into articles of desired forms. The art was discontinued on the discovery of electroplating in 1837.

shell. (1) A husk of a fruit. (2) The calcareous or siliceous covering of marine invertebrates. (3) A projectile filled with explosives. (4) An area surrounding an atomic nucleus in which electrons are situated. Cf. *Lewis atom, periodic chain.* **s. lime.** A fertilizer obtained by grinding mollusks containing 90 % $CaCO_3$ (or $MgCO_3$). **s. marl.** A fertilizer obtained by grinding natural deposits of shells containing not less than 80 % $CaCO_3$ (or $MgCO_3$).

shellac. The purified resin lac. (q.v.) obtained from various plants by the incisions of an insect, *Laccifer lacca* (*Coccus lacca*). Thin, yellowish-brown leaflets, insoluble in water, soluble in alcohol; used extensively in varnishes, polishing materials, sealing wax, and in pyrotechnics. It contains 30 % aleuritic acid and 35–38 % resin acid mixture. **earth-** Acaroid resin.

shellane. (1) A compressed natural gas, shipped in cylinders as fuel. (2) $C_{13}H_{22}$ = 178.1. The saturated hydrocarbon corresponding with shellene.

shellene. $C_{13}H_{20}$ = 176.1. The hydrocarbon



shellolic acid. $C_{15}H_{20}O_6$ = 296.14. *10*-Hydroxyshellene-*1.12*-dicarboxylic acid. Colorless crystals, m.200, decomp. 203, soluble in hot water or alcohol.

shepherd's purse. The freshly-gathered green herb of *Capsella Bursa-pastoris*. Used medicinally as a stimulant, as the fluid extract.

sherardize. To galvanize articles by covering them with zinc dust and heating in a tightly-closed retort. Cf. *calorizing.*

sherbet. (1) An effervescing drink, sold in powder form, consisting of sugar, sodium bicarbonate, tartaric acid and flavoring materials. (2) A frozen fruit-juice used as a dessert.

Sherman settler. A series of cylindrical tanks which, as they decrease in depth, increase in width. Used for settling out suspended materials from liquids.

shibuol. $C_{14}H_{20}O_9$ = 332.15. A phenol obtained from kaki shibu, the unripe kaki fruit of Japan. Used in water-proofing paper.

shift. (1) A slight change in the wave length of a spectral line caused by: (a) density (cf. *pressure*), (b) mass (cf. *relativity*), (c) motion (cf. *Döppler effect*), (d) absorption (cf. *Compton effect*), (e) reflection (cf. *Raman effect*). (2) A change of workers.

shikimol. Safrole.

shikonin. $C_{16}H_{16}O_5$ = 288.11. A principle from shikon, the dried root of *Lithospermum erythrorhizon*, a Boraginaceae of Japan.

shilajatu. A mineral gum from India.

shipping. The transporting of materials. Many chemicals, especially those of low melting point, spoil in warm weather and must be kept cool, as, $CaCl_2$, menthol, salol, *p*-dichlorobenzene. Others dry out and lose weight; as, crystalline Na_2CO_3, Na_2SO_4, and Na_3PO_4. **s. container.** A vessel for storing or shipping a solid, liquid, or gas. The principal containers are made of:

GLASS—sealed tubes, vials, ampoules, bottles, carboys.

METAL—lead-tubes, tins, metal cans, canisters, drums, barrels, steel cylinders, tank cars, lead carboys.

WOOD—boxes, kegs, barrels.

PAPER—paper bags, cartons, cardboard boxes, cardboard cylinders.

CERAMICS—earthen jugs, stone jars.

TEXTILES—burlap bags, burlap sacks.

PARAFFIN—bottles.

HARD RUBBER—bottles, cylinders.

s. rules. The regulations governing the transport of dangerous chemicals. See *hazard, labels.*

shirlacrol. A solution of phenolic tars and sodium hydroxide, used as a wetting agent in the textile industry.

shirlan. A mildew-preventive for textiles, 30 times as powerful as zinc chloride, but harmless to the cloth and to humans. It was evolved at the Shirley Institute, q.v.

shirlastain. A stain evolved by the Shirley Institute (q.v.) for distinguishing various textile fabrics. *E.g.*, cotton, blue; jute, brown; ramie, lavender; acetate rayon, green; wool, yellow; silk, orange.

Shirley Institute. The headquarters of the British Cotton Industry Research Association, near Manchester.

shock. (1) A violent collision between bodies; or the concussion it occasions. (2) The effect of an electric discharge on the animal body.

shoddy. Wool waste.

shogaol. $C_{17}H_{24}O_3$ = 276.19. 4-Hydroxy-3-methoxy-phenylethyl-heptenyl ketone. The pungent principle of ginger, resembling zingerone in having OH, OMe and CO groups. A colorless liquid, d.1.04, b.$_{15mm}$235; soluble in water or alcohol.

Shore hardness. The height of rebound of a diamond-pointed hammer falling under gravity on an object. It is measured on an empirical scale, with a high-carbon steel taken as 100.

short circuit. An electric current which passes directly between leads or wires which touch at a point between the source of current and its destination.

shorthand. See *structure symbols.*

shortite. $Na_2CO_3.2CaCO_3$. A pyroelectric crystalline mineral from Wyoming.

shotgun pattern. The irregular points on a diagram which, instead of coinciding with a theoretical curve, are unevenly distributed.

shoyu. The aromatic principle of fermented koji. It contains phenolic compounds, and is used as flavoring agent.

shunt. An alterable resistance connected in parallel with a galvanometer or other circuit, and used to control the current passing through it by diverting or "shunting."

Si. The symbol for silicon.

sial. [Contraction of Si and Al]. A hypothetical solid or semi-solid rock substance on which the land masses of the earth are assumed to be supported. Cf. *sima.*

sialagogue. An agent that increases the flow of saliva.

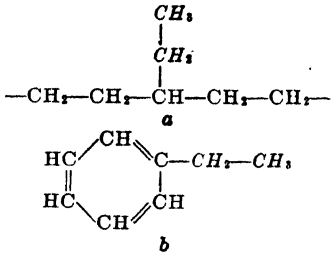
siaresinolic acid. $C_{30}H_{46}O_4$ = 470.4. A resin acid, $C_8H_7.C_{26}H_{39}O_2.COOH$, from Siamese benzoin gum, m.260, soluble in alcohol.

sibucao. Sappan wood.

sibucara. The bark of an unknown tree of Venezuela.

siccative. Drier. A solution of lead-manganese or zinc salts of resin acids. It is added to varnish or paints to quicken their drying.

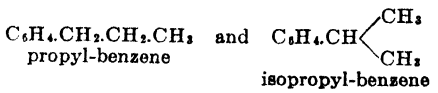
side-chain. A group of two or more similar atoms, generally carbon atoms, that branch off from a ring of atoms or a longer chain of atoms:



a

b

For type *a* the term, "branched chain," is preferable, restricting "side-chain" to type, *b*. Cf. *chain, Ehrlich's theory, protoplasm.* **s. isomery.** The isomery of a set of molecules that differ in structure by reason of a different arrangement of the atoms in the sidechain; as,



$C_6H_4.CH_2.CH_2.CH_3$ propyl-benzene and $C_6H_4.CH(CH_3)_2$ isopropyl-benzene

s. substitution. A reaction in which substitution takes place in the side-chain of the molecule. **s. theory.** See *Ehrlich's theory.*

side-cut. A distillate obtained by fractional distillation.

side reaction. Simultaneous but subsidiary reaction.

siderazote. Fe_6N_2. A volcanic incrustation.

sidereal. Pertaining to the fixed stars. Cf. *solar, lunar.* **s. day.** (86164.1 seconds) q.v. **s. year.** (365 d., 6 hrs. 9 min. 9 sec.) q.v.

siderite. (1) $FeCO_3$. Clay iron stone, chalybite, spathic iron ore, a native iron carbonate. (2) An iron meteorite. A body of metallic iron with Ni, Co, etc., which has fallen to earth from outer space.

siderocyte. A blood cell containing iron.

siderography. (1) The study of the natural surface condition of siderites. (2) The etching of steel and iron, and its microscopic study.

siderolite. Mesoderite. A meteorite consisting of spongy meteoric iron, with embedded grains of silicate minerals, such as chrysolite.

siderology. Siderurgy.

sideroplesite. A form of bruennerite.

siderosis. Damage to lungs due to exposure to dusts containing iron or steel.

siderostat. An instrument to transmit a beam of light along the optical axis of a fixed horizontal telescope.

siderotilate. $FeSO_4.5H_2O$. A native ferrous sulfate.

siderurgy. Siderology. A branch of science that deals with the metallurgy of iron.

sidonal. Piperazine quinate.

Sidgwick, Nevil Vincent. 1873– . An English physical chemist, noted for his electronic theory of valency.

Sidot's blende. An artificially-prepared zinc sulfide, which contains traces of copper; used in fluorescent screens for x-rays or radioactive rays.

Siegbahn, Karl Manne Georg. A Swedish physicist, noted for his work on crystal structure. **S. notation.** See *quantum numbers.*

Siemens, Carl Friedrich von. 1872– . A German industrialist. **S., Karl Wilhelm.** 1823–1883. A German chemist, and inventor of the S. process, q.v. **S. furnace.** A reverbatory furnace, heated by gas. **S.-Halske process.** A method for recovering copper by dissolving copper sulfides in a solution of ferrous sulfate and sulfuric acid, and obtaining the metallic copper by electrolysis. **S.-Martin process.** A method for producing steel in a reverbatory furnace by adding scrap iron to iron ores. **S. ozonizer.** Two concentric glass tubes, the outer covered and the inner lined with tin foil, which act as electrodes for a silent discharge passed through the stream of oxygen flowing between them. **S. process.** A method for making wrought iron directly from iron ores. **S. producer.** A furnace used in the manufacture of producer gas.

sienna. A brownish-yellow clay used as a permanent pigment. It contains hydrated ferric oxide and manganic oxide. **burnt s.** A burnt form of sienna, which is richer and brighter in color than s.

sieve. An apparatus with square apertures, used to separate particles according to size. Cf. *screen* (round holes).

sigma. A letter of the Greek alphabet. σ. The one-thousandth part of a second. **S. reaction.** Σ test. The Wassermann test for syphilis.

Sikes' hydrometer. See *hydrometer.*

sikimin. $C_{10}H_{16}$ = 136.1. A terpene in the leaves of *Illicium religiosum*, the sikimi plant of Japan, a Magnoliaceae. Cf. *staranise.*

silage. A fodder made of finely-cut green plants packed tightly in tanks (silos) and fermented.

silanes. Silicans, q.v., silicohydrides, hydrosilicons. A group of compounds similar to hydrocarbons in which tetravalent silicon replaces the carbon atom; as,

SiH_4—monosilane, silicomethane
Si_2H_6—disilane, silicoethane
Si_3H_8—trisilane, silicopropane
Si_4H_{10}—tetrasilane, silicobutane

Silanes are very reactive, ignite in air, and form derivatives; as, $SiHCl_3$, trichlorosilane or silicochloroform.

silanol. Silicol.

silbamin. Silver fluoride.

Silesia explosive. A high explosive consisting of 75 % $KClO_3$ and 25 % nitrated resin.

silex. A heat-and-shock-resistant glass containing 98 % quartz. **liquid-** Waterglass.

silfos. An alloy, m.625–705, of 80 % Cu, 15 % Ag and 3 % P; used for brazing alloys containing copper.

silica. SiO_2 = 60.1. Silicon dioxide, silicic acid anhydride. It occurs abundantly in nature (12 % of all rocks), and exists in 7 crystalline forms:

Stable		Transition °C
below 870°C..	quartz	573° $\alpha \rightleftharpoons \beta$
below 1470°C..	tridymite	117° 163° $\alpha \rightleftharpoons \beta_1 \rightleftharpoons \beta_2$
above 1470°C..	cristobalite	200–273° $\alpha \rightleftharpoons \beta$
	1200°	
also: quartz ⟷ cristobalite		

The many silica minerals may be grouped into: (1) Phenocrystalline or vitreous minerals (see *quartz*). (2) Cryptocrystalline and amorphous minerals (see *chalcedony*). (3) Amorphous and colloidal minerals (see *opal*). **amorphous-** A colorless powder, d.2.30, m.1650; insoluble in water or alcohol, soluble in hot alkalis or hydrofluoric acid; used for chemical glassware. **colloidal-** See *silicic acid*. **crystalline-** Colorless hexagonal, transparent prisms, $d_{.16°}$2.660 m.-1760, insoluble in water, alcohol, alkalis or acids, soluble in hydrofluoric acid. Used in optical instruments, and for chemical glassware as a platinum substitute. The main crystalline forms (quartz, tridymite and cristobalite) have definite transition points, (870°C. and 1470°C., respectively).

s. brick. A fire-brick containing over 92 % s.; its crystalline phase is cristobalite and tridymite. **s. gel.** A gelatinous form of silica which, if activated, absorbs water; used to dry blast-furnace gases, air, and other gases. **s. minerals.** A group of rock-forming minerals:

quartz, tridymite.... SiO_2

Feldspar group

orthoclase..... $KAlSi_3O_8$
albite..... $NaAlSi_3O_8$—Ab
anorthite..... $CaAl_2Si_2O_8$—An

The composition of other rocks is indicated by the proportion of Ab and An; as,

oligoclase..... Ab_3An_1 to Ab_3An_1
andesine..... Ab_2An_1 to Ab_1An_1
labradorite..... Ab_1An_1 to Ab_1An_2
bytownite..... Ab_1An_2 to Ab_1An_6

Leucite group

leucite..... $KAlSi_2O_6$
analcite..... $NaAlSi_2O_6$

Nephelite group

nephelite..... $NaAlSiO_4$
kaliophylite..... $KAlSiO_4$
eucryptite..... $LiAlSiO_4$

Cancrinite-sodalite group

cancrinite..... $Al_3Na_4HCSi_3O_{15}$
sodalite..... $Al_3Na_4ClSi_3O_{12}$
hauynite..... $Al_3Na_3CaSSi_3O_{16}$
noselite..... $Al_3Na_2SSi_3O_{16}$

Pyroxene group

enstatite..... $MgSiO_3$
hypersthene..... $FeSiO_3$
wollastonite..... $CaSiO_3$
diopside..... $CaMgSi_2O_6$
hedenbergite..... $CaFeSi_2O_6$
acmite..... $NaFeSi_2O_6$
jadeite..... $NaAlSi_2O_6$
spodumene..... $(Li, Na)_2\ AlSi_2O_6$

Amphibole group

anthophyllite..... $(Mg, Fe)SiO_3$
tremolite..... $CaMg_3Si_4O_{12}$
glaucophane..... $NaAlSi_2O_6.FeSiO_3$

Olivine group

forstérite..... Mg_2SiO_4
fayalite..... Fe_2SiO_4
monticellite..... $MgCaSiO_4$
glaucochroite..... $CaMnSiO_4$

Mica group

muscovite..... $Al_3KH_2Si_3O_{12}$
paragonite..... $Al_3NaH_2Si_3O_{12}$
lepidolite..... $AlR_3F_2Si_3O_8(Li,K)$
biotite..... $Al_3Mg_3KHSi_3O_{12}$
phlogopite..... $AlMg_3KH_2Si_3O_{12}$
choritoid..... $Al_2FeH_2SiO_7$

Chlorite group

A number of minerals of the type, $Al_2(MgOH)_4(SiO_4)_3$ and $Al(MgOH)_6H_3(SiO_4)_3$.

Melilite group

melilite..... $(Al,Fe)_2(Ca,Mg)_3Si_2O_{10}$
gehlenite..... $Al_2Ca_2Si_2O_{10}$
akermanite..... $Ca_4Si_3O_{10}$
sarcolite..... $Al_2(Na_2Ca)_3Si_3O_{12}$

Garnet group

grossularite..... $Ca_3Al_2Si_3O_{12}$
pyrope..... $Mg_3Al_2Si_3O_{12}$
almandite..... $Fe_3Al_2Si_3O_{12}$
spessartite..... $Mn_3Al_2Si_3O_{12}$
garnet..... $Ca_3Fe_2Si_3O_{12}$
uvarovite..... $Ca_3Cr_2Si_3O_{12}$
lagoriolite..... $Na_6Al_2Si_3O_{12}$

Scapolite group

melonite..... $Ca_4Al_6Si_6O_{25}$
marialite..... $Na_4Al_3Si_9O_{24}Cl$

Iolite group

iolite..... $H_2(Fe,Mg)_4Al_8Si_{10}O_{36}$

Zoisite group

zoisite..... $HCa_2Al_3Si_3O_{13}$
epidote..... $HCa_2(Al,Fe)_3Si_3O_{13}$
piedmontite..... $HCa_2(Al,Mn)_3Si_3O_{13}$

Topaz group

topaz..... $Al_2SiO_4F_2$

Andalusite group

andalusite..... Al_2SiO_5
sillimanite..... Al_2SiO_5
kyanite..... Al_2SiO_5

Tourmaline group

A group of borosilicates of aluminum and other bases of the average type, $Al_7M_3Si_6B_3O_{31}$. M is lithium or sodium, and sometimes potassium, in the alkali-tourmalines; magnesium, in the magnesium tourmalines; iron, in iron tourmalines.

Zeolite group

heulandite..... $CaAl_2Si_6O_{16}.5H_2O$
stilbite..... $(Na_2,Ca)Al_2Si_6O_6.6H_2O$
laumontite..... $CaAl_2Si_4O_{12}.4H_2O$
chabazite..... $CaAl_2Si_4O_{12}6H_2O$

Miscellaneous group

beryl..... $Al_2Be_3Si_6O_{12}$
serpentine..... $H_4Mg_3Si_2O_9$
talc..... $H_2Mg_3Si_4O_{12}$

silicam. $Si_2N_3H_2$ = 100.2. A white powder obtained by heating silicon imide, $Si(NH)_2$. Insoluble in water, and forms silicon nitride, Si_2N_4, when further heated.

silicane. (1) A silane; that is, a compound of the type Si_xH_y. (2) An organic compound of the type SiR_4, where R is a hydrocarbon radical. (3) SiH_4 = 32.08. Monosilane, silicomethane, silicohydride. A colorless gas, m.--185, b.—112. **bromo-** SiH_3Br = 111.0. A colorless gas, $d_{-80°}$.1.72, m.94, b.1.8. **chloro-** SiH_3Cl = 66.54. A colorless gas, $d_{-112°}$.1.145, m.—118, b.—30.4. **di-** Si_2H_6 = 62.16. Silicoethane, a gas, m.—132. **dibromo-** SiH_2Br_2 = 189.91. A colorless liquid, d.2.17, m.—70.1, b.66. **dichloro-** SiH_2Cl_2 = 100.99. A colorless gas, $d_{-112°}$.1.42, m.—122, b.8.3. **dimethyl-** SiH_2Me_2 = 60.12. Dimethylmonosilane. Colorless gas, $d_{-80°}$.0.68, m.—150, b.—20. **ether-** $(SiH_3)_2O$ = 78.17. Disilaneoxide. A colorless gas, $d_{-80°}$.0.881, m.—143.5, b.15.2. **ethoxytriethyl-** Et_3SiOEt = 160.22. Triethylsilane ethyloxide triethylsilicol ethylether. Colorless liquid, d.0.8403, b.153, insoluble in water. **hydroxy-** Silicol. **methyl-** $MeSiH_3$ = 46.11. Methylmonosilane. Colorless gas, $d_{-87°}$.0.62,

m. −156.5, b. −56.8. **tetra-** Si_4H_{10} = 122.31. Silicobutane. A gas, m. −93.5. **tetrabromo-** Silicon bromide. **tetrachloro-** Silicon chloride. **tetraethyl-** $Si(C_2H_5)_4$ = 144.25. Silicon tetraethyl, siliconononane, $SiEt_4$. A colorless liquid, d.0.7682, b.153. **tetrafluoro-** Silicon fluoride. **tetraiodo-** Silicon iodide. **tetramethyl-** $SiCH_4$ = 144.22. Silicon tetramethyl, $SiMe_4$. Colorless liquid, d.0.645, b.27. **tetraphenyl-** $Si(C_6H_5)_4$ = 336.24. Silicon tetraphenyl, tetraphenylsilicon, $SiPh_4$. Colorless crystals, m.-233. **tri-** Si_3H_8 = 92.24. Silicopropane. A gas, m. −117. **tribromo-** $SiHBr_3$ = 268.82. Silicobromoform. A colorless liquid, d.2.7, m. −80, b.109. **trichloro-** Silicochloroform. **trichloroethyl-** $Si(C_2H_5)Cl_3$ = 163.47. A colorless liquid, d.1.239. **trichlorophenyl-** $Si(C_6H_5)Cl_3$ = 211.47. A colorless liquid, d.1.326, b.197, decomp. in water. **triethyl-** $(C_2H_5)_3SiH$ = 116.18. Triethylsilicon, silicoheptane, $Si-Et_3H$. Colorless liquid, d.0.751, b.107, insoluble in water. **trifluoro-** $SiHF_3$ = 86.07 Silicofluoroform. A colorless gas, m. −110, b. −80.2. **triiodo-** SiI_3H = 409.83. Silicoiodoform. A red liquid, d.3.314, m.8, b.220.

silicate. A salt derived from silica or the silicic acids. They form, by far, the largest group of minerals (see *silica*), and are derived from the two types: M_4SiO_4—*ortho*silicate; M_2SiO_3—*meta*silicate, which may combine to form a number of *poly*silicates. With the exception of the alkali silicates, they are insoluble in water (see *silica minerals*). **s. cement.** See *dental* cement. **s. of soda.** Sodium silicate.

siliceous. Containing quartz or silica. **s. algae.** See *algae*. **s. deposit.** S. sinter. The solid accumulation of silica deposited from hot mineral springs or geysers. Cf. *geyserite, fluorite*. **s. sinter.** S. deposit.

silicic. (1) Containing silica or silicon. (2) Containing silicic acid. **s. acid.** H_4SiO_4 = 96.3. Ortho-silicic acid. Colorless, amorphous powder, d.1.576; slightly soluble in water. **di-** $H_2Si_2O_5$ or $H_6Si_2O_7$. A white insoluble powder. **meta-** H_2SiO_3 = 78.1. A white powder, d.1.813; insoluble in water, soluble in alkalis. **tri-** $H_4Si_3O_8$ = 216.3. A white insoluble powder.

SILICIC ACIDS

$\%H_2O$	$\%SiO_2$	
	↑	$H_2Si_4O_9$ = $4SiO_2.H_2O$, tetra-
		$H_2Si_2O_5$ = $2SiO_2.H_2O$, meta-di-
		$H_4Si_3O_8$ = $3SiO_2.2H_2O$, meta-tri-
		H_2SiO_3 = $SiO_2.H_2O$, meta-
		$H_8Si_3O_{10}$ = $3SiO_2.4H_2O$, ortho-tri-
		$H_6Si_2O_7$ = $2SiO_2.3H_2O$, ortho-di-
↓		H_4SiO_4 = $SiO_2.2H_2O$,,ortho-

silicide. A binary compound of tetravalent silicon and a metal; as, M_2Si, where M is Fe, Ni, Co, Cr, Mn, Cu, or Mg.

silicification. The gradual replacement of rocks or fossils by silica (petrifaction).

silicified. Describing an organic material (*e.g.*, wood) that has been converted into silica (petrified).

silicium. Silicon.

silico- A prefix indicating silicon, generally in organic compounds. **s. acetic acid.** $Me-SiOOH$ = 76.1. An insoluble solid. **s. benzoic acid.** $PhSiOOH$ = 138.1. A solid, m.-92; insoluble in water, soluble in alcohol or ether. **s. bromoform.** $SiHBr_3$ = 268.9. A heavy, colorless liquid, d.2.7, b.116; decomp. by water. **s. butane.** See *silanes*. **s. calcium.** A product of the electric furnace used to deoxidize steel. **s. chloroform.** $SiHCl_3$ = 135.36. A colorless liquid, d.1.34, m. −1.3, b.34; decomp. by water. **s. decitungstic acid.** $H_8SiW_{12}O_{36}$ or $SiO_2.10WO_3.4H_2O$. A white powder used as a reagent, as it forms insoluble cesium salts. **s. ethane.** Disilane (see *silanes*). **s. fluorides.** Fluosilicate. **s. fluoric acid.** Fluosilicic acid. **s. formic acid.** See *leucone*. **s. heptane.** Et_3SiH = 116.1. Triethylsilane. A colorless liquid, d.0.751, b.107. **s. hydrides.** Silanes. **s. iodoform.** $SiHI_3$ = 409.9. A colorless heavy liquid, d.3.4, b.220; decomp. by water. **s. methane.** Silane. **s. oxalic acid.** $Si_2O_4H_2$ = 122.2. $HOOSi.SiOOH$. A white, unstable solid. **s. tungstic acid.** S. decitungstic acid.

silicol. Hydroxysilan. A compound of the type R_3SiOH; as, **triethyl-** Et_3SiOH = 132.18. Silicoheptyl alcohol. A colorless liquid, d.-0.8709, b.154, insoluble in water.

silicon. Si = 28.06. Silicium. A non-metallic element of the carbon group, atomic number 14. It occurs in several allotropic modifications: (1) *amorphous* s. A brown powder, d.2.35. (2) *crystalline* s. A grayish-black crystalline powder, d.2.49, m.1500; insoluble in water, soluble in alkalis. (3) *graphitoidal* s. A dense crystalline form, or graphite-like masses deposited from molten silicon. (4) *adamantine* s. Needle-shaped crystals of silicon of extreme hardness. The principal valency of s. is four, and like carbon, it forms many complex compounds that are an essential part of the earth surface (rocks). See *silica minerals*. **ethyl-** The radical ≡SiEt, cf. *silicane*. **methyl-** The radical ≡SiMe. **radio-** The isotope of mass 27. Cf. *radioelements*.

s. alkyls. (1) A group of hydrogen compounds of silicon corresponding with the hydrocarbons; as, SiH_4, Si_2H_6 etc. See *silane*. (2) An organic compound of Si and alkyl radicals; as, $SiMe_4$, $SiEt_4$ etc. See *silicanes*. **s. alloys.** A group of non-corrosive alloys of silicon with metals; as, duriron, ironac, narki, silumin, and tantiron. Cf. *s. copper, s. steel, s. zirconium*. **s. borides.** The hard compounds SiB_3 and SiB_6. **s. bronze.** A noncorrosive alloy of silicon, copper, and tin. **s. bromides:** (1) $SiBr_4$ = 347.9. S. tetrabromide. A colorless fuming liquid, d.2.813, m. −12, b.154; decomp. by water to silicic acid and hydrobromic acid. (2) Si_2Br_6 = 535.7. S. tribromide. A colorless solid, b.240, decomp. by water. **s. carbide.** SiC = 40.1. Colorless rhombohedric plates, d.3.12; dissociates at 2250°C., but has no melting point. Cf. *carborundum, silundum, crystolon*. **s. chlorides:** (1) $SiCl_4$ = 170.0. S. tetrachloride. A colorless fuming liquid, d.1.524, m. −87, b.57.6; decomp. by water to silicic and hydrochloric acid. Used in electrotechnics, and mixed with ammonia vapors, in the production of smoke screens. (2) Si_2Cl_6 = 269.0. S. trichloride. A white solid, d_0°.1.58, m. −1, b.146, decomp. by water. (3) Si_3Cl_8 = 367.8. S. octachloride. A white powder. **s. copper.** An alloy of 20–30 % Si and 70–80 % Cu, used in metallurgy. **s. dioxide.** Silica. **s. disulfide.** SiS_2 = 92.2. White needles, which sublime when heated, decomp. by water. **s. ethane.** See *silanes*. **s. ethyl.** Tetra-

ethyl silicane (see *silicane*). **s. fluorides:** (1) SiF_4 = 104.3. S. tetrafluoride. A colorless, suffocating gas, $d._{(air=1)}$3.57, m. −77 (at 2 atm.), $b._{81\,0mm.}$ −65, decomp. by water to fluosilicic acid, soluble in alcohol or ether. (2) Si_2F_6 = 170.6. S. subfluoride. A white powder. **s. hydrides.** See *silanes*. **s. iodides:** (1) SiI_4 = 535.8. S. tetraiodide. A colorless solid, m.121, b.290; insoluble in water. (2) Si_2I_6 = 817.7. S. subiodide. A colorless solid, m.250 (in vacuo); decomp. by water. **s. iron.** Ferrosilicon. An iron that contains from 2 to 15 % silicon; used in metallurgy. **s. magnesium.** Mg_2Si = 76.7. Magnesium silicide. Gray leaflets of metallic luster, decomp. by water to silanes. **s. methane.** Silane. **s. methyl.** $SiMe_4$ = 88.3. A colorless liquid, b.26. **s. nitride.** Si_3N_4 = 140.2. A gray or white amorphous powder; insoluble in water. **s. octachloride.** See *s. chlorides*. **s. oxide.** Silica. **s. oxychlorides:** The liquids Si_2OCl_6 (b.137); $Si_4O_4Cl_8$ (b.200); $Si_4O_3Cl_{10}$ (b.153); $Si_8O_{10}Cl_{12}$ (b.300); $Si_2O_3Cl_2$ (b.400); and the solid $Si_4O_7Cl_2$ (m.400). **s. steel.** A steel that contains 2–3 % Si. It is hard, brittle, and difficult to work. **s. sulfide.** S. disulfide. **s. tetrabromide.** See *s. bromides*. **s. tetrachloride.** See *s. chlorides*. **s. tetrafluoride.** See *s. fluorides*. **s. tetraiodide.** See *s. iodides*. **s. tetraphenyl.** Tetraphenyl silicon. **s. tungstic acid.** Silico decitungstic acid. **s. zirconium.** An alloy used to purify molten steel.

silicone. $H_3Si_3O_2$ = 119.2. A yellow solid.

siliconic acid. A compound of the type R.SiOOH, analogous to organic acids. Cf. *carbylic acid*.

siliconize. To combine or mix with silicon or silica.

silicono. The monovalent radical, (HO)OSi—, derived from metasilicic acid.

silicotungstate. A salt of silicotungstic acid, especially with the alkaloids.

silicotungstic acid. $4H_2SiO_3.12WO_3.22H_2O$. $SiO_2.12WO_3.26H_2O$. Colorless or slightly yellow crystals, soluble in water or alcohol; used for the qualitative and quantitative analysis of alkaloids.

silicyl. (1) The monovalent radical H_3Si—, derived from silane. (2) The divalent radical, =SiO, derived from silicic acid. **di-** The divalent radical $=Si_2O_5$. **s. oxide.** A compound of the type $(R_3Si)_2O$; as, ***hexaethyl-*** $(Et_3Si)_2O$ = 246.35. A colorless liquid, d.0.859, b.231.

silicylene. The divalent radical, H_2Si=, from silane.

silk. (1) Fibroin, sericin. The fibrous material with which the silkworm envelops itself before passing into the chrysalis state (cocoon). It consists of fibroin (the fiber protein) and sericin (the gummy protein). The former yields on hydrolysis:

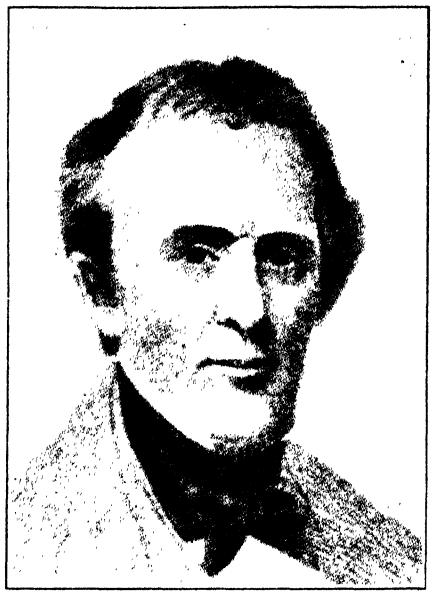
alanine	23.8 %
glycine	19.7 %
tyrosine	9.8 %
aspartic acid	2.9 %
proline	1.9 %
glutamic acid	1.7 %
leucine	1.6 %
phenylalanine	1.2 %
serine	1.0 %

(2) A sieve used for grading flour. No. 5 s. = 0.270, No. 8 s. = 0.190 mm. aperture. **artificial-** Rayon. **vegetable-** (1) The floss from the seeds of *Calotropis gigantea*, an Asclepiadaceae of Asia. (2) Kapok.

silkwarp. Organzine.

silkweed. Milkweed. The dried roots of *Asclepias syriaca*. Used medicinally, as the fluid extract, as a diuretic and tonic.

silky. Having the luster of silk.



Benjamin Silliman (The Elder).

Silliman, Benjamin. (1) 1779–1864. An American chemist and geologist, who founded the American Journal of Science and Arts. (2) 1816–1885. His son. An American inorganic chemist noted for his textbooks.

sillimanite. Al_2SiO_5. (1) A rhombic aluminum silicate, used for porcelain of superior quality, m.1820. Above 1545°C. it forms mullite and siliceous glass. See *cyanite*. (2) Fibrolite. **s. ware.** Laboratory utensils (dishes, crucibles, tubes, etc.) made of s. which have remarkable strength against mechanical and thermal shock.

Sillman bronze. An alloy of 86 % copper, 10 % aluminum and 4 % iron.

silo. (1) A tank or channel for conveying solid material in small pieces (such as coal), on the large scale. (2) A pit or chamber in which fodder is fermented. See *silage*.

siloxicon. Si_2OC_2. A refractory material obtained by heating quartz, carbon and sawdust in the electric oven. Cf. *fibrox*.

silumin. A non-corrosive alloy of silicon and aluminum, sometimes containing 4–5 % copper.

silundum. Silicon carbide.

silvan. Sylvan.

silver. Ag = 107.880. A metal of the gold family and element, atomic number 47. A white lustrous metal of regular crystalline structure, d.10.5, m.961, b.2570, soluble in nitric acid or hot conc. sulfuric acid, insoluble in hydrochloric acid, water, or cold sulfuric acid. Silver forms only one series of compounds and has a valency of one. It is used as metal in jewelry, coins and instruments; and in the manufacture of silver salts for photography and pharmacy. The World output in 1941 was

275,000,000 ounces troy, coming from Mexico (about half) > U. S. A. > Canada > Peru > Australia > Japan. **antimonial-** Dyscrasite. **black-** Stephanite. **blue-** Niello. **coinage-** See *s. alloys*. **colloidal-** Collargol. **fulminating-** S. nitride. **German-** q.v. **horn-** Argentum cornu. **liquid-** Mercury. **moss-** A native s. in moss-like form. **niello-** q.v. **nickel-** German s. **quick-** Mercury. **ruby-** Proustite. **Russian-** Mello.

s. acetate. $AgC_2H_3O_2$ = 166.9. Colorless crystals, d.3.259, decomp. by heat, soluble in water, or alcohol; used medicinally in ophthalmia. **s. acetylide.** Ag_2C_2 = 239.88. s. carbide. An explosive white powder. **s. alloys.** A mixture of silver with some other metal, principally:

coinage silver.
U. S.—Ag 90, Cu 10 %.
British—Ag 50, Cu 40, Ni 5, Zn 5 %.
jewelry silver.
ordinary—Ag 80, Cu 20 %.
hall-marked—Ag 92.5, other metals usually Cu and/or Cd 7.5 %.

The melting points of silver alloys are:

with	90 % Ag 10 %	80 % Ag 20 %	70 % Ag 30 %	60 % Ag 40 %	50 % Ag 50 %
Al	750°C	650°C	570°C	575°C	580°C
Au	982°C	1006°C	1025°C	1039°C	1040°C
Cd	940°C	895°C	850°C	805°C	760°C
Cu	875°C	814°C	788°C	830°C	870°C
Pb	905°C	840°C	775°C	705°C	650°C
Sb	850°C	680°C	545°C	505°C	500°C
Sn	870°C	750°C	630°C	550°C	495°C
Zn	850°C	755°C	705°C	690°C	660°C

s. amalgam. $AgHg_2$ = 509.1. A silvery, uneven, brittle solid. **s. ammonium chloride.** $AgCl.NH_4Cl$ = 196.9. Colorless cubes, soluble in ammonium hydroxide; used medicinally. **s. ammonium nitrate solution.** A test solution made by dissolving one gram of silver nitrate in 20 cc. of water and adding ammonia until the precipitate has just dissolved. It is then filtered, kept in amber bottles, and used for silvering, or the production of a silver mirror on heating with certain organic reducing agents. **s. antimonide.** S. stibide. **s. arsenate.** Ag_3AsO_4 = 462.6. A dark-red powder, d.6.66, insoluble in water and soluble in alcohol or alkalis. **s. arsenide.** Ag_3As = 398.4. A velvet-black precipitate, readily decomp. when dried. **s. arsenite.** Ag_3AsO_3 = 446.60. A yellow powder, insoluble in water; used medicinally as an antiseptic in skin diseases. **s. arsphenamine.** A compound of silver and salvarsan, used medicinally. **s. atoxylate.** $NH_2C_6H_4AsO.AgO.OH$ = 323.8. Argatoxyl, silver-p-aminophenylarsenate; used medicinally as a bactericide. **s. azide.** AgN_3 = 149.91. A curdy, white explosive powder (cf. *s. nitride*). **s. benzamide.** See *benzamide*. **s. benzoate.** $AgC_7H_5O_2$ = 228.8. A colorless powder; soluble in hot water, slightly soluble in alcohol. **s. bichromate.** S. dichromate. **s. borate.** $Ag_2B_4O_7$ = 371.0. An unstable white powder, soluble in ammonium hydroxide or cyanide solutions. **s. bromate.** $AgBrO_3$ = 235.8. Colorless tetragonal crystals, d.5.206, decomp. by heat; soluble in hot water, slightly soluble in alcohol. **s. bromide.** AgBr = 187.80. Native as bromyrite and embolite. A yellow powder or pale yellow regular crystals, d.6.473, m.427, decomp. 700; insoluble in water, alcohol or ether, soluble in cyanide, bromide, or thiosulfate solution. Used in photography as a light-sensitive coating on plates, films, and papers. **s. carbide.** S. acetylide. **s. carbonate.** Ag_2CO_3 = 275.8. A heavy yellow powder, d.6.0, decomp. 200; insoluble in water, soluble in cyanide or hydroxylamine solutions. **s. caseinate.** Argonin. **s. chlorate.** $AgClO_3$ = 191.3. Colorless, regular or tetragonal crystals d.4.21, m.230, decomp. 270; soluble in water or alcohol, insoluble in ether. **s. chloride.** AgCl = 143.34. Lunar cornea. Native as horn-silver, cerargyrite, embolite. Colorless regular crystals or white powder, d.5.553, m.455; insoluble in water or alcohol, soluble in ammonium hydroxide, cyanide or thiosulfate solutions. Used as an antiseptic and nerve sedative; in the manufacture of pure silver, and silver salts; for silver plating; and in photography and photometry. **s. chlorite.** $AgClO_2$ = 175.3. A yellow powder; slightly soluble in water. **s. chromate.** Ag_2CrO_4 = 331.8. Dark-red crystals, d.5.623; insoluble in water, soluble in ammonium hydroxide. **s. cinnamate.** $AgC_9H_7O_2$ = 254.8. Silver cinnamylate. A heavy white powder, slightly soluble in water or alcohol; used medicinally as an antiseptic. **s. cinnamylate.** S. cinnamate. **s. citrate.** $Ag_3C_6H_5O_7$ = 512.4. Itrol. An odorless, heavy, white powder, insoluble in water or alcohol; used medicinally as a non-irritant dusting-powder for wounds. **s. colloidal.** Collargol, argentum colloidale. An allotropic form of metallic silver, with a small percentage of albumin; black scales giving a fairly stable colloidal suspension with water. **s. cyanate.** AgCNO = 149.9. A colorless powder, d.4.0, decomp. by heat; slightly soluble in water, soluble in ether or nitric acid. **s. cyanide.** AgCN = 133.90. A white crystalline powder, d.3.99, decomp. by heat; insoluble in water or alcohol, soluble in cyanide, thiosulfate or ammonium salt solutions. Used medicinally as an antipyretic and sedative. **s. dichromate.** $Ag_2Cr_2O_7$ = 431.76. Purple, triclinic crystals d.4.67, decomp. by heat or alcohol, slightly soluble in water. **s. dithionate.** $Ag_2S_2O_6$ = 375.90. **s. eosolate.** The silver salt of trisulfoacetylguaiacol, $C_6H_5O—CH_2O—C_2H_3O.Ag_2(SO_3)_3$; used medicinally as an antiseptic. **s. ferricyanide.** $Ag_3Fe(CN)_6$ = 535.5. An orange-red crystalline powder; slightly soluble in water, soluble in ammonium hydroxide. **s. ferrocyanide.** $Ag_4Fe(CN)_6.H_2O$ = 661.4. A yellow crystalline powder, insoluble in water or alcohol, soluble in cyanide solutions. **s. fluoride.** AgF,H_2O = 144.90. Tachiol. Silbamin. Yellow or colorless, tetragonal, deliquescent crystals, soluble in water, d.5.852, m.435; used medicinally as a strong antiseptic, and to sterilize water. **s. fluosilicate.** (1) Ag_2SiF_6 = 249.94. A white powder. (2) $Ag_2SiF_6.4H_2O$ = 366.94. Globular granules, slightly soluble in water. **s. fulminate.** $Ag_2C_2N_2O_2$ = 299.8. Colorless, small needles which explode when

heated; slightly soluble in water, alcohol or ether. Used in the manufacture of detonators. **s. gelatose.** Albargin. **s. glance.** S. glanz. Argentite. **s. hypochlorite.** AgClO = 159.34. An unstable bleaching agent. **s. hyponitrite.** $Ag_2N_2O_2$ = 275.78. A yellow powder. **s. hypophosphate.** See *s. phosphates.* **s. iodate.** $AgIO_3$ = 282.80. Colorless monoclinic crystals, d.5.4, decomp. by heat; insoluble in water, slightly soluble in alcohol or ether. Used medicinally as an astringent and antiseptic. **s. iodide.** AgI = 234.8. Native as iodyrite. A yellow hexagonal crystalline powder, d.5.674, m.536, insoluble in water, soluble in cyanide, iodide or thiosulfate solutions; used in photography, and medicinally as an alterative. **s. lactate.** $AgC_3H_5O_3.H_2O$ = 214.8. Actol. Colorless crystalline needles or granular masses, soluble in water; used medicinally as an antiseptic and astringent. **s. laurate.** $AgC_{12}H_{23}O_2$ = 307.06. Colorless powder, m.212.5. **s. leaf.** Stillingia. **s. luster.** The appearance of an untarnished metallic s. surface. **s. methylene blue.** A compound of silver and methylene blue. A blue powder, soluble in water; used medicinally as a germicide and internal antiseptic. **s. myristate.** $AgC_{14}H_{27}O_2$ = 335.09. White powder, m.211, insoluble in water. **s. nitrate.** $AgNO_3$ = 169.9. Colorless hexagonal or rhombic crystals, d.4.352, m.209, decomp. by further heat, soluble in water, alcohol, or ether. Used as a reagent for detecting and determining halogens, aldehydes, chromic acid, arsenous oxide, hydrogen-peroxide, and many other compounds; also used medicinally as an antiseptic, in the manufacture of silver salts, for silver plating, in photography, for permanent laundry-proof markings, and for dyeing hair and fur. *fused-* Lunar caustic, molded silver nitrate. White hard sticks, used as an external antiseptic. **s. nitrate paper.** A filter paper impregnated with a solution of silver nitrate and dried in the dark. Used as a sensitive test paper for arsenic (yellow color), phosphorus (black color), chromates (red color) and uric acid (brown color). **s. nitride.** Ag_3N = 337.4. Fulminating s. A gray, explosive substance; insoluble in water, soluble in ammonium hydroxide. Cf. *s. azide.* **s. nitrite.** $AgNO_2$ = 153.9. A colorless crystalline powder, d.4.453, decomp. 150, slightly soluble in water, ammonia or alcohol. Used as a reagent in standardizing permanganate solutions, in determining nitrites and differentiating primary, secondary, and tertiary alcohols. **s. nucleinate.** Nargol. A compound of nucleic acids and silver. A light powder, used medicinally. **s. ores.** Silver is found in nature associated with copper and gold minerals and occurs generally in binary compounds, as:

native silver	Ag
argentite, acantite	Ag_2S
chilenite	Ag_2Bi
animikite	Ag_3Sb
dyscrasite	Ag_2Sb
huntilite	Ag_2As
naumannite	Ag_2Se
aguilarite	Ag_4SSe
hessite	Ag_2Te
smithite	$AgAsS_2$
proustite	Ag_3AsS_3
miargyrite	$AgSbS_2$
matildite	$AgBiS_2$
cucairite	AgCuSe
stromeyerite	AgCuS
sternbergite	$AgFe_2S_3$
cerargyrite	AgCl
bromyrite	AgBr
iodyrite	AgI
argentiferous lead	AgPbS

See also *embolite, hornsilver, polyargyrite.* **s. oxalate.** $Ag_2C_2O_4$ = 303.8. A white crystalline powder, d.5.029, detonating when heated; insoluble in water, soluble in nitric acid or ammonium hydroxide. **s. oxide.** Ag_2O = 231.8. A heavy, brownish-black powder, d.7.521, decomp. 330, insoluble in water and soluble in nitric acid; used medicinally as an antiseptic and tonic. **s. oxyquinoline sulfonate.** Argentol. **s. palmitate.** $AgC_{16}H_{31}O_2$ = 363.12. A white powder, m.209, insoluble in water. **s. perchlorate.** $AgClO_4$ = 207.3. A white crystalline powder, m.486, soluble in water or alcohol. **s. period.** A group of heavy metals of the fourth sub-period in the periodic system, Ru, Rh, Pd, Ag, Cd, and In. **s. permanganate.** $AgMnO_4$ = 225.8. Dark violet monoclinic crystals, decomp. by heat, slightly soluble in water or alcohol; used as an antiseptic. **s. peroxides.** (1) Ag_2O_2 = 247.76. A black insoluble solid, d.7.44, decomp. 110. (2) Ag_2O_4 = 279.76. An unstable solid. **s. phenolsulfonate.** $C_6H_4(OH)SO_3Ag$ = 280.9. S. sulfophenylate, s. sulfocarbolate. A colorless crystalline powder, soluble in water; used in ophthalmology and as a surgical antiseptic. **s. phosphates:** (1) Ag_3PO_4 = 418.7. S. orthophosphate. A yellow powder, d.7.32, m.849, insoluble in water, soluble in ammonium hydroxide; used in photography. (2) $Ag_4P_2O_7$ = 605.60. S. pyro-phosphate. A white insoluble solid, $d_{7.5°}$.5.31, m.585. (3) Ag_2PO_3 = 294.76. s. hypophosphate. **s. phosphide.** AgP_2 = 169.88. A dark-colored powder. **s. picrate.** $C_6H_2O(NO_2)_3Ag.H_2O$ = 353.9. Picratol, s. trinitrophenylate. Yellow crystals, soluble in water; used medicinally as an antiseptic. **s. plate.** Any metal utensil, vessel or ware plated or covered with metallic silver. (See *Sheffield plate,* cf. *electroplate.*) **s. plating.** The process of electrolytically depositing a film of s. on some other metal. **s. potassium cyanide.** $KAg(CN)_2$ = 199.0. Potassium argentocyanide. A colorless octahedral crystalline powder, soluble in water or alcohol; used medicinally as a strong bactericidal antiseptic, and in silvering and silver plating. **s. quinaseptol.** Argentol. **s. salicylate.** $C_6H_4(OH)COOAg$ = 244.9. White or reddish crystals, soluble in water or alcohol; used as an antiseptic. **s. salt.** Sodium anthraquinone-β-sulfonate, used as an aid in stripping dyed rags by reducing agents. **s. selenide.** Ag_2Se = 187.0. A dark gray powder; insoluble in water. **s. silicofluoride.** Ag_2SiF_6 = 357.9. Isotachiol. A colorless powder slightly soluble in water; used for sterilizing drinking water. **s. silvinate.** S. sylvate. **s. sodium chloride.** $NaAgCl_2$ = 201.8. Colorless crystals, decomp. by water. **s. sodium cyanide.** Sodium argentocyanide. **s. sodium thiosulfate.** $Na_4Ag_2(S_2O_3)_3$ = 643.6. White crystals, soluble in water; used technically. **s. solder.** An alloy of 40, 50, or 60 % Ag with Cu, Zn and Cd (British Standard Specification). **s. stearate.** $AgC_{18}H_{35}O_2$ = 391.15. A white powder, m.205, soluble in

water. s. stibide. Ag_3Sb = 443.6. S. antimonide. Rhombic black crystals, insoluble in water or dilute acids, soluble in boiling nitric acid. **s. sulfate.** Ag_2SO_4 = 311.82. Colorless triclinic or rhombic crystals, d.5.40, m.651, decomp. 925, slightly soluble in water, soluble in alcohol or nitric acid; used as a reagent and in electroplating. **s. sulfides:** (1) Ag_2S = 247.83. Native as argentite and acanthite. Gray or black regular crystals or powder, d.7.08, m.676; insoluble in water, soluble in concentrated nitric acid. Used in the manufacture of pigments for ceramics. (2) Ag_2S_2 = 279.88. A black solid. **s. sulfite.** Ag_2SO_3 = 295.8. Colorless crystals decomp. 100; slightly soluble in water or alcohol. **s. sulfocarbolate.** S. phenolsulfonate. **s. sulfocyanide.** S. thiocyanate. **s. sulfoichthyolate.** Ichthargan. **s. sulfophenylate.** S. phenolsulfonate. **s. sylvate.** $AgC_{20}H_{29}O_2$ = 408.8. S. silvinate. A brown crystalline powder; insoluble in water or alcohol. **s. tartrate.** $Ag_2C_4H_4O_6$ = 363.6. A white crystalline powder, d.3.432, slightly soluble in water. **s. telluride.** Ag_2Te = 343.1. Native as hessite. A black powder, insoluble in water. **s. thiocyanate.** AgCNS = 166.0. A white powder, insoluble in water, soluble in cyanide or ammonia solutions, decomp. by heat. **s. thiosulfate.** $Ag_2S_2O_3$ = 327.90. A white solid, soluble in water, decomp. by heat. **s. tree.** Arbor Dianae. **s. trinitrophenolate.** S. picrate. **s. vanadate.** Ag_3VO_4 and $Ag_4V_2O_7$. A solid, m.385, used as catalyst. **s. vitellin.** Argyrol.

silvering. Coating or covering with metallic silver, either produced chemically (*e.g.*, by reduction of silver salts), or deposited electrolytically.

silverweed. Wild tansy. The herb of *Potentilla anserina*, a Rosaceae, used as an astringent and tonic.

silvestrene. $C_{10}H_{16}$ = 136.1. Sylvestrene. A terpene from European turpentine. A colorless liquid, d.0.863, b.177.

silvinate. Sylvate.

sima. A liquid or semi-liquid rock substance on which the less dense sial (q.v.) floats. The word is a contraction of *silica* and *magnesium magma*.

simaruba. Bitter damson. The dried root bark of *Simaruba amara* or *S. officinalis*, a Simarubaceae of tropical America. It contains quassin and is used medicinally as an astringent.

Simarubaceae. A group of tropical shrubs and trees.

Brucea sumatrana	kosam seeds
Picrasma excelsa	Jamaica quassia
Quassia amara	Surinam quassia
Simaruba officinalis	simaruba bark
Simaruba cedron	cedron seeds
Ailanthus glandulosa	Chinese sumac
Picramnaea antidroma	cascara amarga
Castela Nicholsoni	amargosa bark

Cf. *picramnine*, *picrasmine*.

simmer. To boil gently.

Simon's test. A test for primary and secondary amines. Acetaldehyde and sodium nitroprusside added together, give a red and blue color, respectively.

simple. Not complex (as s. spectrum); not mixed (as. s. ether); not double (as, s. salt).

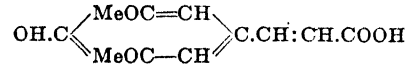
simultaneous reaction. (1) A side-reaction or secondary reaction. (2) A reaction which occurs at the same time and in the same reacting system as the principal reaction; or one of two reactions which occur at the same time and in the same reacting system. See *reaction*.

sinactine. $C_{20}H_{21}NO_4$ = 339.0. *l*-Tetrahydro-*epi*-berberine. A diisoquinoline alkaloid from *Sinomenium acutum*.

sinalbin. $C_{30}H_{44}O_{16}N_2S_2$ = 722.27. A glucoside obtained from the seeds of *Brassica* (*Sinapis*) *alba*, white mustard seed, a Cruciferae. Colorless crystalline powder, hydrolyzed to sinapine, p-oxybenzylmustard oil and glucose.

sinamine. $C_4H_6N_2$ = 82.1. Allylcyanamide. An amine derived from black mustard seed. **thio-** Allylsulfocarbimide.

sinapic acid. $C_{11}H_{12}O_5$ = 224.1. An unsaturated oxyacid derived from sinapine.



sinapine. $C_{16}H_{25}O_6N$ = 327.3. An alkaloid derived from sinalbin, the glucoside of white mustard. It is hydrolysed to sinapic acid and choline.

sinapis alba. White *mustard*. **s. nigra.** Black *mustard*.

sinapolin. $C_{21}H_{24}O_4N_3$ = 382.3. Diallylurea, $C_{14}H_{12}O_2N_2.C_7H_{12}O_2N$. A compound isolated from mustard oil.

sine. The ratio of the length of the side opposite an angle of a right-angled triangle to that of the hypotenuse gives the sine of the angle. Cf. *cosine*.

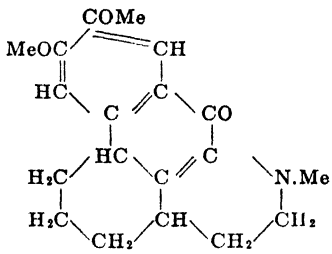
singular solution. A solution that has a maximum or minimum point on its vapor-pressure curve.

sinigrin. Potassium myronate.

sinistrin. $C_6H_{10}O_5$ = 162.1. A levorotatory carbohydrate from squill.

sinkaline. Choline.

sinomenine. $C_{19}H_{23}O_4N$ = 329.3. An isoquinoline alkaloid from the roots and stems of *Sinomenium acutum*, a Menispermaceae. Colorless needles, m.182, soluble in benzene or alkalis.



sinter. (1) The incrustations formed around mineral springs by salt deposits. (2) To vitrify by heating, as in sintering. **calcareous-** Tufa, travertine or onyx. **iron-** An amorphous form of scorodite. **pearl-** A modification of silica. **siliceous-** Geyserite. (3) Fluorite.

sintering. The coalescence of crystalline or amorphous particles into one solid mass through heating, due to the formation of allotropic crystals. Cf. *fritted*.

siomine. $(CH_2)_6N_4I_4$ = 633.6. Hexamethyleneamine tetraiodide. A colorless powder, insoluble in water or alcohol; used medicinally.

sipalin. A mixture of the cyclohexyl and methylcyclohexyl esters of adipic acid, used as plasticizers in nitrocellulose lacquers.

siphon. A ∩ shaped pipe or tube with one leg longer than the other. The short leg takes up

liquid and delivers it, by atmospheric pressure, into a receptacle on a lower level.

sipylite. A native columbate of erbium and other rare earth metals.

sirup. Syrup.

sisal. Sisal hemp. A fiber from the leaves of *Agave sisalana*, a century plant of Mexico and the West Indies; used in making rope, twine and sacking. Cf. *henequen*.

sitostane. $C_{27}H_{46}$ = 370.4. An isomer of cholane, q.v.

sitosterol. $C_{27}H_{45}OH$ = 386.4. An alcohol from wheat, corn, bran and calabar beans; an isomer of cholesterol. Cf. *cholane*. β- $C_{29}H_{48}O$ = 412.4. *22*-Dihydrostigmasterol. **dihydro-** $C_{27}H_{48}O.H_2O$ = 406.37. An alcohol, m.140–141, from corn, wheat, etc. A colorless mass, m.140; insoluble in water.

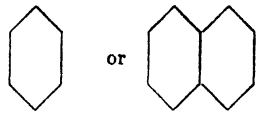
six hundred six. (606). Salvarsan.

sizing. The dressing and preparation of textiles for printing. **tub-** See *tub*. **s. materials.** In textile and paper industries: starch, dextrin, gums, gelatin, rosin, tragacanth, albumin, casein, or other substances used to prevent water or ink absorption due to capillary attraction.

skatole. C_9H_9N = 131.1. Methylindole. Colorless leaflets with a strong fecal odor, m.95, b.265, insoluble in water, soluble in alcohol; formed as a decomposition-product of proteins.

skatoxyl. The monovalent radical, C_9H_8ON, derived from skatole.

skeleton symbol. An abbreviated structural formula, in which the ring compounds are usually represented as:



(see *structure symbols, ring systems*).

skelgas. Pentane.

skiagenol. A vegetable oil containing 20 % iodine; used as a radiopaque oil in radiography.

skiagram. Radiograph.

skiagraph. (1) A photograph made by x-rays. (2) Scotograph.

skiameter. A device for measuring the intensity of x-rays preparatory to a photographic exposure.

skimmianine. $C_{32}H_{29}O_9N_3$ = 599.3. An alkaloid from the Japanese plant, *Skimmia japonica*, a Rutaceae.

skimming. Removing the dross from molten metal, or the foam and floating substances from liquids in general.

skin varnish. A preparation for covering skin wounds; as, collodion.

skiver. A sheepskin, split, and tanned with sumach. Cf. *roan*.

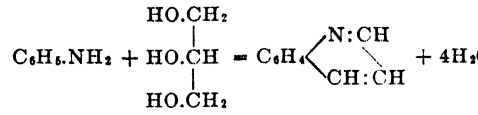
sklero- See *sclero*.

skleron. An aluminum alloy which contains lithium, copper, zinc, and manganese.

sklodowskite. A radioactive mineral, MgO, $2UO_3.2SiO_2.7H_2O$, from the Belgian Congo. Named in honor of Mme. Curie (née Sklodowska).

skotography. Scotography.

Skraup, Zdenko Hans. 1850–1910. A Polish chemist, noted for organic synthesis. **S. synthesis.** Quinoline synthesis. A ring-formation obtained by heating an aromatic amine with a free ortho-position (as aniline) with glylerin and concentrated sulfuric acid in the presence of an aromatic nitro-body (as nitrobenzene); yield, 75 %:



skullcap. Scutellaria.

skunk. The mammal *Mephitis mephitis;* it has an offensively odorous secretion. **s. bush.** Feverbush. The leaves of *Garrya Fremontii*, a Cornaceae of California, used as a tonic; it contains garryine. **s. cabbage.** The dried rhizomes of *Symplocarpus foetidus*, an Araceae; used medicinally, as the fluid extract, as a stimulant and antispasmodic.

skutterudite. $CoAs_3$. A native cobalt arsenide.

slack. (1) Slake. To quench with water. (2) Lumpy and damp, as soft coal or lime when exposed to air and water. (3) Loose. (4) Slow.

slacken. The mixing of ores with slag to prevent fusion of the non-metallic portions.

slag. The vitreous mass which separates from fused metals during the melting of ores. **basic s.** Thomas s. A slag composed of calcium phosphate and free lime, produced in the manufacture of steel by the basic hearth process, and a valuable fertilizer. **Thomas s.** Basic s. **s. wool.** A fibrous packing material made by pouring molten slag into a pan with steam injection.

slake. To slack or loosen.

slaked lime. Calcium hydroxide.

slat. A thin, flat piece of slate, stone or glass.

slate. A dense, fine-textured rock whose separate mineral constituents are indistinguishable to the unaided eye. It has parallel cleavage planes and breaks into thin plates. Cf. *shale*. **polishing-** A gray or yellow shale, used for polishing.

slide. A plane glass plate; as, **lantern-** of size 80 × 100 mm. (3¼ × 4″) for projection, and **microscope-** of size 25 × 75 mm. (1 × 3″) for observation.

slide rule. A ruler with a medial slide, both scales of which are graduated logarithmically and numbered. As the addition of two logarithms equals the product of their two antilogarithms, so in the slide rule the addition of two lengths gives the desired result of multiplication; while the subtraction of one length from the other is equivalent to division. **chemical-** A slide rule that is labelled with common chemical factors. It is used for the rapid calculation of analytical results.

slime. A fine powder held in suspension; as, the ore mud of ore crushers. **s. molds.** Myxomycetes.

slip. (1) A fluid suspension of clay, fluxing material and water, used to coat ceramics before final heating; *e.g.*, ZnO and clay, which gives a glaze.

sludge. A soft mud; as, the refuse from a coal washing plant or the sediments obtained in the purification of city sewage. **activated-** S. produced by bubbling air through sewage, thus promoting growth of aerobic bacteria. Filtered and dried this forms a useful fertiliser. N 4 to 6 %; P_2O_5 2.5 to 4 %. **Imhoff-** S. produced by the action of anaerobic bacteria; it is

a low-grade fertilizer: N 1.5 to 2.5 %; P_2O_5 1 %. **s. acid.** The tarry substance from the bottom of oil refining-tanks; it consists of the impurities from the oil mixed with the strong sulfuric acid used as refining agent. **s. acid phosphate.** A superphosphate manufactured with petroleum sludge acid. It has a characteristic odor.

slug. The mass which acquires an acceleration of 1 foot/sec.^{2} under the free weight of 1 pound. **metric-** That mass which acquires an acceleration of 1 meter/sec.^{2} under a free weight of 1 kilogram.

sluice. A long, inclined flume or trough for washing gold-bearing earth and gravel in a stream of water. **s. box.** A wooden box or trough in which the heavier gold accumulates during the washing of auriferous gravel.

sluicing. The washing of auriferous earth by a stream of water rushing through long boxes provided with riffles, or other gold-retaining devices.

slum. The insoluble oxidation-products deposited from lubricating oil. They are eliminated by extraction of the oil with suitable solvents.

Sm. The symbol for samarium (see also *Sa*).

smalt. A blue glass or pigment of cobalt, potash and silica.

smaltine. Smaltite.

smaltite. $CoAs_2$. Cobalt pyrites. Smaltine. A native cobalt diarsenide. Cf. *bismuthosmaltite, speiss cobalt.*

smaragd. A green variety of beryl, used as a gem.

smart weed. Waterpepper.

smectic. Pertaining to liquid crystals of the soap-like type, having disc-shaped molecules. Cf. *nematic.*

smell. See *odors.*

smelt. (1) To obtain metals from their ores by a process which includes fusion. In general it includes (a) calcination and roasting to remove sulfur and other volatile constituents; (b) reduction or smelting proper in which the metals are fused and separated from gangue; (c) refining, during which the metals are purified. (2) The material obtained in stage (b).

smelter, smeltery. An establishment or plant where ores are converted into metals.

smilacin. (1) $C_{18}H_{30}O_6 = 342.3$. Salseparin, pariglin. A glucoside from sarsaparilla. (2) $C_{28}H_{42}O_3 = 402.3$. A solid, decomp. 160.

Smilax. A genus of climbing plants which includes sarsaparilla and chinaroot (Liliaceae).

Smith, Edgar Fahs. 1854–1929. An American chemist, noted for his writings and educational methods.

smithite. $AgAsS_2$. A silver sulfide.

Smithson, James. 1765–1829. An English chemist and mineralogist, noted for his bequest which led to the foundation of the Smithsonian Institution.

Smithsonian Institution. A government establishment in Washington, D. C., created by Act of Congress in 1846 according to the terms of the will of James Smithson "to increase and diffuse knowledge among men." It consists of the
Smithsonian Library
Bureau of the International Catalogue
United States National Museum
National Gallery of Art
Bureau of American Ethnology
National Zoological Park
Astrophysical Observatory

smithsonite. $ZnCO_3$. Calamine. A native white or yellow carbonate of zinc.

smoke. The material escaping or expelled from a burning substance. It usually consists of a dispersed system of solid carbon in air. **s. stone.** Smoky quartz. **s. screen.** A smoke or fog produced by chemical reactions, which serves to screen vessels or objects from observation. During World War I vapors of silicon tetrachloride and ammonia, also oleum or concentrated sulfuric acid injected into smoke stacks, were used.

smokeless powder. An explosive which consists mainly of nitrocellulose.

smokes. A colloidal system which consists of a solid phase suspended in a gaseous phase. It is also termed, sogasoid, from so(lid) gas(eous).

smoky quartz. A smoky, gray or brown colored variety of quartz. **s. topaz.** Smoky quartz used for jewelry.

Sn. The symbol for tin (stannum).

snake. One of a large class of reptiles. **s. head.** Balmony, turtle bloom. The leaves of *Chelone glabra*, a Scrophulariaceae, used as anthelmintic, tonic and detergent. Cf. *chelonin.* **s. lily.** Iris. **s. poison.** S. venom. **s. root.** Snakeroot. **s. venom.** The proteins secreted by certain s., which cause hemolysis of the blood. **s. weed.** Bistort.

snakeroot. black- Cimifuga. **Canada-** Asarum. **Seneca-** Senega. **Texas-, Virginia-** Serpentaria.

snow. A crystalline, finely-divided form of water. **carbon dioxide-** Frozen carbon dioxide obtained by rapid evaporation of liquid carbon dioxide. It has a temperature of −110°C., and is sometimes mixed with ether; used (as "dry ice") in refrigeration. **nitrous oxide-** The snow formed by the rapid evaporation of liquid nitrous oxide.

soap. A salt of one or more of the higher fatty acids with an alkali or metal. Soaps may exist in two micro-crystalline forms, viz. hexagonal plates and curd fibres, and in three types of solution, viz. isotropic solutions (including lyes and nigre), and neat and middle soaps, the two latter being conic, anisotropic "liquid crystal" forms. **Castile-** A soap made from sodium carbonate and olive oil. **essence of-** An alcoholic soap solution, used in pharmacy. **hard-** An ordinary soap, made with soda. They give a poor lather. **marine-** Salt water-. **metallic-** The salts of heavy metals with oleic, stearic, palmitic, erucic, and lauric acids. Used in the paint, varnish and textile industries as siccatives and dryers (Pb, Co, Mn); for waterproofing leather; decolorizing varnish (Zn, Fe, Ni, Co, Cr); waterproofing explosives and textiles (Al, Mg); and as fungicides and sprays (Cu, Hg). **middle-** A phase sometimes formed in soap boiling at concentrations intermediate between those of neat soap and isotropic solutions. A conic, anisotropic solution, plastic but inelastic, and darker in color (due to impurities) than neat soap. **neat-** The upper layer in the soap pan or kettle. It is an anisotropic (liquid crystal) solution containing about 63 % fatty acid for sodium, and 40 % fatty acid for potassium, soaps. **potash-** A soft soap made with potassium hydroxide. **salt water-** S. containing caproic, caprylic, capric and myristic acids, which are not readily precipitated by Ca^{++} and Mg^{++} ions; made from coconut oil. **soda-** A hard soap made with sodium hydroxide. **soft-** Soap made with potash. They give a good lather. **toilet-** An ordinary soap containing 70 % or more of fatty and resin acids.

transparent- S. made transparent by adding methyl alcohol. **white curd-** S. made from tallow.

s. bark. Quillaia. **s. root.** Saponaria. **s. tree.** Quillaia. **s. wort.** Saponaria.

soapstone. Talc.

Sobrero, Ascanio. 1812–1888. An Italian chemist and discoverer of nitroglycerin (1847). Cf. *Nobel.*

to magnesium with emission of β^-rays (electrons). It can also be produced by neutron bombardment of Na, Mg and Al:

$$_{11}Na^{23} + {}_0n^1 \rightarrow {}_{11}Na^{24}$$
$$_{12}Mg^{24} + {}_0n^1 \rightarrow {}_{11}Na^{24} + {}_1H^1$$
$$_{13}Al^{27} + {}_0n^1 \rightarrow {}_{11}Na^{24} + {}_2He^4$$

Used as a synthetic radioactive element in medical research.

PHYSICAL PROPERTIES OF SODIUM

m.97.6°C; b.880°C.

$d_0°$.0.9721; $d._{97.6(s)}$0.9519; $d._{97.6(l)}$0.9219; $d._{880°(l)}$0.7414.

Surface tension: 293.6 dyne/cm. (against CO_2 at 97.6°C).

Electric conductivity: at 0°C. 19.84 × 10^4 mho; at 75°C. 17.1 × 10^4 mho.

Thermal conductivity: 0.305 cal./cm./cm.²/sec. at −100°C; 0.335 at 0°C; 0.270 at 75°C.

Specific heat: (solid) 0.2930 at 0°C., 0.3266 at 97.6°C.; (liquid) 0.334 at 97.6°C., 0.3369 at 100°C.

Heat of vaporization: 1100 cal./gm. at 880°C.

Heat of fusion: 27.21 cal./gm. at 97.6°C.

Critical temperature: 2000°C. Critical pressure: 343 atm.

sobrerol. Pinol hydrate.

sobrerone. Pinol.

soda. Sodium carbonate. **baking-** Sodium bicarbonate. **caustic-** Sodium hydroxide (solution). **chlorinated-** Sodium hypochlorite. Sal-sodium carbonate. **sesqui-** A molecular mixture of $NaHCO_3$ and Na_2CO_3. **washing-** Sodium carbonate.

s. alum. A double salt of aluminum and sodium sulfates. **s. ash.** A commercial anhydrous sodium carbonate (99 % Na_2CO_3). Used in the manufacture of glass, soap, paper, chemicals, paints, drugs, leather, enamel ware, cleansers, in metallurgy, dyeing, refining oils, the textile industry, and many other chemical processes. **s. feldspar.** Albite. **s. lime.** See *sodium hydroxide with lime.* **s. nitre.** Native sodium nitrate. **s. process.** (1) A method of manufacturing sodium carbonate. (See *Le Blanc, Solvay processes.*) (2) See *soda pulp.* **s. pulp.** Wood fibers obtained by digesting chipped wood with sodium hydroxide under 100 pounds per sq. in. pressure; used in the manufacture of paper. **s. water.** A beverage made by injecting CO_2 into a solution of Na_2CO_3; cf. aerated or mineral *waters.*

sodalite. $Na_4Al_3Si_3O_{12}Cl$. A silicate of aluminum and sodium, which contains salt.

sodamide. Sodium amide.

Soddy, Frederick. 1877– . An English chemist, noted for his researches on radioactive elements and Nobel Prize (1921) in chemistry.

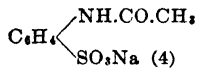
sodic. Containing sodium. (An obsolete term.)

sodio-malonic. Sodium malonic.

sodion. Same as sodium ion. Na^+.

sodium. Na = 22.997. Natrium. An alkali metal element, atomic number 11. A tetragonal crystalline, soft metal, silvery-white when freshly cut but rapidly becoming dull on exposure to air. It is stored under coal oil. It becomes brittle at low temperature, $d_{15°}$.-0.9732, m.97, b.880, decomp. water; insoluble in alcohol, benzene, or ether. Marggraf differentiated soda and potash in 1757, and Davy isolated the metal in 1807. Used as a reagent, a reducing agent, a dehydrating agent, a flux, and in organic synthesis, for the manufacture of NaCN, Na_2O, Na_2O_2, indigo, antipyrine, acetoacetic ester, tetraethyl lead, sodium azide. **radio-** The isotope of mass 24, having a half-life of 15.5 hours, and formed from Na by bombardment with deuterons: $_{11}Na^{23} + {}_1D^2 \rightarrow {}_{11}Na^{24} + {}_1H^1$. It decomposes

s. abietinate. S. sylvate. **s. acetate.** $NaC_2H_3O_2$ = 82.0. CH_3COONa. Colorless monoclinic crystals, d.1.4, m.58, soluble in water, alcohol or ether. Used as a mordant, in the manufacture of acetic acid, acetic ether, pigments, in photography, for filling thermophores; as a reagent for alkaloids, and in quantitative analysis. *hydrated-* $NaC_2H_3O_2.3H_2O$ = 136.07. Monoclinic, colorless crystals d.1.45, m.58. Soluble in water. **s. acetotungstate.** $Na_2(CH_3CO)WO_4$ = 337.0. S. acetwolframate. A white crystalline powder, soluble in water; used as a microscope reagent. **s. acetsulfanilate.** $NaC_8H_8O_4S$ = 223.0. Cosaprin,



A greenish-white, fine crystalline powder, soluble in water and slightly soluble in alcohol. Used medicinally. **s. acetwolframate.** S. acetotungstate. **s. acetylarsanilate.** $NaAsO_2.C_6H_4.NHCOCH_3$ = 264.1. A yellowish crystalline powder, soluble in water; used medicinally. **s. acetyl salicylate.** $C_2H_3O.OC_6H_4COONa$ = 202.06. Hydropirin, pyranol; used medicinally. **s. agaricinate.** A colorless powder, soluble in water; used medicinally. **s. alginate.** The sodium salt of alginic acid; used as antisettling agent for chocolate-milk drinks, as a gelatin substitute in ice cream, and as protective colloid in pharmaceuticals and cosmetics. **s. alizarinsulfonate.** $NaC_{14}H_5O_2(OH)_2SO_3$ = 342.1. Alizarin carmine. An orange-yellow powder, soluble in water or alcohol. Used as a dye, and indicator for strong acids (yellow) and strong alkalis (violet) (except carbonates). **s. alloys.** A mixture of sodium with some other metal (for m., see table).

with	90 % Na 10 %	80 % Na 20 %	70 % Na 30 %	60 % Na 40 %	50 % Na 50 %
Bi	425	520	590	645	690
Cd	125	185	245	285	325
Hg	90	80	70	60	45
K	77	58	41	26	11
Pb	130	200	250	290	330

s. alum. Aluminum s. sulfate. **s. aluminate.** $Na_2Al_2O_4$ = 164.2. A colorless amorphous powder, m.1850, soluble in water, or alcohol, insoluble in alkalis or ether. **s. aluminum chloride.** $2NaCl,AlCl_3$ = 383.7. A colorless deliquescent solid, m.185. **s. amalgam.** A mercury amalgam with 2 % to 10 % of sodium. Gray pieces, the size of a pea, used as a reducing agent and in organic synthesis. **s. amide.** $NaNH_2$ = 39.03. Sodamide. Colorless crystals, m.208, sublimes 400; decomp. by water. Used in organic synthesis similarly to sodium, but should not be kept longer than 12 hours as it forms explosive products when exposed to air. **s. aminosuccinate.** S. asparaginate. **s. ammonium acid phosphate.** Sodium ammonium phosphate. **s. ammonium phosphate.** $NaNH_4HPO_4.4H_2O$ = 209.15. Microcosmic salt, triphosphate, acid sodium ammonium phosphate. Colorless crystals, soluble in water. Used as a reagent in blowpipe analysis, for standardizing uranium solutions, and in the determination of magnesium and manganese. Decomposed by heat, and forms a molten bead which is colored characteristically by impurities. **s. ammonium sulfate.** $NaNH_4SO_4$ = 137.1. Colorless crystals; soluble in water. **s. amylsulfate.** $C_5H_{11}SO_4Na$ = 202.2. A colorless crystalline powder; soluble in water. **s. amylxanthogenate.** $NaC_6H_{11}OS_2$ = 186.1. $Me_2CH.CH_2.CH_2.O.CS_2Na$. Yellowish crystals, soluble in water; used as a bactericide and insecticide. **s. amytal.** Isoamyl ethyl barbiturate. A white powder, soluble in water; used as a basal hypnotic for intravenous injection. **s. anhydromethylenecitrate.** Citarin. **s. aniline sulfonate.** S. sulfanilate. **s. anisate.** $NaC_8H_7O_3$ = 174.1. $C_6H_4(OMe)COONa$. White crystals, soluble in water. Used medicinally as an antipyretic and antirheumatic. **s. anthranilate.** $NaC_7H_6O_2N$ = 159.1. Sodium orthoaminobenzoate, $NH_2.C_6H_4.COONa$. A grayish powder, soluble in water or alcohol; used as an antiseptic. **s. anthrarobinate.** A sodium salt of anthrarobin. A dark-brown powder, soluble in water or alcohol; used medicinally for skin diseases. **s. antimonate.** $2NaSbO_3,7H_2O$ = 508.5. Colorless octahedral crystals; slightly soluble in water or alcohol. *pyro-* See *sodium pyroantimonate.* **s. antimony tartrate.** Plimmer's salt, $Na(SbO)C_4H_4O_6$. Colorless, transparent crystals, soluble in water. **s. argentocyanide.** $NaAg(CN)_2$ = 182.90. S. silver cyanide. A yellow, soluble solid produced in the cyanide process for the extraction of silver. **s. arsanilate.** $Na(AsO_2)C_6H_4NH_2$ = 222.2. Colorless crystals; soluble in water or alcohol **s. arsenates:** *normal-* $Na_3AsO_4.12H_2O$ = 424.2. Colorless crystals, d.1.754, m.85, soluble in water or alcohol; used as a reagent. *s. arsenate, acid-* (1) $Na_2HAsO_4.12H_2O$ = 402.2 (Dodecahydrate). Colorless monoclinic or rhombic crystals, d.1.71, m.28, b.100; soluble in water or alcohol. (2) $Na_2HAsO_4.7H_2O$ = 312.1 (Heptahydrate). Colorless monoclinic prisms, m.57, b.100; soluble in water or alcohol; used as a reagent, and medicinally as a tonic and antiseptic. (3) Na_2HAsO_4 = 186.0 (Anhydrous). A white amorphous powder, soluble in water or alcohol; used in dyeing and printing textiles. **s. arsenide.** Na_3As = 143.96. A dark solid, which evolves arsine in presence of water. **s. arsenite.** $NaAsO_2$ = 129.9 (meta-) or Na_2HAsO_3 = 170.0 (ortho-). A grayish-white powder, d.1.87, soluble in water or alcohol; used in the manufacture of antiseptic soap, in the leather industry and as a parasiticide. **s. asparaginate.** $NaC_4H_6O_4N$ = 155.1. Sodium aminosuccinate, $HOOC.CH_2.CHNH_2.COONa$. Colorless rhombic needles; soluble in water. **s. arsphenamine.** The sodium salt of salvarsan. **s. auribromide.** Gold sodium bromide. **s. aurichloride.** Gold sodium chloride. **s. aurosulfide.** $NaAuS.4H_2O$ = 324.33. Colorless crystals. **s. azide.** NaN_3 = 65.1. An explosive solid, used in detonators. **s. azo-a-naphthol-sulfanilate.** Tropeolin. **s. barbitone.** Barbital sodium. **s. benzene sulfonate.** $NaC_6H_5SO_3$ = 180.1. Sodium sulfobenzene, $Ph.SO_3Na$. A colorless crystalline powder; soluble in water or alcohol. **s. benzoate.** $NaC_7H_5O_2$ = 144.0. A white amorphous powder or colorless crystals, soluble in water or alcohol; used medicinally as an antiseptic and antipyretic. **s. benzosulfinide.** $NaC_7H_4O_3NS.2H_2O$ = 241.2. Soluble gluside, soluble saccharin. The sodium salt of saccharin, sodium benzoylsulfonate, $C_6H_4CO.SO_2.N.NA$. Colorless crystals, soluble in water; used medicinally as an intestinal antiseptic. **s. benzosulfite.** A colorless crystalline powder, used as an antiseptic. **s. benzoylsulfonate.** S. benzosulfinide. **s. biborate.** S. borate. **s. bicarbonate.** $NaHCO_3$ = 84.01. Acid sodium carbonate, baking soda. A white opaque powder or colorless crystals, d.2.206, decomp. 270, soluble in water, insoluble in alcohol. Used as a reagent; in making volumetric solutions; medicinally as an antiacid; pharmaceutically in effervescent mixtures; and in baking powders. **s. bichromate.** S. dichromate. **s. bifluoride.** $NaHF_2$ = 62.0. An acid salt, NaF.HF. Colorless, crystalline powder, soluble in water. Used as a powerful antiseptic, in ant powders, preservatives, and for etching glass. **s. bilactate.** $NaH(C_3H_5O_3)_2$ = 202.1. A colorless liquid; soluble in water. **s. binoxalate.** $NaHC_2O_4$ = 112.0. Acid sodium oxalate. Colorless monoclinic crystals, soluble in water; used in stain and ink removers. **s. biphosphate.** See *s. phosphates.* **s. bipyrophosphate.** See *s. pyrophosphate.* **s. bismuthate.** $NaBiO_3$ = 280.0. A light, fawn colored powder, used in Mn determinations. **s. bismuth thiosulfate.** $Na_3Bi(S_2O_3)_3$ = 614.42. A colorless crystalline solid. **s. bisulfate.** $NaHSO_4.H_2O$ = 138.1. Acid sodium sulfate. Large colorless crystals, d.1.8, m.300, soluble in water. Used as a reagent, as a flux for decomposing minerals, in thermophores, and as an antiseptic for drinking water. **s. bisulfite.** $NaHSO_3$ = 104.07. A white crystalline powder, soluble in water, insoluble in alcohol. Used as a reagent and reducing agent in qualititive and quantitative analysis; as a disinfectant and bleach; as a preservative; as an antiseptic in the fermentation industry; also medicinally. **s. bitartrate.** $NaHC_4H_4O_6.H_2O$ = 190.08. Colorless crystals or powder, soluble in water. Used as a reagent and in effervescent mixtures. **s. borates:** (1a) *S. metaborate.* $NaBO_2$ = 66.0. Colorless hexagonal prisms, m.966; soluble in water, alcohol or ether. (1b) *S. metaborate, tetrahydrate.* $NaBO_2.4H_2O$ = 203.6. Neutral sodium borate. Colorless monoclinic prisms, m.57, soluble in water, alcohol or ether; used as an antiseptic. (2a) *S. tetraborate, calcined.* $Na_2B_4O_7$ = 202.0. A white

spongy mass or powder, soluble in water; used as a reagent. (2b) *S. tetraborate, fused.* $Na_2B_4O_7$ = 202.0. Borax glass, anhydrous borax. A colorless vitreous mass, d.2.367, m.741; slightly soluble in water, soluble in alcohol, insoluble in ether; used as a reagent. (2c) *S. tetraborate, pentahydrate.* $Na_2B_4O_7.5H_2O$ = 292.1. Colorless octahedral crystals, d.1.815, slightly soluble in water or alcohol, insoluble in ether; used as a reagent. (2d) *S. tetraborate, decahydrate.* $Na_2B_4O_7.10H_2O$ = 382.2. Borax, sodii boras, (U.S.P.), sodium biborate, s. pyroborate. Colorless monoclinic crystals or white powder, $d._{17}°1.72$, m. at red heat; slightly soluble in water, insoluble in alcohol. Used as a reagent and flux, in blowpipe analysis, for borax beads, in metallurgy, as a preservative, and as an antiseptic. **s. borosalicylate.** Borsalyl, a reaction product of salicylic acid and sodium borate. A white powder, soluble in water; used medicinally as an antiseptic. **s. bromate.** $NaBrO_3$ = 150.9. Colorless, lustrous crystals, d.3.339, m.384, soluble in water or alcohol, insoluble in ether; used as a reagent and oxidizing agent, in volumetric analysis and in the determination of phenols. **s. bromides.** (1) NaBr = 102.9. Colorless cubic crystals, d.3.014, m.768; soluble in water, ether or alcohol. Used as a reagent, and medicinally as an alternative and diuretic. (2) $NaBr.2H_2O$ = 138.95. Colorless monoclinic crystals, d.2.176; soluble in water, alcohol or ether. **s. butylsulfate.** $NaSO_4C_4H_9$ = 176.1. Colorless crystals; soluble in water. **s. butyrate.** $NaC_4H_7O_2$ = 110.06 or C_3H_7COONa. Colorless deliquescent crystals, soluble in water; used in organic synthesis. **s. cacodylate.** $NaAsO_2(CH_3)_2$ = 160.02 and $NaAsO_2Me_2.3H_2O$ = 214.17. A white amorphous powder, soluble in water. Used medicinally, especially in ampoule medication as a hematinic. **s. caffeine sulfonate.** Symphorol N. **s. camphorate.** $Na_2C_{10}H_{14}O_4$ = 244.2. A white deliquescent powder, soluble in water; used medicinally as an antiseptic. **s. cantharidate.** $Na_2C_{10}H_{14}O_6.2H_2O$ = 312.2. The sodium salt of cantharides camphor, the active principle of *Cantharis vesicatoria.* A white crystalline powder, soluble in water; used medicinally as a tonic. **s. carbide.** Na_2C = 58.0. A gray powder; decomp. by water. **s. carbolate.** S. phenate. **s. carbonate.** Soda, washing soda. Cf. *Solvay process, ammonia soda process.* There are several hydrated forms: (1) *Anhydrous.* Na_2CO_3 = 106.0. A white powder, d.2.476, m.852, decomp. by further heat, soluble in water. Used as a reagent and in freezing mixtures. Cf. *sesquisoda, soda ash.* (2) *Monohydrate.* $Na_2CO_3.H_2O$ = 124.0. A white, crystalline powder, soluble in water, insoluble in ether; used as a reagent and in photography. (3) *Decahydrate.* $Na_2CO_3.10H_2O$ = 286.2. Colorless monoclinic crystals, d.1.458, m.34, b.106, soluble in water, insoluble in alcohol or ether. Used as a reagent, precipitant and neutralizer, for volumetric solutions, medicinally as an antiacid, and in large amounts as soda ash (q.v.). (4) *Peroxide form.* $Na_2CO_3.1\frac{1}{2}H_2O_2$ = 157.01. This was formerly regarded as a peroxide. **s. carminate.** $Na_2C_{11}H_{10}O_6$ = 284.1. A red powder, soluble in water; used as a dye in microscopy. **s. chlorate.** $NaClO_3$ = 106.5. Colorless cubic or tetragonal crystals, d.2.490, m.250, decomp. by further heat; soluble in water, slightly soluble in alcohol or ether. Used as a reagent, in explosives and pyrotechnics, medicinally as antiseptic, in toothpastes, and gargles. **s. chloride.** NaCl = 58.5. Table salt, common salt, rock salt, sea salt. Colorless cubic crystals or crystalline powder, d.2.176, m.800; soluble in water, insoluble in alcohol or ether. Used as a reagent, as a condiment, for freezing mixtures and reducing chlorine; and in industry and technology for many purposes. **s. chlorite.** $NaClO_2$ = 90.5. A colorless crystalline powder, soluble in water; used as an oxidizing agent. **s. *p*-chlorobenzoate.** Mikrobin. **s. chloroplatinate.** S. platini chloride. **s. chloroplatinite.** S. platino chloride. **s. chlorosulfonate.** $NaClSO_3$ = 138.7. A fine crystalline powder, readily hydrolysed to HCl; used as a reagent in sulfonation and chlorination. **s. cholate.** A former name for bile salts, q.v. **s. chromate.** $Na_2CrO_4.10H_2O$ = 342.2. Yellow triclinic crystals, d.2.71, m.20, soluble in water, slightly soluble in alcohol or ether; used as a reagent and mordant, and in organic synthesis. **s. chromite.** Na_2CrO_3 = 146.1. Bright green needles; soluble in water. **s. cinnamate.** $NaC_9H_7O_2$ = 170.1. Hetol. A white crystalline powder, soluble in water; used medicinally. **s. citrate.** $2Na_3C_6H_5O_7.11H_2O$ = 714.3. Sodii citras (U.S.P.). Colorless crystals, m.150, soluble in water slightly soluble in alcohol or ether. Used as a reagent, and medicinally as an antipyretic and refrigerant. **s. coerulinsulfate.** Indigo carmine. **s. cyanaurite.** Aurous s. cyanide. **s. cobaltic nitrite, s. cobaltinitrite.** $Na_3Co(NO_2)_6.\frac{1}{2}H_2O$ = 413.0. A dark purple hygroscopic, crystalline powder, soluble in water. **s. cobaltic nitrite solution.** A clear, brown solution of 4 gm. cobaltous chloride, 10 gm. sodium nitrite, and 2 cc. acetic acid (36 %) in 100 cc. water; used as a reagent for potassium. **s. cobaltinitrite.** S. cobaltic nitrite. **s. copaivate.** $C_{20}H_{29}O_2Na$ = 324.24. A yellowish powder, soluble in water; used as an antiseptic. **s. corallinate.** Sodium rosolate. **s. cyanamide.** Na_2NCN = 86.02. **s. cyanide.** NaCN = 49.01. A white, deliquescent, crystalline powder, soluble in water, slightly soluble in alcohol or ether. Used in electroplating, case-hardening, flotation and extraction of metals (cyanide process), fumigation, synthesis of fine chemicals and rubber accelerators; as a reagent; parasiticide and antiseptic. **s. dichromate.** $Na_2Cr_2O_7.2H_2O$ = 298.0. S. bichromate. Red, triclinic crystals, d.2.52, m.320, decomp. 400, soluble in water, insoluble in alcohol. Used as a reagent, as an oxidizing substance, and medicinally as an antiseptic. **s. diethylbarbiturate.** $NaC_8H_{11}O_3N_2$ = 206.1. Barbital-sodium, the monosodium salt of barbital. White crystals, soluble in water, insoluble in alcohol or ether; used medicinally as a hypnotic. **s. diethyl dithiocarbamate.** $Et_2N.CS.SNa$ = 171.2. A white solid; a sensitive reagent for copper. **s. dihydrogen phosphate.** See *S. phosphates, monobasic.* **s. dimethylaminoazobenzenesulfonate.** Methyl orange. **s. dinitrocresolate.** Antinonnin. **s. dioxide.** S. peroxide. **s. disulfate.** S. pyrosulfate. **s. dithionate.** S. hyposulfate. **s. dithiosalicylate.** Dithion. **s. divanadate.** $Na_2V_4O_{11}.9H_2O$ = 589.0. S. tetravanadate. Orange red crystals, slightly soluble in water; used in the manufacture of dyes and inks. **s.**

ethoxide. S. ethylate. **s. ethylate.** NaC_2H_5O = 68.0. EtONa. S. ethoxide. A white hygroscopic powder, soluble in water or alcohol; used as a reagent, and medicinally as an escharotic. **s. ethylsulfate.** $NaC_2H_5SO_4$ = 148.11. S. sulfovinate. A colorless deliquescent, crystalline powder, soluble in water or alcohol. **s. ferricyanide.** $Na_3Fe(CN)_6.H_2O$ = 298.93. Red prussiate of soda. Ruby-red, hygroscopic crystals, soluble in water, insoluble in alcohol or ether. Used as a reagent, and in the manufacture of pigments and blue-print paper. **s. ferric oxalate.** $2Na_3Fe(C_2O_4)_3.10H_2O$ = 957.82. Monoclinic green crystals, d.1.973, dehydrated at 100° ($4H_2O$) and 200°C ($10H_2O$); soluble in water. **s. ferrite.** $Na_2Fe_2O_4$ = 221.7. An unstable salt of sodium; decomposed by water. **s. ferrocyanide.** $Na_4Fe(CN)_6.12H_2O$ = 520.18. Yellow prussiate of soda. Yellow monoclinic prisms, d.1.458, soluble in water, insoluble in alcohol or ether. Used as a reagent in photography, and in the manufacture of pigments. **s. fluobenzoate.** $C_6H_4FCOONa$ = 162.0. A white crystalline powder, soluble in water; used medicinally as an antiseptic. **s. fluorescein.** Uranin. **s. fluoride.** NaF = 42.0. Colorless cubic crystals, d.2.766, m.982, soluble in water, slightly soluble in alcohol or ether. Used as a reagent for blood; as an antiferment in the brewing industry, yeast manufacture, and distilleries; medicinally, as an antiseptic. **s. fluosilicate.** Na_2SiF_6 = 188.05. S. silicofluoride, salufer. A white crystalline powder, d.2.755, slightly soluble in water, insoluble in alcohol or ether. It is a by-product of superphosphate manufacture; used as reagent, antiseptic and insecticide, also in enameling and laundering. **s. formaldehyde sulfoxylate.** $NaHSO_2.HCHO.2H_2O$. A reducing agent used in the dyeing industry. **s. formate.** $NaCHO_2$ = 68.0 or HCOONa. Colorless rhombic crystals, d.1.919, decomp. by heat, soluble in water, alcohol or glycerol. Used as reagent for arsenic and phosphorus, and as an antiseptic. **s. furacrylate.** $C_4H_3OCH:CHCOONa$ = 160.03. A light brown powder, d.1.919, soluble in water. **s. germanate.** Na_2GeO_3 = 166.0. Colorless crystals, soluble in water; used as a hematinic. **s. glycerinophosphate, s. glycerophosphate.** $Na_2C_3H_7PO_6.xH_2O$. A yellowish viscid liquid, soluble in water. Used extensively in ampoule medication as a tonic and hematinic; also as reagent for phosphatase. **s. gynocardate.** $NaC_{14}H_{23}O_2$ = 246.0. A yellow powder, soluble in water or alcohol; used medicinally as an antiseptic. **s. halides.** The sodium salts of the halogen acids; as NaF, NaCl, NaBr and NaI. **s. hippurate.** $NaC_9H_8O_3N$ = 201.07. A white powder, soluble in hot water; used medicinally. **s. hydrate.** S. hydroxide. **s. hydride.** NaH = 24.01. Colorless crystals, d.0.92; decomp. by water or heat. **s. hydrogen arsenate.** $Na_2HAsO_4.12H_2O$ = 402.21. A solid, d.1.6, fairly soluble in water. **s. hydrogen arsenite.** Na_2HAsO_3 = 169.97. A colorless solid, d.1.87, soluble in water. **s. hydrogen carbonate.** S. bicarbonate. **s. hydrogen oxide.** S. hydroxide. **s. hydrogen peroxide.** (1) Sodyl hydroxide. (2) $2NaOH.H_2O_2$ = 148.04. A white solid. **s. hydrogen phosphate.** See *s. phosphates*. **s. hydrogen phosphite.** See *s. phosphites*. **s. hydrogen sulfate.** S. bisulfate. **s. hydrogen sulfide.** S. hydrosulfide. **s. hydropyroantimonate.** S. metantimonate. **s. hydrosulfate.** S. sulfhydrate. **s. hydrosulfide.** $NaHS.2H_2O$ = 92.10. S. hydrogen sulfide. Deliquescent, colorless crystals, decomp. by heat, soluble in water or alcohol. **s. hydrosulfite.** $Na_2S_2O_4.2H_2O$ = 210.1. Colorless crystals, decomp. at red heat; soluble in water, insoluble in alcohol. **s. hydroxide.** NaOH = 40.01. S. hydrate, soda, caustic soda, sodii hydroxidum (U.S.P.). A white, very hygroscopic powder, or white flakes, plates, pellets, or sticks, d.2.13, m.318; very soluble in water, alcohol, or ether. Used extensively in chemistry, the chemical industry, metallurgy, photography, and sold in various degrees of purity:

(1) reagent from sodium—for special analytical work.
(2) reagent from alcohol—for general analytical work, volumetric solutions, etc.
(3) reagent, purified—for general analytical and chemical work.
(4) U.S.P. or B.P.—for pharmaceutical work.
(5) technical—fused or in flakes for industrial purposes.

s. hydroxide solution. An aqueous solution of s. hydroxide. Commercial grades:

(1) 31 % solution, d.1.34
(2) 27 % solution, d.1.30
(3) 15 % solution, d.1.17
(4) 5 % solution, d.1.06

The solutions employed in the laboratory have the following strengths:

6M solution—240.03 gm. NaOH per 1000 cc.
N or M solution—40.005 grams NaOH per 1000 cc.
N/2 solution—20.0025 grams NaOH per 1000 cc.
N/10 solution—4.0005 grams NaOH per 1000 cc.

s. hydroxide with lime. Soda-lime. A mixture of sodium hydroxide and calcium oxide. A white granular powder, or porous mass; used as a reagent, as a general absorbent for acid gases and carbon dioxide in particular, in absorption tubes and in scrubbers. **s. hydroxylamine sulfonates.** mono- $HO.NH(SO_3Na)$ = 135.40. di- $HO.N.(SO_3Na)_2$ = 237.16. **s. hypobromite.** NaOBr = 119.0. A colorless powder, soluble in water; used as an oxidizer in organic synthesis. **s. hypochlorite.** NaOCl = 74.5. A colorless powder, decomp. by heat, soluble in water, decomposed by ether. Used as a reagent, an oxidizing agent, and a bleaching agent. Cf. *Eau de Javelle, Carrel-Dakin-, Dakin-, Labarraque solutions*. **s. hyponitrite.** $Na_2N_2O_2$ = 106.0. A colorless crystalline powder; soluble in water. **s. hypophosphite.** $NaH_2PO_2.H_2O$ = 106.1. Colorless deliquescent monoclinic prisms or white granular powder, soluble in water, alcohol or ether. Used as a reagent in gas analysis, and medicinally as a tonic. **s. hyposulfate.** (1) $Na_2S_2O_6.2H_2O$ = 242.1. Sodium dithionate. Large, transparent rhombic prisms; soluble in water, insoluble in alcohol. (2) S. thiosulfate. **s. hyposulfite.** (1) $Na_2S_2O_4$ = 174.1. S. hydrosulfite. Colorless crystals, soluble in water; used to recover silver from photographic waste. (2) S. thiosulfate. (3) S. bisulfite. **s. indigotinsulfonate.** Indigo carmine. **s. iodate.** $NaIO_3$ = 197.9. A white powder, d.4.277, decomp. by heat, soluble in water, insoluble in alcohol or ether; used as a reagent. It may contain 5 mols.

of water of crystallization. **s. iodide.** NaI = 149.9. Colorless cubic crystals, d.3.665, m.664, soluble in water, alcohol or ether; used as a reagent, and medicinally as an alterant. *dihydrate.* $NaI.2H_2O$ = 185.9. Colorless crystals, d.2.448; soluble in water, alcohol or ether. **s. iodoeosin.** Erythrosin. **s. iodotheobromate.** Theobromine sodium iodide. **s. ion.** The monovalent cation, Na^+. **s. iridichloride.** Iridium sodium chloride. **s. iron pyrophosphate.** $Na_8Fe_2(P_2O_7)_3$ = 818.4. Used as a catalyst in carbohydrate oxidation. **s. lactate.** $NaC_3H_5O_3$ = 112.06. A thick syrup-like liquid, soluble in water or alcohol; used medicinally. **s. lauryl sulfate.** $NaC_{12}H_{25}SO_4$ = 288.3. Irium. A white powder, used as detergent in toothpastes. **s. lorinate.** Griserin. A yellowish powder, soluble in water; used medicinally. **s. lygosinate.** The sodium salt of diorthocumareketone (see *lygosin*). **s. magnesium tartrate.** $Na_2Mg(C_4H_4O_6)_2.10H_2O$ = 546.53. A white powder, soluble in water. **s. malate.** $Na_2C_4H_4O_5$ = 178.1. Colorless crystals, soluble in water. **s. malonic ester.** $NaC_7H_{11}O_4$ = 182.1. Sodio-malonic ester, EtO(NaO)C:CH.COOEt. White needles. Formed, but not usually isolated, in the malonic ester synthesis. **s. manganate.** $Na_2MnO_4.10H_2O$ = 345.1. Green monoclinic crystals, decomp. by heat; soluble in water, decomp. by alcohol. **s. metabisulfite.** $Na_2S_2O_5$ = 190.14. White crystals, soluble in water; used in photography. **s. metaborate.** See *s. borates.* **s. metantimonate.** $Na_2H_2Sb_2O_5$ = 400.0. S. hydropyroantimonate. A white granular powder; slightly soluble in hot water. **s. metaphosphate.** $NaPO_3$ = 101.98. Exists in two crystalline forms, one sol. in water (s. trimetaphosphate), other insol. On melting either form and quickly cooling, a water-sol. glass. (Graham's salt), is obtained. **s. metasilicate.** See *s. silicates.* **s. metastannate.** $Na_2Sn_5O_{11}.4H_2O$ = 887.6. A crystalline powder, insoluble in alcohol. **s. metavanadate.** $NaVO_3$ = 122.2. A pale-green crystalline powder, soluble in hot water; used as a reagent, and medicinally. **s. methyl arsenate.** See *methyl.* **s. methyl arsenite.** $Na_2CH_2AsO_3$ = 184.0. Disodium methylarsonate, mono-methyldisodiumarsenate, arrhenal, arsynal, neoarsycodyl, stenosine. Colorless crystals, m.135, soluble in water, slightly soluble in alcohol, insoluble in ether; used medicinally instead of cacodylates. **s. methylate.** $NaCH_3O$ = 54.0. MeONa. A white powder, decomp. by water; soluble in alcohol. **s. methylsulfate.** $NaCH_3SO_4$ = 134.09. Colorless hygroscopic crystals; soluble in water or alcohol. **s. molybdate.** $Na_2MoO_4.2H_2O$ = 242.0. Colorless leaflets with mother-of-pearl luster, soluble in water; used as a reagent. **s. molybdophosphate.** S. phosphomolybdate. **s. monosulfide.** S. sulfide. **s. monoxide.** S. oxide, Na_2O. **s. morrhuate.** The sodium salt of a fraction of the fatty acids of codliver oil having a high iodine content; used to treat varicose veins. **s. naphthionate.** S. naphthylamine sulfonate. **s. naphtholsulfonate.** $NaC_{10}H_7SO_4$ = 246.1. S.-β-naphthol-α-sulfonate. White tablets; soluble in water or alcohol. **s. naphthoquinone sulfonate.** A white powder, used as reagent for nitrogen in amino acids. **s. naphthylaminesulfonate.** $NaC_{10}H_6.NH_2.SO_4$ = 261.1. S. naphthionate. Colorless monoclinic prisms, soluble in water; used as a reagent for nitrous acid. **s. nitranilate.** $Na_2C_6O_8N_2$ = 274.02. S. dinitrodioxyquinonate, $C_6(NO_2)_2O_2(ONa)_2$. A brown powder; soluble in water. **s. nitrate.** $NaNO_3$ = 85.01. Saliter. Soda nitre, cubic nitre, caliche, Chile saltpetre. Colorless rhombohedral crystals, d.2.265, m.312, soluble in water, slightly soluble in alcohol. Used as a reagent and oxidizer in organic synthesis, in the manufacture of acids, fertilizers, explosives and glass, as a flux in metallurgy, and medicinally. **s. nitrite.** $NaNO_2$ = 69.01. Colorless crystals or white, slightly yellow sticks, d.2.167, m.271; soluble in water, slightly soluble in alcohol, ether, or benzene. Used as a reagent, in the manufacture of azodyes and synthetics; and medicinally as a diuretic and diaphoretic; also for sea-sickness. Cf. *mystin.* **s. 5-nitro-6-chlorotoluene-3-sulfonate.** A white powder, a reagent for potassium. **s. nitroferricyanide.** $Na_2Fe(CN)_5NO.2H_2O$ = 297.8. S. nitroprusside. Dark red, transparent crystals, d.1.680, soluble in water. Used as a reagent for alkali sulfides, acetone, formaldehyde, aminoacids, and alkaloids. **s. nitronaphthalenesulfonate.** $NaC_{10}H_6(NO_2)SO_3$ = 275.0. A brownish-yellow powder, soluble in water; used in organic synthesis. **s. nitroprussiate.** S. nitroferricyanide. **s. nitroprusside.** S. nitroferricyanide. **s. nitrosohydroxylamine sulfonate.** $ON.N(ONa)SO_3Na$ = 186.09. **s. nucleate.** S. nucleinate. **s. nucleinate.** S. nucleate. The sodium salt of nucleic acids of yeast. A grayish-white powder, soluble in water and insoluble in alcohol; used medicinally as a tonic and for syphilis. **s. oenanthate.** $NaC_7H_{13}O_2$ = 152.1. The sodium salt of n-heptylic acid, $Me(CH_2)_5COONa$. A white crystalline powder, soluble in alcohol or water. **s. oleate.** $NaC_{18}H_{33}O_2$ = 304.3. Yellow, unctuous granules; soluble in water or alcohol. **s. orthoaminobenzoate.** S. anthranilate. **s. orthovanadate.** See *s. vanadate.* **s. oxalate.** $Na_2C_2O_4$ = 134.0. A white crystalline powder, soluble in water. Used as a reagent, and in the manufacture of stain and ink removers. *acid-* $NaOOC.COOH.H_2O$ = 130.02. Colorless monoclinic crystals, soluble in water. **s. oxide.** Na_2O = 62.0. S. monoxide. A grayish or white mass, d.2.7, subliming and m. at red heat, and decomp. by water (to form sodium hydroxide), alcohol or ether. Used as a reagent and strong base, similarly to sodium hydroxide. **s. para-periodate.** $Na_3H_2IO_6$ = 293.9. A crystalline solid, used as an oxidising agent in quantitative analysis. **s. pentasulfide.** See *s. sulfides.* **s. pentobarbital.** White powder, used for seasickness. **s. pentoxydichloride.** $Cl.SO_2O.SO_2Cl$ = 215.4. A straw-colored liquid, b.150, slightly soluble in cold water, but reacting violently with warm water. **s. perborate.** $NaBO_3.4H_2O$ = 154.1. Peroxydol. A white crystalline powder; soluble in water. Used as a reagent, oxidizing agent, antiseptic, deodorant and bleaching agent for textiles, rayon and vat colors; also in dentifrices and detergents. **s. percarbonates:** (1) *normal* $Na_2C_2O_6$ = 166.00. (2) *mono-* Na_2CO_4 = 122.00. **s. perchlorate.** $NaClO_4$ = 122.5. Colorless rhombohedral crystals, m.482, decomp. by further heat, soluble in water, alcohol or ether; used as a reagent, and in explosives. **s. periodate.** $NaIO_4.3H_2O$ = 267.9. Efflores-

cent hemihedral crystals, d.$_{18}$3.219, dehydrated at 300, soluble in water. **s. permanganate.** $Na_2MnO_4.3H_2O$ = 218.98. Purple or reddish-black crystals, decomp. by heat; soluble in water or alcohol. Used as a reagent and oxidizing agent, and medicinally as an antidote to poisoning from snake bites, morphine or curare. **s. peroxide.** Na_2O_2 = 78.0. S. dioxide, s. superoxide. A white or yellowish powder, d.2.805, decomp. by heat, soluble in water with production of heat, sodium hydroxide and hydrogen peroxide. Used as a powerful oxidizer for destroying organic matter in analysis; as a flux for minerals; in bleaching animal or vegetable tissues, *e.g.*, flour; in the preparation of calcium peroxide, sodium perborate and ferrate. It should be used with caution, as it is liable to ignite organic matter or alcohol. **s. persulfate.** $Na_2S_2O_8$ = 238.0. A white crystalline powder, soluble in water. Used as a reagent for indican, adrenalin and other organic substances, as a strong antiseptic and bleaching agent; and medicinally as an aperient. **s. phenate.** NaC_6H_5O = 116.0. S. carbolate, PhONa. A colorless hygroscopic powder, soluble in water; used medicinally as an antiseptic. **s. phenolphthaleinate.** $Na_2C_{20}H_{12}O_4$ = 362.1. A red syrupy mass; soluble in water. **s. phenolsulfonate.** $NaC_6H_5O_4S$ = 196.1. S. p-phenolsulfonate, s. sulfocarbolate, $C_6H_4(OH)SO_3Na$. Colorless crystals, soluble in water and slightly soluble in alcohol; used medicinally as an antiseptic and disinfectant. **s. phenylethyl barbiturate.** Luminal-sodium, phenobarbital sodium, the monosodium salt of luminal. A white, hygroscopic powder, m.147, soluble in water; used medicinally as a hypnotic. **s. *o*-phenylphenate.** $C_{12}H_9ONa$ = 192.1. $Ph.C_6H_4ONa$. A white powder, used as preservative of glues. Cf. *phenylphenol*. **s. phosphates:**

(1) $Na_3PO_4.12H_2O$ = 380.2, tribasic
(2) Na_2HPO_4 = 142.0, dibasic, anhydrous
(3) $Na_2HPO_4.12H_2O$ = 358.2, dibasic, hydrous
(4) $NaH_2PO_4.H_2O$ = 138.1, monobasic
(5) $NaPO_3$ = 101.98, metaphosphate
(6) $Na_4P_2O_7.10H_2O$ = 446.24, pyrophosphate

(1) *tribasic-* S. orthophosphate. Colorless hexagonal crystals, d.1.644, m.77; soluble in water. (2) *dibasic*, anhydrous- Sörensen's sodium phosphate, disodium orthophosphate. A white hygroscopic powder, soluble in water; used as a reagent, and in buffer solutions. (3) *dibasic*, hydrous- Disodium orthophosphate. Monohydrogen sodium phosphate. Colorless, transparent rhombic crystals, d.1.52, m.35, soluble in water, insoluble in alcohol or ether; used as a reagent. (4) *monobasic-* Monosodium orthophosphate, dihydrogen sodium phosphate, sodium biphosphate. Large colorless, transparent, rhombic crystals, d.2.04, soluble in water, insoluble in alcohol; used medicinally. (5) *metaphosphate-* Insoluble form, colorless crystals; soluble form, colorless crystals, d.2.476, m.627; soluble glass obtained by quenching from melt. Cf. *s. metaphosphate*. (6) *pyrophosphate-* Colorless monoclinic crystals, d.1.836, m.988, soluble in water, insouble in alcohol or ether; used as a reagent and in the manufacture of pharmaceuticals. (7) *tetraphosphate-* $Na_6P_4O_{13}$. **s. phosphide.** Na_3P = 100.04. A red solid which evolves phosphine with water; decomp. by heat. **s. phosphites.** There are three phosphites: Na_3PO_3, Na_2HPO_3 and NaH_2PO_3. The most common is $Na_2HPO_3.5H_2O$ = 216.2. Colorless rhombohedral crystals, m.53, soluble in water, insoluble in alcohol or ether. **s. phosphomolybdate.** $Na_3PO_4.10MoO_4$ = 1764.0. S. molybdophosphate. A yellow crystalline powder, soluble in water. Used as a reagent for alkaloids and vegetable fats, and in microscopy. **s. phosphotungstate.** $Na_4P_2O_7.12WO_3.18H_2O$ = 3374.0. S. phosphowolframate. A white granular powder, soluble in water. Used as a reagent for alkaloids, potassium, ferrous salts and uric acid. **s. phosphovanadate.** $Na_4P_2O_7.6V_2O_5.21H_2O$ = 1736.4. A yellow crystalline powder, soluble in water; used as a microscope reagent. **s. phosphowolframate.** S. phosphotungstate. **s. phthalate.** $C_6H_4(COONa)_2$ = 210.03. A white powder, slightly soluble in water. **s. platinichloride.** $Na_2PtCl_6.6H_2O$ = 562.1. S. platinic chloride. A red solid, m.100, soluble in water or alcohol. **s. platinochloride.** Na_2PtCl_4 = 383.04. S. platinous chloride. A dark brown crystalline solid. **s. platinocyanide.** Platinous sodium cyanide. **s. plumbate.** $Na_2PbO_3.3H_2O$ = 351.9. A yellow amorphous powder, decomp. by water. **s. potassium carbonate.** $NaKCO_3.6H_2O$ = 230.2. Colorless monoclinic crystals, d.1.6334, soluble in water. **s. potassium tartrate.** Potassium s. tartrate. **s. propionate.** $NaC_3H_5O_2$ = 96.04. Et.COONa. A white granular powder; soluble in water or alcohol. **s. pyroantimonate.** $H_2Na_2Sb_2O_7.6H_2O$ = 508.5. A colorless powder; slightly soluble in water, alcohol or ether. **s. pyroborate.** See *s. borates*. **s. pyrophosphate.** See *s. phosphates*. **s. pyrosulfate.** $Na_2S_2O_7$ = 284.2. S. disulfate. Colorless crystals; soluble in water. **s. pyrosulfite.** $Na_2S_2O_5$ = 190.1. A colorless crystalline powder; soluble in water. **s. rhodanate.** S. thiocyanate. **s. rhodanide.** S. thiocyanate. **s. rosolate.** $NaC_{20}H_{15}O_3$ = 326.1. S. corallinate, the sodium salt of trihydroxy-diphenyl-tolylcarbinol. A dark-red powder with greenish luster, soluble in water; used as a stain in microscopy. **s. saccharate.** $NaC_{12}H_{21}O_{11}$ = 364.2. A white powder, soluble in water; used medicinally in ampoule medication. **s. salicylate.** $NaC_7H_5O_3$ = 160.1. White scales or crystalline powder, soluble in water, slightly soluble in alcohol or ether. Used as a reagent for free acid in gastric juice; and medicinally, as an antirheumatic and antipyretic. **s. salicylsulfonate.** S. sulfosalicylate. **s. santonate.** $NaC_{15}H_{19}O_4$ = 286.2. A colorless hygroscopic powder, soluble in water or alcohol; used medicinally as an anthelminthic. **s. santoninate.** $NaC_{15}H_{19}O_4.3\frac{1}{2}H_2O$ = 353.1. Colorless crystals; soluble in water or alcohol. Used medicinally as an anthelminthic. **s. selenate.** $Na_2SeO_4.10H_2O$ = 369.3. White crystals, soluble in water; used as a reagent. **s. selenite.** Na_2SeO_3 = 173.1. A colorless powder, soluble in water, insoluble in alcohol. Used as a reagent in bacteriology, and in the manufacture of red glass. **s. sesquicarbonate.** See *sesquicarbonate of soda*. **s. silicate.** *solid-* Na_2SiO_3 = 122.3. S. metasilicate. Colorless monoclinic crystals, or a white to grayish powder, m.1056, soluble in water and insoluble in alcohol; used similarly to the liquid. *liquid-* $Na_2Si_4O_9.xH_2O$ = 303.2 + 18x. Water glass, soluble glass. An amorphous powder or thick, heavy liquid aqueous solution, soluble in water,

insoluble in alcohol. Used as an adhesive in the paper industry; as binder in acid proof cements, cold water paints, abrasives; as a protective coating on waterproofing cements, concrete, wood, or paper utensils; as a preservative for eggs; in the chemical industry, for the manufacture of soap, boiler compounds, paper sizings, road binders; in the textile industry for in bleaching and cleaning fabrics, milk bottles, and greasy glass. *tetra-* See *s. tetrasilicate.* **s. silicofluoride.** Na_2SiF_6 = 188.3. S. fluosilicate, salufer. A white granular powder, d.2.73, slightly soluble in water, insoluble in alcohol or ether. Used as a reagent, antiseptic and germicide. **s. silver cyanide.** S. argentocyanide. **s. silvinate.** S. sylvate. **s. sozoiodolate** $C_6H_2I_2(ONa)SO_3H$ = 447.7. Sozoiodolesodium. A colorless crystalline powder, soluble in water, alcohol or glycerol; used medicinally as an antiseptic. **s. stannate.** $Na_2SnO_3.3H_2O$ = 266.7. White hexagonal crystals, soluble in water, insoluble in alcohol or ether; used as a mordant in dyeing. **s. stannite.** $HSnOONa$ = 174.71. A compound known only in solution, and analogous to s. formate. **s. stearate.** $NaC_{18}H_{35}O_2$ = 306.3. A white, unctuous powder; soluble in water; used in pharmaceutical preparations. **s. succinate.** (1) $Na_2C_4H_4O_4$ = 162.2. A colorless powder; soluble in water. (2) $Na_2C_4H_4O_4.6H_2O$ = 270.3. Colorless monoclinic prisms, soluble in water; used medicinally. **s. sulfalizarate.** Alizarin red. **s. sulfanilate.** $NaC_6H_4(NH_2)SO_3.2H_2O$ = 231.1. S. anilinesulfonate, s.-p-aminebenzene sulfonate. Colorless lustrous flakes, soluble in water; used medicinally. **s. sulfantimonate.** $Na_3SbS_4.9H_2O$ = 479.4. Schlippe's salt, s. thioantimonate. Large colorless tetrahedral crystals, soluble in water decomp. by heat; used as a reagent for alkaloids. **s. sulfates:**

(1) Na_2SO_4 = 142.1, normal, anhydrous.
(2) $Na_2SO_4.H_2O$ = 160.1, normal, monohydrate.
(3) $Na_2SO_4.7H_2O$ = 268.2, normal, heptahydrate.
(4) $Na_2SO_4.10H_2O$ = 322.2, normal, decahydrate.
(5) $NaHSO_4$. See *s. bisulfate.*

(1) *anhydrous-* Salt cake, niter cake, native as thenardite. A colorless powder, d.2.673, m.884, soluble in water, insoluble in alcohol. (2) *monohydrate-* Native as mirabilite. A white powder, soluble in water. (3) *heptahydrate-* Colorless rhombic or tetragonal crystals, soluble in water and insoluble in alcohol. (4) *decahydrate-* Glauber's salt, ordinary sodium sulfate. Colorless monoclinic crystals, d.1.462, m.38, soluble in water, insoluble in alcohol; used as a reagent, as a precipitant, and medicinally as a cathartic and diuretic. **s. sulfhydrate.** $NaHS$ = 56.0. S. hydrosulfide, s. hydrosulfate. Colorless crystals, soluble in water; used as a reagent. **s. sulfides:** (1) Na_2S = 78.1. Anhydrous s. monosulfide. An amorphous, slightly pink powder, d.2.471; soluble in water, slightly soluble in alcohol, decomp. by heat. (2) $Na_2S.9H_2O$ = 240.3. Colorless hygroscopic crystals, soluble in water. Used as a reagent instead of hydrogen sulfide. The following polysulfides are also known:

(3) Na_2S_2 = 110.1, s. disulfide
(4) Na_2S_3 = 142.2, s. trisulfide
(5) Na_2S_4 = 174.2, s. tetrasulfide
(6) $Na_2S_5(+8H_2O)$ = 206.4, s. pentasulfide.

s. sulfites: (1) Na_2SO_3 = 126.1 (*anhydrous*). Colorless hexagonal prisms, d.2.633, m.150 decomp. by further heat, soluble in water, insoluble in alcohol; used as a reagent and reducing agent. (2) $Na_2SO_3.7H_2O$ = 252.2 (*heptahydrate*). Colorless prismatic crystals, m.100 (decomp.), soluble in water, insoluble in alcohol. Used as a reagent, preservative, and medicinally, as an antiseptic and antizymotic. **s. sulfocaffeinate.** Symphorol N. **s. sulfocarbolate.** S. phenolsulfonate. **s. sulfocarbonate.** Na_2CS_3 = 154.2. S. trithiocarbonate. A granular brown powder; soluble in water; used as an insecticide, antiseptic and reagent for nickel and cobalt. **s. sulfocyanate.** **s. thiocyanate.** **s. sulfocyanide.** S. thiocyanate. **s. sulfo-oleate.** Thigenol. **s. sulfosalicylate.** $NaC_7H_5O_3SO_3$ = 240.0. S. salicylsulfonate. A white crystalline powder, soluble in water, insoluble in alcohol; used medicinally as an antiseptic. **s. sulfovinate.** S. ethylsulfate. **s. sulfoxylate formaldehyde.** $NaHSO_2.CH_2O.2H_2O$ = 154.11. White rhombic prisms, m.64, very soluble in water; used as a reagent. **s. superoxide.** S. peroxide. **s. sylvate.** $NaC_{20}H_{29}O_2$ = 324.3. S. abietinate, s. silvinate. A white powder, soluble in water or alcohol; used medicinally. **s. tannate.** $NaC_{14}H_9O_9$ = 344.1. A dark brown powder; soluble in water. **s. tartrate.** $Na_2C_4H_4O_6.2H_2O$ = 230.1. White, trimetric crystals, d.1.794, soluble in water, insoluble in alcohol; used as a reagent, and medicinally as a cathartic and refrigerant. **s. taurocholate.** (1) $NaC_{26}H_{44}NSO_7$ = 537.5. A yellowish-gray powder, soluble in water or alcohol, from the bile of carniverous animals; used as a diagnostic reagent. (2) The B.P. Codex term for bile salts, q.v. **s. tellurate.** $Na_2TeO_4.5H_2O$ = 327.6. A white powder; soluble in water. **s. tellurite.** Na_2TeO_3 = 221.5. A white powder, slightly soluble in water; used in bacteriology. **s. tetraborate.** See *s. borates.* **s. tetraiodophenolphthalein.** Antinosin. **s. tetrasilicate.** $Na_2Si_4O_9$ = 302.2. An amorphous colorless solid, soluble in water. **s. tetrathionate.** $Na_2S_4O_6$ = 270.28. A white soluble solid. **s. tetravanadate.** S. divanadate. **s. thioantimonate.** S. sulfantimonate. **s. thioarsenate.** $2Na_3AsS_4.15H_2O$ = 814.74. A soluble solid. **s. thiocarbonate.** Na_2CS_3 = 154.21. A heavy brown oil. It is the sulfur analogue of s. carbonate. **s. thiocyanate.** $NaSCN$ = 81.1. S. sulfocyanate. S. sulfocyanide, s. rhodanate, s. rhodanide. White deliquescent rhombic crystals, m.287, soluble in water; used as a reagent, especially for ferric ions. **s. thiophenesulfonate.** $NaC_4H_3O_3S_2.H_2O$ = 209.1. A white powder, soluble in water; used as an antiseptic. **s. thiosulfate.** $Na_2S_2O_3.5H_2O$ = 248.20. S. hyposulfite, s. subsulfite, antichlor. Colorless monoclinic crystals, d.1.729, m.32–48, decomp. 220; soluble in water, insoluble in alcohol or ether. Used as a reagent, for volumetric solutions, as a group precipitant instead of hydrogen sulfide, as "antichlor" in paper making and bleaching, as mordant, in metallurgy, in photography as a fixing salt, and in mining as a solvent for lead and silver; medicinally as a detoxicant for metallic poisons. **s. thiotetraphosphate.** $Na_6P_4O_{10}S$ = 454.3. A detergent. **s. thymol benzoate.** Porphyrin. **s. titanates:** $(Na_2O)_2.TiO_2$; $Na_2O.TiO_2$, and $Na_2O.(TiO_2)_2$. **s.**

trichloracetate. $NaC_2O_2Cl_3$ = 185.4. CCl_3COONa. Colorless crystals; soluble in water. **s. trichlorophenate.** $C_6H_2Cl_3ONa$ = 219.4, Dowicide B. A white crystralline powder, soluble in water; used as a mold fungicide, and medicinally as an antiseptic. **s. trithiocarbonate.** S. sulfocarbonate. **s. triticonucleinate.** The sodium salt of nucleic acids from wheat. A grayish-white powder, soluble in water. **s. truxillate.** $Na_2C_{18}H_{14}O_4.10H_2O$ = 520.2. A white powder; soluble in water. **s. tungstate.** $Na_2WO_4.2H_2O$ = 330.0. S. wolframate. Colorless rhombic prisms, m.100, soluble in water. Used as a reagent for alkaloids, bile pigments and tannins, and for waterproofing and fireproofing textiles. **s. uranate.** Na_2UO_4 = 348.20. Uranium yellow. An orange-yellow, rhombic, crystalline powder; soluble in water or acids. Used as a reagent, and in the manufacture of green glass, enamels and porcelain pigments. **s. urate.** $Na_2C_5H_2O_3N_4.H_2O$ = 230.1. A white, granular powder; slightly soluble in water. *acid-* $NaHC_5H_2N_4O_3$ = 190.05. A white granular powder, slightly soluble in water. **s. valerate.** $NaC_5H_9O_2$ = 124.1. Colorless crystals, soluble in water or alcohol; used medicinally as a sedative. **s. vanadate.** Na_3VO_4 = 184.2. S. *ortho*vanadate. A colorless crystalline powder, soluble in water. Used as a reagent and in the manufacture of inks and dyes. *meta-* See *s. metavanadate.* **s. wolframate.** S. tungstate. **s. xanthogenate.** $NaS(OC_2H_5)C{:}S$ = 144.1. A yellow powder, soluble in water or alcohol; used medicinally as an antiseptic and germicide. **s. zincate.** Na_2ZnO_2 = 143.4. A white amorphous powder, soluble in alkalis; decomp. by water into $Zn(OH)_2$ and NaOH.

sodos. A mixture of sodium dihydrogen phosphate and sodium bicarbonate; used medicinally.

sodyl. The monovalent NaO—radical. **s. hydroxide.** NaOOH = 56.01. A white powder, which explodes if heated.

soft-sized paper. Bibulous or blotting paper.

softener. (1) A substance which when added to another substance increases the plasticity of the latter. They are either true s. or lubricants; as, stearic acid or pine tar for rubber, respectively. (2) An agent used in water-softening, q.v. (3) A substance added to paper or glue to make it more pliable and prevent warping; as, diethylene glycol. (4) A substance imbibed by cellophane or cotton cellulose making it less brittle; as, glycerol and glycols. **anti-** A substance which stiffens; as, benzidine in rubber.

softening. (1) Making plastic. (2) Removing salts. **water-** See soft *water, permutite.*

s. temperature. The transition point at which substances without a sharp melting-point change from viscous flow into plastic flow, as determined by the plastometer.

softifume. A mixture of NaCN, $NaClO_3$ and sand, which is pressed into bricks and used in fumigation by dropping it into HCl to liberate HCN.

sogasoid. A dispersed system which consists of a solid phase in a gaseous phase, or solid colloidal particles suspended in air or a gas (as, smoke).

soil. The surface layer of the earth, which consists of the weathered mineral and rock fragments of diverse origin, mixed with decaying and decomposed vegetable and animal matter. Cf. *humus, subsoil.* See tables.

SOILS

	Lime	*Sand*	*Clay*	
lime poor	0–15	80–100	0	flying sand
			10	loose sand
			20	clay sand
		30–50	30	sandy loam
			40	mild loam
			55	strong loam
		0–30	65	mild clay
			75	common clay
			90	strong clay
lime rich	15–20	25–50	20–50	loamy soil
		0–25	50–75	clayey soil
	15–60	40–80	.....	sandy soil
	50–75	little	.....	calcareous soil
	75–95	little	.....	lime soil.

gravel—particles over		2	mm. diam.
coarse sand—	" 0.2	–2.0	mm. diam.
fine sand—	" 0.02	–0.20	mm. diam.
silt—	" 0.002	–0.02	mm. diam.
clay—	" below 0.002		mm. diam.

s. amendment. A material added to soil to improve its physical or chemical character and productivity other than by the plant nutrients. E.g., lime added to correct acidity or to promote flocculation of colloidal clay; sand added to prevent hardening of clay. **s. bacteria.** An important group of protophyta that enrich the soil by the ammonification and nitrification of nitrogen compounds. *E.g., Bacillus mycoides, B. proteus vulgaris, B. mesentericus, B. subtilis, B. janthinus, B. coli communis, B. megatherium, B. fluorescens.* Cf. *azobacter, acetobacter, nitrobacter, nitromonas, nitrosomonas, nitrogen cycle.* **s. science.** Pedology. The study of the surface layer of the earth.

soja. Soy bean.

sol. (1) A colloidal solution. (2) The liquid phase of a colloidal solution. **aero-** A colloidal system in which the surrounding phase is a gas; *e.g.*, smoke, fog. **collo-** Collosol. **electro-** Electrosol. **hydro-** A colloidal suspension in which the liquid phase is water. (See *gel*). **sulfo-** See *sulfosol.*

Solanaceae. Nightshade family, a group of herbs or shrubs with rank-scented, often poisonous foliage, and a colorless juice containing alkaloids. Cf. *solanum.*

Roots:	
Atropa belladonna.....	deadly nightshade, atropine
Brunfelsia hopeana....	manaca
Mandragora officinalis	mandragorine
Scopola carniolica.....	scopola
Leaves:	
Datura stramonium...	thornapple, stramonium
Hyoscyamus niger.....	henbane, hyoscine, hyoscyamine
Nicotiana tabacum....	tobacco, nicotine
Duboisia myoporoides.	duboisine
Duboisia hopwoodii...	pituri
Branches:	
Fabiana imbricata.....	pichi
Solanum dulcamara...	bittersweet, solanin
Fruits:	
Capsicum frutescens...	cayenne pepper
Lycopersicum esculentum.....	tomato

s. alkaloids. The alkaloids obtained from various species of Solanaceae.

atropine	$C_{17}N_{23}O_3N$
hyoscyamine	$C_{17}H_{23}O_3N$
hyoscine	$C_{17}H_{21}O_4N$
atroscine	$C_{17}H_{21}O_4N$
atropamine	$C_{17}H_{21}O_2N$
belladonine	$C_{17}H_{21}O_2N$
mandragorine	$C_{16}H_{19}O_2N$
meteloidine	$C_{13}H_{21}O_4N$

Cf. *grandiflorine, hypaphorine, lycine, natrine, noratropine, solandrine, solanine.*

solandrine. An alkaloid derived from *Solandra lavis.* It resembles hyoscine.

solanellic acid. $C_{23}H_{34}O_{12}$ = 502.2. A hexabasic acid formed on oxidation of bile acids.

solanidine $C_{27}H_{43}O_3N$ = 397.4. A decomposition-product of solanine. Colorless crystals, m.208, soluble in alcohol or ether.

solanin. $C_{45}H_{73}O_{15}N$ = 867.7. A glycoside from *Solanum nigrum,* potato and other species. Colorless, microcrystalline powder, m.280, slightly soluble in water; used medicinally as a nerve sedative.

solanine. $C_{52}H_{91}O_{18}N$ = 1017.7. An alkaloid in Solanaceae; decomp. 254.

solanorubin. Licopene.

Solanum. A genus of herbs and shrubs of the family Solanaceae. It includes the nightshades, potatoes, and other species. **S. carolinense.** Solanum, horse nettle, poison potato, sand brier, bull nettle. The air-dry ripe fruits of S.c., a Solanaceae of the Southern States; used medicinally, as the fluid extract, as a sedative. **S. dulcamara.** Bittersweet. **S. grandiflora.** S. yielding grandiflorine, q.v. **S. insidiosum.** Jurubeba. The root of S.i., a Solanaceae of Brazil; used medicinally as a stomachic and diuretic. **S. melongena.** The egg-plant of the tropics. **S. nigrum.** The common garden nightshade. **S. tomatillo.** S. yielding natrine, q.v. **S. tuberosum.** The common potato.

solar. Pertaining to the sun. **s. constant.** The amount of energy from the sun falling at normal incidence per 1 sq. cm. per minute, on a body at the earth's mean distance from the sun. It equals 1.932 small calories. **s. evaporation.** The concentration of a solution, as sea water, by the sun's heat. Cf. *evaporator.* **s. pond.** The flat areas surrounded by low dykes in which sea water is evaporated; as in California and Eritrea. **s. radiation.** See *radiation.* **s. rays.** The visible and invisible radiations of the sun. **s. spectrum.** The spectrum produced when sunlight is refracted by a prism or grating. It is characterised by the dark Fraunhofer lines. (See *spectrum.*) **s. year.** The ordinary year, q.v.

solargentum. A compound of silver and gelatin; black, lustrous granules, used medicinally.

solarization. (1) Exposure to the sun; as of a photographic plate or the accelerated ageing of rubber and celluloid articles. Cf. *irradiation.* (2) A decrease or complete disappearance of starch following long exposure to light, of plant leaves which previously formed abundant starch.

solate. A liquefied gel.

solation. The liquefaction of a gel; the reverse of gelation.

solbrol. Nipagin.

solder. Braze. A fusing metal or alloy used to unite adjacent surfaces of less fusible metals or alloys. **brass-** Copper s. **copper-** An alloy of 2 parts lead and 5 parts tin, using zinc chloride or resin as flux. **fine-** Soft s. **fusible-** An alloy of lead, tin, and bismuth, which melts in water and is also used in fire-spray extinguishers. See *Mellot's metal.* **gold-** An alloy of 4 parts copper, 6 parts silver and 10 parts gold. **hard-** A high melting-point alloy, used as s.; it fuses at red heat. *E.g.,* Cu + Zn + Ag. **lead-** An alloy of equal parts of lead and tin, used for soldering lead. **plumber's-** An alloy usually containing approx. Pb 65, Sn 30 %, with some Sb. **silver-** An alloy of silver, zinc and copper. **soft-** Any low melting s. which fuses below red heat, as Sn + Pb, *lead s. fusible s.* **zinc-** An alloy of 3 parts lead and 5 parts tin.

soldering. Brazing. The act of uniting metallic pieces by heat, with or without an alloy (solder) and flux (borax). **autogenous-** The union of metal surfaces by interfusion, without the addition of a more fusible alloy. **fusing-** The union of metal surfaces by filling all intervening space with a completely fused solder. **sweating-** S. in which the solder is heated near its melting point and then adheres to the metal surface without being completely fused.

Solenhofen stone. A fine-grained porous limestone, which contains clay.

solenoid. Selenoid.

solfatara. A volcanic vent from which deposits of sulfur are obtained.

solferino. Fuchsin.

solid. (1) A substance of definite shape, and relatively great density, lower internal heat content, greater cohesion of its molecules. It may be homogeneous (as crystals and solid solutions); or heterogeneous (as amorphous and colloidal substances). It differs from the liquid or gaseous state by reason of its slower molecular motions. **s. solution.** (1) Sosoloid. A completely homogeneous solidified mixture of substances; as, glass. (2) A solution of a solid, liquid, or gas in a solid, which is itself a solid.

solidago. Golden rod. The dried herb of *Solidago odora,* a Compositae. Used medicinally as a diaphoretic, stimulant, carminative and diuretic. The flower causes a form of hay fever.

solidify. To change into the solid state. Cf. *heat of solidification.*

solidifying point. Freezing point.

solidus. In a temperature-concentration diagram where there are both solid and liquid solutions, though the concentration of the two components are not the same, two curves are required for each system; the *s.* relates to the solid phase and the *liquidus* to the liquid phase. Cf. *diagram.*

soliquoid. A dispersed system which consists of a solid phase in a liquid phase. Solid colloidal particles suspended in a liquid; hence, a suspension.

solodization. Dealkalization, or the removal of alkali from soils by degradation.

solomon's seal. Polygonatum. The dried herb of *Polygonatum officinale,* a Liliaceae; used medicinally as an astringent and antirheumatic.

solubility. The extent to which a substance (solute) mixes with a liquid (the solvent) to produce a homogeneous system (solution). The degree of solubility is the concentration of a saturated solution at a given temperature.

Solubility generally increases with an increase in temperature. **apparent-** The total amount of substance dissolved in a liquid, comprising the non-ionized and ionized portions. **molar-** The relative number of molecules dissolved; m = s/M, where m is *molar solubility*, s the number of grams per liter and M the molecular weight. **real-** The amount of non-ionized portion of a solute dissolved in a liquid.

s. curve. A graph obtained by plotting the amount of dissolved substance in a saturated solution against the temperature. **s. exponent.** p or pS. The logarithm of the reciprocal of the solubility product; thus, $p_s = \log 1/S$. Cf. *pH*. **s. product.** The product of the concentration of ions of a substance in its saturated solution: Let MX be a salt that ionises to M^+ and X^-:

$$MX \rightleftharpoons M^+ + X^-, \quad \text{then,} \quad S = \frac{[M^+] \times [X^-]}{[MX]}$$

If the product of the ion concentration, $[M^+] \times [X^-]$, is smaller than the solubility product, the solution is unsaturated and MX will not precipitate. If its exceeds the solubility product, MX will precipitate, and in order to cause this it is not necessary to add both ions, as either added M^+ or X^- will shift the equilibrium to the saturation point and cause the precipitation of MX. For example, NaCl ionises to Na^+ and Cl^-, and can be precipitated in concentrated solutions by the addition of Cl^- as HCl gas.

soluble. Capable of mixing with a liquid (dissolving) to form a homogeneous mixture (solution). The degree of solubility may conventionally be expressed:

very soluble....	less than 1 part solvent
freely soluble...	from 1 to 10 parts solvent
soluble.....	from 10 to 30 parts solvent
sparingly soluble	from 30 to 100 parts solvent
slightly soluble..	from 100 to 1000 parts solvent
very slightly soluble	from 1000 to 10,000 parts solvent
insoluble.....	more than 10,000 parts solvent

needed to dissolve 1 part substance (solute).

Cf. *solubility, solution.* **s. barbital.** Barbital sodium. **s. cotton.** Nitrocellulose. **s. glass.** Sodium silicate. **s. gluside.** Sodium benzosulfinide. **s. mercury.** $NH_2Hg_2NO_3$ = 479.6. Hahnemann's mercury. A black precipitate obtained by adding ammonia to mercurous nitrate; used medicinally. **s. starch.** See *starch*. **s. tartar.** Ammonium potassium tartrate. **s. tartrate.** Potassium tartrate.

soluend. An early term for solute.

solurol. $C_{30}H_{46}O_{16}N_4.2P_2O_5$ = 1002.5. Thyminic acid, nucleotin phosphoric acid. A yellow amorphous powder, soluble in water; used medicinally (cf. *nucleic acid*).

solute. A substance that mixes with or dissolves in a solvent to produce a solution.

solution. The mixing of a solid, liquid or gaseous substance (solute) with a liquid (the solvent), forming a homogeneous mixture from which the dissolved substance can be recovered by crystallisation or other physical processes. It is generally not accompanied by chemical change, and is thus strictly a physical phenomenon that may or may not involve ionisation. Thus, NaCl = $Na^+ + Cl^-$ occurs in *solution;* whearas, $2Na + 2H_2O = 2NaOH + H_2$ is a chemical *reaction*. **alcoholic-** A solution in which alcohol is the main solvent. **anisotonic-** Any non-isotonic solution; as, a hypotonic or hypertonic solution. **aqueous-** A solution in which water is the main solvent. **buffer-** A solution which consists of acid or basic salts that can neutralize either acids or bases without any appreciable change in hydrogen ion concentration. **centinormal-** A solution containing $\frac{1}{100}$ equivalent moles per liter. **chemical-** A s. in which solute and solvent reaction to form a compound which dissolves in the remainder of the solvent; the latter can not therefore be recovered by distillation. Cf. *physical-*. **colloidal-** A macroscopically-homogeneous, but microscopically-heterogeneous system consisting of minute particles (colloid, dispersed phase) suspended in a liquid (continuous phase, medium). Cf. *colloid*. **concentrated-** A s. in which the solute is relatively great in quantity. **decinormal-** A solution which contains $\frac{1}{10}$ equivalent moles per liter. **dilute-** A s. in which the solute is relatively small in quantity. **gram-molecular-** Molar solution. **heat of-** See *heat*. **hypertonic-** A solution which has an osmotic pressure greater than that of blood serum. **hypotonic-** A solution having an osmotic pressure less than that of blood serum. **ionic-** A s. in which the ions of the solute are surrounded by oriented molecules of the solvent. **isotonic-** A solution having an osmotic pressure equal to that of blood serum. **molal-** A s. containing a gram-molecule (mol) of substance per 1000 gm. solution. **molar-** A solution containing a gram-molecule of substance per liter. It may differ from normal solution. **molecular-** A true s. in which the molecules of solute are surrounded by the molecules of solvent; Cf. *colloidal-, ionic-*. **normal-** A solution containing one equivalent gram-molecule per liter. It may differ from molar solution. **normal salt-** A solution containing one mol NaCl per liter. It differs from physiological or standard salt solution, q.v. **physical-** A s. in which solute and solvent mix but do not react chemically; the solute can be recovered on evaporation, the solvent by distillation. Cf. *chemical-*. **physiological-** An isotonic solution; as, a solution containing 0.6–0.7 % NaCl. **saturated-** A solution that normally contains the maximum amount of substance able to be dissolved. **solid-** See *solid-solution, sosoloid*. **standard-** A solution that contains a definite amount of substance dissolved; as, a molar or normal solution. **standardized-** A solution that has been adjusted to a definite, or known concentration, and has definite chemical, physical or therapeutic effects. **supersaturated-** A solution that contains a greater quantity of solid than can normally be dissolved at a given temperature, but from which the solid has not separated. It is obtained by slowly cooling a saturated solution, and is an unstable system from which the excess readily crystallizes or precipitates. **test-** T.S. A reagent solution. **volumetric-** V.S. A standard solution, usually containing 1, $\frac{1}{2}$, or $\frac{1}{10}$ mol of a substance dissolved in one liter of water; used in volumetric analysis.

s. pressure. The tendency of atoms or molecules to mix with a liquid, or to dissolve in it. It is measured by the osmotic pressure, and represents the "adhesive" power of the molecusle of the solvent towards the molecules of the

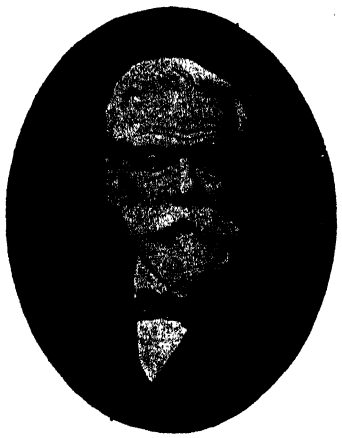
solute. A substance that is capable of forming ions produces the analogous solution tension (q.v.). **s. tension.** The tendency of atoms or molecules to ionize in a liquid, or to dissolve with ionization. It is generally measured by the electromotive force, and represents the power of atoms to hold or lose electrons. See *Nernst's theory.* **s. theory.** See *Nernst's theory, Arrhenius' theory.*

solvate. A molecular or ionic complex formed by one or more molecules or ions of the solvent with one or more molecules or ions of the solute; as, the hydrates $Na(H_2O)_x^+$ and $Cl(H_2O)_x^-$, where the ions are surrounded by a zone of oriented water molecules. **crystalline-** A crystal containing solvent as part of its lattice; as, water, alcohol, chloroform, benzene, acetic acid. **s. theory.** The abnormalities of solutions are due to the formation of addition compounds or complexes between the ions or molecules of the dissolved substance, and of the solvent. Cf. *zone, hydration, aquation.*

solvation. A combination between solute and solvent; if the latter is water, hydrates or hydrated ions are formed, *e.g.*, $M(H_2O)x$.

solvatochromism. The formation, by molecular addition, of a colored complex (solvate) between colorless molecules of organic compounds and those of other inorganic or organic compounds.

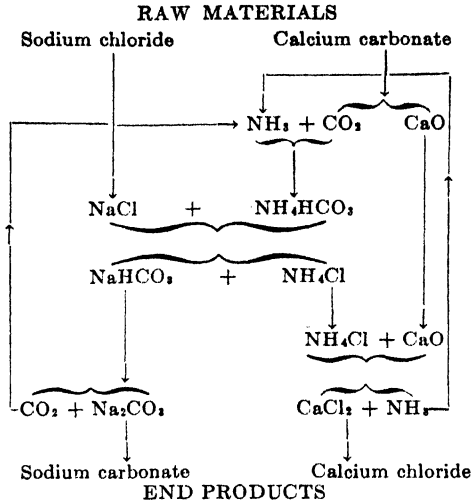
solvatone. A mixture of 80 % acetone, 10 % toluene and 10 % *i*-propylalcohol; used as a lacquer solvent.



Ernst Solvay.

(From Brownlee, Fuller and Hancock "Elementary Chemistry." Courtesy of Allyn & Bacon.)

Solvay, Ernst. 1838–1922. A Belgian chemist and industrialist, noted for his development of soda-manufacture. **S. process.** Ammonium soda process. A method of making sodium carbonate by treating sodium chloride with ammonia and carbon dioxide. The sodium bicarbonate produced is heated and some carbon dioxide recovered, while the ammonia is recovered by lime or magnesia. With sodium chloride and the resulting calcium carbonate as raw materials and with a certain quantity of ammonia as circulating medium, the net output is sodium carbonate and calcium chloride, according to the following flow-sheet:



solvent. (1) That component of a homogeneous mixture which is in excess. (2) A liquid which dissolves another substance (solute), generally a solid, without any change in chemical composition; as, sugar or salt in water. (3) A liquid which reacts chemically with a solid and brings it into solution; as, acids which dissolve metals. See tables. **acid-** One which acts as an acid by losing a proton to the solute. **associating-** A s. whose molecules form complexes; as, water, liquid ammonia. Cf. *bond, association.* **aqueous-** Water. **basic-** One which acts as a base by gaining a proton from the solute. **chemical-** A substance which reacts with another to form a solution; as carbonates or sulfides which dissolve in acids. **hydrocarbon-** Gasoline, benzene, kerosene, etc. **ionizing-** See *polar-*. **lacquer-** Those organic liquids which are used to dissolve resins and nitrocellulose. They are classified as: *low boiling*—b. below 100 (acetone, alcohol, benzene); *medium boiling*—b. near 125 (toluene, butyl acetate, amyl acetate); *high boiling*—b. 150–200 (xylene, ethyl acetate, benzyl alcohol); and as *plasticizers* and *softeners*—b. near 300 (camphor, phthalates, phenyl phosphates). **molten-** Flux. **nonassociating-** A s. which does not form complexes between its molecules or ions and the solute; as, benzene. **nonaqueous-** A solvent other than water. **nonionizing-** Nonpolar. **nonpolar-** A solvent which does not conduct an electric current; as hydrocarbons, chloroform, carbon disulfide, etc. **normal-** Nonassociating-. **physical-** A s. which does not react chemically with the solute. **polar-** A s. which produces electrically-conducting solutions, (as, water, liquid ammonia, sulfur dioxide, hydrocyanic acid, hydrofluoric acid, organic acids and alcohol) and causes dissociation of the solute into ions. **universal-** Aqua regia.

s. action. Any process of making substances water-soluble; as insoluble phosphates transformed by soil bacteria to the soluble phosphoric acid.

ONE-TYPE SOLVENTS

(*a*) Alcohols, R.OH.
methanol, wood alcohol
ethanol, grain alcohol
propanol, propyl alcohol

butanol, butyl alcohol
glycol, ethane-1.2-diol
propan-1.3-diol
glycerol, glycerine
(*b*) Ethers, R.O.R.
dimethylether
ethylmethylether
ethylether, ether
propylmethylether
methylal, dimethoxymethane
glycoldimethylether
(*c*) Ketones, R.CO.R.
acetone, dimethylketone
ethylmethylketone, 2-butanone
diethylketone, 3-pentanone
propylmethylketone, 2-pentanone
acetylacetone, 2.4-pentandione
acetonylacetone, 2.5-hexandione
(*d*) Esters, R.COO.R.
methylacetate
methylpropionate
methylbutyrate
ethylacetate
propylacetate
ethyleneacetate, glycoldiacetate

TWO-TYPE SOLVENTS

(*ab*) Alcohol-ethers, HO.R.O.R.
cellosolve, methoxyethanol
ethoxyethanol
diethoxyglycerol
(*ac*) Alcohol-ketones, HO.R.CO.R.
acetol, acetylcarbinol
acetylpropyl alcohol
diacetone alcohol
(*ad*) Alcohol-esters, HO.R.COO.R.
methylglycolate
ethylglycolate
cellosolve acetate
(*bc*) Ether-ketones, R.O.R.CO.R.
methoxyacetone
ethoxyacetone
diethoxyacetone
(*bd*) Ether-esters, R.O.R.COO.R.
methylmethoxy acetate
methylethoxy acetate
ethylethoxy lactate
(*cd*) Ketone-esters, R.CO.R.COO.R.
methyl pyruvate
ethyl pyruvate
methylketo butyrate

solvolysis. The effect of the acid or basic character of a solvent on the ionization of a salt dissolved in it.

solvolytic. Pertaining to solvation. **s. dissociation.** Ionization in a non-aqueous solution; as, liquid ammonia. Cf. *solvate* theory.

sombrerite. A "hard" mineral phosphate (35 % P_2O_5); a source of phosphorus.

Sommerfeld, Arnold. A German physicist, noted for his development of the quantum theory of atomic structure. **S. notation.** See *quantum numbers*.

somnal. $C_7H_{12}NO_3Cl_3$ = 264.49. An ethyl derivative of chloral urethane. A clear colorless liquid, used medicinally as a hypnotic and diuretic.

somnifacient. A hypnotic, or agent that causes sleep.

somnifene. Allonal.

somnirol. $C_{32}H_{44}O_7$ = 540.34. A monohydric alcohol of *Withania* species, Solanaceae.

somnitol. $C_{33}H_{46}O_7$ = 554.43. A dihydric alcohol from *Withania* species, Solanaceae.

somnol. $C_9H_{11}O_6Cl_3$ = 518.2. Somnos. Chlorethanal alcoholate. Colorless crystals, used medicinally as a hypnotic.

somnos. Somnol.

soneryl. Neonal.

sonic. Phonic. Cf. *sound*.

Sonnenschein, Franz Leopold. 1819–1879. A German pharmacist noted for analytical and forensic methods. **S.'s reagent.** A solution of phosphomolybdic acid. It forms a yellow precipitate with the sulfates of alkaloids.

sonometer. Phonometer. An instrument for measuring sound vibrations.

sonora gum. The exudations of the creosote bush, *Covillea tridentata*, a native of the South Western States and Mexico.

soot. An impure black carbon containing oily and empyreumatic compounds produced during the incomplete combustion of resinous materials or wood. It contains hydrocarbons, and if derived from coal, it has a fertilizing value on account of the presence of ammonium sulfate. Cf. *lamp-black*.

sophol. A compound of silver and methylene-nucleinic acid; a yellowish powder, used medicinally.

sophora. Coral bean. The poisonous seeds of *Sophora* species, a Leguminosae of India. **S. tomentosa.** A leguminous shrub or tree of the Dutch East Indies and Japan. A famous remedy for cholera and diarrhea; it contains an alkaloid, sophorine.

sophorin. $C_{27}H_{30}O_{16}$ = 610.23. A glucoside from *Sophora* species. Cf. *cyanin*.

sophorine. An alkaloid from *Sophora* species. A colorless liquid resembling cytisine and matrine. Cf. *kuhseng*.

soporific. An agent that produces deep sleep; a hypnotic.

sorbic acid. $C_6H_8O_2$ = 112.1. Hexadienic acid, pentadiene carboxylic acid, *2.4*-hexadienoic acid*. A monobasic acid, Me.CH:CH.CH:CH.COOH, derived from the unripe berries of mountain ash (*Sorbus*). Colorless needles, m.134, b.228 (decomp.), slightly soluble in water, soluble in alcohol or ether. **hydro-** Hexenic acid*. **methylenedioxyphenyl-** Piperic acid. **para-** A lactone-like body that changes when heated with H^+ or OH^- to sorbic acid.

sorbin. Sorbinose.

sorbinose. $C_6H_{12}O_6$ = 180.1. Sorbin, *1.3.4.5.6*-pentahydroxy-*2*-hexanone*, sorbose. An optically-active carbohydrate derived from the fruits of mountain ash (*Sorbus*). Colorless rhombic crystals, d.1.654, m.154; slightly soluble in water, alcohol or ether.

sorbite. (1) Sorbitol. (2) A constituent of steel; considered to be a mixture of ferrite and cementite. It is a transition-form between pearlite and troostite.

sorbitol. $C_6H_{14}O_6.\frac{1}{2}H_2O$ = 191.1. Sorbite, *1.2.-3.4.5.6*-hexanehexol*. An alcohol isomer of mannitol from *Sorbus aucuparia*. Colorless crystals, m.111, soluble in water or alcohol.

sorbol. $C_{34}H_{70}O$ = 494.5. An alcohol, m.78, from the wax of the berries of *Sorbus aucuparia*.

sorbose. Sorbinose.

sorbus. Rowan tree, mountain ash. The tree *Pyrus* (*Sorbus* or *Mespilus*) *aucuparia*, a Rosaceae. Its ripe berries furnish an acidulous and astringent gargle; its unripe berries yield sorbic acid. A decoction of the bark is used for diarrhea, and contains sorbitol and sorbinose.

Sorel, cement. $MgO.MgCl_2.11H_2O$. A hard, quick-setting mixture of MgO and a conc. solution of $MgCl_2$. **S. dental cement.** A mixture of ZnO, $ZnCl_2$ and fine sand. **S. floor cement.** A mixture of MgO, $MgCl_2$ and Portland cement, used for hard, smooth, dustless floors in office buildings. The addition of 10 % finely-powdered copper makes it waterproof.

Sörensen, S. P. L. 1868–1939. A Danish chemist noted for the preparation of pure salts, aminoacids and enzymes. **S. indicators.** A group of indicators, used to determine the hydrogen-ion concentration. See *indicators*. **S. phosphate.** Dibasic sodium phosphate. **S. symbols.** See P_H. **S. value.** Hydrogen-ion concentration.

Soret's effect, S.'s principle. Ludwig phenomenon. When differences of temperature are maintained in a salt-solution, the dissolved material will concentrate in the coolest portions of the liquid.

sorghum. A cane-like grass, *Andropogon sorghum*, from which a sugar and syrup is obtained.

soricin. A registered trade-mark for certain preparations containing purified sodium ricinoleate which are employed as sclerosing agents and detoxicants as well as to prevent absorption of toxins.

sorption. A reaction occurring on a surface; such as, hydrolysis, electrification and especially *absorption* (q.v.) or solution, *adsorption* (q.v.) (strictly confined to a surface, as between liquid and solid), *persorption* (permeation into a very porous solid). Cf. *monomolecular film, orientation, desorption.* **ab-** See *absorption.* **ad-** See *adsorption.* **re-** See *resorption.* Cf. *zone.*

sorrel. The leaves of *Rumex acetosa*, a Polygonaceae, used as refrigerant and diuretic. **s. salt.** Potassium bioxalate.

sosoloid. Solid solution. A dispersed system consisting of a solid phase dispersed in another solid phase. See *colloidal systems.*

Soubeiran, Eugène. 1797–1858. A French apothecary, noted as discoverer of chloroform and as a writer.

sound. (1) Those air-oscillations or vibrations which affect the ear and are rendered audible. Cf. *musical notes.* (2) The vibrations in air or other medium which may or may not be audible; as, *infraphonic* (longer frequency than audible s.); *phonic* (audible); *ultraphonic* (shorter frequency than audible s.). (3) Free from defect; as s. steel, which is free from blowholes. **s. intensity.** The actual energy content of s. waves as measured by electrical instruments. **s. loudness.** The magnitude of s. as measured by the human ear; it is related to intensity as follows:

Loudness	*Intensity*
10 decibels =	10
20 decibels =	100
30 decibels =	1,000
40 decibels =	10,000
50 decibels =	100,000
60 decibels =	1,000,000
70 decibels =	10,000,000

Cf. *phon, loudness.* **s. velocity.** The speed with which s. vibrations travel in materials:

in air	331.9 m. per sec.
in water	1460 m. per sec.
in wood	4200 m. per sec.
in iron	5000 m. per sec.

s. waves. Phonic waves. Mechanical radiations consisting of air vibrations. Cf. *sound* (2), *noise, decibel.* The *highest audible* s. has a wave-length of 17 mm.; the *lowest audible* s. 16 m.

sourwood. The leaves of *Oxydendrum arboreum*, a small tree of North America; used medicinally as the fluid extract.

southern wood. *Abrotanum.*

sovprene. A polymerized chloroprene, q.v.

Soxhlet, Franz. 1848–1913. A German chemist, noted for his methods of food analysis. **S. apparatus.** A flask and condenser for the continuous extraction of fats or other alcohol-soluble or ether-soluble materials (see illustration).

Soxhlet apparatus.

soy. S. bean. **s. bean.** Soja, soya. The bean of *Soja hispida*, a Leguminosae of China. It is an important native food and the source of many preparations; as, flour, sizing materials, bean cake, sauce, cheese, etc. It contains protein, starch, alkaloids and urease. **s. bean oil.** A colorless oily liquid expressed from s. $D._{15}°0.925$, free fatty acids (as oleic acid) 0.46 %, sapon. val. 191.1, iodine val. 129.2; used in cooking.

soya. Soy bean.

sozal. $Al_2[C_6H_4(OH)SO_3]_6 = 1093.4$. Aluminum-p-phenolsulfonate, aluminum sulfocarbolate. A brown crystalline powder, soluble in water or alcohol; used medicinally as an iodoform substitute and antiseptic.

sozalbumin. A non-toxic defensive protein. Antonym, toxalbumin.

sozins. Defensive proteins which occur normally in the body. Antonym, toxosozins.

soziodol. Sozoiodol.

sozoiodol. $C_6H_4O_4I_2S = 425.94$. Sozoiodolic acid, soziodol, diiodo-p-phenolsulfonic acid, $C_6H_2I_2OH.SO_3H$. A white lustrous, crystalline powder, decomp. 200, soluble in water. Used medicinally as an antiseptic and iodoform substitute.

sozoiodolate. A salt of sozoiodol. Those of Pb, Hg, K, Na, and Zn are used medicinally as antiseptics.

sozoiodolic acid. Sozoiodol.

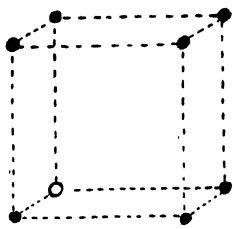
sozolic acid. Aseptol.

Sp. An abbreviation for spirit.

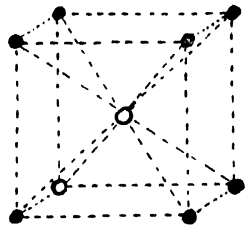
Sp. Gr. An abbreviation for specific gravity.

space. The three-dimensional concept of length, width, and height: L^3, where L is any unit of length. **Crookes'-.** Dark s. **dark-** A non-luminous region near the cathode of a vacuum tube, through which a high-frequency current is passing. **interatomic-** The region between the outermost orbits of two atoms. **intra-atomic-** The area within the outermost orbit of an electron and the nucleus of an atom. It consists of the kernel (q.v.) and the orbits of the valence electrons.

s. group. One of the characteristic space lattices or arrangements of atoms in a crystal. **s. lattice.** The pattern formed by the spatial distribution of atoms or radicals in a crystal, q.v. See figure.



Cubic



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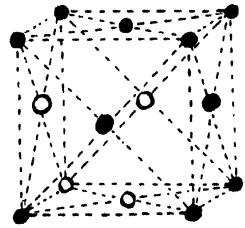


Face-centered

Space lattice.

spalling. (1) The failure of a refractory material to withstand stresses induced by temperature fluctuations without rupture. (2) Of metals: The cracking or flaking off of particles from a surface (*e.g.*, wheels and rails). (3) In general: The splintering, cracking or breaking up of materials due to heat (*e.g.*, ceramics).

span. A unit of length in the English system. It equals 9 inches, half a cubit, or 22.86005 cm.

Spanish broom. Spartium. **S. flies.** Cantharides. **S. hops.** Origanum. **S. moss.** Vegetable *horsehair*.

spans. Trade name of a group of sorbitan esters having emulsifying properties.

spar. Any transparent or translucent, readily cleavable, crystalline mineral having a vitreous luster; as, calcspar, feldspar, fluorspar, heavy spar.

sparassol. $C_{10}H_{12}O_4$ = 196.09. Methyl evernate, $C_6H_2(COOMe)Me(OMe)OH$, *-1.2.4.6.* An ester and ether from the oil of *Sparassis ramona*, a lichen. Colorless powder, m.68. Cf. *lichenol.*

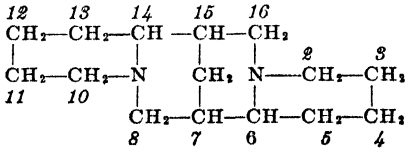
spark. A flash of light produced chemically or physically; as, on burning iron wire in oxygen, or passing an electric discharge through air. It differs from an arc since it depends on the ionization of the medium through which it passes. **s. spectrum.** An emission spectrum characteristic of the electrode metal, obtained by refracting the flashes passing between metallic electrodes carrying a high-tension discharge. It is used in analysis and is characterized by the enhanced lines due to ionized atoms. It differs from the arc spectrum (produced by neutral atoms), and resembles in general the arc spectrum of the element of next smallest atomic number. Cf. *isostere.*

sparking. Producing electric sparks. Cf. *arcing.* **s. potential.** The electric potential necessary to produce a spark in vapor or gas at ordinary temperature. It depends on the distance apart, shape, and size of the electrodes.

sparklet. A powder (similar to baking powder) for the generation of small quantities of carbon dioxide in the laboratory.

spartalite. Native zinc oxide.

sparteine. $C_{15}H_{26}N_2$ = 234.2. Lupinidine. An alkaloid obtained from *Spartium scoparium* or broom. Cf. *scoparius.*



A colorless oily liquid, d.1.02, b.328, soluble in water, alcohol, ether, or chloroform. Used medicinally as a heart stimulant. Cf. *cytisine, anagyrine.* **s. bisulfate.** Sparteine sulfate. **s. hydriodide.** $C_{15}H_{26}N_2(HI)_2$ = 490.09. Colorless needles; soluble in water or alcohol. **s. hydrochloride.** $C_{15}H_{26}N_2(HCl)_2$ = 307.17. Colorless crystals; soluble in water or alcohol. **s. sulfate.** $C_{15}H_{26}N_2.H_2SO_4.5H_2O$ = 422.40. Sparteine bisulfate. Colorless, deliquescent crystals, m.136, soluble in water, alcohol or ether; used medicinally as a cardiac tonic and diuretic.

spartium. (1) Scoparius. (2) The fiber from *S. junceum*, Spanish broom, a Leguminosae. Cf. *esparto.* **s. alkaloids.** A group of alkaloids derived from scoparius:

sparteine	$C_{15}H_{26}N_2$
spartyrine	$C_{15}H_{24}N_2$
oxysparteine	$C_{15}H_{24}ON_2$
dioxysparteine	$C_{15}H_{24}O_2N_2$
trioxysparteine	$C_{15}H_{24}O_3N_2$

spasmotin. $C_{20}H_{21}O_9$ = 405.2. Sphacelotoxin. A poisonous principle from ergot. A yellow amorphous powder, soluble in alcohol or ether.

spathic. Describing a lamellar or foliated structure. **s. iron ore.** Siderite.

spatial. Pertaining to space.

spatula. A blunt knife used for mixing semi-solid masses, or to transfer small quantities of powders in weighing.

spearmint. Mentha viridis. The dried leaves of *Mentha spicata*, a Labiatae. Used as the fluid extract, as a carminative and flavoring agent. **s. oil.** Oleum menthae viridis. The volatile oil distilled from the fresh overground portions of the flowering plant *Mentha spicata.* Colorless oil, d.0.917–0.934, soluble in alcohol; it contains carvone, linalol, pinene, etc.

spear pyrites. Marcasite.

species. (1) A subdivision of a genus of plants or animals. (2) The Latin term for a tea. (3) A type; as, atomic s. **aromatic-** A mixture of thyme, peppermint, lavender and cloves. **laxative-** St. Germain tea. A mixture of senna, elder flowers, fennel, anise, and potassium bitartrate. **pectoral-** Breast tea. A mixture of althaea, coltsfoot, licorice, anise, mullein and orris.

specific. Pertaining to a single kind of matter, microorganism, plant, animal; or to any particular thing. **s. charge.** The ratio e/m_0 = 1.760×10^7 e.m.u./g. = 5.276×10^{17} e.s.u./g. **s. conductivity.** See *conductivity.* **s. conductance.** L. The reciprocal of the resistance, R, of a centimeter cube of a substance; L = 1/R. **s. energy.** See *energy.* **s. gravity.** The ratio of the density of a substance to the density of another substance chosen as standard; *i.e.*,

$$\text{Sp. Gr.} = \frac{\text{weight of substance}}{\text{weight of equal volume of standard}},$$

(weighed under the same conditions). In the case of solids and liquids the standard is usually water, and in metric units it is equal to the density (grams per cubic centimeter). In the case of gases the standards are oxygen, hydrogen or air, and they can be calculated from the molecular weight for ideal gases (see *equation of state*):

$D_{(O_2=1)}$ = Molecular weight = M
$D_{(H_2=1)}$ = Molecular weight divided by 2
$D_{(air=1)}$ = Molecular weight divided by 28.95

See *hydrometers*. **s. heat.** The number of calories required to raise the temperature of one gram of material by one degree centigrade. **s. inductive capacity.** Di-electric constant. **s. magnetization.** The susceptibility to a magnetic field, $\chi = I/Hd$; I is the quantity of magnetization, H the intensity of the magnetic field, d the density of the material. **s. reaction rate.** The constant, k, or rate of reaction at unit concentration (1 mol per liter). **s. refraction.** Refractivity. The degree of deviation of light caused by an element or compound. It is the ratio (1) $\frac{n-1}{d}$; or (2) $\frac{n^2-1}{n^2-2}\cdot\frac{1}{d}$; n is the refractive index, and d the density of the substance. **s. resistance.** Resistivity. The number of ohms of resistance offered at a particular temperature by one cubic centimeter of material. Conductivity (q.v.) is the reciprocal of resistance. S.r. is expressed by the factor of proportion, $\rho = Ra/l$, where R is the resistance in ohms, a the area of a cross section and l the length of the body; ρ is expressed in ohm-cm.; 1 ohm-cm. = 0.3937 ohm-inch. **s. rotation.** The angle of rotation, α, produced by one cubic centimeter of material at standard temperature with sodium light: $[\alpha]^t_D = \frac{rv}{nl}$ where $[\alpha]^t_D$ is the s. rotation at t°C. for the sodium line D; r, the observed rotation in angular degrees, v the number of cc.; n the number of grams dissolved; and l, the length of the tube in cm. See *polariscope*, *rotation*. **s. rotatory power.** The rotation (in angular degrees) produced by a solution containing one gram of substance for each cc. of liquid and examined in a column 10 cm. long, usually with the yellow sodium flame (D-line of spectrum) and at room temperature (20°C.); hence $[\alpha] = \frac{100a}{lc}$, where $[\alpha]$ is the s.r., a the observed angle, l the length of the column in decimeters, and c the concentration (g. per 100 cc.). **s. surface.** The ratio of the area A, per unit volume, V, of a colloidal system: sp. s. = A/V. **s. volume.** The volume occupied by one gram of material. It is the reciprocal of density. sp. vol. = 1/d. **s. weight.** Specific gravity.

specifics. A small group of remedies that are exceptionally definite and uniform in their action towards certain diseases; as, quinine for malaria or mercury for syphilis, germanin for sleeping sickness, magnesium sulfate for tetanus, emetine for amebic dysentery, amyl nitrite for angina pectoris.

specpure. Spectroscopically pure; *e.g.*, applied to a substance giving a pure spectrum, characteristic of itself only.

spectra. Plural of spectrum, q.v. Classification:

A. The SOURCE of the light—

solar s.	flame s.	vacuum spark s.
stellar s.	flash s.	vacuum flash s.
arc s.	explosion s.	x-ray s.
spark s.	vacuum arc s.	

B. The KIND of spectrum produced—

emission s. or absorption s. { continuous s. (*a hot solid body*); discontinuous s. { line s. (*atoms*); band s. (*molecules*) }

C. The MODE of production—

prism-refracted s.	grating diffracted s.
grating-refracted s. primary, secondary, etc.	primary, secondary, etc.
	crystal diffracted s.

spectral. Pertaining to a spectrum. **s. analysis.** See *spectrum analysis*. **s. classification.** S. types. Harvard Star classification. A systematic arrangement of the stellar spectra in a continuous sequence of types, which ranges from bright line spectra to diffused band spectra. Of all the stars examined 99 % fall into the classes B, A, F, G, K, M, and N, which are characterized by the following predominant lines:
B—hydrogen and helium lines
A—hydrogen lines
F—hydrogen lines and faint metallic lines
G—many metallic lines, but no compounds
K—strong metallic lines, very weak bands
M—banded spectra of metallic oxides
This, however, does not indicate completely the chemical nature, but rather the physical conditions of a celestial object. Cf. *transuranium*, *hypon*. The stars of each class show many similarities of temperature, brightness and size, which lead to conclusions as to their equality of mass and internal conditions. See table of star s. classes. **s. tube.** An evacuated glass tube with two electrodes. By filling the glass tube with a gas before evacuation, the remaining,

Spectral tube.

rarefied traces of gas produce light with a characteristic spectrum when an electric current is passed through. **s. types.** (1) S. classification. (2) See spectra.

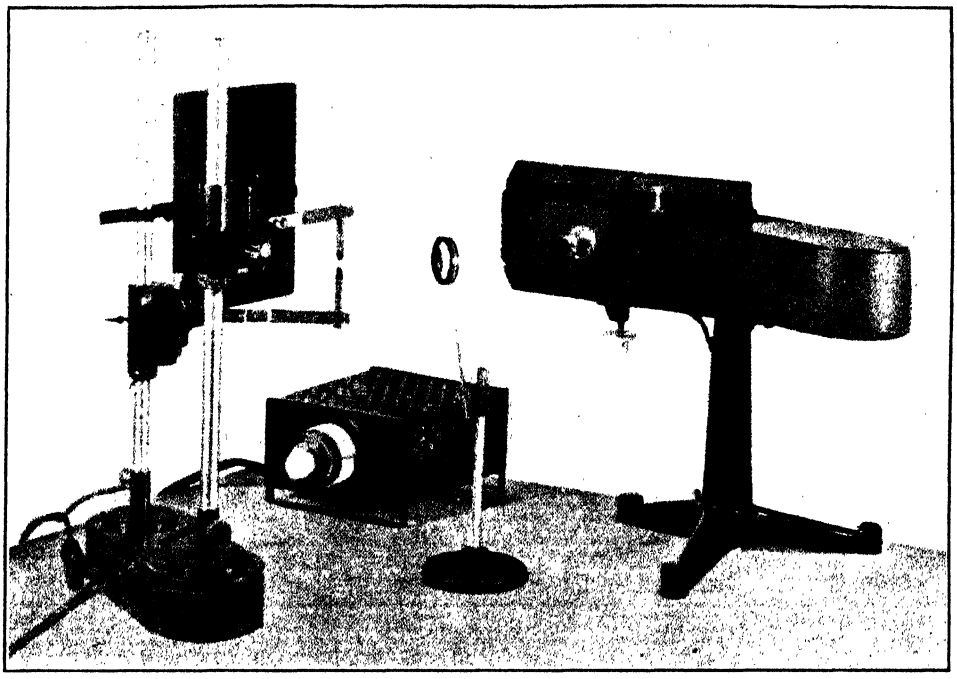
spectrochemical analysis. Spectroscopic analysis.

spectrochemistry. A branch of science that utilizes light waves as a means of chemical analysis (see *spectrum analysis*).

spectrogram. The photographic plate, film or print on which a spectrum is recorded, together with a standard comparison spectrum.

spectrograph. An instrument to produce a spectrogram, consisting of (1) the slit, (2) the lenses (collimeter or camera lens), (3) the dispersing system (prisms or gratings), (4) the recording system (photographic, thermal or ionic). See illustration. **quartz-** A s. used for wave-lengths of 8000–2000 A.U. **x-ray-** A device for obtaining crystallograms.

spectroheliograph. A device for photographing the sun's surface by means of a spectroscope employing a specific line of the spectrum; the slit of a camera is focused on the desired portion



Spectrograph.

1. Arc and spark stand: 2. Rheostat: 3. Condensing lens; 4. Littrow spectrograph. (*Bausch and Lomb.*)

of the solar spectrum, and a picture of the distribution of certain element vapors is obtained.

spectrometer. A spectroscope with scales for measuring the angle of refraction and the wavelengths of lines or bands. **constant deviation-** A s. in which the collimator and telescope are fixed permanently at right angles, and the prism is rotated.

spectrometry. The measurement of the wavelengths of the lines or bands in a spectrum and their identification with the elements which produce them.

spectrophotometer. (1) A device for measuring photometrically the quantity of light of any particular wave-length range absorbed by a colored solution. (2) A device for measuring the intensity of the photographic image of a spectral line.

spectroscope. (1) An instrument for analyzing light by separating it into its component rays. It consists essentially either of a prism that refracts the light, or a grating by which the light is diffracted, together with a device for making the rays parallel (collimator) and an eyepiece for enlarging the spectrum (view telescope). (2) A device by which radiations are separated into component parts; as, mass s., x-ray s. S. are classified in terms of:

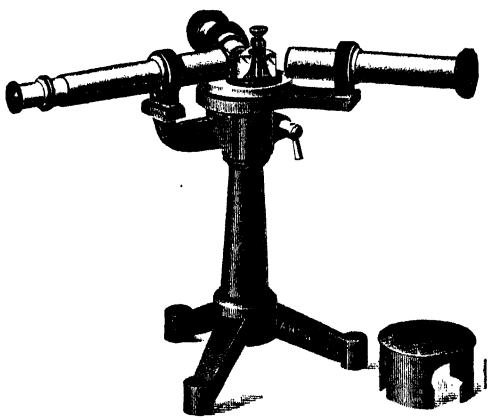
(1) Slit:
- present ..... general work
- absent ..... astronomical work

(2) Lens system (collimator):
- quartz ..... for ultra-violet
- crown glass ..... for low dispersion
- flint glass ..... for high dispersion
- fluorite, sylvine and rock salt ..... for infra-red

(3) Dispersing system:
- prisms (made of material as under 2)
- plane grating
- concave grating

(4) Observing and recording system:
- eyepiece ..... visual (spectroscope)
- photographic plate ..... spectrograph
- thermopile, photoelectric cell ..... energy measurements

abridged- An absorptiometer (q.v.) used with a series of restricted spectral ranges. **comparison-** A s. for comparing two spectra, side by side. **direct vision-** A s. of low-dispersive power in which the collimator, train of prisms and eyepiece are along the axis of a single tube.



Prism spectroscope.

SPECTRAL CLASSIFICATION OF STARS

Showing the relations of spectral class (a), temperature (b), luminosity (c, d, and e), radius (f), mass (g) and density (h)

(a)	(b)		(c)	(d)	(e)	(f)	(g)	(h)
		MAIN SEQUENCE						
B1	21000°C	β Centauri	0.9	−3.8	3100	11	(25)	0.018
B2	20000	Spica α Virginis	1.2	−3.1	1500	.....	(20)	
B3	17000	ν Scorpii	4.3	−0.8	.....	3.2	(5.2)	0.16
A0	11200	β Aurigae	2.8	0.6	50	2.4	2.2	0.18
A0	11200	Vega α Lyrae	0.1	0.6	50	2.4	3.0	0.11
A0	11200	Sirius α Canis Maj. A	−1.6	1.3	26	1.8	2.3	0.42
A3	9000	Formalhaut α Piscis Austr.	1.3	2.0	13			
A5	8600	Altair α Aquilae	0.9	2.5	9.2	1.4	1.7	0.6
dF5	6500	Procyon α Canis Min.	0.5	3.0	5.4	1.9	1.1	0.16
dG0	6000	α Centauri A	0.3	4.7	1.1	1.1	1.1	1.1
dG0	6000	SUN	−26.7	5.0	1.00	1.00	1.00	1.42
dK0	5100	70 Ophiuchi A	4.3	5.7	0.21	1.0	0.9	0.9
dK7	3800	61 Cygni A	5?0	8.4	0.04	0.7	0.45	1.3
dM3	3300	Krüger 60 A	9.2	11.2	0.003	0.34	0.26	9.0
dM4	3100	Bernard's star	9.7	13.4	0.001	0.16	0.18	45
		GIANTS AND DWARFS						
		(giants)						
gG0	5500	Capella α Aurigae A	0.9	−0.1	150	12	4.2	0.0024
gK0	4100	Arcturus α Boötis	0.2	−0.3	100	30	(8)	0.0003
gK5	3300	Aldebaran α Tauri	1.1	−0.1	90	60	(4)	2×10^{-5}
gM5	2900	β Pegasi	2.6	−1.4	600	170	(9)	2×10^{-6}
		(super-giants)						
cM5	3100	Betelgeux α Orionis	0.9	−2.9	1200	280	(15)	6×10^{-7}
cM0	3100	Antares α Scorpii A	1.2	−4.0	3400	480	(30)	3×10^{-7}
cB8	.....	Rigel β Orionis	0.34	−5.8	18000			
cF0	.....	Canopus α Carinae	−0.8	−7.4	80000			
		(white dwarfs)						
F	7500	Companion to Sirius	8.4	11.2	0.003	0.034	0.96	27000
A0	11000	40 Eridani B	9.7	11.2	0.003	0.019	0.44	64000
F	7500	van Maanen's star	12.6	14.5	.....	0.007	(0.14)	400000

(a) *Spectral Class* (d—dwarfs, g—giants, c—super-giants).
(b) *Surface Temperature*, decreases gradually from 21,000°C. in class B to 3000°C. in class M.
(c) *Apparent* or *Visual Magnitude* as seen from the earth. Brightest stars are Sirius, Canopus, α Centauri, Vega, Arcturus. (A standard candle at 1 m. distance has −14.2, at 1 km. distance 0.8.)
(d) *Absolute Magnitude*, corrected for distance: −7.4 (Canopus) the brightest, and 14.5 (van Maanen's star) the faintest star on this list.
(e) *Luminosity*, the reciprocal of absolute magnitude. Compared to the Sun = 1, it ranges in giants from 80,000 to 10, in the main sequence from B = 3100 to M = 0.001.
(f) *Radius* as compared to Sun = 1, ranges in giants from 480 to 12, in main sequence from 11 to 0.1, and in the white dwarfs from 0.03 to 0.007.
(g) *Mass*, remains for all stars within the narrow range of $\frac{1}{10}$ to 30 times the mass of the sun.
(h) *Density*, in giants from 0.000,000,3 to 0.002,4 (highly-rarified gases); in main sequence from B = 0.01 to M = 9.0; and in dwarfs from 50 to 400,000 times the density of water (closely-packed atoms stripped of electrons).

(Adapted from Russel, Dugan and Stewart, "Astrophysics," Ginn and Co., 1927.)

It is used in analytical work. **grating-** A s. of high dispersive power in which a series of spectra is formed by either: (a) a reflection grating, a finely-ruled piece of plane or concave (self-focusing) speculum metal; or (b) a transmission grating, which is a celluloid cast of the original grating. **mass-** A device for separating canal rays or positively-charged corpuscles by subjecting them to electric and magnetic fields. Cf. *isotopes, mass spectra.* **measuring-** A s. adapted to the measurement of the wave-lengths of the component rays; a *spectrometer.* **micro-** See *microspectroscope.* **photographic-** A s. in which the viewing telescope is replaced by a camera; a *spectrograph.* **prism-** A s. of low or high dispersive power containing a single prism or a train of prisms, either of glass, quartz, rock salt or other transparent material. **reversion-** A s. which enables the same spectrum to be reproduced twice, but in reverse directions, thus doubling any displacement of absorption bands; used for the determination of CO in blood. **x-ray.** See *x-ray spectrometer.*

spectroscopic. Associated with the spectroscope. **s. analysis.** Spectrum analysis, spectrochemical analysis. The qualitative and quantitative

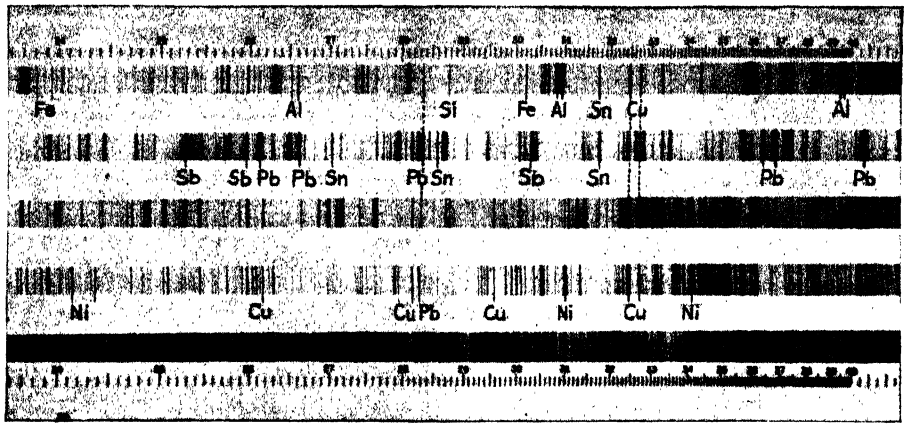
analysis of substances by means of the spectroscope. Minute quantities of elements may be detected by their characteristic lines in the spectrum. The principal methods are:

1. Examination of a flame (bunsen burner) colored with a small quantity of the substance:
   sodium, yellow line 589
   potassium, red lines 766, 769, purple line 404
   lithium, red line 671
   cesium, blue lines 455, 459
   rubidium, purple lines, 420, 421
   calcium, orange band 620–618
   strontium, red bands, 686–674–662 and 606
   barium, green line 553, bands 534–524, etc.
   radium, red band 670–653
   thallium, green line 535
   indium, blue line, 451, purple line 410
   copper, green and blue lines and bands
2. Examination of an electric spark passing through a small cup containing a solution of the substance; for: magnesium, iron, manganese, zinc, cobalt, nickel, chromium.
3. Examination of the spectrum when the light has previously passed through a solution of the substance (absorption spectrum). This method is used extensively in the investigation of organic substances, including blood and coloring materials.

spectroscopically. Pertaining to spectroscopy. **s. pure.** Specpure. The degree of purity of a substance which enables it to be identified spectroscopically, the essential lines being apparent without interference from those due to the impurities present.

spectroscopy. That branch of science which investigates the properties of light by means of the spectroscope.

spectrum. (1) A variously-colored band of light showing in succession the rainbow colors or isolated lines or bands of colors; produced by refraction through a prism, or by diffraction by a grating. It may be of the emission type (flame, arc, spark), or the absorption type. Cf. *spectra.* (2) A similar band of radiant energy, invisible to the eye and extending beyond the violet (ultra-violet) or red (infra-red) portions of the visible spectrum. See *radiations.* **absorption-** The visible or invisible **s.** produced by a composite ray of light after it has passed through a colored solution or through a layer of vapor or gas, which absorbs one or more constituent ray. **arc-** A s. produced with an electric arc as source of light. The element or compound is placed between the carbon poles of an arc. **Aston-** See *mass-.* **band-** A s. consisting of a series of lines so close together that they appear as a continuous band. They are due to *molecular* vibrations. Cf. *line s.* **bright line-** See *line-, flash-.* **chemic-** That portion of the s. which contains the most chemically-active wave-lengths, as actinic or ultra-violet rays. **comparison-** A s. which contains a number of sharp lines, whose wave-lengths serve as standard; it is usually photographed on the same plate above and below the spectrum to be examined or measured. The arc or spark spectrum of titanium or iron is often used. **continuous-** A s. in which no Fraunhofer lines are visible; that is, in which there is an uninterrupted change from one color to another. **dark line-** Reversal s. A s. which contains Fraunhofer lines, or some portions less bright than others, cf. *absorption-.* **diffraction-** A s. produced by means of a grating. **discontinuous-** A combined line and band s. **electrochemical-** See *electrochemical-.* **electromagnetic-** See *radiations.* **emission-** A s. which consists of a series of bright lines produced from an incandescent source. **explosion-** A s. produced by exploding a metallic wire or a solution on an asbestos fiber by means of an electric current. It shows lines from excitation states above the spark s. **flame-** A s. produced with a bunsen flame as the source of excitation. **flash-** (1) Explosion-. (2) A s. showing bright Fraunhofer lines on a dark background; it is seen during a solar eclipse and originates in the hot gases surrounding the sun, which ordinarily absorb and give rise to the dark Fraunhofer lines. **furnace-** A s. obtained with an electric furnace (3000°C.) as source of excitation. It is intermediate between the flame and arc s. **high frequency-** An x-ray s. produced by high-frequency currents. **hyperfine-** A s. consisting of extremely thin lines close together, and due to nuclear vibrations. Cf. *band s.* **infrared-** The dark region beyond the red end of the s.; it consists chiefly of thermal rays. **line-** A s. that shows colored or bright lines on a dark back-ground; due to atomic vibrations. Cf. *hyperfine s.* **invisible-** See *ultra-violet s., infra-red s.* **magnetic-** See *magnetic s.* **mass-** Aston-. The series of images produced on the photographic plate when canal rays are subjected to electric and magnetic fields, which separate the ions according to their mass. Cf. *isotopic weight.* **molecular-** See *band s., molecular ray.* **Moseley-** See *x-ray spectrum.* **nebular-** S. obtained by photographing gaseous, planetary or spiral nebulae with telescope and spectrograph. **normal-** Diffraction s. A s. produced by a grating; it shows the rays of different wave-lengths in proper relationship to one another, and is not as distorted as is the s. produced by a prism, which crowds the blue and violet lines together. **photographic-** S. that affect photographic emulsions. Cf. *ionic, thermal.* **photopic-** A s. bright enough to arouse color sensations in the human eye. Cf. *scotopic s.* **planetary-** A polarized solar s., produced by light reflected from planets. **primary-** The most prominent s. produced by a grating. **Raman-** See *scattering, Raman spectrum.* **reversal-** See *dark line-.* **Roentgen-.** X-ray-. **scotopic-** The s. seen by the dark-adapted human eye. Cf. *photopic s.* **secondary-** The second most prominent s. produced by a grating. **solar-** A s. produced by the light of the sun; it shows the characteristic Fraunhofer lines. **spark-** A s. produced by the excitation of a vapor by electric sparks. By using electrodes of different metals a characteristic spectrum with many enhanced lines for each metal is obtained. **stellar-** A s. produced by the light of stars. Cf. *spectral classification.* **sun-spot-** A s. obtained by passing the light from sun spots through a quarter-wave plate or Nicol prism; it shows the Zeeman effect, q.v. **ultra-violet-** The dark portion beyond the violet end of the s.; it consists chiefly of chemically-active rays. Cf. *irradiation.* **x-ray-** Moseley s. A series of lines characteristic of the metal used as anticathode in an x-ray tube. The



Spectra of metals and alloys.

1. Aluminum casting. 2. Babbitt metal. 3. Electrolytic copper. 4. Monel metal. 5. Iron spark

x-rays are diffracted by a crystal acting as a grating, and the rays are photographed. The frequencies are proportional to the atomic number of the element used as anticathode; they originate in the transitions of electrons from one energy level to another. Cf. *K, L, M radiations, Bohr atoms, orbit.*

s. analysis. (1) The measurement of the intensity and frequency of s. lines. (2) Spectroscopic analysis. (3) The analysis of the structure of a spectrum, *e.g.*, the resolution of it into series or multiplets. **s. classes.** See (1) *spectra*, (2) *spectral classification.* **s. lamp.** See *lamp.* **s. lines.** See *s. series.* **s. series.** A mathematical relationship existing between the lines or group of lines in the spectrum of an element.

$$\nu = \frac{1}{\lambda} = L + \frac{BN}{\left(m + \alpha + \frac{\beta}{m^2}\right)^2}$$

ν = the wave number in vacuo (waves per cm.);
L = the wave number of the limit of the series;
N = the Rydberg universal series constant, (109678.7 for H_2);
m = a variable integer corresponding with a definite line,
α, β, B = constants.

Cf. *Rydberg, Bohr's theory, orbits.* **s. types.** The appearance of a s., as in spectral classification. Laboratory s. are generally either:

A. Continuous; as, from an incandescent lamp, carbon arc or hot glowing body
B. Discontinuous:
   1. *bright line* s.; as incandescent gas, flame of sodium, arc of iron or spark spectra.
   2. *dark line* s.; as solar spectrum or continuous spectrum absorbed by a hot gaseous envelope.
   3. *bright band* s.: as comet spectrum.
   4. *dark band* s.: as, the absorption spectrum of hemoglobin or dye solutions.

specular. Mirror-like. **s. coal.** Pitch coal. A shining variety of coal. **s. hematite.** Specularite. **s. iron.** Specularite. **s. metal.** Speculum metal.

specularite. Fe_2O_3. Specular hematite, specular iron, gray hematite. A native iron oxide; disk-like crystals with bright metallic luster.

speculation. A guess or a conclusion drawn from incomplete knowledge of facts. Cf. *deduction, hypothesis.*

speculum metal. An alloy of 66 % copper and 33 % tin, with a trace of arsenic; used in making mirrors.

speise. A native arsenide; usually fusible and brittle.

speiss cobalt. $(FeNiCO)As_2$. An impure smaltite.

spelter. Commercial zinc used for galvanizing. **hard-** S. recovered from the dross from the galvanizing bath and containing 10 % iron.

Spengler's method. A method of staining a microscopical object by three successive treatments:

1. Carbolfuchsin; apply as usual.
2. Spengler No. 1—a solution of 1 part Esbach's reagent and 1 part alcohol; stain, dry and decolorize.
3. Spengler No. 2—a saturated solution of picric acid; stain and dry.

sperm. A male reproductive cell. **s. oil.** The oil of the s. whale. **s. whale.** The mammal, *Physeter macrocephalus*, a source of spermaceti and ambergris.

spermaceti. Cetaceum. The solid fat from the head of the sperm whale, *Physeter macrocephalus;* chiefly cetyl palmitate. A white unctuous mass of faint odor, d.0.94, m.45; used pharmaceutically, and for standard candles, q.v.

spermin. $C_8H_{14}N_2$ = 102.1. A leukomaine and constituent of spermatic fluid, sputum and other animal substances. Colorless crystals, soluble in water; used as a nerve tonic and stimulant.

sperrschicht cell. A photoelectric cell which is sensitive over the whole range of the visual spectrum.

sperrylite. $PtAs_2$. A native platinum arsenide.

spessartite. $3MgO.Al_2O_3.3SiO_2$. A reddish variety of aluminum garnet (q.v.) found in Germany.

sp. gr. Abbreviation for specific gravity.

sphacelic acid. An acid from ergot.

sphacelotoxin. Spasmotin.

sphaerite. A hydrous phosphate of aluminum.

sphalerite. ZnS. Pseudo-galena. Zinc blende, blende, rosinjack, jack, mock ore. An isometric native zinc sulfide. Cf. *wurtzite.*

sphene. $CaTiSiO_5$. Titanite. A native yellow or brown calcium silicotitanite, found in rocks; it has a waxy lustre.

sphenoid. A hemihedral form of a crystal or a half crystal.

sphere. A globe or ball.

spherical. Ball-shaped or globular.

spherocobaltite. $CoCO_3$. A native cobaltous carbonate.

spheroidal. Sphere-shaped.

spheroidization. The formation of rounded grains in alloys, generally during annealing.

spherometer. An instrument for determining the curvature of a surface.

spherulite. A spherical group of minute radiating crystals.

sphingoin. $C_{17}H_{35}O_2N$ = 285.3. A leukomaine in the brain.

sphingomyelin. $C_{46}H_{96}N_2O_6P$ = 1035.00. A phospholipin from brain, yielding on hydrolysis phosphoric acid, choline, sphingosine and cerebronic acid.

sphingosine. $C_{17}H_{35}O_2N$ = 285.32. An unsaturated, aliphatic amino-alcohol split-product of the cerebrosides.

sphygmograph. A device for recording the pulse.

sphygmomanometer. A device for recording heart beats.

spice. A condiment or substance used to give flavor and distinctive taste to food; the majority contain essential oils. Their ash content is an indication of their purity and the following are average standards for powdered spices:

	Average total ash %	*Maximum ash permissible (U. S. A.)*
allspice	4.5	(6 %)
anise	6.8	(9 %)
bay leaves	4.6	
basil	15.12	
calamus	4.6	
capers	2.1	
caraway	6.7	(8 %)
cardamon	6.7	(8 %)
cassia	4.3	(5 %)
cassia buds	4.7	
celery seeds	8.4	(10 %)
charlock	6.1	
cinnamon	4.0	(5 %)
cloves	6.1	(7 %)
coriander	5.4	(7 %)
cumin	7.6	(8.5 %)
dill	9.9	
fennel	8.1	(9 %)
fenugreek	3.0	
garlic	6.4	
ginger	4.9	(7 %)
juniper berries	2.7	
mace	2.3	(3 %)
marjoram	10.6	(16 %)
mustard	4.8	(5 %)
mustard flour	5.5	(6 %)
nutmeg	2.5	(5 %)
onion	4.3	
paprika	6.8	(8 %)
parsley	11.7	
pepper, black	5.0	(7 %)
pepper, red	6.3	(8 %)
pepper, white	1.3	(3.5 %)
safflower	6.7	
saffron	5.4	
sage	7.4	(10 %)
savory	9.9	
star anise	2.6	
tarragon	10.4	
thyme	9.8	(14 %)
turmeric	6.4	
vanilla bean	4.8	

(20 % variations of these percentages are not abnormal.)

spicular. Needle-shaped.

spider poison. Arachnolysin.

spiegel. (1) Spiegeleisen. (2) The German for mirror.

spiegeleisen. Spiegel. A white cast iron containing 5 to 20 % manganese, obtained in the blast furnace, and used to make manganese steels.

Spiegler Jolle's reagent. A solution of 2 gm. mercuric chloride, 4 gm. succinic acid, and 4 gm. sodium chloride in 100 cc. water; a reagent for albumin in urine.

spigelia. Pinkroot, Indian pink. The dried rhizomes and roots of *Spigelia marilandica*, a Loganiaceae, which contain spigeline. Used, as the fluid extract, as a teniafuge.

spigeline. An alkaloid from Spigelia species.

spike. (1) Plantain. (2) Pepper. **s. nard.** See *spikenard.*

spikenard. The aromatic root of a herb, *Nardostachys Jatamansi*, of the Valerianaceae. **American-** Aralia.

spilanthol. $C_{14}H_{25}NO$ = 213.20. A liquid, $b._{1mm}$ 165, from *Spilanthus acmella* (called *isiSilli* by the Zulus), a Compositae of South Africa; used for toothache.

spin. Angular momentum; rotation around an axis; *e.g.*, of a nucleus or electron.

spinacene. Squalene.

spinacine. A protein derived from spinach leaves, *Spinacia oleracea*, a Chenopodiaceae, soluble in acid or alkaline water.

spinasterol. $C_{28}H_{46}O$ = 398.0. A phytosterol from spinach, occurring as α-, β- and γ-isomers. Cf. *cholane.*

spindle. A hydrometer.

spindle tree. Euonymus.

spinel. $MgAl_2O_4$. Rubicelle, ruby alamandine, ruby balas. A native magnesium aluminate; variously-colored isometric crystals, some of which are used as gems.

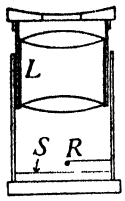
spinels. A group of rock-forming aluminates or ferrates of the type $M''M'''_2O_4$, in which M'' may be magnesium, zinc, manganese, or ferrous iron, and M''' is aluminum, chromium, ferric iron or manganic manganese. They have a high hardness and refractive index.

spinel	$MgAl_2O_4$
hercynite	$FeAl_2O_4$
gaehnite	$ZnAl_2O_4$
magnetite	$FeFe_2O_4$
magnesioferrite	$MgFe_2O_4$
franklinite	$(Fe,Zn,Mn)Fe_2O_4$
chromite	$FeCr_2O_4$

spinneret. (1) A platinum thimble with a flat base containing very minute holes through, which is forced rayon spinning solutions to form filaments. (2) The spinning organ of spiders.

spinning. (1) To revolve around its axis. (2) to form a thread. **s. electron.** The fourth motion of an electron in an atom. Cf. *Pauli's exclusion principle.* **s. power.** The property of a fluid which enables it to be drawn out into threads; as, the white of an egg.

spinthariscope. Scintillascope. An instrument for detecting radioactive rays. It consists of a magnifying glass before a fluorescent screen, and a needle containing a trace of radioactive material on its tip. Each α-particle striking the screen causes a flash and the radiations appear as fluorescent dots, appearing and disappearing irregularly near the tip of the needle.

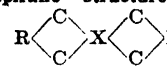


Spinthariscope. L = eyepiece, R = radioactive matter, S = fluorescent screen.

spinulosin. $C_8H_8O_5$ = 184.1. 3.6.Dihydroxy-4-methoxy-2.5-toluquinone. Purple-bronze plates, m201, having anti-bacterial properties; formed in laboratory cultures of the mold *Penicillium spinulosum* (cf. *penicillin*).

spiracin. Methylcarboxyl salicylic acid. A white crystalline powder, insoluble in water; used as a substitute for salicylic acid.

spiraeic acid. Salicylic acid.

spirane structure. The atomic arrangement,  ; X is an atom held in common by two rings, as in spiro-compounds or borosalicylates.

spirans. A spiro-compound.

Spirillaceae. The third family of the schizomycetes or bactoria; they have curved or wave-shaped cells.

Genus 1; spirosoma—without organs of locomotion.

Group 2; microspira—rigid cells, with few polar flagella.

Group 3; spirillum—rigid cells, with many flagella.

Group 4; spirochetae—flexible and mobile cells.

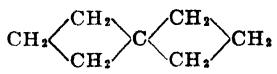
spirit. (1) Any distilled liquid. (2) A solution of a volatile substance in alcohol. (3) Ethanol. **cologne-** Ethanol. **Colonial-** Methanol. **Columbian-** Methanol. **Libavius-** Stannic chloride. **methylated-** Q.v. **motor-** Petrol (England) or gasolin (U. S.). **potato-** A whisky distilled from fermented potatoes. **proof-** See *proof spirit.* **pyroacetic-** Acetone. **pyroligneous-** Methanol. **pyroxylic-** Methanol. **rectified-** 90 % Ethyl alcohol. **silent-** The alcoholic spirit obtained by distillation of a spiritous liquor, before the addition of denaturants or other impurities. **wood-** Methanol.

s. acid. Concentrated acetic acid obtained by distillation of a 12 % vinegar. **s. of alum.** Sulfuric acid. **s. of copper.** Acetic acid obtained from copper acetate. **s. of ethyl nitrite.** Spiritus aethylis nitritis; s. of sweet nitre. An alcoholic solution of 3.5–4.5 % (U.S.P.) or 1.52–2.66 % (B.P.) ethyl nitrite, used in medicine. **s. of hartshorn.** Ammonium hydroxide. **s. of niter.** S. of ethyl nitrite. **s. of salt.** Hydrochloric acid. **s. of tin.** Stannic chloride. **s. of vitriol.** Concentrated sulfuric acid. **s. of wine.** Ethyl alcohol. **s. of wood.** Methanol.

irit(u)ous. Having the character of spirit.

spirit-colors. A group of aniline dyes that are insoluble in water and soluble in alcohol; used in dyeing silk and as stains.

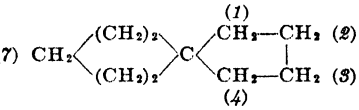
spiro-compounds. Spirans, spirocyclans. A group of organic compounds that comprise two rings joined by one carbon atom common to both rings; as, spiroheptane.



Cf. *ring structures* (E).

spirocyclans. Baeyer's name for spiro-compounds.

spirodecane. $C_{10}H_{18}$ = 138.2. A group of bicyclic hydrocarbons; as,

5, 6-. (7) 

spiroform. $C_{15}H_{12}O_4$ = 256.10. Vesipyrin, acetylsalol, acetylsalicylphenylester, acetylphenyl-o-oxybenzoic acid, $C_6H_4(OOCMe)COOPh$. A white tasteless powder, insoluble in water; used medicinally as an antirheumatic.

spirogyra. A filamentous alga; green felt-like mass or scum in fresh water ponds or tanks; used in biochemical experiments.

spirosal. $C_9H_{10}O_4$ = 182.1. Monoglycosalicylate, **glysal,** $C_6H_4(OH)COOCH_2CH_2OH$. An odorless, colorless liquid, b.170, slightly soluble in water, soluble in alcohol or ether; used medicinally in lotions.

spitting. Small explosions and scattering of materials occurring when certain substances are dried and heated or brought together; as, with sulfuric acid and water, or when molten materials cool and their surface crust is perforated by escaping gases. Cf. *decrepitation.*

splash head. A device fitted to a distillation apparatus between the flask and condenser, to prevent the boiling liquid from splashing over into the latter. It consists usually of an open glass tube in a bulb, bent away from the direction of the flask, along which the vapor passes.

split-product. A decomposition product; *e.g.*, of a hydrolyzed glucoside.

splitting. The breaking of a molecule into two or more individual atoms.

spodumene. $(Li,Na)_2Al_2Si_4O_{12}$. Triphane. A lithium aluminum silicate, occurring in large crystalline masses. The pink variety, (kuntzite) and green variety (hiddenite) are used as gems. Some spodumene crystals are 47 feet long.

spoilage. Any disadvantageous change due to physical or chemical action; as melting of chemicals in warm weather (cf. *shipping*), crystallizing or separating in cold weather, drying out or taking up water (cf. *storage*), or decomposition (cf. *hazard*).

spoilbank. Bing.

sponge. (1) A marine animal, *Euspongia officinalis,* belonging to the Porifera. (2) The flexible fibrous skeleton of the animal cut and dried. It forms yellow porous masses of various shapes. (3) A metal in porous form, as **platinum sponge. iron-** Ferric oxide. **platinum-** Platinized asbestos. **vegetable-** Tufa.

spongin. A sclero-protein from bath sponge which yields diiodotyrosine and bromine.

spontaneous. Sudden or voluntary, and without apparent external cause or incitement. **s. combustion.** Self-ignition of inflammable material caused by the accumulation of heat by slow oxidation.

sporangia. Cells containing spores.

spores. The resting state of micro-organisms. Single cells capable of growth and reproduction.

spot analysis. (1) A microchemical test, carried out on a porcelain plate, for the identification of metals, alkaloids, etc. (2) A reaction on impregnated filter-paper.

spout. (1) A slightly-projecting depression on the rim of a beaker or other vessel through which liquids in the vessel are poured. (2) The cylindrical projection of a teapot. (3) A trough to conduct molten metals.

spray. A stream of air and finely-divided liquid produced with an atomizer, nebulizer or other device. **s. drying.** A form of rapid evaporation, in which a solution is heated in the atomized state so that the dissolved substance falls out of the spray. Cf. *Nyrop process.* **s. residue.** The amount of insecticide remaining on fruits, such as apples, pears, peaches and grapes. The maximum amounts permitted per pound of food are: 0.01 grain, arsenious oxide; 0.018 grain, lead; 0.01 grain, fluorides.

sprays. (1) Pharmaceutical preparations used as antiseptics for throat, nose or other cavities. The principal sprays consist of liquid petrolatum in which the active substances are dissolved, as:

aromatic spray	nebula aromatica
eucalyptol spray	nebula eucalyptolis
menthol spray	nebula mentholis
thymol spray	nebula thymolis

(2) Technical preparations used as insecticides fungicides or disinfectants for protecting plants or trees.

Sprengel pump. A mercury pump for obtaining a high vacuum (0.001 mm.).

spring. A source of a natural water. **hot-** Water emerging from the soil at a temperature higher than 50°C.

spring balance. A device for determining the amount of a force by means of the extension it produces in a spring. (See *Hooke's Law.*)

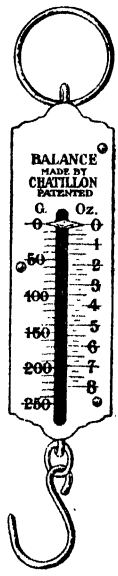
sprinkler. (1) A perforated iron or stoneware plate near the top of a gas-scrubbing tower. It produces a rain of gas-absorbing liquid. (2) A bushing filled with a low melting alloy (*e.g.*, D'Arcet metal) which, when heated, will release water from a pipe system.

sprudel effect. The phenomenon observed on gas-jet electrodes, from which the emerging gas bubbles are rising in a continuous stream or sprudel.

sprue. A projection left on a casting, to be broken off for testing purposes.

spur feterita. Sorghum.

spurred rye. Ergot.



Spring balance.

sputter. To produce a metal in the finely-divided state by passing a high-potential discharge between two electrodes of the metal in a dielectric liquid or gaseous medium.

sputum. Saliva mixed with mucus and other secretions of the mouth or nose. Sputum is usually examined microscopically, but now it is also examined chemically. Its composition varies greatly according to the food eaten, and the time elapsing since a meal:

Organic constituents:	4.1–6.9 %
fatty acids	0.02–0.97 %
soaps	traces–0.40 %
cholesterol	traces–0.16 %
lecithin	traces–0.15 %
nuclein	traces–0.48 %
proteins	0.90–0.52 %
Inorganic constituents	0.3–0.9 %
Water	93.0–95.0 %

sq. Abbreviation for square. **sq. ch.** Square chain. **sq. cm.** Square centimeter, or cm^2. **sq. in.** Square inch. **sq. ft.** Square foot, ft^2. **sq. m.** Square meter, or m^2. **sq. mi.** Square mile. **sq. yd.** Square yard. **sq. rd.** Square rod.

squalene. $C_{30}H_{50}$ = 410.40. Spinacene. An unsaturated hydrocarbon found in the oils of the Elasmobranch fishes (shark family) and, as its homologs, in many marine oils. A colorless oil, $d._{15°}$0.8610, $b._{25mm}$.284. Cf. *carotene, lycopin.*

square. A four-sided figure, whose sides are equal and whose angles are right angles. **s. centimeter.** cm^2. A unit of area and the one-ten-thousandth part of a square meter; 1 cm^2. = 0.155 sq. in. **s. foot.** ft^2. or sq. ft. A unit of area in the English system, 1 ft^2. = 1 sq. ft. = 0.0929 m^2 = 929 cm^2. **s. inch.** in^2. or sq. in. A unit of area in the English system; 1 in^2. = 1 sq. in. = 6.452 cm^2. **s. meter.** m^2. A unit of area in the metric system; 1 m^2. = 10,000 cm^2. = 10.7638 sq. ft. = 1.196 sq. yd. = 24.7104 sq. links = 0.039537 sq. rods = 0.00247104 sq. chains. **s. root.** The square root of a quantity is that quantity which, when multiplied by itself, gives the original quantity. **s. yard.** yd^2., or sq. yd. A unit of area in the English system: 1 sq. yd. = 0.836 m^2.

squaw root. Caulophyllum. **s. vine.** Partridge berries. The dried herb of a small trailing, evergreen plant, *Mitchellá repens.* Used medicinally, as the fluid extract, as a diuretic, astringent, and emmenagogue. **s. weed.** Senecio.

squill. Scilla. The fleshy inner scales of the bulb of *Urginea maritima*, a Liliaceae. It contains several glucosides and bitter principles (scillin, scillitoxin, sinistrin); used medicinally as an emetic and expectorant.

Sr. The symbol for strontium.

St. Abbreviation for stoke.

S.T. Surface tension.

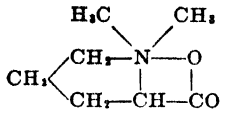
S.T.P. Standard temperature and pressure.

stabile. Stable.

stabilizer. (1) A retarding agent, or a substance that counteracts the effect of a vigorous accelerator and preserves a chemical equilibrium. (2) A substance added to a solution to render it more stable; as, acetphenetidin to cupferron solution, acetanilide to hydrogen peroxide.

stable. A balanced condition not readily destroyed; as, photo-s., thermo-s. **s. scopolamine.** Scopomannite.

stachydrine. $C_7H_{13}O_2N$ = 143.1. A cyclic amino acid and heterocyclic compound occurring in many plant juices (as *Stachys* species) and in mussels (as *Arca noae*). Cf. *trigonelline.*

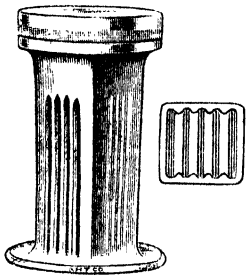


stachyose. $C_{24}H_{42}O_{21}$ = 666.4. A non-reducing tetrasaccharide from the roots of *Stachys tuberifera*, a Labiatae. It hydrolyzes to fructose, glucose and two molecules of galactose; $[\alpha]_D^{20}$ + 148°.

stagonometer. Stalagmometer.

Stahl, Georg Ernst. 1660–1734. A German physician and chemist, noted for his development of the phlogiston theory (1697).

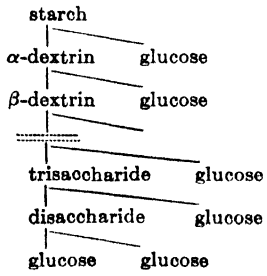
stain. A substance that is used for coloring materials such as wood, tissues, textiles. *Stains* are *dyes* in solutions; *paints* are *pigments* in suspensions. **acid proof-** See *table top impregnation*. **contrast-** q.v. **counter-** q.v. **microscope-** A dye used for staining preparations for microscopic examination.



Staining jar.

staining. The coloring of materials by colored solutions. In microscopy it is used for differentiating structural elements. **s. jar.** A small, square glass vessel used in staining microscopic slides (see illustration).

staircase reaction. A chemical change that proceeds step-wise; as, the hydrolysis of starch to glucose:



stalactite. A hanging column of calcite formed by the drip of carbonated mineral solutions from the roof of a cavern.

stalagmite. A standing column of calcite formed by the drip of carbonated mineral solutions on to the floor of a cavern.

stalagmometer. A device for obtaining drops of a liquid at definite intervals; *e.g.*, Traube's s., used to calculate surface tension by determining the number of liquid drops passing an orifice in a given time. It can also be used to determine molecular weight (cf. *Morgan equation*) and the association of liquids.

stalagmometric. Measuring the progress of chemical reactions (as esterifications) from the change in surface tension.

stalagmones. Characteristic substances occurring in urine and lowering its surface tension. They are associated with certain diseases (as, tuberculosis, carcinoma, nephritis) and severe infections, and occur normally in pregnancy.

stalloy. An alloy of iron with 3–4 % silicon.

stamen. The male organ of a plant, in which the pollen is prepared. Cf. *pistil*.

Stammer, Carl. 1828–1890. A German chemist noted for his development of the sugar industry.

stamp. (1) To break up or crush ore and rock by machinery. (2) A heavy mechanical pestle for crushing ore. **s. battery.** A group of pestles working mechanically in an iron mortar. Stamps are as heavy as 2000 pounds, and drop 6–8 inches 100 times per minute. **s. mill.** An establishment for crushing ores by stamp batteries.

stand oil. An oil heated at 250–300°C without addition of oxygen or driers, and allowed to settle to remove coagulated "mucilage."

standard. (1) An established form of quality or quantity. (2) A substance used for establishing the strength of volumetric solutions; as, purified oxalic acid used as a standard in alkalimetry and acidimetry. **s. candle.** A spermaceti candle that burns 120 grains per hour. (See *standard lamp.*) **s. cell.** An electrolytic cell having a definite voltage; as, the Clark and Weston cells. **s. conditions.** In gas analysis an atmospheric pressure of 760 mm., and a temperature of 0°C., at latitude 45°. It is sometimes abbreviated, S.T.P. (= standard temperature and pressure). Cf. *N.T.P.* **s. deviation.** The expression $\sqrt{PQ/N}$, where P and Q are the percentages of positive and negative reactions, respectively, and N is the number of tests made. **s. lamps.** A source of light for photometric determinations of a known light intensity; as,

pentane lamp.....	10.00 international candles
Hefner lamp.....	0.9 international candle
Carcel lamp.....	9.6 international candles
standard candle....	1.0 international candle

s. meter. The length between two lines ruled on a bar of platinum-iridium, which is kept at the International Bureau of Weights and Measures, Sèvres, near Paris. **s. pressure.** A pressure equal to a column of 760 mm. mercury at sea-level in lat. 45°. **s. solution.** A solution of definite concentration, usually normal, half normal or tenth normal. **s. substance.** A substance used to standardise volumetric solutions. It should have the following properties: (1) easily obtained in a state of sufficient purity; (2) unaltered in air and at moderate temperatures, and neither hygroscopic nor efflorescent; (3) readily soluble in water or alcohol; (4) a high molecular weight, thus lessening effects of errors in weighing. (5) produce no interfering product on titration; (6) free from color before and after titration, thus avoiding interference with the indicator. **s. temperature.** A temperature of 0°C. or 273°A. **s. thermometer.** A thermometer, as prescribed by the United States Pharmacopoeia. **s. volume.** The normal volume occupied by one mole of a gaseous substance, *i.e.*, 22.4 liters. **s. wavelength.** The wave-length of the red cadmium line, observed in air at 15°C. and 760 mm. pressure. It is equal to 6438.4696 Ångstrom Units. The cadmium blue and green lines are also used.

standardization. The manipulations necessary to bring a preparation to an established or known quality; as, the preparation and adjustment of a standard solution in volumetric

analysis. **physiological-** The testing of drugs or biological products (which cannot be chemically analyzed) by their pharmacological action on a normal animal. Thus:

digitalis	frog heart
strophanthus	frog heart
ergot	rooster (cocks comb)
aconite	guinea pig (toxicity)
cannabis	dog (intoxication)
adrenalin	dog (blood pressure)

standardized. Describing a utensil, device or preparation that has been tested, measured and compared with a standard. See *Bureau of Standards* (B.S.), *National Physical Laboratory* (N.P.L.), *volumetric glass ware.* **s. buret.** A certified buret checked at 20°C. according to the methods of the Bureau of Standards or the National Physical Laboratory. The limits of error are: (B.S.)

Capacity	30 cc.	50 cc.	100 cc.
Limit of error	0.03 cc.	0.05 cc.	0.1 cc.

s. cylinder. A certified graduated cylinder checked according to the methods of the B.S., or N.P.L. The limits of error are: (B.S.)

Capacity	10 cc.	25 cc.	50 cc.
Limit of error	0.05 cc.	0.12 cc.	0.25 cc.

Capacity	100 cc.	250 cc.	500 cc.
Limit of error	0.2 cc.	1.25 cc.	2.5 cc.

s. flask. A certified graduated flask checked according to the methods of the B.S. or N.P.L. The limits of error are: (B.S.)

Capacity	50 cc.	100 cc.	200 cc.
Limit of error	0.50 cc.	0.08 cc.	0.10 cc.

Capacity	500 cc.	1000 cc.
Limit of error	0.15 cc.	0.30 cc.

s. pipet. A certified pipet tested according to the methods of the B.S. or N.P.L. The limits of error are: (B.S.)

Capacity	2 cc.	5 cc.	10 cc.
Limits of error for measuring pipet	0.01 cc.	0.02 cc.	0.03 cc.
transfer pipet	0.006 cc.	0.01 cc.	0.02 cc.

Capacity	25 cc.	50 cc.
Limits of error for transfer pipet	0.03 cc.	0.05 cc.

s. solution. See *solutions.*

standards. The agencies establishing or defining s. in various countries are:

A.S.A.	American Standards Association
B.S.I.	British Standards Institution
D.V.M.	German Association for Testing Materials
A.F.N.O.R.	French Association for Standardising Materials
S.A.A.	Standards Association of Australia
S.O.S.	Swedish Standards Society
S.V.M.T.	Swiss Society for Testing Materials
C.E.S.A.	Canadian Engineering Standards Association
I.S.A.	International Standards Association (Basle)

stannanes. A group of organic compounds containing tetravalent tin; as,

tetramethyl-	$SnMe_4$
tetraethyl-	$SnEt_4$
tetraphenyl-	$SnPh_4$
dichlorodiphenyl-	$SnCl_2Ph_2$
bistannane	$H_3Sn.SnH_3$
tristannane	$H_3Sn.SnH_2.SnH_3$

Cf. *phenylstannane.*

stannate. A salt of stannic acid of the type, M_2SnO_3. **sulfato-** A compound of the type $R_2H_2Sn(SO_4)_3$. Cf. *stannosulfate.* **sulfo-** A salt of the type, M_2SnS_2. **thio-** A salt of the type, M_2SnS_3.

stannated. Treated with tin salts: as, s. hydrochloric acid used in the Gutzeit test.

stannekite. $C_{20}H_{22}O_3$. A native, resinous hydrocarbon, in coal deposits in Bohemia.

stannic. A compound of tetravalent tin. **s. acids.** A series of acids which vary in composition from H_2SnO_3 to H_4SnO_4. *normal-* or alpha- H_2SnO_3 = 168.7. A white amorphous powder; insoluble in water or alcohol, soluble in alkalis. *meta-* or beta- $H_{10}Sn_5O_{15}$ = 843.6, $H_2Sn_3O_{11}$ or H_2SnO_3. A colorless amorphous powder; insoluble in alcohol or water, soluble in alkalis. **s. bromide.** $SnBr_4$ = 438.4. A colorless, fuming, caustic liquid, d.3.349, m.31, b.203, soluble in water, decomp. by alcohol; used as a mordant and in tinning. **s. chloride.** $SnCl_4$ = 260.5. Tin bichloride or tin tetrachloride. A colorless, fuming, caustic liquid, d.2.2738, m.−33, b.114; soluble in water, decomp. by alcohol; used as a mordant in dyeing and reviving colors, as a reagent, and for tinning. **s. chromate.** $Sn(CrO_4)_2$ = 350.7. A brownish-yellow crystalline powder, soluble in water; used in ceramics as pigment. **s. ethide.** Tin tetraethyl. **s. ethyl hydroxide.** Tin ethyl hydroxide. **s. fluoride.** SnF_4 = 194.7. A white, crystalline deliquescent solid, $d_{20°}$.4.78, sublimes if heated, b.705. **s. hydroxide.** $Sn(OH)_4$ = 186.5. A white amorphous powder; insoluble in water or alcohol. **s. ion.** The tetravalent cation Sn^{++++}. **s. iodide.** SnI_4 = 626.4. Tin tetraiodide. A red crystalline powder, d.4.696, m.144, b.341, decomposed by water, soluble in alcohol, ether or chloroform. **s. methide.** Tin tetramethyl. **s. oxide.** SnO_2 = 150.7. Tin dioxide, tin ash, flowers of tin, stannic anhydride. A white amorphous powder, d.6.95, m.1197, insoluble in water or alcohol, and soluble in alkalis. Used as a polishing material for steel, glass and finger nails, and in the manufacture of milk-colored and opaque glass. **s. phenide.** Tin tetraphenyl. **s. sulfate.** $Sn(SO_4)_2.2H_2O$ = 346.9. Colorless rhombic crystals; soluble in water. **s. sulfide.** SnS_2 = 183.80. Tin bisulfide, mosaic gold, tin bronze. A yellow, hexagonal, crystalline powder, d.4.58, decomp. at red-heat, insoluble in water, soluble in alkalis; used for bronzing and gilding.

stannising. A process for coating metal objects of complicated shape with tin, by suspending them for a few minutes in a mixture of vapours of hydrogen and stannous chloride at 500–600°C.

stannine. Stannite.

stannite. $SnS_2.Cu_2S.FeS$. Stannine, tin pyrites. A native sulfide of tin, copper and iron.

stannites. Theoretically a salt of stannous acid of the type, M_2SnO_2 derived from stannous hydroxide. There is no evidence for this, and the actual composition is $MHSnO_3$ or HSnOOM (cf. HCOOM).

stannonate. A salt of the type RSnOOM.

stannonic acid. A group of organic compounds of the types, $RHSnO_2$, or R.SnOOH. **s. ester.** A group of organic compounds of the types, $RR'.SnO_2$, or, RSnOOR'.

stannonium. An organic compound of tetravalent tin of the type $RSnH_3$. Cf.-*onium*, *stannane*, *stannyl*.

stannosulfate. A salt of the type $M_2Sn(SO_4)_2$. Cf. *sulfatostannate*.

stannous. A compound containing divalent tin, Sn=. **s. bromide.** $SnBr_2$ = 278.5. Tin protobromide. Yellow crystals, d.5.117, m.215, b.619, soluble in water, decomp. by alcohol. **s. chloride.** $SnCl_2$ = 189.6. Tin salt, tin protochloride. A white crystalline mass, m.247, b.620, soluble in water, alcohol, or alkalis. It absorbs oxygen from the air, forms an insoluble oxychloride, and is used as a reagent and reducing agent, and as a mordant in the manufacture of lakes. *hydrous*-$SnCl_2.2H_2O$ = 225.7. Colorless triclinic crystals, d.2.7, m.37.7, decomp. by further heat, soluble in water or alcohol; used as a reagent and in organic synthesis. **s. chromate.** $SnCrO_4$ = 234.6. A brown powder; slightly soluble in water; used in ceramics as a pigment. **s. citrate.** $SnC_6H_6O_7$ = 308.5. Tin citrate. A white powder; slightly soluble in water. **s. ethide.** Tin diethyl. **s. fluosilicate.** $SnSiF_6$ = 260.76. S. silicofluoride. Colorless prismatic crystals, very soluble in water. **s. hydroxide.** $Sn(OH)_2$ = 152.7. An amorphous white powder; insoluble in water and soluble in fused alkalis with formation of stannites. **s. iodide.** SnI_2 = 372.5. Red needles, m.316; slightly soluble in water, soluble in dilute acids or alkalis. **s. ion.** The divalent cation, Sn^{++}. **s. oxalate.** SnC_2O_4 = 206.7. A white crystalline powder, insoluble in water, soluble in acids; used in dyeing. **s. oxide.** SnO = 134.7. Tin monoxide, t. protoxide. A brownish-black powder, d.6.3, burns on heating, insoluble in water, alcohol or alkalis; used as a reducing agent. **s. sulfate.** $SnSO_4$ = 214.8. A white crystalline powder, soluble in water, alcohol or acids; used as a mordant in dyeing. **s. sulfide.** SnS = 150.8. A brown crystalline powder, d.5.08, m.882, b.1230, insoluble in water or alcohol, soluble in hydrochloric acid; decomp. at red heat. **s. tannate.** $SnC_7H_2O_5.H_2O$ = 302.7. A dark brown crystalline powder; insoluble in water. **s. tartrate.** $SnC_4H_4O_5$ = 250.7. A white crystalline powder, soluble in water; used as a mordant in dyeing and printing textiles.

stannum. The Latin term for tin.

stannyl. The monovalent radical, H_3Sn—.

staphisagria. Stavesacre seed. The ripe seeds of *Delphinium staphisagria*, a Ranunculaceae. It contains a number of alkaloids, and is used externally as an insecticide. **s. alkaloids.** The alkaloids of staphisagria:

staphisagrine	$C_{22}H_{33}O_5N$
delphinine	$C_{22}H_{35}O_6N$
delphinoidine	$C_{22}H_{35}O_5N$
delphisine	$C_{27}H_{46}O_4N_2$
staphisagroine	$C_{20}H_{24}O_4N$

staphisagrine. $C_{22}H_{33}O_5N$ = 391.3. Staphisaine. An alkaloid from staphisagria.

staphisagroine. $C_{20}H_{24}O_4N$ = 342.20. An alkaloid from staphisagria.

staphisaine. Staphisagrine.

Staphylococcus [pl.-cocci]. A genus of *Coccaceae* (Schizomycetes) forming grape-like clusters, many of which are pathogenic and produce pus; see *bacteria*.

staphylotoxin. A poisonous substance produced by staphylococcus cultures.

staple fiber. See fiber.

star. (1) A group of needle-shaped crystals, which radiate from a common center. (2) A sun-like body outside the solar system. See *spectral classification*. (3) A burner-attachment for holding small vessels. **blazing-** Aletris. **s. anise.** See *anise*. **s. grass.** Aletris.

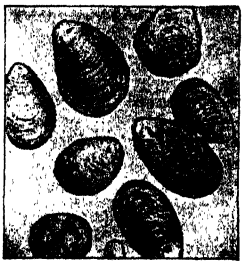
starch. $(C_6H_{10}O_5)_x$ = $(162.1)_x$. Amylum. A group of carbohydrates or polysaccharides occurring in many plant cells. The ordinary starch or potato starch is a white, soft, amorphous powder, d.1.5; insoluble in water, alcohol, or ether. It hydrolyzes in "staircase" (q.v.) fashion to several forms of dextrin and glucose. Its structure is not yet completely known; but the starch granules consist of at least two fractions: (1) An envelope (80 %) of *amylopectin*, *α-amylose* or *α-starch*, which is less soluble, contains a phosphoric acid ester, yields a paste and gives a violet color with iodine; and (2) an inner substance, *amylose*, *β-amylose*, or *β-starch*, which is more soluble, free from phosphorus, does not yield a paste, and turns blue with iodine.

	α-amylose, per cent	β-amylose, per cent
corn-	15	85
potato-	3	97
rice-	12	88
tapioca-	16.5	83.5
wheat-	23.5	76.5

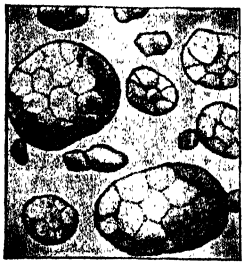
allant- Inulin. **animal-** Glycogen. **cassava-** Tapioca. **corn-** Amylum. The starch granules obtained from the fruit of *Zea mays*, Indian corn. Used as paste, for starching fabrics, as a dusting powder; as a food and antidote for iodine; and chemically, as a reagent and indicator for iodine. **lichen-** Lichenin. **rice-** Rice flour. The starch granules from the seeds of *Oryza sativa*, rice. Used as nutrient, for starching fabrics and for pastes. **nitro-** See *nitrostarch*. **soluble-** See *s. soluble*. **wheat-** The starch granules from the seeds of *Triticum vulgare*, wheat; used as a reagent, for pastes and in starching fabrics. (See illustration.)

s. glycerite. A protective colloid prepared by heating starch with glycerol and diluting with water. **s. gum.** Dextrin. **s. iodide. s. iodized.** Starch iodide. A bluish-black powder containing 2 % iodine, insoluble in water; used medicinally as an antiseptic. It is produced by the reaction of starch and a solution of iodine, and is used as a test for either. **s. nitrate.** Nitrostarch. **s. soluble.** $C_{36}H_{62}O_{31}.H_2O$. Amylodextrin. A hexasaccharide and white powder obtained by heating starch with glycerin. It gives a yellow color with iodine solution, is soluble in water and is used as an indicator, emulsifying agent, and in the textile industry. **s. sugar.** A dextrose obtained by heating starch with dilute sulfuric acid. It

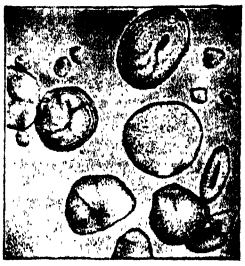
1. Potato



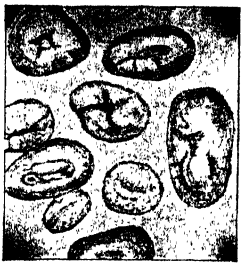
2. Arrowroot



3. Oat



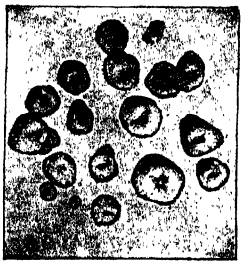
4. Wheat



5. Pea

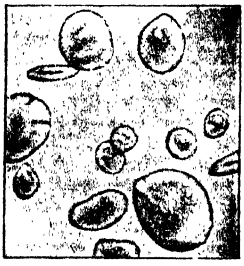
6. Bean

7. Rice



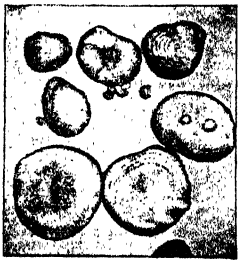
8. Maize

9. Buckwheat



10. Rye

arrowroot	2
barley	11
bean	6
buckwheat	9
maize	8
oat	3
pea	5
potato	1
rice	7
rye	10
wheat	4



11. Barley

Starches.

From: Hawk and Bergeim, Practical Physiological Chemistry.

consists of 1 part dextrose and 2 parts glucose, and is used as a syrup.

Stark effect. The action of an intense electric field causes a separation of the lines of a positive ray spectrum.

starlite. An artificial gem of a brilliant light green or blue color. Blue zircon of Siam is burned from 6 to 8 hours and treated with cobalt nitrate or potassium ferrocyanide. See *zircon.*

starter. A mixture of a culture of a suitable organism and nutrient medium, used to initiate large-scale fermentation; *e.g.*, in formation of cheese from milk curd, a culture of lactic acid-producing streptococci.

Stas, Jean Servais. 1813–1891. A Belgian chemist, noted for his determination of atomic weights. **S. pipet.** A pipet, the jet of which has parallel walls so that the contents run out and the level stops at the same point each time.

stassanization. A method of sterilization by heat, similar to pasteurization. Milk is heated at 167°F. for 15–20 seconds, and then cooled rapidly to 40–45°F.

Stassfurt salts. A large deposit of oceanic salts, mainly chlorides and sulfates, found in the Magdeburg Halberstadt region in northern Germany; the principal salts are rock salt and anhydrite. Cf. *abraum salts.* The deposits are arranged in layers under a top alluvial deposit and sandstone and include:

Sulfates:

anhydrite	$CaSO_4$
gypsum	$CaSO_4.2H_2O$
glauberite	$CaSO_4.Na_2SO_4$
polyhalite	$2CaSO_4.MgSO_4.K_2SO_4.2H_2O$
krugite	$4CaSO_4.MgSO_4.K_2SO_4.2H_2O$
kieserite	$MgSO_4.H_2O$
epsomite	$MgSO_4.7H_2O$
vanthoffite	$MgSO_4.3Na_2SO_4$
bloedite	$MgSO_4.Na_2SO_4$
loewite	$MgSO_4.2Na_2SO_4.2\frac{1}{2}H_2O$
langbeinite	$2MgSO_4.K_2SO_4$
leonite	$MgSO_4.K_2SO_4.4H_2O$
picromerite	$MgSO_4.K_2SO_4.6H_2O$
schoenite	$MgSO_4.K_2SO_4.9H_2O$
aphthitalite	$K_3Na(SO_4)_2$
kainite	$MgSO_4.KCl.3H_2O$
celestite	$SrSO_4$

Chlorides:

halite or rock salt	NaCl
sylvite	KCl
sylvinite (sylvine)	(K, Na)Cl
douglasite	$2KCl.FeCl_2.2H_2O$
carnallite	$KMgCl_3.6H_2O$
tachhydrite	$2MgCl_2.CaCl_2.12H_2O$
bischofite	$MgCl_2.6H_2O$
baeumlerite	$KCl.CaCl_2$
rinneite	$FeCl_2.3KCl.NaCl$

stassfurtite. A double salt of magnesium borate and chloride from Stassfurt.

state. (1) A condition. (2) A form of aggregation or dispersion; as, colloidal-, (3) Orbit, energy level. The condition of an electron in a neutral or ionized atom. **activated-** See *activation.* **amorphous-** Non-crystalline. Describing a homogeneous solid in which the molecules are not symmetrically oriented. Cf. *crystal.* **change of-** See *change.* **colloidal-** Matter in finely-divided particles, surrounded by another medium. See *colloidal systems.* **crystalline-** A homogeneous, anisotropic solid, in which the atoms are symmetrically oriented. **d-** See *orbital.* **dissociated-** See *dissociation.* **dynamic-** The condition of the atoms in an ion, as opposed to the static s. **equation of-** See *equation, gas laws.* **excited-** See *excitation.* **f-** See *orbital s.* **fluid-** Molten, liquid, or gaseous s. **gaseous-** A condition in which the molecules are in rapid and irregular motion. See *gas.* **irradiated-** See *irradiation.* **liquid-** A condition between the solid and gaseous state. **luminescent-** See *luminescence.* **molten-** A liquid s. above melting point temperature. **nascent-** A newly-formed atom or molecule. Cf. *status nascendi.* **orbital-** The position towards which electrons may fall during a quantum transition; as:

Final state	Electrons are in	Spectral lines produced belong to
s	lowest quantum state	sharp series
p	↓	principal series
d	↓	diffused series
f	highest quantum state	fuzzy series

Cf. *orbits, series.* **p-** See *orbital s.* **quantum-** See *energy levels.* **radiant-** See *incandescence, luminescence, fluorescence.* **s-** See *orbital s.* **solid-** A condition in which the molecules are in slow motion as compared with the liquid s., and in which they are held in more or less rigid and definite positions, which may be symmetrical (crystalline s.) or non-symmetrical (amorphous s.). **static-** The condition of atoms in a molecule, as opposed to dynamic-. **steady-** (1) A balance between intake and output, or between the formation and decomposition of a substance. (2) If in a chain of reactions, A→ B→ C, the amount or concentration of reactant B remains constant, while that of A decreases, and that of C increases; then, B is in the steady state.

static. (1) The condition of rest or equilibrium as opposed to motion (dynamic). (2) The interference with wireless radiations produced by atmospheric electric charges or by the presence of other sources of electricity.

s. atom. See *Lewis-Langmuir atom.* **s. electricity.** An electrical charge at rest; often produced by friction.

statics. A branch of science that deals with matter and forces in a state of equilibrium.

statistics. (1) The science of classifying numerical facts, judging collective numerical data, and determining probabilities from values obtained by enumeration or estimation. "The mathematics of experiment" (Mather). (2) In particular the consideration of conditions and properties of matter (as the *average* normal value of a group of units) rather than the *actual* value of a single unit. Cf. *Heisenberg principle, histogram, atomic* and *isotopic weights.*

stator. The stationary portion of a machine, as distinct from the revolving portion, rotor (q.v.).

status nascendi. The nascent (q.v.) state, or the condition of a molecule at its formation during a chemical reaction. Many elements are more active when newly-formed (as hydrogen), and it is assumed that in this state there exist free

atoms, H, that have not combined into the molecule, H_2. Cf. *excitation*.

staubosphere. The dust content of the atmosphere. [German, staub = dust.]

staurolite. Staurotide. An iron aluminum silicate, sometimes used as a gem.

staurotide. Staurolite.

stavesacre seed. Staphisagria.

steam. Water vapor. **superheated-** Water vapor that is heated under pressure to a temperature above 100°C.

s. bath. A vessel surrounded by steam with or without pressure. **s. black.** Hematoxylon. **s. distillation.** Distillation by blowing steam through the liquid, to obtain a distillate consisting of water and substance. **s. gauge.** See *pressure gauge*.

steapsase. Steapsin. A lipase of the pancreatic juice that hydrolyzes fats to glycerol and free acids.

steapsin. Steapsase.

steapsinogen. The substance from which steapsase is formed or liberated.

stearaldehyde. $C_{17}H_{35}CHO$ = 268.28. Octadecanal*. White scales, m.63.5, $b._{100mm}$261.

stearamide. $C_{18}H_{37}NO$ = 283.3. Octadecanamide*, stearic amide, $Me(CH_2)_{16}CONH_2$. White leaflets, m.109.

stearate. A salt or ester of stearic acid of the type, $C_{17}H_{35}COOM$, in which M is a monovalent metal or radical.

stearic acid. $C_{18}H_{36}O_2$ = 284.38. Octodecanoic acid*, *n*-octodecylic acid. A monobasic fatty acid, $CH_3(CH_2)_{16}COOH$, occurring in many vegetable and animal fats. Colorless, shining leaflets, $d._{70°}$0.852, m.69, $b._{100mm}$291, insoluble in water, soluble in alcohol or ether. **s. aldehyde.** Stearaldehyde. **s. amide.** Stearamide.

stearin. (1) $C_{57}H_{110}O_6$ = 891.0. Tristearin, glycerol tristearate, $C_3H_5(C_{17}H_{35}COO)_3$. A colorless crystalline mass, the chief constituent of many fats, $d._{65°}$0.943, m.71; insoluble in water, soluble in alcohol or ether. (2) *commercial-* A mixture of fatty acids, prepared from fats by hydrolysis; used in the manufacture of candles and solid alcohol. **lauro-** Laurin.

stearolic acid. $C_{18}H_{32}O_2$ = 280.3. *9*-Octadecynoic acid*. The unsaturated acid, $Me(CH_2)_7C{:}C(CH_2)_7COOH$. Colorless prisms, m.48, b.260; insoluble in water, slightly soluble in alcohol, soluble in ether.

stearone. $C_{35}H_{70}O$ = 506.74. *18*-Pentatriacontanone*, $(C_{17}H_{35})_2CO$. A solid, d.0.80, m.88, insoluble in water, soluble in hot alcohol or ether.

stearonitrile. $C_{17}H_{35}CN$ = 265,28. Octadecanenitrile*. Colorless crystals, m.41.

stearoptene. Oleoptene. The oxygenated portions of an essential oil consisting chiefly of the solid part (camphor, as opposed to the liquid part; as, eleoptene). *E.g.*, camphor of camphor oil; menthol of peppermint oil; thymol of thyme oil.

stearoxylic acid. $C_{18}H_{32}O_4$ = 312.35. *9.10*-dioxooctadecanoic acid*, $Me(CH_2)_7CO.CO(CH_2)_7COOH$. A solid, m.86, insoluble in water, slightly soluble in alcohol or ether.

stearyl. Octodecanoyl*. The monovalent radical, $C_{17}H_{35}CO$—, derived from stearic acid.

steatite. A variety of talc.

stechiometry. Stoichiometry.

steel. (1) Carbon steel. A tough, elastic alloy of iron containing small quantities of carbon:

mild or soft steel	less than 0.15 % C
medium steel	0.15–0.30 % C
hard steel	more than 0.30 % C

COMPOSITIONS OF TYPICAL STEELS

S.A.E. number	Per cent C	Per cent Mn	Per cent P, S	Per cent Cr	
(1)	(2)	(3)	(4)	(5)	(6)
1. Plain carbon steels					
1010	0.1	0.45	c.g.		
1040	0.4	0.65	c.g.		
1095	0.95	0.40	b.g.		
1120	0.2	0.75	d.h.		
2. Straight nickel steels					Per cent Ni
2015	0.15	0.45	b.f.	....	0.5
2315	0.15	0.45	b.f.	....	3.0
2340	0.4	0.45	b.f.	....	3.0
2512	0.12	0.45	b.f.	....	5.0
3. Chrome-nickel steels					Per cent Ni
3115	0.15	0.45	b.f.	0.5	1.25
3140	0.4	0.65	b.f.	0.6	1.25
3215	0.15	0.45	b.f.	1.0	1.75
3240	0.4	0.45	b.f.	1.0	1.75
3315	0.15	0.45	b.f.	1.50	3.50
4. Molybdenum steels					Per cent Mo
4130	0.4	0.55	b.f.	0.65	0.2
4150	0.5	0.55	b.f.	0.95	0.2
4615	0.5	0.45	b.f.	1.75*	0.25
5. Chromium steels					
5130	0.2	0.45	b.f.	0.75	
5150	0.5	0.65	b.f.	0.95	
52100	1.0	0.35	b.f.	1.35	
6. Chrome-vanadium steels					Per cent V
6120	0.2	0.65	b.f.	0.95	0.18
6140	0.4	0.65	b.f.	0.95	0.18
6195	0.95	0.65	b.f.	0.95	0.18
7. Tungsten steels					Per cent W
7260	0.6	0.15	a.e.	0.75	1.75
71360	0.6	0.15	a.e.	3.5	13*
71660	0.6	0.15	a.e.	3.5	13*
9. Silico-manganese steels					Per cent Si
9250	0.5	0.75	c.g.	....	2.0
9260	0.6	0.75	c.g.	....	2.0

(2) Range is ±0.05 % C.
(3) Range is ±0.15 % Mn.

(4) Maximum is (*a*) 0.035 % P, (*b*) 0.04 % P, (*c*) 0.045 % P, (*d*) 0.06 % P, (*e*) 0.04 % S, (*f*) 0.045 % S, (*g*) 0.05 % S, (*h*) 0.15 % S.

(5) Range is ±0.15 % Cr (* is nickel).

(6) Range for Ni ±0.25; for Mo ±0.05; for V ±0.03; for W ±0.25 and for * ±1.5; for Si ±0.2 %.

For phase diagram, see *iron*. World production (1941) 143,000,000 long tons (for order of countries, see *iron*). (2) Alloy steel. An alloy of iron whose properties are due to an element or elements other than carbon; such as, chromium, manganese, nickel, tungsten, silicon. Cf. *S.A.E. classification, ferrochromium, ferromanganese.*

alloy- A mixture of iron and some other metal, fused together and cooled rapidly. **alloy treated-** A steel which contains small quantities of other metals, incorporated during its manufacture for curative purposes, and not intended to produce the distinct properties of an alloy steel. *E.g.*, a steel containing less than 1 % Mn, or 0.3 % Si. **austenic-** A s. containing 18 % Cr, 8 % Ni and 1–4 % Mo; used for acid-resisting utensils (not corroded by HNO_3 or H_2SO_4). **bullet-proof-** S. containing 12 % Mn, 1 % C and less than 0.02 % P or S. **carbon-** An alloy of iron and carbon, variously treated, without the addition of other metals. **chrome-molybdenum-** An alloy of iron and 0.8–1.1 % Cr, 0.4–0.6 % Mn, 0.15–0.25 % Mo and 0.25–0.35 % C; used in the framework of aeroplanes. **chromium-nickel-** See *stainless-*. **high speed-** An alloy of iron containing 0.65 % C, 0.2 % Mn, 4 % Cr, 17 % W, and 5 % V. The tungsten can be replaced by 8.5 % Mo. It is used for tools and does not lose temper if heated. **nickel-** See *nickel*. **nickel-zirconium-** A tough, tenacious alloy of iron and 2 % Ni, 0.34 % Zr, 1 % Mn, 15 % Si and 0.4 % C, used for armor plates and helmets. **stainless-** A steel which contains elements such as nickel and/or chromium; it does not tarnish on exposure and is used for high-grade cutlery, kitchen- and tableware, etc. **super-** A high-speed steel containing 4 % cobalt. Cf. *carboloy*.

Steele microbalance. A quartz instrument which consists of a beam with a small quartz-ball, whose buoyancy is changed by increasing or decreasing the air pressure. It is the most delicate balance, and is sensitive to 4×10^{-6} mg.; with its aid the density of 0.1 cubic millimeter of radium emanation was determined by Ramsay and Gray.

Steenbock unit. A vitamin unit, q.v.

Stefan-Boltzmann equation. An equation indicating the radiations per square centimeter radiated per sec. by a black body at absolute temperature, T, to surroundings at absolute temperature t_0: $E = \sigma(T^4 - t_0^4)$. (Cf. *Wien's equation.*) **S. constant.** The constant, σ (sigma), of the Stefan-Boltzmann equation: $\sigma = 5.72 \times 10^{-12}$ watt/cm.²/degree. **S. law.** The total amount of energy (E in ergs) radiated from a black body (which is a perfect radiator) and due to heat alone, is proportional to the fourth power of the absolute temperature; $E = \sigma T^4$, where σ is 5.72×10^{-5}.

steigerite. $Al_2O_3.V_2O_5.6\frac{1}{2}H_2O$. A yellow mineral found in the uranium deposits of Colorado.

stellar. (1) Pertaining to stars. (2) Star-shaped; as, crystals. **s. evolution.** See *spectral classification.* **s. spectra.** See *spectral classification.*

stellate crystals. Stellar- or star-shaped crystals; as, phenyl glucosazone.

stellite. An alloy of steel with cobalt and 10–50 % chromium and/or tungsten, used for high-speed tools and instruments.

stem correction. The correction to be applied to a thermometer reading to allow for the portion of the mercury column not in the liquid.

stench. (1) An obnoxious odor. (2) A group of malodorous gases used industrially; as, in mine warnings. They are mercaptan, butyl mercaptan, amyl acetate, butyric acid or valeric acid.

stenocarpine. Gleditschine.

stenosation. A process for increasing tensile strength (*e.g.*, of viscose fibers) by treatment with formaldehyde.

stenosine. Sodium methyl arsenate.

stephanite. $5Ag_2S.Sb_2S$. A native silver, antimony sulfide.

step-wise decomposition. A staircase reaction (q.v.); decomposition that proceeds gradually in a series of reactions. **s. dissociation.** A gradual dissociation.

steradian. The solid angle which is subtended by a surface of a sphere equivalent to the square of the radius.

stercobilin. $C_{33}H_{46}N_4O_6 = 594.5$. The normal pigment of feces, m.236, it is probably urobilin.

stercorol. Coprosterol.

stercorite. $Na(NH_4)HPO_4$. Native microcosmic salt.

sterculia. A genus of tropical plants, some of which yield edible seeds and barks; used for cordage and mats. **s. gum.** Indian tragacanth, Indian gum. A tragacanth-like exudation from *Sterculia* species, a group of trees and shrubs of India; used as a filler in ice-cream. Cf. *hog* gum.

Sterculiaceae. A group of soft-wood trees or shrubs:

Cola acuminata..... kola nut
Theobroma cacao.....cocoa, cacao butter

Cf. *adansonia, heretine, kapok.*

stere. A kiloliter or 1000 liters (nearly 1 cubic meter).

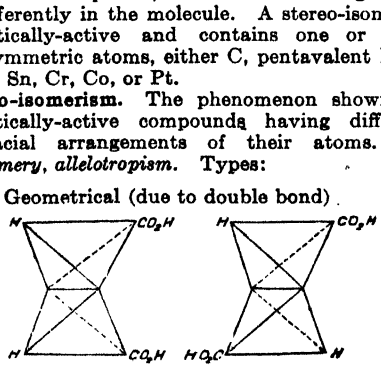
stereo- (1) A prefix derived from the Greek, indicating "solid" in structure or "three dimensional." (2) Abbreviation for stereotype.

stereochemistry. Spatial or configurative chemistry. A branch of science that investigates the spatial arrangement of the atoms in a molecule.

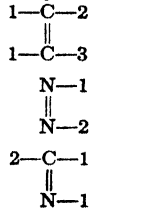
stereo-isomer. Stereomer. A compound containing the same number and kind of atoms as another compound, but with the atoms grouped differently in the molecule. A stereo-isomer is optically-active and contains one or more asymmetric atoms, either C, pentavalent N, S, Se, Sn, Cr, Co, or Pt.

stereo-isomerism. The phenomenon shown by optically-active compounds having different spacial arrangements of their atoms. See *isomery, allelotropism.* Types:

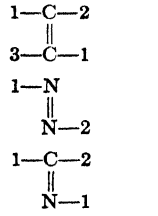
A. Geometrical (due to double bond)



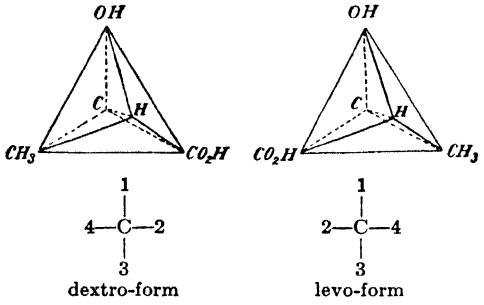
Plane symmetric cis- or syn- form



Axial symmetric anti- or trans- form



B. Optically-active (due to asymmetric atom)



stereomer. See *stereo-isomer.*

stereopticon. Balopticon. An instrument that projects an amplified image of an object.

stereoscope. A device for viewing a pair of photographs each simultaneously with one eye, and thus obtaining a perspective effect.

stereoscopic photographs. Two adjacent photographs of the same object, taken on the same plate at the same time, with two lenses. They are used to give depth and perspective to the picture.

stereoskiagraphy. The production of stereoscopic x-ray pictures; used to locate an opaque object in the human body.

stereotyping. An operation in printing in which the original type is used to emboss a plastic paper sheet (flong), which is then hardened and used to cast metal type for high-speed rotary letterpress machines.

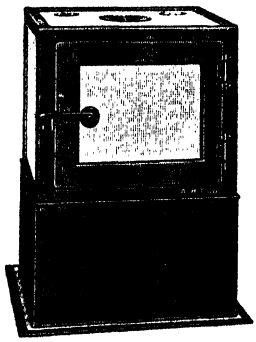
steric. Pertaining to the spatial arrangement of atoms in the molecule. **s. hindrance.** The non-appearance of the chemical reaction expected from a structural formula (two-dimensional); it is explained by the spatial arrangement of the atoms (three-dimensional). The presence of a particular atomic grouping in a certain position may inhibit or encourage the reaction.

sterid. Steroid.

steride. A tertiary lipid in which the alcohol is a sterol.

sterile. Aseptic or free from microorganisms. **s. solution.** A solution that has been made aseptic by the destruction or removal of all microorganisms.

sterilization. The destruction or removal of all living bacteria, microorganisms and spores. It is accomplished either physically (heat, sound, light, filtration) or chemically (antiseptics).



Hot air sterilizer.

sterilize. To render free from all living microorganisms and their spores.

sterilizer. An autoclave, steam or bake-oven, or other device for sterilization.

sterilizing The act of destroying or removing bacteria and their spores. Methods:

Glass and metal utensils:

(1) heat for two hours at 160–170°C. in a hot air oven;

(2) heat in a closed vessel (autoclave) under steam pressure at 115—120°C. for 15 minutes;

(3) heat in a current of steam for 30 minutes;

(4) boil in water for 20 minutes;

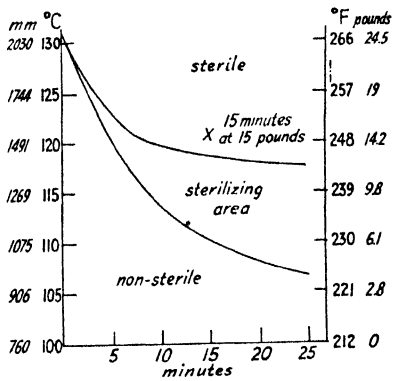
(5) boil in a solution of sodium bicarbonate (1:1000) for 20 minutes.

Solutions in their containers:

(1) If the solution is not decomposed by heat, proceed as above.

(2) If the solution is decomposed by heat, filter through a stone, porcelain, or alundum filter, the entire apparatus having been previously sterilized.

s. area. A pressure-temperature diagram on which the thermal death-points of all bacteria are marked by a wedge-shaped figure (see illustration).



Sterilizing with steam.

sternbergite. $Ag_2S.Fe_4S_5$. A native sulfide of iron and silver.

sternutatives. An agent that produces sneezing. **poison gas-** Substances that are used in explosive shells and cause, on liberation, violent sneezing; as, diphenylchlorarsine, ethyldichlorarsine, and diphenylcyanoarsine.

sternutatory. Able to produce sneezing.

steroid. Sterid. A generic name for the group of compounds comprising the sterols, bile acids, heart poisons, saponins and sex hormones.

sterols. A group of solid alcohols derived from vegetable sources, which consist chiefly of high-atomic *monohydric* unsaturated alcohols. *E.g.*,

farnesol, $C_{15}H_{26}O$.....	acacia
colocynth sterol, $C_{20}H_{34}O$.	colocynth
cucurbitol, $C_{24}H_{40}O_4$.....	watermelon seed
withaniol, $C_{28}H_{36}O_6$.....	*Withania coagulans*
homotaraxasterol, $C_{25}H_{40}O$	dandelion
fongisterol, $C_{28}H_{48}O$.....	ergot
bombicesterol, $C_{26}H_{44}O$...	silkworm chrysalis
isocholesterol, $C_{26}H_{46}O$...	wool fat

ergosterol, $C_{27}H_{42}O.H_2O$.. yeast, animal tissues
cholesterol, $C_{27}H_{46}O$..... animal and plant tissues
stigmasterol, $C_{27}H_{46}O$.... calabar beans
sitosterol, $C_{27}H_{46}O$..... wheat, corn, etc.
phytosterol, $C_{27}H_{46}O$..... many plants
coprosterol, $C_{27}H_{48}O$..... feces
dihydrositosterol, $C_{27}H_{48}O.H_2O$..... wheat
hippocoprosterol, $C_{27}H_{54}O$ horse feces
taraxasterol, $C_{29}H_{48}O$..... dandelion
clutyianol, $C_{29}H_{50}O_5$..... *Clutyia similis*
psylla alcohol, $C_{33}H_{58}O$... psylla wax
asteriasterol..... starfish

They appear to be derivatives of chrysene with a branched unsaturated side-chain. See *cholane*.

sterro metal. An alloy consisting of 56.5 % copper, 40 % zinc, 1.5 % iron and 1 % tin. It is stronger than gun-metal or bronze.

sterule. An ampoule or glass container containing a sterile solution.

Stetefeldt furnace. A furnace for roasting silver and copper ores, and at the same time exposing them to chlorine gas.

stew. To cook in boiling water or other liquid.

Stewart-Kirchhoff law. The light waves emitted by a hot gaseous body can be absorbed by the same substance at a lower temperature. Cf. *Fraunhofer lines*.

stibate. Antimonate.

stibiate. Antimonate.

stibic. Antimonic.

stibiconite. $Sb_2O_3(OH)_2$. Antimony ocher. Stibite. A native hydroxide of antimony.

stibide. Antimonide, stibnide. A binary compound of antimony and another element (hydrogen or a metal).

stibine. (1) Antimonous hydride. (2) An organic compound of the type, SbR_3. **triphenyl-** $Sb(C_6H_5)_3$ = 352.8. Antimony triphenyl. A colorless crystalline powder, m.48. **s. hydroxide.** An organic compound of the type, R_2SbOH.

stibious. Antimonous.

stibite. Stibiconite.

stibium. Antimony.

stibnate. Antimonate.

stibnic. Antimonic.

stibnide. Stibide.

stibnite. Antimony glance.

stibnous. Antimonous.

stibonic acid. An organic compound of the type, R_2SbO_2H.

stibonium. The monovalent radical, SbH_4^+, analogous to ammonium. **s. compounds.** A group of organic compounds derived from stibine and stibonium, of the general type R_4SbX, in which antimony is pentavalent. **s. hydroxide.** A compound of the type, R_4SbOH. **s. iodide.** A compound of the type, R_4SbI.

stibono. The monovalent radical, $(HO)_2OSb$—.

stibophen. Fuadin, fouadin, neoantimosan. Sodium antimony-bispyrocatechol-3,5-sodium disulfonate, $(NaO_3S)_2C_6H_2O_2{:}SbOC_6H_2(ONa)(SO_3Na)_2.7H_2O$. Used in the treatment of trichinosis and trypanosomiasis.

stibosan. $NH_2.C_6H_4.SbO(OH)ONa.5H_2O$. The antimony analogue of atoxyl; used medicinally.

stick. (1) A rod or cylinder; *e.g.*, of dynamite. (2) Gummy or viscous; as, syrup. (3) A thick syrup obtained by evaporation of the water used in making tankage. It contains 1.5–10 % N and is mixed with other fertilizers.

stick lac. See *lac*.

Stieglitz, Julius Oscar. 1867–1937. An American chemist noted for organic research.

stigmastane. $C_{29}H_{48}$ = 396.35. A hydrocarbon derived from stigmastanol.

stigmastanol. $C_{29}H_{48}O$ = 412.3. A hydrogenation product of stigmasterol.

stigmasterol. $C_{29}H_{46}O$ = 410.35. A sterol, m.-170, from calabar beans, soy beans and vegetable oils. Cf. *cholane*.

stilbamidine. 4.4′-diamino stilbene-di-β-hydroxyethane sulfonate. A drug used in the treatment of kala-azar.

stilbene. $C_{14}H_{12}$ = 180.17. Diphenylethylene, toluylene, bibenzal, $Ph.CH{:}CH.Ph$. An unsaturated hydrocarbon. Colorless rhombic leaflets, d.0.970, m.124, b.306; insoluble in water, soluble in alcohol or ether. **diamino-** See *diamino stilbene*. **dibenzoyl-** $C_{28}H_{22}O_2$ = 390.16. Acicular oxylepidine. $(Ph.CH.COPh)_2$. **phenyl-** Triphenylethylene.

s. diol. $C_{14}H_{12}O_2$ = 212.09. Vinylene-bisphenol. $HO.C_6H_4.CH{:}CH.C_6H_4.OH$. **s. hydrate.** $C_{14}H_{14}O$ = 198.2. Toluylene hydrate, $Ph.CHOH.CH_2.Ph$. Colorless crystals, m.62; soluble in alcohol. **ar-** $PhCH{:}CHC_6H_4OH$. Ar-hydroxy stilbene, styryl phenol.

stilbestrol. Diethylstilbestrol (q.v.).

stilbite. $(Na_2,Ca)O.Al_2O_3.6SiO_2.6H_2O$. A native hydrated sodium calcium aluminum silicate of the zeolite group; pearly white prisms.

still. Any apparatus in which a substance is heated to the gaseous state (as, a retort, vaporizer, or evaporator) and the gaseous products condensed (as a condenser or fractionating column). (See *distillation*.) **column-** A s. for fractional distillation. **pot-** A distillation apparatus for whisky or other potable spirits. **vacuum-** A device for distilling at a low temperature, under a reduced pressure obtained by a vacuum pump. **water-** A s. for distilling water.

s. head. Fractionating column. A device for selectively refluxing the less volatile components of mixtures under distillation, thus rendering fractionating more efficient.

stillingia. Queen's root, silver leaf, yaw root. The dried roots of *Stillingia sylvatica*, an Euphorbiaceae of North America. It contains alkaloids; used medicinally, the fluid-extract, as an alterative and expectorant.

stillingine. An alkaloid obtained from stillingia.

stillingoid. The combined principles of the root of stillingia; used medicinally as an alterative.

stilpnomelane. $FeSiO_3$. An iron metasilicate which contains Al, Ca and Mg.

stimmi. Sb_2S_3. A black, native antimony sulfide.

stimulant. An agent that excites or increases a functional activity. Cf. *sedative*.

stinging nettles. Urtica.

stinkstone. Anthraconite.

stinkweed. Stramonium.

stirrer. A device for agitating liquids.

stirring rod. (1) A glass rod bent in various shapes, and mechanically driven by water or an electric motor, for agitating liquids. (2) glass rod used for stirring. Cf. *policeman*.

stizolobin. A globulin from Chinese velvet beans, *Mucuna* (*Stizolobium*) *pruriens*, a Leguminosae.

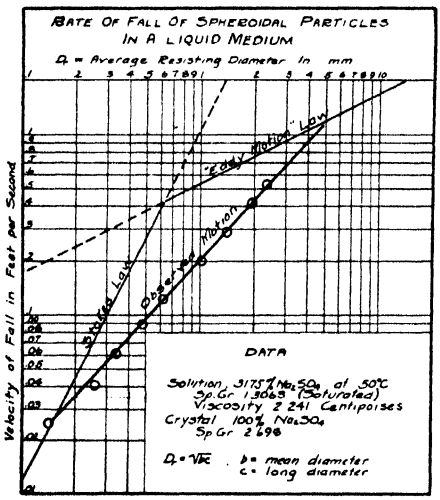
stoechiometry. Stoichiometry.

stoichiometry. A branch of chemistry that deals with the numerical relationship between elements or compounds, (atomic weights), the determination of the proportions in which the

elements combine, (formulae), and the weight-relations in reactions (equations).

stok(e). St. The unit of kinematic viscosity, n, as determined from Stokes' law. It equals dynamic viscosity in poises/density at the same temperature. Viscosity of water at 20°C. = 1.0018.

Stokes, George Gabriel. 1819–1903. An English mathematician noted for laws of hydrodynamics and optics. **S. law.** A mathematical equation that indicates that the rate of fall, v, of a spherical body of radius, a, under gravity, g, is dependent on the viscosity of the medium (η in C.G.S. units): $v = \frac{2ga^2}{9\eta}(\sigma - \rho)$, where σ and ρ are the density of the substance and of the medium respectively. This equation is used in the calculation of the charge on an electron by Millikan's method. For sedimentation (q.v.) the formula is: $v = \frac{gD(\sigma - \rho)}{18\eta}$, where D is the effective diameter of the particle of density σ in a liquid of density ρ. Cf. *settling*.



(from R. B. MacMullin, Double Bond, 9:115, 1937)

	v	v in ft. per sec.	
D mm.	observed	Stokes' law	Eddy law
2.331	0.535	6.00	0.812
1.970	0.426	4.28	0.747
1.415	0.291	2.21	0.633
1.036	0.201	1.19	0.542
0.622	0.122	0.426	0 419
	critical velocity		
0.489	0.089	0.263	0.372
0.343	0.061	0.130	0.312
0.261	0.041	0.075	0.271
0.145	0.025	0.023	0.203

stolzite. $PbWO_4$. Native lead tungstate.

stomach. A digestive pouch between the esophagus and the intestines, in which partial digestion of food takes place. **s. contents.** The partly-digested food materials, mixed with salivary and gastric juices; usually examined for free hydrochloric acid, lactic acid, total acidity, ferments and blood. **s. enzyme.** Pepsin. **s. juice** Gastric juice. **s. tube.** A rubber tube, used as a syphon to wash out the stomach or to take samples of s. contents.

stomachic. An agent that stimulates the appetite or increases gastric secretions; as, gentian, cinchona, nux vomica.

stone. (1) A standard British weight, equal to 14 pounds. (2) Concrete mineral matter or pieces of rock. (3) A concretion or calculus, q.v. **blue-** Copper sulfate. **gall-** Calculus. **Lydian-** Jasper. **precious-** Gem. **rotten-** See *rotten s.* **touch-** See *touchstone.*

s. flax. Asbestos. **s. root.** Collinsonoid. **s. ware.** See *ceramics, earthenware, pottery.*

stonecrop. The herb of *Penthorum sedoides*, a Crassulaceae; used as a laxative.

Stoner energy levels. See *S. quanta.* **S. quanta.** A modified Bohr theory, which deals with the distribution of electrons in different energy levels. The quantum number, k, of Bohr is divided into functions, k_1 and k_2, from which a systematic relationship of the lines of x-ray spectra is found. Accordingly there are for:

K	L	M	N	O	P	shells
1	3	5	7	5	3	energy levels

and the respective quantum numbers are:

shell	K	L		M			etc.
Bohr:	1_1	2_1	2_2	3_1	3_2	3_3	etc.
Stoner:	$1_{1(1)}$	$2_{1(1)}$	$2_{2(1)}$ $2_{2(2)}$	$3_{1(1)}$	$3_{2(1)}$ $3_{2(2)}$	$3_{3(2)}$ $3_{3(3)}$	etc.

The numbers denote $n_{k_1(k_2)}$. The electron distribution reduced for the noble gases is shown in the table below. Cf. *Pauli's principle.*

stoneroot. Rich weed, knob weed, horsebalm. The root of *Collinsonia canadensis*, a Labiatae, used as stomachic and diuretic. Cf. *collinsoid.*

stool. The discharge from the bowels; feces, q.v.

stopping power. The capacity of substances to absorb α-particles, as compared with that of air. It is proportional to the atomic number, N: $\sigma = kN^{\frac{4}{3}}$; where k is a constant and σ the stopping power.

storage. (1) The keeping of a chemical in its most suitable container and condition (cf. *hazard*), *e.g.*,

Immersed in a hydrocarbon liquid (oil, kerosene, naphtha)	sodium, potassium, etc.
Immersed in water..	white phosphorus, picric acid
Dry.....	peroxides and hygroscopic chemicals

K $k_2 = 1$	L 1 1 2	M 1 1 2 2 3	N 1 1 2 2 3 3 4	O 1 1 2 2 3	P 1 1 2
He 2					
Ne 2	2 2 4				
A 2	2 2 4	2 2 4			
Kr 2	2 2 4	2 2 4	2 2 4		
Xe 2	2 2 4	2 2 4 4 6	2 2 4	2 2 4	
Rn 2	2 2 4	2 2 4 4 6	2 2 4 4 6 6 8	2 2 4	2 2 4

Cool	volatile and inflammable substances
Ventilated	odoriferous and combustible substances
Isolated	explosives and acids
Dark	light-sensitive substances, dyes
Warm	liquid phenol, phosphoric acid, glacial acetic acid creolin, sodium silicate, formaldehyde.
Tightly covered	Ammonium salts, citric acid, potassium or sodium hydroxide, lead salts, zinc salts

s. battery. An electrical accumulator, q.v. **s. cell.** See *accumulator*. **s. tank.** Gasometer. (2) A large, usually round, iron or concrete structure, used to keep liquids.

storax. Styrax. A semi-liquid balsam from the wood and inner bark of *Liquidambar orientalis*, a Hamamelidiaceae of western Asia. It contains styrol, styracin and cinnamic acid; insoluble in water, slowly soluble in alcohol, soluble in ether. **s. oil.** The volatile oil of s., d.0.890–1.100, b.150–300, containing styrene and cinnamic esters. Cf. *liquidambar*.

storesin. $C_{36}H_{55}(OH)_3$ = 538.46. A hard resin from storax. **alpha-** An amorphous mass, m.160–168. **beta-** A white flocculent mass, m.140–145.

stovaine. $C_{14}H_{21}O_2N$ = 235.19. Benzoyldimethylaminomethylpropanol hydrochloride, $MeCH_2C(PhCOO)Me.CH_2.NMe_2$. The hydrochloride of 2-benzoxy-2-methyl-1-dimethylaminobutane. Small, lustrous scales, m.175, soluble in water; used as a local anesthetic.

stovarsol. Acetarsone.

stove. (1) A heating device in which the flame is covered. (2) To heat a paint or varnish film on metal to convert it into a protective and/or decorative coating; *e.g.*, at 160–260°F.

S.T.P. An abbreviation for standard temperature and pressure (0°C. and 760 mm.). Cf. *N.T.P.*

strain. (1) A deformation resulting from stress. It is the increase in length per unit original length. (2) To filter through a coarse filter, so as to remove large solid particles. **s. theory.** Baeyer's theory. The assumption that the normal lines of force of the valency bonds of a carbon atom run from the center of a tetrahedron to each of the four corners, and make an angle of 109° with each other. The stability of the five- and six-atomic rings is thus explained; also, the instability of aliphatic double bonds, and rings which contain a greater or less number of atoms. Cf. *molecular diagram, porphin ring*.

stramonium. Thornapple leaves, Jamestown or Jimson weed, stinkweed, apple of Peru. The dried leaves of *Datura stramonium*, a solanaceous plant containing various alkaloids; used medicinally as a nerve sedative and antispasmodic. **s. seeds.** The seeds of stramonium, containing atropine, hyosycamine, oil, resin, and proteins; used as a hypnotic and antispasmodic.

strata. Pl. of stratum, q.v. (1) The geological layers of rock on the earth surface. (2) The several layers of the atmosphere. (3) The seams of minerals.

stratification. The formation of layers, as in Liesegang rings, q.v.

stratiform. Describing a form of bacterial growth in a solid culture medium, characterized by liquefaction near the walls of the tube which then proceeds downwards.

stratometer. An instrument by which the hardness of a soil is determined from the distance it sinks in the soil under a given impact.

stratum. A geological layer. See *epoch, strata, geologic era*.

streak. The colored line produced when a mineral is rubbed across unglazed porcelain. **s. test.** The approximate gold-content of an alloy is determined by streaking a fine-grained silica stone, covered with charcoal, with the alloy, and comparing the streak with those produced by alloys of known compositions. The streaks are again compared after treatment with dilute aqua regia. Cf. *touchstone*.

stream-line filtration. Edge filtration. A principle of filtration in which the filter acts in a plane perpendicular to the direction of motion (stream-line) of the liquid. The usual type of s. l. filter consists of a pack of stout paper sheets held together in a press; the filtrate passes between the sheets and emerges through holes running along the length of the pack. Pressure or suction is employed. Cf. *filter press*.

Strecker reaction. The formation of amino acids by the action of ammonia on cyanohydrins.

strengite. The ore $FePO_4.2H_2O$.

streptococcus. A group of round or spherical bacteria arranged in strings or rows. pl. -cocci.

streptolysin. A protein which, when activated by reducing enzymes, hemolyses red blood corpuscles.

streptomycin. An antibiotic substance from certain strains of *Streptomyces griseus*.

streptothricin. An antibiotic substance obtained from *Streptomyces lavendulae*.

stress. The force per unit area that produces or tends to produce deformity of a body. Cf. *strain*.

striate. Striped, provided with lines.

string. A gold-plated quartz thread, 1.5–6μ thick, used for Einthoven galvanometers.

stripped atom. An atom from which one or more electrons have been removed by electrical means; hence, the gaseous ion of an element. Cf. *ionization potential, isosteres, kernel, spectral classification*.

stripping. (1) The removal of light fractions (*e.g.*, of lubricating oil distillates) by distillation with superheated steam. (2) The removal of dyestuffs from textiles by immersion in chemical or bleaching reagents.

stroboscope. Rotoscope. A mercury arc or neon lamp coupled with a periodically-discharging condenser. By regulating the frequency of the flashes (up to 2000 per second) the motion of fast-moving machinery can be observed.

stroboscopic. Pertaining to the stroboscope. **s. illumination.** Examined by the light of the stroboscope. **s. photography.** A moving picture of quick moving objects having rotary, oscillatory or vibratory motion and illuminated by the stroboscope which reduces it to slow motion. Cf. *chronoteine*.

stromatin. A constituent of blood corpuscles, which forms a loose compound with hemoglobin.

Stromeyer, Friedrich. 1786–1835. A German apothecary, discoverer of cadmium (1817).

stromeyerite. $(Ag,Cu)_2S$. A native sulfide of copper and silver.

strontia. Strontium oxide.

strontianite. $SrCO_3$. A native strontium carbonate.

strontium. Sr = 87.63. An alkaline earth metal and element, atomic number 38. It is a crystalline, silver-white metal, d.2.54, m.900, b.1000, slowly soluble in water forming the hydroxide. It occurs in nature as strontianite and celestite, and forms only one series of compounds (valency, two). **s. acetate.** $Sr(C_2H_3O_2)_2.\frac{1}{2}H_2O$ = 214.7. A white crystalline powder, soluble in water; used medicinally as an anthelminthic. **s. arsenite.** $Sr(AsO_2)_2.4H_2O$ = 373.7. A white powder; soluble in water; used as an insecticide. **s. bromate.** $Sr(BrO_3)_2.H_2O$ = 361.5. A colorless, deliquescent, crystalline powder, decomp. 240 soluble in water. **s. bromide.** $SrBr_2$ = 247.5. Colorless needles, $d_{24°}$.4.2, m.630; soluble in water or alcohol. *hydrous-* $SrBr_2.6H_2O$ = 355.6. Colorless hygroscopic crystals, d.2.358, soluble in water or alcohol; used medicinally as a tonic. **s. caffeine sulfonate.** Symphorol **s. s. carbonate.** $SrCO_3$ = 147.6. Native as strontianite. Colorless rhombic crystals, d.3.62, decomp. 1155, insoluble in water, soluble in acids; used as a source of strontium salts. **s. chlorate.** $Sr(ClO_3)_2$ = 254.6. Colorless rhombic or monoclinic crystals, d.3.152; m.290 decomp., soluble in water, alcohol or ether; used in pyrotechnics for red fires. **s. chloride.** $SrCl_2$ = 158.6. A colorless crystalline powder, d.3.054, m.872; soluble in water or alcohol. *hydrous-* $SrCl_2.6H_2O$ = 266.6. Colorless hexagonal needles, d.1.964, m.112, soluble in water or alcohol; used as a reagent and in pyrotechnics. **s. chromate.** $SrCrO_4$ = 202.7. Yellow monoclinic crystals, d.3.895; insoluble in water, soluble in acetic acid or ammonium hydroxide. **s. citrate.** $Sr_3(C_6H_5O_7)_2$ = 640.8. A colorless crystalline powder; soluble in water. **s. dioxide.** S. peroxide. **s. dithionate.** $SrS_2O_6,4H_2O$ = 319.81. Plates, d.2.373, insoluble in alcohol. **s. fluoride.** SrF_2 = 125.6. Colorless cubic or octahedral crystals, d.2.44, m.902, decomp. 1190, insoluble in water, soluble in acids; used as an antiseptic. **s. fluosilicate.** $SrSiF_6.2H_2O$ = 265.72. S. silicofluoride. White monoclinic crystals, d.2.99, very soluble in water. **s. formate.** $Sr(OOCH)_2$ = 177.6. Colorless rhombic crystals, d.2.69, m.71.9, soluble in water. *hydrated-* $Sr(OOCH)_2.2H_2O$ = 213.68. White powder, d.2.695, soluble in water. **s. glycerophosphate.** $SrC_3H_7PO_6.(H_2O)_x$. A white crystalline powder; soluble in water, insoluble in alcohol. **s. hydroxide.** $Sr(OH)_2$ = 121.7. Strontium hydrate. A colorless powder, d.3.625, m.375; slightly soluble in water. *hydrous-* $Sr(OH)_2$, $8H_2O$ = 265.8. Colorless, tetragonal, deliquescent crystals, d.1.396; very slightly soluble in water, soluble in ammonium hydroxide. Used in beet sugar manufacture for crystallization of the sugar from the molasses. **s. hyposulfate.** $SrS_2O_6.4H_2O$ = 319.6. A colorless crystalline powder; soluble in water. **s. hyposulfite.** S. thiosulfate. **s. iodide.** SrI_2 = 341.5. Colorless hygroscopic plates, d.4.549, m.402; slightly soluble in water, soluble in alcohol. *hydrous-* $SrI_2.6H_2O$ = 449.6. Colorless crystals, d.4.415, slightly soluble in water, soluble in alcohol; used medicinally as a KI substitute. **s. lactate.** $Sr(C_3H_5O_3)_2.3H_2O$ = 319.8. A white granular powder, soluble in water or alcohol; used medicinally as a diuretic and antirheumatic. **s. monoxide.** S. oxide. **s. nitrate.** $Sr(NO_3)_2$ = 211.7. Colorless cubic or octahedral crystals, d.2.93, m.645 (decomp.), soluble in water. *hydrous-* $Sr(NO_3)_2.4H_2O$ = 283.7. Colorless triclinic crystals, d.2.249, soluble in water, slightly soluble in alcohol; used in pyrotechnics for red fires, and red signal rockets. **s. nitrite.** $Sr(NO_2)_2$ = 179.8. A white powder; soluble in water. **s. oxalate.** $SrC_2O_4.H_2O$ = 193.7. A white crystalline powder, decomp. by heat, insoluble in water, soluble in acids. Used in pyrotechnics. **s. oxide.** SrO = 103.63. Strontia, s. monoxide. Colorless rhombic crystals or grayish-white porous powder, $d_{15°}$.4.36, m.3000, decomp. by water; used industrially in beet sugar manufacture. **s. peroxide.** SrO_2 = 119.62. A fine, white, odorless and tasteless powder; slightly soluble in water; soluble in acids. Used medicinally as an antiseptic; also as a bleaching agent. *hydrous-* SrO_2, $8H_2O$ = 263.76. White crystals, decomp. at red heat. **s. phosphate.** $Sr_3(PO_4)_2$ = 452.8. A white powder, soluble in acids, insoluble in water; used medicinally as a tonic. *acid-* $SrHPO_4$ = 183.7. Colorless rhombic crystals, d.3.544; insoluble in water or alcohol, soluble in ammonium hydroxide or sodium chloride solutions. **s. platinocyanide.** Platinum strontium cyanide. **s. saccharate.** $C_{12}H_{22}O_{11},2SrO$ = 549.52. An almost insoluble salt by means of which sugar is separated from molasses. The sugar is separated by precipitation of the strontium as carbonate. **s. salicylate.** $Sr(C_7H_5O_3)_2.2H_2O$ = 397.6. A colorless crystalline powder, soluble in water or alcohol; used medicinally. **s. silicofluoride.** $SrSiF_6,2H_2O$ = 265.8. A very soluble solid. **s. sulfate.** $SrSO_4$ = 183.7. Native as celestine. Colorless rhombic crystals, d.3.71, decomp. white heat, insoluble in water, slightly soluble in acids. Used in pyrotechnics. **s. sulfide.** SrS = 119.7. Colorless regular crystals or a light-gray powder, d.3.72; soluble in water or alcohol. Used as a depilatory, and as a constituent of luminous or phosphorescent paints. **s. sulfite.** $SrSO_3$ = 167.7. Colorless crystals, decomp. by heat; insoluble in water, soluble in sulfurous acid. **s. tartrate.** $SrC_4H_4O_6.4H_2O$ = 307.6. A white crystalline powder; slightly soluble in water. **s. thiosulfate.** $SrS_2O_3.5H_2O$ = 289.83. Strontium hyposulfite. Colorless needles, d.2.16, soluble in water, insoluble in alcohol.

strophanthic acid. $C_{23}H_{36}O_8$ = 434.3. A dibasic acid derived from strophanthin, decomp. 270, insoluble in water, soluble in sulfuric acid.

strophanthidin. $C_{23}H_{32}O_6$ = 404.3, or $C_{22}H_{38}O_7$ = 474.29. An aglucone from strophanthus, m.178.

strophanthin. $C_{31}H_{48}O_{12}$ = 612.5. Methylouabain, strophanthum. A mixture of glucosides (strophantidin, strophantobiose methyl ether, etc.) from the ripe seeds of strophanthus. A white or faintly-yellow, extremely poisonous crystalline powder, m.179, soluble in water or alcohol; used medicinally as a heart tonic. **crystallized-** Ouabain. **G-** Ouabain. **K-** The glucosides from *Strophanthus kombe.*

strophanthobiose. $C_{12}H_{22}O_{11}$ = 326.17. A disaccharide obtained by partial hydrolysis of strophanthin. It hydrolyzes to mannose and rhamnose.

strophanthum. Strophanthin.

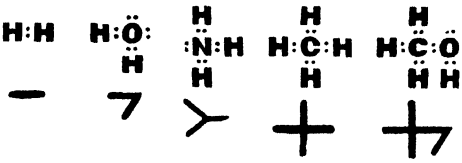
strophanthus. The dried ripe seeds of *Strophanthus Kombe* or other species, an Apocynaceae of Africa and Asia; used medicinally for heart-diseases.

structural. Pertaining to the arrangement of atoms in a molecule. **s. formula.** A representation (on a plane surface) of the atomic arrangement of a molecule.

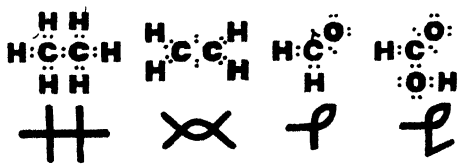
structure. (1) The mode of linkage of atoms in a molecule, especially of an organic compound; it is represented by a graphical formula, a structure symbol, a molecular diagram or molecular model. (2) The constitution of the nucleus, or the arrangement of nuclear particles, q.v. (3) The arrangement of electrons in the atom. **atomic-** Structure (3). Cf. *constellation*. **molecular-** Structure (1). Cf. *atomic distance, molecular models*. **nuclear-** Structure (2). Cf. *isotopes, radioactive elements*.

structure-symbol. A geometrical figure that indicates the arrangement of the atoms in an organic molecule. It represents the valence skeleton of carbon, hydrogen, oxygen and nitrogen of the compound. Each line indicates a bond or a pair of electrons. The terminals or junctions of lines indicate the atoms as follows:

A hydrogen atom at the end of each line,
An oxygen atom at the junction of two lines,
A nitrogen atom at the junction of three or five lines and
A carbon atom at the junction of four lines.
Thus:



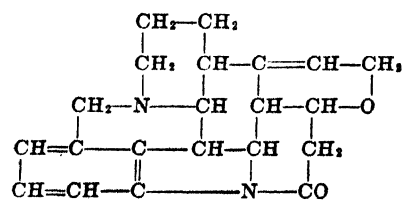
Single, double and triple bonds are shown, respectively, by straight and curved lines as follows:



Atoms of elements, other than the above are represented by their symbols in their respective locations. **electronic-** A s. showing the relative positions of electrons; see *bonds, molecular diagram*.

Strutt, John William. See *Rayleigh*.

strychnine. $C_{21}H_{22}O_2N_2$ = 334.3. Vauqueline. An alkaloid from various species of *Strychnos ignatia* and *S. nux vomica*.



Colorless tetragonal crystals, m.268, slightly soluble in water, soluble in alcohol or ether. Used medicinally in small doses as a tonic and stomachic; also as a rat and pest poison. **dimethoxy-** Brucine. **methyl-** A yellow powder; soluble in water or alcohol.

s. acetate. (Str)$C_2H_4O_2$ = 394.3. Small colorless crystals soluble in water; used medicinally. **s. arsenate.** (Str)H_3AsO_4 = 476.3. A colorless crystalline powder, soluble in water; used medicinally in ampoule medication. **s. arsenite.** (Str)$HAsO_2$ = 442.4. Colorless crystals, slightly soluble in water; used medicinally. **s. bisulfate.** (Str)H_2SO_4 = 432.3. Colorless needles; soluble in water. **s. cacodylate.** (Str)AsO_2Me_2 = 471.3. A white powder; soluble in water. **s. citrate.** (Str)$C_6H_8O_7$ = 497.4. Colorless crystals; soluble in water. **s. glycerophosphate.** (Str)$C_3H_7PO_6$ = 504.3. Colorless crystals, soluble in water; used in ampoule medication. **s. hydrobromide.** (Str)-HBr = 415.3. Colorless needles, soluble in water; used medicinally. **s. hydrochloride.** (Str)$HCl.1\frac{1}{2}H_2O$ = 397.7. Colorless trimetric crystals, soluble in water; used medicinally. **s. iodate.** (Str)HIO_3 = 510.2. Colorless crystals; soluble in water. **s. lactate.** (Str)$C_3H_6O_3$ = 424.4. A white crystalline powder; soluble in water. **s. nitrate.** (Str)HNO_3 = 397.3. Colorless needles, decomp. by heat, soluble in water, alcohol, glycerin or ether. Used medicinally as a tonic and stomachic. **s. phenolsulfonate.** (Str)$PhOHSO_3$ = 508.4. A white crystalline powder; soluble in water or alcohol. **s. phosphate.** (Str)$_2H_3PO_4.9H_2O$ = 928.5. Colorless crystals; soluble in water. **s. salicylate.** (Str)$C_7H_6O_3$ = 472.4. A white crystalline powder; soluble in water or alcohol. **s. sulfate.** (Str)$_2H_2SO_4.5H_2O$ = 856.7. Colorless prisms, anhydrous at 200, soluble in water, alcohol or ether; used medicinally as a tonic and stomachic. **s. valerate.** (Str)-$C_5H_{10}O_2$ = 436.4. A colorless crystalline powder, soluble in water or alcohol; used medicinally as a tonic and sedative.

strychninium. A strychnine containing pentavalent N. Cf. *piperidinium*.

Strychnos. A genus of tropical trees belonging to the Loganiaceae. They yield strychnine, nux vomica, ignatia, curare, akazgine, copalchi, hoangnan, and ipoh.

stucco. A mixture of calcium sulfate, sand, and lime, used as a decorative building material.

Stuffer law. Sulfones, in which two $=SO_2$ groups are on adjacent carbon atoms, will be readily saponified.

stuffing. A dyeing process in which the textiles are first run through the color and afterwards through a mordant. **s. box.** A box containing asbestos or other packing which fits round the point where a moving rod passes through the side of a vessel containing a fluid, and thus prevents leakage.

sturin. $C_{36}H_{68}O_7N_{10}$ = 753.65. A protein from the sperm of the sturgeon.

sturnutatory. Sternutatory.

Stutzer's reagent. A suspension of cupric hydroxide in aqueous glycerol used to separate proteins from other nitrogenous constituents of plants; *i.e.*, "albuminoid" from "amido" nitrogen. The hydroxide is precipitated from a solution of 100 g. copper sulphate crystals in 5 liters of water containing 2.5 cc. glycerol, rubbed in a mortar with water containing 5 cc.

glycerol per liter, washed free of alkali and made into a gelatinous but pipettable mass by rubbing with 10 % aqueous glycerol.

stylophorum. The herb of *Stylophorum diphyllum*, a Papaveraceae. It contains the alkaloids, chelidonine, protopine, sanguinarine and chelerythrine.

styphnic acid. $C_6H_3O_8N_3$ = 245.1. Trinitroresorcinol, 2.4-dihydroxy-1.3.5-trinitrobenzene. A yellow crystalline substance of the picric acid type, d.1.829, m.180; used in explosives.

styptic. An astringent or agent that contracts blood vessels and stops hemorrhage when applied locally; as, alum, tannic acid, ferric chloride, Monsel's solution.

stypticine. $C_{12}H_{15}O_4N.HCl$ = 273.5. Cotarnine hydrochloride. A decomposition-product of narcotine. Yellow crystals, soluble in water or alcohol; used medicinally as a styptic, astringent and hemostatic.

styptol. Cotarnine phthalate. A yellow crystalline powder, soluble in water or alcohol; used as a styptic.

styracine. $C_{18}H_{16}O_2$ = 264.2. Cinnamyl cinnamate. The ester of cinnamic alcohol and cinnamic acid, $PhCH{:}CHCOOCH_2CH{:}CHPh$. It is a solid constituent of liquidambar or styrax, m.44, used in perfumery.

styracol. $C_{16}H_{14}O_2$ = 238.1. Cinnamyl guaiacol, $C_6H_4(OC_9H_7O.CH_3)$. Colorless crystals, soluble in alcohol; used as an antiseptic.

Styrax. (1) A genus of trees and shrubs, Styraceae, that yield balsams; as, storax, benzoin. (2) Storax.

styrene. (1) C_8H_8 = 104.1. Cinnamene, styrolene, phenethylene, styrol, vinylbenzene, phenylethylene, $Ph.CH{:}CH_2$. A constituent of storax, essential oils, and coal tar. A colorless, aromatic liquid, d.0.925, b.145, soluble in alcohol or ether. Used in organic synthesis, and forms two types of derivatives; as, o-, m-, p-aminostyrolene, aminovinylbenzene = $NH_2C_6H_4CH{:}CH_2$. ω-, p-aminostyrolene, phenylvinylamine = $C_6H_5CH{:}CHNH_2$. (2) The bivalent radical, —CHPh.CH_2—.

styrilic acid. Cinnamic alcohol.

styrol. (1) Styrolene. (2) Colloidal silver.

styrolene. Styrene. **s. alcohol.** Cinnamic alcohol.

styron. (1) Cinnamic alcohol. (2) Trade name for a polystyrene plastic. **m-methoxy-p-oxy-** Coniferol.

styryl. The monovalent radical. PhCH:CH— derived from styrolene. **s. alcohol.** Cinnamyl alcohol. **s. amine.** C_8H_9N = 119.1. $PhCH{:}CHNH_2$. A colorless liquid, b.236, insoluble in water, soluble in alcohol. **s. ketone.** $C_{17}H_{14}O$ = 210.1. Dibenzilideneacetone, 1.5-diphenyl-3-pentadienone*, $(Ph.CH{:}CH)_2CO$. Colorless crystals, m.112. **s. methylketone.** Benzilidene acetone.

S.U. Saccharomyces unit, q.v.

sub- A prefix derived from the Latin, and indicating "below," "almost," "under" or "near." It is used to designate a lower form of oxidation or a basic compound, and indicates deficiency of the substance or radical it describes. Cf. *per-*.

subacetate. A basic acetate; as, lead subacetate.

subatomic. Pertaining to the structure of the atoms themselves, as distinct from their function as parts of a molecule. **s. decomposition.** A radioactive disintegration; or other phenomena in which an atom is split or divided. Cf. *radioelement*. **s. particle.** See *particles*. **s. reaction.** A change in which an atom is disintegrated or transformed; as in nuclear chemistry, q.v.

subatomics. A branch of science that investigates the structure of the atoms and the rôle of electrons and nuclei in subatomic changes. Cf. *atomic structure*, *isostere*, *periodic system*, *nuclear reaction*.

subcarbonate. A basic carbonate.

subcutaneous. Located beneath the skin. **s. injection.** The administration of a drug by injecting it under the skin.

subdural injection. The administration of a drug by injecting it into the outermost membrane of the brain or spinal cord.

suber. Cork.

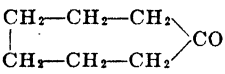
suberane. C_7H_{14} = 98.1. Cycloheptane*, heptamethylene, $(CH_2)_7$. A colorless liquid, m.—13, b.117; soluble in alcohol.

suberic acid. $C_8H_{14}O_4$ = 174.1. Octanedioic acid*, *1.6*-hexanedicarboxylic acid. A dibasic acid and homolog of oxalic acid, $(CH_2)_6(COOH)_2$, obtained by oxidation of cork. Colorless needles, m.140, b.300; soluble in water, alcohol or ether.

suberin. The fat extracted from cork.

suberol. $C_7H_{14}O$ = 114.1. Cycloheptanol*. Colorless liquid, d.0.958, b.185.2.

suberone*. $C_7H_{12}O$ = 112.1. Cycloheptanone, ketoheptamethylene. The heptatomic ring compound,



A colorless oily liquid obtained by distilling calcium suberate, d.0.969, b.180, slightly soluble in water, soluble in alcohol or ether.

suberyl. The monovalent cyclic radical, C_7H_{13}—, derived from suberane. **s. alcohol.** Suberol.

sublamine. $HgSO_4.2C_2H_4(NH_2)_2.2H_2O$ = 452.6. Mercuric sulfate ethylene diamine. A white crystalline powder, soluble in water; used medicinally as a non-irritant germicide.

sublethal. Below fatal; not quite fatal. **s. dose.** The administration of a drug in quantities below the fatal dose.

sublimate. (1) A solid or condensed substance obtained by heating a material; as, the deposit formed on the charcoal block or in a glass tube, after heating certain substances which pass directly from the solid to the vapor phase and then back to the solid state. (2) Mercuric chloride. **corrosive-** Mercuric chloride.

sublimation. The transformation of a solid to a gaseous substance, followed by condensation to the solid state. It differs from distillation in that the solid does not pass through the liquid state. It is used to purify substances such as mercuric chloride, iodine, camphor.

sublime. To successively volatilize and condense a solid.

submicron. A particle between 2×10^{-6} and 5×10^{-7} cm. in diameter ($0.2\mu - 5m\mu$). Cf. *amicron*. They are visible under the ultramicroscope, but not under the ordinary microscope.

subnitrate. A basic nitrate; as, bismuth subnitrate.

subnormal. Below normal.

suboxide. That oxide of an element which contains the lowest proportion of oxygen.

subsoil. The layer below the surface soil. It contains the soluble organic portion of the latter, washed into it by rain.

substance. A particular kind of matter. The material of which a body is composed; as, a chemical compound or a mixture of compounds.

substantive dyeing. The coloring of fabrics without mordants.

substantive dyes. A group of coal tar colors, chiefly for cotton, that impart color directly and without mordanting; as, benzidine dyes, primulin, congodiamine.

substituent. The atom or radical that enters into the structure of a molecule and replaces another atom or radical.

substitute. (1) To replace one element or radical in a compound by another element or radical. (2) Ersatz. A substance used in place of another.

substituted. Pertaining to a compound in which one or more atoms or radicals have been exchanged for one or more others. **s. compound.** A compound obtained by substitution; a derivative, q.v. Cf. *nucleus, group.*

substitution. Describing: (1) A reaction in which an atom or group of atoms in a molecule is exchanged for another atom or group of atoms. A term used mainly in connection with organic compounds. (2) A reaction in which an element or radical is either oxidized or reduced, and a portion of it combines with the displaced element; as

$$MN + 2X = MX + XN$$

SUBSTITUTIONS

alkaline fusion	OH for SO_3H
alkylation	R for H
halogenation	X for H
nitration	NO_2 for H
reduction	NH_2 for NO_2
sulfonation	SO_3H for H

substitutive derivate. A compound formed by the replacement of one atom or radical by another atom or radical; as, $C_6H_6 \rightarrow C_6H_5Cl$. It differs from an additive derivative in that in the latter one or more atoms are added to the molecule; as, $C_6H_6 \rightarrow C_6H_6Cl_2$.

substrate. The material upon which an enzyme or ferment acts; the substance acted upon.

subsubmicron. Amicron.

subsulfate. A basic sulfate.

subtilin. An antibiotic substance produced by *Bacillus subtilis*, a bacterium.

subultramicroscopic. Matter in such a high degree of dispersion as to be invisible in the ultramicroscope. Cf. *amicron.*

succinaldehyde. $C_2H_4(CHO)_2$ = 86.07. Butanedial*. Five forms:

α—liquid b.169.	δ—solid, m.135.
β—liquid, b.171.	ϵ—solid, m.95 (decomp.)
γ—solid, m.64.	

methyl- Pyrotartaraldehyde.

succinamic acid. $C_4H_7O_3N$ = 117.1. Amidosuccinic acid, β-carbamylpropionic acid, $COOH.CH_2.CH_2CONH_2$. A white, colorless powder; soluble in water. **amino-** Asparagine.

succinamide. $C_4H_8O_2N_2$ = 116.1. Diamidosuccinic acid, butanediamide*, $(NH_2COCH_2)_2$. Colorless needles, m.242 (decomp.), soluble in water, insoluble in alcohol or ether. **hydroxy-** Malamide. **phenetyl-** Pyrantin.

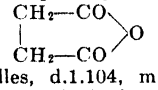
succinamyl. The monovalent radical, $—OC(CH_2)_2CONH_2$.

succinate. A salt of succinic acid of the type $C_2H_4(COOM)_2$.

succinelite. Succinic acid obtained from amber.

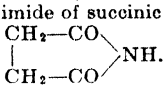
succinic acid. $C_4H_6O_4$ = 118.1. Ethylene dicarboxylic acid, amber acid, butanedioic acid*. A bibasic acid and homolog of oxalic acid, $HOOC.CH_2.CH_2.COOH$. It occurs in amber and various other resins as colorless monoclinic prisms, d.1.554, m.184, b.235, slightly soluble in water, alcohol or ether; used as a reagent. **iso-** $CH_3.CH:(COOH)_2$. A solid, d.1.455, m.130, (decomp.), soluble in alcohol or ether, insoluble in water. **α-amino-** Aspartic acid. **diamido-** Succinamide. **dihydroxy-** Tartaric acid. **ethyl-** See *ethyl-succinic acid.* **formyl-** Aconic acid. **hydroxy-** Malic acid. **keto-** Oxalacetic acid. **methyl-** Pyrotartaric acid. **methylene-** Itaconic acid.

s. aldehyde. Succinaldehyde. **s. anhydride.** $C_4H_4O_3$ = 100.1. Succinyl oxide, butanedioic anhydride*. The pentacyclic compound,



Colorless needles, d.1.104, m.120, b.261; insoluble in water, soluble in alcohol or ether. **s. peroxide.** $C_8H_{10}O_8$ = 234.2. Alphozon, alphogen. $(HOOC.CH_2.CH_2.CO)_2O_2$. A white fluffy powder, soluble in water; used as germicide and mouthwash.

succinimide. $C_4H_5O_2N.H_2O$ = 117.1. Butaneimide*. The imide of succinic acid,



Colorless octahedral crystals m.124, b.287; soluble in water, alcohol or ether.

succinite. (1) An amber-colored grossularite or aluminum garnet, q.v. (2) Baltic amber; it contains 4 % of succinic acid.

succinol. An oil obtained by distilling amber.

succinonitrile. Ethylene cyanide.

succinoresinol. $C_{12}H_{20}O$ = 180.2. An alcohol from amber.

succinyl. Butanedioyl*. The bivalent radical, $—OC.CH_2CH_2.CO—$, derived from succinic acid. **s. chloride.** $(CH_2COCl)_2$ = 154.97. Succinyl dichloride, butanedioyl chloride*, $C_2H_4(COCl)_2$. A colorless, fuming, highly refractive liquid, d.1.412, m.16, b.190; used in organic synthesis. **s. oxide.** Succinic anhydride.

succinylsulfathiazole. $C_{13}H_{13}N_3O_5S_2$ = 373.39. Sulfasuxidine. Sulfathiazole in which a hydrogen of the NH_2 group is replaced by the succinyl radical. It is employed in treating intestinal infections.

sucramine. The ammonium salt of saccharin.

sucrase. Invertase.

sucrate. A compound of sucrose.

sucroclastic. Describing a glycolytic enzyme.

sucrol. $C_9H_{12}O_2N_2$ = 180.2. Dulcin, p-phentylurea, valzin, *p*-ethoxyphenylurea, *p*-phenetolcarbamide, $NH_2.CO.NH.C_6H_4.OEt$. Colorless lustrous needles, m.173; slightly soluble in water, soluble in alcohol or ether. It is 200 times as sweet as cane sugar, and is used for sweetening.

sucrolite. A synthetic resin plastic of the formaldehyde-urea type, in which most or all of the former is replaced by sugar or molasses; some are transparent.

sucrose. $C_{12}H_{22}O_{11}$ = 342.2. Cane sugar, saccharobiose, beet sugar, saccharose. A di-

saccharide, hydrolyzing to fructose and glucose, $[\alpha]_D^{20} + 66.5°$. Colorless monoclinic crystals, d.1.588, m.160 (decomp.), soluble in water, slightly soluble in alcohol. Cf. *sugar refining*. Used extensively as a food, for preserves, jams, confectionery, beverages and for sweetening; also in explosives. **s. octaacetate.** A white powder, m.69–72, having a very bitter taste; used as denaturant for rubbing alcohol (4.25 lb. added to 100 gallons).

suction. The act of sucking. Drawing a fluid into a pipe. **s. gas.** The coal gas contained in producer-gas when coal is used in place of coke. **s. pump.** See *pump*.

sucuuba bark. Plumiera.

sudan. s. I. Sudan yellow. **s. II.** Xylidine azo-β-naphthol. A brown dye. **s. III.** Sudan red. **s. IV.** Scarlet Red. **s. brown.** A fat-soluble diazo-dye, soluble in alcohol. **s. red.** $C_{22}H_{16}ON_4$ = 352.3. Aminoazobenzeneazo-β-naphthol, sudan III. $Ph.N_2C_6H_4.N_2C_{10}H_6OH$. A brown powder, insoluble in water, soluble in alcohol or ether; used as a microscope stain and for coloring fats. **s. yellow.** $C_{12}H_{10}O_2N_2$ = 214.2. Aniline azo-β-naphthol, sudan I. A red powder, insoluble in water, soluble in alcohol or fats; used to color oils and varnishes.

sudanite rock. A mixture of talc and magnesite.

sudonific. A diaphoretic, or an agent that causes the production of sweat.

suet. Tallow. (1) Pharmaceutically: The fat from the abdominal cavity of sheep; it contains chiefly stearates and palmitates, with some oleates of glycerol. A colorless unctuous mass, m.45–50, soluble in alcohol or ether. Used in the preparation of ointments and cerates; and in cooking. (2) Culinarily: The fat from beef. (3) Industrially: The solid fat from any animal.

suffocating gases. A group of poison gases (q.v.) used in warfare, that stop respiration; as, Cl_2 or $COCl_2$.

sugar. (1) A carbohydrate having a sweet taste; general formula, $(C_nH_{2n}O_n)$ or $C_nH_{2n-2}O_{n-1}$, cf. *carbohydrates*, *monosaccharides*, *furanoside*, *pyranoside*, *sweetness*. See table. (2) Generally sucrose. **acorn-** Quercitol. **avocado-** A mannoketoheptose isolated from the avocado or alligator pear. **beechwood-** Xylose. **beet-** A sucrose from the sugar beet, *Beta vulgaris*. **blood-** Glucose. **brain-** Cerebrose. **cabbage-** A triose from cabbage leaves. **cane-** A sucrose from sugar cane, *Saccharum officinalis*. **collagen-** Glycocoll. **corn-** Glucose. **diabetic-** A misnomer for saccharin. **fruit-** Fructose. **gelatin-** Glycocoll. **grape-** Glucose. **gum-** Arabinose. **heart-** Inositol. **invert-** See *invert-sugar*. **larch-** Melezitose. **liver-** Glycogen. **malt-** Maltose. **maple-** A crude s., chiefly sucrose, of agreeable flavor made from the sap of certain maples (*Acer saccharum, A. nigrum*, etc.) native in Eastern Canada and the North-Eastern United States. **meat-** Inositol. **milk-** Lactose. **muscle-** Inositol. **palm-** A sucrose from the toddy palm, *Caryota urens;* or the cocoanut palm, *Cocos nucifera*. Cf. *jaggery*. **priming-** See *priming sugar*. **reducing-** A s. that will reduce Fehling's solution at the boiling point. This is indicative of free aldehyde or keto groups which are not in glucoside combination with other molecules. **sorghum-** A sucrose from sugar millet, *Sorghum saccharatum*. **stone-crop-** A heptose in *Sedum spectabile*. **wood-** Xylose. **yeast-** A sulfur-containing sugar, found in small traces in yeast.

s. cane. *Saccharum officinarum*, the source of cane sugar. **s. carbonate.** A carbonic ester of sugars. **s. of lead.** Lead acetate. **s. refining.** The purification of beet or cane sugar by removal of vegetable proteins and salts, followed by decolorization and crystallization of pure sucrose. World output in the season 1940/1:

beet sugar: 10,500,000 long tons, by Russia > Austria + Germany > U. S. A. > Italy > U. K. > France, as leading producers;

cane sugar: 17,100,000 long tons, from India > Cuba > U. S. A. > Formosa > Hawaii > Porto Rico > Brazil > Australia, as leading growers of raw sugar.

suint. A greasy substance derived from dry perspiration from the wool of sheep; it consists of potassium salts of organic acids. **s. ash.** Potassium black. A source of potassium salts and fertilizer.

sulf-, sulph- A prefix indicating the presence of sulfur. (See *thio-*.)

sulfa drugs. A family of drugs of the sulfonamide type which are effective in combating certain bacterial infections; individual members of the family differ widely in their efficacy toward a particular disease. The more important of these drugs are: sulfadiazine, sulfaguanidine, sulfamerazine, sulfanilamide, sulfapyridine, sulfathiazole, succinylsulfathiazole.

sulfacetimide. Albucid, sulamyd. The *p*-aminobenzene-sulfonacetamide, $NH_2.C_6H_4.SO_2.NH.CH_3CO$. It is employed in treating urinary infections and meningitis.

sulfacid. (1) A thioacid. (2) A sulfonic acid.

sulfactol. Sodium thiosulfate used in sulfur therapy.

sulfadiazine. $C_{10}H_{10}N_4O_2S$ = 250.27. 2-Sulfanilamidopyrimidine, *p*-amino-N-2-pyrimidylbenzenesulfonamide, $NH_2.C_6H_4.SO_2.NH.C_4H_3N_2$. Used in treating various bacterial infections. **s. sodium.** The sodium derivative of sulfadiazine.

sulfaguanidine. $C_7H_{10}O_2N_4S.H_2O$ = 232.24. Sulfanilylguanidine monohydrate; the *p*-aminobenzenesulfonylguanidine monohydrate, $NH_2.C_6H_4.SO_2.N:C(NH_2)_2.H_2O$. It is valuable in the treatment of various intestinal infections, being poorly absorbed from the gastrointestinal tract.

sulfaldehyde. C_2H_6S = 74.1. Thioaldehyde, thioacetaldehyde, Me.CS.H. An oily liquid, used medicinally as a hypnotic.

sulfamerazine. 2-Sulfanilamido-4-methylpyrimidine, the 4-methyl derivative of sulfadiazine (q.v.). It is more soluble in water and more rapidly absorbed than sulfadiazine.

sulfamethazine. Sulfamezathine. 2-Sulfanilamido-4,6-dimethylpyrimidine, a dimethyl derivative of sulfadiazine or monomethyl derivative of sulfamerazine. It is slightly more rapid in action than sulfamerazine.

sulfamic. The trivalent radical, $=N.SO_2-$. **s. acid.** Sulphonamic acid, sulfamidic acid. An organic acid of the general type, $R_2N.SO_2.OH$.

sulfamide. $SO_2(NH_2)_2$ = 96.18. The diamide of sulfuric acid. A solid, soluble in water or alcohol, m.92, decomp. 250. Cf. *sulfaminic acid*. **alkyl-** An organic compound of the type, $R_2N.SO_2.NR_2$.

sulfamidic acid. Sulfamic acid.

sulfamidobarbituric acid. Thionuric acid.

sulfamine. Sulfonamide. The monovalent radical, $—SO_2NH_2$. Cf. *sulfa drugs*.

SUGARS

1. Monosaccharides

$[\alpha]_D^{20}$		
1a. TETROSES		$C_4H_8O_4$
	erythrose, threose	from pentoses
1b. PENTOSES		$C_5H_{10}O_5$
−105.0*m*	arabinose	from gum arabic, cherry gum, beet roots.
18.8	ribose	from nucleic acids
48.78	cyclose	
	xylose	from wood, corn cobs, straw, jute, etc.
	lyxose	from xylonic acids
1c. METHYLPENTOSES		$C_6H_{12}O_5$
−77	fucose	from seaweeds
−71.7	styracitol	
19.5	rhamnose	from glucosides (quercitrin)
74.5	rhodeose	
1d. HEXOSES		$C_6H_{12}O_6$
A. Aldoses:		
14.36	mannose	from orange peels, Brazil nuts, glucosides, etc.
19.8	cocaose	from coca nut
52.50*m*	glucose (dextrose)	from sweet fruits, honey, etc.
80.8	galactose	from galactans, lactose, glucosides
	gulose	from oxidation and reduction of glucose
B. Ketoses:		
−90.9	fructose (levulose)	from sweet fruits
42.9	sorbose	from mountain ash
1e. METHYLHEXOSES		$C_7H_{14}O_6$
−61.4*m*	rhamnohexose	
1f. HEPTOSES		$C_7H_{14}O_7$
−25*m*	α-glucoheptose	
−12.2	β-glucoheptose	
−54.5	β-galaheptose	
29.37	perseulose	
68.64	mannoheptose	
1g. METHYLHEPTOSES		$C_8H_{16}O_7$
8.4	rhamnoheptose	
1h. OCTOSES		$C_8H_{16}O_8$
	$\alpha\alpha$-gluco-octose	
−93	$\alpha\alpha$-gluco-octose (α-form)	
−28	$\alpha\alpha$-gluco-octose (β-form)	
1i. NONOSES		$C_9H_{18}O_9$
13.5	$\alpha\alpha\alpha$-glucononose	
1j. DECOSES		$C_{10}H_{20}O_{10}$
50.4*m*	glucodecose	

2. Disaccharides

2a. (Pentose-hexose)		$C_{11}H_{20}O_{10}$
39.72*m*	vicianose	from vetch
	primeverose	from cowslip
2b. (Methylpentose-hexose)		$C_{11}H_{22}O_{10}$
	strophanthobiose	from strophanthus
2c. (Hexose-hexose)		$C_{12}H_{22}O_{12}$
9.6	gentiobiose *aa r*	from starch gentianose.
52.4*m*	lactose *ab r*	from milk
34.6	cellobiose *aa r*	from cellulose
66.40	sucrose *ac n*	from sugar beet, sugar cane, sugar maple, jaggery, toddy palm, sorghum, etc.
91.5	revertose *aa r*	synthetic from glucose
138.17	maltose *aa r*	from barley, soja beans, etc.
143	melibiose *ab r*	from Australian manna, raffinose
197	trehalose	from yeast, fungi, mushrooms, manna.

3. Trisaccharides

3a. (2 Methylpentoses-hexoses)		$C_{18}H_{32}O_{14}$
−41	rhamninose *add r*	from glucosides
3b. (3 Hexoses)		$C_{18}H_{32}O_{16}$
−31	gentianose *aac n*	from gentian root
	mannotriose *abb*	from manna
	melicitose *aac*	from manna
123	raffinose *abc n*	from sugar beet, cottonseed cake, manna, etc.
	procellose *aaa*	from cellulose.

4. Tetrasaccharides

4a. (4 hexoses)..... $C_{24}H_{42}O_{21}$

148 stachyose *abbc n*..... from the root of Stachys tuberifera.

$[\alpha]_D^{20}$ All figures without minus sign are dextro-rotatory.

m indicates mutarotation of freshly prepared solutions.

r indicates reduction of Fehling's solution.

n indicates non-reduction of Fehling's solution.

The products of hydrolysis are indicated by: *a* = d-glucose, *b* = d-galactose, *c* = d-fructose. *d* = rhamnose.

sulfaminic acid. $NH_2.SO_2OH$ = 97.10. Amidosulfonic acid. The monoamide of sulfuric acid (cf. *sulfamide*). Colorless crystals, soluble in water. **alkyl-** An organic compound of the type, $R_2N.SO_2.OR$.

sulfamino. The monovalent radical, HO_3SNH— or —$NHSO_2.OH$; derived from sulfaminic acid.

sulfaminobenzoic acid. $C_7H_7O_4NS$ = 201.2. o-Sulfaminebenzoic acid, $NH_2SO_2.C_6H_4.COOH$. Colorless rhombohedral crystals, m.165, soluble in water, alcohol or ether; used in organic synthesis.

sulfamyl. The monovalent radical, NH_2SO_2—

sulfanilamide. $C_6H_8N_2O_2S$ = 172.20. Sulfamidyl, prontylin, prontosil-album, streptozone, streptocide, stramid, lysococcine. The *p*-aminobenzenesulfonamide, $NH_2.C_6H_4.SO_2.NH_2$. It is effective as an antibacterial in many diseases.

sulfanilate. A salt of sulfanilic acid.

sulfanilic acid. $C_6H_7O_3NS$ = 173.17. Sulphanilic acid, *p*-aniline sulfonic acid, p-aminobenzenesulfonic acid, $NH_2.C_6H_4.SO_3H$. Colorless, efflorescent, rhombic crystals, decomp. 280; soluble in water, alcohol or ether. Used as a reagent (Ehrlich's diazo reaction), for detecting nitrous acid and bile pigments, in microscopy, in organic synthesis, and in the manufacture of azo dyes.

sulfantimonate. A salt of the general type, M_3SbS_4, obtained by dissolving antimonic sulfide in ammonium sulfide. **sodium-** *Schlippe's salt.*

sulfantimonide. A double salt of sulfide and antimonide; as CuS_2Sb = CuS.SbS.

sulfantimonite. A salt of the general type, M_3SbS_3, obtained by dissolving antimonous sulfide in ammonium sulfide.

sulfapyridine. $C_{11}H_{11}N_3O_2S$ = 249.28. Dagenan, eubasin, coccoclase, pyriamid, M & B 693. The 2-sulfanilyl-aminopyridine or 2-*p*-aminobenzene-sulfonamido-pyridine, $NH_2.C_6H_4.SO_2.NHC_5H_4N$. It is especially useful in the treatment of pneumonia. **s. sodium.** The sodium derivative of sulfapyridine.

sulfarsenate. A salt of the general type, M_3AsS_4, derived from the hypothetical sulfarsenic acid, H_3AsS_4.

sulfarsenide. A double salt of sulfide and arsenide; as, $FeAsS_2$.

sulfarsenite. A salt of the general type, M_3AsS_3, derived from the hypothetical sulfarsenous acid, H_3AsS_3.

sulfarsphenamine. A compound similar to arsphenamine; less irritating but less efficient therapeutically.

sulfasuxidine. Succinylsulfathiazole (q.v.).

sulfate. A salt of sulfuric acid of the general type, M_2SO_4. **acid-** A salt of the type, $MHSO_4$; as, $NaHSO_4$. **basic-** Subsulfate, or a salt of the type, $M(OH)SO_4$. **bi-** Acid. **hydrogen-** Acids. **hypo-** A salt of the type $M_2S_2O_6$, dithionate. **neutral-** Sulfate. **normal-** Sulfate. **pyro-** A salt of the type, $M_2S_2O_7$. **thio-** A salt of the type, $M_2S_2O_3$, thionate.

s. ion. The divalent anion, SO_4^{--}. **s. of lime.** Calcium sulfate. **s. of potash.** Potassium sulfate. **s. pulp.** Paper pulp obtained by digestion of wood in a solution of sodium sulphide containing some sodium hydroxide, sulphate, and carbonate.

sulfathiazole. $C_9H_9N_3O_2S_2$ = 255.31. The 2-sulfanilyl-aminothiazole, $NH_2.C_6H_4.SO_2.NHC_3H_2SN$. Especially useful in the treatment of pneumonia and for local application in certain types of wounds. **s. sodium.** The sodium derivative of sulfathiazole.

sulfatide. One of a class of lipoid substances containing sulfuric acid esters.

sulfatostannate. An organic compound of the type, $R_2H_2Sn(SO_4)_3$. Cf. *sulfostannate.*

sulfazide. An organic compound of the type, R—NH.NH.SO_2—R.

sulfhydrate. Hydrosulfide.

sulfhydryl. Mercapto. The monovalent radical, —SH.

sulfidal. Colloidal sulfur.

sulfide. A binary compound of divalent sulfur; as, M_2S or, R_2S, where M is a monovalent metal or R a monovalent organic radical. The latter are named like the ethers, *thio-** replacing *oxy-**, as methylthioethane*, MeSEt. **alkyl-** Thioethers. Compounds of the type, R—S—R. **di-** Compounds of the type, M_2S_2, or, R_2S_2. **s. dyes.** A dye that is used in a sodium sulfide bath. **s. ion.** The divalent ion, S^{--}. **s. sulfur.** The divalent, negative, sulfur atom in sulfides, as distinguished from tetra- or hexavalent, positive sulfur.

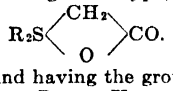
sulfidion. See *sulfide ion.*

sulfime. A compound having a =C:N.S— group; as R.CH(:NSH). Cf. *oxime.*

sulfilimine. A compound of the general type, R_2S:NH.

sulfimide. (1) A compound containing the divalent —SO_2.NH— radical. (2) $(SO_2NH)_3$ = 239.7. An imide of sulfuric acid.

sulfinate. (1) Thetines. A group of organic compounds of the general type,



(2) A compound having the grouping

(3) A salt of sulfinic acid,

sulfindigotic acid. $C_8H_5NOSO_3$ = 211.11. A compound obtained by the action of sulfuric acid on indigo. (Cf. *thioindigo.*)

sulfine. Sulfonium compound. An organic compound of the type, R_3SX (see *sulfonium*).

sulfinic acid. An organic compound of the type, R—SO.OH; as, ethanesulfinic acid*, $EtSO_2H$; naphthalenedisulfinic acid*, $C_{10}H_6(SO_2H)_2$. In derivatives it becomes the prefix sulfino-*.

sulfinid. Saccharin.

sulfino*. The monovalent radical, —SO_2H. Cf. *sulfinic acid.*

sulfinoxide. An organic compound of the type, $R_2S.OH$.

sulfinyl. The divalent radical, =SO.

sulfion. Sulfide ion, S^{--}.

sulfite. Any salt of sulfurous acid of the general type, M_2SO_3. **acid-** A salt of the type, $MHSO_3$. **bi-** Acid sulfite. **hydrogen-** Acid-. **hypo-** (1) A salt of the type $M_2S_2O_4$. (2) Thiosulfate. **sub-** Thiosulfate.

s. ion. The divalent anion, SO_3^{--}. **s. cellulose liquor.** The waste liquor obtained after the pulping of wood by the sulfite process. It contains 2–4 % free SO_2, 2–7 % SO_3^{--}, 2–5 % SO_4^{--}, 80–90 % solids and 12–16 % ash, with calcium compounds, carbohydrates and lignone sulfonate. It is used as a tanning, binding, or mordanting agent, or for fermentation. **s.c.l. lactone.** Tsugaresinol. **s. pulp.** A paper pulp obtained by the digestion of wood (generally coniferous wood) with calcium bisulfite containing free SO_2.

sulfo- sulpho- A prefix, generally indicating the presence of (1) divalent sulfur, or (2) the sulfo-group, $—SO_3H$. Cf. *thio-*. **s. acid.** Sulfonic acid. **s. group.** The monovalent $—SO_3H$ group. (See *sulfonic acids.*) **s. salt.** (1) A salt of an acid containing sulfur. (2) An ester of sulfonic acid.

sulfoacetic acid. $C_2H_4O_5S$ = 140.10. $HSO_3.CH_2.COOH,H_2O$. Colorless tablets, m.86, subliming on further heating, soluble in water, alcohol or ether.

sulfoarsenide. Sulfarsenide.

sulfobenzide. $C_{12}H_{10}O_2S$ = 218.2. Diphenylsulfone, Ph_2SO_2. Colorless scales, m.123; insoluble in water, slightly soluble in alcohol or ether.

sulfobenzoic acid. $C_7H_6O_5S$ = 202.12. $HSO_3.C_6H_4.COOH$. **ortho-** Colorless triclinic crystals, m.134, forming an anhydride when heated above 125°C; soluble in water or alcohol. **meta-** Colorless crystals, m.141; soluble in water or ether. **para-** Colorless needles, m.260, soluble in water, alcohol or ether; used in organic synthesis. Cf. *halazone.*

sulfocarbamide. Thiourea.

sulfocarbanilide. $C_{13}H_{12}N_2S$ = 228.24. Thiocarbanilide, diphenylsulfourea, diphenylthiourea, Ph.NH.CS.NH.Ph. Colorless crystalline leaflets, d.1.303, m.153, insoluble in water, soluble in alcohol or ether; used in organic synthesis.

sulfocarbazide. A compound containing the divalent —NH.NH.CS.NH.NH— radical.

sulfocarbimide. Isothiocyanic acid.

sulfocarbodiazone. A compound containing the divalent —N:N.CS.N:N— radical.

sulfocarbolate. Phenol sulfonate. A salt of phenolsulfonic acid.

sulfocarbolic acid. Phenolsulfonic acid.

sulfocarbonate. Any salt of the general type, M_2CS_3, derived from sulfocarbonic acid.

sulfocarbonic acid. H_2CS_3 = 110.2. Thiocarbonic acid, trithiocarbonic acid. A brown oil, insoluble in water and readily decomposed. Its potassium salt is a reagent for nickel.

sulfochloride. The chloride of sulfonic acids of the general type $R.SO_2.Cl$.

sulfocyan. Thiocyanate.

sulfocyanate. Thiocyanate.

sulfocyanic acid. Thiocyanic acid.

sulfocyanide. Thiocyanate.

sulfoform. $C_{18}H_{15}SbS$ = 384.8. Triphenylstibine sulfide, Ph_3SbS. Colorless needles, m.120, used in skin diseases. *crude-* A yellow liquid; a powerful reducing agent. It reduces sulfuric acid to sulfurous acid, and antimonic oxide to antimonous oxide.

sulfo-group. The monovalent $—SO_3H$ group (see *sulfonic acid*).

sulfoguaiacin. Quinine methyl sulfoguaiacate.

sulfohydrate. Hydrosulfide.

sulfoichthyolic acid. One of a number of compounds obtained from bituminous shales, which contain sulfur as sulfonate, sulfone or sulfide.

sulfoid. Colloidal sulfur.

sulfoleate. A salt of sulfoleic acid.

sulfoleic acid. A compound obtained by mixing sulfuric acid with oils containing oleic acid.

sulfolipins. Fatty substances containing sulfur.

sulfonal. $C_7H_{16}O_4S_2$ = 228.3. Sulphonal, sulfonmethane, diethylsulfone-dimethylmethane, $Me_2C(SO_2Et)_2$. Colorless prisms, m.126 decomp. 300, slightly soluble in water, soluble in alcohol or ether; used medicinally as a hypnotic. **methyl-** Trional.

sulfonamic. Sulfamic.

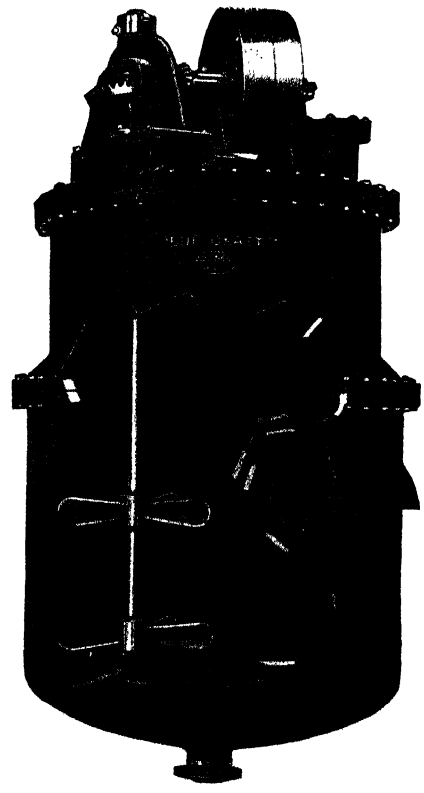
sulfonamide. Sulfamine.

sulfonamido. The bivalent radical, $—NH.SO_2—$. Cf. *sulfamino, sulfamyl.*

sulfonaphthol. $C_{10}H_8O_4S$ = 224.13. $HSO_3.C_{10}H_6.OH$. A colorless powder; used medicinally as an antiseptic, also in organic synthesis.

sulfonate. (1) To treat an aromatic hydrocarbon with fuming sulfuric acid. (2) A sulfuric acid derivative. (3) The ester of a sulfonic acid.

sulfonation. The substitution of one or more H by one or more $—SO_3H$ groups. **direct-** The treatment of an organic compound with fuming



Sulfonator.

sulfuric acid. **indirect-** Treatment with acid sulfites or other salts.

sulfonator. A double-walled cast iron vessel with power-driven stirring device; used for large-scale sulfonation. See illustration.

sulfone. An organic compound of the type, R_2SO_2, or, RSOOR, obtained by oxidation of sulfides. In derivatives its prefix is sulfonyl*; as ethyl sulfone*, Et_2SO_2; methylsulfonyl ethane* $EtSO_2Me$. **s. methanes.** A group of compounds used medicinally to produce sleep:

sulfonal, diethylsulfonedimethylmethane, $Me_2C(SO_2Et)_2$.

trional, diethylsulfonemethylethylmethane, $MeEtC(SO_2Et)_2$.

tetronal, diethylsulfonediethylmethane, $Et_2C(SO_2Et)_2$.

s. phthalein. See *sulfonphthalein.*

sulfonethylmethane. Trional.

sulfonic acid*. An organic compound containing the monovalent —SO_3OH or —SO_3H radical. They are derived from sulfuric acid by the replacement of an —OH group; usually obtained by treatment of aromatic hydrocarbons with conc. sulfuric acid. They are soluble in water, and yield phenols when heated with solid KOH. Many sulfonic acids are used in organic synthesis, and in the manufacture of dyes and synthetic drugs. The more common dyestuff intermediates and their trade names are:

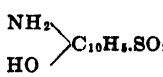
Monosulfonic acids

$HO.C_{10}H_6.SO_2OH$

1-naphthol-4-sulfonic acid.... NW acid
1-naphthol-5-sulfonic acid.... L acid
2-naphthol-6-sulfonic acid.... Schäffer's acid
2-naphthol-7-sulfonic acid.... F acid
2-naphthol-8-sulfonic acid.... Bayer's acid

$NH_2.C_{10}H_6.SO_2OH$

1-naphthylamine-2-sulfonic acid..... o-naphthionic
1-naphthylamine-3-sulfonic acid..... Cleve's acid
1-naphthylamine-4-sulfonic acid..... naphthionic acid
1-naphthylamine-5-sulfonic acid..... Laurent's acid
1-naphthylamine-6-sulfonic acid..... Cleve's acid
1-naphthylamine-8-sulfonic acid..... peri acid
2-naphthylamine-1-sulfonic acid..... Tobias acid
2-naphthylamine-5-sulfonic acid..... Dahl's acid
2-naphthylamine-6-sulfonic acid..... Brönner's acid
2-naphthylamine-8-sulfonic acid..... Badische acid



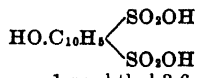
$C_{10}H_5.SO_3OH$

1-amino-5-naphthol-7-sulfonic acid.. M acid
1-amino-8-naphthol-4-sulfonic acid.. S acid
1-amino-8-naphthol-6-sulfonic acid.. γ acid
2-amino-5-naphthol-7-sulfonic acid.. J acid

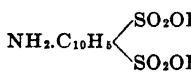
Disulfonic acids

$C_{10}H_6(SO_2OH)$

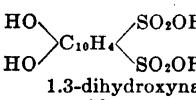
naphthalene-1.5-disulfonic acid..... Armstrong's acid
naphthalene-1.6-disulfonic acid..... Ewer & Pick's acid
naphthalene-2.5-disulfonic acid..... Ebert & Merz's acid



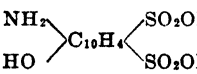
1-naphthol-3.6-disulfonic acid.. RG acid
1-naphthol-3.8-disulfonic acid.. Andresen's acid
1-naphthol-4.8-disulfonic acid.. δ acid
2-naphthol-3.6-disulfonic acid.. R acid
2-naphthol-6.8-disulfonic acid.. G acid



1-naphthylamine-2.7-disulfonic acid..... Kalle's acid
1-naphthylamine-3.6-disulfonic acid..... Freund's acid
1-naphthylamine-3.8-disulfonic acid..... ε acid
1-naphthylamine-4.6-disulfonic acid..... Dahl II acid
1-naphthylamine-4.7-disulfonic acid..... Dahl III acid
1-naphthylamine-4.8-disulfonic acid..... Disulfo acid
2-naphthylamine-3.6-disulfonic acid..... amino R acid
2-naphthylamine-6.8-disulfonic acid..... amino G acid



1.3-dihydroxynaphthalene-5.7-disulfonic acid..... yellow acid
1.5-dihydroxynaphthalene-3.7-disulfonic acid..... red acid
1.7-dihydroxynaphthalene-3.6-disulfonic acid..... A acid
1.8-dihydroxynaphthalene-3.6-disulfonic acid..... chromotropic acid



1-amino-8-naphthol-2.4-disulfonic acid..... 2 S acid
1-amino-8-naphthol-3.6-disulfonic acid..... H acid
1-amino-8-naphthol-4.6-disulfonic acid..... K acid
2-amino-8-naphthol-3.6-disulfonic acid..... 2R acid

Trisulfonic acids

$NH_2.C_{10}H_4(SO_2OH)_3$

1-naphthylamine-3.6.8-trisulfonic acid..... Koch's acid

amino- Sulfamic acid. **diamino-** Sulfamide. **nitro-** Nitrosylsulfate.

sulfonium. Sulfine. The monovalent, electropositive radical, R_3S—. **s. compound.** Sulfine. An organic compound of the type, R_3SX, in which R is an organic radical, and X

an electronegative element (Br, Cl, I) or radical (OH). **s. hydroxide.** An organic compound of the type, $R_3S.OH$. They are strong bases and ionise to R_3S^+ and OH^-. **s. iodide.** An organic compound of the type, R_3SI.

sulfonmethane. Sulfonal.

sulfonaphthalein. A group of compounds similar in constitution to the phthaleins, but having a sulfone, instead of a carbonyl, group. Made by condensation of *o*-sulfobenzoic acid anhydride with phenols. Many are important indicators (q.v.) and dyes:

m-cresol-	cresol purple
o-cresol-	cresol red
dibromo-*o*-cresol-	brom cresol purple
dibromophenol-	brom phenol red
dibromothymol-	brom thymol blue
dichlorophenol-	chlor phenol red
phenol-	phenol red
tetrabromo-*m*-cresol-	brom cresol green
tetrabromophenol-	brom phenol blue
tetrachloro-*m*-cresol-	chlor cresol green
thymol-	thymol blue.

sulfonyl. Sulfuryl. The bivalent radical, $—SO_2—$.

sulfoparaldehyde. $(C_4H_4S_2)_3$ = 448.5. Trithioacetaldehyde. A colorless crystalline powder, insoluble in water, soluble in alcohol or ether; used medicinally as a hypnotic.

sulfophenol. Aseptol.

sulfophenylate. (1) Phenolsulfonate. (2) Phenylsulfate.

sulforhodanide. Thiocyanate.

sulfosalicylic acid. $C_6H_3(OH).(COOH).SO_3H$ = 218.1. A soluble, solid sulfonic acid derivative of salicylic acid, m.120; used as reagent for albumin.

sulfo-salt. (1) A salt of an acid which contains sulfur. (2) An ester of sulfonic acid.

sulfoselenide. A double salt of the type, M_4SSe.

sulfosemicarbazide. A compound containing the monovalent $NH_2.CSNH.NH—$ radical.

sulfosol. A colloidal system with sulfuric acid as the enclosing or disperse phase.

sulfostannate. A compound of the general type, M_2SnS_3; as, Na_2SnS_3. Cf. *sulfatostannate.*

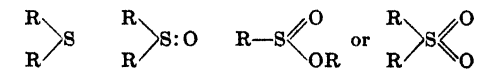
sulfostannite. A compound of the general type, M_2SnS_2.

sulfo-urea. Thiourea.

sulfovinic acid. Ethyl sulfuric acid.

sulfoxide. The divalent radical, $=SO$.

sulfoxides*. A group of organic compounds of the general type, R_2SO or, $R.SO.R$. In derivatives they have the prefix sulfinyl* as, methylsulfoxide*, Me_2SO; methylsulfinylethane*, MeSOEt. They are obtained by oxidation of mercaptans, and are intermediate between the sulfides and sulfones and analogous to the ketones:



sulfides sulfoxides sulfones

sulfoxylate. A salt of the type, M_2SO_2, or, $MHSO_2$, derived from sulfoxylic acid.

sulfoxylic acid. The hypothetical acid, $S(OH)_2$, containing bivalent sulfur. It is known in the form of its salts, Na_2SO_2, and, $NaHSO_2$ (see *rongalite*).

sulfur, sulphur. [sulfur is the spelling adopted by The American Chemical Society, and the Pharmacopoeia of the United States XII.] S = 32.06. Brimstone. A solid non-metal and element, atomic number 16. Sulfur occurs as a yellow, brittle mass or in transparent monoclinic or rhombic crystals and exists in a number of modifications. The more important are: (1) rhombic sulfur, S_8 = 256.4. Stable at ordinary temperatures, d.2.07, m.114, b.444.7. (2) monoclinic sulfur, S_8 = 256.4. Stable above 96°C, and forms transparent, yellow, monoclinic prisms, d.1.957, m.119, b.444.7. (3) amorphous sulfur, S_x. A soft, pale-yellow or fine white powder (colloidal), d.2.046, m.120, b.444.7. If sulfur is heated the following changes and modifications are observed:

Ordinary temp. ..... rhombic, S_8
96°C ..... monoclinic, S_8
114°C, melts to a thin, yellow liquid, S_8 or S_λ
160°C, forms a thick, brown liquid containing thiozon, S_3, besides S_8.
220°C, becomes dark brown and plastic, S_6 and S_8 or $S_{\lambda\mu}$.
250°C, begins to burn if heated in air.
440°C, forms a thin brown liquid, S_6 or S_μ.
44.7°C, boils and forms a reddish-brown vapor of S_6 which, when further heated, becomes lighter in color and larger in volume until, at
860°C, it forms a colorless vapor of S_2, d.2.23.

Sulfur is found native in Sicily and the United States. It is insoluble in water, slightly soluble in alcohol or ether, soluble in carbon disulfide. The solubility varies with the modification. Used in the manufacture of gun-powder, matches, disinfectants, vulcanizing materials, sulfuric acid, sulfides and pharmaceuticals. It forms several series of compounds (see *sulfur compounds*). **colloidal-** Sulfidal, sulfoid. Finely-divided sulfur obtained by passing hydrogen sulfide through a solution of a sulfite; used medicinally for skin diseases. **flowers of-** Sublimed sulfur. **lac-** Precipitated sulfur obtained by adding sulfuric acid to a solution of a polysulfide. It contains up to 45 % calcium sulfate; used in pharmacy. **liver of-** A mixture of potassium sulfide and polysulfides. **milk of-** Precipitated sulfur. **precipitated-** Milk of sulfur. A suspension of finely-divided sulfur obtained by precipitation of calcium pentasulfide or a thiosulfate by an acid. **ruby-** Realgar. **sublimed-** A fine yellow powder obtained by distilling sulfur. **vegetable-** Lycopodium. **washed-** Sulfur washed with ammonium hydroxide and water; used medicinally.

s. acids. See *sulfuric acids.* **s. alcohols.** Hydrosulfides. **s. bromide.** S_2Br_2 = 224.0. Sulfur monobromide. A yellow liquid, d.2.628, soluble in carbon disulfide. **s. chlorides.** (1) S_2Cl_2 = 135.0. Sulfur monochloride. A brown fuming liquid, d.1.709, m.—80, b.138, decomp. by water, soluble in carbon disulfide, alcohol or ether. Used as a reagent; and industrially in vulcanizing rubber, in organic synthesis, for sulfur solvents, war gases, vulcanized oils; also in the purification of sugar. (2) SCl_2. Sulfur dichloride. (3) S_2Cl_4 = 238.02. Trisulfur tetrachloride. (4) SCl_4. Sulfur tetrachloride. **red-** A reddish-brown liquid, d.1.6–1.65, composed of 75 % SCl_2 and 25 % S_2Cl_2; used in the manufacture of varnishes, rubber pigments, poison gas and for synthesis. **yellow-** A yellowish, corrosive liquid, d.1.70, containing 5–9 % free sulfur; used similarly to red s. **s. compounds.** Sulfur has a valency of two, four

or six, and accordingly, forms the following four series of compounds:

A. Valence number, −2.

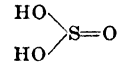
Hydrogen sulfide..... H_2S
Hydrosulfides (thiols*, RSH)..... M.SH
Sulfides (thioethers, R_2S)..... M_2S
(see *thio compounds*)

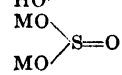
B. Valence number, 2.

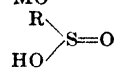
Sulfur dichloride..... SCl_2
Sulfoxylic acid..... $S(OH)_2$

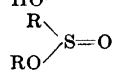
C. Valence number, 4.

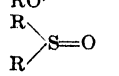
Sulfur dioxide..... $O{=}S{=}O$

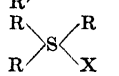
Sulfurous acid..... 

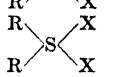
Sulfites..... 

Sulfinic acids..... 

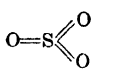
Sulfones..... 

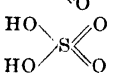
Sulfoxides..... 

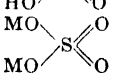
Sulfonium..... 

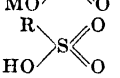
Sulfinates..... 

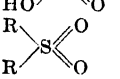
D. Valence number, 6.

Sulfur trioxide..... 

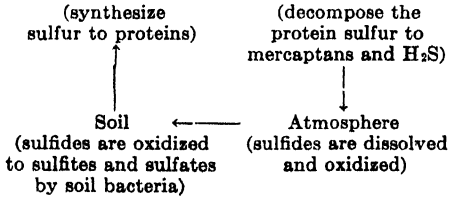
Sulfuric acid..... 

Sulfates..... 

Sulfonic acids..... 

Sulfones..... 

s. cycle. The transformation of sulfur compounds by living organisms in relationship to surrounding nature:



s. dichloride. SCl_2 = 103.1. A reddish-brown liquid, d.1.622, m.−78, b.69, decomp. by water or heat. Used in the rubber industry for vulcanizing; for purifying sugar juices; and as a sulfur solvent. It has been stated to be a mixture of the mono- and tetrachloride. **s. dioxide.** SO_2 = 64.1. Sulfurous acid anhydride. A liquid, d.$_0$°1.434; or colorless gas, m.−73, b.−10; soluble in water, alcohol or ether. It is marketed in small iron tanks and is used as a reagent, in bleaching and as a preservative. **s. dyes.** Pyrogenic dyes. A group of organic dyes containing sulfur; obtained by heating amino- or nitro-compounds with alkali sulfides. They are insoluble in water, but soluble in sodium sulfide solutions; used as permanent dyes for cotton, wool or silk. **s. ether.** An organic compound of the type, R_2S. See *thioethers*. **s. fluorescein.** Uranin. **S. fluoride.** S_2F_2 = 102.1. Sulfur monofluoride. A colorless gas, readily hydrolyzed to HF, SO_2 and S. **s. group.** The sixth group of the periodic system, which consists of the elements sulfur, selenium, tellurium and oxygen. **s. hexafluoride.** SF_6 = 146.06. A white solid, insoluble in water, slightly soluble in alcohol or ether, m.−55, b.−50. **s. hexaiodide.** SI_6 = 793.8. Green crystals, soluble in carbon disulfide, decomp. by water. **s. introfier.** See *introfier*. **s. iodide.** S_2I_2 = 317.8. Iodine disulfide, sulfur subiodide. A grayish-black, brittle, crystalline mass of metallic luster, insoluble in water, soluble in glycerol or carbon disulfide; used medicinally in ointments for skin diseases. **s. monobromide.** S. bromide. **s. monochloride.** S. chloride. **s. monofluoride.** S. fluoride. **s. oxides.** See *s. dioxide, s. trioxide*. **s. oxychlorides:** (1) SO_2Cl_4 = 205.96. A red liquid, d.1.656, b.100. decomp. by water. (2) $S_2O_3Cl_4$ = 253.96. White needles, m.57 (subliming). They are decomp. by water. (3) See *sulfuryl chloride*. **s. oxyfluoride.** SO_2F_2 = 134.12. Sulfuryl fluoride. An irritating vapor or extremely pungent liquid. **s. subbromide.** S. bromide. **s. subchloride.** S. chloride. **s. subiodide.** S. iodide. **s. tetrachloride.** SCl_4 = 173.9. A yellow liquid or yellow-white solid, m.−31. It is unstable, but forms stable compounds of the type $2AlI_3{,}SCl_4$. **s. trioxide.** SO_3 = 80.1. Sulfuric acid anhydride. *solid-* $(SO_3)_2$. Colorless crystalline prisms, d.1.982, m.15, b.46, rapidly decomp. by water and form sulfuric acid; soluble in conc. sulfuric acid. **s. yellow.** Naphthol yellow.

sulfur acids. The following acids of sulfur and their *salts*, are known:

H_2S—hydrosulfuric acid or hydrogen sulfide.
H_2S_5—hydrogen pentasulfide (H_2SS_4).
H_2SO_3—sulfurous acid, *sulfite*.
H_2SO_4—sulfuric acid, *sulfate*.
$H_2SO_4 + SO_3$—oleum.
$H_2S_2O_3$—thiosulfuric acid, *thiosulfate*.
$H_2S_2O_4$—dithionous acid, *hyposulfite, dithionite*.
$H_2S_2O_5$—Caro's acid, metasulfuric acid.
$H_2S_2O_6$—dithionic acid, *hyposulfate, dithionate*.
$H_2S_2O_7$—pyrosulfuric acid, *pyrosulfate*.
$H_2S_2O_8$—persulfuric acid, *persulfate*.
$H_2S_3O_6$—trithionic acid, *trithionate*.
$H_2S_4O_6$—tetrathionic acid, *tetrathionate*.
$H_2S_5O_6$—pentathionic acid, *pentathionate*.
$H_2S_6O_6$—hexathionic acid, *hexathionate*.

s. anhydride. Sulfur trioxide.

sulfurated, sulphuretted. Combined with sulfur. **s. oil.** An essential oil containing sulfur compounds; as, mustard oil.

sulfuret. A sulfide.

sulfuretted hydrogen. Hydrogen sulfide.

sulfuric. Pertaining to hexavalent sulfur. **s. acid.** See *sulfur a., sulfuric acid*. **s. anhydride.** Sulfur trioxide. **s. chloride.** Sulfuryl chloride.

sulfuric acid. H_2SO_4 = 98.1. Oil of vitroil, spirit of vitriol, hydrogen sulfate. A dibasic acid obtained from sulfur dioxide (see *sulfuric acid manufacture*), and used extensively technically.

(1) H_2SO_4 = 98.1, d.1.8542, m.10, b.316.
(2) $H_2SO_4.H_2O$ = 116.1. Colorless prisms, d.-1.788, m.8, b.210; soluble in water, decomposed by alcohol.
(3) $H_2SO_4.2H_2O$ = 134.1. Colorless liquid, d.-1.665, m.−38, b.170; soluble in water, alcohol or ether
(4) $H_2SO_4.xH_2O$..d.1.84...concentrated acid, 94 %
(5) .....d.1.826..U.S.P. conc. 92.5 %
(6) .....d.1.067..U.S.P. diluted 10 %
(7) $H_2SO_4.xSO_3$.....oleum (above 100 %)

Cf. *sulfamide, sulfaminic acid, sulfur-acids B.O.V., D.O.V., R.O.V.* **chloro-** See *chlorosulfuric acid.* **concentrated-** See (4) (5). **dilute-** See (6). **ethyl-** See *ethylsulfuric acid.* **fuming-** See (7). **glycerol-** q.v. **nitro-** q.v. **nitroso-** q.v. **Nordhausen-** Oleum. **phenol-** Phenylsulfuric acid. **s. manufacture.** Two principal processes: (A) Lead chamber process—Sulfur or pyrites is burned in furnaces and the sulfur dioxide formed passes through the Glover tower, where it comes in contact with 65 % sulfuric acid from the lead chamber and the acid containing oxides of nitrogen from the Gay-Lussac tower. A portion of the SO_2 is oxidized and dissolved. The remaining mixture of gases, consisting now principally of SO_2 and NO, passes into the lead chamber, where the principal reaction occurs:

$$So_2 + O_2 + NO \rightarrow SO_3 + NO_2 \rightarrow H_2SO_4(65\ \%)$$

The escaping NO_2 is passed through the Gay-Lussac tower, in which it is dissolved in strong sulfuric acid from the Glover tower. The acids collecting at the bottom of the lead chambers are finally concentrated in pans by heat. (B) Contact process—Sulfur or pyrites is burned in furnaces and the SO_2 formed passes through scrubbers. In some the gas is washed with water; in others it is dried with sulfuric acid. The dry gas enters the contact chamber in which a catalyst, (generally platinum or iron oxide) oxidizes it to SO_3 which, in turn, is passed through water and absorbed as sulfuric acid.

sulfuric esters. Sulfuric acid esters. An organic compound of the type, R_2SO_4.

sulfuric ether. An erroneous name for the ether of commerce, diethylether, Et_2O.

sulfuring. (1) Burning sulfur in barrels to disinfect them for wines, etc. (2) Dressing growing crops with flowers of sulfur to arrest mold growth. (3) Adding sulfur to the fires used in hop kilns to liberate SO_2 for its preserving effect.

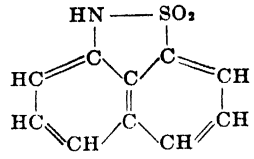
sulfurize. To combine with sulfur.

sulfurous. Pertaining to tetravalent sulfur. **s. acid.** H_2SO_3 = 82.1. $SO(OH)_2$. An aqueous solution of sulfur dioxide, which contains about 6 % SO_2. A clear, colorless liquid, d.1.03, used as a reducing agent and in bleaching textiles. *ethyl-* See *ethylsulfurous a.* **s. anhydride.** Sulfur dioxide. **s. esters.** Organic compounds of the type, R_2SO_3.

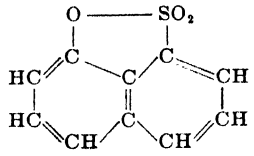
sulfuryl. Sulfonyl. The divalent radical, $=SO_2$, derived from sulfuric acid by subtraction of two —OH groups. **s. chloride.** SO_2Cl_2 = 135.0. Sulfuric chloride, chlorsulfuric acid. A colorless, extremely pungent liquid, $d_{20°}$.1.66, b.69, decomp. by water; used as a reagent and in organic synthesis. **s. diamide.** Sulfamide. **s. fluoride.** Sulfur oxyfluoride.

sulph-, sulpho-, sulphur, sulphuretted, sulphuric, etc. See *sulf-, sulfo-, sulfur, sulfurated, sulfuric,* etc. (The American Chemical Society, and the U.S.P. XII, prefer the latter spelling.)

sultam. A derivative of a 1.8-naphthylamine sulfonic acid having the characteristic grouping,



sultone. A derivative of 1.8-naphthol-sulfonic acid, having the characteristic grouping,



sulvanite. Cu_3VS_4. A vanadium mineral.

sumach. (1) The shrub *Rhus coviaria*, Sicilian s., an Anacardiaceae of Southern Europe, whose leaves are used for tanning and dyeing. (2) Any of the *Rhus* species. (3) Sumac. A tanning material (18–25 % tannin) from the dried leaves of *Rhus* species:

Rhus copellina	American s.
Rhus coriaria	Sicilian s.
Rhus cotinus	Venetian s.
Rhus glabra	White s.
Rhus metopium	American s.
Rhus pentaphylla	Tizra s.
Rhus succedania	Indian s.

Cf. *fustic.* **Chinese-** Tree-of-heaven. The bark of *Ailanthus glandulosa*, a Simarubiaceae, used as an astringent and antispasmodic, and for tanning. **curriers-** The plant *Coriaria myrtifolia*, a Coraniaceae, containing coria myrtin. **smooth-** Sumac berries. The dried ripe fruit of *R. glabra*, used as an astringent and tonic. **sweet-** Fragrant s. The bark of the root of *R. aromatica*, used as an astringent and diuretic. **s. bark.** Sweet s. **s. berries.** Smooth s.

sumaresinol. $C_{30}H_{48}O_4.4H_2O$ = 544.35. Sumaresinolic acid. A resin acid, m.298, from Sumatra gum benzoin.

sumbul. Musk-root. The dried rhizome of *Ferula sumbul*, an Umbelliferae of Asia. Used medicinally as a nerve stimulant and antispasmodic.

sump. An open channel or pit for collecting dripping liquids in works, factories, etc., prior to removal by pumping.

sun. The star nearest to the earth; mass 1.99 × 10^{33} grams, d.5.00, luminosity −26.7, surface temperature 6000°C. Cf. *spectral classification, solar spectrum, earth constants.* **s. light.** Intensity on a clear day = 100,000 to 125,000 lux.

SUN'S ATMOSPHERE

	By volume, per cent	By weight, per cent
1. hydrogen.....	92	46
2. helium.....	3	6
3. oxygen.....	3	24
4. metals.....	2	24

Metallic vapors in the sun's atmosphere, in tons per square mile

Mg 350	Al 15	V 1.5
Fe 250	Ni 15	Cu 1.5
Si 150	Mn 10	Zn 1.0
Na 100	Co 6	others 0.2
K 50	Cr 6	
Ca 50	Ti 2	Total 1,008

sundew. Drosera.

sunflower. Helianthus. The dried seeds of *Helianthus annuus*, a Compositae; used medicinally, as the fluid extract, as a diuretic. **s. oil.** A slow-drying oil extracted from the seeds of s.

sunstone. Orthoclase.

super- A prefix derived from the Latin, which indicates "above," "beyond" or "higher."

superacid. Excessively acid in reaction. **s. solution.** A solution in acetic or phosphoric acid.

superacidity. An increased acidity of the gastric juice.

superbine. A poisonous bitter principle from *Gloriosa superba*, a Liliaceae of India and South Africa, which resembles the bitter principle of squill. The plant is often used for suicidal purposes.

supercalender. A calender, (q.v.) which uses both steam and high pressure to obtain a high finish; *e.g.*, on paper for illustrations.

supercarbonate. Bicarbonate.

superchlorination. A process of sterilizing water by chlorinating in excess, and then adding an antichlor.

superconductivity. Supraconductivity.

supercooled. Over- or undercooled. Cooled below the freezing-point of a liquid without the separation of solid matter.

superheated. Overheated. Describing a liquid or gas heated above its boiling point in the liquid state; as superheated steam, *i.e.*, water vapor heated above 100°C.

supernatant. The liquid standing above a sediment or precipitate.

supernickel. An alloy of 30 % of nickel and 70 % of copper. It retains its strength at high temperatures better than most copper alloys.

supernormal. A volumetric solution of greater concentration than normal; as, 2N-solution.

superol. o-Hydroxy quinoline sulfate.

superoxide. Peroxide.

superpalite. A poison gas; cf. *palite*.

superphosphate. (1) An acid phosphate. (2) A mixture of calcium phosphate and calcium sulfate obtained by the action of conc. sulfuric acid on phosphate minerals (apatite, phosphorite); used as fertilizer. **ammoniated-** A fertilizer containing s. or dissolved bone or both, but no potash. **double-** A fertilizer made by the action of phosphoric acid on rock phosphate; it contains 40–50 % P_2O_5.

superpolymer. A polymer whose molecular weight is 10,000 or more.

superpotential. Overvoltage.

supersaturate. To more than saturate.

supersaturated solution. A solution that contains an excess of dissolved substance over the amount normally required for saturation at a particular temperature, but which still holds it all in solution; usually obtained by slowly cooling a saturated solution.

supersaturation. Containing an abnormally high proportion of solute.

supersolubility. Supersaturation. **s. curve.** The curve obtained by plotting the concentration of a supersaturated solution against the temperature. It is analogous to and parallel with the solubility curve, q.v.

supersonic. Ultraphonic.

supersteel. A high-speed steel, q.v.

supertension. Overvoltage.

support. A device for holding an apparatus or vessel in position.

suppurative. An agent that produces pus.

supra- A prefix derived from the Latin, and indicating "above."

supracapsuline. Adrenalin.

supraconductivity. The property of certain metals of becoming good conductors of electricity near the absolute zero. The temperature at which this takes place is: 7.2°K for Pb; 4.21°K for Hg; 3.71°K for Sn; 3.41°K for In; and 2.47°K for Tl. No other metal shows any change above 1.3°K, the temperature limit of present methods.

suprarenal. A gland located above the kidney. **s. liquid.** An aqueous extract of the suprarenal gland, used medicinally.

suprarenalin. Adrenalin.

suprarenin. The acid tartrate of synthetic epinephrine (adrenalin). A white odorless powder, m.211, insoluble in water, used medicinally.

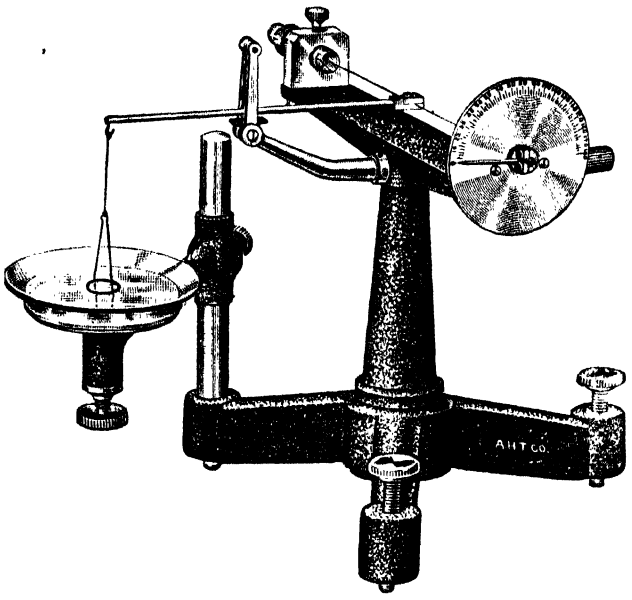
suprasterols. A group of sterols produced by irradiation of lumisterol. Cf. *cholane derivatives*.

suramin. Bayer 205.

surcharge. The sum of the errors involved in an assay, which is often included in the assay report.

surface. The outer part of a body. A magnitude that has length and breadth but not thickness. **s. density.** The electric or magnetic charge per unit area located on the surface of an electrode or other body. See *current density*. **s. energy.** The product obtained by multiplying surface tension by the two-thirds power of the molecular weight and specific volume. **s. tension.** The contractile surface force of a liquid by which it tends to assume a spherical form and to present the least possible surface (*e.g.*, the formation of a meniscus). It may also be exerted at the junction of two liquids. It is measured directly (g. per $cm.^2$ or dynes), or indirectly by determining the capillarity. Increase in temperature or the addition of certain substances lowers the surface tension. The s. t. (at const. temp.), γ, is in a constant ratio to the fourth power of the orthobaric densities of liquid, D, and gas, d; hence $\gamma^{\frac{1}{4}} = K(D - d)$. Cf. *parachor*. **s. tension apparatus.** Tensiometer. A device for determining the surface tension, based upon the flexibility

of a wire (accurate within 0.1 dyne). See illustration. **s. t. 37.** See under *S.*



Surface tension apparatus.

surfusion. The unstable condition of a liquid cooled below its freezing point without solidifying. Cf. *supercooled.*

surpalite. Diphosgene.

surrogate. A substance used as a substitute for another substance; as, margarine for butter.

surrosion. The increase in weight of a substance owing to corrosion.

susceptible. (1) Sensitive. Readily capable of responding to an action or force; as, magnetic susceptibility. (2) See *immune.*

susotoxin. $C_{10}H_{26}N_2$ = 174.3. Sustoxin. A ptomaine from cultures of hog-cholera bacillus.

suspension. (1) Suspensoid. (2) A thin thread of steel, phosphor-bronze or other substance, on which the mirror and magnet of a galvanometer hang. **s. method.** The determination of the density of minerals or powders by placing them in a solution of known density; as, Rohrbach's, Thiel and Stohl's, or Thoulet's solution.

suspensoid. Suspension, soliquoid. Finely-divided, colloidal particles floating in a liquid; the particles are so small that they do not settle, but are kept in motion by the moving molecules of the liquid (Brownian motion, q.v.).

sussexite. A native, hydrated magnesium manganese pyroborate.

sustoxin. Susotoxin.

Sutherland's equation. The diameter of a molecule, D, is determined by

$$D = [1.402/\sqrt{2}\,\pi NL(1 + C/T)]^{\frac{1}{3}}$$

where N is the number of molecules per unit volume, L the mean free path (cm.), and C is Sutherland's constant. **S.-Einstein equation:** $D = \frac{RT}{Nf}$, where D is the diffusion constant, R the gas constant, T the absolute temperature, N Avogadro's constant and f the frictional force in dynes on each molecule having unit velocity.

Sved. A unit of sedimentation rate.

Svedberg, The(odor). 1884– . A Swedish physical chemist, noted for research on colloids and Nobel prize winner (1926). **S.'s. equation.** The amplitude, A, of Brownian movement of a particle is proportional to its vibration period, t. Thus: $A = kt$, where k is a constant.

swage. To fashion metal, particularly iron, by drawing it into a groove, mold or die having the desired shape.

Swain, Robert Eckles. 1875– . An American chemist noted for research in physiological chemistry.

Swan, Sir Joseph Wilson. 1828–1914. An English chemist, noted as pioneer in photographic processes, electric carbon filament lamps and electrodeposition of metals.

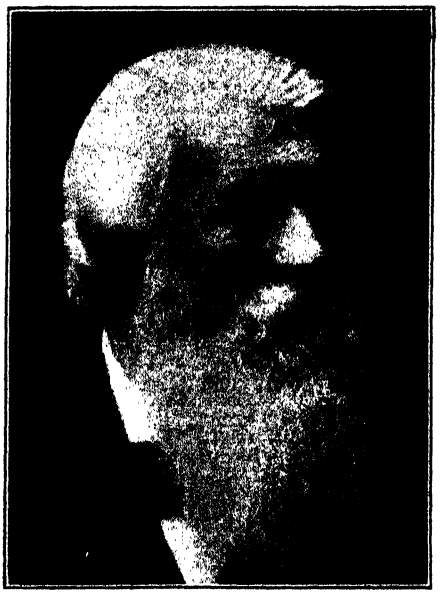
swan neck. A tube bent into the shape of an upright U-tube joined to an inverted U-tube; thus S.

swarf. The raw edge of a metallic object produced in casting metals, and removed for re-use.

Swarts, Frederic. A Dutch chemist noted for organic research.

Swedenborg, Emanuel. 1688–1772. A Swedish mineralogist and later, theosophist, who invented the mercury pumps and wrote books on chemistry.

sweet flag. Calamus.



Joseph Wilson Swan.

sweeten. (1) To remove substances of unpleasant odor (as mercaptans) from spirits, petroleum, etc., usually by oxidation. (2) To purify. (3) To add a sugar.

sweetness. The taste of sugars. The relative physiological response has been determined by the University of Minnesota as follows:

fructose	175
invert sugar	123
sucrose	100
glucose	74
xylose	40
maltose	32
rhamnose	32
galactose	32
raffinose	23
lactose	16
For synthetic agents *estimated* as:	
peryllartine	2000
saccharin	700
sucrol	300

Cf. *dulcigen, sapiphore.*

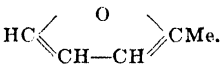
swelling. The adsorption of water by an amorphous substance, with the formation of a jelly. It is assumed to be due to a chemical reaction with water, distinct from hydrolysis, and the formation of a zone (q.v.) of oriented molecules.

sycoceryl alcohol. $C_{18}H_{30}O$ = 262.23. Colorless crystals, m.90. Cf. *lactucerol.*

syenite. A granular igneous rock which consists chiefly of orthoclase with or without albite, biotite, hornblende, microcline or corundum.

sykose. A brand of saccharin.

sylvan. C_5H_6O = 82.1. α-Methylfuran,



A constituent of wood-tar. A yellowish liquid, d.0.916, b.63, soluble in alcohol.

sylvanite. $(Au,Ag)Te_2$. Graphic tellurium. A native telluride of gold and silver.

sylvanium. Tellurium.

sylvate. A salt of abietic acid, $C_{19}H_{24}COOM$.

sylvic acid. Abietic acid.

sylviculture. The study of forestry.

sylvine. An isomorphous native mixture of Na and K chlorides, richer than carnallite.

sylvinite. A sylvite, with rocksalt, containing about 16 % K_2O; used as a fertilizer.

sylvite. KCl. A native potassium chloride, from Stassfurt; used as a fertilizer.

Sylvius, François. 1614–1672. (Dubois de la Boë.) A German-born, Dutch physician who considered combustion and respiration and similar physiological functions, both normal and pathological, as based on chemical reactions.

sym- Abbreviation for symmetrical.

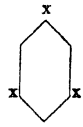
symbiosis. A partnership of two different living organisms, either vegetable or animal, which is of mutual benefit to both species. **antagonistic-** An association of two living organisms of different species in which one derives more benefit than the other. **conjunctive-** The living together of two vegetable or animal organisms with bodily union between them; as, lichens, which consist of algae and fungi. **disjunctive-** An association of two living organisms that are not actually united.

symbiotic fixation. The conversion of atmospheric nitrogen to nitrates or nitrites by soil bacteria and leguminous plants. Cf. *nitrogen fixation.*

symbol. Any mark which represents some substance, quality or relation. **chemical-** A letter or a combination of letters that represents an atom of an element and its relative mass. A chemical symbol is used in several distinct ways: (1) to indicate an atom; as, H, Na, S, or Fe. (2) To indicate an ion; as, H^+, Na^+, S^{--}, or Fe^{++}. (3) To indicate a molecule; as, H_2, Na_x, S_8, or Fe_x. (4) To indicate a gram-atom or gram-molecule, thus, H = 1 gm. hydrogen, H_2 = 2 grams of hydrogen, $2H_2$ = 4 grams of hydrogen. (See *mol.*) (5) To indicate an excited atom, by an asterisk, as, H*. (6) To indicate an isotope by its isotopic weight or small letter showing its abundance; as, Cl^{35}, Cl^{37} or Cl^a, Cl^b. (7) To indicate an atomic nucleus by prefixing its charge (atomic number) as subscript, and suffixing its mass (isotopic weight) as superscript; thus, $_2He^4$ and $_7N^{14}$. See: *Report of a Joint Committee of the Chemical, Faraday and Physical Societies on Symbols*, 1937. *British Standards Institution*, Standard Nos. 423, 1938 (electrical); 560, 1934 (engineering); 813, 1938 (chemical); 974, 1941 (chemical plant). Cf. *notation, formula, alchemistic symbols.* **mathematical-** A letter that indicates quantity; or a mark that indicates or forms part of an algebraic operation. **structure-** A graph that indicates the arrangement of atoms in an organic compound (see *structure symbols*).

symmetric, symmetrical. Having constituent parts arranged in a definite pattern, repeated over and over again in a definite direction of space; as atoms in a crystal. (2) Describing a s. compound. **axial-** See *stereoisomerism.* **plane-** See *stereoisomerism.*

s. carbon atom. See *asymmetric carbon, optical activity, stereoisomerism.* **s. compound.** A benzene derivative in which substitution of the 1,3, and 5-hydrogen atoms has taken place; as,



symmetry. Being symmetrical. The s. of a crystal is determined by regularities in the positions of the similar faces or edges etc., and is defined by the number of elements of symmetry, q.v. (See *crystal systems.*) **axis of-** An imaginary axis through a symmetrical body. If such a body is rotated round this axis, the body occupies the same position in space more than once in a complete turn. **center of-** A central point of a symmetrical body, around which like faces are arranged in opposite pairs. **elements of-** The number of planes, axes and centers of s. of a symmetrical body. A cube has the largest possible number (23), made up of 9 planes, 13 axes, and one center. **external-** The s. of the outside crystal form as distinct from the internal s. of the arrangement of the atoms. **geometrical-** The external shape of a crystal, which resembles that of a geometrical figure. **internal-** The s. of the arrangement of the atoms inside a crystal, as distinct from its external s. **plane of-** An imaginary plane through a symmetrical body, that divides it into halves which are mirror images. Cf. projection *nucleus.*

s. groups. The grouping of crystals into systems according to the number and nature of their elements of symmetry. Thirty-two types exist, of which eleven cover most common substances. See *crystal systems.*

sympathetic. Pertaining to or related to a mutual relationship. **s. ink.** A secret or invisible ink

which is visible only if heated (as cobaltous chloride solution) or when treated with a specific reagent; as, writing with tannic acid solution and developing with ferrous sulfate. **s. reaction.** Induced *reaction*.

sympathin. A hormone produced in smooth muscle under sympathetic impulse, causing augmentation of blood pressure, heart rate and salivary secretion. It resembles epinephrine. Cf. *sympathol*(2).

sympathol. (1) $C_9H_{13}O_2N.HCl$ = 203.6. Methyl-δ-hydroxy-β-p-hydroxy-phenylethylamine hydrochloride. Colorless crystals, m.184, similar to adrenalin in pharmacological action. (2) $C_9H_{13}NO_2$ = 167.1. *p*-Hydroxy-α-(methylamino methyl)-benzyl alcohol. $HO.C_6H_4.CMeOH.NHMe$. Probably identical with sympathin.

sympathomimetic action. The stimulation of the sympathetic nervous system by drugs.

symphorol. Any of the salts of caffeine sulfonic acid, used medicinally as diuretics; as,

symphorol L—Lithium-caffeine sulfonate.

symphorol N—Sodium-caffeine sulfonate or nasrol.

symphorol S—Strontium-caffeine sulfonate.

symplocarpus. Skunk cabbage.

symphytum. Bruisewort, comfrey, blackwort. The dried root of *Symphytum officinale*, a Boraginaceae of Europe and Asia; used medicinally as a demulcent.

syn- (1) A prefix derived from the Greek "with" or "together," which signifies union, association or "building up." (2) The syn-position.

syn-position. *σ*. The position occupied by two radicals in that type of stereo-isomerism in which they are closer together than in the corresponding anti-position. (See *stereo-isomerism*.) The radicals are related in that they are similar or may tend to react, *e.g.*, H and OH may split out and form water.

synaldoxime. See *aldoxime*.

synanthrose. $C_6H_{10}O_5$ = 162.1. Levulin. A carbohydrate isomeric with inulin, from the rhizomes of *Helianthus tuberosus*, a compositaceous plant.

synaptase. Emulsin.

syncaine. Procaine.

synchronal. Occurring at the same time.

synchronism. The occurrence of two or more phenomena at the same time.

synchronizing. To control two or more phenomena so that they occur at the same time; as, a speed-controller for a number of current generators.

syncyanin. A blue pigment produced by the bacteria, *B. syncyanus*, and *B. cyanogenus*.

syndiazotate. See *diazotate*.

synephrin. $C_9H_{14}NO_2$ = 168.1. A white crystalline powder, used as vasoconstrictor.

syneresis. The contraction of a clot or gel; as of blood or milk.

syngenite. $CaSO_4.K_2SO_4.H_2O$. A native potassium-calcium sulfate.

synonym. One of the different names given to the same substance; as, wood alcohol, methyl alcohol or wood-spirit are synonyms for methanol.

syntan. (1) A sulfurized phenol. (2) An artificial tanning material made by the sulfonation of hydrocarbons; *e.g.*, naphtha.

synthalin. The synthetic HCl-salt of decamethylene bisguanidine, $NH_2.C:NH.NH(CH_2)_{12}NH.C:NH.NH_2$. Used as an insulin substitute, and given by mouth (1 insulin unit = 1 mg. synthalin). Now known to be ineffective. **s. B.** Dodecamethylene bisguanidine hydrochloride.

synthesis. The processes and operations necessary to build up a compound. In general, a reaction, or series of reactions, in which a complex compound is obtained from elements or simple compounds. Cf. *analysis*. **electro-** q.v. **organic-** The production of dye-stuffs and medicinals; or the artificial production of a naturally-occurring substance, *e.g.*, indigo, camphor, rubber or quinine. **photo-** q.v.

synthesize. To produce a complex compound from simpler compounds.

synthetic. (1) Produced synthetically. (2) Produced by artificial means. **s. drying oil.** See *oil*. **s. resins.** The plastics, q.v., produced by (a) polymerization (olefines, polyolefines); or (b) condensation (phenolaldehyde, ketone-aldehyde or hydrocarbon aldehyde). Also in a wider sense the polymers of organic compounds; such as, (a) association polymers (viscose silk), (b) hemicolloidal polymers (warm styrene), or (c) eucolloidal polymers (cold styrene).

synthetic. An artificially-produced organic compound used in medicine.

synthol. A synthetic motor fuel obtained from carbon monoxide and hydrogen, in the form of water-gas, when subjected to a pressure of 75 to 150 atmospheres at 400–435°C. with a catalyst (iron and sodium carbonate). It is a mixture of higher alcohols, aldehydes, ketones and higher fatty acids with aliphatic hydrocarbons; heating value, 8200 calories per kg.

syntonin. Muscle fibrin, parapeptone, acid albumin. An acid albumin obtained from albumose by the action of dilute hydrochloric acid. A yellowish powder, insoluble in water, soluble in acids. It is produced in the body as an intermediate product of the gastric digestion of proteins, which eventually become peptones.

syphon. See *siphon*.

syr. An abbreviation for syrup.

syringa. The dried leaves and fruits of *Syringa vulgaris*, the lilac bush, an Oleaceae of America and Europe. It contains several glucosides, and is used as bitter tonic.

syringe. A tube, usually of glass, with a jet at one end and a small piston-pump or bladder at the other; for injections.

syringenin. $C_{11}H_{14}O_4$ = 210.1. Oxymethyl coniferin. A light, rose-red, amorphous mass from syringa; nsoluble in water or alcohol, soluble in ether. It is formed by hydrolysis of syringin.

syringetin. $C_{17}H_{14}O_8$ = 314.11. 3.4'.5.7-tetrahydroxy-3'.5'-dimethoxy flavone. A flavone (q.v.) from lilac.

syringic acid. $C_9H_{10}O_5$ = 198.1. 4-Hydroxy-3.5-dimethoxybenzoic acid. An acid obtained by hydrolysis of syringin.

syringin. $C_{17}H_{24}O_9.H_2O$ = 390.3. Lilacin, ligustrin. A glucoside from *Syringa vulgaris* (lilac), an Oleaceae, *Ligustrum vulgare* (privet), *Robinia pseud-acacia*, or other plants. Long white needles, m.212, slightly soluble in water or alcohol, insoluble in ether. Used medicinally as an antipyretic and antiperiodic. Cf. *syringenin*.

syrup. Sirup. A concentrated aqueous solution of a carbohydrate (as, cane sugar), with or without drugs. **simple-** Syrupus simplex. An

aqueous solution of cane sugar (83 %); a viscous liquid, d.1.313.

s. acacia. A 10 % solution of acacia in sucrose syrup.

system. (1) A combination of matter containing one or more phases. (2) An organized and related group of facts, phenomena or ideas. **binary-** A s. involving two components (elements or compounds). **condensed-** A s. which contains no gaseous phase. **divariant-** A s. with two degrees of freedom (cf. *phase rule*) which can be represented by an area on a diagram, q.v. **geological-** See *epochs, strata.* **heterogeneous-** A s. containing two or more phases or distinct regions, separated from one another by definite boundaries. **homogeneous-** A s. containing no definite boundaries; one whose properties are the same at all parts, or vary gradually from point to point. **mobile-** A s. which responds readily to external conditions, as pressure and temperature. **monovariant-** A s. with one degree of freedom (cf. *phase rule*), Its conditions are given by the *line* of a diagram, q.v. **nonvariant-** A s. with no degree of freedom (cf. *phase rule*). It is represented by a point on a diagram, (q.v.); thus for ice-water-steam, a P of 4.6 mm. and T of 0.007°C. **periodic-** See *periodic system.* **quarternary-** A s. involving four components. **ring-** See *ring system.* **stable-** A s. which does not respond readily to a changing environment. **tertiary-** A s. involving three components. **thermodynamic-** A system which may consist of matter, energy, or both, and is limited by a physical or imaginary boundary. **unstable-** See *mobile* s.

s. of compounds. See *notation, organic compounds, chemicals.* **s. of elements.** See *periodic system.* **s. of stars.** See *spectral classification.*

szomolnokite. $FeSO_4.H_2O$. A native ferrous sulfate.

T

T. An abbreviation for: (1) time; (2) absolute temperature; (3) triple bond, thus T^3 = a triple bond between the third and fourth carbon atom, cf. Δ (*delta*); (4) transport number.

t. An abbreviation for: (1) metric ton; (2) time; (3) temperature (not on absolute scale).

τ. The Greek letter "tau." The symbol for quantum number; τ_1 = azimutal; τ_2 = radial.

θ. The Greek letter "theta." Symbol for thermodynamic temperature.

Θ. The Greek capital letter "theta." (1) A symbol for the absolute temperature at which C_v is $\frac{3}{2}R$. (2) The absolute temperature of a transition point.

Ta. The symbol for tantalum, At. No. 73.

tabacin. The toxic principle of tobacco. A yellow, waxy, hygroscopic, acid glucoside containing nitrogen, decomp. 110.

tabacum. Tobacco.

tabashir. Tabashis.

tabashis. A secretion of bamboo containing lime and silica; used by Hindus as a cure for tuberculosis.

table. (1) A lamella, or flat, scale-like crystal. (2) The flat surface of a precious stone. **t. salt.** Sodium chloride. *iodized-* Sodium chloride with 0.1 % of potassium or sodium iodide. **t. spoon.** An empirical measure, equivalent to about 15 cc. or ½ fluidounce. **t. top impregnation.** An acid-proof, waterproof impregnation for laboratory tables. It consists of two alternate coatings each of solutions A and B, the scraping off of surplus precipitates, and the final treatment and polishing with linseed oil:

A.	Copper sulfate	100 gm.
	Potassium chlorate	100 gm.
	Water	800 cc.
	Boil and apply hot.	
B.	Aniline	120 cc.
	Hydrochloric acid	180 cc.
	Water	1000 cc.

Apply in the order A, B, A, B, let dry for one day, then sand-paper and rub in linseed oil. Caution: the scraped-off surplus is liable to self-combustion.

tablet. Tabloid. Any medicated disk made by incorporating a drug into a mixture of absorbents or adhesives, and passing the slightly-moistened mixture through a tablet machine. The substances, other than drugs or coloring materials, that enter into the composition of a tablet are: (1) A moistening agent—water or alcohol. (2) Absorbents—starch, milk-sugar, magnesium carbonate, magnesium oxide or licorice root. (3) Adhesives—cane sugar, tragacanth, acacia, glucose, gelatin, dextrin, flour boric acid. **effervescent-** A tablet in which an effervescent mixture is incorporated, thus causing rapid solution in water. Cf. *pill.*

tabloid. A small tablet.

tabular crystal. A table-shaped or flattened crystal. **t. spar.** Wollastonite.

tacamahac. (1) A resin from *Calophyllum tacamahaca*, a Guttiferae. (2) A resin from *Populus balsamifera*, balsam poplar, a Salicaceae.

Tachenius, Otto. 17th century. A German physician and chemist, the first to use distilled water and to suspect a hidden acid in oils and fats; author of *Epistola de famoso liquore alcahest* (1655) and *Hippocrates chymicus* (1674).

tachhydrite. $CaCl_2.2MgCl_2.12H_2O$. A white or yellow, very hygroscopic, native calcium magnesium chloride; d.1.671, very soluble in water.

tachia. Caferana. The dried root of *Tachia guianensis*, a Gentianaceae of South Africa and South America; it contains glucosides. Used medicinally for malaria, and as a tonic. Cf. *caferanine, tachinin.*

tachinin. A glucoside from tachia.

tachiol. Silver fluoride. **iso-** Silver silicofluoride.

tachogram. A curve that indicates the speed of the blood current.

tachometer. (1) A device for recording the speed of the blood current. (2) An instrument for recording the angular speed of a revolving shaft in revolutions per minute.

tachylite. A dark, basic, volcanic glass.

tachymeter. A speed-recorder or speedometer.

tachyol. Tachiol.

tachysterol. An isomer of ergosterol which yields vitamin D, (q.v.) on irradiation. Cf. *cholane derivatives.*

tackiness. The property of being sticky; sa, of resins.

tactile. Pertaining to touch.

tæ- *tae-, te-.*

tael. A Chinese bullion weight unit; 1⅓ oz. av.

taeniacide. Teniacide.

taeniafuge. Teniafuge.

taenite. A constituent of iron-nickel meteoric alloys, containing 35–48 % Ni.

tagatone. $C_{10}H_{18}O$ = 154.14. A ketone, related to myrcene, found in the volatile oil of *Tagates glandulifera*, a Compositae.

tagatose. $C_6H_{12}O_6$ = 180.09. A hexose; its *d*-form, m.124, is an unfermentable ketohexose.

tagud nut. The dried fruit of the negrito palm, *Phytelephas macrocarpa;* the source of vegetable ivory.

tagulaway. Cebur. The dried bark of *Parameria vulneraria*, an Apocynaceae of the Philippine Islands. It contains a resin and caoutchouc.

taka amylase. (from Japanese, "taka"-strong). An amylolytic enzyme found with taka diastase. **t. diastase.** An enzyme from a fungus growing on bran, similar in action to diastase. **t. maltase.** An enzyme analogous to maltase and found with taka-diastase.

Talbot, William Henry Fox. 1799–1877. An English archaeologist and inventor of photographic paper (1840) and plates. **T.'s law.** If any part of the eye retina is excited with intermittent light recurring periodically and regularly and, if the period is sufficiently short, a continuous impression will result; as, in moving pictures.

talc. (1) $3MgO.4SiO_2.H_2O$. Talcum, soapstone, rensselaerite. A hydrous magnesium silicate, having a soft, greasy touch, and found in various grades; as, potstone, steatite, French chalk. Purified talcum is used as a dusting powder, as a filtering material and in making crayons. (2) In England; mica used for glazing.

talcum. Talc (1).

talisai oil. An oil from the seeds of *Terminalia catappa*, country almond, a Combretaceae.

talite. Talitol.

talitol. $C_6H_{14}O_6$ = 182.1. Talite. A hexatomic alcohol, $CH_2OH(CHOH)_4CH_2OH$, obtained by reduction of talose; m.86.

talloil. A by-product from sulfate woodpulp digestion, consisting mainly of resin acids and fatty acids. Used for the manufacture of soap, varnishes and fruit sprays.

tallol. Floating soap. An emulsifying agent obtained from black liquors produced in the manufacture of sulfate and soda pulps. Cf. *talloil.*

tallois-desmi. Talmi.

tallow. A solid fat; as suet, q.v. **bone-** See *bone.* **Borneo-** Illipé butter (misnomer). A fat used in the chocolate industry, from shared fats. **Japan-** See *Japan wax.* **mineral-** Hatchettinine.

Tallquist scale. A thin brochure of perforated sections of blotting paper and ten printed shades of hemoglobin (10 % to 100 %). Diagnosis is made by matching a blot of blood with the color scale.

talmi. Talmi-gold, tallois-desmi. A gold-plated brass used in jewelry.

talomucic acid. $C_6H_{10}O_8$ = 210.07. The dibasic acid, $COOH(CHOH)_4COOH$ derived from talose and altrose. White crystals, m.158, soluble in water; occurring *d-* and *l*-forms. Cf *mucic acid.*

talonic acid. $C_6H_{12}O_7$ = 196.1. The monobasic acid, $CH_2OH(CHOH)_4COOH$, derived from talose.

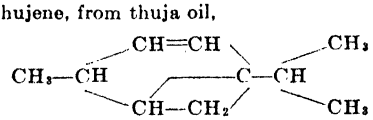
talose. $C_6H_{12}O_6$ = 180.1. An aldose or hexose, $CH_2OH(CHOH)_4CHO$, which occurs in two isomeric forms, d- and l-.

tamarac. The dried bark of the hackmetack, *Larix laricina* or *L. americana*, a larch tree of North America. Used medicinally, as the fluid extract, as an astringent and stimulant.

tamarind. The preserved pulp of the fruit of *Tamarindus indica*, a leguminous tree of India; used as a mild laxative.

tampicin. $C_{34}H_{54}O_{14}$ = 686.4. An amorphous resin obtained from tampico jalap, *Ipomoea simulans*, a Convolvulaceae.

tanacetene. $C_{10}H_{16}$ = 136.13. A terpene, b-thujene, from thuja oil,



tanacetin. $C_{11}H_{16}O_4$ = 212.1. A bitter principle from tanacetum. A brown, amorphous, hygroscopic mass, soluble in water or alcohol, insoluble in ether.

tanacetone. $C_{10}H_{16}O$ = 152.13. A ketone obtained from tansy oil, and apparently identical with thujone. A colorless liquid, b.195.

tanacetum. Tansy. The dried leaves and tops of *Tanacetum vulgare*, a Compositae of Asia, Europe and North America. **t. balsamita.** Costmary. The dried leaves and tops of *Tanacetum balsamita;* used as a vermifuge. **t. oil.** An essential oil distilled from tanacetum. It contains a terpene (tanacetene), a ketone (tanacetone), and alcohol (borneol); used medicinally as an anthelmintic. Cf. *silverweed.*

tanekaha. The bark of *Phyllocladus trichomanoides*, a Coniferae or pine tree of New Zealand; used in tanning and dyeing leather.

tané-koji. A grayish-brown powder from *Aspergillus oryzae*, a mold; used in the manufacture of saké.

tangent. The ratio of the side opposite the angle concerned to the base of the right-angled triangle in which it occurs.

tanghinia. The fruit of *Tanghinia venenifera*, an apocynaceous tree of Madagascar. Used as an ordeal bean, and contains a cardiac poison, tanghinine.

tanghinine. $C_{10}H_{16}N$ = 150.1. An alkaloid obtained from tanghinia. Colorless lustrous scales, soluble in alcohol, ether or acetic acid; it is a cardiac poison.

tang-kui. (1) Eumenol. (2) Lovage.

tangle. Laminaria.

tank culture. Hydroponics.

tankage. The rendered, dried, ground by-products from the slaughter of animals or from carcasses of animals. Used as fertilizer and feeding stuff: N, 5–10 %; $Ca_3(PO_4)_2$, 8–30 %. **fish-** q.v., **garbage-** The rendered, dried, ground product of waste household food materials: N, 2.5–3.5 %; P_2O_5, 2–5 %; K_2O, 0.5–1.0 %. **gashouse-** A misnomer for "spent oxide," consisting of iron oxide and the materials it has taken up in the purification of illuminating gas. It is often rich in nitrogen (5–10 %), but is poisonous to plants. **hynite-** A tankage with a high content of nitrogen. **process-** Hynite t.

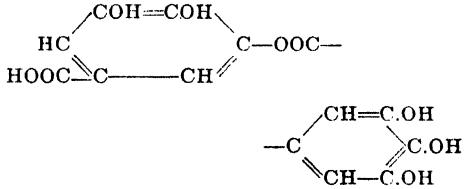
tannal. Aluminum tannate.

tannalbin. Tannin albumate. A light brown, odorless and tasteless powder, insoluble in water, alcohol or ether; used as an intestinal astringent.

tannase. An enzyme in various tannin-bearing plants; it hydrolyzes tannins to gallic acid.

tannate. A salt of tannic acid.

tannic acid. (1) $C_{14}H_{10}O_9$ = 322.2. Tannin. Gallotannic acid, digallic acid. A yellow amorphous powder or lustrous crystalline scales,

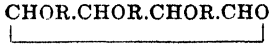


m.200 (decomp.), soluble in water, alcohol or glycerol, slightly soluble in ether. Used as a reagent and in the treatment of burns. (2) $C_{76}H_{52}O_{46}$. Gallotannin, Chinese tannin, Turkish tannin. A light yellow-brown powder from galls of oak, sumac, etc., soluble in water or alcohol. It is probably pentadigalloylglucose or a glucoside of polydigalloylgallic acids. **iodo-** See *iodotannic acid.*

tannigen. $C_{18}H_{14}O_{11}$ = 406.11. Acetannin, diacetyltannin, tannogen, tannin-diacetanilate, the acetic ester of tannic acid, $C_{14}H_8(COMe)_2O_9$. A light gray powder, insoluble in water, soluble

in alcohol; used medicinally as an intestinal astringent.

tannin. (1) Tannic acid. (2) The glucoside, pentadigalloylglucose, from nutgalls:



in which R represents tannic acid less the —OH of the carboxyl group. (3) See *tannins*. **acetyl-, diacetyl-** Tannigen. **iodo-** See *iodotannin*. **t. albumate.** Tannalbin.

tanning. The process of converting skins or hides into leather. **t. materials.** A group of native vegetable preparations that contain tannic acid:

TANNING MATERIALS

	*	
Anacardiaceae:		
Pistacio, *Pistacia* species	g.	30–40
Sumac, *Rhus copollina*	l.	17–38
White sumac, *Rhus glabra*	l.	15–25
Chinese galls, *Rhus semialata*	g.	70
Tizra sumac, *Rhus pentaphylla*	r.	29–31
Quebracho, *Schinopsis* species	e.	35–65
Apocynaceae:		
White quebracho, *Aspidiosperma* sp.	l.	27–30
Betulaceae:		
Birch, *Betula alba*	b.	3–18
Alder, *Alnus glutinosa*	b.	16–20
Minibari, *Alnus firma*	f.	25–28
Combretaceae:		
Dhaura, *Anogeissus latifolia*	l.	10–20
Myrobalan, *Terminalia chebula*	n.	30–40
Kumbuk, *Terminalia glabra*	b.	27–32
Thann, *Terminalia oliveri*	b.	30–35
Coniferae:		
Australian fir, *Callitris* sp	b.	17–31
Celery pine, *Phyllocladus* sp	b.	28–30
Larch, *Larix europoea*	b.	9–10
Western larch, *L. occidentalis*	b.	10–12
Hemlock, *Tsuga canadensis*	b.	7–16
Dipterocarpaceae:		
Ironwood, *Hopea* sp	b.	17–22
Pentacme suavis	l.	12–24;
	b.	7–13
White dammar, *Vateria indica*	f.	25
Euphorbiaceae:		
Cleistanthus collinus	b.	32–34
Amla, *Phyllanthus emblica*	f.	26–35;
	l.	23–28;
	b.	15–24
Fagaceae:		
Chestnut, *Castanea* sp	b.	6–8;
	w.	7–11
Live oak, *Quercus agrifolia*	b.	19
Valonia, *Quercus aegilops*	c.	30–65;
	a.	17–40
Turkey oak, *Quercus cerris*	g.	35
Aleppo oak, *Qu. infectoria*	g.	24–60
Common oak, *Qu. robur*	b.	9–12;
	w.	2–4
Red oak, *Qu. rubra*	g.	35;
	b.	4–6
Quercitron bark, *Q. tinctoria*	b.	25–30
Leguminosae:		
Angica, *Acacia angica*	b.	20–25
Babul, *A. arabica*	b.	12–20;
	p.	20–42
Black wattle, *A. binervata*	b.	30
Cutch, *A. catechu*	e.	60
Wattle, *A. decurrens*	b.	20–51
Green wattle, *A. microbotrya*	b.	12–47
Hickory, *A. penninervis*	b.	14–38
Golden wattle, *A. pycnantha*	b.	40–50
Bengal kino, *Butea frontosa*	e.	30–40
Algarobilla, *Caesalpinia brevofolia*	p.	43–67
Cascalote, *C. cacolaco*	p.	40–55
Divi-divi, *C. coriaria*	p.	30–50
Tari, *C. digyna*	p.	40–50
Guyacan, *C. melanocarpa*	p.	15–24
Tarwar, *Cassia auriculata*	b.	16–22
Elephant roots, *Elephantorrhiza*	r.	6–22
Timbo, *Enterolobium timbouva*	b.	22
Paypay, *Inga feullei*	p.	15–20
Ingagwazu, *I. offinis*	b.	26
Mimosa, *Mimosa pudica*	r.	10
Yhvihta, *Peltaphorum dubium*	b.	31
Kurupaih-ra, *Piptadenia rigida*	b.	28
Camanchile, *Pithecolobium dulce*	b.	15–25
Kino, *Pterocarpus* species	e.	45–60
Meliaceae:		
Piagao, *Xylocarpus granatum*	b.	21–48
Tabique, *X. obovatus*	b.	22–28
Kaatigua, *Trichilia* sp	b.	21–25
Myrtaceae:		
Mountain gum, *Eucalyptus alba*	b.	30
Ribbon gum, *E. amygdalina*	s.	58–65
Bloodwood, *E. corymbosa*	s.	28;
	l.	18
White mallet, *E. erythronema*	b.	30
Eucalyptus, *E. globulus*	s.	28
Spotted gum, *E. maculata*	s.	45
Black mallet, *E. occidentalis*	b.	40–50;
	l.	20–30
Mallet, *E. occidentalis*	b.	30–50
Messmate, *E. piperita*	s.	33–62
Moort, *E. platypus*	b.	25
Red ironbark, *E. siderophloia*	s.	35–73
Yhva, *Eugenia* species	b.	44;
	l.	15
Oak gum, *Spermolepsis* species	s.	43–80
Malpighiaceae:		
Tamwood, *Byrsonima* species	b.	22–40
Mangrutta, *Malpighia* species	b.	20–30
Palmae:		
Saw palmetto, *Sabal cerrulata*	l.	13
Polygonaceae:		
Canaigre, *Rumex* species	r.	25–30
Protaceae:		
Heath honeysuckle, *Banksia* species	b.	12–25
Sugarbush, *Protea* species	b.	15–25
Rhizophoraceae:		
Mangrove, *Braguiera* species	b.	22–52
Bahau, *Ceriops candolleana*	b.	25–43
Tangal, *C. tagal*	b.	24–37
Mangrove, *Rhizophora* species	b.	21–58;
	l.	22
Rosaceae:		
Tormentilla erecta	r.	20–46
Sapindaceae:		
Guara, *Paullinia sorbilis*	f.	43–55
Tamaricaceae:		
Tamarisk, *Tamarix species*	g.	26–58;
	l.	10
Punicaceae:		
Pomegranate; *Punica granatum*	f.	27–32;
	b.	20

* Approximate percentage of tannins in: a—acorns; b—bark; e—extract; f—fruit; g—galls; l—leaves; n—nuts; p—pods; r—root; s—secretions or sap; w—wood.

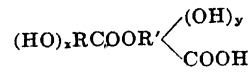
tannins. A group of astringent, aromatic, acidic compounds found in various plants and trees. They precipitate alkaloids, mercuric chloride, and heavy metals; form deep blue or black solutions (ink) with ferric solutions; and their strongly alkaline solutions absorb oxygen rapidly

The term should be restricted to the glucosides. The most common tannin is tannic acid. (See table of *tanning materials*.)

Types of tannins:

1. Hydrolyzable tannins, Ester-type RCOOR

a. Depsides or gallotannins,



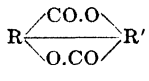
di-β-resorcylic acid	$C_{14}H_{10}O_7$
diprotocatechuic acid	$C_{14}H_{10}O_7$
digentisic acid	$C_{14}H_{10}O_7$
m-digallic acid	$C_{14}H_{10}O_9$
hamamelitannin	$C_{20}H_{20}O_{14}$
chebulinic acid	$C_{34}H_{30}O_{22}$
gallotannic acid	$C_{76}H_{52}O_{46}$

b. Glusides or galloylsugars,

$(HO)_xRCOOR'(OH)_y$

digalloyl-l-glucosan	$C_{20}H_{18}O_{13}$
trigalloyl glycerol	$C_{24}H_{20}O_{15}$
α-trigalloyl-l-glucosan	$C_{27}H_{22}O_{17}$
trigalloyl glucose	$C_{27}H_{24}O_{18}$
trigalloyl acetoneglucose	$C_{30}H_{28}O_{18}$
tetragalloyl erythrite	$C_{32}H_{26}O_{20}$
tetragalloyl methylglucoside	$C_{35}H_{30}O_{22}$
pentapyrogallol carbonyl glucose	$C_{41}H_{32}O_{26}$
pentagalloyl glucose	$C_{41}H_{32}O_{26}$
hexagalloyl mannite	$C_{48}H_{38}O_{30}$
penta-digalloyl-glucose	$C_{76}H_{52}O_{46}$

c. Ellagitannins or diphenylmethylolids,



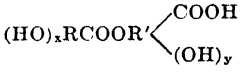
ellagic acid	$C_{14}H_6O_8$
cyanomaclurin	$C_{15}H_{12}O_6$
ellagitannin	$C_{20}H_{16}O_{13}$

2. Condensed tannins, Keto-type, R.CO.R

d. ketones, HOR.CO.R'

hydroxybenzophenone	$C_{13}H_{10}O_2$

e. Catecholtannins or phlobatannins,



maclurin	$C_{13}H_{10}O_6$
pinitannic acid	$C_{14}H_{16}O_8$
quinotannic acid	$C_{14}H_{16}O_9$
galitannic acid	$C_{14}H_{16}O_{10}$
ipecacuanhic acid	$C_{14}H_{18}O_7$
rubitannic acid	$C_{14}H_{22}O_{12}$
quercin	$C_{15}H_{12}O_9.2H_2O$
l-catechol	$C_{15}H_{14}O_6.3H_2O$
d-catechol	$C_{15}H_{14}O_6.4H_2O$
epicatechol	$C_{15}H_{14}O_6$
catechol carboxylic acid	$C_{16}H_{14}O_8$
pinicortannic acid	$C_{16}H_{18}O_{11}$
cola tannin	$C_{16}H_{20}O_8$
cocatannic acid	$C_{17}H_{22}O_{10}$
maletto tannin	$C_{19}H_{20}O_9$
hemlock tannin	$C_{20}H_{18}O_{10}$
quercitannic acid	$C_{20}H_{20}O_4$
sequoia tannin	$C_{21}H_{20}O_{10}$
tormentilla tannin	$C_{26}H_{22}O_{11}$
horse chestnut tannin	$C_{26}H_{24}O_{12}$
rheotannic acid	$C_{26}H_{26}O_{14}$
fraxitannic acid	$C_{26}H_{32}O_{14}$
cortepinitannic acid	$C_{32}H_{34}O_{17}$
paullinio tannin	$C_{38}H_{36}O_{20}$

tannoform. $C_{29}H_{20}O_{16}$ = 656.2. Methylene-ditannin, $(C_{14}H_9O_9)_2CH_2$. A condensation-product of formaldehyde and tannic acid. A pink powder, insoluble in water, soluble in alcohol or ether.

tannogen. Tannigen.

tannon. Tannopin.

tannopin. $C_{48}H_{42}O_{27}N_4$ = 1106.3. Hexamethyl-enetetraminetannin, tannon, urotropine-tannin, $(CH_2)_6N_4(C_{14}H_{10}O_9)_3$. A light-brown powder, insoluble in water or alcohol; used medicinally as an intestinal antiseptic and disinfectant.

tannyl. The monovalent radical, $—C_{14}H_9O_9$, derived from tannic acid. **t. acetate.** Tannigen.

tansy. Tanacetum. **wild-** Silverweed. **t. oil.** Tanacetum oil.

tantalate. A salt of tantalic acid of the type, $MTaO_3$. **hexa-** A salt of the type $M_8Ta_6O_{19}$. **peroxy-** A salt of the type M_8TaO_8.

tantalic acid. $HTaO_3$ = 230.5. Colorless crystals, insoluble in water, soluble in hydrofluoric acid. It forms complex salts; as, $Na_8Ta_6O_{19}$.

tantalite. $(FeMn)O.Ta_2O_4$. A native iron tantalate; black crystals, often found with niobium.

tantalites. A group of minerals of the type, $M(TaO_3)_2$, where M is divalent iron, or manganese. They are usually mixed with the corresponding columbites, $M(CbO_3)_2$.

tantalous. A compound of trivalent tantalum. **t. bromide.** See *tantalum bromide* (1). **t. chloride.** See *tantalum chloride* (1).

tantalum. Ta = 180.88. A rare metal of the vanadium family, and element, atomic number 73. It is a gray platinum-like metal, d.16.6, m.2850, insoluble in alkalis or acids, (except hydrofluoric acid). It occurs in tantalite and columbite and was discovered in 1802 by Ekeberg. The principal valency of Ta is five, but it also forms compounds containing trivalent tantalum. It is resistant to corrosion and is used as a substitute for platinum, for filaments in incandescent electric light bulbs, and as an electrode in current rectifiers for radio instruments; for surgical instruments, as it may be sterilized in the flame without losing hardness; and for rayon spinnerets, jewelry and laboratory ware. **t. bromides:** (1) $TaBr_3$ = 421.5. Tantalous bromide, t. tribromide. Yellow crystals, m.240, b.320, decomp. by water or alcohol. (2) $TaBr_5$ = 581.1. Tantalic bromide. A colorless powder, decomp. by water. **t. carbide.** TaC = 192.9. A hard, high melting-point solid. A mixture of 75 % TaC and 25 % HfC has the highest known melting point (above 4200°C). **t. chlorides.** (1) $TaCl_3$ = 287.88. Tantalous chloride. Yellow prismatic crystals, d.3,68, decomp. by water, soluble in sulfuric acid. (2) $TaCl_5$ = 359.0. Tantalic chloride. Light-yellow, crystalline needles, m.211, b.242, decomp. in moist air or water to tantalic acid; soluble in potassium hydroxide or absolute alcohol. **t. fluorides.** A group of double salts of the type, $(MF)_2TaF_5$, or, M_2TaF_7; M is a monovalent metal. **t. minerals.** Tantalum occurs in nature associated with columbium. Its principal ore is tantalite, $FeTa_2O_6$. **t. nitride.** TaN = 195.5. A colorless powder insoluble in water or acids, soluble in a mixture of HF and HNO_3. **t. oxide.** Ta_2O_5 = 443.0. Tantalic acid anhydride, t. pentoxide, tantalic oxide. A white, rhombic, crystalline powder, d.7.53; insoluble in water or alcohol, soluble in fused potassium bisulfate. **t. pentabromide.**

See *t. bromide* (2). **t. pentachloride.** See *t. chloride* (2). **t. pentoxide.** See *t. oxide.* **t. potassium fluoride.** K_2TaF_7 = 392.7. White silky needles; slightly soluble in water. **t. tribromide.** See *t. bromide* (1). **t. trichloride.** See *t. chloride* (1).

tantcopper. A copper alloy, analogous to tantiron.

tantiron. An acid-resistant alloy of iron containing silica, used for chemical equipment.

tantnickel. A nickel alloy analogous to tantiron.

tapioca. Cassava, manioca starch, Bahia arrowroot, Rio arrowroot, mandioc. The starch granules of the root of cassava, *Jatropha manihot*, an Euphorbiaceae of Brazil and the West Indies; used as food.

tar. A thick brown to black liquid with a distinctive odor, obtained by the distillation of wood, peat, coal, shale or other vegetable or mineral materials. It is a mixture of hydrocarbons and their derivatives. **coal-** A thick, black liquid obtained by the destructive distillation of bituminous coal or crude petroleum. It contains many aromatic hydrocarbons and phenols, including naphthalene, toluene, quinoline, aniline, cresols. Cf. *coal.* **oil of-** T. oil. **pine-** Wood tar. **rock-** Crude petroleum. **wood-** Pix liquida, pine tar. The empyreumatic syrup-like mass obtained by distillation of the wood of *Pinus* species. It contains resins, turpentine and oils; used as a disinfectant and antiseptic. On fractional distillation it yields an acid liquor (pyroligneous acid), empyreumatic oil (oil of tar) and a black residue (pitch).

t. camphor. Naphthalene. **t. oil.** Oleum picis rectificatum. The volatile oil from pine t, rectified by steam distillation, d. 0.862–0.872.

tarapacaite. Native potassium chromate.

taraxacerin. $C_8H_{16}O$ = 128.1. A ketone obtained from taraxacum.

taraxacum. Dandelion, lion's tooth. The dried rhizome and roots of *T. officinale*, a Compositae; used as a tonic and mild laxative.

taraxanthin. $C_{40}H_{56}O_4$ = 600.43. A carotenoid (q.v.) from dandelion flowers, m.184, an isomer of violaxanthin.

tarchonyl alcohol. $C_{50}H_{102}O$ = 718.79. An alcohol of the methanol series, m.82, insoluble in water, from the leaves of *Tarchonanthus camphoratus*, a Compositae of Africa.

tare. (1) The weight of a container in which a substance is to be weighed. (2) A counterweight used to balance a container. (3) A plant of the vetch family, grown for fodder. (4) Any weed that grows among corn. (5) Waste cloth wrappings, usually of jute, used for paper manufacture.

target. (1) Anticathode. (2) A substance exposed to bombardment by particles. Cf. *rays, radioelements.*

targusic acid. Lapachol.

tariric acid. $C_{18}H_{32}O_2$ = 280.3. 5-octadecynoic acid*, $Me(CH_2)_{10}C{:}C(CH_2)_4COOH$. An unsaturated acid, m.50.5; an isomer of linoleic acid occurring as glyceride in the fruit fats of Guatemalan tariri, seeds, from *Picramia* species.

tarnish. A surface film of a contrasting color formed on an exposed surface of a metal or mineral; it usually consists of the oxide or sulfide.

taro. The rhizome of *Colocasia esculenta*, an Araceae of the tropics whose poison is destroyed by boiling; used as food (poi).

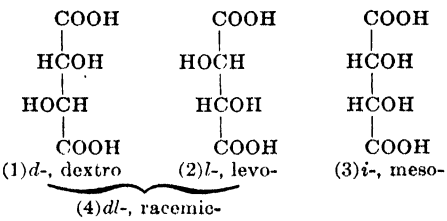
tarpaulin. (1) Canvas rendered waterproof by a coating of tar. (2) A waterproof cloth.

tarragon. The plant *Artemisia tranunguloides*, a Compositae; used as spice. **t. oil.** Estragon oil.

tartar. (1) Tatar. A crude potassium bitartrate which forms as sediment in wine casks. (2) Calculus. A deposit of saliva proteins and calcium phosphate on teeth, causing mechanical friction on gums which may lead to pyorrhea. **cream of-** Potassium bitartrate. **oil of-** A saturated solution of potassium carbonate. **salt of-** Potassium carbonate.

t. emetic. Potassium antimonyl tartrate.

tartaric acid. $C_4H_6O_6$ = 150.1. Dihydroxysuccinic acid, *2,3*-dihydroxybutanedioic acid*. A dibasic, tetratomic acid; 4 isomers:



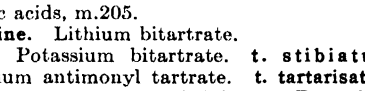
The common acid is *d-* and occurs in many vegetable tissues and fruits. **dextro-** or **levo-** Clear, colorless, monoclinic crystals, d.1.76, m.168, soluble in water or alcohol, insoluble in ether. Used as a reagent and in pharmaceutical preparations. **inactive-** Meso-. **levo-** See *dextro-*. **meso-** $+1H_2O$. Colorless scales, d.1.666, m.140, slightly soluble in water. **racemic-** $+1H_2O$. A mixture of dextro- and levotartaric acids, m.205.

tartarlithine. Lithium bitartrate.

tartarus. Potassium bitartrate. **t. stibiatus.** Potassium antimonyl tartrate. **t. tartarisatus.** Potassium tartrate. **t. vitriolatus.** Potassium sulfate.

tartrate. A salt of tartaric acid of the type, $M_2C_4H_4O_6$. **acid-** or **bi-.** A salt of the type, $MC_4H_5O_6$. **bi-** Acid-. **normal-** See *tartrate.* **pyro-** See *pyrotartrate.*

tartrazine. A yellow pyrazolone dye of the type,



Often used in foodstuffs.

tartronic acid. $C_3H_4O_5.\frac{1}{2}H_2O$ = 129.1. Oxymalonic acid, propanoldiacid, *2*-hydroxypropanedioic acid*, isopropanol diacid, COOH.CHOH.COOH. Colorless prisms, sublime 110, decomp. 186, m.185; soluble in water, alcohol or ether. **benzyl-** See *benzyltartronic acid.* **methyl-** Iso*malic acid.*

t. acid series. A group of polyhydroxy acids (q.v.) formed from carbohydrates; as

tartronic acid.....	$HOOC(CHOH)COOH$
tartaric acids.....	$HOOC(CHOH)_2COOH$
ribosic acids.....	$HOOC(CHOH)_3COOH$
saccharic acids.....	$HOOC(CHOH)_4COOH$

tartronyl. The bivalent radical, —CO.CHOH.CO—. **t. urea.** Dialuric acid.

taste. The sensation caused by a soluble substance on the nerves of the tongue. Classification:

acid	*e.g.*, hydrogen ions
sweet	*e.g.*, sugars
bitter	*e.g.*, strychnine
saline	*e.g.*, sodium chloride
metallic	*e.g.*, iron or copper salts
astringent	*e.g.*, alum
alkaline	taste of hydroxyl ions

The threshold values of taste stimulus for the four fundamental tastes are:

salty	0.25 gm. NaCl per 100 cc. H_2O
sweet	0.5 gm. sugar per 100 cc. H_2O
acid	0.007 gm. HCl per 100 cc. H_2O
bitter	0.00005 gm. quinine per 100 cc.

Cf. *odor*.

tatar. Tartar.

tau. The Greek letter τ (see under T).

taurine. $C_2H_7O_3NS$ = 125.14. Aminoethionic acid, aminoethylsulfonic acid, $NH_2.CH_2.CH_2.SO_3H$. Large monoclinic prisms, m.240 (decomposes), soluble in water insoluble in alcohol or ether; formed in bile by the hydrolysis of taurocholic acid.

taurocarbamic acid. $C_3H_8O_4N_2S$ = 168.15. $NH_2.CO.NH.CH_2.CH_2.SO_3H$. It occurs sometimes in urine.

aurocholeic acid. $C_{27}H_{47}NO_6S$ = 513.45. A bile acid (q.v.), which hydrolyses to choleic acid and taurine.

aurocholic acid. $C_{26}H_{45}O_7NS$ = 515.4. Choleic acid. An acid in bile. Colorless needles, soluble in water or alcohol, m.180; it hydrolyzes to taurine and cholic acid.

auryl. The monovalent radical, $NH_2.CH_2.CH_2SO_2$—.

taurylic acid. $C_7H_{14}O_2$ = 130.12. An acid occurring sometimes in urine.

tauto- A prefix indicating a tautomeric form of the substance it describes; as, tautohypoxanthine.

tautocyanate. An ester of the type R.N:CO.

tautomeric. Existing in a dynamic, isomeric state; describing a substance which can react in manners corresponding with two different structural arrangements of its atoms.

tautomerism. Dynamic allotropy. The property of certain substances of existing in a state of equilibrium between two isomeric forms, and being able to react according to either. It differs from the related types of metamerism and desmotropism (q.v.), because the two latter produce relatively stable compounds which react in accordance with a specified structure. The molecules may differ in L (the linkage, bond or connections between the atoms) and P (the position or distribution of these atoms in the molecule). Hence:

Tautomerism	L—different; P—different
Metamerism	L—alike; P—different
Desmotropism	L—different; P—alike

hence: R.CN and R.NC; R.ONO and $R.NO_2$; R.CO.NHR and R.C:NH.OR are tautomeric. The ketone-enol type of transformation is desmotropic. RNH.C:NR′, R′NH.C:NR are metamers. Cf. *desmotropes*. **electrolytic-** The phenomenon exhibited by an amphoteric substance in solution, which produces hydroxyl ions in presence of acids and hydrogen ions in presence of alkalis.

tautourea. $NH_2.C:NH.OH$, as distinct from $NH_2.CO.NH_2$ (urea).

tautouric acid. A tautomeric form of uric acid, q.v.

tawing. The tanning of hides with mineral substances; *e.g.*, alum, sodium chloride, chromium or aluminum salts.

taxicatin. $C_{13}H_{22}O_7.2H_2O$ = 326.2. A crystalline glucoside from the twigs of taxus.

taxine. $C_{37}H_{51}O_{10}N$ = 669.4. An alkaloid from the seeds and leaves of *Taxus baccata*. White scales, m.80, slightly soluble in water.

taxis. The movement of a cell in response to an external stimulus; as, chemotaxis, electro-taxis, photo-taxis.

taxus. Yew, chinwood. The poisonous dried seeds of *Taxus baccata*, a Taxaceae of Europe and Northern Africa.

Taylor, Hugh Stutt. 1890– . An English-born American chemist, noted for work in photochemistry and thermodynamics.

Taylor-White process. A method of toughening steel by heating it almost to fusion and cooling it in molten lead, followed by cooling in hot oil, reheating to 400–600°C. and cooling in air.

tazettine. $C_{18}H_{21}NO_5$ = 331.17. An alkaloid from the dried corm of *Narcissus tazetta*, related to sekisanine.

TB. An abbreviation for tuberculin.

Tb. The symbol for terbium.

Te. The symbol for tellurium.

tea. (1) A decoction or infusion of a medicinal plant. (2) The dried leaves of *Thea sinensis* and other species of China, Japan, India and other tropical countries. Average composition:

water	10 %
extractives	32.7 %
tannin	11.4 %
caffeine	1.9 %
ash	6.23 %
fibers	40–60 %

The following plants are used as tea:

(1) For medical use: (Cf. *species*).

Paronychia species	Algerian t.
Melaleuca species	Australian t.
Chenopodium anthelminticum	Mexican t.
Monarda species	Oswego t.
Gaultheria species	Salvador t.
Capraria species	West Indian t.

(2) As beverages:

Thea sinensis	Chinese t. (Pekoe, souchong, congou)
Catha edulis	Arabian t. (kat)
Stachy tarpheta species	Jamaica t.
Ledum palustre	Labrador t.
Ilex paraguensis	Paraquay t. (maté)
Neea theifera	Caparrosa t.

Brazil- Maté. **James-** See *Labrador t.* **Jesuits-** Maté. **Paraguay-** Maté.

t. berries. Gaultheria. **t. cup.** About 120 cc. or 4 fluid ounces. **t. root.** The root of *Ceanothus Americanus*, a Celastraceae, used as an astringent. Cf. *ceanothine*. **t. spoon.** About 4 cc. or 1 fluid drachm. **t. tree.** Cajeput.

teak. The extremely hard wood of *Tectona grandis*, (Verbenaceae) a tree of Southern Asia.

tear gases. A group of volatile lachrymatory compounds used in warfare. They are, in general, halogenated ketones of the type $RCO.CH_2X$, as chloroacetophenone; or halogenated cyanides, as PhCHBrCN, brombenzylcyanide. Cf. *poison gas*.

teas. (1) See *tea.* (2) See *species.*
tebelon. Isobutyloleate.
technic. (1) Technique. The details of a method of procedure. (2) The mechanical trades. **pyro-** The manufacture of fireworks.
technical. Pertaining to the manufacturing trades. **t. analysis.** The analytical methods employed in industry for the rapid evaluation of materials.
technique. Technic.
technology. A branch of science that deals with the methods of manufacturing materials from vegetable, animal or mineral sources.
Teclu burner. A modified bunsen burner the air and gas streams of which can be finely adjusted.
tecomin. Lapachol.
tecsol. A product of wood distillation, used as a denaturant for alcohol.
tegit. A trade name for molded asbestos and tar products used for electrical insulation.
Teichmann's crystals. See *hemin.*
teilungs koeffizient. Distribution coefficient.
tekite. A variety of meteorite.
telautograph. An instrument for directly transmitting sketches or writing.
tele- A prefix derived from the Greek "far off," indicating distance.
telekinesy. Action at a distance without contact.
telephan. [A better term than televox, which is a Greco-Latin hybrid.] An instrument in which sound waves of certain frequencies activate electrical relays, and so enables the operation of devices to be controlled by sounds.
telephone. An electrical instrument for transmitting sound.
telephotography. The transmission of black and white pictures by telegraphy or wireless (cf. *television*).
telescope. An optical instrument for observing distant objects; used in the laboratory for reading measuring scales at a distance.
television. See *telopsis, iconoscope.*
televox. Telephan.
telfairic acid. A fatty acid, d.0.9429, m.6, b.225, from East African gourd seeds, *Telfairia pedata*, a Cucurbitaceae; probably identical with linoleic acid.
tellerwort. Sanguinaria.
tellurate. A salt of telluric acid of the general type, M_2TeO_4, or M_6TeO_6.
tellur bismuth. Tetradymite. **t. nickel.** Melonite. **t. ocher.** TeO_2. Tellurium dioxide.
telluretted. An obsolete term for a compound containing divalent tellurium. **t. hydrogen.** Hydrogen telluride.
telluric. (1) Of earthly (as opposed to meteoric, or solar) origin. (2) Referring to hexa-valent tellurium. **t. acid.** H_2TeO_4 = 193.5. Allotelluric acid. A colorless powder, d.3.441, decomp. 160; insoluble in water, alcohol or alkalis. **soluble-** H_6TeO_6 or, $H_2TeO_4{,}2H_2O$ = 229.5. A white crystalline substance obtained by oxidation of tellurium dioxide.
t. bismuth. Tetradymite. **t. lead.** Nagyagite. **t. lines.** The lines in the solar spectrum due to absorption of rays by the atmosphere; as, Fraunhofer lines A and B. Their intensity varies with the altitude of the sun, and they do not show the Döppler shift. **t. ocher.** Tellurite. **t. silver.** Hessite.
telluride. (1) A binary compound containing divalent tellurium, of the general type, M_2Te. There are various native minerals:

hessite	Ag_2Te
altaite	PbTe
tetradymite	Bi_2Te_3

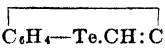
(2) Weissite. (3) An organic compound of the type R_2Te. **di-** Pertelluride. An organic compound of the type $R_2Te.Te.R$. **per-** Di-.
tellurinic acid*. A compound of the type $RTeO_2H$; as, methanetellurinic acid*, CH_3TeO_2H. Cf. *telluronic acid, sulfinic acid.*
tellurious. Tellurous.
tellurite. (1) Any salt of tellurous acid containing tetravalent tellurium of the general type, M_2TeO_3. (2) TeO_2. Telluric ocher. Native tellurium dioxide.
tellurium. Te = 127.61. Sylvanium. A nonmetal and element, atomic number 52. Amorphous rhombic crystals, d.6.25, m.451, b.1390, insoluble in water, soluble in concentrated sulfuric acid or alkalis. Te is a homolog of sulfur and selenium and forms several series of compounds:

	(inorganic compounds)		
valency:	−2	4	6
ion:	Te^{--}	TeO_3^{--}	TeO_4^{--}
name:	tellurides and tellurous	tellurites	tellurates and telluric
	(organic compounds)		
	R_2Te		R_2TeO
	R-tellurides		R-tellurium oxide

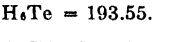
It was discovered by Müller in 1782 and occurs native as lionite, in tellurite and tellurides. **black-** (Pb,Au) (Te,S). A lead-gold mineral. **foliated-** Nagyagite. **graphic-** Sylvanite. **radio-** Polonium.
t. bichloride. See *t. chloride.* **t. bromides:** (1) $TeBr_2$ = 287.3. T. dibromide, tellurous bromide. Steel-gray needles, m.280, b.339, decomp. by water. (2) $TeBr_4$ = 447.25. T. tetrabromide, telluric bromide. A white powder, slightly soluble in water, and hydrolysed by it. **t. chlorides:** (1) $TeCl_2$ = 198.4. Tellurous chloride. t. dichloride. Black crystals, d.6.89, m.175, b.324; decomp. by water. (2) $TeCl_4$ = 269.3. Telluric chloride, t. tetrachloride. A white crystalline powder, m.224, b.380, decomp. by water. **t. dibromide.** T. bromide (1). **t. dichloride.** T. chloride (1). **t. diethyl.** $TeEt_2$ = 185.6. A liquid, b.137. **t. dimethyl.** $TeMe_2$ = 157.6. A liquid, b.182. **t. dioxide.** See *t. oxide.* **t. disulfide.** T. sulfide. **t. glance.** Nagyagite. **t. graphite.** (AgAu)Te_2. A native gold-silver telluride. Cf. *sylvanite.* **t. hydride.** Hydrogen telluride. **t. hydroxides:** (1) A group of organic compounds of the type, R_2TeOH. (2) The slightly basic tellurous acid, $TeO(OH)_2$. **t. iodide.** TeI_2 = 381.3. A black crystalline mass; insoluble in water. **t. lead.** An acid-resistant lead containing 0.05 % Te. It resists mechanical shock and stress reversal better than pure lead, and may be used with sulfuric acid of strength below 77 %. **t. monoxide.** See *t. oxide.* **t. nitrate.** $Te_2O_3(OH)NO_3$, derived from tellurous acid, $TeO(OH)_2$. **t. nitrates.** A group of organic compounds of the type $R_2Te(NO_3)_2$. **t. oxides:** (1) TeO = 143.5. T. monoxide, a rare compound. (2) TeO_2 = 159.5. T. dioxide. Yellow octahedral crystals, d.5.89, m.700, slightly soluble in water, soluble in alkalis. (3) TeO_3 = 175.5. T. trioxide. An orange colored powder, $d_{15°}$.5.07, decomp. at red-heat, insoluble in water, soluble in alkalis. (4) A

group of organic compounds of the type, R_2TeO; as, Me_2TeO, dimethyltellurium oxide. **t. oxychloride.** $TeOCl_2$, derived from tellurous acid. **t. sulfate.** $Te_2O_3SO_4$, derived from tellurous acid, $TeO(OH)_2$. **t. sulfide.** TeS_2 = 191.6. A black amorphous powder, insoluble in water or acids. **t. sulfite.** $(TeO_2)_2SO_3$, derived from tellurous acid. **t. sulfoxide.** $TeSO_3$ = 207.5. A compound formed by treating tellurium with concentrated sulfuric acid. **t. trioxide.** See *t. oxide.*

telluro- A prefix indicating the divalent atom, =Te. Cf. *sulfo-, seleno-.* **t. naphthene.** C_8H_6Te = 229.55.



t. pyran. C_5H_6Te = 193.55.



telluronic acid. A compound of the type $RTeO_3H$; as, methane telluronic acid*, CH_3TeO_3H. Cf. *tellurinic acid, sulfonic acid.*

telluronium. A compound of the type $R.TeH_3$. Cf. *selenonium.*

tellurous. Tellurious. Describing a compound which contains tetravalent tellurium. **t. acid.** H_2TeO_3 = 177.5. Tellurious acid. Colorless octahedral amphoteric crystals, d.3.053, decomp. 40, slightly soluble in water, alcohol or ether. Since: $H_2TeO_3 \rightleftharpoons TeO(OH)_2$, it forms a series of salts of the type M_2TeO_3, $M_2Te_2O_5$, $M_2Te_3O_7$ and $M_2Te_4O_9$; as well as a sulfate $TeO.SO_4$, nitrate, oxychloride, and oxybromide. **t. bromide.** See *tellurium bromide.* **t. chloride.** See *tellurium chloride* (1). **t. sulfate.** $Te(SO_4)_2$ = 319.64. A crystalline solid.

telluryl. The divalent radical =TeO, derived from tellurous acid, q.v.

telopsis. [A better term than television, which is a Greco-Latin hybrid.] The transmission of far-off events and moving scenes by telegraphy or radio (wireless). Cf. *radiovision.*

temperature. The intensity of heat or the degree of heat of a body, measured by a thermometer (q.v.) and expressed in °C. Cf. *quantity of heat, calorie.* The extremes of t. are:

TEMPERATURE MAGNITUDES.

Stellar interior	72,000,000°F	40,000,000°C
Stellar surface (B star)	41,000°F	23,000°C
Mercury lamp	25,200°F	14,000°C
Solar surface (G star)	10,800°F	6,000°C
Sun furnace (focus of 19 lenses)	10,000°F	5,500°C
Atomic hydrogen torch	7,600°F	4,200°C
Induction furnace (conductors)	7,200°F	4,000°C
Electric arc in vacuum	5,400°F	3,000°C
Stellar surface (M star)	5,400°F	3,000°C
Tungsten, melting point	5,350°F	2,970°C
Oxy-hydrogen torch	3,600°F	2,000°C
Gas burner	3,090°F	1,700°C
Rubrene, melting point	932°F	501°C
Water, boiling point	212°F	100°C
Hottest climate (Tripoli)	136.4°F	58°C
(Death Valley)	134.1°F	56.8°C
Man, body temperature	98.6°F	37°C
Ocean water (La Jolla)	78.4°F	25.7°C
Water, freezing point	32°F	0°C
Mercury, freezing point	−37.8°F	−38.8°C
Coldest climate (Alaska)	−82°F	−63.3°C
(Northern Siberia)	−87°F	−66.1°C
Liquid air	−319°F	−195°C
Interstellar space	−454°F	−270°C
Hydrogen freezes	−458°F	−272.2°C
Lowest experimental temperature	(0.75°A)	−272.38°C
Absolute zero	(0°A)	−273.13°C

(1°F-0.5556°C and 1°C-1.8°F)

absolute- T. as measured on, or calculated to the absolute thermometer scale; °A. which begins at −273°C. **color scale of-** See *color.* **critical-** The t. above which a gas can not be condensed to a liquid by pressure alone. **critical solution-** See *critical.* **flame-** See *flame temperature.* **maximum-** The t. above which life or growth of bacteria ceases. **normal-** (1) Room t. (2) The t. as measured on the hydrogen thermometer. (3) Standard- **optimum-** The t. most favorable for the action of an enzyme or the growth of an organism. **potential of-** Escaping tendency, q.v. **room-** The average t. of about 20°C. or 68°F. (293°A.). In England 15.5°C. or 60°F. **salt-** The t. at which crystals commence to separate when a solution is concentrated by boiling. **standard-** A t. of 0°C. or 273°A.

t. coefficient. A factor that indicates quantitatively the effect of t. on a property of matter; as of:

electrical conductivity	2.5 % per 1°C
chemical reactivity	2 to 3.5 % per 10°C

t. indicator. An electrical instrument consisting of a dial and galvanometer, which accurately measures the temperature. **t. reaction.** See *Maumené number.* **t. regulator.** Thermo-regulator. **t. recorder.** An electrical device for permanently recording the temperature at one or more locations. **t. scale.** See *thermometer scale.*

tempered. Subjected to repeated heatings; each of less intensity than the one before it. **t. steel.** A steel that has been hardened and subsequently heated again at a lower temperature.

tempering. (1) The reheating and cooling of metal; especially, a process for hardening steel. (2) Rendering plastic materials (such as clay) homogeneous. Cf. *annealing.* **t. oil.** A heavy, viscous oil used for cooling metals during the tempering process.

template. An outline of an article to be constructed, made in thin wood, paper or metal, to serve as a pattern or guide.

tempolabile. Describing a substance that changes in the course of time; as, certain biological liquids.

temulentine. $C_{12}H_{42}O_{19}N$ = 504.3. An alkaloid from the seeds of *Lolium temulentum*, the darnel grass associated with wheat.

temuline. $C_7H_{12}ON_2$ = 140.1. An alkaloid from lolium, q.v.

tenacity. Ability to hold fast, cf. *tensile strength.*

tenaculum. A hook-shaped dissecting needle.

tendering unit. A measure of the tendering of fabrics by chemical attack (*e.g.*, in laundering) in terms of the cuprammonium viscosity in reciprocal poises.

tengujo. Yoshino.

teniacide. An agent that kills tapeworms; as, aspidium.

teniafuge. An agent that expels tapeworms; as, spigelia, pomegranate.

tenite. Trade name for a cellulose aceto-butyrate plastic.

tenith. Trade name for a cellulose acetate plastic.

Tennant, Charles. 1768–1838. A Scotch industrial chemist noted for the original manufacture of chloride of lime.

Tennant, Smithson. 1761–1815. An English chemist noted for his discovery of iridium and osmium.

tennantite. $3Cu_2S.As_2S_3$. A native copper sulfarsenite, with iron.

tenorite. CuO. A native black oxide of copper.

tensile. Rigid. **t. strength.** Tenacity. The resistance which materials offer to a pulling action. It is measured by the breaking stress of the substance in dynes per sq. cm. Some t. s. (kg./sq. mm.) are:

flax fibers	60–110
steel	50–100
ramie fibers	70–80
rayon	60
copper	20–50
silk fibers	35–44
cotton fibers	28–44
rubber	15–20

tensimeter. An instrument used to determine transition points by measuring small vapor-pressure changes.

tensiometer. An apparatus for measuring surface tension, q.v.

tension. The stress caused by pulling or stretching; as, of rubber. **adhesion-** The degree of wetting of a solid by a liquid. **electric-** Electromotive force. **gaseous-** The elasticity of a gas. **surface-** The force exerted on the surface of a liquid, which causes the formation of a meniscus or the absence of froth. It is due to the unequal attractions exerted upon one another by the molecules near the surface, and in the liquid. **vapor-** See *vapor tension*.

tenth-meter. 10^{-10} m. or 1 Ångström unit.

tenth-normal solution. N/10 or 0.1 N, decinormal. A solution that contains 0.1 of the equivalent weight of a substance per liter.

tephigram. An entropy-temperature diagram.

tephroite. Mn_2SiO_4. A manganese silicate.

tephrosal. $C_{10}H_{16}O$ = 152.1. A volatile, liquid ketone from tephrosia; slightly soluble in water, soluble in alcohol, ether or benzene.

tephrosia. (1) Devil's shoe-string, Turkey pea. The dried leaves of *T. virginiana*, a Leguminosae; used medicinally as a cathartic. (2) Fish bean, uwuwa, ombwe. The leaves of *T. vogelii*, a Leguminosae of N. Rhodesia, used as fish poison and parasiticide.

tephrosin. $C_{23}H_{22}O_7$ = 410.15. Hydroxydequelin. A crystalline principle from *tephrosia*, *derris* and *cube*, q.v. Colorless, short, thick prisms, m.198, insoluble in water, soluble in alcohol, ether or glycerol.

ter- A prefix derived from the Latin indicating thrice or threefold. Cf. *tri-*.

teraconic acid. $C_7H_{10}O_4$ = 158.12. *2*-isopropylidene butanedioic acid*. The crystalline solid $Me_2C:C(COOH).CH_2COOH$, soluble in water, alcohol or ether, m.162 (decomp.).

teracrylic acid. $C_7H_{12}O_2$ = 128.09. *β,γ*-dimethylpentenic acid. A liquid, m.−18, b.218.

teratolite. A mixed, native oxide of iron and manganese, with decomposed feldspar.

terbium. Tb = 159.2. A rare earth metal and element, atomic number 65; discovered by Mosander in gadolinite. **t. chloride.** $TbCl_3$ = 265.6. A colorless, crystalline powder, readily soluble in water or alcohol. **t. hydroxide.** $Tb(OH)_3$ = 210.2. A colorless powder, soluble in dilute acids. **t. nitrate.** $Tb(NO_3)_3$ = 345.2. A white powder; soluble in water, decomp. by heat to Tb_2O_3. **t. oxide.** Tb_2O_3 = 366.4. An amorphous white powder, soluble in dilute acids. **t. sulfate.** $Tb_2(SO_4)_3$ = 606.5. Colorless crystals; soluble in water.

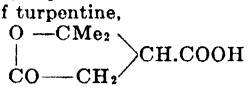
terchloride. Trichloride.

terebene. $C_{10}H_{16}$ = 136.18. A mixture of terpenes from turpentine. A yellowish, fragrant liquid, b.160–172, insoluble in water.

terebenthene. Turpentine.

terebentylic acid. $C_8H_{10}O_2$ = 138.12. A liquid, $d_0°$.0.87, b.160.

terebic acid. $C_7H_{10}O_4$ = 158.1. Terebinic acid, *2,2*-dimethyl paraconic acid. An oxidation-product of turpentine,



Colorless crystals, m.175. Cf. *terpenylic acid*. **pyro-** Pyroterebic acid.

terebinic acid. Terebic acid.

terebinthina. Turpentine.

terephthalal, terephthalyl. The tetravalent radical, =CH.C_6H_4.CH=.

terephthalic. Pertaining to p-phthalic acid. **t. acid.** $C_8H_6O_4$ = 166.1. Benzene-p-dicarboxylic acid, $C_6H_4(COOH)_2$. The para-isomer of phthalic acid. A white powder, sublimes when heated, insoluble in water, slightly soluble in alcohol; used as a reagent for alkali in wool. **t. aldehyde.** $C_8H_6O_2$ = 134.1. Benzene-p-dialdehyde, $C_6H_4(CHO)_2$. Colorless needles, m.-116, b.245; soluble in water or alcohol. **t. nitrile.** $C_8H_4N_2$ = 128.1. p-Dicyano-benzene, $C_6H_4(CN)_2$. Colorless crystals, m.215, insoluble in water, slightly soluble in alcohol or ether.

terephthalonic acid. Carboxyformyl benzoic acid.

terephthalyl alcohol. *α,α'-p*-Xylenediol.

teresantalic acid. $C_8H_{16}O_2$ = 143.1. An acid of the terpene series, in sandalwood oil.

tergitol. The trade name of a group of sodium or amine salts of higher primary or secondary alkyl sulfates having detergent properties.

terlinguarite. Hg_2ClO. A native oxychloride of mercury.

term. A mathematical relation. **D-** The diffuse lines in the spectrum. **P-** the principal lines in the spectrum. **S-** The sharp lines in the spectrum. See *hydrogen atom*, *orbits*, *atomic structure*, *series*, and *state*. **t. system.** See *quantum numbers*.

terminal. The end of an electric wire or electrode; or a binding post for it.

terminalia. Myrobalan.

terminology. (1) A branch of science that deals with the construction, definition and arrangement of names and terms. (2) A nomenclature. **Geneva-** See *Geneva*. **organic-** See *organic compounds*, *ring systems*, *radicals*, *structure symbols*.

termolecular. Trimolecular.

ternary. (1) Consisting of three. (2) Tertiary. **t. compound.** A molecule that consists of three different types of atoms. **t. steel.** A steel consisting of iron, carbon and one other metal. **t. system.** A system of three components.

ternitrate. Trinitrate.

teroxide. Trioxide.

terpadiene. A derivative of terpane (methane), containing two double bonds.

terpadienone. A derivative of terpanone containing two double bonds, generally $C_{10}H_{14}O$; as, carvone.

terpane. Methane.

terpanone. A saturated ketone, $C_{10}H_{18}O$, derived from terpenes; as, tetrahydrocarvone.

terpene. (1) A hydrocarbon of the general formula, $C_{10}H_{16}$, in essential oils, resins and other vegetable aromatic products. Classification:

A. *Monocyclic*—cymene-group, isomers of hexahydrocymene or menthane, limonene.

B. *Bicyclic*—carene, pinene, camphene group.

C. *Acyclic*—aliphatic terpenes.

Related to the terpenes are compounds with one-half, one and one-half, two or more times, the molecular weight of the terpenes. These are:

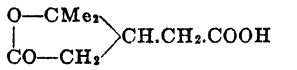
hemiterpenes	C_5H_8
as: pentadiene, isoprene.	
terpenes	$C_{10}H_{16}$
as: bornylene, camphene, carene, dipentene, fenchene, geranene, limonene, myrcene, ocimene, phellandrene, pinene, sabinene, sylvestrene, terpinene, thujene.	
sesquiterpenes	$C_{15}H_{24}$
as: cadinene, cannibene, caryophyllene, cedrene, clovene, guajene, patchoulene, santalene, selinene, zingiberene.	
diterpenes	$C_{20}H_{32}$
polyterpenes	$n(C_{10}H_{16})$

Cf. *projection nucleus, symmetry.* (2) A derivative of the related cyclic or unsaturated hydrocarbons, $C_{10}H_{14}$, $C_{10}H_{18}$ and $C_{10}H_{20}$; as, pinane, pinol, menthol, ionone. (3) $C_{10}H_{16}$ = 136.1. Dipentene, d.l.-limonene, cinene, cajeputene, kautchin, diamylene. A liquid hydrocarbon in the oils of bergamot, geranium, citronella, dill, caraway, wormseed and other essential oils. A colorless liquid, d.0.85, b.181, insoluble in water, alcohol or ether; used for flavoring purposes, as an anthelmintic, antispasmodic and anodyne. **t. dihydrochloride.** $C_{10}H_{16}.2HCl$ = 209.0. Dipentene dihydrochloride. A colorless crystalline substance, m.50; insoluble in water, soluble in alcohol, ether or benzene. **t. hydriodide.** $C_{10}H_{16}.HI$ = 264.1. Dipentene iodide, terpene iodide. A reddish-brown liquid; insoluble in water, soluble in alcohol, ether or benzene. **t. hydrochloride.** $C_{10}H_{16}.HCl$ = 172.6. Dipentene hydrochloride, pinene hydrochloride, artificial camphor, turpentine camphor. A colorless crystalline mass, m.125, b.208, insoluble in water, soluble in alcohol; used medicinally as an antiseptic.

terpenol. A group of cyclic alcohols, $C_{10}H_{17}OH$, derived from the terpenes; as, carvestrol.

terpenone. A group of ketones, $C_{10}H_{16}O$, derived from terpanones; as, dihydrocarvone.

terpenylic acid. $C_8H_{12}O_4$ = 172.1. An oxidation-product of turpentine and the monobasic acid.

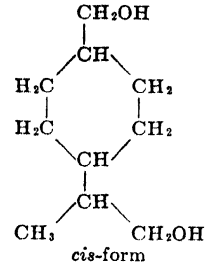


Colorless crystals, m. about 90 (see *terebic acid*).

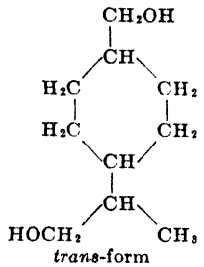
terpilene. $C_{10}H_{16}$ = 136.1. Terpinylene. A terpene obtained by dehydrating a terpene dihydrochloride solution. A clear liquid, d.0.852, b.176. **t. dihydrochloride.** Eucalyptole.

terpilenol. Terpineol.

terpin, terpine. $C_{10}H_{20}O_2$ = 172.2. Dipentene-glycol, dihydroxymenthane. A diatomic alcohol; two isomers:



cis-form
m.104
b.258

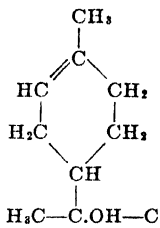


trans-form
m.156
b.263

t. hydrate. $C_{10}H_{20}O_2.H_2O$ = 190.23. Colorless rhombic crystals, m.106, b.258; soluble in water, alcohol or ether. It is obtained by oxidation of turpentine; used medicinally for whooping cough.

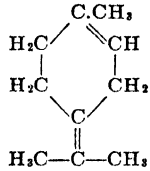
terpinene. $C_{10}H_{16}$ = 136.2. A hydrocarbon from turpentine. It exists in an alpha- and beta-form. A colorless liquid, d.0.865, b.179; insoluble in water, soluble in alcohol or ether.

terpineol. $C_{10}H_{18}O$ = 154.2. Lilacin, terpilenol. A clear, colorless liquid. (α-) d.0.936, m.35, b.219.8; (β-) d.0.923, m.33, b.210; (γ-) d.0.936, m.70, b.218; insoluble in water, soluble in alcohol or ether. It has a lilac odor; used in perfumery.



terpinol. A mixture of terpenes forming a colorless, oily liquid of hyacinth odor; insoluble in water, soluble in alcohol. Used as an antiseptic, in perfumery, soap manufacture, and medicinally.

terpinolene. $C_{10}H_{16}$ = 136.2. The hydrocarbon,



A colorless liquid, m.15, b.183; insoluble in water, soluble in alcohol, ether or glycerol. Cf. *citral, citronellal.*

terpinylene. Terpilene.

terpyridyl. 2.6-di-2′-pyridyl pyridine. A solution in HCl is a reagent for Co (orange color).

terra- A prefix indicating an earth or earthy origin. **t. alba.** A white clay or kaolin. **t. cariosa.** Rotten stone. **t. cotta.** A coarse clay or plastic earth, baked and used for decorative purposes or utensils. It is of better quality than brick. **t. rossa.** A fossil red earth. **t. japonica.** Pale catechu or gambir. **t. verde.** Green earth. A pale-green disintegration-product of hornblende minerals; used to fix basic dyes on textiles.

terracoles. A group of lichens.

terrein. $C_8H_{10}O_3$ = 154.0. A hydroxycyclopentanone produced by the mold *Aspergillus terreus.*

tersulfate. A sulfate containing three sulfate radicals.

tert-. An abbreviation and prefix indicating *tertiary.*

tertiary. Third in order or type. **t. alcohol.** An organic compound of the type, $R_3C.OH$. **t. amine.** An organic compound of the type, R_3N; as, trimethylamine Me_3N. **t. carbon atom.** A carbon atom that is attached to three other carbon atoms. **t. epoch.** A geologic period (q.v.) and system of strata deposited during the cenozoic era. **t. lipid.** See *lipids.* **t. phosphate.** The normal phosphate, M_3PO_4.

tervalent. Having three different valencies.

tesseral. Same as isometric or cubic (crystals). Cf. *crystal system.*

test. (1) A qualitative trial, or reaction, *e.g.*, for the identification of a substance. (2) A physical experiment designed to determine the physical properties of a substance or material. **biological-** A serum reaction. **generic-** q.v. **hot toddy-** An evaluation of: *aroma*, by treating 10 cc. liquors with 40 cc. hot water and lightly smelling it in comparison with a standard; *flavor*, sip and roll the liquid over the tongue without swallowing. If many tests are to be made chew an olive between tests and breathe fresh air. **layer-** Ring t. **load-** The subjection of a material to different pressures or weights and temperatures, and measurement of the resulting deformation. **negative-** q.v. **ordinal-** q.v. **ring-** A chemical reaction between two liquid layers, so that the reaction-products form a zone between them. **slag-** An examination of refractories for their behavior towards slag penetration. The slag should break from the walls cleanly. **spalling-** The behavior of heated materials after repeated quenching in water. **spot-** q.v. **streak-** q.v.

t. glass. Test tube. **t. meal.** See *test-meal.* **t. paper.** A filter paper impregnated with a solution of a reagent or an indicator (see table). Used to determine: (1) the presence of certain substances in a solution which must not be contaminated by the addition of the reagent itself; (2) the acid or basic character of a solution. **t. solution.** T.S. A solution of reagent. **t. tube.** A small cylindrical glass vessel of resistant glass; used for chemical reactions.

TEST PAPERS

Congo Red	with OH^- red, with H^+ blue (pH3–5)
Lead acetate	with H_2S black
Litmus blue	red with H^+
Litmus red	blue with OH^-
Litmus neutral	red with H^+, blue with OH^- (pH 4.5–8.3 sensitive to 0.001N)
Methyl orange	red with H^+, yellow with OH^-, pH 3.1–4.4
Nitrazine	at pH 4.5—yellow; 6.0—olive; 6.5—green; 7.5—blue.
Phenolphthalein	red with OH^-, white with H^+ pH 8.3–10
Potassium iodide	red with Hg salts
Potassium iodide-starch	blue with oxidizing agents
Starch	blue with iodine
Turmeric	red with OH^- (sensitive to 0.004N) or borates.

testa. A shell; as, testa ovi (egg shell).

testes. The dried substance of the testes of the steer; used medicinally for neurasthenia and diabetes.

test-meal. The specially-prepared food that is eaten, withdrawn from the stomach after a certain time, and then analyzed.

testosterone. A male sex hormone, m.154, from testis tissue, or synthesized. Cf. *androsterone, cholane derivatives.*

tetanics. A poison that chiefly affects the spinal cord and produces spasmodic contractions of the muscles; as, nux vomica, ignatia, thebaine.

tetanine. $C_{13}H_{30}O_4N_2$ = 288.2. A ptomaine from cultures of the tetanus bacillus.

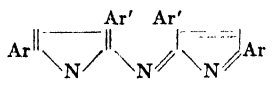
tetanotoxin. $C_6H_{11}N$ = 85.1. A ptomaine from cultures of the tetanus bacillus.

tetanthrene. $C_{14}H_{14}$ = 182.11. Tetrahydrophenanthrene, an aromatic hydrocarbon.

tetartohedral. A crystal form which exhibits only one quarter of the full number of faces required by the symmetry of the system.

tethelin. A principle obtained from the anterior lobe of the pituitary body. It is supposed to control the growth of an organism.

tetra- Quadri-. A prefix derived from the Greek, indicating "four." **t. arylazadipyrromethines.** Stable dyestuffs made by the progressive replacement of methine bridges in porphins to form azaporphins and finally phthalocyanines (q.v.): e.g.,



tetrabasic. Describing an acid that has four replaceable hydrogen atoms, as H_4SiO_4.

tetrabenzyl- A prefix indicating four benzyl radicals. **t. tin.** $Sn(CH_2Ph)_4$ = 482.92. Colorless prisms, m.42.5, insoluble in water, soluble in organic solvents.

tetraborane. B_4H_{10} = 53.3. A boron hydride, q.v.

tetraborate. A salt of tetraboric acid of the type, $M_2B_4O_7$; as, $Na_2B_4O_7$, borax or sodium tetraborate.

tetraboric acid. See *boric acid* (pyro-).

tetrabrom-, tetrabromo- A prefix describing a compound containing four bromine atoms in its molecule. **t. benzene.** 1.2.3.5- or 1.3.4.5-. $C_6H_2Br_4$ = 393.73. Soluble in ether, insoluble in alcohol, m.98.5, b.329. **t. cresol sulfonphthalein.** Bromcresol green. **t. ethane.** $C_2H_2Br_4$ = 345.8. Ethylene tetrabromide, $CHBr_2.CHBr_2$. A colorless liquid, d.2.972, m. −20, insoluble in water, soluble in alcohol or ether; used in organic synthesis. **t. fluorescein.** Eosin. **t. phenolsulfonphthalein.** Bromphenol blue.

tetracaine hydrochloride. Pontocaine, decicaine. The hydrochloride of 4-butylaminobenzoyl-β-dimethylaminoethanol, a local anesthetic.

tetracarboxylic acid. A tetrabasic organic acid containing four COOH radicals; as,
ethanetetracarboxylic acid, or dimalonic acid, $CH(COOH)_2.CH(COOH)_2$
propanetetracarboxylic acid, or methylenedimalonic acid, $CH(COOH)_2.CH_2.CH(COOH)_2$.
butanetetracarboxylic acid, or ethylenedimalonic acid, $CH(COOH)_2.CH_2.CH_2.CH(COOH)_2$

tetracetate. A compound containing four acetate radicals, $(CH_3COO)_4M$.

tetrachloro-, tetrachlor- A prefix describing a compound containing four chlorine atoms in its

molecule. **t. acetone.** $C_3H_2O.Cl_4$ = 195.86. Di-dichlormethyl-ketone, $(CHCl_2)_2CO$. Colorless crystals, m.48. **t. aniline.** $C_6HCl_4NH_2$ = 230.9. **2.3.4.5-** 1-Amino-tetrachlorobenzene. Colorless crystals, m.118; insoluble in water, soluble in alcohol or ether. **2.3.5.6-** m.90. **t. benzene.** $C_6H_2Cl_4$ = 215.9. **1.2.3.4-** Colorless needles, m.45, b.254; insoluble in water, soluble in alcohol or ether. **1.2.4.5-** Colorless monoclinic crystals, d.1.858, m.140, b.243; slightly soluble in water, soluble in alcohol or ether. **1.2.3.5-** White needles, m.50, b.246; insoluble in water, soluble in alcohol. **t. ethane.** $C_2H_2Cl_4$ = 167.87. Acetylenetetrachloride, ethylenetetrachloride. **1.1.2.2-** or *αα'ββ'*- CH_2Cl_2—CH_2Cl_2. A colorless liquid, d.1.600, m. −43.8, b.146.3, insoluble in water, miscible with alcohol or ether. Used as a solvent for fats and waxes, for airplane dope, for cleaning metals, as a paint remover, spotting agent, insecticide, and in organic synthesis. **1.1.1.2-** or *ααα'β'*- CH_2Cl—CCl_3. A colorless liquid, d.1.5825, b.129. **t. ethylene.** C_2Cl_4 = 165.84. Perchloroethylene. $CCl_2:CCl_2$. A colorless liquid, d.1.608, m. −19, b.119; insoluble in water, soluble in alcohol or ether. Used as a spotting and drying agent, soap solvent, and solvent for fats and waxes. **t. methane.** Carbon tetrachloride. **t. quinol.** Chloranil.

tetrachloride. A compound that contains four chlorine atoms in its molecule; as, $SnCl_4$.

tetracid. A base that contains four hydroxyl radicals; or an alcohol with four OH groups.

tetracol. Trade name for carbon tetrachloride.

tetracosane. $C_{24}H_{50}$ = 338.4. A hydrocarbon of the paraffin series. Colorless crystals, m.51; insoluble in water, soluble in alcohol or ether.

tetracosanic acid*. $C_{24}H_{48}O_2$ = 368.37. A fatty acid, m.84.2 from peanut oil. **iso-** A fatty acid, m.80, from Swedish pine oil.

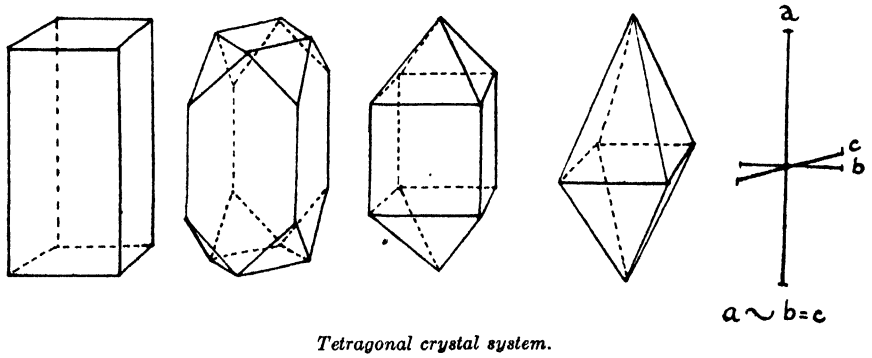
tetradymite. Bi_2Te_3. Tellurbismuth. A native bismuth telluride, which usually contains some sulfide.

tetraedrite. A native arsenic and copper sulfide, intermediate in composition between tennantite and tetrahedrite.

tetraethyl- A prefix describing a compound containing four ethyl groups in its molecule. **lead-** See tetraethyl *plumbane* and *tetraethyl gas*. **t. ammonium hydroxide.** $C_8H_{21}ON$ = 147.1. NEt_4OH. Colorless, hygroscopic, hairlike needles, m.50, soluble in water. Used medicinally as an antirheumatic or uric acid solvent. **t. ammonium iodide.** $C_8H_{20}NI$ = 257.2. NEt_4I. Yellowish crystals; soluble in water or alcohol. **t. benzene.** $C_{14}H_{22}$ = 190.2. The aliphatic-aromatic hydrocarbon $C_6H_2Et_4$. **1.2.3.4-** A colorless liquid, d.0.888, m.13, b.254; insoluble in water, soluble in alcohol, ether or benzene. **1.2.4.5-** A colorless liquid, d.0.887, b.250. **t. gas.** A "knockless" gasoline for automobiles, which contains a small amount of lead tetraethyl. Cf. *knock*. **t. germanium*.** $GeEt_4$ = 188.76. Colorless liquid, d.0.991, m. −90, b.163, insoluble in water. **t. lead*.** Tetraethyl *plumbane*. **t. tin*.** $SnEt_4$ = 234.86. Ethylstannane. Colorless liquid, d.1.187, m. −112, b.181, insoluble in water. **t. urea-** $C_9H_{20}ON_2$ = 172.18. $Et_2N.CO.NEt_2$. A colorless liquid, b.210; soluble in water or alcohol.

tetragalloyl- A prefix indicating four $C_6H_2(OH)_3CO$— radicals, from gallic acid. **t. erythrite.** $C_{32}H_{26}O_{20}$ = 730.2. $C_4H_6O_4[C_6H_2(OH)_3CO]_4$. White crystals, decomp. 308, slowly soluble in water, alcohol, or acetone.

tetragonal. Describing a crystal having its three axes at right angles to each other; two of the axes are of equal length, the third is shorter or longer (see illustration).



Tetragonal crystal system.

tetrad. (1) An atom or group of atoms that has a valency of four. (2) In crystallography: A crystal which exhibits four similar faces when rotated about its axis of symmetry through 360°.

tetradecane*. $C_{14}H_{30}$ = 198.24. A hydrocarbon of the methane series. A colorless liquid, d.0.765, m.5, b.253; insoluble in water, soluble in alcohol or ether.

tetradecanoic acid*. Myristic acid.

tetradecoic acid. Myristic acid.

tetradecyl. The monovalent radical, $—C_{14}H_{29}$, derived from tetradecane.

tetradecylene. $C_{14}H_{28}$ = 196.29. A hydrocarbon, soluble in alcohol, m. −12, $b._{15mm}$.127.

tetrahedral. Pertaining to a tetrahedron, cf. *tetrahedronal*.

tetrahedrite. Cu_2SbS_3, or $3Cu_2S.Sb_2O_3$. Panabase, fahlerz, gray copper ore. A native copper antimony sulfide. Cf. *aphthonite*, *schwatzite*, *tetraedrite*.

tetrahedron. A crystal of the isometric system, which has four equal faces; as, a pyramid.

tetrahedronal. Tetrahedral. Resembling a tetrahedron. **t. atom.** A static atom in which the electron octet is divided into four pairs of electrons which oscillate around centers located as the four corners of a tetrahedron. Cf. *Lewis atom*. **t. carbon.** A model of the C atom, generally used to illustrate the directions of the bonds; as,

single bond: tetrahedrons touching on corners; double bond: tetrahedrons touching on edge; triple bond: tetrahedrons touching on face; These correspond, respectively, with one, two, or three pairs of electrons held in common by the two C atoms.

tetrahexahedron. A crystal of the isometric system that has 24 equal faces; four on each face of a cube.

tetrahydro- A prefix describing a compound that contains four hydrogen atoms in excess of the formula indicated by its suffix-name. An unsaturated compound whose molecule has been saturated with four hydrogen atoms. **t. benzene.** C_6H_{10} = 82.11. $C_6H_6.H_4$. A colorless liquid, b.82. **t. benzoic acid.** See *benzoic acid*. **t. butene.** Tetramethylene. **t. furan.** Butylene oxide. **t. naphthalene.** Tetralin. **t. naphthol.** $C_{10}H_{12}O$ = 148.15. $C_6H_5.OH.(CH_2)_4$. A solid, m.69, b.$_{716mm}$.264, fairly soluble in water, very soluble in alcohol or ether. **t. naphthylamine.** $C_{10}H_{11}.NH_2$ = 147.2. *alpha-* aryl-. A colorless oil, b.277; soluble in alcohol. *beta-* acyl-. A colorless liquid, d.1.034, b.251; soluble in alcohol. **t. phenol.** $C_6H_{10}O$ = 98.11. $C_6H_9.OH.H_4$. A liquid, b.166, soluble in water. **t. quinoline.** $C_9H_{11}N$ = 133.1. A hydrogenation product of quinoline, $C_6H_4\langle^{NH—CH_2}_{CH_2—CH_2}$. A colorless crystalline mass or liquid, d.1.063, m.20, b.251, soluble in water, alcohol or ether; used in organic synthesis. *iso-* $C_6H_4\langle^{CH_2—NH}_{CH_2—CH_2}$. A yellow liquid, b.232; soluble in water, alcohol or ether. **t. thiazoles.** Thiazolidines. **t. tubanol.** q.v.

tetrahydroform. Trimethylenimine.

tetrahydroxy- A prefix that indicates four hydroxy groups. **t. benzene.** (1:2:4:5) $C_6H_2(OH)_4$ = 142.1. Colorless leaflets, m.215; soluble in water, alcohol or ether. **t. benzoic acid.** $C_6H(OH)_4COOH$ = 186.1. A solid, m.148. **t. quinone.** $C_6H_4O_6$ = 172.06. A soluble solid. **t. stearic acid.** $C_{18}H_{36}O_6$ = 348.4. Sativic acid. A white purgative powder in strophanthus oil.

tetraiodo- A prefix that indicates four iodine atoms. **t.-ethylene.** C_2I_4 = 531.73. CI_2:CI_2. An odorless, colorless, crystalline powder, m.187; used as an antiseptic. **t. phenolphthalein.** $C_{20}H_8I_4N_4Na$. A bluish powder, soluble in water; used as a radiopaque medium. **t. pyrrole.** Iodol.

-tetraketone. A suffix indicating four =CO groups; as, diphenyl t. Cf. *tetrone*.

tetrakis hexahedron. A form of the regular crystal system, (4-faced cube).

tetralin. $C_{10}H_{12}$ = 132.15. Tetrahydronaphthalene. A colorless liquid, d.0.917, b.205; insoluble in water, soluble in alcohol or ether. Used as a solvent for resins, waxes, fats and oils, as a substitute for turpentine, and in motor fuels. Cf. *dekalin*.

tetralite. Tetryl.

tetramethyl- A prefix that indicates the presence of four methyl groups. **t. ammonium.** A group of organic compounds of the type, $N(CH_3)_4X$; as,

$N(CH_3)_4Br$—t. bromide
$N(CH_3)_4Cl$—t. chloride
$N(CH_3)_4OH$—t. hydroxide
$N(CH_3)_4I$—t. iodide.

t. ammoniumformate. Forgenin. **t. ammoniumhydroxide.** NMe_4OH = 91.13. A soluble solid, decomp. by heat. **t. benzene.** $C_{10}H_{14}$ = 134.1. The hydrocarbon, $C_6H_2Me_4$. **1.2.3.4-** A colorless liquid, d.0.882, m.−4, b.204, insoluble in water, soluble in alcohol; it is an isomer of prehenitol. **1.2.4.5-** Durene. **6.1.2.4-** Isodurene. **1.2.3.5-** Isodurene. **t. diamino benzhydrol.** *Michler's hydrol*. **t. diaminobenzophenone.** See *Michler's ketone*. **t. diaminodiphenylmethane.** See under *diphenylmethane*. **t. diaminotriphenylmethane.** Leucomalachite green. **t. lead*.** $PbMe_4$ = 267.31. A colorless liquid, d.1.995, m.−27.5, b.110, insoluble in water. **t. oxamide.** $(CONMe)_2$. White crystals, m.80. **t. p-phenylene diamine.** Wurster's blue. **t. tin*.** $SnMe_4$ = 178.79. A colorless liquid, d.1.314, b.78, insoluble in water, soluble in organic solvents.

tetramethylene. (1) C_4H_8 = 56.06. Tetrahydrobutene. Cyclobutane, cyclotetramethylene, $CH_2\langle^{CH_2}_{CH_2}\rangle CH_2$. Many derivatives are known:

amino tetramethylene, $C_4H_7.NH_2$, b.81
hydroxy tetramethylene, $C_4H_7.OH$, b.123
methyl tetramethylene, $C_4H_7.Me$, b.39

(2) 1.4-butylene. The divalent radical, $—CH_2.CH_2.CH_2.CH_2—$; as, in
tetramethylene amine, $H(CH_2)_4NH_2$;
tetramethylene diamine, $NH_2—(CH_2)_4—NH_2$, putrescine.

(3) compound containing four CH_2== radicals. **t. amine.** Aminobutane. **t. diguanidine.** Arcaine. **t. glycol.** 1.4-Butanediol. **t. imine.** Pyrrolidine. **t. oxide.** Butylene oxide. **t. sulfide.** Butylene sulfide.

tetramethylethyleneketone. Pinacone.

tetramethylleucaniline. $C_{23}H_{27}N_3$ = 345.25. $(Me_2N.C_6H_4)_2CH.C_6H_4NH_2$. Lustrous crystals, m.151, soluble in alcohol; used in organic synthesis.

tetramethylmethane. C_5H_{12} = 72.1. *Tert.*-pentane, 2,2-dimethylpropane CMe_4. A colorless liquid, and isomer of pentane.

tetramethylurea. $C_5H_{12}ON_2$ = 116.1. $Me_2N.CO.N.Me_2$.

tetramido. Containing four amino groups and one or more oxygen atoms.

tetramine. An organic compound containing four amino nitrogens; as, hexamethylenetetramine, $(CH_2)_6(NH_4)$. Cf. *tetrammine, amines*.

tetramino- A prefix indicating the presence of four amino groups, $R(NH_3)_4$.

tetrammine. A metallic compound of the type $M(NH_3)_4X_3$, where M is a trivalent metal (as Co or Cr) and X a halogen. Cf. *tetramine, ammines*.

tetramolecular. A reaction of the fourth order, in which four molecules undergo a change.

tetramorphism. Crystallizing in four different crystal systems; as, phosphorus.

tetrandrine. (1) $C_{19}H_{23}NO_3$ = 313.19. An alkaloid, m.217 from *Stephania tetrandra*, a Menispermaceae. Cf. *codethyline*. (2) $C_{38}H_{42}O_6N_2$ = 622.3. An alkaloid from the Chinese drug hanfengchi.

tetrane. Butane.

tetranitrate. A compound containing four $—NO_3$ radicals; as, erythroltetranitrate.

tetranitro- A prefix indicating a compound containing four $—NO_2$ radicals. **t. aniline.** $C_6H_4N_5O_8$ = 273.06. T.N.A. $NH_2.C_6H(NO_2)_4$.

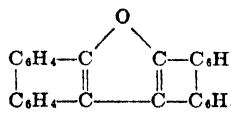
A high explosive, d.1.89, m.170, exploding at 237. **t. anthraquinone.** Aloetic acid. **t. chrysazin.** Chrysammic acid. **t. diphenyl.** $C_{12}H_6(NO_2)_4$ = 334.1. Colorless crystals, m.140, insoluble in water, soluble in alcohol or ether. It is used in organic synthesis. **t. diphenylmethane.** $C_{13}H_8(NO_2)_4$ = 348.2. Yellow prisms, m.172, insoluble in alcohol or ether; used in organic synthesis. **t. methane.** $C(NO_2)_4$ = 196.1. A colorless liquid, d.1.650, m.13, b.126 (decomp.), insoluble in water, soluble in alcohol or ether. It is a color reagent for unsaturation in organic compounds. **t. methylaniline.** Tetryl. **t. naphthalene.** $C_{10}H_4(NO_2)_4$ = 308.12. **1.4.5.8-** alpha-. Yellow rhombic crystals, m.257, explodes when further heated, slightly soluble in water, alcohol or ether. **1.3.6.8-** Long needles, m.203, explodes when further heated; insoluble in water. **1.3.5.8-** Yellow tetragonal crystals, m.194, soluble in water, alcohol or ether; used in organic synthesis. **t. phenol.** $C_6H(OH)(NO_2)_4$ = 274.1. 1-hydroxy-2.3.4.6-tetranitro-benzene. Yellow needles, m.130, explode when further heated; soluble in water, alcohol or ether. **t. phenosulfonphthalein.** A pH indicator changing from yellow (acid) to magenta (alkaline).

tetranitrol. Erythrol tetranitrate.

tetranthera. The bark of *Tetranthera citrata*, a Lauraceae.

tetraphenyl. Describing a compound containing four phenyl groups (—C_6H_5)$_4$, as, tetraphenylethane or lead tetraphenyl. **t. ethane.** $C_{26}H_{22}$ = 334.3. The hydrocarbon $\alpha\alpha'\beta\beta$-$CHPh_2$.-$CHPh_2$. Colorless crystalline needles, d.1.182, m.209, b.360; insoluble in water, soluble in alcohol, ether or acetic acid. **t. ethylene.** $C_{26}H_{20}$ = 332.2. The hydrocarbon Ph_2C:-CPh_2. Colorless monoclinic crystals, m.221, b.415; insoluble in water, soluble in alcohol or ether. **t. lead*.** $PbPh_4$ = 515.38. White needles, m.228, soluble in benzene. **t. methane.** $C_{25}H_{20}$ = 320.15. CPh_4. Colorless crystals, m.285, b.431. **t. silicon.** $C_{24}H_{20}Si$ = 336.2. The silane, $SiPh_4$. Colorless crystals, m.228, b.300; insoluble in water. **t. succinic acid.** $C_{28}H_{22}O_4$ = 422.2. Tetraphenylethanedicarboxylic acid, $Ph_2C(COOH).C(COOH)Ph_2$. Colorless crystals, m.261. **t. tin*** $SnPh_4$ = 426.86. Tetragonal crystals, d.1.490, m.226, insoluble in water, soluble in organic solvents. **t. urea.** $C_{25}H_{20}ON_2$ = 364.17. $Ph_2N.CO.NPh_2$. Colorless crystals, m.183; insoluble in water.

tetraphenylene. Describing a compound containing four phenylene groups, (=C_6H_4)$_4$; as, tetraphenylene furfurane. **t. furfurane.** $C_{28}H_{16}O_2$ = 368.2. The heptacyclic compound,

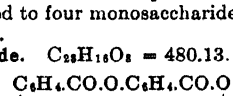


tetraphenyltin. See *tin tetraphenyl.*

tetraphosphorus monoselenide. P_4Se = 203.34. An insoluble solid, m.166.

tetrasaccharide. A carbohydrate which can be hydrolyzed to four monosaccharides; as lupeose, stachyose.

tetrasalicylide. $C_{28}H_{16}O_8$ = 480.13.



tetrasilane. Si_4H_{10} = 122.32. A hydride of silicon, $SiH_3.SiH_2.SiH_2.SiH_3$. An unstable liquid, m. —94, b.90.

tetrathionate. A salt of the type $M_2S_4O_6$; soluble in water, insoluble in alcohol.

tetrathionic acid. $H_2S_4O_6$ = 226.0. A polythionic acid obtained by the action of iodine on thiosulfates. When heated it decomposes into sulfuric acid, sulfur dioxide and sulfur. It can exist only in dilute solutions.

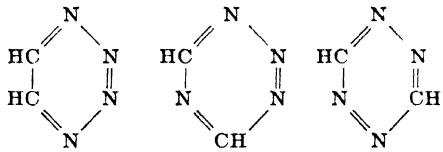
tetratomic. Describing: (1) A molecule consisting of four atoms, as, NH_3; (2) A compound that has in its molecule four hydroxyl groups, as, $M(OH)_4$ or $R(OH)_4$.

tetravalent. Describing an atom or group of atoms that has a valency of four. (Cf. *quadrivalent.*)

tetrazone*. A derivative of bihydrazine (q.v.) $H_2N.NH.NH.NH_2$. (See *tetrazone, tetrazo-*).

tetrazene*. A derivative of $NH:N.NH.NH_2$. Cf. *tetrazane.*

tetrazine. $C_2H_2N_4$ = 82.2. The heterocyclic compounds,

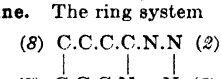


1.2.3.4- v- 1.2.3.5- a- 1.2.4.5- s-

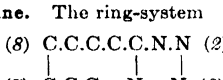
symmetric- Dark red prisms, m.99; insoluble in water, soluble in alcohol. **vicinal-** Ozotetrazone, known only in its derivatives.

tetrazo- Bisazo, bisdiazo. A prefix indicating a compound containing two azo groups, (—N:-N—)$_2$; as, bisdiazoamine (tetrazoamine), bisdiazohydrazine (tetrazohydrazine).

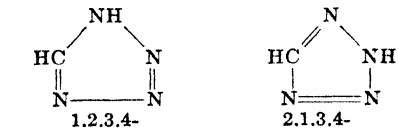
tetrazolazocine. The ring system



tetrazolazonine. The ring-system



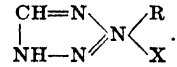
tetrazoles. CH_2N_4 = 70.06. The heterocyclic compounds,



1.2.3.4- 2.1.3.4- (or 1.2.3.5-)

Soluble in water, alcohol or ether, m.156 (sublimes). Two types of derivatives: **C-**, when the substituting radical is on the carbon atom; **N-**, when the substituting radical is on the nitrogen atom. **azo-** q.v. **benzo-** q.v. **bis-** q.v. **diazo-** q.v. **phenyl-** q.v. **pyrro-** q.v.

tetrazolium. A tetrazole derivative in which one nitrogen atom is pentavalent; as,

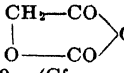


tetrazone. An organic compound of the type, $R_2N.N:N.NR_2$, obtained by the action of

yellow mercuric oxide on asymmetric dialkylhydrazines. They are strong reducing agents in an acid solution. Cf. vicinal *tetrazine*.

tetrazotic acid. $(CH_2)N_4$, known only in derivatives. Cf. *tetrazole, tetrazyl*.

tetrazyl. The monovalent radical, —HCN_4, derived from tetrazole. **t. hydrazine.** $CN_4.NH.NH_2$ = 99.08. Yellow crystals, m.199.

tetrinic acid. $C_5H_6O_3$ = 114.05. *α*-methyltetronic  . Colorless crystals, m 189. (Cf. *pentinic* and *hexinic acids*.)

tetrodonine. A curare-like poisonous principle, fugin, obtained from the roe of Japanese fishes of the genus, Tetrodon.

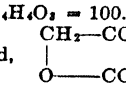
tetrole. Furan.

tetrolic acid. $C_4H_4O_2$ = 84.1. Butynoic acid*. The unsaturated acid MeC:C.COOH. Colorless leaflets, m.76, b.203; soluble in water, alcohol or ether. **t.a. series.** See *acetylene acids*.

tetronal. $C_9H_{20}S_2O_4$ = 256.3. Diethylsulfonediethylmethane, *3.3*-bisethylsulfonyl pentane*, $Et_2C(SO_2Et)_2$. Lustrous leaflets, m.85; slightly soluble in water, soluble in alcohol or ether. Used medicinally as a hypnotic and sedative, but it may cause hematoporphyrin to appear in urine.

-tetrone. A suffix indicating four=CO groups; as, anthracene t. Cf. *-tetraketone*.

tetronerythrin. A red pigment from the feathers of birds.

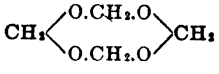
tetronic acid. $C_4H_4O_3$ = 100.03. The pentacyclic compound,  . Colorless crystals, m.141; soluble in alcohol. **ethyl-** Pentinic acid. **methyl-** Tetrinic acid. **propyl-** Hexinic acid.

tetrophan. Trade name for dihydro benzacridine carboxylic acid.

tetrose. $C_4H_8O_4$—. A group of monosaccharides that contain four carbon atoms. Four isomers:

d- and l-erythrose
d- and l-threose.

tetroxane. $C_4H_8O_4$ = 120.1. The heterocyclic compound,



tetroxide. A binary compound that contains four oxygen atoms.

tetryl. $C_7H_5N_5O_8$ = 287.08. Tetranitromethylaniline, methylnitropicramide, tetralite, *2.4.6*-trinitrophenylmethylnitramine, $(NO_2)_3C_6H_2NMe.NO_2$. Yellow powder, m.130, exploding 187. Used as an explosive in detonators, and as a primer for less sensitive explosives.

teucrin. $C_{31}H_{24}O_{11}$ = 452.2. A glucoside from germander, *Teucrium fruticans*, a labiate plant. Used in the treatment of tuberculosis.

teucrium. (1) Cat thyme, Syrian mastic. The dried herb of *Teucrium marum*, a Labiatae. It contains an essential oil, camphor, resin and glucoside. A sterilized extract is used in ampoule medication. (2) *T. chamaedris*. Germander, q.v. (3) *T. scordium*. Water *germander*.

textile. A woven cloth or fabric. **t. chemistry.** The methods of dyeing and finishing, and the chemical and microscopical examination of fabrics and yarns.

TEXTILES, SOLUBILITY

	Per cent solubility in			
	Acetone	NaOH	H_2SO_4	Calcium thiocyanate solution
Wool	0	100	0	3
Silk	0	100	0	100
Cotton	0	3.5	100	2
Cotton mercerized	0	3.5	10	2
Acetate rayon	100	6	100	100
Viscose rayon	0	6	100	100

texture. Coarse structure. *E.g.*, the arrangement of rock particles and crystals that gives a stone its physical appearance; or of fibers in textiles or paper.

tfol. An argillaceous earth containing gelatinous silica; used in North Africa as a substitute for soap. **t. ointment.** A mixture of 20 parts tfol and 100 parts tar; used medicinally as an antiseptic paste.

Th. The symbol for thorium. Th Ω. Hibernium. **ThEm.** Thoron. **ThX.** See *radioactive elements*.

thalenite. The mineral $2Y_2O_3,4SiO_2,H_2O$.

Thales of Miletus. About 640–546 B.C. A Greek philosopher noted for his attempt to find a single material cause for all things. To him is ascribed the saying that "Moisture is the principle of all life."

thalictrine. $C_{20}H_{27}O_4N$ = 345.2. An alkaloid obtained from *Thalictrum macrocarpum*, or *T. foliolosum* (Ranunculaceae). Colorless prismatic needles, m.208, insoluble in water and soluble in alcohol. It is a cardiac poison and laxative.

thalleoquine reaction. A test for alkaloids in which a characteristic color is obtained on adding in succession chloroform, bromine water and sodium hydroxide.

thallic. Describing a compound containing trivalent thallium, Tl^{+++}. (See *thallium compounds*.) **t. chloride.** Thallium chloride (2).

thalline. $C_{10}H_{13}ON$ = 163.2. Tetrahydro-p-quinanisol, tetrahydro-p-methoxyquinoline, $C_6H_4N(OMe).H_4$. Colorless rhombic crystals, m.40, soluble in water, alcohol or ether. It has a coumarin-like odor, and gives a deep green color with ferric chloride; hence its name (cf. *thallium*). **t. salicylate.** $C_{10}H_{13}ON.C_7H_6O_3$ = 301.2. Reddish crystals, soluble in alcohol. Used medicinally as an antiseptic and antipeptic. **t. sulfate.** $(C_{10}H_{13}ON)_2.H_2SO_4.2H_2O$ = 460.4. Colorless crystals, m.110; soluble in water or alcohol; used medicinally as an antiseptic and antipyretic. **t. tartrate.** $C_{10}H_{13}ON.C_4H_6O_6$ = 313.2. White crystals, m.155; soluble in water, slightly soluble in alcohol. Used medicinally as an antipeptic.

thallium. Tl = 204.39. A rare metal of the gallium-indium family, and element, atomic number 81. It is the lightest element having naturally-radioactive isotopes. Cf. *radioele-*

ments. A bluish-white metal, d.11.862, m.303.5, b.1280, insoluble in water, soluble in nitric acid. It was discovered in 1861 by Crookes and named from its green spectral line (Greek, thallein = green). It is widely distributed in nature, in small quantities, and is obtained from the lead chamber sludge by precipitation with zinc. Thallium forms two series of compounds, and has valencies of one and three:

Tl^{+}	Tl^{+++}
thallous-	thallic-

Its salts are all cumulative poisons. In its chemical properties it is analogous to the alkali metals, lead, and aluminum. The metal is used as a catalyst in the manufacture of azobenzene; as an antiknock compound; in optical glass; and as poison for ants and rodents. Principal sources:

crookesite (16–19 % Tl)..... $(Cu, Tl, Ag)_2Se$
lorandite (59–60 % Tl)..... $TlAsS_2$
hutchinsonite (18–25 % Tl).... $(Tl, Ag, Cu)_2S$
vrbaite (29–32 % Tl)..... $TlAs_2S_5$

t. acetate. $TlC_2H_3O_2$ = 263.4. Thallous acetate. Colorless hygroscopic crystals, d.-3.68, m.110, soluble in water. **t. alcoholate.** $TlOC_2H_5$ = 249.4. A saturated alcoholic solution of thallous oxide, d.3.55; the heaviest liquid known excepting mercury. **t. alloys.** A mixture of thallium and other metals. The m. of some thallium alloys are:

with	90 %Tl 10 %	80 %Tl 20 %	70 %Tl 30 %	60 %Tl 40 %	50 %Tl 50 %
Cd	235°C	210°C	230°C	245°C	258°C
K	305°C	208°C	240°C	220°C	215°C

t. alkyls. A group of organic compounds of the type, R_2TlX; as,

thallium diethylchloride..... Et_2TlCl,
thallium diethylhydroxide..... Et_2TlOH,
thallium diethyliodide..... Et_2TlI.

t. alum. $Tl_2SO_4,Al_2(SO_4)_3,24H_2O$ = 1279.64. Soluble white crystals. **t. amalgam.** An alloy of 8.5 % Tl and 91.5 % Hg, used in thermometers for low temperatures (−60°C.). **t. bromides:** (1) TlBr = 284.3. Thallous bromide. Colorless regular crystals, d.7.54, m.450; insoluble in water. (2) $TlBr_3$ = 444.1. Thallic bromide. Yellow needles, soluble in water or alcohol, decomp. by heat. **t. carbonate.** Tl_2CO_3 = 468.8. Thallous carbonate. Colorless monoclinic crystals, d.7.11, m.272 (decomp.); soluble in water, insoluble in ether. **t. chlorides:** (1) TlCl = 239.5. Thallous chloride. Colorless cubic crystals, d.7.02, m.429, b.720, slightly soluble in water or hydrochloric acid; it is used as a getter (q.v.) in tungsten lamps, and is more stable than $TlCl_3$. (2) $TlCl_3,-H_2O$ = 328.5. Thallic chloride. Thallium sesquichloride. A colorless, deliquescent, crystalline powder, occurring anhydrous or with 1, 4 and 7½ mol. of H_2O. Very soluble in water or alcohol, decomp. 100. **t. chloroplatinate.** Tl_2PtCl_6 = 816.54. A yellow, sparingly-soluble solid, analogous to K_2PtCl_6. **t. ethyl.** $TlEt_3$ = 291.39. An "anti-knock" compound. **t. fluosilicate.** $Tl_2SiF_6.2H_2O$ = 382.48. Six-sided plates, very soluble in water. **t. formate.** HCO_2Tl = 249.39. Thallous formate. Colorless liquid, used for mineralogical solutions. **t. formate- malonate.** A double salt, d.4.9, m.60, miscible with water; used as density liquid in mineralogy. Cf. *Clerici's solution.* **t. glass.** A variety of flint glass in which lead is replaced by thallium. It has a high refractive index. **t. hydroxides:** (1) TlOH = 221.4 ($+H_2O$). Thallous hydroxide. A pale yellow powder, soluble in water, alcohol or ether. It contains $1H_2O$ and is a strong base, decomp. 100. (2) $Tl(OH)_3$ = 255.4 or, TlO.(OH) = 237.4. Thallic hydroxide Tl. A dark orange powder, insoluble in water or caustic alkalis, soluble in acids or ammonium salt solutions; decomp. 100. **t. iodides:** (1) TlI = 331.31. Thallous iodide. A citron-yellow, crystalline powder, d.7.072, m.432, b.806; insoluble in water, alcohol or ether, soluble in aqua regia. (2) TlI_3 = 585.15. Thallic iodide. A yellow powder, slowly decomp. in air, soluble in alcohol or ether. **t. ions.** The monovalent Tl^{+} (thallous) or trivalent Tl^{+++} (thallic) ion. **t. mercurous nitrate.** A saturated solution, d.5.3, used for the separation of minerals. **t. nitrates:** (1) $TlNO_3$ = 266.2. Thallous nitrate. Colorless rhombic crystals, d.5.55, m.205, soluble in water or alcohol; used as a reagent and indicator, and in pyrotechnics for green fires. (2) $Tl(NO_3)_3 + 3H_2O$ = 444.4. Thallic nitrate. Colorless deliquescent crystals, decomp. 100. **t. oxides:** (1) Tl_2O = 424.8. Thallous oxide. A black powder, m.870, decomp. 1865; soluble in water, slightly soluble in alcohol. Used in the manufacture of flint, glass and artificial gems. (2) Tl_2O_3 = 456.8. Thallic oxide. A dark brown, hexagonal, crystalline powder, d_0°5.56, m.759, decomp. 875; insoluble in water and soluble in acids. The oxides TlO or Tl.O.Tl:O, and Tl_3O_5 also exist. **t. oxysulfide.** Tl_2SO. A light-sensitive substance used in photoelectric cells (thalofide cell). **t. ozone paper.** A filter-paper that has been impregnated with a solution of thallium hydroxide. It is colored brown by ozone. **t. peroxide.** T. oxide (2). **t. phosphate.** Tl_3PO_4 = 708.07. Thallous phosphate. Colorless needles, d.6.89; soluble in water or in ammonium salt solutions, insoluble in alcohol or ether. **t. sesquichloride.** Thallic chloride. **t. sulfates:** (1) Tl_2SO_4 = 504.8. Thallous sulfate. Colorless rhombic prisms, d.6.76, m.632, decomp. by further heat, soluble in water; used as a reagent. (2) $Tl_2(SO_4)_3,7H_2O$ = 823.1. Thallic sulfate. Colorless crystals; decomp. by heat, soluble in water. It forms double-salts of the type, $MTl(SO_4)_2$, not isomorphous with $TlAl(SO_4)_2$. Used as poison for rodents, and insecticide. **t. sulfides:** (1) Tl_2S = 440.8. Thallous sulfide. Black tetragonal, lustrous crystals, d.8.0, m.448 (decomp.); insoluble in water, alcohol or ether, soluble in acids. (2) Tl_2S_3 = 505.0. Thallic sulfide. A black mass, insoluble in water, decomp. by heat. **t. trioxide.** T. oxide (2).

thallochlor. The green coloring material of Iceland moss. It differs from chlorophyll.

thallofide cell. Thalofide cell.

thallophytes. A class of cryptogamous plants that includes algae, fungi and single-celled plants (bacteria, diatoms). Classification:

1. *Peridineae*	flagellates
2. *Cyanophyceae*	blue-green algae
3. *Chlorophyceae*	green algae
4. *Rhodophyceae*	red algae
5. *Phaeophycetes*	brown algae
6. *Diatomae*	diatoms
7. *Schizomycetes*	bacteria
8. *Phycomycetes*	algal fungi
9. *Myxomycetes*	slime molds
10. *Eumycetes*	fungi
11. *Characeae*	stone worts

thallous. Describing a compound of monovalent thallium. **t. compounds.** See *thallium*. **t. formate.** See *thallium formate*.

thalofide cell. A photoelectric cell in which thallium oxysulfide is the light-sensitive material; the ohmic resistance decreases when it is illuminated.

thalviol. Thujone.

thanatol. $C_8H_{10}O_2$ = 138.08. Guaethol, ajacol, pyrocatechin monoethylether, $C_6H_4(OEt)OH$, ethoxyhydroxybenzene. An oily liquid, m.27, b.215, insoluble in water, soluble in alcohol or ether; used medicinally.

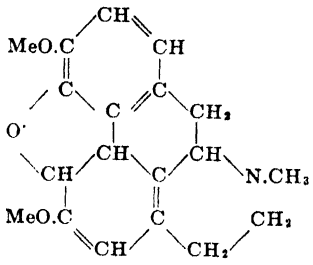
thapsic acid. A fatty acid, m.124 from *Thapsia garganica*, an Umbelliferae; insoluble in water, soluble in alcohol.

thawing. (1) The liquefaction of ice by heat. (2) The warming of frozen dynamite until it becomes soft and plastic.

thea. The Latin term for tea.

theamin. $C_7H_8N_4O_4.NH.C_2H_4OH$. Theophylline ethanolamine. A white powder, used as a diuretic and vasodilator.

thebaine. $C_{19}H_{21}O_3N$ = 311.3. Paramorphine, dimethylmorphine. An alkaloid from opium.



Colorless glistening prisms, m.193, slightly soluble in water, soluble in alcohol or ether. It is very poisonous; used medicinally similarly to strychnine. **methyl-** $C_{20}H_{23}O_3N$ = 325.3. An alkaloid from opium. Colorless crystals, insoluble in water.

t. hydrochloride. (Tbn)HCl.H_2O = 365.7. Colorless rhombic crystals, soluble in water; used in ampoule medication. **t. tartrate.** (Tbn)$C_4H_6O_6.H_2O$ = 479.36. A white crystalline powder, soluble in water or alcohol.

thebaol. $C_{16}H_{12}O_3$ = 253.1. *3.6*-Dimethoxy-*4*-hydroxyphenanthrene. A phenol from thebaine.

theelin. Oestrone.

theelol. Oestriol.

theetsee. A black varnish obtained by tapping the stems or trunks of *Melanorrhoea usitata*, an Anacardiaceae of Malaya.

theine. Caffeine.

thelophoric acid. $C_{20}H_{12}O_9$ = 396.1. A deep-red pigment from the fungus *Thelophora*, or from *Hydnum ferrugineum*.

ThEm. The symbol for thoron.

Thénard, Louis Jacques. 1777–1857. A French chemist, noted for his writings and the isolation of elementary boron. **T.'s blue.** The blue mass obtained by heating alum moistened with cobalt nitrate. It consists of cobalt aluminate, $Co(AlO_2)_2$, and its formation is used as a blowpipe test for aluminum.

thenardite. Na_2SO_4. A native sodium sulfate.

thenyl alcohol. Thiophene carbinol.

theobroma. (1) Cocoa. (2) A genus of plants, Sterculiaceae, that yield cacao. **oil of-** Cacao-butter.

theobromine. $C_7H_8O_2N_4$ = 180.1. Cacaine, 3.7-dimethylxanthine, 3.7-dimethyl-2.6-dioxypurine. An alkaloid from the leaves and seeds of *Theobroma* species; an isomer of theophylline and paraxanthine. A microcrystalline powder, m.337, slightly soluble in water or alcohol, soluble in ether. Used as its salts medicinally, as a diuretic and nerve stimulant. **iodo-** T. sodium iodide. **methyl-** Caffeine. **uro-** Paraxanthine.

t. acetylsalicylate. (Tbr)$C_9H_8O_4$ = 360.16. A white crystalline powder; insoluble in water, soluble in alcohol. **t. barium sodium salicylate.** Barutine. A white amorphous powder. **t. hydrochloride.** (Tbr)HCl = 215.6. White crystals, soluble in water; used medicinally as a nerve stimulant. **t. lithium.** $C_7H_7LiO_2N_4$ = 186.10. Theobromose. Uropherin. Colorless needles; soluble in water. **t. lithium benzoate.** $C_7H_7LiO_2N_4.LiC_7H_5O_2$ = 314.14. Uropherin-B. A white powder, soluble in water; used medicinally. **t. lithium salicylate.** $C_7H_7LiO_2N_4.LiC_7H_5O_3$ = 330.14. Uropherin-S. A colorless powder; soluble in water. **t. salicylate.** (Tbr)$C_7H_6O_3$ = 318.15. Fine white needles, slightly soluble in water; used medicinally. **t. sodium acetate.** $C_7H_7NaO_2N_4.NaC_2H_3O_2$ = 284.12. Theonacet, aguirin. A hygroscopic white powder, used medicinally. **t. sodium benzoate.** $C_7H_7NaO_2N_4.NaC_7H_5O_2$ = 346.14. A white crystalline powder; soluble in water. **t. sodium citrate.** $C_7H_7NaO_2N_4.Na_3C_6H_5O_7$ = 460.40. Urocitral. A white powder; soluble in water. **t. sodium formate.** $C_7H_7NaO_2N_4.NaCHO_2.H_2O$ = 288.12. Theophorine. A white powder; soluble in water. **t. sodium iodide.** $C_7H_7NaO_2N_4.NaI$ = 352.02. Eustenin, iodotheobromine, sodium iodotheobromate. A white hygroscopic powder; soluble in water.

theobromose. Theobrominelithium.

theocine. A brand of synthetic theophylline.

theodolite. An instrument for measuring angles in horizontal and vertical planes; used in surveying.

theoforine. Theobromine sodium formate.

theoline. C_7H_{16} = 100.1. An aromatic hydrocarbon from petroleum.

theonacete. Theobromine sodium acetate.

theophorine. Theobromine sodium formate.

theophylline. $C_7H_8O_2N_4.H_2O$ = 198.2. 1.3-Dimethylxanthine, 1.3-dimethyl-2.6-dioxypurine. An isomer of theobromine; an alkaloid from tea leaves. Colorless needles, m.264, slightly soluble in water, alcohol, or ether; used medicinally as a cardiac stimulant. **t. ethylene diamine.** Euphylline. A white crystalline powder; soluble in water. **t. sodium.** C_7H_7-

NaO_3N_4 = 202.3. Colorless crystals; soluble in water. **t. sodium formate.** $C_7H_7NaO_3N_4.NaCHO_2.H_2O$ = 288.4. Theophorine. An isomer of theoforine. A white powder, soluble in water.

theorem. Theory.

theory. The reduction of data or facts to a principle, and the demonstration of their interrelations. A doctrine or proposition capable of being demonstrated. **atomic-** See *atom.* **ionic-** See *ions, ionization.* **phlogiston-** See *phlogiston.* **quantum-** See *quanta, energy levels, orbits.* **side-chain-** See *Ehrlich theory.* **valency-** See *valency.*

theotannin. A tannin prepared from freshly-plucked, green tea leaves.

thephorine. Theophylline sodium formate. Cf. *theoforine.*

therapeutic. Pertaining to the art of healing. **t. agent.** A remedy or substance used to alleviate disease, pain or injuries. Therapeutic agents are classified according to their physiological actions:

I. *Internal remedies*
A. Affecting nutrition:—hematics, alkalis, acids, digestants, antipyretics, alteratives.
B. Affecting the nervous and muscular system:
(a) The brain:—cerebral excitants, cerebral depressants, narcotics, hypnotics, analgesics, anesthetics.
(b) The spinal cord:—motor excitants, motor depressants.
(c) Nerve centers and ganglionic systems:—antispasmodics, tonics, antiperiodics.
(d) Heart and circulatory system:—cardiac stimulants, cardiac sedatives, vascular stimulants, vascular sedatives.
(e) Excretories:—diuretics, renal depressants, vesical tonics, vesical sedatives, urinary sedatives, diaphoretics, sudorifics, anhidrotics, antilithics.
C. Affecting special organs:
(a) Organs of respiration:—expectorants, pulmonary sedatives, errhines, sternutatories.
(b) Alimentary canal:—sialagogues, emetics, purgatives, peristaltics, carminatives, astringents, stŏmachics.
(c) The liver:—hepatic stimulants, cholagogues, hepatic depressants.
(d) Generative system:—ecbolics, emmenagogues, aphrodisiacs, anaphrodisiacs.
(e) Eyes (ciliary muscle):—mydriatics, myotics.
II. *External remedies*
A. Irritants:
rubefacients, epispastics, pustulants, escharotics.
B. Local sedatives:
demulcents, emollients.
III. *Agents which act on organisms infecting the human body*
Antiseptics, disinfectants, antizymotics, anthelmintics, antiparasitics, antiperiodics.

t. index. The ratio: minimum fatal dose/minimum curative dose. *chemical-* The ratio: curative dose/tolerated dose.

therapeutics. The teaching of the use of remedial measures; the science and art of curing disease.

therapy. A system of treatment, as:

pharmacotherapy	action of drugs
specific chemotherapy	action of chemicals
immunotherapy	action of vaccines
organotherapy	action of glands

Cf. *aero t., atmo t., hydro t., electro t., radium t.*

therm. (1) *Metric.* Small calorie. (2) *British.* British Thermal Unit (B.Th.U.), q.v. It equals 251.9 calories, and is the heat-producing capacity of 200 cubic feet of standard supply gas.

thermae. Natural warm springs.

thermal. Pertaining to heat or temperature. **t. capacity.** The amount of heat necessary to change the unit mass of a body one degree centigrade; =M × spec. heat, where M is the mass. **t. conductivity.** The amount of heat that passes, in unit time, through a unit volume (one cubic centimeter) of a substance when the opposite faces of the cube differ by one degree centigrade. **t. constant.** The heat in calories evolved during a particular reaction. **t. death point.** The degree of temperature required to kill bacterial cultures when exposed for 10 minutes. **t. deformation.** Pyro-electricity. **t. energy.** Heat energy. **t. excitation.** The transition of an electron to an excited orbit, caused by an increase in temperature. According to Saha, the fraction, Y, of a gas which is excited at the absolute temperature, T, is $\log \frac{Y}{1-Y} = -\frac{5048E}{T}$, where E is the excitation potential. **t. expansion.** The increase of volume due to heat. It is relatively small for solids and liquids, but large for gases. **t. intensity.** Temperature. **t. ionization.** The loss of an electron by an atom due to an increase in temperature. The fraction, X, of an element which is ionized at absolute temperature, T, is (Saha):

$$\log \frac{X}{1-X} = -\frac{5048I}{T} + \frac{5}{2}\log T - \log p\epsilon - 6.5,$$

where I is the ionization potential and $p\epsilon$ the electron pressure in atmospheres. **t. radiations.** Heat radiations, q.v. **t. unit.** Therm.

thermel. Thermocouple.

thermic. Pertaining to heat.

thermifugin. $C_9H_8(CH_3N.COONa)_3$ = 404.1. Sodium methyltrihydroxyquinoline carbonate A pale yellow powder, soluble in water; used medicinally as an antipyretic.

thermin. $C_{10}H_{11}NH_2.HCl$ = 183.6. Tetrahydro-β-naphthylamine hydrochloride. Pale-rose, crystalline powder, m.237, soluble in water, alcohol or ether; used medicinally as a mydriatic.

thermion. The ions which carry current through a vacuum in a thermionic tube. They may be positive (positively-charged atoms), or negative (electrons).

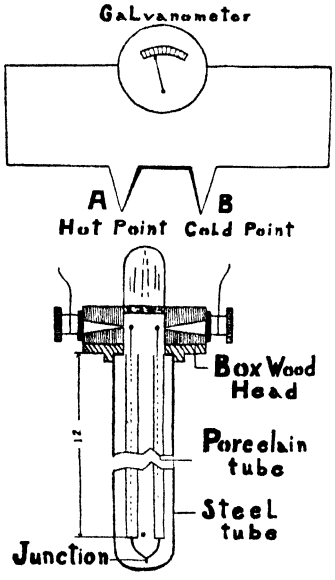
thermionic effect. The loss of electrons from a heated body maintained at an electric potential. It is the foundation of the thermionic valve or tube used for radio reception or transmission, and may be used to rectify or to amplify currents.

thermit(e). A mixture of aluminum and ferric oxide (Fe_3O_4). It is ignited by a primer (magnesium powder) and reacts violently

with liberation of heat and formation of aluminum oxide and molten iron. Used in the thermite process and incendiary bombs, and attains a temperature of about 3000°C. **t. process.** Goldschmidt's process. Thermo-reduction. (1) A method of obtaining a high temperature and molten iron by igniting a mixture of aluminum and ferric oxide; used in welding steel, rails, steam-ship shafts, etc. (2) A method of obtaining metallic chromium or manganese by mixing their oxides with powdered aluminum and igniting the mixture with a primer, the aluminum combining with the oxygen of the oxide to form Al_2O_3.

thermo- A prefix derived from the Greek, indicating "heat."

thermochemistry. The study of the relations of heat and chemical reactions. (See *thermodynamics.*)



Thermocouple.

thermocouple. Thermopile, thermel, thermoelement, thermojunction. A sensitive device for measuring temperature by the production of a thermo-electric current at the junction of two different metallic wires embedded in clay or porcelain. One wire is kept at constant low temperature, the other at the temperature to be measured.

Couple	Maximum temperature	E.M.F.
copper-constantan	500°C	25.54 millivolts
chromel-copel	550	
silver-constantan	600	32.50
iron-constantan	600	32.75
chromel-alumel	1200	
Pt—(*90%* Pt+*10%* Rh)	1600	18.00
Ni—nickel chrome	1090	41.80

By using a sensitive galvanometer and a t. of Bi and Sb wires the heat radiations from stars or planets are measured. Cf. *radiometer, pyrometer, bolometer.*

thermocross. Thermocouple.

thermodin. $C_{13}H_{17}O_4N$ = 251.2. Phenacetin urethane, acetyl-p-ethoxyphenylurethane, EtO.C_6H_4.N(COMe)COOEt. Colorless crystals, m.-87, slightly soluble in water; used medicinally as an antipyretic.

thermodynamic concentration. Activity. **t. potential.** Gibb's function, thermo-potential. "*The differential coefficient of the energy with respect to the variable expressing the quantity of the substance.*" (Gibbs.)

thermodynamics. The study, founded on experiment, of the empirical relations between heat energy and other forms of energy. **First law of-** *Conservation of energy;* "Heat and work are equivalent." Thus, a definite quantity of heat gives a fixed amount of mechanical energy; and, *vice versa*, a definite quantity of mechanical energy yields a fixed quantity of heat. This is also expressed by the statement that any change or transformation produced in a body is proportional to the *heat equivalent;* hence, the change in the energy content of a body depends on the difference between the original and final states, and is independent of any intermediate states. The maximum net amount of work obtained from a given process, changing at constant temperature and pressure from a higher to a lower state, is the *free energy.* **Second law of-** *Degradation of energy:* It is impossible, when unaided by any external agency, to convey heat from one body to another at a higher temperature; therefore in all changes, the *entropy* or amount of irreversible energy of the participating bodies increases. **Third law of-** Every substance has a finite positive entropy and, at absolute zero temperature, the entropy value is zero in the case of pure crystalline substances. Cf. *entropy.*

thermoelectric. Pertaining to electricity produced by heat. **t. current.** An electric current produced from a thermo-couple. **t. power.** The thermoelectromotive force produced at the junction of two metals by a temperature-difference between the two metals of one degree centigrade.

thermoelectromotive force. Thermoelectric power.

thermoelement. (1) Thermocouple. (2) Thermopile.

thermograph. A self-recording thermometer.

thermojunction. Thermocouple.

thermokalite. A mixture of trona, thenardite, thermonatrite and sodium bicarbonate.

thermolabile. Decomposed or destroyed by heat.

thermoluminescence. Luminescence caused by a slight increase in the temperature of a body, without the production of incandescence.

thermolysis. Dissociation or decomposition produced by heat.

thermomagnetic effect. A difference in magnetic properties caused by heat; as, the Leduc effect, Nernst effect.

thermometamorphism. A change in allotropic forms produced by heat.

thermometer. A device for determining the temperature or the intensity of heat of a body. Three types: *Mechanical-* Consists of a substance that expands and contracts with alterations of temperature.

Electrical- Involves measuring the change in or production of an electric current or resistance caused by a change of temperature; as, resistance thermometers, electrical thermocouples.

Optical- Involves examining the light of an

incandescent body; as, optical pyrometer, radiation thermometer.

THERMOMETERS

Classification according to Rimbach and Behar.

A. Indicating Thermometers (visible scales):

1. Liquid-in-glass (visible column)

mercury	− 38 to 540°C
pentane	−180 to 20°C
alcohol	− 70 to 120°C
thallium amalgam	− 60° to 100°C
gallium in quartz	31 to 1000°C

2. Pressure-spring (dials)

mercury expansion	− 38 to 530°C
non-mercury liquids	− 50 to 400°C
vapor pressure	− 30 to 370°C
gas filled	−130 to 540°C

3. Solid expansion

bimetallic	up to 550°C
metal and refractory	up to 650°C

4. Electrical resistance

nickel	−180 to 120°C
platinum	−180 to 1000°C

B. Indicating Pyrometers (graphic pointers):

1. Thermoelectrical

thermocouples	up to 1600°C

2. Optical

optical pyrometer	600 to 2500°C

3. Radiation

radiation pyrometers	500 to 2000°C

4. Fusion and melting

Seger cones	600 to 2000°C

C. Controlling thermometers (thermostats, q.v.)

angle- An L-shaped t. for insertion in the vertical side of a vessel. **armored-** A t. surrounded by a metal casing. **Beckmann-** See Beckmann. **kata-** q.v. **ultra-** Beckmann t.

t. conversion. To change a thermometer reading from one scale to another:

To change °C to °F—Multiply the °C by nine, divide by five, and add 32.

To change °F to °C—Subtract 32 from the °F, multiply by five and divide by nine.

t. scales:

(1) °C = degree centigrade or degree Celsius

$$t°C = \frac{9}{5}t + 32°F = \frac{4}{5}t°R = t + 273°A$$

(2) °F = degree Fahrenheit

$$t°F = \frac{5}{9}(t - 32)°C = \frac{4}{9}(t - 32)°R$$

(3) °R = degree Réaumur

$$t°R = \frac{5}{4}t°C = \frac{9}{4}t + 32°F = \frac{5}{4}t + 273°A$$

(4) °A = degree absolute

$$t°A = t - 273°C$$

thermonatrite. $Na_2CO_3.H_2O$. A native monohydrated sodium carbonate.

thermoneutrality. The absence of a heat change when dilute solutions of neutral salts are mixed, and no precipitate forms.

thermonuclear reaction. A reaction which proceeds at high temperatures (*e.g.*, in the interior of a star) and results in transmutation of elements by bombardment by α-particles, protons, electrons, etc.

thermophore. A device for retaining or holding heat; as, a hot water bag.

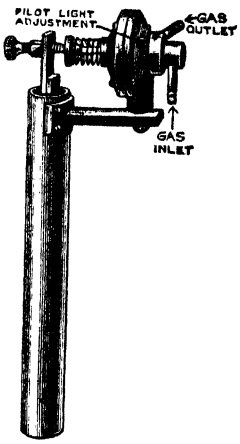
thermopile. A thermoelement which consists of a series of soldered metal plates or bars arranged in series so as to produce a cumulative effect; when heated at their junctions an electric current results.

thermoplastic. Rendered soft and moldable by the action of heat. Cf. *plastics.*

thermopotential. Thermodynamic potential.

thermoreduction. Thermite process.

thermoregulator. A device for mechanically regulating temperature by controlling the source of heat. (See *thermostats* and illustration.)



Thermoregulator for gas-heated thermostats.

thermosetting. Rendered hard by heat; as, certain plastics q.v.

thermostabile, thermostable. (1) Refractory or heat-resisting. (2) In biochemistry; not affected by temperatures above 55°C, or below 100°C.

thermostat. A device for regulating the heat of an oven, incubator, retort or other apparatus automatically.

thermotaxy. (1) A form of orthotaxy (q.v.) produced by the influence of heat. (2) The directional tendency of regular groupings in crystalline substances due to heat.

thermotension. The subjection of a red-hot metal to high tensile stress during cooling.

thermotropic. Caloritropic. Stimulated by or responding to a change of temperature.

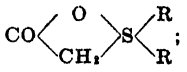
thermsilid. An acid-resisting alloy of 84 % iron and 16 % silicon.

°C	°F	°R	°A	°C	°F	°R	°A	°C	°F	°R	°A	°C	°F	°R	°A
1000	1832	800	1273	45	113	36	318	95	203	76	368	−5	23	−4	268
900	1652	740	1173	40	104	32	313	90	194	72	363	−10	14	−8	263
800	1472	640	1073	35	95	28	308	85	185	68	358	−15	5	−12	258
700	1292	560	973	30	86	24	303	80	176	64	353	−17.8	0	−14.2	255.2
600	1112	480	873	25	77	20	298	75	167	60	348	−20	−4	−16	253
500	932	400	773	20	68	16	293					−30	−22	−24	243
400	752	320	673	15	59	12	288	70	158	56	343	−40	−40	−32	233
300	572	240	573	10	50	8	283	65	149	52	338	−50	−58	−40	223
200	392	160	473	5	41	4	278	60	140	48	333	−100	−148	−80	173
150	302	120	423	0	32	0	273	55	131	44	328	−200	−328	−160	73
100	212	80	373	−1	30.2	−0.8	272	50	122	40	323	−273	−459.4	−218.4	0

Besides these common scales there are: (5) °K = degree Kelvin, practically the same as °A. (6) °Ra = degree Rankine, which is absolute Fahrenheit or °F based on absolute zero: −459°F = 0°Ra, 0°F = 459°Ra, 212°F = 671°Ra.

theta. The Greek letter *θ*, Θ. See *T*.

thetine. Thiobetaine, sulfinate. A group of organic compounds derived from the heterocyclic compound,



e.g., dimethylthetine, where R is —CH_3. **dimethyl-** $OSMe_2.CH_2.CO$ = 120.12. ***2.2*-dihydro-*2.2*-dimethyl-*1.2*-oxathietan-*4*-one.** Deliquescent crystals, decomp. by heat.

theveresin. $C_{48}H_{70}O_{17}$ = 918.7. A white amorphous powder; a split-product of thevetin.

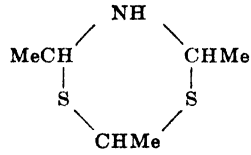
thevetin. $C_{54}H_{48}O_{24}$ = 1100.5. A crystalline glucoside from the seeds of yellow oleander, *Thevetia neriifolia*, an Apocynaceae of Central America. Small colorless crystals, m.215, $[\alpha]_D$ −39.2°, slightly soluble in water, soluble in alcohol. Cf. *theveresin*.

thiacetamide. Thioacetamide.

thiacetic. Thioacetic acid.

-thial*. The suffix for a thioaldehyde; as, ethanethial*, CH_3CHS.

thialdine. $C_6H_{13}NS_2$ = 163.26.

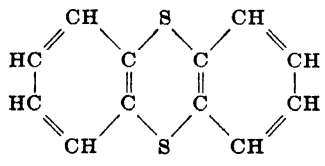


Colorless crystals, d.1.92, m.43 (decomp.)-soluble in water, alcohol or ether; used medicinally as a heart stimulant.

thiamide. An organic compound of the type, R—C:S.(NH_2). **iso-** An organic compound of the type, R—C:NH.(SH).

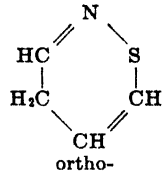
thiamin(e). Vitamin B_1.

thianthrene. $C_{12}H_8S_2$ = 216.24. Diphenylene disulfide, dibenzo-*p*-dithiin. The heterocyclic compound,

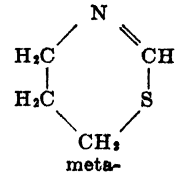


m.159, b.365; insoluble in water, soluble in alcohol or ether.

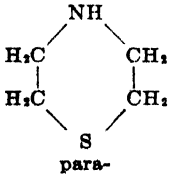
thiazine. A group of sulfur-containing heterocyclic compounds:



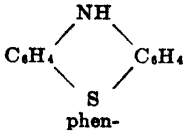
ortho-



meta-

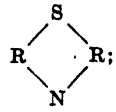


para-



phen-

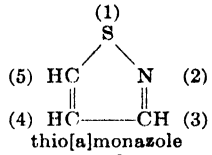
Cf. *benzo-t.*, *benziso-t.*, *pheno-t.* **t. dyes.** A group of aniline dyes derived from thiazines and containing the grouping,



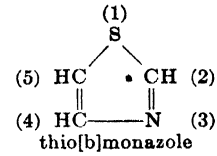
as in thionine, toluidine blue, methylene blue, methylene violet.

thiazole. C_3H_3NS = 85.1. Metathiazole, thio[o]-monazole. A colorless liquid, d.1.200, b.117; insoluble in alcohol, soluble in ether. **t. purple.** $C_{19}H_{17}BrN_2S_2$. A carbocyanine dye: *1.1'*-dimethyl thiocarbocyanine bromide, used as photographic sensitizer.

thiazoles. A group of organic compounds derived from:



thio[a]monazole or **ortho-**



thio[b]monazole or **meta-**

The derivatives are named according to position; thus:

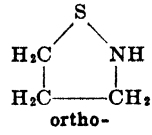
1—s—(sulfur)	1—s—(sulfur-)
2—n—(nitrogen)	2—μ—(median-)
3—γ—(gamma)	3—n—(nitrogen-)
4—β—(beta)	4—β—(beta-)
5—α—(alpha)	5—α—(alpha-)

as in

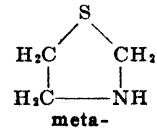
μ-amidothiazole, $C_3H_2NS.NH_2$	m.90
α-methylthiazole, $C_3H_2NS.Me$	b.232
μ-methylthiazole	b.128
$\alpha\mu$-dimethylthiazole, C_3HNSMe_2	b.143
trimethylthiazole, C_3NSMe_3	m.167

dihydro- Thiazoline. **tetrahydro-** Thiazolidine.

thiazolidine. C_3H_7NS = 89.1. Tetrahydrothiazoles. The saturated heterocyclic compounds:



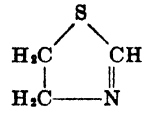
ortho-



meta-

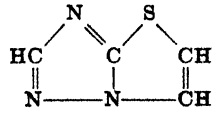
4-keto-2-thio-m- Rhodamine.

thiazoline. C_3H_5NS = 87.1. Dihydrothiazoles. A group of organic compounds derived from the heterocyclic compound,



μ-methylthiazoline, C_3H_4NSMe	b.145
μ-phenylthiazoline, C_3H_4NSPh	b.276

thiazoltriazol. $C_4H_3N_3S$ = 125.1. The heterocyclic compound,

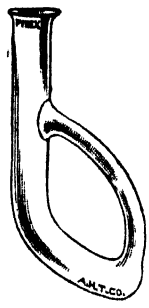


thiazyl. (1) The monovalent radical, C_3H_2NS—, derived from thiazole. (2) The monovalent N_3S_4— radical. **t. chloride.** N_3S_4Cl = 205.77. **t. nitrate.** $N_3S_4NO_3$ = 232.32.

thicken. (1) To evaporate to a greater viscosity. (2) To expand the ends of a metal rod.

thickness. (1) The degree of viscosity or fluidity. (2) The width of a plate. (3) The radius or gage of a wire.

Thiele tube. A specially-shaped test-tube (see illustration) which if heated at the base insures the circulation of the liquid in it, and thus, an even distribution of heat. Used in making melting-point determinations, a melting-point tube and thermometer being inserted in it.

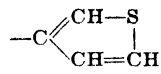


Thiele tube.

Thiel-Stoll solution. A saturated solution of lead perchlorate, $Pb(ClO_4)_2$, d.2.6; used for determining the specific gravity of minerals by the suspension method.

thienone. Thienylketone. **aceto-** Thienylmethylketone.

thienyl. The monovalent radical, —C_4H_3S, derived from thiophen:



t. diphenylmethane. $C_{17}H_{14}S$ = 250.1. $(C_4H_3S)CHPh_2$. Colorless crystals, m.63, b.335; soluble in alcohol. **t. ketone.** $C_9H_6OS_2$ = 194.17. Thienone, *2.2'*-dithienylketone, $(C_4H_3S)_2CO$. White needles, m.87, b.326, insoluble in water. **t. methylketone.** C_6H_6OS = 126.1. Acetothienone. $(C_4H_3S)COMe$. A colorless liquid, b.213. **t. phenylketone.** $C_{11}H_8OS$ = 188.1. $(C_4H_3S)COPh$. Colorless crystals, m.55, b.360; soluble in alcohol.

Thies process. A method of extracting gold from ores by adding chloride of lime and sulfuric acid to the crushed ore.

thigenol. A registered trade-mark for sodium sulfo-oleate solution, an antiseptic.

thimble. A porous cup made of filter paper or alundum, used for extracting materials, *e.g.*, in a Soxhlet apparatus.

thinner. A liquid which is used to thin out or dilute a solution of a paint or lacquer, but which is not itself necessarily a solvent for it (cf. *vehicle*).

thinolite. A tufa or native calcium carbonate, forming layers of interlaced crystals. It occurs in Nevada and California in large deposits.

thio- A prefix derived from the Greek "theion" —sulfur. It indicates the replacement of oxygen in an acid radical by sulfur having a negative valence of two. Cf. *sulfo-*.

thioacetal. Mercaptal.

thioacetaldehyde. $(CH_3.CHS)_3$ = 180.31. A solid, m.45, b.205, soluble in alcohol, insoluble in water or ether.

thioacetamide. C_2H_5NS = 75.1. Thiacetamide. $Me.C:S.NH_2$. Colorless leaflets; soluble in water or alcohol, m.109. Its derivatives are thiamides.

thioacetanilide. C_8H_9NS = 151.2. The thiamide, $Me.CS.NHPh$. Colorless needles, m.75, decomp. by further heat, insoluble in water, soluble in alcohol or alkalis; used in organic synthesis.

thioacetic acid. C_2H_4OS = 76.1. Thiacetic acid, thiolacetic acid. The thiolic acid, MeCOSH. A colorless liquid, d.1.074, b.93; soluble in water, alcohol or ether.

thioacetin. $C_8H_{10}O_3S$ = 150.15. Akcethin.

thioacid. An organic compound in which divalent sulfur has replaced some or all of the oxygen atoms of the carboxyl group; as,

R.CO.SH.....	thiolic acids* or carbothiolic acid*
R.CS.OH.....	thionic acids* or carbothionic acid*
R.CS.SH.....	dithionic acids* or carbodithioic acid*

If structure is uncertain:

RCSOH ⇋ RCOSH.....	thioic acid* or carbothioic acid*, *e.g.*,
CH_3COSH or CH_3CSOH	ethanethioic acid* or methane carbothioic acid*

If structure is certain:

CH_3COSH.....	ethanethiolic acid* or methane carbothiolic acid*
CH_3CSOH.....	ethanethionic acid* or methane carbothionic acid*
CH_3CSSH.....	ethanethionothiolic acid* or methane carbodithioic acid*

They differ from sulfo-acids, in which sulfur is tetra- and hexavalent. See *polythionic acids*, *carbylic acid*.

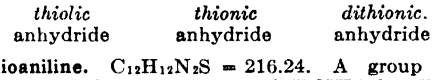
thioalcohol. Hydrosulfide.

thioaldehyde. A group of organic compounds containing the monovalent —CHS radical. They have the suffix -thial*, q.v.

thioamides. A group of organic compounds of the type $R.CS.NH_2$.

thioanhydride. An anhydride of a thioacid.

Three types:



thiolic anhydride — *thionic* anhydride — *dithionic.* anhydride

thioaniline. $C_{12}H_{12}N_2S$ = 216.24. A group of compounds of the type, $(C_6H_4NH_2)_2S$. *E.g.*, p-diamidodiphenylsulfide, m.115; o-diamidodiphenylsulfide, m.93. Soluble in ether, insoluble in water or alcohol.

thioantimonate. A salt of the unknown orthothioantimonic acid, H_3SbS_4 or $Sb_2S_5.3H_2S$. See *Schlippe's salt*.

thioantimonites. Salts of the type R_3SbS_3, $R_4Sb_2S_5$ and RSb_2, known only in solution.

thioarsenate. A salt of the type, M_3AsS_4.

thioarsenite. A salt of the type, M_3AsS_3.

thiobacteria. A group of bacteria that reduce or oxidize sulfur compounds.

thiobenzaldehyde. PhCHS = 122.14. **alpha-** A solid, m.160, decomp. by further heat. Soluble in alcohol or benzene, insoluble in water. **beta-** A solid, m.225, soluble in acetic acid.

thiobenzamide. C_7H_7NS = 137.1. The thiamide, $Ph.CS.NH_2$. Colorless crystals, m.116.

thiobenzanilide. $C_{13}H_{11}NS$ = 213.2. The thiamide, $Ph.CS.NHPh$. Colorless crystals, m.98.

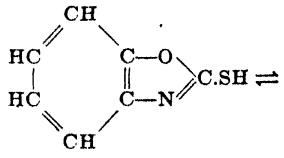
thiobenzimidazolone. Phenylene thiourea.

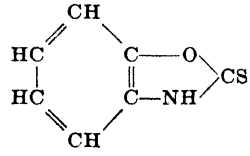
thiobenzoic acid. $C_7H_6OS.\frac{1}{2}H_2O$ = 147.15. The thiolic acid, Ph.COSH. Colorless crystals,

m.24; insoluble in water, soluble in alcohol or ether. Cf. *sulfobenzoic acid.*

thiobenzophenone. $C_{13}H_{10}S$ = 198.14. Ph.CS.Ph. Colorless crystals, m.146.5.

thiobenzoxazole. C_7H_5ONS = 151.1. The heterocyclic tautomeric compound:

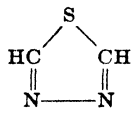




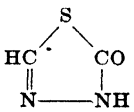
Colorless crystals, m.193.

thiobetaine. Thetine.

thiobiazoline. $C_2H_2N_2S$ = 86.1. Thio-bb'-diazole. The heterocyclic compound,



thiobiazolone. $C_2H_2ON_2S$ = 102.1. The heterocyclic compound,



thiocacodylate. A salt of thiocacodylic acid containing the Me_2AsOS— radical.

thiocarbamic acid. CH_3NS_2 = 93.16. $CS(NH_2)SH$, soluble in water, alcohol or ether. **t. ester.** An organic compound of the type, $R_2N.CS.OR$; *e.g.*, diphenylthiocarbamic phenyl ester, $Ph_2N.CS.OPh$.

thiocarbamide. Thiourea.

thiocarbanilide. Sulfocarbanilide.

thiocarbimide. Isothiocyanic acid.

thiocarbin. A mercaptan prepared by boiling glycerol with sodium thiosulfate; used as photographic emulsion ripening accelerator, and as an analytical reagent.

thiocarbonate. (1) A salt of trithiocarbonic acid of the type, M_2CS_3. (2) A salt of one of the thiocarbonic acids.

thiocarbonic acids. (1) A group of thioacids derived from carbonic acid by substitution of one or more of its oxygen atoms:

monothiocarbonic acid (thioncarbonic acid)	$CS(OH)_2$
carbonylmonothio acid (thiolcarbonic acid)	$CO(SH)OH$
dithiolcarbonic acid (carbonyl-dithio acid)	$CO(SH)_2$
dithiocarbonic acid (See *xanthic* acid)	$CS(SH)OH$
trithiocarbonic acid	$CS(SH)_2$

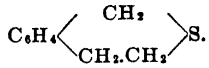
(2) H_2CS_3 = 110.6. An insoluble liquid, cf. *sulfocarbonic acid.* **ortho-** $C(SH)_4$. Known only in esters. **per-** H_2CS_4 = 142.2. A red oily liquid, decomp. to CS_2, H_2S and S. **t. ester.** An ester of a thiocarbonic acid; as, diphenyl-*thio*carbonic ester, PhO.CS.OPh. diphenyl*thiol*carbonic ester, PhO.CO.SPh.

thiocarbonyl. The divalent >CS radical, analogous to >CO.

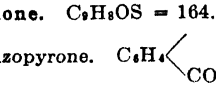
thiocarbonylchloride. Thiophosgene.

thiocarburyl chloride. Thiophosgene.

thiochroman. $C_9H_{10}S$ = 150.08. Dihydrobenzothiopyran.



thiochromanone. C_9H_8OS = 164.06. 2.3-dihydro-1.4-benzopyrone.

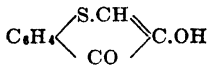


thiochrome. A fluorescent quinochrome (q.v.) which contains sulfur. It is an oxidation product of vitamin B_2 (q.v.), and is used to determine it.

thiochromene. 1.2-Benzothiopyran.

thiochromone. 1.4-Benzothiopyrone. **2.3-dihydro-** Thiochromanone. **3-hydroxy-** Thiochromonol. **2-phenyl-** Thioflavone. **2-phenyl-4-keto-** Thioflavone.

thiochromonol. $C_9H_6O_2S$ = 178.1. 3-hydroxybenzothiopyrone, hydroxythiochromone.

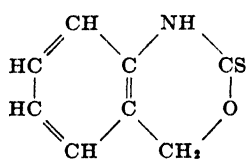


thiocol. Registered trade-mark for a preparation of potassium guaiacol sulfonate.

thiocoumarin. 1.2-Benzothiopyrone.

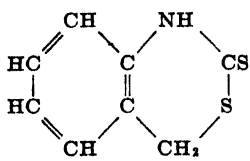
thiocresol. MeC_6H_4SH = 124.16. **ortho-** m.15, b.193. A solid. **meta-** A liquid. **para-** A solid, m.43, b.191. It stimulates cell proliferation and granulation of tissue.

thiocumazone. C_8H_7ONS = 165.14. Benzodihydrothiometoxazine. The heterocyclic compound,



Colorless crystals, m.142.

thiocumothiazone. $C_8H_7NS_2$ = 181.21. Benzodihydrothiothiazine. The heterocyclic compound,



Colorless crystals, m.166.

thiocyanate*. A salt of thiocyanic acid, which contains the monovalent radical, —SCN. Thiocyanate is the term preferred for thiocyanide, sulfocyanate, sulfocyanide, rhodanate, rhodanide.

thiocyanic acid. HSCN = 59.1. Sulfocyanic acid, rhodanic acid. HS.C:N. A colorless liquid; m.5, decomp. 200, soluble in water, alcohol or ether. **t. ester.** An ester of thiocyanic acid of the type, R—SCN. *E.g.*, methylthiocyanate, MeSCN; ethylthiocyanate, EtSCN.

thiocyanide. Thiocyanate.

thiocyano. The monovalent radical, NCS—. **t. dyestuffs.** Dyestuffs produced from nuclear-substituted t. derivatives or aromatic amines and phenols. They are deeper in shade than the corresponding non-substituted compound.

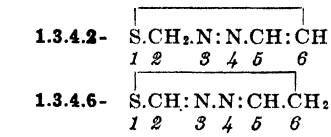
thiocyanogen. $C_2N_2S_2$ = 116.0. NCS—SCN, white rhombic crystals, m. −2; unstable, particularly in light. It behaves like a halogen. **t. value.** An analogue of the iodine number (q.v.) in which the thiocyanate radical replaces iodine. Cf. *thiocyanometry.*

thiocyanometry. Rhodanometry. Volumetric analytical methods using thiocyanates; as, determination of silver, the halogen-absorbing capacity of unsaturated compounds, etc.

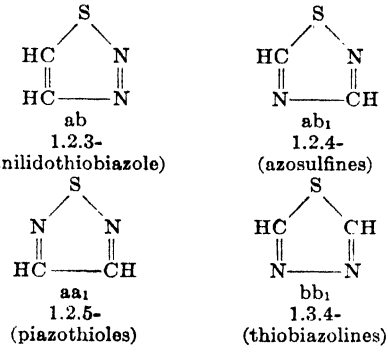
thiocyanuric acid. $C_3N_3S_3H_3$ = 177.25. Yellow needles, decomp. 200, soluble in alcohol, water or ether.

thiodialkylamine. An organic compound of the type, R_2NSNR_2; as, thiodiethylamine, $Et_2NSN.Et_2$.

thiodiazine. Diazthines. Derivatives of the heterocyclic compounds:



thiodiazoles. $C_2H_2N_2S$ = 86.2. A group of heterocyclic compounds:



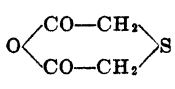
dihydro- Thiodiazoline. **tetrahydro-** Thiodiazolidine.

thiodiazolidine. $C_2H_6N_2S$ = 90.2. Tetrahydrothiodiazole. A group of heterocyclic compounds derived by saturating thiodiazoles.

thiodiazoline. $C_2H_4N_2S$ = 88.2. Dihydrothiodiazole. A group of heterocyclic compounds derived by partially saturating thiodiazoles.

thiodiglycol. Dioxyethylene sulfide. $S(CHOH.CH_2OH)_2$.

thiodiglycollic anhydride. $C_4H_4O_3S$ = 132.10. The heterocyclic compound,



Colorless crystals, m.103, b.159.

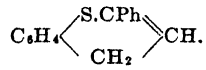
thiodiphenylamine. Phenothiazine.

thioether. Alkylsulfide, sulfur ether. An organic compound of the type, R.S.R., obtained from alkylhalides and alkalisulfides, and forming colorless volatile liquids that can be oxidized to sulfones. *E.g.*,

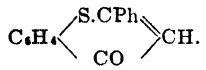
methylsulfide	Me_2S, b.37
ethylsulfide	Et_2S, b.91
n-propylsulfide	Pr_2S, b.130
n-butylsulfide	Bu_2S, m.182
vinylsulfide	$(CH_2:CH)_2S$, b.101
allylsulfide	$(CH_2:CH.CH_2)_2S$, b.140

In mixed ethers the term thio* is used; thus, methylthioethane*, MeSEt.

thioflavol. $C_{15}H_{12}S$ = 224.09. Phenylbenzothiopyran. The heterocyclic compound,



thioflavone. $C_{15}H_{10}OS$ = 238.09, 4-keto-2-phenyl-1.4-benzothiopyrone.



thioform. A basic bismuth dithiosalicylate, used as a dental antiseptic.

thioformanilide. C_7H_7NS = 137.14. The thioaldehyde, Ph.NH.CSH. Colorless crystals, m.137.

thiofuran. Thiophen.

thiogenic dyes. Sulfur dyes.

thioglycerol. $C_3H_8O_2S$ = 108.12. **1-** $CH_2SH.CHOH.CH_2OH$. A colorless liquid, d.1.295, decomp. by heat. **2-** $(CH_2OH)_2CHSH$. ***1.2-di-*** $C_3H_8OS_2$ = 124.19. A thick liquid, d.1.342, decomp. 130. **tri-** $C_3H_8S_3$ = 140.26. A heavy odorous liquid, d.1.391. They are all used to treat skin diseases.

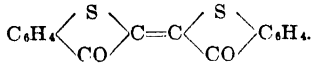
thioglycollic acid. $C_2H_4O_2S$ = 92.04. $CH_2SH.COOH$. White crystals, used as reagent for iron (1:10 million).

thiohydantoic. See *hydantoic.*

thiohydroquinone. $C_6H_4(SH)_2$ = 142.20. A solid, m.98.

thiohydroxy. Hydrosulfide, q.v. Cf. *thiol**.

thioindigo. $C_{16}H_8O_2S_2$ = 296.20.



Used as a permanent purple dye.

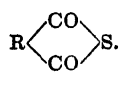
thioindigotic acid. Sulfindigotic acid.

thioketone. A compound of the type R_2CS. Their suffix is -thione*; as, *2*-butanethione*, MeCSEt or $CH_3.CS.CH_2.CH_3$.

thiol*. The monovalent radical, —SH. Cf. *hydrosulfide, thiols.*

thiolacetic acid. (1) Thioacetic acid. (2) Thioglycollic acid (incorrect use).

thiolic acid. An organic compound containing the monovalent radical, —CO.SH. **t. anhydride.** A compound of the type



thiols. Mercaptans, hydrosulfides. A compound of the type R.SH: methanethiol*, CH_3SH; ethanedithiol*, $CH_2SH.CH_2SH$, propanetrithiol*, $(CH_2SH)_2CHSH$.

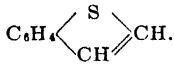
thion. Pertaining to divalent sulfur. Cf. *thione.* **t. dyes.** Sulfur dyes. **t. kudor.** A red-yellow solution of sulfur in boiling milk of

lime. It contains the calcium polysulfides, CaS_2 to CaS_7.

thionalid. Thio-glycollic-β-amino-naphthalide; used as a reagent.

thionamic acids. An organic compound of the type, R.NH.S:O.OH, in which sulfur replaces the carbon of the COOH group. *E.g.* ethylthionamic acid, EtNH.SOOH; diethylthionamic acid, $Et_2N.SOOH$. Cf. *carbamic acid.*

thionaphthene. C_8H_6S = 134.1. Benzothiophene, benzothiofuran. The heterocyclic compound,



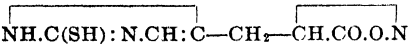
Colorless leaflets, m.31, b.221; soluble in alcohol.

thionate. Thiosulfate. **di-** A salt of the type $M_2S_2O_6$. **penta-** A salt of the type $M_2S_2O_6$. **tetra-** $M_2S_4O_6$. **tri-** $M_2S_3O_6$.

thion dyes. Sulfur dyes.

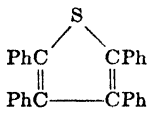
-thione*. The suffix for a thioketone; as, propanethione*, $CH_3.CS.CH_3$. Cf. *thion.*

thioneine. $C_9H_{16}N_3O_2S$ = 230.12. Thionene, thiazine, ergothioneine, sympectothiene,



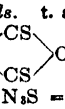
A constituent of blood and certain plants. Cf. *histidine.*

thionessal. $C_{28}H_{20}S$ = 388.2. The heterocyclic compound,

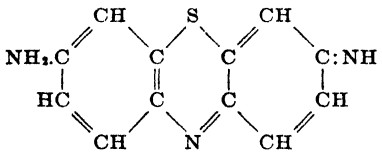


Colorless crystals, m.184.

thionic acid. (1) An organic compound containing the monovalent —CS.OH radical. (See *thioacids, polythionic acids.*) (2) A compound of the type, $H_2S_nO_6$, where n varies from 2 to 5. See *sulfuric acids.* **t. anhydride.** A compound of the type



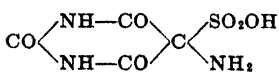
thionine. $C_{12}H_9N_3S$ = 227.2. Lauth's violet, amidophenthiazine. The heterocyclic compound,



A greenish-black powder of metallic luster, soluble in water with violet color. Used as a nuclear stain in microscopy, and as a hydrogen-ion indicator. Cf. *thioneine, leucothionine, methylene blue.*

thiono. The divalent radical, =CS. Cf. *thiocarbonyl, thione*.*

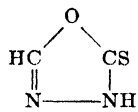
thionuric acid. $C_4H_3O_6N_3S$ = 223.14. Sulfamidobarbituric acid. The heterocyclic compound,



thionyl. Sulfinyl. The divalent group, =SO, from sulfurous acid. Cf. *sulfoxide, thienyl.* **t. amines.** An organic compound of the type, R.N:SO. *E.g.*, thionylmethylamine, Me-N:SO, b.58; thionylethylamine, EtN:SO, b.75. **t. aniline.** C_6H_5ONS = 139.1. PhN:SO. A colorless liquid, d.1.236, b.200; used in organic synthesis. **t. benzene.** $C_{12}H_{10}OS$ = 202.1. Diphenylsulfoxide, Ph_2SO. Colorless crystals, m.70. **t. bromide.** $SOBr_2$ = 207.91. A red liquid, b.$_{40mm}$.68. **t. chlorobromide.** SOClBr = 163.45. A yellow liquid, b.115. **t. chloride.** $SOCl_2$ = 118.9. A colorless, pungent liquid, b.79; used in organic synthesis. **t. dialkylamine.** An organic compound of the type, $R_2N.SO.NR_2$; as thionyldiethylamine, $(Et_2N)_2SO$, b.118. They may be considered as carbamides (ureas) in which the carbon atom is replaced by a tetravalent sulfur atom; or as substituted amides of sulfurous acid. Cf. alkyl *sulfamide.* **t. fluoride.** SOF_2 = 86.07. A colorless gas, b.—32. It forms with ammonia the compounds, $2SOF_2.5NH_3$ and $2SOF_2.7NH_3$. **t. hydrazine.** An organic compound of the type, $R_2N.N:SO$. *E.g.*, thionyldiethylhydrazine, $Et_2N.NSO$. **t. imide.** SONH = 63.2. A colorless liquid, m.—85, prepared by the action of ammonia on t. chloride. It polymerises at —70°C. to a yellow transparent resin, soluble in alcohol or acetone, insoluble in most other organic solvents or water. **t. toluidines.** C_7H_7ONS = 153.1. $Me.C_6H_4N:S:O$. ortho-, b.184; meta-, b.220; para-, m.7, b.224. Used in organic synthesis.

thio-oxamide. $(CSNH_2)_2$ = 120.18. A solid, soluble in alcohol or ether, decomp. by heat.

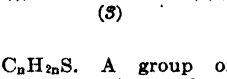
thio-oxybiazoline. The heterocyclic compound,



It is known only in the form of its derivatives; as, n-naphthyl-amido-, $NH_2—C_2ON_2S—C_{10}H_7$.

thio-oxydiphenylamine. Sulfaminol.

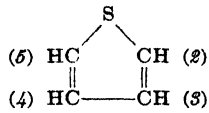
thiophane. $C_5H_{10}S$ = 92.15. The heterocyclic compound



Cf. *pyrane.*

thiophanes. $C_nH_{2n}S$. A group of sulfurated hydrocarbons from crude petroleum.

thiophen(e). C_4H_4S = 84.11. Thiofuran. The heterocyclic compound,



A colorless, benzene-like liquid, $d._{15}$°1.071, m.—37, b.84; insoluble in water, soluble in alcohol or ether. It forms numerous derivatives; used in organic synthesis. Cf. *thienyl.* **amino-** Thiophenine. **benzo-** Thionaphthene. **methyl-** Thiotolene. **nitro-** q.v. **tetrahydro-** Butylene sulfide. **tetraphenyl-** Thionessal.

t. alcohol. $C_4H_3S.CH_2OH$ = 114.13. A liquid, b.207. **t. carboxylic acids.** A group of acids derived from thiophen:

$C_4H_3S.COOH$ = 128.12.

2-thiophen carboxylic acid.	m.126, b.260
3-thiophen carboxylic acid.	m.136

$C_4H_2S(COOH)_2$ = 172.2.

2.3-thiophen dicarboxylic acid	m.260
2.4-thiophen dicarboxylic acid	m.118
2.5-thiophen dicarboxylic acid	b.30

t. biniodide. $C_4H_2I_2S$ = 336.0. Thiophen diiodide. Yellow leaflets, m.40; insoluble in water, soluble in alcohol, ether or chloroform. Used as an iodoform substitute and antiseptic. **t. sulfonate.** $C_4H_3S.HSO_3$ = 164.1. Colorless crystals; insoluble in water. The sodium salt is used as an antiseptic. **t. tetrabromide.** C_4Br_4S = 400.0. A yellow crystalline powder, m.112, b.326, insoluble in water, soluble in alcohol. It is used as an antiseptic.

thiophenine. C_4H_5NS = 99.1. Aminothiophen, $C_4H_3S.NH_2$. A yellow, liquid; insoluble in water.

thiophenol. C_6H_6S = 110.1. Phenthiol, phenylmercaptan, phenylthiol*, phenylsulfhydrate, PhSH. A colorless liquid, d.1.078, b.168, insoluble in water, soluble in alcohol or ether; used in organic synthesis. **ethenylamino-** q.v.

thiophenyl. The monovalent radical, PhS—, derived from thiophenol. Cf. *phenoxy*. **t. acetone.** A colorless liquid, m.3, b.266; soluble in alcohol.

thiophosgene. $CSCl_2$ = 115.0. Thiocarbonyl chloride, carbonthionyl chloride. A red liquid, d.1.508, b.73; insoluble in water, soluble in alcohol or ether.

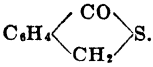
thiophosphates. A group of compounds derived from phosphoric acids by substituting divalent sulfur for one or more oxygen atoms; as,

*mono*thiophosphates	M_3PO_3S
*di*thiophosphates	$M_3PO_2S_2$
*tri*thiophosphates	M_3POS_3
*tetra*thiophosphates	M_3PS_4

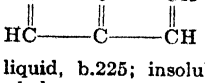
thiophosphoric acid. $PS(OH)_3$ = 114.12. A solid, decomp. by water, soluble in alcohol. **t. anhydride.** Phosphorus pentasulfide.

thiophosphorous anhydride. Phosphorus trisulfide.

thiophosphoryl. The trivalent radical, PS≡ derived from thiophosphoric acid. **t. bromide.** $PSBr_3$ = 302.86. A yellow solid, d.2.85, m.38, decomp. by further heat and by water. **t. chloride.** $PSCl_3$ = 169.5. A colorless liquid, $d_0°$.1.68, b.126, decomposed by water. **t. triamide.** $PS(NH_2)_3$ = 111.18. A white solid, decomp. by heat or water, d.1.7.

thiophthalide. C_8H_6OS = 150.1. The heterocyclic compound,  Colorless crystals, m.60.

thiophthene. $C_6H_4S_2$ = 140.10. Bithiophene. The heterocyclic compound,



A colorless liquid, b.225; insoluble in water, soluble in alcohol.

thiopyrophosphoryl bromide. $P_2S_3Br_4$ = 477.94. A yellow liquid, decomp. by water or heat.

thioresorcinol. $C_6H_4(SH)_2$ = 142.19. A yellowish-gray powder, m.27, b.243, insoluble in water; used medicinally as an antiseptic.

thiosemicarbazide. CH_5N_3S = 91.1. $H_2N.CS.NH.NH_2$. Colorless needles, m.181, soluble in water, used in organic synthesis, and as reagent for aldehydes and ketones.

thiosinamine. Allylsulfocarbamide. **t. ethyliodide.** $C_4H_8N_2S.C_2H_5I$ = 272.1. Tiodine. Colorless crystals, soluble in water or alcohol; used in medicine.

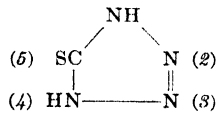
thiostannates. A salt of thiostannic acid, M_2SnS_3.

thiostannic acid. H_2SnS_3 = 216.9. Yellow unstable crystals.

thiosulfate. A salt of thiosulfuric acid of the type, $M_2S_2O_3$. Cf. *sodium t., thionate*.

thiosulfuric acid. $H_2S_2O_3$ = 114.0. An unstable acid, decomp. readily to sulfur and sulfurous acid.

thiotetrazoline. The heterocyclic compound;

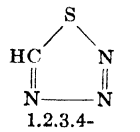


known in its compounds, *e.g.*, 1-phenylthiotetrazoline, $Ph(CHN_4S)$, m.142.

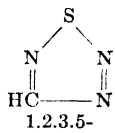
thiotolene. C_6H_6S = 98.13. Methylthiophen. A homolog of thiophen, C_4H_3MeS.

2- or alpha-	m.13, b.113
3- or beta-	b.120

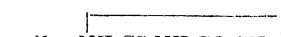
thiotriazole. CHN_3S = 87.1. The heterocyclic compounds:



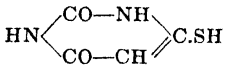
1.2.3.4-triazsulfole



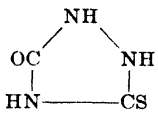
1.2.3.5-

thiouracil.  A compound used in hyperthyroidism.

thiouramil. $C_4H_4O_2N_2S$ = 144.1. The heterocyclic compound,



thiourazole. $C_2H_3ON_3S$ = 75.0. The heterocyclic compound,



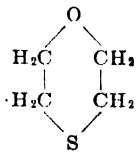
Colorless crystals, m.177; soluble in alcohol.

thiourea. CH_4N_2S = 76.1. Sulfourea, sulfocarbamide, thiocarbamide, $NH_2.CS.NH_2$ or $NH_2.CNH.SH$. Colorless prisms, d.1.42, m.180, slightly soluble in water, alcohol or ether. Used in organic synthesis, and as reagent for bismuth. **allyl-** See *allylsulfocarbamide*. **benzoyl-** q.v. **benzyl-** q.v. **diethyl-** q.v. **dimethyl-** q.v. **diphenyl-** Sulfocarbanilide. **ethyl-** q.v. **glycol-** q.v. **phenyl-** q.v. **pseudo-** $NH_2.CNH.SH$. Cf. pseudo-*urea*.

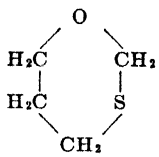
thiourethane. C_3H_7ONS = 105.14. The solid, $NH_2.CO.SEt$, m.108 (sublimes), insoluble in water, soluble in alcohol or ether.

thioxalic acid. $C_2H_2O_2S_2$ = 122.08. $(CO.SH)_2$. Cf. *rubeane*.

thioxane. C_4H_8OS = 104.1. The heterocyclic compounds,

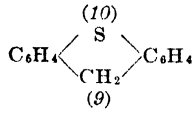


1.4- or *p*-



1.3- or *m*-

thioxanthene. $C_{13}H_{10}S$ = 198.1. Methylenediphenylenesulfide,

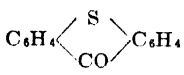


(*10*)

(*9*)

Colorless crystals, m.128, b.340; used in organic synthesis.

thioxanthone. $C_{13}H_8OS$ = 212.1. Benzophenone sulfide.



Colorless crystals, m.207, b.340.

thioxene. C_6H_8S = 112.13. Dimethylthiophen, $C_4H_2Me_2S$. A homolog of thiophen; four isomers:

2.3-	b.136	2.5-	b.135
2.4-	b.138	3.4-	b.145

thiozon. An allotrope of sulfur, q.v.

third law of thermodynamics. See *thermodynamics, entropy.*

third order. See *reactions, tertiary.*

thiuram. (1) The radical $R_2N.CS.$—. (2) $C_6H_{12}N_2S_4$ = 240.35. Bis(dimethylthiocarbamyl)-disulfide, $(Me_2N.CS.S)_2$. Yellow crystals, d.1.29, m.155. **ethyl-** $C_{10}H_{20}N_2S_4$ = 296.41. Bis(diethylthiocarbamyl)-disulfide, tetraethylthiuramdisulfide, $(Et_2N.CS.S)_2$. Yellow crystals, m.70. **t. disulfide.** A compound of the type $R_2N.CS.S.CS.NR_2$. **t. monosulfide.** A compound of the type $R_2N.CS.S.CS.NR_2$. Cf. *xanthogenate.*

thiurea. Thiourea.

thiuret. $C_6H_7N_3S_2$ = 185.2. A colorless crystalline powder, insoluble in water, soluble in alcohol or ether; used medicinally as an iodoform substitute.

thixotrope. A colloid whose properties are changed by mechanical treatment; as, clay.

thixotropic. Pertaining to thixotropy. **t. viscosity.** The anomalous viscosity of sols which are about to gel.

thixotropy. The property of certain gels of becoming fluid on shaking, and coagulating again when left at rest; as, a suspension of ferrous hydroxide. It is explained by the mechanical destruction of the zones (q.v.) of oriented molecules.

Thomas, Sidney Gilchrist. 1850–1885. An English technologist noted for his improvement of the Bessemer process. **T. meal. Basic slag. T. process.** The use of burned dolomite as a converter lining, which reacts with the phosphorus of the pig iron. **T. slag.** The finely-powdered basic slag obtained in the Thomas process. It consists of phosphates, and is used as a fertilizer.

Thompson, Benjamin. See *Rumford.*

Thompson process. Welding by means of an electric arc with the metal as an electrode.

Thomsen, Hans Peter Jürgen Julius. 1826–1909. A Danish chemist, noted for his work in thermochemistry. **T. process.** The manufacture of soda and alumina by heating powdered cryolite with lime, leaching out the sodium aluminate, and decomposing the latter into aluminum hydroxide and sodium carbonate by means of carbon dioxide.

thomsenolite. $NaCaAlF_6.H_2O$. A native fluoride of aluminum, calcium, and sodium.

Thomson, Sir Joseph John. 1856–1940. An English physicist noted for work in theoretical physics, discoverer of the electron, and Nobelist in 1906. **T., Thomas.** 1773–1852. An English chemist noted for his textbooks. **T., William.** Lord Kelvin.

thomsonite. A variety of zeolite sometimes used as a gem. It is a hydrous aluminum sodium calcium silicate.

thoria. Thorium oxide.

thorianite. A complex mineral which contains 70 % thorium oxide, 10–12 % uranium oxide, and rare earths.

thorite. $ThSiO_4$. A native thorium silicate, containing Ca, Fe, Mn, and V; varieties are freyalite and orangite.

thorium. Th = 232.12. A metal and element, atomic number 90. It occurs in monazite and thorite, and was discovered in 1828 by Berzelius. A gray, amorphous or crystalline, soft mass, readily burning in air to thorium oxide, d.11.2, m.1700; insoluble in water, alcohol, alkalis or acids, soluble in aqua regia. Thorium is radioactive and disintegrates into a series of elements. Cf. *radioactive elements, isotopes.* **meso-** See *mesothorium.* **radio-** See *radiothorium.*

t. Ω. Hibernium. **t. anhydride.** T. oxide. **t. chloride.** $ThCl_4$ = 374.2. Colorless, deliquescent plates, d.4.59, m.820 (sublime), soluble in water, alcohol or ether; used in the manufacture of incandescent burners. **t. dioxide.** T. oxide. **t. emanation.** Thoron, Tn. A radioactive gas; a disintegration-product of thorium. **t. hydroxide.** $Th(OH)_4$ = 300.4. A colorless, gelatinous substance, insoluble in water or alcohol. Formed on adding a hydroxide solution to thorium salt solutions. **t. lead.** ThD. See *radioactive elements.* **t. nitrate.** $Th(NO_3)_4.3H_2O$ = 534.2. A white, hygroscopic, crystalline or granular powder, soluble in water, decomp. to thorium oxide by heat. Used extensively in the manufacture of Welsbach mantles. **t. oxalate.** $Th(C_2O_4)_2$ = 408.12. White crystals, d.4.637, insoluble in water, soluble in ammonium oxalate solution. *hexahydrate-* $Th(C_2O_4)_2.6H_2O$ = 516.21. White amorphous powder. **t. oxide.** ThO_2 = 264.1. Thoria, t. dioxide. A white amorphous, infusible powder, d.9.9, insoluble in water or acids; it constitutes a large proportion of the white ash of incandescent gas mantles. Used medicinally as substitute for bismuth subnitrate in taking x-ray pictures. **t. picrate.** $Th(C_6H_2N_3O_7)_4.10H_2O$ = 1324.43. A yellow powder, highly explosive. **t. series.** See *radioactive elements.* **t. sulfate.** $Th(SO_4)_2.4H_2O$ = 496.2. Colorless crystals; slightly soluble in water. **t. x.** ThX. A radioactive substance produced from thorium, through the three intermediate products, Mesothorium I and II, and radiothorium. (See *radioactive series.*)

thornapple. Stramonium.

thorogummite. $UO_2.3ThO_2.3SiO_2.6H_2O$. A native hydrous silicate of thorium and uranium.

thoron. Tn = 220. Thorium emanation, ThEm. An isotope of radon (niton), and member of the thorium series. (See *radioactive elements.*)

thorotrast. A colloidal preparation of thorium oxide.

thoroughwort. Eupatorium.

Thorpe, Jocelyn Field. 1872–1940. An English chemist noted for organic synthesis; author and co-editor of *Thorpe's Dictionary of Applied Chemistry.* **T., Thomas Edward** 1845–1925. An English chemist noted for atomic weight determinations, and studies on gold.

thortveitite. A mineral, consisting chiefly of scandium silicate.

Thoulet's solution. A concentrated solution of potassium and mercuric iodides in water, d.3.17; used to determine the density of minerals by the suspension method.

thread. (1) A string, q.v. (2) A unit of worsted yarn measure, 36 inches.

three-dimensional. Pertaining to the three dimensions: length, width and height. **t. diagram.** A graph showing the relationships along the x, y and z axes of coordinates, q.v.

threonic acid. $C_4H_8O_5$ = 136.1. The hydroxy-acid, $CH_2OH(CHOH)_2COOH$ from threose.

threonine. α-Amino-β-hydroxy butyric acid.

threose. $C_4H_8O_4$ = 120.1. A tetrose and isomer of erythrose. It occurs in d- and l-forms.

threosic acid. $C_4H_6O_5$ = 134.1. The aldehyde-hydroxy acid, $CHO(CHOH)_2COOH$ from threose.

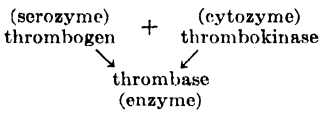
threshold. (From the German: schwellen wert). Liminal value.

thrombase. Thrombin, zymoplasm. The coagulating enzyme of the blood that transforms fibrinogen to fibrin, thus causing the coagulation of the blood.

thrombin. Thrombase.

thrombocytes. Blood platelets.

thrombogen. Serozyme. A substance of the blood that gives the enzyme, thrombase, with thrombokinase.



thrombokinase. Thrombozym. A substance in the blood cells that causes the formation of thrombase, and thence the clotting of blood. Cf. *coagulen, fibrinogen.*

thromboplastin. An extract of cattle brain. Used, in physiological salt solutions, as a hemostatic, and also in surgery.

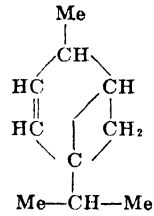
thrombosis. The formation of clots or plugs in the blood vessels.

thrombozym. Thrombokinase.

throwing power. The efficiency of an apparatus or electrolyte for the electro-deposition of metals. It is measured by: $(L - M)100/(L + M - 2)$; where L is the ratio of the distance between the anode and two half-cathodes in the liquid, and M is the ratio of the weights of metal deposited on the two half-cathodes.

thuja. Thuya. Arbor vitae, white cedar, tree of life. The dried, leafy young tops of *Thuja occidentalis,* a Pinaceae of North America and Europe. It contains an essential oil and tannin, which is used medicinally as a diuretic an sudorific. **t. oil.** Oil of white cedar. An essential oil from thuja. It has a sharp, camphor-like odor and taste, d.0.925, b.190; insoluble in water, soluble in alcohol. It contains pinene, fenchene, thujone and carvone.

thujene. $C_{10}H_{16}$ = 136.2. Tanacetene. A terpene obtained from thuja oil,



hydroxy- Thujol.

thujetic acid. $C_{28}H_{22}O_{13}$ = 566.2. A compoun obtained by heating thujin with barium hydroxide.

thujetin. $C_{14}H_{14}O_8$ = 310.1. A colorless, crystalline substance formed by hydration of thujigenin. It resembles quercitrin.

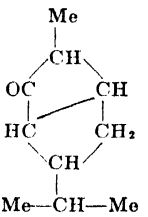
thujigenin. $C_{14}H_{12}O_7$ = 292.1. A decomposition product of thujin. Cf. *thujetin.*

thujin. $C_{20}H_{22}O_{12}$ = 454.18. A glucoside and coloring matter of thuja. Yellow crystals, insoluble in water, soluble in alcohol. It hydrolyzes to thujigenin.

thujoid. The combined principles of thuja; used medicinally.

thujol. $C_{10}H_{16}O$ = 152.2. Absinthol. Hydroxythujene. An alcohol in thuja oil.

thujone. $C_{10}H_{16}O$ = 152.2. Thalviol, 6-keto-sabinane, salviol, tanacetone. The dextrorotatory ketone,



A colorless liquid, d.0.913, b.203, from the essential oil of *Thuja* and *Salvia* species; insoluble in water, soluble in alcohol.

thujorhodin. Rhodoxanthin.

thujyl. The monovalent radical, $C_{10}H_{17}$—, derived from sabinane.

thulite. Zoisite.

thulium. Tm (or Tu) = 169.4. A rare earth metal and element, atomic number 69. It has a valency of three, and was discovered by Cleve in 1879 and independently by Soret. Its salts are greenish white. **t. chloride.** $TmCl_3$ = 275.8. Colorless crystals; soluble in water. **t. oxalate.** $Tm_2(C_2O_4)_3.6H_2O$ = 710.89. Greenish white precipitate, soluble in alkaline oxalate solutions. **t. oxide.** Tm_2O_3 = 386.8. A white amorphous powder; insoluble in water.

thuringite. $4(AlFe)_2O_3,7FeO,6SiO_2,9H_2O$. An amorphous mineral.

thus. Olibanum.

thuya. Thuja.

thymacetin. $C_6H_2MeC_3H_7(OEt)NHC_2H_3O$. Thymol-phenacetin. A white crystalline pow-

der, slightly soluble in water, soluble in alcohol; used medicinally as a hypnotic and analgesic.

thymamine. $C_{22}H_{40}O_5N_6$ = 468.2. A protamine isolated from the thymus gland.

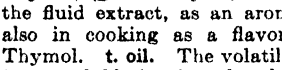
thyme. Thymus. The dried tops of *Thymus vulgaris*, (garden thyme) a Labiatae. Used, as the fluid extract, as an aromatic carminative; also in cooking as a flavoring. **t. camphor.** Thymol. **t. oil.** The volatile oil of t., d.0.894–0.930, soluble in alcohol and occurring in many grades.

thymegol. See *egol*.

thymene. $C_{10}H_{16}$ = 136.2. A terpene from thyme oil. A colorless aromatic liquid, d.0.868, b.160, insoluble in water, soluble in alcohol; used as an antiseptic. Cf. *thymine*.

thymidol. Methylpropylphenylmenthol. A condensation-product of thymol and menthol, used as an antiseptic mouth wash.

thymine. $C_5H_6O_2N_2$ = 126.06. 5-Methyluracil;



Colorless crystals, decomp. 335; a constituent of nucleic acids. Cf. *thymene*.

thyminic acid. Solurol.

thymiodol. Thymol iodide.

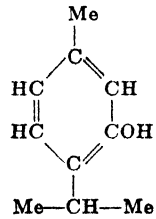
thymipin. A dialyzate of *Thymus vulgaris*, *Drosera rotundifolia* and *Pinguicula alpine*. Used in the subcutaneous treatment of whooping cough.

thymodin. Thymol iodide.

thymoform. $C_{21}H_{28}O_2$ = 312.3. A condensation-product of thymol and formaldehyde, $CH_2:(C_6H_2Me_2CH_7O)_2$. A yellow powder; insoluble in water, soluble in alcohol or ether. Used as an antiseptic dusting powder.

thymohydroquinone. $C_{10}H_{14}O_2$ = 166.16. A solid, m.140, b.290, slightly soluble in water, soluble in alcohol or ether.

thymol. $C_{10}H_{14}O$ = 150.2. Thyme camphor, p-propyl-m-cresol, 3-methyl-6-iso-propylphenol, 3-hydroxy-*p*-cymene, 1-methyl-3-hydroxy-4-isopropyl-benzene.



Colorless crystals, d.0.979, m.50, b.230, slightly soluble in water, soluble in alcohol or ether. Used as a reagent for indican, and medicinally, as an antiseptic. **acetyl-** q.v. **diiodo-** T. iodide. **hexahydro-** Menthol.

t. blue. $C_{27}H_{30}O_5S$ = 466.23. T. sulfonphthalein. A black powder, used as pH indicator, changing from pink (1.5) to yellow (2.8–8) to blue (9.6). *brom-* See *indicators*. **t. cambamate.** $C_{11}H_{15}O_2N$ = 193.2. Thymol urethane, thymotal, tyratol, thymolcarbamic ether, $C_{10}H_{13}OCO.NH_2$. A colorless crystalline powder, slightly soluble in water, decomp. by hydroxides; used medicinally as an intestinal antiseptic. **t. iodide.** $(C_{10}H_{13}OI)_2$ = 552. Diiodothymol, aristol, annidalin, thymotol, iodohydromol, iodosol, thymiodol, thymodin. A reddish-brown powder, obtained by the treatment of thymol with iodine in alkaline solution, insoluble in water, soluble in alcohol; used medicinally as an iodoform substitute and antiseptic. **t. phenacetin.** Thymacetin. **t. phthalein.** A pH indicator changing at 9.8 from colorless (acid) to blue (basic). **t. salicylate.** Salithymol. **t. sulphonphthalein.** T. blue. **t. urethane.** T. carbamate.

thymoquinone. $C_{10}H_{12}O_2$ = 164.15. Colorless crystals, m.46, b.232; soluble in water, alcohol or ether.

thymotal. Thymol carbamate.

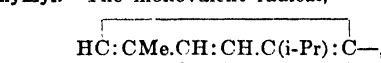
thymotic acid. $C_{11}H_{14}O_3$ = 194.27. $C_6H_2(Me)$-$C_3H_7(OH)COOH$. Colorless crystals, m.127° (sublime), soluble in alcohol or ether. **t. alcohol.** Methyl-*i*-propyl-benzyl alcohol. **t. anhydride.** $C_{11}H_{12}O_2$ = 176.15. Colorless crystals, m.174.

thymotol. Thymol iodide.

thymovidin. A hormone from thymus.

thymus. (1) Thyme. (2) A lymph-gland in the neck and chest of an infant or young animal, which disappears before maturity is reached. Cf. *thymamine*. **t. histon.** A protein from t., mol. wt. = 6000, which lowers the pressure and coagulability of blood.

thymyl. The monovalent radical,



derived from thymol.

thynnin. A protamine (75 % arginine) from the sperm of *Thymnus thynnus*, the tunny fish of the Pacific Ocean.

thyraden. A dried extract of the thyroid gland; used medicinally for rickets and cretinism.

thyratron. A gas-filled, hot-cathode, grid-controlled valve rectifier and self-amplifier.

thyresol. $C_{18}H_{23}OMe$ = 234.21. Santalol methyl ester. A colorless liquid, used medicinally as a santalol substitute in urethritis.

thyroglobulin. A pseudoglobulin containing thyroxine and diiodotyrosine; it is considered to be the thyroid hormone.

thyroid. Thyroideum siccum. The dried thyroid glands of animals. A yellowish powder, slightly soluble in water; used medicinally as an alterative. **t. gland.** A large gland in front and on either side of the windpipe of man and animals; it produces thyroxine.

thyroidectin. The dried blood of animals from which the thyroid gland has been removed; used medicinally in goiter.

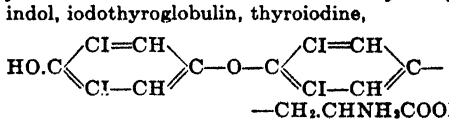
thyroidine. A crystalline iodine-free substance obtained from thyroid.

thyroiodine. Thyroxine.

thyro-oxindole. Thyroxine.

thyrotrophin. The active principle of the anterior lobe of the pituitary gland; it acts on the thyroid gland.

thyroxine. $C_{15}H_{11}O_4NI_4$ = 776.8. Thyro-oxyindol, iodothyroglobulin, thyroiodine,



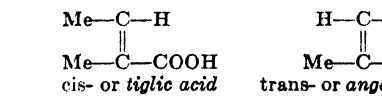
It is a derivative of tyrosine, and is the natural or synthetic active hormone of the thyroid gland. Colorless crystalline needles, m.250; insoluble in water. Used medicinally for goiter, cretinism and myxedema.

Ti. The symbol for titanium.

tiemannite. HgSe. Native mercurous selenide.

tiglaldehyde. C_5H_8O = 84.06. Guaiol, tiglic aldehyde, *2*-methyl-*2*-butenal*, MeCH:CMe.CHO. A colorless liquid, d.0.870, b.116.5.

tiglic. Pertaining to tiglium. **t. acid.** $C_5H_8O_2$ = 100.1. Methylcrotonic acid, iso-angelic acid, cevadic acid, *2*-methyl-*2*-butenoic acid*. An unsaturated, monobasic acid, which occurs in two isomeric forms in croton oil and chamomile oil.



cis- or *tiglic acid* trans- or *angelic acid*, q.v.

Colorless prisms, d.0.964, m.64, b.198; slightly soluble in water, soluble in alcohol or ether. Its isomer is angelic acid (q.v.). **t. aldehyde.** Tiglaldehyde.

tiglium. Croton seeds. The dried seeds of the croton oil plant, *Croton tiglium*, an Euphorbiaceae of the East Indies and Philippines. It contains croton oil, tiglic acid and crotonol; used as a drastic purgative.

tikitiki. Darak.

tile ore. Cuprite.

tilia. Linden flowers, lime flowers. The dried flowers of *Tilia europea*, a Tiliaceae of Europe. It contains an essential oil; used as an antispasmodic and tonic.

Tillmans' reagent. *2,6*-Dichlorophenol indophenol, which is a quantitative reducing agent for ascorbic acid.

timbo. The bark of *Serjania curassavica*, a Sapindaceae of Brazil; it contains an alkaloid and is used by natives as a fish-poison.

timbonine. An alkaloid from timbo.

time. (1) The fourth dimension; a measure of duration of an object, phenomenon or event. The standard unit is the second, *i.e.*, 1/86,400 part of a mean solar day; 1 second equals 1000 σ. Sensitive measurements of time are made with a tuning fork (registers $\frac{1}{1000}$ to $\frac{1}{10000}$ second). Longer periods are measured in days (q.v.) and years, q.v. The velocity of light per meter is 10^{-8} second. (See table.) (2) The relative hour of a day, which depends on geographical longitude and the position of the earth relative to the sun. Cf. *year*.

MAGNITUDES IN TIME

Sun diminishing one half its mass		1.5×10^{19}	sec.
Thorium, average life	25,000,000,000 yrs.	7.7×10^{17}	sec.
Uranium, average life	6,300,000,000 yrs.	1.9×10^{17}	sec.
Earth age (He in rocks)	2,000,000,000 yrs.	6×10^{16}	sec.
Universe, doubling in size	1,400,000,000 yrs.	4.3×10^{16}	sec.
Earth, Proterozoic era	850,000,000 yrs.	2.6×10^{16}	sec.
Earth, Paleozoic era	420,000,000 yrs.	1.3×10^{16}	sec.
Sun period in Milky Way	200,000,000 yrs.	6.2×10^{15}	sec.
Earth, Quaternary period	1,500,000 yrs.	4.6×10^{13}	sec.
Ionium, average life	120,000 yrs.	5×10^{12}	sec.
Dawn of history	6,000 yrs.	1.9×10^{11}	sec.
Birth of Christ	1,943 yrs.	6×10^{10}	sec.
Pluto period around sun	282 yrs.	8.7×10^{9}	sec.
Neptune period around sun	164.7 yrs.	5×10^{9}	sec.
Steam engine invented	162 yrs.	4.9×10^{9}	sec.
Oxygen discovered	162 yrs.	4.9×10^{9}	sec.
Urea synthesized	107 yrs.	3.1×10^{9}	sec.
Man, average life	42 yrs.	1.3×10^{9}	sec.
Radium and x-ray discovered	35 yrs.	1×10^{9}	sec.
1 year = 31,536,000 sec		3.1×10^{7}	sec.
Earth period around sun	365.2 days	3.1×10^{7}	sec.
Mercury period around sun	87.96 days	7.6×10^{6}	sec.
Uranium X[1], average life	35.4 days	3×10^{6}	sec.
Moon period around earth	27.8 days	2.3×10^{6}	sec.
Sun rotation	24.6 days	2×10^{6}	sec.
Radium E, average life	7 days	6×10^{5}	sec.
1 day = 86,400 sec		8.6×10^{4}	sec.
Earth rotation, 23h. 56m. 4 sec		8.6×10^{4}	sec.
1 hour = 3,600 sec		3.6×10^{3}	sec.
Radium A, average life, 4.5 sec		270	sec.
1 minute = 60 seconds = 60,000 sigmas		60	sec.
1 second = 1,000 sigmas (σ)		1	sec.
Motion-picture image on screen	64 σ	6.4×10^{-2}	sec.
Engine wheel period (1,500 r.p.m.)	40 σ	4×10^{-2}	sec.
Alternating current cycle	10 σ	1×10^{-2}	sec.
Sound vibration (C_3)	4 σ	4×10^{-3}	sec.
Sound vibration (C_4)	2 σ	2×10^{-3}	sec.
Photographic shutter, fastest	1 σ	1×10^{-3}	sec.
1 sigma (σ) = 1,000 millisigma (mσ)		1×10^{-3}	sec.
Chromatine image	100 mσ	1×10^{-4}	sec.
Oscillograph	1 mσ	1×10^{-6}	sec.
Radium C', average life	1 mσ	1×10^{-6}	sec.
1 millisigma (mσ = 1,000 microsigma ($\mu\sigma$)		1×10^{-6}	sec.
High frequency cycle	100 $\mu\sigma$	1×10^{-7}	sec.
Radio oscillation	80 $\mu\sigma$	8×10^{-8}	sec.
Lingering period of excited atom	1$\mu\sigma$	1×10^{-9}	sec.
Thorium C', average life	1$\mu\sigma$	1×10^{-9}	sec.
1 microsigma ($\mu\sigma$) = 0.000,000,001 second		1×10^{-9}	sec.
Yellow light oscillation		5×10^{-14}	sec.
Cosmic ray oscillation		1×10^{-22}	sec.

tin. Sn = 118.70. Stannum. A metal and element, atomic number 50. A silver-white, rhombic or tetragonal metal, d.7.29, m.232, b.2270, insoluble in water, decomp. in dilute acids or concentrated alkalis. Crystalline forms:

Snβ gray tin d.5.85 brittle	18°C ⇌	Snα tetragonal d.7.29 malleable	170°C ⇌	Snγ rhombic d.6.56 brittle

Tin has a valency of two and four, and forms two series of compounds:

valency:	2	4
cations:	Sn^{++}, stannous	Sn^{++++}, stannic
anions:	SnO_2^{--}, stannites	SnO_3^{--}, stannates

The tin-organic compounds are derived mainly from tetravalent t. It is used as a metal, in alloys for t. foils, solders, utensils, type metal, dental alloys; and in the manufacture of tin salts. The World output in 1941 was 237,000 long tons, produced chiefly in the Federated Malay States > Dutch East Indies > Bolivia > Thailand > China > Nigeria.

alpha- White t. **beta-** Gray t. **black-** A treated t. ore which contains 60–70 % SnO_2. **block-** Cassiterite. **butter of-** Stannic chloride. **cry of-** The sound heard on bending a stick of tin. **flowers of-** Stannic oxide. **gray-** Beta t., β-tin. An enantiotropic form of white t. produced as a gray powder when the white t. is cooled to −40°C; the transition point is 18°C. It is the cause of tin disease, q.v. **stream-** Tinstone, occurring in an alluvial deposit. **tetraphenyl-** See *t. tetraphenyl*. **white-** Alpha-, ordinary-, α-tin. The usual form of malleable tin.

t. acetate. Stannous acetate. **t. alkyls.** A compound of the type SnR_4. See *stannanes, t. tetraethyl, t. tetramethyl, etc.* **t. alloys.** A mixture of tin and other metals. The melting points of some binary alloys are:

with	90 % Sn 10 %	80 % Sn 20 %	70 % Sn 30 %	60 % Sn 40 %	50 % Sn 50 %
Al	540°C	560°C	570°C	590°C	605°C
Ag	300°C	375°C	420°C	450°C	495°C
Sb	255°C	310°C	350°C	395°C	430°C
Cu	440°C	530°C	580°C	630°C	680°C
Pb	216°C	200°C	185°C	190°C	220°C
Ni	800°C	1060°C	1230°C	1305°C	1290°C

Cf. tables under *Al, Co, Pb, Ni, Ag;* also *babbitt, Britannia, pewter, rhine-metal, solder.* **t. ammonium chloride.** Pink salt. **t. anhydride.** Stannic oxide. **t. ash.** Stannic oxide. **t. bath.** Molten tin into which metals are dipped, and so coated with a film of tin. **t. bichloride.** (1) Stannic chloride. (2) Sodium stannic chloride, Na_2SnCl_6. **t. bisulfide.** T. disulfide. **t. bronze.** Stannic sulfide. **t. chlorides.** (1) Stannous chloride. (2) Stannic chloride. **t. chloride solution.** A solution of 5 pts. stannous chloride in 1 pt. hydrochloric acid. A slightly yellow, refractive liquid, d.1.9, used as a reagent. **t. chromate.** See *stannic* or *stannous chromate.* **t. citrate.** Stannous citrate. **t. dichloride.** Stannous chloride. **t. diethyl*.** $Sn(C_2H_5)_2$ = 176.8. Stannous ethide. An oily liquid, d.1.654, decomp. by heat; insoluble in water, soluble in alcohol. **t. dioxide.** Stannic oxide. **t. disease.** The transformation into grey t. and the resulting brittleness and loss of metallic luster. **t. disulfide.** Stannic sulfide. **t. foil.** A thin sheet of tin or tin alloy; used for wrapping food and other articles to prevent them drying out. **t. glass.** (1) A glass that contains tin; as, certain flint glasses. (2) An obsolete name for bismuth. **t. glaze.** An opaque glaze formed on pottery by tin salts. **t. hydroxide.** Stannic hydroxide. **t. iodide.** Stannic iodide. **t. minerals.** The chief ore of tin is the oxide, cassiterite. Others are:

cassiterite	SnO_2
stannite	Cu_2FeSnS_4
teallite	$PbSnS_2$
cylindrite	$Pb_3FeSn_4Sb_2S_{14}$
nordenskioldine	$CaSnB_2O_6$

t. monosulfide. Stannous sulfide. **t. monoxide.** Stannous oxide. **t. mordant.** A tin salt used in dyeing; as, stannous chloride or stannic chloride. **t. oxalate.** Stannous oxalate. **t. oxide.** See *stannous oxide, stannic oxide.* **t. oxychloride.** Stannous chloride. **t. oxymuriate.** Commercial stannic chloride, $SnCl_4.5H_2O$. **t. peroxide.** Stannic oxide. **t. pickling.** The process of immersing iron in diluted acids prior to a tin bath. **t. plate.** A sheet iron or steel covered with a film of tin. **t. protochloride.** Stannous chloride. **t. protoxide.** Stannous oxide. **t. pyrites.** Stannine. **t. salt.** Stannous chloride. **t. spar.** Cassiterite. **t. sponge.** Argentine. **t. stone.** Cassiterite. **t. sulfate.** Stannous sulfate. **t. tetraethyl.*** $Sn(C_2H_5)_4$ = 234.9. Stannic ethide. A colorless liquid, d.1.187, b.181; insoluble in water, soluble in alcohol. **t. tetramethyl.*** $Sn(CH_3)_4$ = 178.81. Stannic methide. A colorless liquid, d.1.314, b.78; insoluble in water, soluble in alcohol. **t. tetraphenyl.*** $Sn(C_6H_5)_4$ = 426.7. Stannic phenide. Colorless crystals, m.226, b.420; soluble in ether. **t. triethyl.*** $Sn_2(C_2H_5)_6$ = 411.7. Distannic ethide, $Et_3Sn—SnEt_3$. A colorless liquid, b.270, insoluble in water or alcohol. **t. triethylhydroxide.** $Sn(C_2H_5)_3OH$ = 222.7. Stannic ethylhydroxide, Et_3SnOH. Colorless crystals, m.66, b.272.

tincal. Borax.

tincture. A medicated liquid made by extraction of a drug and generally weaker in strength than a fluid extract. **alcoholic-** A solution made by percolating 10 gms. of a drug with 100 cc. of alcohol, or macerating the same quantity of a resinous drug. **aqueous-** An extract made with water.

t. of iodine. A solution of 7 gm. iodine and 5 gm. potassium iodide in 5 cc. water, made up to 100 cc. with alcohol; used medicinally as an antiseptic.

tinder. Inflammable charred linen or wood used for lighting furnaces.

tinkal. Borax.

tinning. Coating with a film of tin; as, tin plate.

tinstone. Cassiterite.

tint. A shade of a color.

tintometer. A colorimeter or device for estimating the intensity of a colored solution by comparison with standard solutions, or colored glass slides.

tiodine. Thiosinamine ethyliodide.

tissue. In biology, a structure composed of cells and cell products.

titan yellow. Clayton yellow, thiazol yellow. A yellow dye made from dehydrothio-*p*-toluidine, used for detection of caustic alkalis (red) and magnesium (red). Cf. *titanellow.*

titanate. A salt of titanic acid; as, M_2TiO_3—metatitanate, M_4TiO_4—orthotitanate.

titanellow. Yellow titanium oxide, used for making ivory shades in dental porcelain, for dental cements and for yellow tiles. Cf. *titan yellow.*

titania. Titanium dioxide.

titanic. Pertaining to tetravalent titanium. **t. acid.** (1) H_2TiO_3 = 97.9. *meta-* $TiO(OH)_2$. A colorless precipitate obtained by boiling titanium sulfate solution, insoluble in water or acids, soluble in alkalis with the formation of salts. (2) H_4TiO_4 = 115.9. *ortho-* $TiO(OH)_4$. A white precipitate obtained by adding acids to metatitanates, soluble in excess of acid or alkali and forming with the latter, the titanyl radical. **t. anhydride.** Titanium oxide. **t. chloride.** Titanium tetrachloride. **t. hydroxide.** Titanic acid. **t. iron.** Ilmenite. **t. oxide.** Titanium dioxide.

titaniferous. Containing titanium, (mineralogical). **t. iron ore.** Ilmenite.

titanite. Sphene.

titanium. Ti = 47.90. A metallic element of the carbon group, atomic number 22, discovered by Gregor, 1789. It is a dark gray, amorphous metal, d.4.9, m.1800; insoluble in water, soluble in warm hydrochloric acid. Used (as ferrotitanium) as a cleaning and deoxidizing agent for molten steel; and in alloys with copper, bronze and other metals. Cf. *konel.* It has a valency of 2, 3, and 4 and forms several ions:

Ti^{+++}	titanous ion
Ti^{++++}	titanic ion
TiO_3^{--}	m-titanate ion
TiO_4^{----}	o-titanate ion
TiO^{++}	titanyl ion

t. bromide. $TiBr_4$ = 367.8. Orange crystals, d.2.6, m.39, b.230, decomp. by water. **t.**

chlorides. See *t. dichloride, t. trichloride, t. tetrachloride.* **t. dichloride.** $TiCl_2$ = 119.0. Titanous chloride. A black, hygroscopic powder, decomp. by water and burns when heated in air. **t. dioxide.** TiO_2 = 80.1. Titania. Colorless to black tetragonal or rhomic crystals, d.3.70–4.26, m.1560; insoluble in water, soluble in alkalis or concentrated sulfuric acid. In its pure state it is used as a white pigment for paint, water colors, inks, shoe polish, soap, rubber goods and for ceramic glazes, and as a filler for paper. **t. hydroxide.** (1) $Ti(OH)_3$ = 98.9. Titanous hydroxide. A blue black powder insoluble in water. (2) $Ti(OH)_4$ = 115.9. Titanic hydroxide. A white, insoluble solid. **t. iodide.** TiI_4 = 555.8. Titanic iodide. Red octahedral crystals, m.150, b.330; soluble in water or alcohol. **t. minerals.** Titanium is widely diffused in igneous and sedimentary rocks.

ilmenite	$FeTiO_3$
pseudobrookite	$Fe_4(TiO_4)_3$
perofskite (perowskite)	$CaTiO_3$
titanite	$CaTiSiO_5$
rutile, brookite, anatase, octahedrite	TiO_2

t. nitrate. Titanyl nitrate. **t. nitride.** Ti_2N_2 = 123.8. A dark powder prepared from rutile and nitrogen in the electric furnace; used for dusting moulds previous to casting steel. **t. oxalate.** $Ti_2(C_2H_4)_3.10H_2O$ = 539.97. Yellow prisms, soluble in water. **t. oxides.** See *t. sesquioxide, t. dioxide, t. trioxide.* **t. peroxide.** T. trioxide. **t. sesquioxide.** Ti_2O_3 = 143.8. A black amorphous powder, insoluble in water, soluble in concentrated acids. **t. sulfates:** (1) $Ti(SO_4)_2$ = 240.1. Colorless crystals; soluble in water. (2) $Ti_2(SO_4)_3$ = 384.0. Green crystals; insoluble in water, soluble in dilute acids. It is an antiseptic. **t. trichloride.** $TiCl_3$ = 154.5. Dark violet crystals, decomp. 440, soluble in water, alcohol or acids; used as a reducing agent in analytical chemistry. **t. trioxide.** TiO_3 = 95.9. Titanellow, q.v. A yellow powder. **t. tetrachloride.** $TiCl_4$ = 189.9. Titanic chloride. A colorless liquid, d.1.76, m.−26, b.136, soluble in water; used as a mordant in dyeing. **t. white.** A white pigment composed chiefly of t. dioxide.

titanous. Pertaining to trivalent titanium. **t. chloride.** Titanium trichloride.

titanox. A mixture of titanium oxide and barium sulfate (3:1) kneaded with linseed oil and turpentine, and used for paints. **t. B.** 25 % TiO_2 with 75 % $BaSO_4$. **t. C.** 30 % TiO_2 with 70 % $CaSO_4$.

titanyl. The divalent radical, TiO=. **t. nitrate.** $TiO(NO_3)_2$ = 188.1. Titanium nitrate. Colorless crystals; soluble in water. **t. sulfate.** $TiOSO_4$ = 160.1. White crystalline needles; soluble in acidic water; used as a mordant in dyeing.

titer. (1) A standard test for oils and waxes in which the sample is completely saponified, and the solidifying-point (or titer) of the resulting separated and washed fatty acids determined. (2) The number of cc. per liter by which a normal solution differs from a true standard. (3) The normality of a solution as determined by titration with a standard. (4) The number of grams of an element, radical or compound in one cc. of a standard solution.

titrant. The standardized solution used for titration.

titrate. (1) To analyze by a volumetric method. (2) The solution being titrated.

titrating. The process of titration. Cf. volumetric *analysis.*

titration. The volumetric determination of a constituent in a known volume of a solution by the slow addition of a standard reacting solution of known strength until the reaction is completed. The end-point of the reaction is indicated by a change of color (indicators) or by galvanometric measurements. **differential-.** The t. of equal portions of the test solution in such a way that one always contains the same volume of the titrating solution in excess of that in the other. At the end-point the potential difference between the solutions in a maximum. **t. error.** The ratio of the concentration of active ions at the end-point to the initial concentration.

titre. Titer.

titrimeter. A line-operated vacuum tube device for potentiometric titrations, in which the potential changes of the system are followed continuously and automatically on a microammeter, which may be calibrated to read e.m.f. directly. Cf. *potentiometer, sectrometer.*

titrol. Tea tree oil. The volatile oil of *Melaleuca alternifolia*, a Myrtaceae of Australia; an antiseptic. Cf. *melasol.*

Tl. Symbol for thallium, element No. 81.

Tm. Symbol for thulium, element No. 69.

Tn. Symbol for thoron, isotope of No. 86.

tn. Abbreviation for ton.

T.N.A. An abbreviation for trinitroaniline.

T.N.B. An abbreviation for trinitrobenzene.

T.N.T. An abbreviation for trinitrotoluene.

T.N.X. An abbreviation for trinitroxylene.

tobacco. Tabacum. The dried leaves of *Nicotiana tabacum*, a Solanaceae. It contains nicotine, nornicotine, nicotianine, nicotelline and other alkaloids; used medicinally as a relaxant, and in large quantities for smoking and as a fumigant and insecticide. **Indian- Lobelia. t. stems.** The ground waste-products of t., used as fertilizer: 1.2–3.3 % N_2, 4–9 % K_2O.

Tobias acid. *2*-Naphthylamine-*1*-sulfonic acid; used as an intermediate.

Tobin bronze. An alloy of 55 pts. copper, 43 pts. zinc and 2 parts tin.

tocopherols. See *vitamins E.*

toddy. (1) The fermented sap of the coconut and other palms. (2) A hot tea containing some spirituous liquor. **t. test.** See *test.*

Toison solution. A staining solution for the red blood corpuscles: 0.025 gm. methyl violet (6B), 1.0 gm. sodium chloride, 8.0 gm. sodium sulfate, 30 cc. glycerin in 300 cc. water.

tolamine. Chlorazene.

tolane. $C_{14}H_{10}$ = 178.2. Bibenzyl, diphenylacetylene. The unsaturated hydrocarbon, PhC:CPh. Colorless crystalline leaflets, m.60, b.275; insoluble in water, soluble in alcohol or ether. **t. sulfide.** $C_{14}H_{10}S$ = 210.1. Tollalylsulfide. PhC(=CPh)–S– Colorless crystals, m.174.

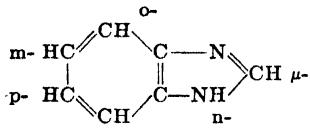
tolerance. (1) The capacity to withstand the effects of a continued use of a drug. (2) The limit of error permitted in the graduation of measuring instruments, as, standardized burets; or, in general, of any standardized product.

tolidine. $C_{14}H_{16}N_2$ = 212.22. Dimethylbenzidine, 4.4′-diamino-3.3′-dimethyldiphenyl, $NH_2MeC_6H_3.C_6H_3MeNH_2$. **3.3′.4.4′.-** Colorless

scales, m.129, slightly soluble in water, soluble in alcohol or ether. **2.2′.4.4′-** m.109. **1.1′.4.4″-** m.128; **a reagent. t. sulfate.** $C_{14}H_{16}N_2.H_2SO_4$ = 310.3. A white or reddish crystalline powder; slightly soluble in water or alcohol.

tolil. $C_{16}H_{14}O_2$ = 238.11. Dimethylbenzil. A group of ketones; $MeC_6H_4CO.COC_6H_4Me$.

tolimidazole. $C_7H_6N_2$ = 118.1. The heterocyclic compound,



tolite. Trinitrotoluene.

tollalyl sulfide. Tolane sulfide.

Tollens, Bernhard. 1841– . A German agricultural chemist, noted as author. **T. reagent.** An ammoniacal solution of silver oxide, used in testing for aldehydes and ketones.

toloxy. Cresoxy. The monovalent radical, $Me.C_6H_4O$— or methylphenoxy group, from cresol.

tolu. Balsam of Tolu. The resinous exudation of *Myroxylon toluifera*, or *Toluifera balsamum*, a Leguminosae of tropical America; used medicinally as a stimulant and stomachic. **t. oil.** Albahaca oil.

tolualdehyde. C_8H_8O = 120.06. Toluic aldehyde. **α-** Phenylacetaldehyde, $PhCH_2CHO$. A liquid, d.1.027, b.194. **o-** Methylbenzaldehyde, $Me.C_6H_4CHO$. A liquid, d.1.039, b.-195.5. **m-** d.1.019, b.195. **p-** d.1.020, b.204.

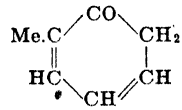
toluamide. C_8H_9ON = 135.1. (1) Carbamyltoluene. $Me.C_6H_4.CONH_2$. **ortho-** Colorless needles, m.139; slightly soluble in water, soluble in alcohol or ether. **meta-** Colorless crystals, m.94; slightly soluble in water. **para-** Colorless needles, m.158; slightly soluble in water, soluble in alcohol or ether; used in organic synthesis. (2) α-Phenylacetamide. $C_6H_5CH_2CONH_2$.

toluanilide. $C_{14}H_{13}NO$ = 211.11. α-phenylacetanilide, $PhNHCOCH_2Ph$. Colorless crystals, m.117.

toluene. C_7H_8 = 92.1. Toluol, methylbenzene, phenylmethane, PhMe. A colorless, benzene-like liquid, d_{15}°.0.871, m. −93.2, b.111; insoluble in water, soluble in alcohol or ether. It is obtained from coal tar and is used extensively as a solvent, in organic synthesis, in the manufacture of benzoic acid derivatives, and coal-tar products. For derivatives see *benzal, benzenyl, benzyl, benzylene, tolyl, tolylene.* **amino-** Toluidine. **aminohydroxy-** Cresidine. **bromo-** C_7H_7Br = 171.1. Monobromtoluene, MeC_6H_4Br. (1) *ortho-* A colorless liquid, d.1.41, b.182; soluble in alcohol, ether or benzene. (2) *para-* Pale red crystals; soluble in alcohol or benzene. *alpha-* Benzylbromide. **chloro-** C_7H_7Cl = 126.6. Monochloro-p-toluene. A colorless liquid, d.-1.073, b.161; soluble in alcohol or ether. *alpha-* Benzylchloride. **cyano-** C_8H_7N = 117.1. Toluic nitrile, $CN.C_6H_4Me$. (1) *para-* A yellow crystalline powder, m.28, b.218; soluble in alcohol, ether or benzene. (2) *ortho-* A brown liquid, b.203; soluble in alcohol, ether or benzene. *alpha-* Benzylcyanide. **diacetylamidoazo-** Dimazon. **dihydroketo-** Toluenone. **isopropyl-** Cymene. **nitro-** q.v. **nitroso-** C_7H_7ON = 121.1. Nitrosomethylbenzene, $NO.C_6H_4.M$ *ortho-* m.72; *meta-* m.53; *para-* m.48. **oxy** Cresol. **phenyl-** q.v. **trichloro-** Benzotrichloride. **trinitro-** q.v. **trinitro-*tert.*-butyl-** Artificial musk.

t. sulfonic acid. $C_7H_8O_3S$ = 172.1. $Me.C_6H_4.SO_3OH$. Cf. *tosyl. ortho-*, $2H_2O$ = 208.2. Colorless crystals, b.129; soluble in water or alcohol. *meta-* $.H_2O$ = 190.1. Colorless needles; soluble in water, alcohol or ether. *para-* $.4H_2O$ = 244.1. Colorless leaflets, m.107; soluble in water, alcohol or ether. *hydroxy-* Cresol sulfonic acid. **t. sulfonic amide.** $C_7H_9O_2NS$ = 171.18. $Me.C_6H_4.SO_2NH_2$. *ortho-* m.155; *meta-* m.107; *para-* m.137. **t. sulfochloride.** $C_7H_7O_2SCl$ = 190.61. $MeC_6H_4SO_2Cl$, used as a reagent for amines. **t. sulfonylchloride.** T. sulfochloride. *ortho-* m.10, $b._{10mm}$.126; *meta-* m.12; *para-* m.66, $b._{15mm}$.145.

toluenone. C_7H_8O = 108.1. The carbocyclic ketone,



toluenyl. The radical C_6H_5CH=. Cf. *toluylene, tolylene.*

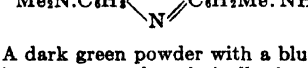
toluic acid. $C_8H_8O_2$ = 136.10. Methylbenzoic acid. The monobasic homolog of benzoic acid, $Me.C_6H_4.COOH$; three isomeric forms: *ortho-* Colorless needles, m.102, b.259; soluble in water, alcohol or ether. *meta-* Colorless prisms, m.110, b.263; slightly soluble in water, soluble in alcohol or ether. *para-* Colorless needles, m.176, b.275, soluble in water, alcohol or ether; used in organic synthesis. **alpha-** α- Phenylacetic acid, $Ph.CH_2.COOH$. Crystals, d.1.078, m.76.7, b.-265.5. **o-carboxy-** Homophthalic acid. **dihydroxy-α-** Homogentisic acid. **α-hydroxy-α-** Mandelic acid. **α-methyl-α-** Hydratropic acid. **methyl-** Xylic acid.

t. aldehyde. α-Tolualdehyde. **t. anhydride** $C_{16}H_{14}O_3$ = 254.2. o-Toluic acid anhydride, $(Me.C_6H_4CO)_2O$. Colorless crystals, m.36, b.-325; soluble in water. **t. nitrile.** Cyano*toluene.*

toluidide. One of a class of compounds derived from the toluidines by replacing one of the amino H atoms by an acyl radical; *e.g.*, $MeC_6H_4NHCOMe$, acetotoluidide.

toluidine. C_7H_9N = 107.12. Aminotoluene, $Me.C_6H_4.NH_2$. *ortho-* Colorless liquid, d.1.003, b.198. *meta-* Colorless liquid, d.0.989, b.203. *para-* Colorless leaflets, m.43, b.200; slightly soluble in water, soluble in alcohol or ether; used extensively in the synthesis of dyes and medicines. **acetyl-** Acetotoluide. **diethyl-** q.v. **methyl-** Xylidine. **nitro-** q.v. **thionyl-** q.v.

t. blue. $C_{15}H_{16}N_3SCl.ZnCl_2$. A double salt of zinc chloride and dimethyltoluthionine.



A dark green powder with a blue luster, soluble in water; used technically in dyeing textiles. Cf. *methylene blue, thiazine dyes, thionine.* **t. hydrochloride.** $C_7H_9N.HCl$ = 143.6. Pale red crystals; soluble in water or alcohol. **t sulfate.** $C_7H_9N.H_2SO_4$ = 205.1. Yellowish crystals; soluble in water or alcohol.

toluido. The monovalent radical MeC_6H_4NH— derived from toluidine.

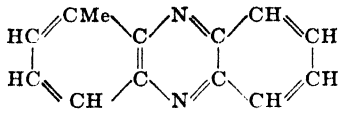
toluino. Toluido.

tolunitrile. Cyano*toluene.* **α-** Benzylcyanide.

toluol. Commercial toluene.

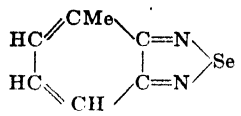
toluoyl. Toluyl.

toluphenazine. $C_{13}H_{10}N_2$ = 194.1. The heterocyclic compound,



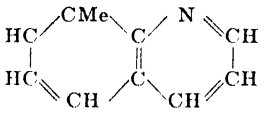
Colorless crystals, m.117. **dimethyldiamino-** Neutral red.

tolupiaselenole. $C_7H_6N_2Se$ = 197.2. The heterocyclic compound,

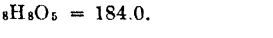


Colorless crystals, m.73, b.267.

toluquinoline. $C_{10}H_9N$ = 143.1. The heterocyclic compound,



toluquinone. $C_7H_6O_2$ = 122.08. The solid, $MeC_6H_3:O_2$, m.67 (sublimes); soluble in alcohol or ether, insoluble in water. **methoxydihydroxy-** $C_8H_8O_5$ = 184.0.

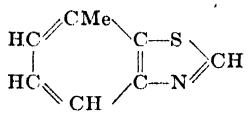


A pigment produced from glucose by the fungus *Penicillium spinulosum.*

toluresitannol. $C_{16}H_{14}O_3OCH_3OH$. A constituent of tolu balsam.

tolurin. Vitamin B_1.

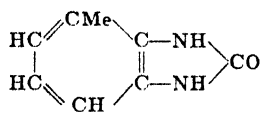
toluthiazole. C_8H_7NS = 149.1. The heterocyclic compound,



toluyl. Toluoyl. The monovalent radical, C_7H_7CO— or MeC_6H_4CO— (methylbenzoyl). Three isomers: o-, m-, p-. **alpha-** The monovalent radical, $PhCH_2CO$—.

t. aldehyde. C_8H_8O = 120.10. MeC_6H_4CHO. *ortho-* A liquid, b.200. *meta-* A liquid, b.199. *para-* A liquid, b.204. **t. azo-β-naphthol.** Scarlet R.

toluylene. (1) Tolylene, cresylene (6 isomers). The bivalent radical, $CH_3C_6H_3$=, derived from toluene. (2) Stilbene. **t. blue.** An oxidation-reduction indicator, q.v. **t. diamine.** $C_7H_{10}N_2$ = 122.1. The diamine, $CH_3C_6H_3(NH_2)_2$. **2.4-** Asymmetric diaminotoluene. Colorless needles, m.99, b.280; soluble in water, alcohol or ether. **2.3-** Colorless scales, m.61, b.255, soluble in water; used in organic synthesis. **2.5-** m.64, b.273. **2.6-** m.104. **t. diamine indophenol.** An oxidation-reduction indicator, q.v. **t. red.** Neutral red. **t. hydrate.** Stilbene hydrate. **t. urea.** $C_8H_8N_2O$ = 148.1. The heterocyclic compound,



Colorless crystals, m.290.

tolyantipyrine. Tolypyrine.

tolyl. (1) The monovalent radical, $CH_3.C_6H_4$—, or C_7H_7— derived from toluene; three isomers: o-, m-, and p-. **alpha-** Benzyl.

t. acetic acid. $C_9H_{10}O_2$ = 150.1. The monobasic acid, $CH_3.C_6H_4.CH_2COOH$. *ortho-* Colorless needles, m.88; soluble in water. *para-* Colorless needles, m.91, b.266; slightly soluble in water. **t. alcohol.** T. carbinol. **t. bromide.** Bromo*toluene*. **t. carbinol.** $C_8H_{10}O$ = 122.1. The monatomic alcohol, $CH_3.C_6H_4.CH_2OH$. *ortho-* Colorless needles, d.1.023, m.34, b.223; soluble in water, alcohol or ether. *meta-* A colorless liquid, d.1.036, m. −20, b.217; soluble in water or alcohol. *para-* Colorless needles, m.59, b.217; soluble in water, alcohol or ether. **t. chloride.** (1) Chloro*toluene*. (2) C_8H_9Cl. Xylyl chloride. **t. hydrazine.** $C_7H_{10}N_2$ = 122.08. Hydrazomethylbenzene $CH_3C_6H_4NHNH_2$. *ortho-* Colorless leaflets, m.56; soluble in water, alcohol or ether. *meta-* A liquid, b.245. *para-* Colorless tablets, m.65, b.240; soluble in water, alcohol or benzene. **t. hydrochloride.** $C_7H_{10}N_2.HCl.H_2O$ = 176.57. The hydrochloride of tolyhydrazine. *ortho-* Reddish crystals; soluble in water or alcohol. *para-* A brown powder, soluble in water or alcohol; used in organic synthesis. **t. hydroxylamine.** C_7H_9ON = 123.1. $CH_3.C_6H_4.NHOH$. *ortho-* Colorless leaflets, m.94, soluble in water, alcohol or ether; used in organic synthesis. **t. mercuric chloride.** C_7H_7HgCl = 327.12. Rhombic crystals, m.233, insoluble in water. **t. mustard oil.** C_8H_7NS = 149.2. Thiocyanomethyl-benzene, $CH_3.C_6H_4.NCS$. *ortho-* A yellowish liquid, b.238, insoluble in water, soluble in alcohol or ether. *para-* Colorless crystals, m.26, b.242, insoluble in water, soluble in alcohol or ether. **t. phenylketone.** Phenyltolylketone.

tolylene. The bivalent radical, $—C_6H_4.CH_2—$, which occurs in six isomers. **alpha-** Benzal. Cf. *toluylene.*

t. diamine. $C_7H_{10}N_2$ = 122.09. A group of isomeric compounds; as methylphenylene diamine, $NH_2CH_2\diagdown C_6H_4$, or diaminotoluene, $NH_2\diagup Me.C_6H_3(NH_2)_2$.

tolypyrine. $C_{12}H_{14}ON_2$ = 202.2. Tolyantipyrine, p-tolyldimethylpyrazole, $MeC_6H_4N(NMe.CMe:CH.CO)$. Colorless crystals, m.136; soluble in water or alcohol, insoluble in ether. Used medicinally as an antipyretic. **t. salicylate.** Tolysal.

tolysal. $C_{12}H_{14}ON_2$ = 202.2. Tolypyrine salicylate, $CH_3.C_6H_4.N(CO.CH:)NMe.CMe$. Small colorless crystals, m.101, insoluble in water, soluble in alcohol. Used medicinally as an antipyretic.

tombak. Any copper and zinc alloy.

ton. Unit of weight: 1 short ton = 2000 pounds = 907.18486 kg. (In common use in U.S.). 1 long ton = 2240 pounds = 1016.047 kg. (In common use in Britain). 1 metric ton (tonne) = 0.9842 long tons = 1.1023 short tons = 1000 kg. (in use in Continental Europe and non-English-speaking World.) **assay-** See *assay.*

refrigeration- The quantity of heat required to melt 2000 pds. of pure solid ice into water at 32°F; it equals 288,000 B.Th.U.

tonalite. A group of quartz, orthoclase and feldspathic rocks.

tonga. A mixture of the barks of *Rhaphidophora vitiensis* (Araceae) and *Premma taitensis*, (Verbenaceae) from the Pacific Islands. It contains tongine and an essential oil; is used as fluid extract for neuralgia. Cf. *tonka*.

tongine. An alkaloid from tonga.

tongs. A laboratory appliance for holding hot objects, such as crucibles, test-tubes or flasks.

Tongs.

tonic. An agent that increases vitality or restores vigor; as, iron, arsenic or gentian.

tonite. An explosive prepared from wet gun-cotton pulp (54 %) and barium nitrate (46 %).

tonka. Tonka bean, snuff bean. The dried seeds of *Coumarouna odorata* or *Dipteryx odorata*, a Leguminosae tree of Northern Brazil and Guiana. It contains coumarin and is used medicinally, as the fluid extract, as a cardiac stimulant, as an ingredient of perfumery and flavoring extracts, and in the manufacture of coumarin. Cf. *tonga*.

tonne. Metric ton.

tonquinol. $C_{11}H_{13}O_6N_3$ = 283.13. A colorless crystalline powder, used in perfumery as a substitute for musk.

toot poison. Tutin.

topaz. $Al_2SiO_4F_2$. A native aluminum fluosilicate, representative of a group of silica minerals (q.v.), and occurring in colorless or variously colored crystals. The transparent yellow variety is used as a precious stone. **false-** Quartz. **oriental-** Corundum.

topazolite. A yellow variety of iron garnet, q.v.

topochemical. (1) Referring to localized reactions which take place in the inner or outer fields of force of crystalline matter; as, ageing processes, or the building of crystals on a limited surface due to local supersaturation. (2) Reactions occurring in zones.

topochemistry. The study of localized reactions; as in colloidal systems. Cf. *zone, protoplasm*.

toramin. The ammonium salt of trichlorbutyl-malonate; used medicinally as a substitute for opium.

torbanite. A variety of cannel coal (q.v.), having a high ash.

torbernite. A hydrated copper, uranium phosphate. Cf. *chalcophyllite*.

tori seed oil. Mustard seed oil.

tormentil. Tormentilla, septfoil. The dried rhizome of *Potentilla tormentilla*, a Rosaceae of Europe and Northern Asia. It contains a red coloring matter, tormentil tannic acid, and quinovic acid; used for tanning leather and medicinally, as an astringent. Cf. *five-finger glass*. **t. tannic acid.** $C_{26}H_{22}O_{11}$ = 510.2. A constituent of tormentil; an amorphous red brown powder, used in tanning.

tornesite. A chlorinated rubber product. White powder, turning brown at 150°C., and resistant to common solvents and reagents.

torque. The force of or resistance to a twisting motion.

Torricelli, Evangelista. 1608–1647. An Italian inventor, assistant of Galilei, noted for construction of barometers, microscope and telescope.

torsion. The act of producing a strain by twisting or rotating at right angles to the length of a material.

torula. Mycoderma. A variety of yeast (fungi imperfectii) having a chain-like cell formation, in milk and beer.

torulin. Vitamin B_1.

tosyl. Abbreviation for the p-toluene sulfonyl radical.

totaquina. An anti-malarial evolved by the Malaria Commission of the League of Nations, which contains at least 75 % of crystallisable cinchona bark alkaloids, including at least 15 % quinine. It is equal in efficiency to, but much cheaper than quinine.

touch. The sense of feeling. **hard-** A t. like that of crystals of inorganic salts. **soft-** A t. like that of phthalic anhydride or bees-wax. **slippery-** The effect produced by alkali hydroxides. **unctuous-** A fatty feel due to substances such as soapstone or ointments.

touchstone. (1) Jasper. (2) A hard black stone, on which a streak is made with a gold alloy. It is treated with hydrochloric and nitric acids and water in succession, and the resultant streak compared with a standard streak gives an approximate value of the alloy. Cf. *streak test*.

Toulet's solution. A concentrated solution of mercury potassium iodide, d.3.17; used for the separation of minerals.

tourmaline. Brazilian sapphire, schorl, rubellite. A group of aluminum silicates in various colors containing boron and lithium. (Cf. *silica minerals*.) The red, blue, green and colorless t. are used as gems. Tourmalines are mixtures of aluminum borate with alkali, magnesium or iron silicates and frequently contain chromium, manganese, calcium and fluorine. They are doubly refractive and are used in optical instruments (polariscopes). See *aphrizite, achroite, indicolite*. **artificial-** Herapathite.

tower. A tall structure used for absorption, scrubbing, cooling or distilling.

towsagis. Mountain gum. A Russian plant used for making rubber.

toxalbumin. A poisonous albumin *e.g.*, in cobra venom. Cf. *sozalbumin*.

toxamins. A group of substances of unknown chemical composition that exist in minute quantities in different foods and are harmful to well-being. Antonym: *vitamins*.

toxemia. Blood-poisoning, or poisoning caused by substances produced by body-cells or microorganisms.

toxic. Poisonous or pertaining to poisons. **t. dose.** A dose that produces the characteristic symptoms of poisoning. **t. equivalent.** The smallest amount of a substance required to kill an animal, divided by the weight of the animal.

toxicarol. (1) $C_{23}H_{22}O_7$ = 410.19. Yellow crystals, optically-inactive, m.219, from the roots of *Tephrosia (Cracca) toxicaria*, of South America; used as a fish poison. (2) A second, unnamed principle, $C_{33}H_{22}O_6$ = 394.19. Greenish crystals, m.171, occurring also in derris (q.v.) and cube, q.v. Cf. *rotenone*.

toxicity. The degree of being poisonous; the ratio between the smallest amount that will cause the

death of an animal and the weight of the animal (toxic equivalent).

toxicodendrol. A poisonous liquid from toxicodendron.

toxicodendron. The dried poisonous leaves of *Rhus toxicodendron* (see *rhus*).

toxicology. A branch of science that deals with the actions, detection and treatment of poisons and poisonings.

toxigenes. Chemical products which, when injected into an animal, are not poisonous until modified by the vital activity of the cells; as ptomaines. Cf. *toxins*.

toxin(e). The soluble substances produced during bacterial growth that stimulate the formation of antitoxins (cf. *toxigenes*). **t. formation.** The production of poisonous substances from proteins of the living body by the action of bacteria: (1) *Phytotoxins* or *vegetable* toxins; such as, abrin, crotin, ricin and pollen. (2) *Zootoxins* or *animal* toxins, as t. of the toad, spider, snake, scorpion or bee. (3) *Bacteriatoxins* or toxins proper; as, t. produced by diphtheria, tetanus, botulism, cholera or coli bacteria. **t. immunity.** The production in the living body of antitoxins that counteract the effects of vegetable or animal toxins. (See *Ehrlich side-chain theory*.)

toxisterol. A sterol produced by irradiation of calciferol.

toxoflavin. An antibiotic substance produced by *Bacterium cocovenenans*.

toxoid. A toxin that has been deprived of its poisonous toxophore. (See *Ehrlich side-chain theory*.) It is a degenerated toxin, chemically modified so as to produce immunity, but not disease.

toxone. A toxin made less poisonous by partial combination with an antitoxin; a mixture of toxins with neutralized toxins (*toxoids*).

toxophore. The poisonous radical in a toxin molecule that reacts with the living protoplasm and forms a stable compound (*paraplasm*). Cf. *constellation*.

trace. A very small quantity of a substance; usually when present in a concentration of less than 5γ per gm.

tracer. A mixture of calcium resinate with magnesium, rare earth nitrates and glue; used in projectiles to make their path visible. **t. element.** A radioactive indicator, q.v.

tracheid. Fiber. An elongated cell from woody plants, containing varying amounts of lignin, and characterised by bordered pits or discoid markings which vary according to its origin.

track. The path described by a particle (*e.g.*, as, α-, β-rays, or protons, electrons, ions or molecules), made visible in a cloud chamber. Cf. *Wilson tracks, Brownian movement*.

tractive force. The power of pulling or drawing; as, of a magnet.

tragacanth. Gum dragon. The gummy exudation from the stems of *Astragalus gummifer* and other Astragalae species of the Leguminosae family native to Asia Minor. It contains bassorin, pectin and starch; used as an emulsifier and adhesive in pharmacy, the textile industry and by cigar makers. Cf. *bandoline, xylan-bassoric acid*. **Indian-** Sterculia gum.

tragacanthin. The carbohydrate of tragacanth, a polysaccharide hydrolyzing to pentosans.

tragon. Locust kernel gum from carob beans.

train. A connected arrangement of several chemical instruments; as, the combustion train in organic analysis.

trans- A prefix derived from the Latin and indicating "across." **t.-form.** An axially-stereoisomeric form of a compound; cf. *cis*:

trans-form *cis*-form

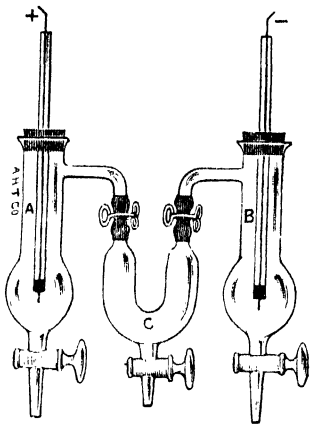
transamination. The reversible transference of amino groups by enzymes (transaminase, aminopherases, q.v.) into ammodicarboxylic acids and keto-acids.

transaudient. Permitting sound waves to pass through.

transcalent. Permitting heat waves to pass through.

transcrystallization. The formation of crystals so that their principal axes are perpendicular to the direction of flow of heat.

transfer. The conveyance of matter or energy from one location to an other. **t. number.** Transport number. **t. pipet.** A pipet that measures one definite volume of liquid. It has only one graduation mark and differs from measuring pipets, which have many graduations.



Transference cell.

transference. Transfer. **t. cell.** Hittorf cell. An electrolytic cell with a detachable center portion; used to determine the change of concentration of an electrolyte during electrolysis. **t. numbers.** Transport numbers.

transformation. A change in form, structure or internal arrangement of atoms. Cf. *nuclear reaction, radio-elements*. **radioactive-** See *radioactivity*.

t. constant. The fraction of radioactive material that disintegrates each second. **t. series.** See *radioactive* disintegration. **t. theory.** Electromagnetic radiations have corpuscular aspects (*e.g.*, Compton effect, light pressure), and the motion of matter has undulatory aspects (*e.g.*, electron scattering, where $\lambda = h/mv$). Cf. *Planck's constant, mass-energy cycle, quantum*.

transformer. A device for changing the electric potential or nature of an electric current; as, *step-down* transformer (higher to a lower potential) and *step-up* transformer (lower to a higher potential). It may also change the phase of the current, or convert it from alternating to direct, or the reverse. Cf. *rectifier*.

transition. A change from one state or form to another state or form; as, melting, boiling or a

change from one to another crystalline, allotropic or enantiomorphic form. **t. elements.** The three trios of elements in the periodic table which are grouped together, and connect the odd series 4, 6, and 8 with the following even series, viz.: (*A*) Fe, Co, Ni; (*B*) Ru, Rh, Pd; (*C*) Os, Ir, Pt. **t. interval.** The pH range over which the color change of an indicator takes place. Cf. *pT*. **t. point.** The temperature at which a transition occurs.

translucent. Semi-transparent; permitting the partial passage of light. Cf. *radiolucent, opaque, transparent.*

transmissibility. The capacity of a substance to allow the passage of light; the absorption by it of light of certain wave-lengths. It may be qualitative (color-screens) or quantitative (translucence).

transmutation. (1) A change of one element into another element; as, in radioactive disintegration or in alchemical notions. In the latter case transmutation always indicated a change from a base to a noble metal (gold). Cf. *atom building.* (2) Artificial. A change from one element into another by bombardment with fast-moving protons, deutons or alpha-particles, q.v. Cf. *radioelements, nuclear reactions, proton bombardment, neutron.*

transparency. The property of permitting the passage of rays of radiations; *e.g.:*
glass—transparent to visible light,
rock-salt—transparent to heat, visible, and ultra-violet rays,
white fluorite—transparent to infra-red, visible, and ultra-violet rays,
paraffin—transparent to Hertzian rays,
thin metals—transparent to gamma rays (Al to x-rays, Ag to ultra-violet rays, etc.).
Antonym: *opacity.*

transparent. Describing a substance through which one can see; or which permits the passage of rays of the visible spectrum. Antonym: opaque. Cf. *radiopaque, translucent.*

transpiration. The exhalation of water vapor by a plant or animal through its surface tissue or skin. Cf. *respiration.*

transport number. Transference number, Hittorf number (n). The relative migration-velocities of the anion and cation of an electrolyte. If u and v are the migration velocities of the anion and cation, respectively, then the corresponding transport numbers are:

$$n(\text{anion}) = v/(u + v),$$
$$(1 - n)(\text{cation}) = u/(u + v).$$

During electrolysis the ratio of the fall in concentration round the anode to that round the cathode is $n/(1 - n)$.

transposition. An atomic displacement within a molecule by which one atom changes place with another atom of the same molecule.

transudate. Liquid which has passed through a living tissue. Cf. *osmosis.*

transuranium. The elements, unknown so far, of atomic weights higher than that of uranium. It is calculated that 98 % of the universe consists of these elements, and that the known elements of our earth and those found by spectrum analysis constitute only 2 %. They are supposed to exist in the interior of stars. Cf. *hypon.* By bombardment of uranium, ekarhenium and ekaosmium, (q.v.) have been synthesized (1935).

trapezeum. A plane figure bounded by four straight lines, no two of which are parallel.

trapezohedron. A crystal of six, eight, or twelve faces, having unequal intercepts on all the axes.

trapezoid. A plane figure bounded by four straight lines, one pair of which are parallel.

trass. A natural pozzolana, q.v.

Traube Isidor. 1860–1943. A German chemist noted for work in colloids and capillary phenomena. **T. stalagmometer.** A stalagmometer (q.v.) for determination of the surface tension of fluids; used in biochemical investigations. **T.'s rule.** The adsorption of organic substances from aqueous solutions increases strongly and regularly in a homologous series with an increasing number of carbon atoms.

traumatol. C_7H_7OI = 234.3. Iodocresol, iodocresine. $CH_3C_6H_2I.OH$. A purplish-red powder, used as an iodoform substitute.

traversal. The path of a particle made visible by a track, q.v.

traversellite. Augite which contains Al_2O_3.

travertine. $CaCO_3$. Calcareous sinter, onyx. A native calcium carbonate, usually banded similarly to marble. Cf. *tufa.*

treacle. Molasses.

Treadwell, Frederick P. 1857–1918. An English chemist, noted for analytical methods.

treble. Triple.

trehalase. An enzyme of fungi that hydrolyses trehalose.

trehalose. $C_{12}H_{22}O_{11}$ = 342.2. A disaccharide from manna, yeast, mushrooms (trehala) and ergot. White crystals, m.210, $[\alpha]_D$ + 197°. It hydrolyzes to glucose and is used to differentiate paratyphoid bacteria. Cf. *mycose.*

treibgas. Calorgas.

tremolite. $3MgO,SiO_2,CaSiO_3$. A white or green native amphibole; a silica mineral, q.v.

trephone. Secretions from leucocytes which stimulate tissue repair in the healing of wounds.

trester. The residue remaining after pressing grapes. **t. fermentation.** The fermentation of diluted grape-residues, with or without addition of sugars.

tri- A prefix derived from the Latin indicating "three." See *ter-.*

triacetamide. $N.(C_2H_3O)_3$ = 143.11. A solid, m.78, soluble in ether.

triacetate. A compound whose molecule contains three acetate radicals, $(CH_3COO—)_3$.

triacetin. $C_9H_{14}O_6$ = 218.2. Glyceryltriacetate, $(MeCOO)_3C_3H_5$. An oily liquid from cod-liver oil, butter and other fats, d.1.161, b.258; slightly soluble in water soluble in alcohol or ether. Cf. *acetin.*

triacetonediamine. $C_9H_{20}N_2O$ = 172.2. *2.6*-Diamino-*2.6*-dimethylheptanone-4; bis (*2*-aminoisobutyl) ketone, $(NH_2CMe_2.CH_2)_2CO$. A reaction-product of ammonia and acetone.

triacontane. $C_{30}H_{62}$ = 422.5. A solid hydrocarbon isolated from the roots of *Oenanthe crocata*, an umbelliferous plant, m.66.

triad. (1) A group of three related elements or compounds; as, the triad Cl, Br, and I, or a group of three tautomeric compounds. (2) A trivalent atom or radical. (3) In crystallography, a crystal which shows 3 similar faces as it is rotated about its axis of symmetry through 360°.

triallylamine. $C_9H_{15}N$ = 137.1. The tertiary amine, $N(C_3H_5)_3$. A colorless, oily liquid.

triamido. Triamine.

triamine. A compound of the type, $R(NH_2)_3$. It differs from the tertiary amine, NR_3.

triaminoazobenzene. $C_{12}H_{13}N_5$ = 227.2. Aniline brown, Manchester brown, Vesuvin, Bismarck brown, $NH_2.C_6H_4N:N.C_6H_3(NH_2)_2$. A red or dark brown powder, m.143; soluble in water, alcohol or ether. Used as dye for leather, cotton or wool; as a bacteriological stain; and for determining the decolorizing power of charcoal.

triaminobenzene. $C_6H_9N_3$ = 123.1. $C_6H_3(NH_2)_3$. **1.2.3-** m. 103, b.330. **1.2.4-** m. below 100, b.340. Both are very soluble in water, alcohol or ether.

triamorph. A substance that crystallizes into three different types of crystals; described as trimorphous.

triamylamine. $C_{15}H_{33}N$ = 227.1. $N(C_5H_{11})_3$. A white solid, used as an antioxidant, solvent, in the rubber industry and for flotation.

triangle. A plane figure, bounded by three straight lines, pairs of which meet at three points. **reference-** See *diagram.*

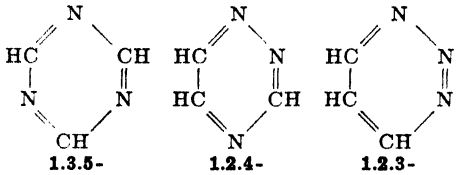
triatomic. Describing: (1) A molecule that consists of three atoms. (2) An acid that has three replaceable hydrogen atoms. (3) A base, alcohol or phenol that has three hydroxyl groups.

triazane. (1) Hydrazoamino. The monovalent radical —NH.NH.NH_2. (2) Prozane, NH_2.NH.NH_2; in which the H is replaceable by hydrocarbon radicals. Cf. *hydronitrogen.*

triazene. (1) The monovalent radical —NH.N:NR. (2) Diazoamine, NH_2,N:NH, in which the H is replaceable by hydrocarbon radicals. Cf. *hydronitrogen.*

triazeno. The monovalent radical, $NH_2N:N$—.

triazine. $C_3H_3N_3$ = 81 03. The heterocyclic compounds,



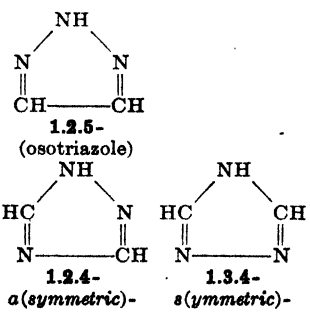
1.3.5- s(ymmetric)- (kyanidine) **1.2.4-** a(symmetric)- **1.2.3-** v(icinal)-

t. triol. Cyanuric acid.

triazinyl. The monovalent radical, $C_3H_2N_3$—, derived from triazine.

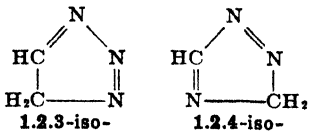
triazo. Azide. Trinitride. The monovalent group —N<N=N **t. benzene.** Phenyl azide.

triazole. $C_2H_3N_3$ = 69.06. Pyrrodiazole. The heterocyclic compounds,



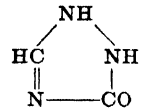
1.2.5- (osotriazole) **1.2.3-** v(icinal) **1.2.4-** a(symmetric)- **1.3.4-** s(ymmetric)-

1.2.4- Common triazole, pyrro-[ab″]-diazole. Colorless needles, m.120, b.260; soluble in water or alcohol. **benzo-** See *benzotriazole.* **diphenyl-** See *diphenyltriazole.* **iso-**



1.2.3-iso- **1.2.4-iso-**

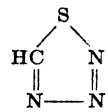
triazolone. $C_2H_3ON_3$ = 85.1. Ketotriazole. The heterocyclic compound,



1-phenyl-..... m.183
1-phenyl-5-methyl-..... m.167, b.300
1-phenyl-5-ethyl-..... m.192

triazolyl. The monovalent radical, $C_2H_2N_3$—, derived from triazole.

triazsulfole. CHN_3S = 87.11. Thio [a,b,b'] triazole. The heterocyclic compound,



E.g., 5-ethylamido-, $Et_2N(CN_3S)$, m.67; 5-allylamido-, $C_3H_5N(CN_3S)$, m.54.

tribasic. Describing a molecule that has three replaceable hydrogen atoms, or produces three hydrogen ions in solution.

tribenzal. Indicating 3 benzal radicals, Ph.CH=.

tribenzo-p-diazine. Naphthophenazine.

tribenzoylmethane. $C_{22}H_{16}O_3$ = 328.24. $(Ph.CO)_3CH$. Colorless crystals, m.225 (sublime), soluble in water, alcohol or ether.

tribenzyl. Indicating the presence of 3 benzyl radicals, $Ph.CH_2$—. **t. amine.** $C_{21}H_{21}N$ = 287.28. The solid, $N(C_6H_5.CH_2)_3$, m.91, soluble in water or ether, slightly soluble in alcohol. **t. ethyl tin.** $EtSn(CH_2Ph)_3$ = 420.90. White crystals, m.31, soluble in organic solvents. **t. tin chloride.** $(PhCH_2)_3SnCl$ = 427.32. White needles, m.142, insoluble in water. **t. tin hydroxide.** $(PhCH_2)_3SnOH$ = 408.87. Rhombic crystals, m.120, soluble in organic solvents.

tribenzylidene diamide. Hydrobenzamide.

tribo-. A prefix derived from the Greek, indicating "friction" or "rubbing."

triboelectric series. An arrangement of substances in a list so that any substance, when rubbed by a substance following it in the list, becomes positively electrified: (+) asbestos, hair (rabbit's fur), glass, wool, calcite, silk, cotton, magnalium, wood, amber, slate, ebonite, sulfur, celluloid, rubber, (−). Cf. *electromotive series.*

triboluminescence. The phenomenon shown by substances, especially crystals, of emitting light when crushed, rubbed, or mechanically pressed together. Cf. *luminescence.*

tribromide. A binary compound that contains three bromine atoms in the molecule.

tribromo-, tribrom- A prefix indicating that a compound contains three bromine atoms in its molecule. **t. acetaldehyde.** Bromal. **t. acetic acid.** $C_2HO_2Br_3$ = 296.78. CBr_3COOH. Colorless leaflets, m.135, decomp. 250; soluble in water, alcohol or ether. Used in organic

synthesis. **t. aniline.** $C_6H_4NBr_3$ = 329.83. Aniline-tribromide, 1-amino-2.4.6-tribromo-benzene, $NH_2C_6H_2Br_3$. Small needles, m.119, b.300, insoluble in water, soluble in alcohol or ether; used medicinally for neuralgia. **t. benzene.** $C_6H_3Br_3$ = 314.8. Symmetrical, or **1.3.5**-tribrombenzene. Colorless needles, m.-119, b.278, insoluble in water, slightly soluble in alcohol. **1.2.3**-. m.87, **1.3.4**-. m.44, b.275. **t. ethane.** $C_2H_3Br_3$ = 266.77. **1.1.2**-. or *β*-. $BrCH_2.CHBr_2$. A liquid, d.2.579, m.-−26, b.188. **t. ethanol.** Avertine. **t. ethylene.** C_2HBr_3 = 264.76. $BrCH:CBr_2$. A liquid, d.2.708, b.164. **t. hydriné.** Allyltribromide. **t. methane.** Bromoform. **t.-β-naphthol.** $C_{10}H_4Br_3OH$ = 380.9. A gray crystalline powder, soluble in alcohol or ether; used medicinally as a disinfectant. **t. phenol.** $C_6H_3Br_3O$ = 330.8 (2:4:6-). Bromol. Soft, white, colorless needles, m.92 (sublime), slightly soluble in water, soluble in alcohol, ether or benzene. Used as a disinfectant and antiseptic. **t. phenol bismuth.** Xeroform. **t. phenyl salicylate.** Cordol. **t. resorcinol.** $C_6H(OH)_2Br_3$ = 346.81. Colorless needles, m.-112, slightly soluble in water, soluble in alcohol or ether. **t. salol.** $C_{13}H_7O_3Br_3$ = 450.7. Cordol, tribromphenylsalicylate, $C_6H_4OHCO-OC_6H_2Br_3$. Colorless crystals, slightly soluble in water; used medicinally as an antiseptic.

tributylamine. $C_{12}H_{27}N$ = 185.3. The tertiary amine, NBu_3. A colorless liquid, d.0.778, m.−71, b.216; insoluble in water, soluble in alcohol or ether. **iso-** $N(CH_2CHMe_2)_3$. A colorless liquid, d.0.766, m.−22, b.191.

tributyrin. Butyrin.

tricalcium phosphate. See *calcium phosphate.*

tricaprin. $C_{33}H_{62}O_6$ = 560.48. Glyceryl tricaprinate, $(C_9H_{21}COO)_3C_3H_5$. Triclinic crystals, d.0.921, m.31, insoluble in water.

tricaproin. $C_{21}H_{38}O_6$ = 386.27. Glyceryl tricapronate, $(C_5H_{11}COO)_3C_3H_5$. A colorless liquid, d.0.988, m.−25, insoluble in water.

tricapryllin. $C_{27}H_{50}O_6$ = 470.39. Glyceryl tricapryllate, $(C_7H_{15}COO)_3C_3H_5$. Colorless liquid, d.0.954, m.8, insoluble in water.

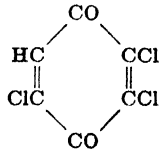
tricarballylic acid. $C_6H_8O_6$ = 176.1. Propane tricarboxylic acid, $CH_2COOH.CHCOOH.CH_2-COOH$. Colorless rhombic crystals, in beet molasses, m.166, decomp. by further heat, soluble in water, alcohol or ether. *β*-**hydroxy-** Citric acid.

tricetin. $C_{15}H_{10}O_7$ = 302.1. *5.7.3′.4′.5′*-Pentahydroflavone. A pigment from wheat.

trichinae. A race of food parasites.

trichloride. Terchloride. A binary compound that contains three chlorine atoms in its molecule.

trichloro-, trichlor- A prefix indicating that a compound contains three chlorine atoms in its molecule. **t. acetal.** $C_6H_{11}O_2Cl_3$ = 221.5. $(EtO)_2CH.CCl_3$. (1) A colorless liquid, d.1.288, b.197, soluble in water, alcohol or ether. (2) A solid, m.83, b.230. **t. acetamide.** $C_2H_2-ONCl_3$ = 162.4. $CCl_3.CONH_2$. Colorless leaflets, m.141, b.239; insoluble in water, soluble in alcohol or ether. **t. acetic acid.** $C_2HO_2-Cl_3$ = 163.4. $CCl_3.COOH$. Colorless rhombic crystals, $d_{60°}$.1.630, m.57, b.195, soluble in water, alcohol or ether. Used as a reagent, as a general test for unsaturated compounds and also in organic synthesis. **t. acetyl-chloride.** C_2OCl_4 = 181.8. $CCl_3.COCl$. A colorless liquid, b.118, soluble in alcohol; used in organic synthesis. **t. aldehyde.** Chloral. **t. benzenes:** $C_6H_3Cl_3$ = 181.43. Colorless solids or liquids, insoluble in water, soluble in alcohol or ether. **1.3.5.**- (asymmetric) m.63, b.209; **1.2.4.**- $d_{10°}$. (liq.) 1.466, m.17, b.213. **1.2.3.**- m.52, b.219, $d_{10°}$ (solid) 1.574. **t. butylalcohol.** Chloretone. **t. butylaldehyde.** Butylchloral. **t. butylmalonate.** Toramin. **t. ethane.** $C_2H_3Cl_3$ = 133.41. *alpha*- Methylchloroform, $MeCCl_3$. A colorless liquid, d.-1.325, b.75, insoluble in water, soluble in alcohol or ether; used medicinally as an anesthetic. *beta*- $CHCl_2.CH_2Cl$. A colorless liquid, d.1.478, b.114, insoluble in water, soluble in alcohol or ether. **t. ethanol.** $C_2H_3Cl_3O$ = 149.4. Trichlorethylalcohol, $CCl_3.CH_2OH$. Colorless rhombic tablets, m.18, b.151, slightly soluble in water, soluble in alcohol or ether. **t. ethylalcohol.** Trichlorethanol. **t. ethylene.** C_2HCl_3 = 131.4. 1-chloro-2-dichloroethylene. $CHCl:CCl_2$. A colorless liquid, d.1.459, m.-−70, b.87; insoluble in water, soluble in alcohol or ether. Used in organic synthesis, dry cleaning, and degreasing, as a refrigerant, in the manufacture of perfumes, paints and varnishes, for the extraction of fats, caffeine and nicotine, and as an inhalation anesthetic, particularly for angina pectoris. **t. ethylurethane.** Voluntal. **t. hydrin.** $C_3H_5Cl_3$ = 147.4. Allyltrichloride, trichloropropane, glycerylchloride, glyceryltrichlorohydrin $CH_2Cl.CHCl.CH_2Cl$. A colorless liquid, d.1.417, b.158, insoluble in water; used medicinally as a hypnotic and anesthetic. **t. hydroquinone.** $C_6H_3O_2Cl_3$ = 213.4. $C_6H-(OH)_2Cl_3$. Colorless prismatic crystals, m.134, soluble in water, alcohol or ether. **t. lactic acid.** $C_3H_3O_3Cl_3$ = 193.42. $CCl_3.CHOH.-COOH$, m.116, and soluble in water, alcohol and ether. **t. methane.** Chloroform. **t. methylchloroformate.** $C_2O_2Cl_4$ = 197.8. Diphosgene. $C_3Cl.COOCl$. A colorless liquid, b.127. A lung-irritant poison gas. **t. phenol.** $C_6H_3-OCl_3$ = 197.43. $C_6H_2(OH)Cl_3$, 1-Hydroxy-2.4.6-trichlorbenzene. Colorless rhombic crystals, m.68, b.244, soluble in water, alcohol or ether; used medicinally as an antiseptic and disinfectant. **1:2:3:5**- m.53, b.252. Slightly soluble in water, very soluble in alcohol or ether. **t. propane.** Trichlorohydrin. **t. quinone.** $C_6HO_2Cl_3$ = 211.5.



Yellow leaflets, m.165; insoluble in water, soluble in alcohol or ether. **t. toluene.** Benzotrichloride. **t. triethylamine.** $N(C_2H_4Cl)_3$ = 204.5. An irritating liquid, causing blisters.

trichodesmine. $C_{18}H_{27}NO_6$ = 353.2. An alkaloid, m.202 (decomp.), from *Trichodesma incanum*, a Boraginaceae.

trichroism. A phenomenon shown by certain minerals or crystals of having three different colors when viewed at different angles.

trichromatic. Three colors (q.v.). **t. analysis.** The matching of colors in terms of three primary components: red, green and blue.

tricin. $C_{17}H_{14}O_7$ = 330.1. *5,7,4*-Trihydroxy-*3′,5′*-dimethoxy flavone. A dimethylether of tricetin, a pigment in the leaves of wheat,

especially the variety khopli, *Triticum dicoceum*. Yellow needles, m.292, insoluble in water or benzene, soluble in alcohol, ether and acetic acid.

triclene. Trade name for trichloroethylene.

triclinic. Anorthic, asymmetric. A crystal that has three unequal, long axes at oblique angles to one another. See *crystal system, prisms, pyramids.*

tricosane. $C_{23}H_{48}$ = 324.37. The hydrocarbon, $Me(CH_2)_{21}Me$. A crystalline solid, d.0.779, m.47.7, b.320.7.

tricosanoic acid. See *cosanic acids.*

tricosanol. See *cosanols.*

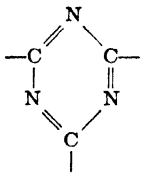
tricosoic acid. A group of isomers, $C_{22}H_{45}COOH$. **n-** Tricosanoic acid.

tricresol. A mixture of *o-*, *m-*, and *p-* cresols.

tricresyl. Indicating the presence of 3 cresol radicals. **t. phosphate.** $C_{21}H_{21}O_4P$ = 368.19. Lindol, tri-*p*-cresylphosphate, $(C_6H_4Me)_3PO_4$. Colorless odorless liquid, d.1.18, m. exceeds −25 (if pure m.77°C), b. exceeds 340; used as a plasticizer for lacquers, dopes, coating solutions, waterproofing paper and fabrics, and for softening resins and rubber. It causes "ginger paralysis."

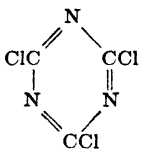
tricyanic acid. Cyanuric acid.

tricyano- Describing members of a group of compounds that contain, in their molecules, the ring,



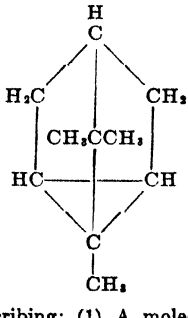
They are derived from cyanocompounds by polymerisation.

tricyanogen chloride. $C_3N_3Cl_3$ = 184.4. Cyanuric chloride. The heterocyclic compound,



Colorless crystals, m.146, b.190; slightly soluble in water, soluble in alcohol or ether. It is a polymer of cyanogen chloride.

tricyclene. $C_{10}H_{16}$ = 136.12. A tricyclic terpene:



tricyclic. Describing: (1) A molecule that contains three rings of atoms; as, anthracene, diphenylbenzene. (2) A ring of three atoms.

tridecane. $C_{13}H_{28}$ = 184.3. A saturated hydrocarbon of the methane series. Colorless liquid, d.0.757, m.−6, b.234; insoluble in water, soluble in alcohol or ether.

tridecanoic acid. $C_{13}H_{26}O_2$ = 214.20. Tridecylic acid, *n*-tridecoic acid, ficocerylic acids $C_{12}H_{25}COOH$, in figs and coconuts. Colorless crystals, m.51, $b._{100mm}$236.

tridecanol. Tridecyl alcohol.

tridecoic acid. An isomer of $C_{12}H_{25}COOH$. **n-** Tridecanoic acid. **cyclopentyl-** Chaulmoogric acid.

tridecyl. The monovalent radical, $C_{13}H_{27}$—, derived from tridecane. **t. alcohol.** $C_{13}H_{28}O$ = 200.22. *n*-Tridecanol, $C_{13}H_{27}OH$. Crystals, d.0.822, m.30.5, $b._{15mm}$156. **t. amine.** $C_{13}H_{29}N$ = 199.23. *n*-Aminotridecane. Crystals, m.27, b.265.

tridecylene. $C_{13}H_{26}$ = 182.3. An unsaturated hydrocarbon of the ethylene series. A colorless liquid, d.0.845, b.233; insoluble in water, soluble in alcohol or ether.

tridecylic acid. Tridecoic acid.

tridiphenylmethyl. The "free radical" compound, $(Ph.C_6H_4)_3C$, occurring in colorless crystals that form a colored solution.

tridymite. SiO_2. A native, hexagonal, crystalline form of silica (quartz), d.2.26, stable below 1470°C. It is also formed when quartz or cristabolite is heated at 870–1470°C; it has three crystalline forms.

trieline. Trichloromethylene.

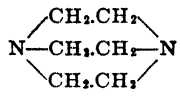
-triene. Suffix indicating three double bonds.

triethanolamine. $C_6H_{15}NO_3$ = 149.12. $\beta.\beta',\beta''$-Trihydroxytriethylamine, $N(C_2H_4OH)_3$. A colorless liquid, $d._{20°}$1.124, $b._{150mm}$227, soluble in water. Used as a basis for soaps and the emulsification of oils, waxes and paraffins; and as a reagent for antimony and tin.

triethoxy. Indicating 3 ethoxy radicals, EtO—. **t. boron.** $B(OC_2H_5)_3$ = 145.94. A colorless liquid, d.0.864, b.120.

triethyl- A prefix indicating the presence of three ethyl radicals in the compound. **t. amine.** $C_6H_{15}N$ = 101.2. The tertiary amine, NEt_3. A colorless liquid, d.0.733, b.89; soluble in water, alcohol or ether. It is a ptomaine in decaying fish. **t. arsine.** $C_6H_{15}As$ = 162.1. $AsEt_3$. A colorless liquid, d.1.152, $b._{735mm}$.140, soluble in alcohol. **t. benzene.** $C_{12}H_{18}$ = 162.20. The hydrocarbon, $C_6H_3Et_3$ (1.3.5). A colorless liquid, d.0.864, b.218; insoluble in water, soluble in alcohol or ether. **t. bismuthine.** $C_6H_{15}Bi$ = 296.12. Bismuth ethyl, $BiEt_3$. Colorless liquid, d.1.82, $b._{79mm}$107, insoluble in water, soluble in organic solvents. **t. boron.** $C_6H_{15}B$ = 97.94. Boron ethyl, BEt_3. Colorless liquid, d.0.6961, b.95, insoluble in water. **t. carbinol.** $C_7H_{16}O$ = 116.2. The tertiary alcohol, CEt_3OH. A colorless liquid, d.0.84, b.141; soluble in water, alcohol or ether. **t. gallium.** $C_6H_{15}Ga$ = 156.85. Gallium ethyl, $GaEt_3$. Colorless liquid, d.1.0576, m.−82.3, b.142.6, decomp. by water. **t. phosphine.** $C_6H_{15}P$ = 118.2. PEt_3. A colorless liquid, d.0.812, b.127; insoluble in water, soluble in alcohol or ether. Used as a reagent for carbon disulfide in illuminating gas. **t. phosphite.** $(C_2H_5)_3PO_3$ = 166.2. A colorless liquid, b.155; insoluble in water, soluble in alcohol or ether. **t. silicoformate.** $SiH(OEt)_3$ = 164.43.

triethylenediamine. $C_6H_{12}N_2$ = 112.15. Hexamethylenediamine. The heterocyclic compound,



A liquid, b.210. **t. glycol.** $C_6H_{14}O_4$ = 150.1. $(CH_2OH.CH_2.O.CH_2—)_2$. Colorless liquid, d.-1.1125, b.276, soluble in water or benzene; used as solvent for nitrocellulose and in synthesis.

triferrin. Iron paranucleinate. A reddish powder containing 22 % iron and 2.5 % phosphorus; insoluble in water, alcohol or ether. Used medicinally as a hematinic.

trifolium. Red clover blossoms. The dried flowers of *T. pratense*, a Leguminosae; used medicinally, as the fluid extract, as an alterative.

triformol. Paraformaldehyde.

trifructosan. $C_{18}H_{30}O_{15}$ = 486.24. Secalose, trifructose anhydride. A white, crystalline, sweet-tasting trisaccharide from rye-flour, and used to detect its presence in other flours; insoluble in 70 % alcohol, soluble in acids.

trigalloyl. Three galloyl radicals, $C_7H_5O_4$— or $C_6H_2(OH)_3CO$—, derived from gallic acid. **t. acetone glucose.** $C_{30}H_{28}O_{18}$ = 676.2. Amorphous, light brown mass, soluble in water. **t. glucose.** $C_{27}H_{24}O_{18}$ = 636.15. $(C_7H_5O_4)_3C_6H_9O_6$. Amorphous yellow mass, soluble in water. **t. glycerol.** $C_{24}H_{20}O_{15}$ = 548.12. $(C_7H_5O_4)_3.C_3H_5O_3$. Amorphous, brown mass, soluble in water, alcohol, ether or acetone. Used as a tanning agent.

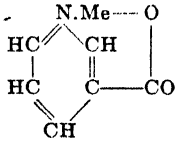
trigemin. $C_{18}H_{30}O_3N_3C_{15}$ = 424.6. Dimethylamidoantipyrinbutylchloralhydrate. Long, white needles, m.85; used as an analgesic and a sedative.

trigger. A substance which initiates a chain reaction, q.v.

triglyceride. See *glyceride*.

trigonal. Describing a crystal with two equal axes and one axis shorter or longer, all of them at right angles to one another. See *crystal systems*, *prisms*, *pyramids*.

trigonelline. $C_7H_7O_2N$ = 137.1. Nicotinic-methyl-betaine, the methylbetaine of nicotinic acid, in seeds of many plants; in sea urchin, *Arabacia pustulosa* and the Coelenterate, *Vella spirans*, jelly fish; and in urine, after taking nicotinic acid. Colorless crystals, m.218 (cf. *stachydrine*).



triguaiacyl. Having three guaiacyl radicals, $C_7H_7O_2$— or MeO.C_6H_4.O—. **t. phosphate.** $C_{21}H_{22}O_7P$ = 416.19. $(C_7H_7O_2)_3P.OH$. White crystals, m.98; used as a plasticizer. **t. phosphite.** $C_{21}H_{21}O_6P$ = 400.19. $(C_7H_7O_2)_3P$. White crystals, m.78; used as a plasticizer.

trihemellitic acid. Trimellitic acid.

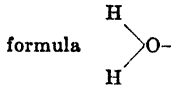
trihexosan. A dextrin, isolated from beer by precipitation with alcohol.

trihydrate. A compound that contains three molecules of water of crystallisation.

trihydric. Describing an alcohol with three hydroxy-groups.

trihydrocyanic acid. See *cyanidines*.

trihydrol. A threefold polymer of water, assumed to exist in solutions and to have the formula



. Cf. *dihydrol*.

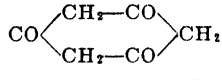
It is more abundant in cold than in hot water.

trihydroxy- A prefix indicating the presence of three hydroxy groups. **t. anthraquinone.** See *anthragallol*, *purpurin*, *anthrapurpurin*, *flavopurpurin*. **t. benzene.** **1.2.3-** Pyrogallol **1.-2.4-** $C_6H_3(OH)_3$ = 126.1. Hydroxy hydroquinone. White crystals m.141, very soluble in water, alcohol or ether. **1.3.5-** Phloroglucinol. **t. benzoic acid.** $C_7H_6O_5$ = 170.1. **2.3.4-** Pyrogallolcarboxylic acid, $C_6H_2(OH)_3COOH$. Colorless needles, d.$_4^{\circ}$1.69, m.110, decomp. 200, soluble in water, alcohol or ether. **3.4.5-** Gallic acid. **t. benzophenone.** $C_{13}H_{10}O_4$ = 230.2, m.133. **t. oestrin.** Oestriol. **t. pyridine.** $C_5H_5O_3N$ = 127.08. A solid, m.220–230 (decomp.), soluble in water, insoluble in alcohol or ether. **t. stearic acid.** $C_{17}H_{32}(OH)_3COOH$ = 332.0. A white solid, m.146, which acts as purgative.

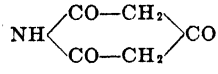
triiodide. A binary compound that contains three iodine atoms in its molecule.

triiodo-, triiod- A prefix indicating that a compound contains three iodine atoms in its molecule. **t. acetic acid.** $C_2HO_2I_3$ = 437.8. $CI_3.COOH$. Yellow scales, m.150; soluble in water. **t. benzene.** $C_6H_3I_3$ = 455.81. **1.2.3-** m.116 (sublime); **1.2.4-** m.91; **1.4.5-** m.183. **t. cresol** (*meta-*). Losophan. **t. methane.** Iodoform.

triketo- A prefix indicating that a compound contains three =CO groups in its molecule. **t. hexamethylene.** The keto-form of phloroglucinol,



t. hydrindenhydrate. Ninhydrin. **t. piperidine.** $C_5H_5O_3N$ = 127.1. 1.3.5-trioxypyridine. The heterocyclic compound,



t. purine. Uric acid.

triketones. A group of organic compounds containing three ketone groups, as,

Me.CO.CO.CO.Me..... pentanetrione
Me.CO.CH_2.CO.CO.Me..... 2.4.5-hexanetrione
Me.CO.CH_2.CO.CH_2.CO.Me. 2.4.6-heptanetrione

trilaurin. $C_{39}H_{74}O_6$ = 638.7. Glyceryl laurate, $C_3H_5(OOC.C_{11}H_{23})_3$. A crystalline glyceride from palmnut oil, cocoanut oil and bayberry oil.

trilinolein. $C_{57}H_{98}O_6$ = 878.8. Glyceryl linolate, $C_3H_5(OOC.C_{17}H_{30})_3$. A glyceride from linseed oil, sunflower oil or hempseed oil.

trilite. Trinitrotoluene.

trillion. (1) The number, 10^{18} (English and German usage = $1{,}000{,}000^3$). (2) The number 10^{12} (American and French usage) = $1{,}000{,}000 \times 1000^2$).

trillium. Beth-root, Indian balm, ground lily. The dried rhizome of *T. erectum*, a Liliacae; used medicinally, as the fluid extract, as a tonic and alterative.

trimellitic acid. $C_9H_6O_6$ = 210.1. Trihemellitic acid, 1.2.4-benzenetricarboxylic acid, $C_6H_3(COOH)_3$. Colorless crystals, m.216; soluble in water or alcohol.

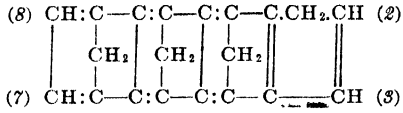
trimer. A condensation-product of three molecules. Cf. *polymer, dimer.*

trimeric. Able to form three-fold polymers. Cf. *trimetric.*

trimesic acid. Trimesitinic acid.

trimesitinic acid. $C_9H_6O_6$ = 210.1. Trimesic acid, 1.3.5-benzene tricarboxylic acid, $C_6H_3(COOH)_3$. Colorless crystals, m.348; soluble in water, alcohol or ether.

trimethano- A prefix indicating the presence of three $—CH_2—$ bridges in a ring; as, **t. cyclopentanthrene.**

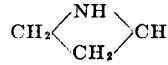


trimethoxy- A prefix indicating the presence of three methoxy groups, $CH_3O—$ or MeO—. **t. boron.** $C_3H_9O_3B$ = 103.69. Methylborate, $B(OMe)_3$. Colorless liquid, d.0.915, b.65.

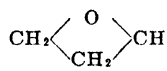
trimethyl- A prefix indicating that a compound contains three methyl groups in its molecule. **t. acetaldehyde.** Pival aldehyde. **t. acetic acid.** Pivalic acid. **t. acetone.** $C_6H_{12}O$ = 100.1. The ketone, $CMe_3.COMe$. **t. acetyl chloride.** Pivalyl chloride. **t. amine.** C_3H_9N = 59.1. Secaline. The tertiary amine, Me_3N, in leaves of *Chenopodium* species, in blood (0.002 %) and formed by the putrefaction of choline, etc. A colorless gas, d.0.673, m. −124, b.3.5; soluble in water, alcohol or ether. It is poisonous, and has a fishy ammoniacal odor; found in herring brine, and used for rheumatism. **t. amine oxide.** Me_3NO = 75.08. Kanirin. A base, m.96, occurring in muscle, urine, fishes, Cephalopods and Crustaceae. **t. amino hydrochloride.** $C_3H_9N.HCl$ = 95.6. Colorless crystals, m.271, soluble in water, alcohol or ether; used medicinally. **t. arsine.** C_3H_9As = 120.1. $AsMe_3$. A colorless liquid, d.1.124, b.52.8, soluble in water. **t. benzene. 1.2.3-** Hemimellitene. **1.2.4-** Pseudocumene. **1.3.5-** Mesitylene. **t. benzoic acid.** $C_{10}H_{12}O_2$ = 164.1. $C_6H_2Me_3COOH$. **2.3.5-** Colorless crystalline needles, m.149; soluble in alcohol or ether. **2.4.6-** Isodurylic acid. Colorless crystals, m.152; slightly soluble in water, soluble in alcohol or ether. **t. bismuthine.** C_3H_9Bi = 254.07. $BiMe_3$. A colorless liquid, d.2.300, b.110. **t. boron.** C_3H_9B = 55.89. BMe_3. White crystals, m.56, b.110. **t. carbinol.** $C_4H_{10}O$ = 74.1. The tertiary alcohol, CMe_3OH. A colorless crystalline mass or liquid, m.25, b.82; soluble in water, alcohol or ether. See *butanol.* **t. cyclohexane.** Hexahydrocumene. **t. cyclopentene.** Laurolene. **t. ethylene.** C_5H_{10} = 70.1. β-isoamylene, $MeCH:CMe_2$. A colorless liquid, b.36, insoluble in water, soluble in alcohol or ether; used medicinally as an anesthetic. **t. gallium.** C_3H_9Ga = 114.79. $GaMe_3$. A colorless liquid, m. −19, b.55.8. **t. glycine.** See *betaine.* **t. naphthalene.** Sapotalene. **t. phosphate.** $C_3H_9PO_4$ = 140.1. Me_3PO_4. A colorless liquid, d.1.220, b.197; soluble in alcohol or ether. **t. phosphine.** C_3H_9P = 76.1. Me_3P. A colorless liquid, b.40; insoluble in water, soluble in alcohol or ether. **t. pyridine.** Collidine. **t. quinoline.** $C_{12}H_{13}N$ = 171.17. The soluble solids: **2.3.4-** m.65, b.285; **2.5.7-** m.43, b.286; **2.3.6-** m.86, b.285; **2.6.8-** m.45, b.266. **t. tin.** $(C_3H_9Sn)_2$ = $(163.77)_2$. $SnMe_3$ or $Me_3Sn.SnMe_3$. A colorless liquid, d.1.570, m.23, b.182, insoluble in water. Cf. *stannane.* **t. tin bromide.** Me_3SnBr = 243.69. White crystals, m.27, b.165. **t. tin chloride.** Me_3SnCl = 199.23. White crystals, m.37. **t. tin hydride.** Me_3SnH = 164.78. An oily liquid, b.60. **t. tin hydroxide.** Me_3SnOH = 180.78. Colorless prisms, decomp. 118. **t. tin oxide.** $(Me_3Sn)_2O$ = 343.54. White amorphous powder. **t. tin sulfide.** $(Me_3Sn)_2S$ = 359.60. Yellow oil, d.1.649, m.6, b.233. **t. tryptophane.** Is Hypophorine. **t. xanthine.** Caffeine. **t. urea.** $C_4H_{10}ON_2$ = 102.1. $MeNH.CO.NMe_2$. Colorless crystals, m.75, b.232; soluble in water, alcohol or ether.

trimethylene. C_3H_6 = 42.1. (1) Cyclopropane, q.v. (2) A prefix indicating three methylene groups. (3) The bivalent radical, $—CH_2.CH_2.CH_2—$. **acetyl-** $C_3H_5.CO.Me$ = 84.1. A colorless liquid, b.113, insoluble in water, soluble in alcohol. **benzoyl-** Benzoyl cyclopropane. **keto-** Cyclobutanone. **methyl-** C_3H_5Me = 56.0. A colorless gas, b.4; insoluble in water, soluble in alcohol or ether.

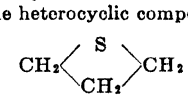
t. bromide. $C_3H_6Br_2$ = 201.90. The liquid $CH_2Br.CH_2.CH_2Br$, d.1.97, $b._{720mm}160$. **t. cyanide.** Glutaronitrile. **t. diamine.** 1.3-Propanediamine. **t. glycol.** 1.3-Propanediol. **t. group.** The bivalent radical $—CH_2.CH_2.CH_2—$. **t. imine.** C_3H_7N = 57.1. Tetrahydroform, 1.3-propylene imine. The heterocyclic compound,



t. oxide. C_3H_6O = 58.0. 1.3-propylene oxide. The heterocyclic compound,

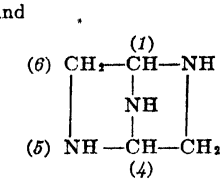


t. sulfide. C_3H_6S = 74.1. 1.3-propylene sulfide. The heterocyclic compound,



trimetric. Orthorhombic; cf. *trimeric.*

trimidine. $C_4H_9N_3$ = 99.09. The heterocyclic compound



trimolecular. Pertaining to three different molecules. **t. reaction.** A third order reaction, q.v.

trimorphism. The phenomenon of crystallizing in three different systems.

trimorphous. Describing a substance that crystallizes in three different systems.

trimyristine. Myristine.

trinitrate. A compound that contains three nitrate radicals, $(NO_3)_3$.

trinitride. Triazo.

trinitrin. Nitroglycerin.

trinitro- A prefix indicating that a compound contains three nitro-groups in its molecule. **t. aniline.** Picramide. **t. anisole.** $C_7H_5N_3O_7$ = 243.06. $MeO.C_6H_2(NO_2)_3$. White crystals, **2.3.4-** m.155. **2.3.5-** d.1.618, m.104. **2.4.6-** d.1.408, m.68.4. **3.4.5-** m.120. **3.4.6-** m.107. Used as high explosives. **t. benzene.** $C_6H_3(NO_2)_3$ = 213.1. T.N.B. **1.2.4-** Yellow crystals, m.57; slightly soluble in water; used in organic synthesis. **1.3.5-** sym., Yellow crystals, d.1.688, m.122, decomp. by further heat; slightly soluble in water, soluble in alcohol or ether. **t. cellulose.** Pyroxylin. **t. cresol.** $C_7H_5O(NO_2)_3$ = 243.1. 1-Methyl-3-hydroxy-2.4.6-trinitrobenzene, $C_6HMe(OH)(NO_2)_3$. Yellow needles, m.105, soluble in water, alcohol or ether; used as an antiseptic and in explosives. **t. glycerin.** Nitroglycerin. **t. naphthalene.** $C_{10}H_5(NO_2)_3$ = 263.1. **1.4.5-** or γ- Yellow needles, m.147; soluble in alcohol. **1.3.8-** or β- Yellow monoclinic needles, m.215; soluble in alcohol, ether or chloroform. **1.3.5-** or α- Yellow monocline crystals, m.122; slightly soluble in water, soluble in alcohol or ether. **1.2.5-** or γ- m.113. Used in organic synthesis and as explosives. **t. orcinol.** $C_7H_5O_8N_3$ = 259.10. $C_6(NO_2)_3Me(OH)_2$. A solid, m.163.5, slightly soluble in water, soluble in ether or benzene. **t. phenol.** $C_6H_3N_3O_7$ = 229.05. $HO.C_6H_2(NO_2)_3$. α- or **2.4.6-** Picric acid. β- or **2.4.5-** m.96. γ- or **2.3.6-** m.117.5. δ- or **2.3.5-** m.120. All are yellow crystals, soluble in water, and used as explosives. **t. phenyl methyl-tetramine.** Tetryl. **t. resorcinol.** $C_6H(NO_2)_3(OH)_2$ = 245.08. A solid, m.176 (sublimes). Soluble in alcohol or ether, slightly soluble in water. **t. toluene.** $C_7H_5O_6N_3$ = 227.1. **2.4.6-** or α- Trotyl, tolit, trilite, trinol, T.N.T., 1-methyl-2.4.6-trinitrobenzene, $C_6H_2Me(NO_2)_3$; pale yellow monoclinic leaflets, d.1.654, m.80.6, slightly soluble in water, alcohol or ether. Used similarly to picric acid in explosives. **2.3.4-** or β- Colorless leaflets, d.1.62, m.112; insoluble in water, slightly soluble in alcohol, soluble in ether. **3.4.5-** or δ- m.137.5. **2.3.5-** or ε- m.97.2. **2.3.6-** or ζ- m.79.5. **2.4.5-** or γ- Colorless crystals, d.1.62, m.104; insoluble in water, soluble in ether. Used as high explosives. **t. triazidobenzene.** $C_6N_{12}O_6$ = 336.0. Turek detonator, $(NO_2)_3C(N_3)_3$. Greenish-yellow crystals, m.131 forming hexanitrobenzene, insoluble in water; used as a detonating high explosive. **t. xylene.** $C_6H(NO_2)_3Me_2$ = 241.13. T.N.X. **2.4.6.1.3-** m.182; **2.3.5.1.4-** m.140.

trinitrol. Erythrol tetranitrate.

trinol. Trinitrotoluene.

-triol. A suffix indicating 3 hydroxy-groups present; as, propanetriol, $C_3H_5(OH)_3$, glycerol.

triolein. Olein.

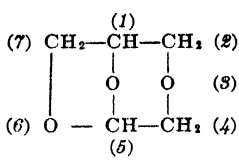
trional. $C_8H_{18}O_4S_2$ = 242.3. Sulfonethylene methane, $EtC(SO_2Et)_2Me$. A colorless crystalline powder, m.76; slightly soluble in water; used medicinally as a hypnotic.

-trione. A suffix indicating the presence of 3 keto groups, =CO.

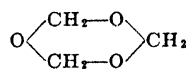
triose. $C_3H_6O_3$ = 90.1. A group of monosaccharides derived from glycerol:

CHO.CHOH.CH_2OH and CH_2OH.CO.CH_2OH.

trioxa- A prefix indicating three oxygen bridges in a ring system; as, **t. bicyclo octane.** $C_5H_8O_3$ = 116.1.

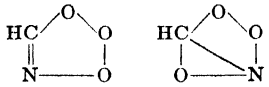


trioxan(e). $C_3H_6O_3$ = 90.1. Paraformaldehyde. The heterocyclic compound,



White crystals, m. 63, used in organic synthesis.

trioxazole. CHO_3N = 75.0. The heterocyclic compounds,



1.2.3.4- **1.2.4.3-**

trioxide. Teroxide. A binary compound that contains three oxygen atoms in its molecule. *E.g.*, Fe_2O_3, iron trioxide; SO_3, sulfur trioxide.

trioxin. Paraformaldehyde.

trioxime. A compound containing three =NOH radicals.

trioximido- A prefix indicating that the compound contains three —CH:N.OH groups in its molecule. **t. propane.** $C_3H_6O_3N_3$ = 132.08. HON:CH—C(:NOH)—CH:NOH. Colorless crystals, m.171.

trioxy- (1) A prefix indicating the presence of three oxygen atoms in the compound; generally as —C:O groups. (2) Trihydroxy. **t. methylene.** Paraformaldehyde. **t. purine.** Uric acid.

tripalmitin. Palmitin.

tripan roth. Trypan red.

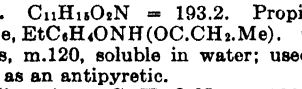
tripestone. A concretionary form of anhydrite.

triphane. Spodumene.

triphasic. Describing a system involving three phases.

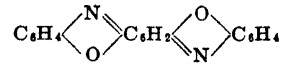
triphen- A prefix indicating that the compound contains three benzene-rings in its molecule.

triphenazineoxazine. $C_{18}H_{11}ON_3$ = 285.2. The heterocyclic compound,



triphenin. $C_{11}H_{15}O_2N$ = 193.2. Propionylphenetidine, $EtC_6H_4ONH(OC.CH_2.Me)$. Colorless crystals, m.120, soluble in water; used medicinally as an antipyretic.

triphenodioxazine. $C_{18}H_{10}O_2N_2$ = 286.2. The heterocyclic compound,

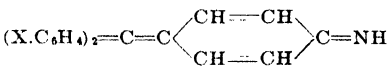


triphenol. Triatomic phenol. A compound having three —OH groups in an unsaturated ring.

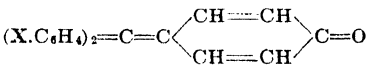
triphenyl- A prefix indicating that the compound contains three phenyl radicals in its molecule. **t. acetic acid.** $C_{20}H_{16}O_2$ = 288.23. The monobasic acid, $CPh_3.COOH$. Colorless monoclinic crystals, m.264 (decomp.); slightly soluble in water, soluble in alcohol. **t. amine.** $C_{18}H_{15}N$ = 245.22. The tertiary amine, Ph_3N. Color-

less monoclinic prisms, m.127, b.347; slightly soluble in alcohol, soluble in benzene or ether. **t. benzene.** $C_{24}H_{18}$ = 306.26. The aromatic hydrocarbon, $C_6H_3Ph_3$ (1.3.5-). Colorless. rhombic crystals, d.1.206, m.169; b. above 300; insoluble in water, slightly soluble in alcohol or ether. **t. bismuthine.** $C_{18}H_{15}Bi$ = 440.12. Bismuth triphenyl, $BiPh_3$. White monoclinic crystals, d.1.585, m.78, very soluble in chloroform. **t. carbinol.** $C_{19}H_{16}O$ = 260.22. The tertiary alcohol, $Ph_3C.OH$. Colorless hexagonal prisms, m.159, b. above 360, insoluble in water, soluble in alcohol, ether or benzene; used in organic synthesis, and in the manufacture of triphenylmethane dyes. *amino-* $C_{19}H_{15}O(NH_2)$ = 275.2. $NH_2C_6H_4.CPh_2OH$. meta-, m.155, para m.116. *diamino-* $C_{19}H_{14}O(NH_2)_2$ = 290.2. $(NH_2C_6H_4)_2CPhOH$. **t. ethane.** $C_{20}H_{18}$ = 258.15. $Ph_2CH.CH_2Ph$. Colorless. crystals, m.54, b.349.4. **t. ethylene.** $C_{20}H_{16}$ = 256.4. *α*-phenylstilbene. The hydrocarbon $Ph_2C:CHPh$. **t. guanidine.** $C_{19}H_{17}N_3$ = 287.17. $PhN:C:(NHPh)_2$. *alpha-* A solid, m.143, decomp. by further heat, soluble in alcohol. *beta-* A solid, m.131, soluble in water, alcohol, or ether. **t. methane.** $C_{19}H_{16}$ = 244.2. The hydrocarbon, Ph_3CH. Colorless leaflets, d.1.057, m.92, b.258, insoluble in water, soluble in alcohol, ether, benzene or chloroform. Used in organic synthesis, and in the manufacture of dyes. **t. methane dyes.** A group of dyes derived from triphenylcarbinol by the introduction of auxochromic groups. Classification:

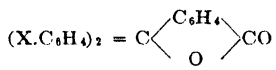
(1) fuchsin group



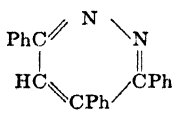
(2) aurin group



(3) phthalein group



t. methyl. $C_{19}H_{15}$ = 243.2. A "free radical" compound, Ph_3C; colorless crystals, m.300, b.420 (cf. *hexaphenylethane*, *tridiphenylmethyl*). **t. phosphine.** $C_{18}H_{15}P$ = 262.3. Ph_3P. Colorless monoclinic crystals, m.15; insoluble in water, soluble in alcohol or ether. **t. pyridazine.** $C_{22}H_{16}N_2$ = 308.15.

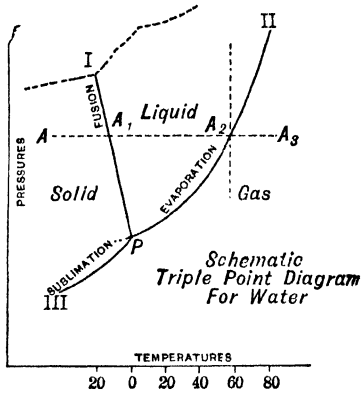


Colorless crystals, m.171. **t. stibine.** $C_{18}H_{15}Sb$ = 352.9. Ph_3Sb. **t. tin.** $C_{18}H_{15}Sn$ = 349.82. Tin triphenyl, $SnPh_3$. White powder, m.232, decomp. 280. **t. tin chloride.** Ph_3SnCl = 385.27. White crystals, m.106, $b._{13mm}240$, insoluble in water; used as reagent for fluorides.

triphenylene. $C_{18}H_{12}$ = 228.1. The tetracyclic hydrocarbon, $C_6H_4{<}^{C_6H_4}_{C_6H_4}{>}C_6H_4$.

triphylite. $LiFePO_4$. A native lithium iron phosphate; greenish-blue rhombic crystals.

triple. Threefold. **t. bond.** The acetylene linkage, —C:C—, which is readily saturated. It is indicated by the suffix -yne*, replacing the former -ine; as, propyne* (propine). **t. chlorides.** A group of complex chlorides of the type $M'_4M''M'''_2Cl_{12}$ in which M' is Na, K, Cs, or NH_4; M'' is either Zn, Cu, Hg, Ag_2, or Au_2; and M''' is trivalent Au. **t. nitrite reagent.** A solution of 120 gm. sodium nitrite, 9.1 gm. copper acetate, 16.2 gm. lead acetate, 2 cc. acetic acid in 50 cc. water. It gives crystals of characteristic shape with potassium salts. **t. phosphate.** (1) A magnesium, calcium, ammonium phosphate, sometimes found in urine. (2) Treble superphosphate. A phosphate rock containing 3 times as much phosphoric acid as superphosphate. **t. point.** The conditions (expressed in terms of vapor-pressure curves)

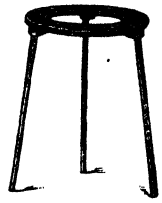


under which three phases can exist in equilibrium; *e.g.*, in the system ice-water-water vapor, at the pressure of 4.57 mm. and temperature of 0.008°C. See figure, and *phase rule, diagram, quadruple.* **t. salts.** A group of compounds whose molecules consist of three cations and one anion; as, $Na_2CaCu(NO_2)_6$.

triplet. See *multiplet.*

triplite. $(Fe,Mn)_2FPO_4$. A greasy mineral.

tripod. A three-legged support for holding flasks or other containers over a bunsen burner.



Tripod.

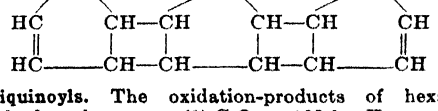
tripoli. Rottenstone. Decomposed limestone used for polishing. **t. powder.** Kieselguhr.

tripolite. A variety of native silica secreted by diatoms. Cf. *kieselguhr.*

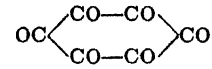
trippkëite. A native copper arsenate.

tripropyl. A prefix indicating the presence of three propyl radicals. **t. amine.** $C_9H_{21}N$ = 143.2. The tertiary amine $(C_3H_7)_3N$. A colorless liquid, m.15; slightly soluble in water, readily soluble in alcohol or ether.

tripyrrole. $C_{12}H_{15}N_3$ = 201.15. The heterocyclic compound



triquinoyls. The oxidation-products of hexahydroxybenzene. (1) C_6O_6 = 168.0. Hexaoxybenzene.



(2) $C_6H_{16}O_{14}$ = 312.16. A solid, decomp. 95, slightly soluble in water, insoluble in alcohol or ether.

triricinolein. Ricinolein.

trisaccharide. A carbohydrate that contains three monosaccharides in its molecule, and hydrolyzes to three simple sugars, *e.g.*, $C_{18}H_{32}O_{16}$, or $(C_6H_{10}O_5)_3.H_2O$, raffinose.

trisalyt. A mixture of cyanides (NaCN, $Zn(CN)_2$) and $NaHSO_3$ used in electroplating.

trisazo- A prefix indicating the presence of three azo-groups, —N:N—, in the molecule of a compound.

trisilane. Si_3H_8 = 92.2. A colorless liquid, m.−117, b.53; unstable at ordinary temperatures.

trisilicic acid. $H_4Si_3O_8$ = 216.3. A white insoluble powder.

tristearin. Stearin.

trisulfide. A binary compound that contains three sulfur atoms in its molecule. *E.g.*, Fe_2S_3, iron trisulfide; Na_2S_3, sodium trisulfide.

tritartaric acid. Uvic acid.

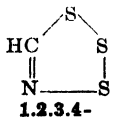
triterium. Tritium.

trithiane. $C_3H_6S_3$ = 138.05.

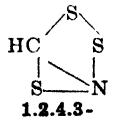
S.CH_2.S.CH_2.CH_2, *s-* or *1.3.5-*.

trithioacetaldehyde. Sulfo-paraldehyde.

trithioazol. $CHNS_3$ = 123.2. The heterocyclic compounds,



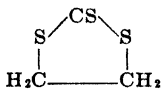
1.2.3.4-



1.2.4.3-

trithiocarbonic acid. See *thiocarbonic acids.*

trithiocarbonicethidene ester. $C_3H_4OS_3$ = 152.2. The heterocyclic compound,



trithiolane. $C_2H_4S_3$ = 124.05.

S.S.CH_2.S.CH_2, *1.2.4-* or

S.S.S.CH_2.CH_2, *1.2.3-*.

trithionic acid. The sulfur acid, (q.v.) $H_2S_3O_6$.

triticum. (1) A genus of grasses which includes wheat. (2) Couch grass, dog grass. The dried rhizomes of *T.* or *Agropyron repens*, a Gramineae. It contains carbohydrates and malates; used medicinally as a diuretic.

tritium. T or H^c = 3.00. Triterium. An isotope of hydrogen (q.v.) having a mass of 3 and obtained with deuterium (q.v.) by the electrolysis of water.

triton-B. Tetramethyl ammonium hydroxide. **t.-F.** Dimethyl dibenzyl ammonium hydroxide. Used as solvents for cellulose, for saponifying fats, and in inorganic synthesis.

tritopine. $C_{42}H_{54}O_7N_2$ = 698.4. An alkaloid from opium; colorless scales, m.182.

triturate. To grind or rub to a powder (usually with a liquid) in a mortar.

trituration. Any finely-powdered drug, or a mixture of milk-sugar and a drug.

trityl. The radical triphenylmethyl, Ph_3C—.

triuret. $C_3H_6N_4O_3$ = 146.06. Carbonylurea. $(NH_2CONH)_2CO$. Cf. *biuret.*

trivalent. Tervalent. Describing an atom or radical that has a valency of three.

trivalerin. Phocenin.

troche. A tablet or medicated disk.

troctolite. A granitoid, crystalline, plutonic rock containing olivine and felspar.

trogerite. A native hydrous uranium arsenate.

troilite. A native form of FeS.

trommel. A cylinder of perforated steel plate revolving around an inclined central axis; used for large-scale sifting purposes.

Trommer's test. A test for glucose in urine. On warming the sample with sodium hydroxide and copper sulfate, a yellowish-red precipitate indicates sugar.

Trommsdorff, Johann Bartholomäus. 1770–1837. A German apothecary noted for chemical analysis, teachings and writings; founder of *Journal der Pharmazie.*

tron(a). $Na_2CO_3.NaHCO_3.2H_2O$. A native sodium carbonate and sodium bicarbonate. Cf. *natron, urao.* **t. potash.** Kemfert. A high grade KCl from Searles Lake, California, 58–62 % K_2O; used for fertilizers.

troostite. (1) A native zinc-magnesium silicate. (2) A transition form of cementite, austenite and ferrite; it is an emulsified ferrite. Cf. *steel.*

tropacocaine. $C_{15}H_{19}O_2N$ = 245.17. Benzoylpseudotropine, $C_5H_9N.CH_2.CH.O.COPh$. An alkaloid obtained from coca leaves. Colorless glistening crystals, m.49, slightly soluble in water, soluble in alcohol or ether; used medicinally as a local anesthetic. **t. hydrochloride.** $C_{15}H_{19}O_2N.HCl$ = 281.62. Colorless crystals, m.271, soluble in water; used as a local anesthetic.

tropæolin. Tropeolin.

tropaic acid. Tropic acid.

tropan. $C_8H_{15}N$ = 125.1. *N*-methyl nortropan. The hydrocarbon of tropine, q.v.

tropate. Any salt of tropic acid.

tropeine. Any ester of tropine and an organic acid, as atropine or hyoscyamine.

tropeolin. Tropaeolin. A group of hydroxy-azo dyes of the type, R—N_2—$C_6H_4.SO_3Na$, the sodium salts of R-azobenzenesulfonic acids; as:

tropeolin D, or methyl orange, p-dimethylaminoazobenzenesulfonic acid, where R is $Me_2NC_6H_4$—

tropeolin O, yellow T, or resorcinol yellow, resorcinolazobenzenesulfonic acid, where R is $(HO)_2C_6H_3$—. Used as pH indicator, changing at 12.0 from yellow (acid) to brown (alkaline).

tropeolin OO, diphenylamine orange, orange IV or phenylamineazobenzenesulfonic acid, where R is $PhNH.C_6H_4$—. Used as a pH indicator, changing from red (1.3) to yellow (3.2).

tropeolin OOO 1, alpha-naphtholorange, orange I, where R is $HO.C_{10}H_6$—

tropeolin OOO 2, beta-naphtholorange, orange II, where R is $HO.C_{10}H_6$—

Some of these dyes are used as indicators, and in dyeing woolen and silken fabrics.

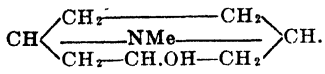
tropic acid. $C_9H_{10}O_3$ = 166.1. Phenylhydracrylic acid, tropaic acid. An optically-active aromatic hydroxyacid, $CH_2OH.CHPh.COOH$, obtained by hydrolysis of atropine. i- Colorless crystals, m.117, decomp. by further heat: soluble in water. d- m.127. l- m.123.

tropidine. $C_8H_{13}N$ = 123.1. *N*-methylnortropidine. An oily liquid obtained by dehydration of tropine, d.0.95, b.162; insoluble in water, soluble in alcohol or ether. Cf. *nortropidine.*

tropilidene. C_7H_8 = 92.1. *1.3.5*-Cycloheptatriene. An oily liquid, d.0.903, b.117, prepared by distilling tropine with soda-lime.

tropin. See *sensitizer* (2).

tropine. $C_8H_{15}ON$ = 141.2. Tropanol-3, 3-hydroxytropan. A heterocyclic alcohol, occurring as ester in atropine and hyoscyamine:



Colorless needles, m.62, b.220; soluble in water, alcohol, or ether. **iso-** See *atropine.* **pseudo-** *ψ*-tropine. An optically-inactive isomer obtained by heating t. with phenyl amylate. It is a hydrolytic split-product of Java coca plants. Colorless needles, m.108, b.$_{755mm}$237; soluble in water or alcohol. **t. alkaloids.** See *atropine, cocaine, ecgonine.* **t. carboxylic acid.** Ecgonine. **t. sulfate.** $(C_8H_{15}ON)_2H_2SO_4$ = 380.6. A white crystalline powder, soluble in water or alcohol.

tropopause. The altitude at which the temperature of the atmosphere ceases to decrease with increase in height.

trotyl. Trinitrotoluene.

Trouton, Frederick Thomas. An English physicist. **T.'s rule.** The molal latent heat or heat of evaporation, ΔH_m, is equal to about twenty times the boiling point, T_b (absolute); $\Delta H_m/T_b$ = 20.22. Exceptions exist; as, water or alcohol. Cf. *Hildebrand's rule, Diterici's rule.* It can also be expressed by $T_{760mm} = T_p(1.648 - 0.255 \log p)$, where T_{760mm} is the boiling point (at 760 mm.), and p the pressure.

troy. A system of weights and measures used by jewelers. 1 oz. troy = $\frac{1}{12}$ pound = 480 grains = 20 pennyweights = 1.09714 oz. avoir. = 1 oz. apoth. = 31.1035 grams. 1 pound troy = 5760 grains = 240 pennyweights = 13.1667 oz. avoir. = 0.82286 pds. av. = 373.2509 grams. **t. weights.** The weight system used in reports on gold, silver, or precious metals:

1 oz. troy = $20.67 = 85 shillings gold value
1 pd. troy = $248.04 = 51 pounds sterling

Trubenizing. A process for permanently stiffening fabrics and making them unshrinkable, by inserting a cellulose acetate thread between the cotton or linen and calendering with a cellulose acetate solvent.

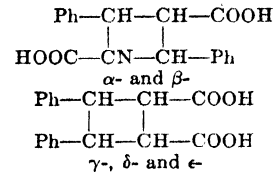
trust. An absolute or near control of the source, manufacture or sale of a commodity within a political area; as (in 1939):

	A, Per cent	B, Per cent	C, Per cent
I. G. Farbenind. (*Germany*)	100	90	85
Imp. Chem. Ind. (*England*)	40	95	100
Kuhlman, etc. (*France*)	80	70	40
Union Chimique (*Belgium*)	...	100	

A = Dyes. B = Acids and heavy chemicals. C = Synthetic nitrogen. Cf. *monopoly.*

truxelline. An alkaloid obtained from coca leaves. It consists of an ester of ecgonine and truxillic acids.

truxillic acid. $C_{18}H_{16}O_4$ = 296.1. A dimer of cinnamic acid obtained from coca leaves. There are five stereoisomeric compounds; the *γ*- and *δ*-isomer is *truxillic acid.* Cf. *norpinic acid.*



truxinic acid. $C_{18}H_{16}O_4$ = 296.1. An isomer of truxillic acid, q.v.

trypaflavin(e). Diamino methyl acridinium chloride. A yellow dye which darkens on exposure; used in a 0.1 % solution as a bactericide. Cf. *acriflavine.*

trypan blue. Diamine blue, congo blue, azidin blue, Niagara blue, sodium tolidin-disazo-bi-1-amino-8-naphthol-3.6-disulfonic acid.

$[(NaSO_3)_2C_{10}H_3(NH_2)OH.N:N.C_6H_3Me—]_2$

A bluish-gray powder. Used as a dye, and medicinally, as an antiprotozoan agent in malaria and trypanosomiasis.

trypan-red. Tripanroth. A brown powder; used as a dye and medicinally, as an antiprotozoan agent.

tryparsamide. $C_8H_{10}AsN_2O_4Na$ = 287.0. Sodium *N*-phenylcinnamide-*o*-arsonate.

$NH_2.CO.CH_2.NH.C_6H_4.AsO(OH)ONa.$

A white powder, used to treat sleeping sickness and neurosyphilis. Cf. *carbarsone, acetarsone.*

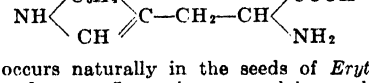
trypsase. Trypsin.

trypsin. Trypsase. Alkali proteinase. An enzyme of pancreatic juice that hydrolyzes proteins to proteoses, and proteoses to true peptones (tryptones) and finally to leucine and tyrosine. A yellowish powder, soluble in water; it is most efficient in a slightly alkaline solution.

tryptic activity. The hydrolytic or digestive power of trypsin.

tryptone. The true peptones produced by trypsin, as distinct from pepsin peptones.

tryptophane. $C_{11}H_{12}O_2N_2$ = 204.2. Indylalanine, *α*-amino-*β*-indyl propionic acid, indolealanine. An aromatic amino acid and split-product of proteins.



It occurs naturally in the seeds of *Erythrina hypaphorus*, a Leguminosae, and is a colorless solid, m.289, soluble in water, insoluble in alcohol or ether. **trimethyl-** Hypophorine.

tryptophyl. The monovalent radical, $C_{11}H_{11}ON_2$—, derived from tryptophane.

T.S. An abbreviation for test-solution.

tschermigite. A native ammonium alum.

Tschugajew's reaction. A test for nickel. The formation of a scarlet-red precipitate on the addition of dimethylglyoxime to a weak ammoniacal, nickel-salt solution.

tsugaresinol. $C_{20}H_{20}O_6$ = 356.2. Sulfite liquor lactone, *l*-conidendrin. A lignin lactone in sul-

fite waste liquor, and in Japanese hemlock (*Tsuga sieboldii*). White crystals, m.250 (approx.)

T-stoff. See *xylyl bromides.*

T.T. Tuberculin-tested; as applied to milk from tuberculin-tested cows.

Tu. The symbol for thulium, element At. No. 69.

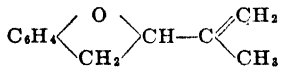
tuba root. Derris root.

tubacurarine. $C_{19}H_{28}N_2O$ = 298.21. An amorphous brown alkaloid from curare.

tubaic acid. $C_{12}H_{12}O_4$ = 220.09. A constituent of derris root; q.v. **iso-** See *rotenic acid.*

tubain. A resin from *derris root*, q.v.

tubanol. $C_{11}H_{12}O$ = 160.0. A split-product of rotenone.



hydroxy-carboxy- Tubaic acid. **tetrahydro-2-**Isoamylresorcinol.

tubatoxin. Rotenone.

tub-sizing. An operation in paper-making in which high-class writing papers are passed through a bath of gelatin and slowly dried in air, in order to increase the strength and improve the writing surface.

tube. Any long and hollow device. **absorption-** See *absorption tube, a. cell.* **agglutination-** A small test-tube. **Arndt-** q.v. **arsenic-** A long glass-tube with drawn-out tip or jet bent at an angle of 120°. Cf. *Marsh test.* **Babcock-** See *Babcock bottle.* **barometer-** A narrow tube closed at one end and more than 32 inches long. **Brown-** A potash bulb. **calcium chloride-** A glass-tube of varied shape, filled with $CaCl_2$; used to dry gases. **capillary-** A glass tube with a fine bore (1 mm. or less). **cathode-** q.v. **centrifuge-** A thick-walled glass-container of varied shape, for use in a centrifuge. **colorimeter-** A flat-bottomed test tube of clear white glass, for use in colorimeters. **combustion-** A glass tube, resistant to heat. **comparison-** A colorimeter t. **condenser-** The inner tube of a condenser. **Coolidge-** An x-ray tube with electrically-heated cathode. **Crookes-** A vacuum tube exhausted to such an extent that x-rays are produced on the passage of an electric current. **culture-** A test-tube for growing bacteria. **Dorn-Goetz-** A vacuum tube for spectroscopic work. **drying-** A glass-tube, variously shaped, filled with a drying agent. **Emmerling-** An absorption t. **extraction-** See *Soxhlet apparatus.* **fermentation-** Saccharometer. An inverted test-t. for collecting gases. **filter-** A glass-tube for connecting Gooch crucibles to a source of suction. **funnel-** A long glass-tube with conical top. **Geissler-** A tube that contains traces of gas at low pressure; used to produce the characteristic spectrum of the gas by the passage of an electric current. **Giltner-** A t. for anaerobic cultures. **guard-** (1) A metal casing to protect glass ware from mechanical injury. (2) See *guard.* **Hinman-** A t. for determining ammonia. **Hittorf-** A modified Crookes t. **Hortvet-** A centrifuge t. **La Bel-** A t. for fractional distillation. **melting point-** A thin-walled capillary tube. **Nessler-** Colorimeter t. **Peligot-** Calcium chloride t. **Pitot-** A manometer to record pressure. **Plucker-** A vacuum t. for spectroscopic work. **T-** A T-shaped glass-tube used in making three-way connections. **test-** A glass-tube, closed at one end and made of heat- and acid-resistant glass. **thistle-** A funnel-tube with bulb-shaped end, called a thistle top. **U-** A U-shaped glass-tube. **vacuum-** A glass vessel that has been highly evacuated; as, a Crookes or Geissler tube. **X-** A cross-shaped tube for making four-way connections. **x-ray-** See *x-ray tube.* **Y-** A Y-shaped glass-tube used for making three-way connections.

tuberculin. A therapeutic preparation obtained by the extraction of tubercle bacillus with various solvents, usually by long grinding in a bacteria mill.

tuberculostearic acid. $C_{19}H_{38}O_2$ = 298.2. *10-*Methylstearic acid. A fatty acid from bovine tubercle bacilli. Cf. *phthioic acid.*

tuberin. A globulin from potato juice, representing about 50 % of the total protein present.

tubers. The underground stems of plants that serve as storage receptacles for reserve materials. Two tubers are official and used medicinally, aconite and jalap.

tubing. Glass or rubber tubes used in the construction and connection of chemical apparatus. **alundum-** A hollow alundum rod. **glass-** A hollow glass-rod. **pressure-** A heavy-walled rubber hose for connecting pressure or vacuum lines. **rubber-** A round, flexible and hollow tube used to connect devices for the passage of liquid or gaseous materials. **silica-** A transparent or opaque, hollow rod of silica, used for the combustion of substances at high temperatures.

tubule. A small tube or neck on a glass apparatus.

tufa. A calcareous sinter or sedimentary rock composed of calcium carbonate and silica; formed by chemical reaction from lake or ground water; as, travertine. Cf. *tuff.*

tuff. A sedimentary rock composed of volcanic dust, ash and cinders, (cf. *tufa*).

tulipiferine. An alkaloid obtained from the bark of *Liriodendron tulipifera*, a Magnoliaceae.

tulip tree. The tree *Liriodendron tulipifera*, a Magnoliaceae of North America.

tumbago. An alloy of 33 % gold, 12 % silver and 55 % copper of ancient origin, found in Columbia.

tung oil. Chinese wood oil. A rapidly-drying oil extracted from the nuts of *Aleurites cordata* and *A. fordii*, an euphorbiaceous tree of China, and Japan, and now cultivated in Florida. A yellow jellifying liquid, d.0.936–0.942, used for paints, varnishes, enamels and linoleum. It replaces linseed oil and gives a higher gloss and a more water-resistant finish. Cf. *lumbang oil, bancoul nuts.* **t. pomace.** Tung oil cake. The ground and dried remains of the seeds after the oil has been extracted. It contains 5–6 % N, 2 % P and 1.3 % K_2O; used as fertilizer.

tungstate. Wolframate. A salt of tungstic acid of the general type, M_2WO_4. **meta-** A salt of metatungstic acid of the general type, $M_2W_4O_{13}$; as, sodium metatungstate, $Na_2W_4O_{13}$. **para-** A salt of paratungstic acid of the general type, $M_{10}W_{12}O_{41}$.

tungsten. W = 183.92. Wolfram, wolframium. A heavy metal and element, atomic number 74. A gray to black, hard, brittle powder, d.19.10, m.2974, b.6700; insoluble in water, soluble in nitric acid and hot hydroxide solutions. Its valencies are 2, 4, 5 and 6. It occurs in nature in wolframite, scheelite, and tungstite, and is used (as ferrotungsten) in the manufacture of steel for high-speed tools and of metallic filaments (m.3100°C.) for electric light bulbs. **ferro-** An alloy obtained in the electric furnace;

used for high-speed tools; W (7–9 %) Cr (2–3 %), and Fe. **orange-** $Na_2WO_4.W_2O_5$. Saffron bronze, tungsten-sodium tungstate. Gold colored scales, insoluble in ordinary solvents; used as a pigment. **violet-** $K_2W_3O_9.W_2O_5$. Potassium tritungstate, a bluish-black powder, used as a pigment.

t. alloy. See *ferrotungsten, steel, partinium.*

t. bronze. An alkali-metal salt of polymerized tungstic acid; as orange t. and violet t., q.v.

t. carbides: (1) WC. d.15.7, m.2780. (2) W_2C. d.16.06, m.2880. (3) W_3C. m. above 2700. *cemented-* An extremely hard alloy of WC embedded in tungsten and 5–15 % Co; d.14–15; hardness, second to diamond. Used for high-speed machine tools. Cf. *carboloy, widia.*

t. chlorides: T. dichloride, WCl_2; t. tetrachloride, WCl_4; t. pentachloride, WCl_5; t. hexachloride, WCl_6.

t. dichloride. WCl_2 = 254.9. An amorphous gray powder, decomp. by water.

t. dioxide. WO_2 = 216.0. A brown, rhombic, crystalline powder, d.12.11; insoluble in water, soluble in acids or alkalis.

t. disulfide. WS_2 = 248.1. A dark gray crystalline powder, d.7.5.

t. fluoride. WF_6 = 298.0. A gas.

t. hexachloride. WCl_6 = 396.8. Dark blue, cubic crystals, d.13.3, m.275, b.346; slightly soluble in water, soluble in carbon disulfide.

t. minerals. The most common ores are the tungstates and sulfide:

tungstenite	WS_2
stolzite	$PbWO_4$
ferberite	$FeWO_4$
wolframite	$(Fe,Mn)WO_4$
hülsnerite	$MnWO_4$
scheelite	$CaWO_4$
cuprotungstite	$CuWO_4$

t. oxides: T. dioxide, WO_2; t. pentaoxide, W_2O_5; t. trioxide, WO_3.

t. oxychloride. $WOCl_4$ = 341.63. Tungstyl chloride. A dark red crystalline mass, m.209, b.227, rapidly decomp. by water; it absorbs moisture from the air.

t. pentachloride. WCl_5 = 361.3. Black needles, d.3.52, m.248, b.275, decomp. in water, slightly soluble in carbon disulfide.

t. pentoxide. W_2O_5 = 448.0. Blue tungstic oxide. A blue powder; insoluble in aqua regia.

t. tetrachloride. WCl_4 = 325.8. A gray crystalline powder, decomp. by water or heat.

t. trioxide. WO_3 = 232.0. Tungstic acid anhydride. A yellow, rhombic, crystalline powder, d.7.16, m. at red heat; insoluble in water or acids, soluble in strong alkalis. Used in the manufacture of metallic tungsten for lamp filaments.

t. trisulfide. WS_3 = 280.2. A black powder, slightly soluble in water, soluble in alkalis or sulfide solutions.

tungstic. Pertaining to pentavalent or hexavalent tungsten.

t. acid. H_2WO_4 = 250.02. A yellow crystalline powder; insoluble in water, soluble in hydrofluoric acid or alkalis. It forms a hydrate H_2WO_4,H_2O.

t. acids. A group of acids derived from hexavalent tungsten by polymerization of tungstic acid:

tungstic acid.... $(WO_3 + H_2O)$, or H_2WO_4.
*meta*tungstic acid $(4WO_3 + H_2O)$, or $H_2W_4O_{13}$.
*para*tungstic acid $(12WO_3 + 5H_2O)$, or $H_{10}W_{12}O_{14}$.

t. ocher. Tungstite.

tungstite. Tungstic ocher. Wolframine. Native WO_3.

tungstosilicic acid. $H_8SiW_{12}O_{42}$. A compound isomeric with silicotungstic acid, which forms hydrates with water.

tungstyl. The tetravalent radical, $\gg WO$.

tuning fork. A forked-shaped metal instrument with two prolonged arms which may be set in rapid and sustained vibrations at an almost constant frequency, by means of a sharp blow. Electrically-sustained tuning-forks are used for synchronizing vibrations.

tuno gum. Chicle.

tupelo. A forest tree of North America, *Nyssa aquatica*, or cotton gum tree, a Cornaceae of the Mississippi valley. Used as a commercial timber; the spongy wood of the roots is used medicinally for sponge tents.

turacin. A crimson pigment containing copper obtained from the feathers of the turakoo, an African bird. Cf. *tetronerythrin.*

turaco-porphyrin. A chromophoric substance, similar to hematoporphyrin, obtained from turacin.

turanose. $C_{12}H_{22}O_{11}$ = 342.18. A disaccharide, consisting of glucose and fructose, formed by partial hydrolysis of melezitose.

turbid. Describing the slight cloudiness of a solution caused by a precipitate or by fine suspended particles.

turbidimetry. The determination of the quantity of matter, in the form of fine suspended particles in a liquid, by measuring the thickness of the liquid that produces a reduction in the visual transmission as compared with a standard solution or a standard pattern. Used in the examination of water and colloidal suspensions. Cf. *nephelometry.*

turbidity value. The temperature at which a solution of an oil in a solvent (*e.g.*, alcohol or acetic acid) shows the first signs of turbidity when cooled under specified conditions. Cf. *Valenta value.*

Turek detonator. Trinitrotriazido benzene.

turkey corn. Corydalis.

t. pea. Tephrosia.

t. red. (1) Harmala red. A coloring matter from the seeds of *Peganum harmala*, a Rutaceae. (2) Madder.

t. red oil. A material obtained by the action of cold concentrated sulfuric acid on castor oil. Used as a wetting agent; and in the preparation of cotton for dyeing with alizarin, etc.

turmeric. Indian saffron, curcuma. The dried rhizomes of *Curcuma longa*, a Scitaminaceae. Used as a condiment, medicinally as the fluid extract, and chemically as an indicator (see *curcuma*).

t. paper. Curcuma paper.

t. root. Hydrastis.

Turnbull's blue. $Fe_3(FeC_6N_6)_2$. Insoluble Prussian blue. A deep-blue precipitate, obtained from excess of a ferrous salt and a solution of potassium ferricyanide.

turnsole. (1) Litmus. (2) A dye prepared from *Chrozophora tinctoria*, an Euphorbiaceae of the Mediterranean countries.

turpentine. Pine cone oil. Terebenthene. Terebinthina. An oleoresin from various coniferous trees, especially those of the Pinus species. Yellowish, sticky masses of characteristic balsamic odor. It contains an essential oil; used in the manufacture of turpentine oil.

Aleppo-	from *Pinus halepensis*
Bordeaux-	from *Pinus maritima*
Canada-	from *Pinus maritima*
Carpathian-	from *Pinus cembra*
common-	from *Pinus palustris*, *P. sylvestris*

Hungarian..... from *Pinus pumilio*
larch..... from *Larix europaea*
Strassburg-..... from *Abies pectinata*
Venice-..... from *Larix europaea*

Cf. *colophony, terebena, terpinene, sylvestrene.* **Chinese-** The volatile oil from *Pistacia terebinthus*, an Anacardiaceae. **t. oil.** An essential oil distilled from turpentine, and consisting of a number of terpenes, (pinene, sylvestrene, dipentene). A colorless, volatile liquid, d.0.869, insoluble in water, soluble in alcohol, oils or benzene. Used extensively as a solvent and vehicle for paints, varnishes, disinfectants, and in pharmacy.

turpeth. The root of *Ipoemoea turpethum*, a Convulvulaceae of India used as a cathartic and substitute for jalap. **t. mineral.** Mercuric subsulfate.

turquoise. Callaite, callainite. A hydrous phosphate of aluminum colored blue by a copper compound; used as a gem.

turtle oil. An oil from the muscles and genital glands of the giant sea-turtle, m.24.6–25.6, d.0.9112, $[n]^{40}1.4599$, sapon. no. 209, iodine no. 64.6. Used as a cosmetic.

tussol. $C_{19}H_{20}O_4N_2$ = 340.2. Antipyrine mandelate, phenylglycolantipyrine. $C_{11}H_{12}N_2OPh\text{-}CHOH.COOH$. A white crystalline powder, soluble in water; used medicinally for whooping cough.

tutanag. Chinese spelter. An alloy of lead and tin used for canisters and tea chest linings.

tutia. Tutty. An obsolete term for zinc carbonate.

tutin. $C_{17}H_{20}O_7$ = 336.2. A poisonous glucoside from the leaves and stems of the toot plant, a *Coriaria* species of New Zealand.

tutocaine. $C_{14}H_{22}N_2O_2.HCl$. Butamin, γ-dimethylamino-α-β-dimethylpropyl-*p*-aminobenzoate, hydrochloride, *p*-aminobenzoyl-dimethylaminomethyl butanol hydrochloride, $Me_2N.CH_2.CHMe.CHMe.OCOC_6H_4NH_2.HCl$. Colorless needles, m.214, soluble in water; used as a local anesthetic.

Tutton's salts. A group of double salts, $M'M''(SO_4)_2.6H_2O$, resembling the alums, (q.v.); where M′ is NH_4, K, Tl etc., M″ is Mg, Zn, Fe, etc. and S can be replaced by Se.

tutty. Tutia.

tuyère. Tweer. A pipe inserted into the walls of a furnace through which an air blast is forced into the furnace.

Tw. An abbreviation for degrees on the Twaddell hydrometer.

Twaddell. A hydrometer scale (q.v.) generally used for technical purposes. If the specific gravity is d:

$Tw° = 200(d - 1)$, or $d = (Tw° + 200)/200$.

Twaddle. Twaddell.

tweens. Trade name of a group of surface-active agents.

tweer, twere. Tuyere.

twin. One of a closely-connected pair. **t. crystals.** A pair of crystals which have grown together in contact. They may coalesce except for a few faces, and usually form a symmetrical figure (a cross or star). **t. electrons.** A pair of electrons that are supposed to form a chemical bond, each atom providing one electron, as in $H:\ddot{\underset{\cdot\cdot}{Cl}}:$. Thus, the pair of electrons between H and Cl in HCl consists of the single electron from hydrogen and the seventh electron of chlorine. See *Lewis' theory, polar bond.* **t. nuclei.** Describing a bicyclic structure; an organic compound that contains two connected rings, as in naphthalene.

Twitchell reagent. A catalyst of fat hydrolysis, prepared by the action of sulphuric acid on oleic acid and naphthalene. It is regarded as a sulphonated addition-product of naphthalene and oleic acid with formula, $C_{18}H_{35}O_2.C_{10}H_6SO_3H$. **T. process.** The splitting of fats by steam in loosely-covered tanks with the aid of T.'s reagent (about 0.5 per cent on the weight of the fat). Cf. *Pfeilring reagent.*

tyllithin. Lithium acetyl salicylate.

tylophorine. An alkaloid from *Tylophora asthmatica*, an asclepiadaceous tree of Southern Asia; used medicinally as an emetic.

tympan. A thick paper, often impregnated with oil or glycerin, used to prevent set-off when backing-up sheets before printing, or for interleaving them after printing.

Tyndall, John. 1820–1893. An English physicist, noted for his experiments with light, sound and magnetism. **T. cone.** The path of light passing through a heterogeneous medium, made visible by means of the solid particles; as, a sunbeam illuminating the dust particles of the air, or a light-beam passing into a colloidal suspension. The cone-shape is due to an analogy of the focusing effect of a lens. **T. effect.** The scattering of light by small particles; as in the T. phenomenon. **T. phenomenon.** A beam of light becomes visible when passing through a turbid solution, fog, or smoke. Cf. *scattering, luminescence, ultramicroscope.*

tyndallimetry. The estimation of the suspended matter in a solution by measuring the intensity of the scattered light from a Tyndall cone.

type. A general or prevailing character. **t. of compounds.** An arbitrary classification of organic compounds which groups together those obtainable from one another by substitution, since they must belong to the same type. More recently type has been used to indicate the presence of typical radicals; as, —OH, —NH_2, —CHO, —COOH, etc. Type differs from class in that the latter refers to the carbon structure, (aliphatic, aromatic, saturated, unsaturated), whereas type indicates the possibility of certain common reactions due to typical radicals. Cf. *classification.* **t. metal.** An alloy used for making printers' type. It consists usually of about 7 parts lead and 2 parts antimony, with small amounts of tin, bismuth, nickel or copper. **t. reaction.** A reaction which is common to a group of related substances.

typhasterol. A phytosterol from the pollen of *Typha orientalis*, a *Typhaceae*. α- White powder, m.133, and levorotary.

typhotoxin. A ptomaine from cultures of Eberth's bacillus.

typical. Pertaining to a certain characteristic, property or standard. **t. compounds.** Fundamental compounds from which a number of others are derived by substitution; as, H_2O HCl, NH_3, CH_4. **t. elements.** The most abundant element of each group of the periodic system, namely:

Non-metals { oxygen and sulfur; nitrogen and phosphorus; carbon and silicon; chlorine; hydrogen

Metals { sodium and potassium; magnesium and calcium; aluminum; iron; copper; zinc; silver; platinum; gold; mercury; lead

tyramine. $C_8H_{11}ON$ = 137.1. p-hydroxyphenylethylamine, aminoethylphenol. $NH_2.CH_2.CH_2.C_6H_4.OH$. An alkaloid obtained from ergot or by heating tyrosine. A white crystalline powder, soluble in water; used medicinally as a heart stimulant and vasoconstrictor. **t. hydrochloride.** $C_8H_{11}ON.HCl$ = 173.5. A colorless crystalline powder, soluble in water; used medicinally as a substitute for pituitary extract.

tyratol. Thymol carbamate.

tyrocidine. An antibiotic component of tyrothricin (q.v.); it is a salt of a polypeptide having a molecular weight of approximately 1260, or a multiple of this number.

tyroleucin. $C_{14}H_{22}O_4N_2$ = 282.3. A split-product of casein or decomposing albumin.

tyrolite. Copper froth.

tyrosal. Salipyrine.

tyrosinase. An enzyme occurring in vegetable and animal tissues, that oxidizes tyrosine to homogentisic acid, melanin or similar pigments.

tyrosine. $C_9H_{11}O_3N$ = 181.14. β-p-hydroxyphenyl-α-aminopropionic acid, amino-hydroxyhydrocinnamic acid, $HO.C_6H_4.CH_2.CH(NH_2).COOH$. An optically-active amino acid occurring in d- (m.311) and l- (m.295) forms, obtained by hydrolysis of many proteins; it occurs in old cheese. (The Greek word, tyros, means cheese.) Silky needles, slightly soluble in water, alcohol or ether; used medicinally as an antidote for snake poisoning. Its isomers are the **o-** (m.249) and **m-** (m.280) compounds. Cf. *erythrosin*. **di-iodo-** A constituent of bath sponges and coral; a source of iodine.

tyrosol. $C_8H_{10}O_2$ = 138.1. *p*-Hydroxyphenethyl alcohol, $HO.C_6H_4.(CH_2)_2OH$. White rhombic crystals, m.93, b.310, formed during putrefaction or yeast fermentation of tyrosine.

tyrosyl. The monovalent radical, $HO.C_6H_4.CH_2.CHNH_2.CO—$, derived from tyrosine.

tyrothricin. An antibiotic substance obtained from cultures of the spore-forming aerobic soil bacterium *Bacillus brevis;* upon treatment with a mixture of equal volumes of acetone and ether it may be separated into a soluble fraction, *gramicidin*, and an insoluble part, *tyrocidine*.

tyrotoxicon. Tyrotoxin.

tyrotoxin. $C_6H_6ON_2$ = 122.1. Diazobenzene hydroxide, PhN:N.OH. A ptomaine in stale milk, cheese or ice cream. Golden-yellow needles, m.90, are produced with a solution of auric chloride.

tysonite. $(Ce,La,Di)F_3$. A native cerium, lanthanum, didymium trifluoride.

U

U The symbol for: (1) uranium; (2) intrinsic energy.

u (1) An abbreviation for unit. (2) The symbol for velocity component of ions.

υ The Greek letter "upsilon."

Υ The Greek capital letter "upsilon."

ν See *nu*.

μ See *mu*.

uabain. Ouabain.

ucuhuba fat. A fat extracted from the ground kernels of *Virola surinamensis*, a Myristicaceae of tropical America; d.0.90, m.47, $[n]_D^{50}$1.450, iodine no. 12.

uintaite. Gilsonite.

ukambine. An alkaloid from African arrow-poisons. Its action is like that of strophanthin.

ulexine. $C_{11}H_{14}ON_2$ = 190.2. An alkaloid from the seeds of *Ulex europaeus*, the common gorse of Europe. It is a local anesthetic and powerful diuretic. Cf. *cytisine*.

ulexite. $NaCaB_5O_9.8H_2O$. An hydrous sodium, calcium borate, found in California.

ullmannite. NiSbS. A native nickel sulfantimonide.

ulmic acid. $C_{20}H_{14}O_6$ = 350.1. Geic acid. An acid from peat, elm sap and elm bark.

ulmin. $C_{40}H_{16}O_{14}$ = 720.1. A gum from the sap and bark of *Ulmus fulva*, slippery elm, an Ulmaceae. **amin-** A gum found in coal, peat and decayed vegetable substances, formed by the action of amino acids on carbohydrates.

ultimate. Fundamental or basic. **u. analysis.** Primary a. The quantitative determination of each element in a compound without regard to molecular combination. Cf. *proximate* and *rational analysis*. **u. lines.** See *raies ultimes*. **u. rational units.** U.R.U. A system of measurement based upon the charge of an electron, $(4\pi e)^2$, which has the dimension of energy × length and from which all other units may be derived. (G. N. Lewis, Phil, Mag. 45, 1923, p. 266.)

ultra- A prefix derived from the Latin "beyond," indicating that the substance or object concerned has values outside of certain limits.

ultracentrifuge. A high-speed centrifuge, used for determining the size and distribution of particles in amicroscopic colloids. **McBain's-** A spinning rotor driven by and suspended in air, and attaining 350,000 revolutions per minute.

ultrafilter. See *filter*.

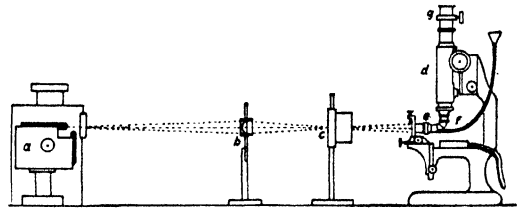
ultrafiltration. Filtration under suction or pressure through a colloidal filter or semipermeable membrane. It is used especially in colloid chemistry, in the preparation of colloidal solutions or suspensions; and for determining the size of the particles in terms of a standard ultrafilter whose pores are of known size.

ultra-gamma rays. Cosmic rays.

ultramarine. $Na_8Al_6Si_6S_2O_{12}$. Artificial lapis-lazuli. A blue pigment, which consists essentially of sodium and aluminum silicates with sodium polysulfides. **genuine-** Lapis-lazuli. **synthetic-** A pigment prepared by melting clay, soda and sulfur or coal; used in paper and the textile industry as a pigment. **yellow-** Barium chromate. **u. green.** U. having a green shade.

ultramicron. A particle less than ¼ of a micron in diameter; the smallest particles visible under the ultramicroscope.

ultramicroscope. Any microscope in which the object is brightly illuminated at right angles to the optical axis of the microscope. Used to detect particles, smaller than 0.1*μ*, which reveal themselves as bright dots of light. Cf. *submicron*, *micron*, *Tyndall cone*.



Ultramicroscope.
(Marshall, "Microbiology.")

ultramicroscopic. Beyond the range of microscopic visibility, but detectable by the ultramicroscope (q.v.).

ultraphonic. Ultrasonic, supersonic. Those air vibrations of high wave-length that are inaudible to the human ear. Cf. *infraphonic*, *phonic*.

ultraphotic. The invisible rays of the ultra-violet and infra-red regions.

ultraquinine. Homoquinine.

ultra-red. Infra-red.

ultrasonic. Ultraphonic.

ultrathermometer. Beckmann thermometer.

ultra-violet. That portion of the spectrum just beyond the violet on the short wave-length side, generally from 180–3,900 Å.U. and emitted

	Ångstrom Units	
visible light	↑	
	4000	non-penetrating
.....	3200	
↑		tan-producing (*Rungling*)
vital	3100	
ray	3000	
(*Hess*)	2900	preferred anti-rachitic (*Heilbron*, *Morton*, *Kamm*)
therapeutic	2800	
UV-rays		
↓	2700	
.....		debated anti-rachitic
	2200	*Schumann* region
W-rays	1800	
	1200	
	150	*Lyman-Millikan* region
X-rays	↓	

by sunlight, and the carbon arc, mercury vapor, tungsten arc and Kromeyer lamps. **far-** Rays of 180–2,900 Å.U. **near-** Rays of 2,900–3,900 Å.U. **vital-** Rays of 2,900–3,100 Å.U. Cf. *radiation*. **u. rays.** Invisible light rays from the ultra-violet region that induce chemical activity and produce fluorescence in many substances. They act on the photographic plate, color p-phenylendiamine paper blue (sunlight does not) and produce a bright green fluorescence in willemite. They are also supposed to have therapeutic properties, and will induce the formation of vitamins in sterols. Cf. *radiation, irradiation, uroxameter, fluorescence analysis*.

ultrawet. Trade name for an alkylated monosodium benzene sulfonate detergent and wetting agent.

ultra-x-rays. Cosmic rays.

umangite. $CuSe.Cu_2Se$. A native copper selenide. Cf. *berzelianite*.

umbellaric acid. $C_8H_{12}O_4$ = 172.09. The dibasic acid

$$CHMe.CH(COOH).CH_2.CH(COOH).CH_2$$

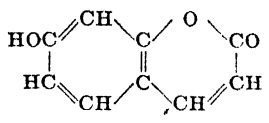
umbellic acid. $C_9H_8O_4$ = 180.00. p-Hydroxycoumaric acid, dihydroxycinnamic acid, $(HO)_2$-$C_6H_3CH:CH.COOH$. An acid obtained from umbelliferone by heating with alkali. A yellow powder; soluble in water, decomp. 125.

Umbelliferae. Parsley family, a group of herbs with hollow stems and flowers having the shape of an umbrella. Many of their seeds are used as spices or drugs; some yield essential oils:

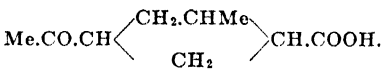
Fruits and Seeds:	
Pimpinella anisum	anise
Foeniculum vulgare	fennel
Conium maculatum	poison hemlock
Carum carvi	caraway
Coriandrum sativum	coriander
Peucedanum (Anethum) graveolens	dill seed
Apium graveolens	celery seed, apiol
Carum ajowan	ajowan
Petroselinum sativum	parsley seed
Oenanthe phellandrium	parsley seed
Oenanthe phellandrium	water hemlock
Cuminum cyminum	cumin seed
Daucus carota	carrot fruit
Roots:	
Ferula sumbul	musk root, sumbul
Imperatoria ostruthium	masterwort
Laserpitium latifolium	white gentian
Levisticum officinale	lovage
Ligusticum filicinum	oshaic acid
Pastinaca sativa	parsnip root
Peucedanum officinale	peucedanin
Sanicula europea	sanicula
Petroselinum sativum	parsley
Angelica officinalis	angelica root
Pimpinella saxifraga	pimpinella
Cicuta virosa	water hemlock
Leaves:	
Conium maculatum	hemlock leaves
Gum Resins:	
Ferula foetida	asafetida
Ferula galbaniflua	galbanum
Dorema ammoniacum	ammoniacum
Ferula persica	sagapenum
Ferula sumbul	sumbul
Pastinaca opopanax	opopanax.

Cf. *aethusine, cynapine, crithmene, hentriacontane, mitsubaene*.

umbelliferone. $C_9H_6O_3$ = 162.1. 4-Hydroxycoumarin. A lactone in galbanum and umbelliferous plants. Colorless crystals, m.223 (sublimes), slightly soluble in water, soluble in alcohol. **methyl-** Resocyanine.



umbellonic acid. $C_9H_{14}O_3$ = 170.11. The monobasic acid



Cf. *pinonic acid, umbellaric acid*.

umbellulic acid. $C_{11}H_{22}O_2$ = 186.17. Colorless crystals, m.23, $b._{160mm}$ 228, from California laurel. Cf. *cocinic acid, undecyclic acid*.

umbellulone. $C_{10}H_{14}O$ = 150.1. A ketone from the oil of *Umbellularia californica*, a laurinaceous tree. It is the chief constituent of California laurel oil, and readily changes to *thymol* by heating under pressure.

umber. Raw umber. A native ferric hydroxide containing manganese dioxide and silicate; a dark brown to brownish-red powder, used as a pigment. **burnt-** A warm reddish-brown pigment produced by heating raw umber.

umbonate. Describing a bacterical culture that has a button-like raised center.

unary. Composed of molecules which are physically and chemically identical, as opposed to associated or dissociated.

uncertainty principle. *Heisenberg* principle.

undark. A luminous paint containing traces of radioactive substances.

undarken. To make an article luminous in the dark by coating it with a luminous paint.

undecalactone. $C_{11}H_{20}O_2$ = 184.15. Peach aldehyde, C14. $Me(CH_2)_6CH(CH_2)_2.CO.O$. A white powder with strong aroma of peach.

undecane. $C_{11}H_{24}$ = 156.2. Hendecane*. A saturated hydrocarbon of the methane series, $Me(CH_2)_9Me$. A colorless liquid, $d._{15°}$0.74, m. −26, b.194, insoluble in water, soluble in alcohol or ether.

undecene. Hendecene*.

undecenoic acid. Undecylic acid.

undecenyl. The monovalent, unsaturated radical $C_{11}H_{21}$—, derived from undecylene.

undecyl. Hendecyl. The monovalent radical $C_{11}H_{23}$—, derived from undecane.

undecylene. Hendecene*.

undecylenic acid. $C_{11}H_{20}O_2$ = 184.2. *9*-Hendecenoic acid*. The unsaturated acid, $Me-CH:CH(CH_2)_7COOH$. A colorless liquid or crystalline mass, d.0.907, m.24, b.295, soluble in water or alcohol.

undecylic acid. $C_{11}H_{22}O_2$ = 186.2. Hendecanoic acid*, $Me(CH_2)_9COOH$. A constituent of castor oil. Colorless scales, m.28, b.212; soluble in water or alcohol. Cf. *umbellulic acid, cocinic acid*. **cyclopentyl-** Hydnocarpic acid.

u. alcohol. Hendecyl alcohol. **u. aldehyde.** Hendecanal*.

under. Below normal. **u. cooling.** Supercooling. **u. meter.** Venturi meter. **u. voltage.** The difference between the potential of a

positive hydrogen electrode and that of a reversible hydrogen electrode. (Cf. *overvoltage.*)

undulate. (1) To have a regular wave-like motion. (2) Describing a bacterial growth with wavy borders and surface.

undulation. (1) A wave-like motion or vibration. (2) The periodic expansion and contraction of bodies; as, steel rails.

undung. Laurel tallow. A vegetable fat obtained from *Litsea* (*Tetranthera*) *laurifolia*, a Lauraceae of tropical Asia.

unedol. The reducing aglucone of unedoside.

unedoside. A glucoside from *Arbutus unedo* whose reducing power is decreased by hydrolysis, a unique property for a glucoside.

ung. An abbreviation for unguentum.

unguentum. (1) The Latin term for an ointment. (2) A simple ointment.

uni- A prefix derived from the Latin, indicating "one." (Greek, mono-).

uniaxial. (1) Having only one axis; as, of a crystal which does not doubly refract light. (2) Having properties in one direction only, as along a particular axis of a crystal.

unicellular. Describing an organism that consists of a single cell; as, the protophyta and protozoa.

unicorn. A plant of the genus *Martynia* (Pedaliaceae). **false-** (1) Aletris. (2) Chamaelirin. (3) Helonias.

unifrequent. Describing a homogeneous beam of light or a radiation consisting of rays of similar wave-lengths.

unimolecular. Monomolecular. (See *reactions.*)

unionized. Not ionized; existing in a non-dissociated molecular form.

unit. (1) A quantity used as a measure. (2) A standardized equipment, which consists of a definite arrangement of devices, considered as a whole; as in a unit process. **Angström-** See *Ångström.* **Board of Trade-** (B.T.U.). See *Board of Trade unit.* **British Thermal-** See *British Thermal unit.* **capacity-** Farad. **c.g.s.-, C.G.S.** Metric units. **derived-** See *derived units.* **electrical-** See *electrical.* **electromagnetic-** See *electromagnetic units.* **electrostatic-** See *electrostatic units.* **e.m.u.-, E.M.U.** Electromagnetic units. **e.s.u.-** or **E.S.U.** Electrostatic units. **fertilizer-** An u. of plant food is 20 pounds, or 1 % of a ton of fertilizer. **force-** The dyne. **fundamental-** See *fundamental units.* **heat-** Calorie. **international-** U. defined by international agreement; as, 1881: volt, ohm, ampere, coulomb, farad; 1889: joule, watt; 1893: henry; 1900: maxwell, gauss; 1930: gilbert, oersted. **light-** See *candle, phot, lux.* **metric-** q.v. **m.k.h.-, M.K.H.** Metric units expressed in terms of meter-kilogram-hour. (Cf. *c.g.s.-units.*) **quantum-** See *Planck's constant.* **ultimate-** q.v. **u.r.u.-, U.R.U.** The ultimate rational units based, upon the charge of an electron. **work-** The erg.

univalent. (1) Describing an element that has only one valency and forms only one series of compounds; as, Na, Mg, or Al. Antonym: polyvalent. (2) Monovalent.

universal. General, applicable in all cases. **u. indicator.** A pH-indicator (q.v.) which changes color over an extended range of pH values. **u. series constant.** Rydberg's constant. The value for N in the equations of the spectrum series. It varies slightly for each element between the values:

$$N_H = 109{,}677.691 \pm 0.06$$
$$N_{He} = 109{,}722.14 \pm 0.04$$
$$N_\infty = 109{,}737.11 \pm 0.06.$$

unofficial. Describing a drug that is not authorized by a pharmacopoeia or formulary.

unorganic. Inorganic.

unorganized. (1) Having no cellular or protoplasmic structure. (2) Amorphous. **u. ferment.** An enzyme that is active in sterilized solutions and is not dependent on cell-life for its action.

unsatisfied. Describing a hydrocarbon which has one or more free valencies. Cf. *free radical, unsaturated.*

unsaturated. (1) Not saturated; describing a solution that is capable of dissolving more solute. (2) Describing an organic compound having double or triple bonds; as, ethylenes, acetylenes.

unslaked lime. Calcium oxide.

unstable. Readily decomposing; as, hydrogen peroxide, fulminates.

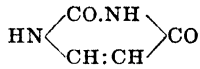
unsymmetrical. Not symmetrical; as the 1.2.4-positions of the benzene ring.

upas. A Javanese arrow-poison containing strychnine (Malay = ipoh). **bohan-** A poisonous resin from the tree, *Antiaris toxicaria* of Java. Cf. *antiarin.*

upsilon. The Greek letter *v*, Υ (see *u*).

uptake. An exit pipe which leads in an upward direction.

uracil. $C_4H_4O_2N_2$ = 112.1. 2.4(1.3) Pyrimidine dione, 2.6-dioxypyrimidine. A pyrimidine base, m.338; a constituent of nucleic acids.



methyl- Thymine.

uraconite Uranic ocher.

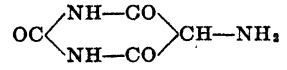
uralin. $C_5H_8O_2NCl_3$ = 236.6. Chloral urethane, $CCl_3CH(OH).NH.COOEt$. A colorless crystalline powder, soluble in water or alcohol; used as a hypnotic.

uralite. (1) A variety of amphibole found in the Ural Mountains. (2) A fireproof substance; asbestos impregnated with sodium silicate and bicarbonate, and chalk.

uralium. A supposed element isolated by Guyard from platinum ores. It has been given the atomic number, 75, and an atomic weight of 187.5, and is probably identical with rhenium.

uramido. Carbamido. **u. acetic acid.** Hydantoic acid.

uramil. $C_4H_5O_3N_3$ = 143.1. Dialuramide, aminobarbituric acid, murexan,



Colorless crystals, soluble in water or alcohol; used in organic synthesis. **thio-** See *thiouramil.*

uramine. Guanidine.

uramino. Carbamido.

uranalysis. Analysis of urine.

uranate. A salt of uranic acid of the general type, $M_2U_2O_7$.

urane. (1) A unit of radioactivity; the $\frac{1}{1000}$ part of a kilurane. (2) Uranium oxide.

uranic. Describing a compound containing hexavalent uranium; as, uranium fluoride. **u. acid.** H_2UO_4 = 304.2. A yellow, insoluble powder consisting of UO_3 in varying degrees of hydration. The salts are derived from

the hypothetical acid, $2UO_3.H_2O$ or $H_2U_2O_7$. **u. ocher.** U_3O_8. Uraconite. An amorphous, yellow native uranium oxide. It contains radium. **u. oxide.** UO_3 = 286.2. Uranium trioxide, uranic anhydride. A yellow or orange powder, d.5.14, insoluble in water, soluble in acids. Used in ceramics, and in the glass, paint, and textile industries.

uranin. $Na_2C_{20}H_{10}O_5$ = 376.2. Sodium fluorescein. A brown powder and sodium salt of fluorescein, used as a reagent.

uraninite. $UO.U_2O_5$. Pitchblende. Native uranium oxide, a source of radium.

uranite. A general term for a group of uranium minerals consisting of the phosphates of uranium with calcium or copper.

uranium. U = 238.07. A heavy metal and the last stable element of the periodic system, atomic number 92. Cf. *transuranium, ekarhenium, ekaosmium.* A hard, heavy, nickel-white metal, d.18.68; insoluble in water or alcohol, soluble in acids, m. red heat. It is radioactive, consists of several isotopes (q.v.), and disintegrates into a number of other elements. (See *radioactive disintegration.*) The isotope of at.wt. 235, when bombarded with slow neutrons, is capable of undergoing fission with explosive violence; the products and rate of reaction depend on the conditions of bombardment. Uranium forms principally tetravalent (*uranous*) or hexavalent (*uranic, uranyl* and *uranate*) compounds, but valencies of 2, 3, 5, and 8 have also been reported. The yellow oxide, UO_3, is amphoteric, and forms the "uranates" with bases and "uranyl" salts with acids. **trans-** See *transuranium.* **U_1, U_2, U_x** etc. See *radioactive elements.*

u. acetate. (1) Uranyl acetate. (2) Uranyl-sodium acetate. **u. ammonium fluoride.** Uranyl ammonium fluoride. **u. barium oxide.** BaU_2O_7 = 725.8. Barium diuranate. An orange powder, soluble in acids. **u. bromide.** UBr_4 = 557.9. Uranous bromide. Black leaflets, d.4.838; soluble in water or alcohol. **u. carbide.** (1) UC_2 = 262.17. Solid, d.11.3, m.2260. (2) U_2C_3 = 512.34. Solid, d.11.28, m.2400. **u. chloride.** (1) UCl_4 = 380.0. Uranous chloride. U. tetrachloride. Dark green, cubic crystals; soluble in water. (2) UCl_3 = 344.51. Uranium trichloride. Purple, soluble crystals. **u. fluoride.** UF_4, uranium tetrafluoride; or UF_6, uranium hexafluoride. **u. glass.** A yellow glass with a green fluorescence, which contains some uranium oxides. **u. hydroxide.** $U(OH)_4$ = 306.15. A green, insoluble powder. **u. iodide.** UI_4 = 745.9. Uranous iodide. Yellow monoclinic crystals, m.500; soluble in water or alcohol. **u. lead.** (1) Radium G (RaG). (2) A mixture of RaG and AcD. See *lead.* **u. minerals.** The ores of u. are numerous and complex and contain the phosphates and vanadates of rare earths. The principal ores (carnotite, uraninite or pitchblende, becquerelite, and autunite) are radioactive. **u. oxides:** The chief oxides are the dioxide UO_2 (uranous oxide), the trioxide UO_3 (uranic oxide), and the tritaoctoxide U_3O_8 (which may be uranosic oxide $UO_2.2UO_3$, uranyl uranate $(UO_2)_2UO_4$, or uranous uranate $U(UO_4)_2$). Others reported are the sesquioxide U_2O_3 (or hemitrioxide), the pentoxide U_2O_5 (or hemipentoxide), and the tetroxide UO_4. **u. oxychloride.** Uranyl chloride. **u. strontium oxide.** SrU_2O_7 = 676.0. Strontium uranate. A yellow powder; soluble in acids. **u. sulfate.** $U(SO_4)_2.8H_2O$ = 574.5. Native as uranvitriol and zippeite. Green monoclinic prisms, m.300, decomp. by water. **u. sulfide.** US_2 = 302.3. Uranous sulfide. A gray powder, m.1100; insoluble in water, soluble in conc. hydrochloric acid. **u. tetrachloride.** U. chloride. **u. tetrabromide.** Uranium bromide. **u.X., u.Y.** See *radioactive elements.* **u. yellow.** Sodium uranate. Used as a pigment in ceramics and the glass industry. **u.Z.** A short-lived isotope of ekatantalum, half-life period, 9.7 hours. Cf. *protoactinium.*

uranocircite. $(UO_2)_2BaP_2O_8$. A uranyl-barium phosphate.

uranophane. $U_2SiO_8.CaSiO_8$. A native uranium calcium silicate.

uranospherite. $U_2O_7(BiO)_2.3H_2O$. A dull orange, scale-like mineral containing radium.

uranospinite. $(UO_2)_2CaAsO_8$. A native uranyl-calcium arsenate.

uranous. Describing a compound containing tetravalent uranium; as, uranium bromide, UBr_4. **u. chloride.** See *uranium chloride.* **u. oxide.** UO_2 = 270.2. Uranium dioxide. A black, octahedral, crystalline powder, d.10.95, m.2176; insoluble in water or alcohol, soluble in acids or alkalis. **u. uranic oxide.** Uranyl uranate.

uranvitriol. Johannite. A native uranium sulfate containing copper.

uranyl. The bivalent radical, UO_2=, derived from UO_3; it forms many salts with acids; these ionize to the positive ion, UO_2^{++}, and produce a yellow color in solution. **u. acetate.** $UO_2(C_2H_3O_2)_2.2H_2O$ = 424.3. Uranium acetate. A yellow, crystalline powder, d.2.893, soluble in water or alcohol. Used as a reagent and in volumetric analysis. **u. ammonium carbonate.** $UO_2CO_3.2(NH_4)_2CO_3$ = 522.3. Small, transparent, yellow crystals, soluble in water; used in ceramics and the glass industry for uranium glazes and glasses. **u. ammonium fluoride.** $UO_2F_2.3NH_4F$ = 419.3. Uranium ammonium fluoride. A greenish, fluorescent, crystalline powder, soluble in water, insoluble in alcohol; used in x-ray screens. **u. benzoate.** $UO_2(C_7H_5O_2)_2$ = 514.3. Uranium benzoate. A yellow powder; slightly soluble in water, soluble in alcohol. **u. calcium phosphate.** $(UO_2)_2Ca(PO_4)_2$ = 770.5. Greenish-yellow crystals; soluble in water. **u. chloride.** UO_2Cl_2 = 341.1. Uranium oxychloride. Yellow, hygroscopic crystals, soluble in water or alcohol. It fuses and decomp. if heated. **u. ferrocyanide.** $(UO_2)_2Fe(CN)_6$ = 752.25. Uranyl-hexacyano ferrate. A reddish-brown powder; insoluble in water. **u. formate.** $UO_2(HCO_2)_2.H_2O$ = 378.17. Yellow octahedral crystals, d.3.695, slightly soluble in water. **u. hydroxide.** $UO_2(OH)_2$ = 304.19. Uranic acid, H_2UO_4. A white solid. **u. nitrate.** $UO_2(NO_3)_2.6H_2O$ = 502.3. Uranium nitrate. Yellow, deliquescent crystals, d.2.807, m.59, b.118, soluble in water, alcohol or ether. Used as a reagent and indicator; medicinally as an antidiabetic; in ceramics; in the glass industry; and in photography. **u. oxalate.** $UO_2C_2O_4.3H_2O$ = 412.2. Uranium oxalate. A yellow powder; insoluble in water, soluble in acids. **u. oxide.** Uranium trioxide. **u. phosphate.** $UO_2HPO_4 + 4H_2O$ = 438.3. A yellow crystalline solid, insoluble in water or acetic acid. **u. potassium nitrate.** $UO_2(NO_3)_2.2KNO_3$ = 596.5. A greenish-yel-

low, crystalline powder; soluble in water. **u. potassium sulfate.** $UO_2SO_4.K_2SO_4$ = 540.5. A greenish-yellow powder; soluble in water. **u. sodium acetate.** $UO_2(C_2H_3O_2)_2.2NaC_2H_3O_2$ = 552.3. Uranium sodium acetate, uranium acetate. A yellow, crystalline powder; soluble in water or alcohol; used as a reagent. **u. sodium sulfate.** $UO_2SO_4.Na_2SO_4$ = 508.2. A yellowish-green crystalline substance; soluble in water. **u. sulfate.** $2UO_2SO_4.7H_2O$ = 858.6. A yellow crystalline powder, d.3.28; soluble in water. **u. sulfide.** UO_2S = 302.3. A brown powder, decomp. by heat, slightly soluble in water. **u. uranate.** U_3O_8 = 842.6. Uranous uranic oxide, $(UO_2)_2UO_4$. An olive-green, crystalline powder, d.7.31, decomp. by heat, insoluble in water or alcohol, soluble in acids. **u. zinc acetate.** A solution of u. acetate and zinc acetate in acetic acid which gives crystals of characteristic shape with sodium salts.

urao. A native sodium carbonate and bicarbonate from South America.

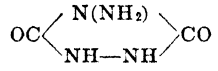
urari. Curare.

urase. Urease.

urasol. $C_{19}H_{16}O_8$ = 372.1. Acetylmethylenedisalicylic acid, afsal, $CH_2[C_6H_3(COOH)OC_2H_3O]_2$. A yellowish powder, insoluble in water, soluble in alcohol or ether; used medicinally as an antiseptic.

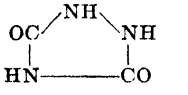
urate. Lithate. A salt of uric acid.

urazine. $C_2H_4O_2N_4$ = 116.0. Aminourazole. The heterocyclic compound



Cf. *diurea*.

urazole. $C_2H_3O_2N_3$ = 101.2. Hydrazodicarbonimide, diketotriazolidine. Colorless crystals, m.244; soluble in alcohol. **amino-** Urazine. **1-phenyl-** $C_2H_2O_2N_3Ph$ = 177.2. Colorless crystals, m.263. **3-phenyl-** Colorless crystals, m.203; soluble in alcohol. **thio-** See *thiourazole*.



Urbain, Georges. 1872–1938. A French chemist, noted for work on the rare earths.

Ure, Andrew. 1778–1857. A Scotch chemist noted as author (*A Dictionary of Chemistry*, 1821) and for technical methods. **U. eudiometer.** A long U-shaped glass-tube closed at one end. On the closed side are two electrodes and a graduated scale used to measure the volumes of gas mixtures.

urea. CH_4ON_2 = 60.1. Carbamide. $NH_2.CO.NH_2 \rightleftharpoons NH_2.CNH.OH$ (pseudo u.). A colorless, tetragonal, crystalline powder, d.1.323, m.132, decomp. by further heat into biuret and ammonia; soluble in water, alcohol or ether. It is the end-product of mammalian protein metabolism, the chief nitrogenous constituent of urine, and the first organic compound synthesized (Wöhler, 1828). It forms addition compounds with salts. Used as a reagent for detecting lignin; in pyrotechnics; and in organic synthesis. Its derivatives are characterized by the prefix ureido-* or the suffix -urea*; as, butylurea*, $C_4H_9NHCONH_2$; butyryl urea*, $C_4H_9CONHCONH_2$. The bivalent radical—NH.CO.NH—is urylene*. *Cf. ureide, uramido.* **ψ-** See pseudo *urea*. **acetonyl-** See *acetonylurea*. **acetyl-** See *acetonylurea*. **alkene-** Compounds of the type RHN.CO.NHR, (urylenes), or $R_2N.CO.NR_2$. **allylthio-** Allysulfocarbamide. **amino-** Semicarbazide. **bi-** See *biurea*. **bromoethylbutyryl-** Adaline. **bromoisovaleryl-** Bromural. **carbamido-** Biurea. **carbamyl-** Biuret. **carbonyl-** Triuret. **cinnamyl-p-oxyphenyl-** Elbon. **di-** See (1) *diurea*, (2) *urazine*, (3) *uril*. **diamino-** Carbohydrazide. **diphenyl-** Carbanilide. **ethoxyphenyl-** Sucrol. **ethylene-** Oxazoline (μ-amido). **guanyl-** See *guanyl* urea. **hydroxy-** Derivatives of the compound, $NH_2.CO.NH.OH$. **imino-** Guanidine. **malonyl-** Barbituric acid. **mesoxalyl-** Alloxan. **oxalyl-** Parabanic acid. **phenetyl-** Sucrol. **phenylene-** Benzimidazolone. **phenylhydrazine-** Diphenylcarbazide. **propylene-** Oxazoline, (μ-amido-α-methylene-). **pseudo-** The tautomeric form of urea, $NH_2.C:NH.OH$. **selen-** Selenurea. **tartronyl-** Dialuric acid. **thio-** Thiourea.

u. acetate. A mixture of urea and acetic acid of varying composition. **u. apparatus.** A device for the rapid determination of urea by the action of urease. **u. carboxylic acid.** Allophanic acid. **u. citrate.** $CH_4ON_2.C_6H_8O_7$ = 252.2. Colorless, crystalline powder; soluble in water or alcohol. **u. hydrochloride.** $CH_4ON_2.HCl$ = 96.6. Colorless deliquescent crystals, soluble in water. Used medicinally, with quinine hydrochloride, as a local anesthetic. **u. nitrate.** $CH_4ON_2.HNO_3$ = 123.1. Colorless scales, slightly soluble in water; used medicinally. **u. oxalate.** $CH_4ON_2.C_2H_2O_4$ = 150.1. Colorless crystals; soluble in water or alcohol. **u. quinate.** $(CH_4ON_2)_2.C_7H_{12}O_6$ = 312.3. Urol. Colorless prisms, m.107; soluble in water; used medicinally. **u. quinine.** Quinine and urea hydrochloride. **u. stibamine.** $NH_2.CO.NH.C_6H_4.SbO_3H.NH_4$. A white powder used in the treatment of kala-azar.

ureameter. Ureometer. An apparatus for determining the amount of urea in a liquid by measuring the volume of nitrogen evolved. Cf. *urinometer*.

urease. Urase. A crystallizable enzyme occurring in numerous bacteria and fungi, and in Jack beans, that converts urea into ammonium carbonate. A fine, nearly colorless powder, or white octahedra, soluble in slightly alkaline water, and giving a protein reaction (globulin). Its isoelectric point is pH 5.05, it is inactivated by metals, and contains 51–52 % C, 7.1 % H, 15.4 % N, 24.1 % O, 1.2 % S and 2 % ash; used as a reagent for determining urea. Cf. *uricase*.

urechitin. $C_{28}H_{42}O_8$ = 506.4. A glucoside from *Urechites suberecta*, the Savannah flower or yellow nightshade, an apocynaceous plant.

urechitine. $C_{24}H_{42}O_8.H_2O$ = 476.4. An alkaloid from *Urechites suberecta*, an apocynaceous plant.

urechitoxin. $C_{13}H_{20}O_5$ = 256.2. A poisonous glucoside from *Urechites suberecta*, an apocynaceous plant.

ureide. (1) A derivative of urea; as,

$NH_2.CO.NHEt$	ethylurea
$NH_2.CO.NHCOMe$	acetylurea
$NH_2.CO.NH.CO.COOH$	oxaluric acid
$NH_2.CO.NH.CO.CO.COOH$	alloxanic acid
$NH_2.CS.NH_2$	thiourea
$NH_2.CO.OEt$	urethane
$NHPh.CO.OEt$	euphorine.

(2) A compound analogous to the amides, derived from carboxy acids and containing the

—NH.CONH$_2$ radical; as, R.CO.NHCONH$_2$. **cyclic-** A compound formed by replacement of one H of each NH$_2$ group by a dibasic acid; as, in barbituric acid, alloxan. **di-** A compound containing two ureido radicals. **pseudo-** A compound of the type NH$_2$.CNH.OR.

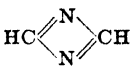
ureido. (1) The bivalent radical, —NH.CO.-NH—. (2) Carbamido.

ureometer. Ureameter.

ureous acid. Xanthine.

-uret. An obsolete suffix, indicating a binary compound of sulfur, arsenic, phosphorus, carbon, etc. with some other element. It is now superseded by the suffix -ide; as, sulfu*retted* hydrogen = hydrogen sulf*ide*.

urete. $C_2N_2H_2$ = 54.1. The heterocyclic compound,



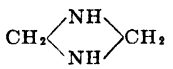
1.2-dihydro- Uretine. **tetrahydro-** Uretidine.

urethan. A derivative of urethane; as, adalin, hedonal, neurodin, thermodin.

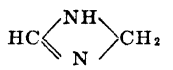
urethane. $C_3H_7O_2N$ = 89.1. Ethylcarbamate, ethylurethan, NH$_2$.CO.OEt. Colorless needles, d.$_{20°}$0.986, m.49, b.184; soluble in water, alcohol or ether. Used medicinally as a hypnotic and in organic synthesis. **acetylethoxyphenyl-** Thermodin. **acetyloxyphenyl-** Neurodin. **amyl-** Amylcarbamate. **chloral-** Uralin. **ethyl-** Urethan. **ethylchloral-** Somnal. **ethylidene-** q.v. **phenacetin-** Thermodin. **phenyl-** q.v. **piperidyl-** q.v. **thio-** q.v. **thymol-** Thymol carbamate. **trichloro-** Voluntal.

urethylan. $C_2H_5O_2N$ = 75.05. "Methylurethane," methylcarbamate, NH$_2$.CO.OMe. A white, crystalline powder, m.52, b.177; soluble in water or alcohol.

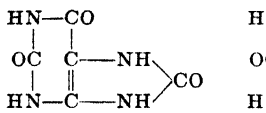
uretidine. $C_2H_6N_2$ = 58.1. Tetrahydrourete.



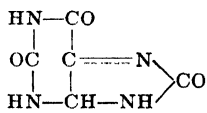
uretine. $C_2H_4N_2$ = 56.1. 1.2-dihydrourete.



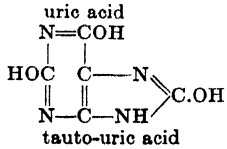
uric acid. $C_5H_4O_3N_4$ = 168.1. Triketopurine, 2.6.8-trioxypurine.



uric acid



iso-uric acid



tauto-uric acid

Colorless scales, d.1.85, decomp. by heat, slightly soluble in water. Used in organic synthesis, and occurs in the body as the end-product of the purines of muscle and cell nuclei. **iso-** An isomeric form of uric acid. **tauto-** A tautomeric form of uric acid. **trimethyl-** Caffeine. Cf. *purine derivatives*.

uricase. An enzyme in animal tissues, that splits uric acid to allantoin, urea and glycocoll. It is destroyed by an excess of carbon dioxide. Cf. *urease*.

uricoclastic. Uricolytic.

uricolytic. Uricoclastic. An enzyme that decomposes uric acid.

uridin. $C_9H_{12}N_2O_6$ = 244.13. Uracil-*d*-riboside, $C_4H_3N_2O_2.C_5H_9O_4$. A nucleoside, m.150, from nucleic acid. **u. phosphoric acid.** A nucleotide, m.202, from nucleo-proteins.

uril. A compound of the type RNH.CO.-NH.NH.CO.NHR. See *biurea*.

urine. A fluid secreted by the kidneys and discharged from the bladder. Normally, a clear amber-colored liquid of slight acid reaction, d.1.005 to 1.030. Composition:

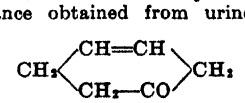
water	96 %
urea	2.3 %
sodium chloride	1.1 %
phosphates	0.2 %
sulfates	0.1 %
other organic compds	0.3 %

u. analysis. The qualitative and quantitative examination of urine. It is of great diagnostic value, *e.g.*,

	Normal
A. Physical characteristics:	
1. Amount in 24 hours	1250–1500 cc. (varies with food)
2. Specific gravity	1.015–1.025
3. Color	amber (pale straw to orange)
4. Transparency	clear
5. Odor	slightly aromatic
6. Consistency	aqueous
7. Reaction	faintly acid (or amphoteric)
8. Solids in 24 hours	60–65 grams
B. Chemical Characteristics:	
Inorganic constituents:	25–30 grams per day
9. Chlorides	10–15 gm.
10. Phosphoric acid	2.5–3.5 gm.
11. Calcium phosphate	0.3–0.4 gm.
12. Sulfuric acid	1.5–2.5 gm.
13. Sulfates of Na, K etc.	1.3–3.0 gm.
14. Carbonates and Bicarbonates (in fresh alkaline urine)	varies
15. Iron	trace
16. Ammonia	trace
17. Carbonic acid	4–9 volumes
18. Oxygen	0.2–0.6 vol.
19. Nitrogen	0.7–0.8 vol.
Organic constituents:	35–40 grams per day
20. Urea	30–40 gm.
21. Uric acid	0.7–1.0 gm.
22. Hippuric acid	0.3–1.0 gm.
23. Creatinine	0.5–1.0 gm.
24. Acetone	trace
25. Mucus	trace

Abnormal constituents: albumin, sugar, pus, blood, diacetic acid, indican, hydrogen sulfide. Cf. *urinometer, Haine's coefficient, Haeser's coefficient, Bang method, Benedict test, Cole's method, Ehrlich's solution, Trommer's test.*

urinoid. C_8H_8O = 96.1. Cyclohexene-3-one. A substance obtained from urine, which is



supposed to cause its characteristic odor.

urinometer. Urometer. An hydrometer for determining the specific gravity of urine. Cf. *ureameter.*

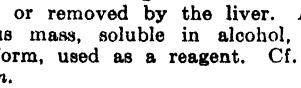
uritone. A brand of hexamethylenetetramine.

urobenzoic acid. Hippuric acid.

urobilin. $C_{33}H_{40}O_7N_4$ = 592.36. Hydrobilirubin. A bile pigment produced by the putrefaction of bilirubin in the gut and excreted in the kidney or removed by the liver. A brown, resinous mass, soluble in alcohol, ether or chloroform, used as a reagent. Cf. *Ehrlich's solution.*

urobromohematin. $C_{68}H_{94}O_{26}N_8Fe_2$. A coloring matter in the urine of lepers; it is a derivative of hemoglobin.

urocanic acid. $C_6H_6O_2N_2$ = 138.1. Imidazoleacrylic acid. The heterocyclic compound,



It is a ptomaine derived from histidine, and occurs in dog's urine. White crystals, m.224, very slightly soluble in water. Cf. *urocaninic acid.*

urocanin. $C_{11}H_{19}ON_4$ = 223.19. A base in the urine of dogs.

urocaninic acid. $C_6H_6O_2N_2.2H_2O$ = 174.2. An acid from the urine of dogs; decomp. by heat to CO_2 and urocanin. Cf. *urocanic acid.*

urochrome. $C_{43}H_{51}O_{26}N$ = 997.5. A yellow coloring matter in urine (0.37–2.0 gm. per day).

urochromogen. A substance occurring in tissues; it is oxidized to urochrome.

urocitral. Theobromine sodium citrate.

uroerythrin. An orange-red pigment in urine.

urol. Urea quinate.

urolith. A calculus occurring in urine.

uromelanin. $C_{16}H_{43}O_{10}N_7$ = 517.6. A black pigment, which sometimes occurs in urine as a decomposition product of urochrome.

urometer. See *urinometer, ureameter.*

uron. A proposed name for the positive nucleus of an atom. (See *proton, prouton.*)

uronic acid. A group of polyhydroxyaldehyde acids, $CHO.(CHOH)_xCOOH$, derived from monosaccharides; made by oxidizing hexoses or pentoses whose aldehyde group is blocked (as in glucosides). *E.g.,*

penturonic acids..... $CHO(CHOH)_3COOH$
as, arabinuric, ribosuric acid.
hexuronic acids..... $CHO(CHOH)_4COOH$
as, glucuronic, galacturonic acids.
hepturonic acids..... $CH(CHOH)_5COOH$.

Their lactones are sometimes included in the definition; as, ascorbic acid.

urophan. A substance which, when taken into the body, appears again chemically unchanged in the urine.

uropherine. Theobromine lithium. **u. benzoate.** Uropherine *B.* Theobromine lithium benzoate. **u. salicylate.** Theobromine lithium salicylate.

uropittin. $C_9H_{10}O_3N_2$ = 194.1. A resinous decomposition-product of urochrome.

uroprotic acid. $C_{88}H_{116}O_{34}N_{20}S$ = 2085.1. An acid protein from urine.

uropterin. A yellow pigment from the purine fraction of human urine.

urosine. $C_7H_{11}O_6Li$ = 198.09. Lithium quinate, $C_6H_7(OH)_4.COOLi$, in a 50 % aqueous solution; used for gout.

urotropine. Hexamethylenetetramine. **u. quinate.** Quinotropine. **u. salicylate.** Saliformine. **u. tannin.** Tannopin.

uroxameter. A mixture of 20 cc. of a 2 % solution of oxalic acid, 5 cc. of a 1 % solution of uranyl acetate, and 20 cc. of water; used to measure the activity of a source of ultra-violet light.

uroxanthin. A yellow pigment of urine.

ursanic acid. $C_{30}H_{48}O_2$ = 440.4. A colorless acid, m.224, obtained by reduction and saponification of methylarsonate.

ursin. Arbutin.

ursol. p-Phenylenediamine.

ursolene. A dark grey wax, m.192, from cranberry skins. At over 200° it hardens to a mass resembling montan wax.

ursolic acid. $C_{30}H_{48}O_3$ = 456.4. Urson, malol, prunol. An unsaturated, monobasic hydroxy acid, $C_{29}H_{46}(OH)COOH$, in the wax covering the leaves of *Arctostaphylos uva-ursae* (bearberry), *Prunus serotina* (wild cherry) and the fruit of *Pyrus malus* (apple). A colorless powder, m.267; insoluble in water, soluble in alcohol, ether or chloroform.

urson. Ursolic acid.

ursonic acid. $C_{30}H_{46}O_3$ = 454.4. A ketonic acid whose methylester is obtained by oxidation of methylursolate.

urstoff. Protyle.

urtica. Stinging nettle. The dried herb of *U. dioica,* an Urticaceae. It contains tannin and glucosides; used medicinally as a diuretic and hematinic.

Urticaceae. The nettle family, a group of plants including Moraceae, Ulmaceae and Cynocrambaceae, from which various drugs are obtained:

Ulmus fulva	slippery elm bark
Ulmus compestris	elm bark
Humulus lupulus	hops
Cannabis sativa	Indian hemp
Urtica dioica	stinging nettle
Ficus carica	fig
Morus rubra	mulberry

See *ebul, fustic, morus, osage orange, ramie.*

u.r.u. or **U.R.U.** An abbreviation for ultimate rational units. Cf. *c.g.s., e.s.u., e.m.u.*

urunday. A vegetable tanning agent.

urusene. $C_{15}H_{28}$ = 208.20. A hydrocarbon from urushi, Japanese lac, the secretion of *Rhus vernicifera,* an Anacardiaceae, the lacquer-tree. Cf. *rhus.*

urushic acid. $C_{22}H_{36}O_2$ = 344.28. Laccol. An acid from the juice of the Japanese lac tree.

urushiol. $C_6H_3(OH)_2C_{15}H_{27}$ = 316.3. A pale, oily catechol derivative. It occurs in *Rhus vernicifera,* and induces sensitiveness to poisoning.

urycury oil. An oil similar to and probably identical with babassu oil, q.v.

urylene. The bivalent radical —NH.CO.NH—. See *urea,* alkene *urea.*

usnaric acid. $C_{36}H_{32}O_{15}$ = 622.18. An acid from the lichen, *Usnea barbata.*

usnic acid. $C_{18}H_{16}O_7$ = 344.22. Usninic acid. An acid derived from *Usnea barbata,* a large lichen growing on forest trees. A solid, levo-, m.190; dextro- m.195. Insoluble in water, soluble in ether, slightly soluble in alcohol.

U.S.P. or **U.S. Phar.** An abbreviation for United States Pharmacopoeia (12th. Edn., 1942).

ustilagine. An alkaloid obtained from ustilago.

ustilago. Corn smut. A mold-like fungus parasitic on maize, and resembling ergot. It contains several alkaloids (ustilagine, secaline); used as an ergot substitute.

utilities. A proposed name for all useful minerals. They are subdivided by M. E. Wadsworth into:

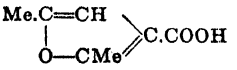
ceramites	fictile or ceramic materials
chalicites	binding or limes, cements
chemites	chemical raw materials
chromatites	color materials
coprites	fertilizers
ignites	pyrotechnic materials
lubricites	lubricating materials
metallites	metalliferous ores
pharmacites	medicinal minerals
pyrolites	refractory minerals
rholites	fluxes
salites	saline minerals
techtonites	building materials
thermites	fuel minerals
tribolites	abrasive minerals
vitrites	vitrifying minerals

U.V. Ultra-violet.

uva. Raisins. **u. ursi.** Bearberry leaves. The dried leaves of *Arctostaphylos uva-ursi*, an Ericaceae. It contains arbutine, ericoline and urson; used medicinally as a tonic and diuretic.

uvarovite. $(CaO)_3Cr_2O_3Si_3O_6$. Uwarowite. A calcium-chromium garnet.

uvic acid. $C_7H_8O_3$ = 140.06. Pyrotritartaric acid, dimethylfuranecarboxylic acid, uvinic acid,



Colorless needles, m.135; slightly soluble in water, soluble in alcohol or ether. It is formed by the dry distillation of tartaric acid.

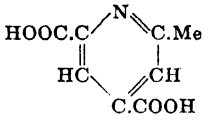
uvinic acid. Uvic acid.

uviol. A glass which transmits ultra-violet light.

uvitic acid. $C_9H_8O_4$ = 180.06. Mesitic acid, 5-methyl-isophthalic acid, 5-methyl-benzene-1.3-dicarboxylic acid. $Me.C_6H_3(COOH)_2$. Colorless needles, m.287; insoluble in water, soluble in alcohol or ether. iso- m.175, soluble in alcohol or ether, insoluble in water.

uvitinic acid. $C_9H_8O_4$ = 180.06. Methyl phthalic acid $C_6H_3Me(COOH)_2$. White crystals, soluble in water.

uvitonic acid. $C_8H_7O_4N$ = 181.1. 2-methyl-pyridine-4.6-dicarboxylic acid. The heterocyclic compound,



A colorless crystalline powder, m.244, decomp. 274.

uvoflavin. Vitamin B_2.

uwarowite. Uvarovite.

uzara. The powdered root of an African asclepiadaceous plant; used for diarrhea and bacillary dysentery.

uzarin. $C_{75}H_{108}O_{30}$ = 1488.86. A glucoside from uzara.

V

(1) The symbol for vanadium. An abbreviation for: (2) volt; (3) velocity; (4) volume; V_p = at constant pressure, V_t = at constant temperature.

v- An abbreviation for vicinal.

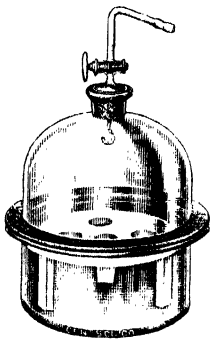
ν See *nu*.

υ See *upsilon*.

V.S. Abbreviation for volumetric solution.

vaccenic acid. $C_{18}H_{34}O_2$ = 282.0. An isomer of oleic acid, *trans*-octadecen-*11*-oic acid, in beef, mutton or butter fats.

vaccine. (1) A bacterial suspension used to produce active immunization by injection or inoculation. (2) The lymph from a cow-pox vesicle.



Vacuum desiccator.

vaccinium. Whortleberry, European huckleberry. The dried herb and fruit of *Vaccinium myrtillus*, an Ericaceae, containing quinic acid, myrtillin and arbutin. Used medicinally as a diuretic.

vacuum. (1) Strictly, a space which contains no fluid. (2) Any space from which air or other gases has been completely or partly removed. Its presence is measured in relation to the air-pressure (760 mm.) and expressed in mm. of mercury.

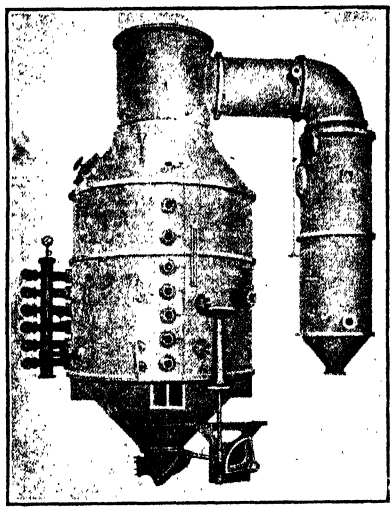
	mm. of Hg (relative)	mm. of Hg (absolute)
water pump	(760 − 7) = 753 mm.	7.00 mm.
Sprengel mercury pump		0.001 mm.
Geryk oil pump		0.0002 mm.
Toepler mercury pump		0.00001 mm.
Charcoal in liquid air		0.0000008 mm.
Gaede molecular pump		0.0000002 mm.

Other units and their equivalents are:

Atm.	mm. Hg	μ Hg	Bars
1	760	760,000	1.013569
0.00132	1	1000	1.333
0.0000013	0.001	1	1.333
0.00000099	0.00075	0.75	1

high- Rarefaction to a pressure below 0.01 mm., such as exists in x-ray tubes. **low-** A rarefaction from 50–1 mm. **Toricellian-** The vacuum in the portion of a barometric tube between the mercury and the closed top.

v. desiccator. An apparatus in which a substance is dried under reduced pressure (see illustration). **v. distillation.** Distillation under reduced pressure; used extensively in the chemical industry. **v. evaporation.** Evaporation in vacuo; as in a v. desiccator or v. pan. **v. fan.** A surface fan. **v. filter.** A device for filtration under reduced pressure or by suction. **v. gases.** (1) The gases obtained by heating solids (*e.g.*, metals) in a v. (2) The residual gas in a v. tube. **v. lamp.** See *lamp*.



Vacuum pan.

v. pan. A closed retort used in industry for vacuum distillation (see illustration). **v. pump.** A suction pump, especially those devices that exhaust air or other gases until a high vacuum is created. Most effective are those using mercury (Sprengel pump) or the phthalates (Hickman pump). V. obtained are:

hyvac pump	4×10^{-4} mm. Hg
megavac	1×10^{-4} mm. Hg
hypervac	5×10^{-5} mm. Hg
aristovac	3×10^{-7} mm. Hg

v. pump oil. An organic liquid used in place of mercury in v. pumps, especially in the Hickman pump. *E.g.*,

n-butyl phthalate	2×10^{-4} mm. Hg
n-amyl phthalate	2.5×10^{-5} mm. Hg
n-hexyl phthalate	3×10^{-6} mm. Hg
n-heptyl phthalate	2.5×10^{-7} mm. Hg
n- octyl phthalate	5×10^{-8} mm. Hg
n-ethyl hexyl phthalate	5×10^{-7} mm. Hg
benzyl phthalate	1.2×10^{-7} mm. Hg

v. still. A v. pan. **v. tar.** A tar obtained from coal by vacuum distillation. It is rich in aliphatic and aromatic hydrocarbons. **v. tube.** Any partly-exhausted, sealed, glass vessel that contains a gas at low pressure; used for the production of luminous electric discharges; as,

x-ray tubes, Crookes' tubes. v. vessel. Dewar flask.

vadose. The ground water which extends only to a slight depth below the earth's surface. In general, any water of surface origin; as rain, spring, well and ground water. Antonym: juvenile water, q.v.

valence. (1) The capacity of an atom to combine with other atoms in definite proportions. (2) Also applied by analogy to radicals and atomic groups. Valence is measured with the combining capacity of a hydrogen atom taken as unity, thus:

HCl	chlorine is monovalent
H_2O	oxygen is divalent
H_3N	nitrogen is trivalent
H_4C	carbon is tetravalent

Its value may be any integer from 1 to 8 (see value for each element under *periodic chain*). According to electronic concepts it is due to the "valence electrons," or the electrons located in the outer shell of an atom. Cf. *bond*. This is illustrated for the first row of the periodic system as follows:

Li· Be: B: ·C· ·N· :O: :F:

where each dot represents a valence electron. In general the electrons in compounds arrange themselves in groups of eight, thus:

Li :F: Li :O: Li

Be :O: B :N:

A *positive* v. indicates the number of electrons that an atom can *give* up; thus, Li = 1, Be = 2. A *negative* v. indicates the number of electrons that an atom can *take* up; thus, F = 1, O = 2. A *co-valence* indicates the number of pairs of electrons which an atom can share with its neighboring atoms. According to some theories the two valencies of each element are of opposite sign (the normal- and contra-valencies); since every element has a total valence of 8, if the normal-valence is $+x$ the contravalence is $-(8-x)$.

Any atom that gives or takes ONE electron is monovalent

Any atom that gives or takes TWO electrons is divalent

Any atom that gives or takes THREE electrons is trivalent

Any atom that gives or takes FOUR electrons is tetravalent

Any atom that gives or takes FIVE electrons is pentavalent

Any atom that gives or takes SIX electrons is hexavalent

Any atom that gives or takes SEVEN electrons is heptavalent

Any atom that gives or takes EIGHT electrons is octavalent.

An element or its atom may exist in several stages of oxidation and thus form several corresponding series of compounds (q.v.), *e.g.*, ferrous and ferric, sulfurous and sulfuric. Hence, an element whose atom exhibits:

one valence is	univalent
two valencies is	bivalent
three valencies is	tervalent
four valencies is	quadrivalent
five valencies is	quinquevalent

See *Werner's coordination theory, bond*. **active-** The commonest v. of an element when the latter can exhibit more than one v. **auxiliary-** Covalence. **chief-** (1) The maximum v. which an element possesses. (2) The v. shown by the greatest number of stable compounds. **co-** Auxiliary v. The valence existing in the form of shared pairs of electrons between two molecules; as, NH_3—H_2O or NH_3—HCl. It is opposed to electro v. **contra-** Co-v. **divided-** A bond which oscillates from one atom to another. It is represented in structural formulas by a forked line, thus —<. **electro-** See *electrovalence, polar bond*. **free-** The v. that appears to be unsatisfied, as in free radicals. **maximum-** The highest stage of oxidation of an element. **negative-** V. due to an atom taking up electrons; as of chlorine. **normal-** The v. expressed according to the group of the periodic system. **null-** Zero v. No v., as in the case of the inert gases, which form no compounds. **partial-** An unsaturated or divided v. **principal-** The normal v. of an atom or radical, as distinct from its residual v. **positive-** V. due to an atom giving up electrons; as, sodium. **residual-** Supplementary-v. The v. by virtue of which complex compounds may be produced from apparently saturated molecules. **rotating-** V. due to oscillation of electrons between two atoms; as, the hydrogen between the two oxygen atoms in —COOH. Cf. *bond*. **semi-** See *semivalence*. **supplementary-** Residual v.

v. bonds. Any pair of electrons that consists of one electron from each of the two atoms they unite:

Na—Cl or Na :Cl:

It is assumed that each bond consists of a pair of electrons in more or less rapid vibration. If these vibrations are rapid, the compound is colorless or emits ultra-violet rays, and if they are slow, the compound is colored. Cf. *bond, polar*. **v. electrons.** The mobile electrons located outside the kernel or in the outer shell of an atom. Atoms that lose these electrons become positive ions, and atoms that gain these electrons become negative ions. **v. number.** Polar number. A negative or positive number that indicates the stages of oxidation of an element according to the number of electrons lost (positive) or gained (negative). It is determined from the formula of a stable compound by assuming that the sum of the v. numbers is zero, and that hydrogen is always +1 and oxygen always −2; thus,

H O H; Na O H

$1+(-2)+1=0$ $1+(-2)+1=0$

or Na_2 S O_4

(2×1) (4×2)

$2+6+(-8)=0$

v. tautomerism. A dynamic isomerism in which the + and − charges produced by a moving double linkage are neutralized by the concomitant movement of a second double linkage, so that ions do not separate. Cf. *ionotropy*.

valency. The phenomena of valence.

Valenta value. The turbidity value (q.v.) of an oil with glacial acetic acid as solvent.

Valentine, Basil. See *Basil*.

valentinite. Sb_2O_3. White antimony. A native antimony trioxide.

valeral. Valeraldehyde.

valeraldehyde. $C_5H_{10}O$ = 86.11. Valeral, valeric aldehyde, amyl aldehyde, pentanal*, $C_4H_9.CHO$. **normal-** $Me(CH_2)_3CHO$. A colorless liquid, d.0.819, b.103.4, slightly soluble in water, soluble in alcohol or ether. **iso-** $Me_2CH.CH_2$-CHO. A liquid, d.0.8041, b.92, soluble in alcohol or ether, slightly soluble in water.

valeramide. $C_5H_{11}ON$ = 101.1. Valeric amide, pentanamide*, $Me(CH_2)_3CO.NH_2$. Colorless crystals, m.127, b.231, soluble in water, ether or alcohol.

valerate. Valerianate. A salt of valeric acid, $C_4H_9.COOM$.

valerene. Amylene.

valerian. The dried rhizome of *Valeriana officinalis*, Valerianaceae. It contains valerian, an essential oil, the bornyl ester of *iso*-valeric and other fatty acids; is used medicinally, as the fluid extract, as a nervine, an antispasmodic and stimulant. **American-** Cypripedium. **Japanese-** Kesso oil.

v. oil. The volatile oil of v., a greenish liquid, d.0.990–0.996, b.250–300, containing borneol, bornyl formate, b. acetate, pinene and camphene.

valerianate. Valerate.

valerianic acid. Valeric acid.

valeric acid. $C_5H_{10}O_2$ = 102.1. Valerianic acid, pentanoic acid*. A group of isomeric, fatty acids in valerian: *normal-* $MeCH_2.CH_2.CH_2$-$COOH$; *iso-*, *common-* or isopropylacetic acid, $Me_2CH.CH_2.COOH$; *dl-*, *dextro-* or *levo-* $MeCH_2$-$CHMe.COOH$; trimethyl acetic acid (q.v.), $CMe_3.COOH$. **normal-** A liquid, m. −19, b.185, d_{20}°941. **common-** Isopropylacetic acid. Pentoic acid. A colorless liquid, d.0.942, m. −51, b.186; soluble in water, alcohol or ether. It occurs in the essential oil of valerian; used in perfumery and the manufacture of fruit ethers. **dl-** Methylethylacetic acid, $EtCHMeCOOH$. A colorless liquid, d.0.941, m. −80, b.177, soluble in water. **amino-** See *valine, norvaline homopiperidic acid.* **aminoguanido-** Arginine **aminomethyl-** See *leucine, isoleucine.* **diamino-** Ornithine. **keto-** Levulinic acid. **methyl-** Isocaproic acid. **tetrahydroxy-** Arabic acid.

v. aldehyde. Valeraldehyde. **v. anhydride.** $C_{10}H_{18}O_3$ = 186.2. Pentanoic anhydride*. The anhydride of valeric acid $(C_4H_9CO)_2O$. A colorless liquid, d_{27}°0.929, b.205, decomp. by water to valeric acid.

valeridin. $C_{13}H_{19}O_2N$ = 221.2. Valeryl-p-aminophenetol, valerylphenetidine, sedatin, valerydin, $EtO.C_6H_4.NH.OC.C_4H_9$. Colorless needles; insoluble in water, soluble in alcohol or ether; used medicinally as a nervine and a sedative.

Valerius Cordus. 1510–1544. A German physician noted as the writer of the first legal pharmacopoeia: *Dispensatorium pharmacorum omnium*, 1535.

valerol. $C_{15}H_{20}O_3$ = 284.2. A ketone obtained from the oil of valerian.

valerolactone. $C_5H_8O_2$ = 100.06. $MeCH.(CH_2)_2CO.O$. A colorless liquid, b.220, in wood tar.

valerone. Diisobutylketone.

valeronitrile. Butyl cyanide.

valerydin. Valeridin.

valeryl. Pentanoyl*. The monovalent radical, C_4H_9CO—, derived from valeric acid. **v. chloride.** C_5H_9OCl = 120.53. Isovaleryl chloride, pentanoylchloride*, $Me_2.CH.CH_2COCl$. A colorless liquid, d.0.989, b.114; decomp. by water. **v. diethylamide.** Valyl (2). **v. oxybutyrine.** Quietol. **v. phenetidine.** Valeridin.

valerylene. C_5H_8 = 68.1. Pentylene, *2*-pentyne*, methylethylacethylene. An unsaturated hydrocarbon of the acetylene series, $MeC{:}CEt$. It is an isomer of pentinene, $Me_2C{:}C{:}CH_2$.

validol. $C_{15}H_{28}O$ = 236.2. Menthol valerate. A colorless liquid; insoluble in water, soluble in alcohol or ether; used medicinally as a nerve sedative and stomachic.

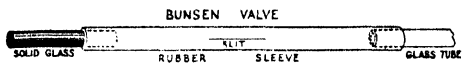
valine. $C_5H_{11}O_2N$ = 117.1. Aminoisovaleric acid, *2*-amino-*3*-methylbutanoic acid*, $Me_2CH.CHNH_2.COOH$. An amino acid from seeds and proteins. It occurs in two steroisomeric forms, dextro- and levo-rotatory compounds. **iso-** See *isovaline.* **nor-** See *norvaline.*

Vallets mass. Ferrous carbonate mass.

valonia. The acorn cups of *Quercus aegilops*, a Fagaceae of Greece and Asia Minor; used for tanning.

value. A number expressing a property; as, acetylation v., acid v., heat v., iodine v., saponification v.

valve. A device for controlling the motion of a fluid along a passage. It may be so arranged as to close or open an outlet by means of the pressure of the fluid flowing in a particular direction with a definite force. **Bunsen-** A piece of rubber tubing with a short slit in the side. A piece of glass rod is inserted in the rubber tube which is fitted to an exit tube, so that steam or air can escape but cannot re-enter.



Contat-Göckel- A chemical v. used in the cooling of acid solutions (*e.g.*, of iron), which are easily oxidized when hot. A solution of sodium bicarbonate is drawn into the flask containing the acids, as it cools, and the CO_2 evolved prevents the entry of an excess of alkali. **Fleming-** See *Fleming tube.* **radio-** See *rectifier, vacuum tubes.*

v. effect. Unilateral conductivity. The phenomenon, shown by cells composed of certain electrodes and electrolytes, of conducting a current in one direction only. Such cells can be used as rectifiers.

valyl. (1) $C_9H_{19}ON$ = 157.2. Valeric acid diethylamide, valeryldiethylamide, $MeCH_2CH_2$-CH_2CONEt_2. A colorless liquid, slightly soluble in water, soluble in alcohol or ether; used medicinally as a sedative and antispasmodic. (2) The monovalent radical, $Me_2CH.CHNH_2$-CO—, derived from valine.

valzin. Sucrol.

vanadate. A salt of vanadic acid of the general type, M_3VO_4. **meta-** A salt of the type, MVO_3. **ortho-** Vanadate, M_3VO_4. **pyro-** A salt of the type, $M_4V_2O_7$.

vanadic. Describing a compound containing tri- or pentavalent vanadium; as, VCl_3 or V_2O_5. **v. acid.** HVO_3 = 100.0. *meta-* Golden-yellow scales, slightly soluble in water, soluble in alcohol or ether; used as an oxidizing agent, and medicinally, as an antiseptic. *ortho-* H_3VO_4 = 118.0. A yellow powder, slightly soluble in water. *pyro-* $H_4V_2O_7$ = 218.0. An amorphous, brown powder; slightly soluble in water, soluble in alcohol or ether. **v. anhydride.** Vanadium pentoxide. **v. salts.** See *vanadium.*

vanadinite $PbCl_2.3Pb_3(VO_4)_2$. A native lead chloride and lead vanadate.

vanadite. (1) A salt of the type of $M_2V_4O_9$ from vanadous acid. (2) Vanadinite.

vanadium. V = 50.95. A rare metal and element, atomic number 23, discovered in 1830 by Sefström. It occurs in the blood of ascidians. It is a light gray metal, d.5.69, m.1720, insoluble in water or alcohol, soluble in acids. Vanadium has valencies of, 2, 3, 4, and 5, and forms, accordingly, several series of compounds. It is distinctly amphoteric, giving basic salts (vanadyl compounds) and acid salts (vanadates). These ions impart various colors to its solutions:

valence number	ion	name	color
2.....	V^{++}	vanadous.....	violet
3.....	V^{+++}	vanadic.....	green
	VO^{+}	vanadyl (ous)....	bluish-gray
5.....	VO_4^{---}	ortho vanadate..	yellow
	VO_3^{-}	meta vanadate...	yellow
	VO^{+++}	vanadyl (ic).....	blue

Vanadium is used in metallurgy, (*e.g.*, as ferrovanadium in the manufacture of steel), and in the preparation of catalysts. It resembles tantalum, and can be cold-worked into wire. The world output in 1940 was 3,500 long tons, from Peru > U. S. > Southwest Africa > Northern Rhodesia.

v. bromide. VBr_3 = 290.71. A dark green amorphous powder, which readily dissolves and decomp. in water. **v. carbides:** (1) VC = 62.96. A black crystalline mass, d.5.36, m.2830; insoluble in acids, except nitric acid. (2) V_4C_3 = 239.84. **v. chlorides:** three chlorides: (1) VCl_2 = 121.9. V. dichloride, vanadous chloride. Violet hexagonal crystals, d.3.28; soluble in water or alcohol. (2) VCl_3 = 157.4. Vanadic chloride, v. trichloride. A green, crystalline powder, d.3.0, soluble in water or alcohol. (3) VCl_4 = 192.8. V. tetrachloride. A red liquid, d.1.865, m. −15, b.154; soluble in water, alcohol or ether. **v. dichloride.** See *v. chloride* (1). **v. difluoride.** See *v. fluoride* (1). **v. dioxide.** (1) V_2O_2 = 134.0. A light-gray, crystalline powder, d.3.64, insoluble in water, alcohol or ether, soluble in acids or alkalis, producing a lavender-blue solution which has strong reducing powers. Cf. *v. monoxide.* (2) VO_2. See *v. tetroxide.* **v. dioxymonochloride.** Vanadyl chloride. **v. disulfide.** V_2S_2 = 166.05. A black powder, d.4.2; insoluble in hydrochloric acid, soluble in sulfuric acid. **v. fluorides:** (1) VF_2 = 89.0. Vanadous fluoride, v. difluoride. Insoluble, except in HF. (2) VF_3 = 107.96. Vanadic fluoride, v. trifluoride. A green crystalline powder, d.3.363, m. about 800, insoluble in water. (3) $VF_3.3H_2O$ = 162.01. Rhombohedral crystals, readily soluble in water. (4) VF_4 = 126.96. V. tetrafluoride. A yellow, hygroscopic crystalline powder, d.2.975, decomp. 325; soluble in water or acetone. (5) VF_5 = 145.96. V. pentafluoride. A liquid, d.2.177, b.111; soluble in water or alcohol. **v. hydroxides:** (1) $VO.xH_2O$, or $V(OH)_2$. Vanadous hydroxide. A violet-gray powder, insoluble in water or sodium hydroxide, soluble in acids. (2) $V_2O_3.xH_2O$ or $V(OH)_3$. Vanadic hydroxide. A green powder, insoluble in water, soluble in acids. **v. minerals.** Vanadium is widely diffused, and occurs in small quantities as a constituent of rocks, clays and coals.

vanadinite.....	$Pb_5V_3O_{12}Cl$
sulvanite.....	Cu_3VS_4
carnotite.....	Uranium vanadate
descloizite.....	$4(Pb, Zn)O.V_2O_5.H_2O$
patronite.....	V_2S_3

Cf. *roscoelite, volborthite.* **v. monosulfide.** VS. See *v. disulfide.* **v. nitride.** VN = 64.97. A solid, d.5.63, m.2050; insoluble in water, acids or alkalis. **v. oxides:** oxides:

VO or V_2O_2.....	v. monoxide, vanadous oxide
V_2O_2.....	v. dioxide
V_2O_3.....	v. trioxide, vanadic oxide, v. sesquioxide
V_2O_4 or VO_2.....	v. tetroxide
V_2O_5.....	v. pentoxide, vanadic anhydride

In addition there are the positive ions:

VO^{++}.....	vanadyl (ous) or vanadyl
VO^{+++}.....	vanadyl (ic) or pervanadyl
VO_2^{+}.....	vanadol

v. oxybromide. Vanadyl bromide (1). **v. oxychloride.** Vanadyl chloride (2). **v. oxydibromide.** Vanadyl bromide (2). **v. oxydichloride.** Vanadyl chloride (3). **v. oxydifluoride.** Vanadyl fluoride (1). **v. oxyfluoride.** Vanadyl fluoride (2). **v. oxytribromide.** Vanadyl bromide (3). **v. oxytrichloride.** Vanadyl chloride (4). **v. pentoxide.** V_2O_5 = 182.0. Vanadic oxide, vanadic anhydride. A yellowish or red crystalline powder, d.3.357, m.656, soluble in hot conc. acids; a strong oxidizing agent. **v. pentafluoride.** V. fluoride (5). **v. pentasulfide.** V_2S_5 = 264.2. Vanadic sulfide. A green powder, d.3.0; slightly soluble in alkalis, soluble in acids. **v. sesquioxide.** V. trioxide. **v. sesquisulfide.** V. trisulfide. **v. silicides:** (1) V_2Si = 129.98. Silver-white prisms, d.5.48; insoluble in water, acids or alkalis. (2) VSi_2 = 107.08. Metallic prisms, d.4.42; insoluble in water, alkalis or acids. **v. steel.** An alloy of iron and 0.1 to 0.15 % vanadium, used in the manufacture of tools. **v. sulfate.** Vanadyl sulfate. **v. sulfides:** V_2S_2, vanadium disulfide; V_2S_3 (vanadous) vanadium trisulfide; V_2S_5 (vanadic) vanadium pentasulfide. **v. tetrachloride.** V. chloride (3). **v. tetrafluoride.** V. fluoride (4). **v. tetroxide.** V_2O_4 = 165.9. Vanadous acid. An indigo-blue, crystalline powder, d.4.399, m. above 1750, insoluble in water, soluble in acids or alkalis. **v. trichloride.** See *v. chloride* (2). **v. trifluoride.** See *v. fluorides,* (2) and (3). **v. trioxide.** V_2O_3 = 149.92. V. sesquioxide, vanadous oxide. A black, infusible, crystalline powder, d.4.87, m.1970; slightly soluble in water, soluble in alkalis or halogen acids. It changes slowly in air to the indigo-blue oxide, V_2O_4; used as a mordant in dyeing, as a catalyst, and in the manufacture of steel and of silver vandate, Ag_3VO_4. **v. trisulfide.** V_2S_3 = 198.2. Vanadous sulfide. A dark-red, crystalline powder, d.3.85; insoluble in water, soluble in nitric acid or ammonium sulphate solution.

vanadol. The radical VO_2^{+}.

vanadous. Describing a compound containing di- or trivalent vanadium; as, VCl_2 or V_2O_3. **v. acid.** $H_2V_4O_9$. The hypothetical compound from which vanadites are derived, $M_2V_4O_9$. **v. chloride.** Vanadium chloride (1). **v. fluoride.** Vanadium fluoride (1). **v. hydroxide.** Vanadium hydroxide (1). **v. oxide.** Vanadium trioxide. **v. sulfide.** Vanadium trisulfide.

vanadyl. (1) The trivalent radical, VO≡ vanadyl(ic), derived from pentavalent vanadium, (vanadic). (2) The monovalent radical, VO— vanadyl(ous), derived from trivalent vanadium (vanadous). **di-** The tetravalent V_2O_2≡ radical. **v. bromides:** (1) VOBr = 146.87. V-ous bromide, vanadium oxybromide. A solid, d.4.00, decomp. 480, slightly soluble in water. (2) $VOBr_2$ = 226.79. V. dibromide, vanadium oxydibromide. A brown, hygroscopic powder, soluble in water. (3) $VOBr_3$ = 306.7. V. tribromide, v-ic bromide, vanadium oxytribromide. A red liquid, d.2.933, readily soluble in water (decomp.). **v. chlorides:** (1) V_2O_2Cl = 169.4. V. semichloride, vanadium dioxymonochloride. Yellow crystals, d.3.6, insoluble in water. (2) VOCl = 102.4. V. monochloride, v-ous chloride, vanadium oxymonochloride. A brown powder, d.2.8; insoluble in water, soluble in acids. (3) $VOCl_2$ = 137.8. V. dichloride, vanadium oxydichloride. Blue scales, d.2.88; deliquescent and slowly decomposed by water. (4) $VOCl_3$ = 173.3. V. trichloride, v-ic chloride, vanadium oxytrichloride. Dark green, syrupy liquid; d.1.836, m.−15, b.127; soluble in alcohol or water. It is used as a mordant in the dyeing industry. **v. dibromide.** See v. bromide 2. **v. dichloride.** See v. chlo- See v. bromide 2. **v. dichloride.** See v. chloride 3. **v. difluoride.** See v. fluoride 1. **v. fluoride** (1) VOF_2 = 104.96. V. difluoride, vanadium oxydifluoride. A solid, d.3.396, decomposed when heated; insoluble in water. (2) VOF_3 = 123.96. V. trifluoride, v-ic fluoride. A solid, d.2.459, m.300; very soluble in water. **v. monobromide.** V. bromide 1. **v. monochloride.** V. chloride 2. **v. semichloride.** V. chloride 1. **v. sulfate** $(VO)_2(SO_4)_3$ = 422.2. A blue, crystalline powder; soluble in water and decomposed by alcohol. *di-* $(V_2O_2)(SO_4)_2$ = 326.0. A double salt of v. sulfate. **v. tribromide.** V. bromide 3. **v. trichloride.** V. chloride 4. **v. trifluoride.** V. fluoride 2.

vanadylic. The trivalent radical, ≡VO. **v. bromide.** Vanadyl bromide 3. **v. chloride.** Vanadyl chloride 4.

vanadylous. The monovalent radical, —VO. **v. bromide.** Vanadyl bromide 1. **v. chloride.** Vanadyl chloride 2.

van der Waals, Johanns Diderik. Vander Waals. 1837–1923. A Dutch chemist noted for his contributions to physical chemistry. **van der W. constant.** The factors, *a* and *b*, in the equation of state (q.v.). **v. d. W. equation.** A modification of the equation of state in which two correcting factors are introduced: $(p + a/v^2)(v - b) = RT$, in which the volume factor, *b*, corresponds with four times the square root of the space occupied by the molecules themselves, and the factor, a/v^2, expresses the mutual attraction of the molecules for each other. See *corresponding states*. **v. d. W. forces.** The weak forces between atoms and molecules which cause crystallization of inert gases at low temperature, and the packing together of nonpolar organic compounds to form soft crystals of low melting point.

van Dyck brown. Vandyke. A mixture of ocher and lamp black.

van Helmont. See *Helmont*.

Vanier's tube. An absorption device consisting of a potash bulb and drying tube, used to absorb the CO_2 evolved in the determination of carbon in steel by the combustion method.

vanilla. Vanilla bean. The cured and full-grown, unripe fruit of *Vanilla planifolia*, an Orchidaceae. It contains vanillin and vanillic acid; used medicinally as an aromatic and in the manufacture of chocolate, confectionery, flavoring extracts and perfumery.

vanillal. The bivalent radical, (3,4)(MeO)(HO)-C_6H_3, CH=, derived from vanillin.

vanillic acid. $C_8H_8O_4$ = 168.1. 3-Methoxy-4-hydroxybenzoic acid, $MeO.C_6H_3(OH)COOH$. Colorless needles, m.207 (sublimes); slightly soluble in water, soluble in alcohol or ether. **v. alcohol.** $C_8H_{10}O_3$ = 154.1. 3-Methoxy-4-hydroxybenzyl alcohol, $MeO.C_6H_3.OH.CH_2OH$. Colorless needles, m.115, decomp. by further heat, soluble in water, alcohol or ether.

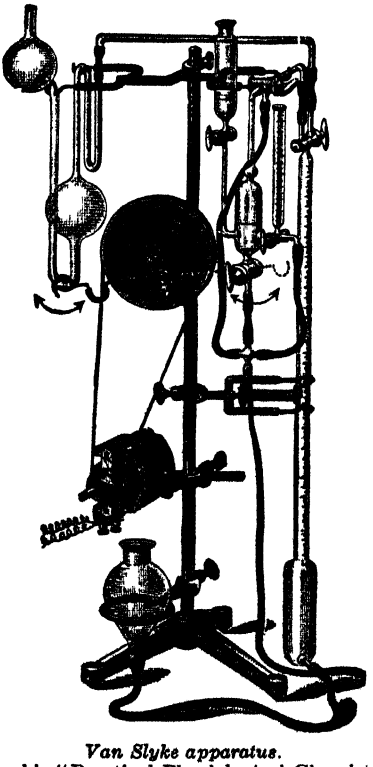
vanillin. $C_8H_8O_3$ = 152.1. Methylprotocatechuic aldehyde, 3-methoxy-4-hydroxy benzaldehyde, $MeO.C_6H_3(OH)CHO$. An odorous principle from the vanilla bean, or prepared synthetically. Colorless needles, m.80 (sublimes), slightly soluble in water, soluble in alcohol, ether or glycerol. Used as a reagent, and as a flavoring agent and vanilla substitute. **ethyl-** $C_9H_{10}O_3$ = 166.08. *m*-Ethoxy-*p*-hydroxy benzaldehyde, bourbonal. A homologue of vanillin, four times as strong in flavor. Cf. *ethyl vanillate*. **iso-** See *isovanillin*.

vanilloyl. The monovalent radical, (3,4)(MeO)-(HO)C_6H_3CO—, derived from vanillic acid.

vanillyl. The monovalent radical, (3,4)(MeO)-(HO)$C_6H_3CH_2$—, derived from vanillic alcohol. **v. alcohol.** Vanillic alcohol.

vanirom. Bourbonal.

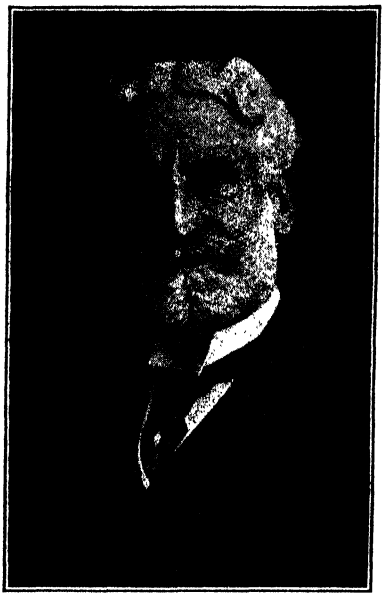
van Laar, J. J. 1860– . A Dutch chemist and coworker of van't Hoff and van der Waals.



Van Slyke apparatus.
(Hawk's "Practical Physiological Chemistry.")

vanning. The mechanical separation of the constituents of an ore by washing away the lighter portions in a stream of water.

Van Slyke, Donald Dexter. 1883– . An American chemist noted for his work on biochemical analysis. **V. S. apparatus.** A setup of chemical glassware for the determination of aliphatic amino-nitrogen in proteins. **V. S. method.** The measurement of the nitrogen gas evolved from aromatic amino compounds and nitrous acid: $R.NH_2 + HNO_2 \rightarrow R.OH + N_2 + H_2O$. It is used in biochemical analysis for the determination of proteins.



Lucius Lincoln Van Slyke.

Van Slyke, Lucius Lincoln. 1859–1931. An American chemist noted for research in the chemistry of dairy products.

van't Hoff, Jacobus Henricus. 1852–1911. A Dutch chemist noted for his work on stereochemistry and the theory of solutions. Nobel Prize winner in 1901. **v. H.'s factor.** The empirical factor, i, in the equation of state when applied to solutions: $pv = iRT$, where p is the osmotic pressure and v the volume. The factor i depends on the dissociation of the compound; if the molecules are completely ionized, i is 2 for binary and 3 for ternary compounds. If d is the degree of ionization and n the number of ions into which a molecule is partly dissociated, $i = 1 + d(n - 1)$. **v. H.'s law.** The osmotic pressure exerted by a solute in solution is the same as it would be for the same solute in the state of an ideal gas occupying the same volume as was occupied by the solution. **v. H. solution.** A solution of 2 gm. $CaCl_2$, 2.2 gm. KCl, 7.8 gm. $MgCl_2$, 3.8 gm. $MgSO_4$ and 100.2 gm. NaCl in 1000 cc. water. **v. H. theory.** Dissolved substances obey the gas laws.

Jacobus Henricus van't Hoff.

(From Brownlee, Fuller and Hancock "Elementary Chemistry." Courtesy of Allyn & Bacon.)

vanthoffite. $MgSO_4.3Na_2SO_4$, a Stassfurt salt.

vapodust. An insecticide spray consisting of vaporized petroleum oils; used, in the form of a fog, in orchards.

vapor, vapour. A gas, especially the gaseous form of a substance that at ordinary temperature is a solid or liquid; as, iodine-v., ether-v. It is the state or phase into which a substance passes when its v. pressure equals that of the atmosphere. **saturated-** A vapor is saturated when liquid in it and from which it is derived cannot further evaporate; that is, the same number of molecules which escape from the liquid into the gas, are condensed from the gas to the liquid, and an equilibrium is set up dependent on temperature only. **unsaturated-** A vapor contained in a space in which there is insufficient liquid to saturate it.

v. bath. Steam bath. **v. density.** The density of a gas compared with some gas as a standard. Three standards:

(a) hydrogen, as 1..... $D_{(H_2=1)}$
(b) oxygen, as 16..... $D_{(O_2=16)}$
(c) air, as 1..... $D_{(air=1)}$

The relationship of these three standards is: $a = M/2$; $b = M$; and $c = M/28.95$; where M is the molecular weight of the substance, the data being corrected for pressure and temperature by the equation of state, q.v. **v. pressure.** The pressure at which a liquid and its vapor are in equilibrium at a definite temperature. If the v.p. reaches the prevailing atmospheric pressure (1 atm.) the liquid boils (boiling point). Cf. *Babo's law, Clausius equation, Wullner's law.* **v. tension.** The tendency of a liquid to form a vapor. It is assumed that the molecules of a liquid are in motion; those moving fastest are expelled from the liquid and become molecules of gas, and vice versa, thus, establishing an equilibrium between the number of molecules in the gas and in the liquid which depends upon the prevailing temperature and pressure.

vaporimeter. An instrument in which the volatility of lubricating or other oils is tested by heating them in a current of air.

vaporization. Volatilization. The change from the liquid to the gaseous state without any change in the chemical composition of the molecule. Cf. *evaporation.* **heat of-** The number of calories required to transform one gram of liquid substance, at its boiling point, into its vapor. Cf. *Clausius equation.*

vaporize. (1) To change into a vapor, *e.g.*, by heating a liquid. (2) To atomize, or subdivide a liquid into a fine spray.

vaporizer. (1) An atomizer. (2) A still.

varek. A French term for kelp.

variability. The deviation from the normal or standard. Cf. *variance*.

variable. A factor that is not constant, but changeable.

variance. Degree of freedom. The number of external conditions which may be arbitrarily fixed; as, composition, temperature, and pressure. See *phase rule, freedom, variability*.

variant. Pertaining to variable factors. di- An area in a diagram, q.v. **mono-** A line in a diagram. **non-** A point in a diagram. Cf. *phase rule*.

variscite. $AlPO_4.2H_2O$. Peganite. A green aluminum phosphate, sometimes used as a gem.

varnish. A solution of a resin or drying oil in a volatile solvent (*e.g.*, alcohol or turpentine). See *lacquer*.

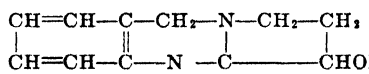
Varrentrapp, Franz. 1815–1877. A German chemist, noted for analytical methods.

varve. A lamination in a deposit of natural clay.

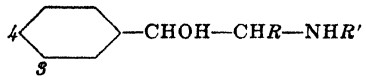
vasculose. An early name for impure lignin; m.211, (decomp.), slightly soluble in water, soluble in alcohol or chloroform.

vaselin. Fossolin. A mixture of hydrocarbons of the paraffin series obtained from the residues of petroleum. See *petrolatum*.

vasicine. $C_{11}H_{12}N_2O$ = 188.11. An alkaloid from *Peganum harmale* or *Adhatoda vasica*, an Acanthaceae, white needles, decomp. 198; used as an insecticide.



vasoconstrictor. A vasomotor stimulant or agent that increases arterial pressure by the constriction of the blood vessels; as, epinephrine, ergot, cocaine, tyramine, and:



	R	*R'*	*3*	*4*
ephedrine	CH_3	CH_3	H	H
synephrine	H	CH_3	H	OH
neosynephrine	H	CH_3	OH	H
epinephrine	H	CH_3	OH	OH
cobefrine	CH_3	H	OH	OH

vasodilator. A vasomotor depressant, or agent that lowers the arterial pressure by the dilation of the blood vessels; as, amyl nitrite, nitroglycerin, veratrum, aconitine.

vasopressin. β-Hypophamine.

vat. (1) A vessel or tub in which colors are dissolved or ores are washed and subjected to chemical treatment; as, indigo-vat or cyanide-vat. (2) The solutions used in these tubs; *e.g.*, zinc-lime vat (10 pts. indigo, 10 pts. zinc dust, 30 pts. lime); sulfate-vat (10 pts. indigo, 50 pts. ferrous sulfate, 60 pts. lime). **v. dye.** A color that is applied with a mordant. See *dyes*.

vaterite. μ-$CaCO_3$. A probable anisotrope of calcite, d.1.254.

Vaughan's cage. An iron-screen box that is collapsible and can be sterilized; used in animal experiments.

Vauquelin, Louis Nicolas. 1763–1829. A French chemist, the discoverer of chromium and organic compounds, and a pioneer in teaching laboratory work.

vauqueline. Strychnine.

vauquelinite. $2PbO.CuO.2CrO_3$. A native mixed oxide of lead, copper and chromium.

vector. A magnitude (such as velocity, force, momentum, induction etc.) which has both, magnitude and direction, and which may be represented as a straight line of suitable length and direction. Cf. *co-ordinates, scalar, molecular diagram*.

veepa oil. Margosa oil.

vegetable. Pertaining to plants, q.v. **v. dyes.** Coloring materials obtained from plants; as, chromoproteins, indicators, cyanins, carotenes, plant pigments. **v. horsehair.** See *horsehair*. **v. parchment.** An imitation parchment used widely for wrapping foodstuffs, and prepared by passing paper through a bath containing sulfuric acid or a solution of zinc chloride. **v. potash.** A fertilizer made from distillery waste (33 % K_2O).

vehicle. A usually-inactive substance serving as a medium or carrier for an active substance; as oil in paints (cf. *thinner*).

vein. (1) A blood-vessel that conveys blood towards the heart. (2) A lode or deposit of ores distinct from the surrounding rocks.

vellosine. $C_{22}H_{28}O_4N_2$ = 396.3. An alkaloid from the bark of *Geissospermum vellosii*, or pareira bark. Pale yellow crystals, m.189, insoluble in water, soluble in alcohol or ether.

velocity. (1) The speed with which an object travels, expressed as the distance covered by it during a certain unit interval of time: v = L/T. (2) The time required for a phenomenon to take place; as, v. of reaction. Cf. table, for magnitudes of velocity. **angular-** q.v. **migration-** q.v. **molecular-** q.v. **reaction-** q.v. **terminal-** The velocity acquired by a freely-falling body when the resistance of the medium through which it falls balances the weight of the particle.

v. constant. The constant of the velocity of reaction (q.v.).

MAGNITUDES OF VELOCITY

Light	186,000	miles per sec.	2.99×10^{10} cm./sec.
Electrons in cathode rays			10^9 to 10^{10} "
Alpha-particles, initial velocity	20,000	miles per sec.	3.2×10^9 "
Farthest spiral nebula (recession)	12,300	"	2×10^9
Sun, around hub of Milky Way	200	"	3×10^7 "
Mercury around sun	29.7	"	4.78×10^6 "
Earth around sun	18.33	"	2.95×10^6 "
Neptune around sun	3.37	"	5.43×10^5 "
Sound in iron	3.1	"	5×10^5 "
Hydrogen molecules at 0°C.	1.11	"	1.8×10^5 "
Sound in water	0.9	"	1.46×10^5 "
Rifle bullet in air	1,970	ft. per sec.	6×10^4
Nitrogen molecules at 0°C.	1,630	"	4.97×10^4 "
Earth rotation at equator	1,525	"	4.65×10^4 "
Oxygen molecules at 0°C.	1,525	"	4.65×10^4
Sound in air	1,089	"	3.32×10^4

Moon around earth	534	".....	1.63×10^4 cm./sec
Speed car on racing beach	370	".....	1.14×10^4 "
Wind at 100 miles p. hr.	150	".....	4.57×10^3 "
Nerve impulse	128	".....	3.9×10^3 "
60 miles per hour	88	".....	2.66×10^3 "
20 miles per hour	29.2	".....	9×10^3 "
Paper-making machine	16.6	".....	5×10^3 "
1 centimeter per second		.....	1 "
Crystal growth (picric acid)	14.3	mm. per sec.	1.43 "
Gas diffusion (H into O)	6.9	".....	0.69 "
Fastest plant growth	0.03	".....	3×10^{-3} "
Crystal growth (o-phosphoric acid)	0.018	".....	1.8×10^{-3} "
Growth of beard	0.00001	mm. per sec.	1×10^{-6} "
Growth of eucalyptus tree	10	feet per year	1×10^{-8} "
Diffusion of gold into lead	0.002	mm. per day	4.6×10^{-9} "

velon. Trade name for a vinylidene chloride plastic.

velox. Trade name for photographic printing paper.

Venetian red. A form of ferric oxide, Fe_2O_3, used as a pigment. **V. white.** A mixture of equal parts of lead white and barium sulfate; used as a pigment.

venom. The poison secreted by reptiles, amphibians, spiders and insects; as, snake v., scorpion v., toad v.

vent. An outlet for fumes or gases.

ventriculin. A dry granular powder extracted from desiccated and defatted hog stomach; used in pernicious anemia.

Venturi meter. Undermeter. A pipeline meter for measuring the quantity of liquid flowing past a certain point. A stream-line or constriction is used, the pressure across which shows the velocity of flow.

venus crystals. Copper acetate.

veratral. The bivalent radical, $(3,4)(MeO)_2$-C_6H_3CH=.

veratraldehyde. $C_9H_{10}O_3$ = 166.2. 3.4-Dimethoxybenzaldehyde, *3.4*-dimethoxybenzenecarbonal,* $(MeO)_2C_6H_3.CHO$. White needles, m.-43, b.283. **o-** 2.3-Dimethoxybenzaldehyde.

veratric acid. $C_9H_{10}O_4$ = 182.2. Dimethoxybenzoic acid, 3-methoxyanisic acid, 3,4-$(MeO)_2$-$C_6H_3.COOH$. An acid in sabadilla; m.181. **o-** 2.3-Dimethoxybenzoic acid. **formyl-** Opianic acid.

veratrin. A mixture of the alkaloids of veratrum: veratrine, (amorphous and crystalline), sabadine, sabadinine, jervine and other alkaloids. Used medicinally as a cardiac sedative and motor depressant. **amorphous-** Veratroidine. **crystalline-** Veratrine. **proto-** See *protoveratrine.*

veratrine. $C_{32}H_{49}O_9N$ = 591.5. Cevadine, cryst. veratrine. The chief alkaloid of veratrum. Colorless crystals, m.205, insoluble in water, soluble in alcohol or ether. Used medicinally, and externally in ointments. **proto-** See *protoveratrine.*

v. hydrochloride. $C_{32}H_{49}O_9N.HCl$ = 627.9. A colorless, amorphous powder; soluble in water or alcohol. **v. nitrate.** $C_{32}H_{49}O_9N.HNO_3$ = 654.5. A colorless, crystalline powder; soluble in water or alcohol. **v. sulfate.** $(C_{32}H_{49}NO_9)_2$-H_2SO_4 = 1280.80. An amorphous brittle mass, soluble in water.

veratroidine. $C_{37}H_{53}O_{11}N$ = 698.43. Amorphous veratrine. An alkaloid from veratrum. It hydrolyzes when heated with potassium hydroxide into cevine, $C_{27}H_{43}O_8N$, and 2 molecules of tiglic acid, $C_5H_8O_2$; veratrine gives only one molecule of tiglic acid.

veratrole. $C_8H_{10}O_2$ = 138.1. Dimethoxypyrocatechol, dimethoxybenzene,* methoxyanisole, $C_6H_4(OMe)_2$. Colorless crystals, d.1.086, m.23, b.205; slightly soluble in water, soluble in alcohol or ether. Used medicinally as an antiseptic and anodyne. **allyl-** Methyleugenol.

veratroyl. The monovalent radical, $(3,4)(MeO)_2$-C_6H_3CO— from veratric acid.

veratrum. American hellebore, green or false hellebore, Indian poke. The dried rhizomes and roots of *V. viride*, a Liliaceae. It contains the alkaloids veratrine, protoveratrine, rubijervine, pseudojervine, veratravine and veratroidine; used medicinally as a cardiac depressant and diaphoretic.

veratryl. The monovalent radical $(3,4)(MeO)_2$-$C_6H_3CH_2$— from veratryl alcohol.

verbascum. Mullein leaves. The dried flowers and herbs of *V. thapsus*, a Scrophulariaceae. It contains an essential oil, tannin, and resin; used medicinally, as the fluid extract, as a demulcent and anodyne. Cf. *mullein.*

verbena. Blue vervain, wild hyssop. The dried overground portions of *V. hastata* Verbenaceae. It contains a tannin and bitter principle; used medicinally, as the fluid extract, as a tonic and diaphoretic. **v. oil.** The volatile oil from the leaves of *V. triphylla* of France and Spain, containing about 30 % citral. Cf. *lippianol, andropogon oil. East Indian-* Lemongrass oil. *Singapore-* Citronella oil.

Verbenaceae. The vervain family. A group of herbs and shrubs, some of which contain aromatic principles.

Verbena hastata.....	verbena
Verbena urticaefolia..	white vervain
Verbena triphyllis....	verbena oil
Verbena officinalis....	verbenaloside
Lantana brasiliensis..	lantanine, yerba sagrada
Lippia dulcis.....	lippia
Premna taitensis.....	tonga bark

verbenalin. Verbenaloside.

verbenaloside. $C_{17}H_{28}O_{10}$ = 389.19. Verbenalin. A crystalline, reducing glucoside from the flowering tops of *Verbena officinalis*, wild verbena; m.181, soluble in water.

Verdet's constant. The magnetic rotation (R) of polarized light per cm., per unit magnetic field. $R = \alpha/H.l.$ where α is the rotation in minutes for the substance in a magnetic field of H gauss, and l, the length of the light path parallel to the lines of force. Films of Fe, Co and Ni are exceptions to this rule. **V.'s equation.** An equation indicating the magneto-optic rotation: $\theta = clH\left(r - \lambda\frac{dr}{d\lambda}\right)\frac{r^2}{\lambda^2}$, where c is a constant depending on the substance, l is the length of the path of the polarized beam, H is the intensity of the magnetic fields, r is the index of refraction of the substance, and λ the wave-length of the light used.

verdigris. Basic cupric acetate. It varies from blue to green, and is used as a pigment. **blue-** Cupric acetate.

verditer. Copper carbonate. **blue-** Blue copper carbonate. **green-** Green copper carbonate.

verdoflavin. A green reduction-product of riboflavin.

verine. $C_{28}H_{45}O_8N$ = 523.5. An alkaloid from sabadilla.

verium. Ve = 224(?). A supposed rare alkali metal, atomic number 87. A liquid like mercury d.2.5(?), m.17(?), b.610(?). It is the most electropositive metal, is not radioactive, has no visible spectrum. It is precipitated by silicotungstic acid and occurs in a few clays and alkali deposits of the Western U.S., in some springs, and in the ocean. Cf. *virginium*. **v. silicotungstate.** White, long, rhomboidal prisms, insoluble in water.

vermicide. An agent that destroys intestinal parasites. Cf. *vermifuge, teniacide*.

vermiculite. The gold-colored mineral $3MgO\cdot(FeAl)_2O_3\cdot 3SiO_2$; it expands on ignition.

vermiform. Describing a bacterial growth that resembles a mass of worms in appearance.

vermifuge. An agent that expels intestinal parasites; especially worms. Cf. *vermicide, teniafuge*.

vermilion. Red mercuric sulfide, cinnabar; used as a pigment and as a polishing material for lenses. Commercial grades may contain red lead and insoluble synthetic dyes. **mock-** Lead chromate.

vermilionette. A substitute for vermilion; usually chalk etc. dyed with a coal tar dye.

vermuth. A cordial prepared from white wine flavored with wormwood. Cf. *absinthe*.

vernalization. The process of bringing plants artificially to the spring state, by subjecting them to indoor temperature before planting. Cf. *auxin, plant hormone*.

vernier. A small movable auxiliary scale attached to a larger scale, by means of which more accurate readings can be taken.

vernine. $C_{16}H_{20}O_8N_8.3H_2O$ = 506.3. An alkaloid from ergot and leguminous seedlings; as, clover or vetches.

vernonine. $C_{16}H_{24}O_7$ = 256.2. A glucoside obtained from the batiator root, the root of *Vernonia nigritiana*, a Compositae of Africa. A hygroscopic white powder, soluble in water; it acts like digitalis, as a cardiac poison.

veronal. Barbital.

veronica. Speedwell. The dried herb of *V. officinalis*, a Scrophulariaceae. It contains an essential oil, tannin and a bitter principle; used medicinally as an alterative and tonic.

verrucose. Describing a growth of bacteria that resembles warts.

verticillic acid. $C_{26}H_{32}O_{11}.(H_2O)$ = 538.4. An acid produced by the mould fungi, *Penicillium Charlesii*.

vertivert oil. The volatile oil of *Andropogon muricatus*, d.1.015–1.030, soluble in water. Cf. *citronella oil, verbena oil*.

vervain. Verbena.

vesicant. An agent that causes blistering of the skin; as mustard gas, cantharides, croton oil. Cf. *pustulant*. **v. gases.** A group of poison gases (q.v.) used in warfare.

vesicle. A small blister.

vesipyrin. Spiroform.

vesorcinol. Dihydroxy toluene.

vesotinic acid. Hydroxy toluic acid.

vessel. (1) A container; as, a flask or beaker. (2) In biology, a canal or tube for carrying a fluid such as, blood or plant saps.

vesuvianite. Iodocrase.

vesuvin. Triaminoazobenzene.

vesypin. Spiroform.

vetiveria. Cuscus, khus-khus. The Indo-Malayan grass *V. zizanioides*, a Graminaceae, whose roots are woven into fragrant mats, fans, baskets, etc. **v. oil.** Oil of cuscus. A volatile oil distilled from v. Cf. *verbena oil*.

vial. Phial. A small bottle. Cf. *ampoule*.

vibracone. A vibrating ore screen; the ore is fed on to a vibrating conical surface.

vibration. A rapid to-and-fro motion, or oscillation. **atomic-** The motion of the atoms of a molecule. Cf. *porphin ring*. **electronic-** The conception of the dynamic atom, in which the electrons are in rapid vibration, causing the emission of rays. Cf. *spinning* electron.

vibrator. A device that produces mechanical vibration, as screens or shaking devices.

vibrograph. An instrument for measuring short time-intervals. It consists of a rotating drum, on which an electrically-driven tuning-fork records the time.

Viburnum. A genus of trees and shrubs of the caprifoliaceous family. **V. opulus.** Cramp bark. Cranberry tree, Guelder-rose. The dried bark of *V. opulus*, a Caprifoliaceae. It contains viburnin, valeric acid, sugar and tannins; used medicinally as the fluid extract, as a uterine antispasmodic and tonic. **V. prunifolium.** Black haw. The dried bark of *V. prunifolium*, a Caprifoliaceae. It contains viburnin, valerates, citrates, malates and tannin; used medicinally as a uterine sedative and tonic.

vicianin. A glucoside from the seeds of vetch, *Vicia sativa*.

vicianose. $C_{11}H_{20}O_{10}$ = 312.15. A disaccharide (glucose and arabinose) obtained by hydrolysis of vicianin.

vicilin. A globulin from peas, beans and lentils.

vicinal. The neighboring position of radicals, as in the 1.2.3- or 1.2.3.4- positions of the benzene or naphthalene rings, respectively.

victor bronze. An alloy of 58.5 parts copper, 38.5 parts zinc, 1.5 parts aluminum, 1 part iron and 0.03 part vanadium.

victoria blue. $C_{33}H_{31}N_3.HCl$ = 505.75. Phenyltetramethyltriamido-α-naphthyldiphenylcarbinol hydrochloride. A bronze colored, crystalline powder, soluble in hot water, alcohol or ether. Used in the textile industry for dyeing silk, wool and cotton. **v. green.** Malachite green. **v. orange.** $C_7H_5O_5N_2K$ = 236.3. Aniline orange, potassium dinitro-o-cresol. A reddish-yellow powder, used in dyeing wool and silk. **v. yellow.** Antinnonin.

victorium. Vi = 117, or monium, Mo. A supposed metallic element discovered by Sir William Crookes in 1898 in yttria minerals, which proved later to be a mixture of rare earths.

vienna caustic. Potassium hydroxide mixed with lime.

Vierordt, Carl. 1818–1884. A German physician and founder of quantitative spectrum analysis.

viferral. Hydronal.

Villavecchia test. A test for sesame oil, in which the sample (5 cc.) is shaken with 5 cc. of fuming hydrochloric acid and not more than 2 drops of a 1 % solution of furfural in alcohol (Baudouin's reagent). On standing the bottom (acid) layer becomes rose-colored if sesame oil is present.

villose. Describing a bacterial growth with hair-like flimsy extensions.

vinaconic acid. $C_5H_6O_4$ = 130.05. Ethylenemalonic acid, *1.1*-cyclopropane dicarboxylic acid*. $CH_2.CH_2.C(COOH)_2$. White needles, m.175.

vinasse. Schlempe. The residue from the fermentation of molasses, or grapes; used as a fertilizer, or as a source of potassium salts.

vinegar. (1) A weak (=6 %) solution of acetic acid containing coloring matter and other substances (esters, mineral matter etc.), formed by the fermentation of alcoholic liquids such as cider, wine or other fruit juices, with an acetifying organism. Cf. *acetifier, acetimetry.* (2) Acetextracts, acetum. The strained liquid obtained by macerating a drug with dilute acetic acid; as, squill v. **artificial-** A substitute for vinegar containing acetic acid, which is not wholly the product of alcoholic and subsequent acetous fermentation. **distilled-** The product of distillation of vinegar as defined above. **imitation-** Artificial v. **malt-** Vinegar derived, without intermediate distillation, wholly from malted barley with or without addition of whole cereal grain, the starch of which has been saccharified by the diastase of malt. **spirit-** The product of a distilled alcoholic fluid. **wood-** Pyroligneous acid.

v. essence. A product made synthetically or by distillation of wood. It usually contains 12 % acetic acid, and is colored with an aniline dye or caramel. Cf. *spirit acid.*

vinetine. Oxyacanthine.

vinic acids. A group of organic compounds analogous to acid salts; as, $EtHSO_4$, (ethylsulfuric acid or sulfovinic acid). **v. ether.** (Ethyl) ether.

vinifera palm oil. Bamboo oil.

vinilite. Vinylite.

vinol. Vinyl alcohol.

vinometer. A hydrometer used for estimating the percentage of alcohol in wine.

vinopyrine. Phenetidine acid tartrate. A colorless crystalline powder, soluble in cold water, decomp. by hot water; used as an antipyretic.

vinum. The Latin term for wine.

vinyl. Ethenyl*. The monovalent radical, $-CH:CH_2$, derived from ethylene. (Cf. *polyvinyl, vinylene, vinylidene.*) **v. acetate.** The ester $CH_3COOCH:CH_2$. **v. acetic acid.** β-Butenic acid. **v. acetylene.** C_4H_4 = 52.05. Butone, monovinyl acetylene. $CH_2:CH.CH:CH$. A gas formed on passing acetylene into ammoniacal cuprous chloride solution; with HCl it forms chloroprene, a source of artificial rubber (see *elastomer*). **di-** See *divinyl acetylene.* **v. alcohol.** C_2H_4O = 44.0. Vinol, ethenol*. $CH_2:CH.OH$. An unsaturated alcohol. **v. amine.** $C_2H_3NH_2$ = 43.06. Ethenylamine*. A liquid, b.56. **v. benzene.** Styrolene. **v. bromide.** C_2H_3Br = 106.95. Ethenylbromide, bromoethene*, $CH_2:CHBr$. A colorless liquid, d.-1.517, $b._{750mm}16$, insoluble in water, soluble in alcohol or ether. **v. chloride.** C_2H_3Cl = 62.5. Chloroethylene, chloroethene*. A colorless gas, $d._{-13.8}0.97$, b. −13.9, soluble in alcohol or ether. **v. cyanide.** C_3H_3N = 53.03. Acrylonitrile, propenenitril*, $CH_2:CH.CN$. A colorless liquid, m. −82, b.78. **v. ether.** C_4H_6O = 70.1. V. oxide, ethenyloxyethene*. The unsaturated compound, $CH_2:CH.O.CH:CH_2$. A colorless liquid, b.39, insoluble in water, soluble in alcohol or ether. **v. ethylene.** Bivinyl. **v. imine.** Dimethylene imine. **v. iodide.** Iodoethylene. **v. ketone.** Pentadienone. **v. oxide.** Vinylether. **v. sulfide.** C_4H_6S = 86.13. Ethenylthioethene*. The uusaturated compound, $CH_2:CH.S.CH:CH_2$. A colorless, oily liquid, d.0.913, b.101, slightly soluble in water, soluble in alcohol or ether.

vinylene. The bivalent radical, $-CH:CH-$, derived from ethylene. (Cf. *vinyl, vinylidene.*) **v. chloride.** Ethylene dichloride.

vinylidene. The bivalent radical, $H_2C:C=$, derived from ethylene. Cf. *vinyl, vinylene.*

vinylites. A group of synthetic resins made by polymerization of vinyl compounds. **v. A.** A solid, colorless, thermoplastic resin softening at 40–60°C, soluble in ketones, esters and hydrocarbons. **v. 80.** A white powder, partly soluble in ketones. **v. N.** A 35 % solution in toluene. V. are used in the manufacture of dentures (Resovin) and phonograph records, and may be colored with dyes and pigments.

vinyon. A vinyl-type plastic (q.v.) product, having a low melting point and resembling nylon, q.v.

vioform. $C_9H_4N(OH)ICl$. Nioform, iodochlorohydroxyquinoline. A pale, greenish-yellow powder, m.177, insoluble in water, alcohol or ether; used as an iodine dusting powder.

Viola. A genus of plants of the *Violaceae*, the violet family, which includes violet and pansy*. Cf. *violine.*

V. odorata..... sweet violet
V. canina..... dog violet
V. tricolor..... pansy or heart's ease.

v. crystallina. A pure gentian violet, used to treat impetigo. **v. quercetrin.** Oxyritin.

violacein. An antibiotic substance produced by the bacterium *Bacillus violaceum.*

violanthrole. $C_{34}H_{16}O_2$ = 456.2. Dibenzanthrole. A nonacyclic diketone; a purple dye for vegetable fibres.

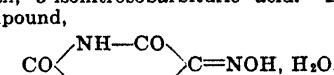
violaquercitrin. $C_{27}H_{30}O_{16}$ = 610.3. Osyritrin. A glucoside from various *Viola* species (pansies and violets); it hydrolyzes to glucose, quercitrin and isodulcitol.

violaxanthin. $C_{40}H_{56}O_4$ = 600.5. A carotenoid (q.v.), m.207, from the pigment of pansies, *Viola tricolor*, and the rind of oranges.

violet. (1) A species of plants of the Violaceae family. Cf. *Viola.* (2) A reddish-blue shade or pigment resembling the extreme blue end of the visible spectrum. **anthracene-** Gallein. **crystal-** Methyl v. **Döbner's-** Aminofuchsin iminochloride. A triphenyl methane dyestuff, used instead of fuchsin as a test for aldehydes. **essence of-** Orris. **ethyl-** See *ethyl v.* **gentian-** See *gentian violet.* **hexamethyl-** Methyl v. **Lauth's-** Thionine. **methyl-** See *methyl violet.* **ultra-** See *ultra-violet.*

violine. An alkaloid isolated from *Viola* species, and resembling emetine in action.

violuric acid. $C_4H_3O_4N_3$ = 157.09. 5-Oxime alloxan, 5-isonitrosobarbituric acid. The ring-compound,



soluble in alcohol, slightly soluble in water.

viosterol. Vitamin D.

Virginia snakeroot. Serpentaria.

virginium. Vi (or Vm). Ekacesium. Element No. 87 discovered by Allison and Murphy (1930) by the magneto-optic method. It is said to occur in minute traces in pollucite and lepidolite. Cf. *alabamine, verium.*

viridine. (1) $C_{12}H_{10}N$ = 177.2. A homolog of pyridine, distilled from coal tar and bone oil. (2) An alkaloid found in *Veratrum viride;* it resembles jervine.

viridinine. $C_8H_{12}N_2O_3$ = 184.1. A monoacid base obtained from putrid pancreas.

virulence. Extreme toxicity or poisonous effect.

virulent. Exceedingly poisonous or active in damaging protoplasm; as of bacteria.

virus. An animal poison that can transmit disease. An obligately-parasitic pathogen too small to be resolved by ordinary microscope methods. They are all chemically-similar nucleoproteins with varying P and carbohydrate contents, but they have widely different stabilities, properties and transmission characteristics.

viscamite. A vegetable glue used in the woodworking industry.

viscid. Sticky or gummy, glutinous.

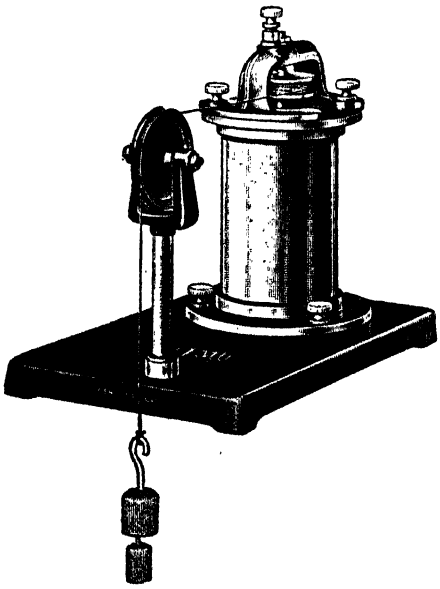
viscidity. Stickiness.

viscin. $C_{20}H_{48}O_6$ or $C_{20}H_{32}.8H_2O$ = 416.5. The glutinous constituent of the berries of the mistletoe; the chief constituent of bird lime. See *viscum.*

viscometer. Viscosimeter.

viscose. An extremely viscous syrup-like liquid obtained by treating cellulose with potassium hydroxide and carbon disulfide, from which acids precipitate cellulose. By pressing this liquid through fine openings into dilute acids the cellulose separates as fine, silky threads—viscose rayon, q.v. **v. silk.** See *rayon.*

viscosimeter. Viscometer. An instrument for determining the internal friction or fluidity of a liquid by measuring the number of revolutions



Torsion viscosimeter.

of a vane immersed in the liquid in comparison with its speed in water (cf. *consistometer);* or its rate of flow through an orifice (cf. *Engler*). **torsion-** A v. based on the force required to twist a cylinder immersed in the liquid through a certain angle.

viscosimetry. The methods of determining the fluidity of liquids.

viscosity. Internal fluid friction. The property of being glutinous or sticky, *i.e.,* offering a slight resistance to a change of form, caused by the molecular attraction between the molecules of a liquid. Poiseuille's formula for determining dynamic v. by the capillary tube method is: $v = \pi pr^4t/8lV$, poises where p is the pressure difference between the two ends of the tube, r the radius of the tube, l its length, and V the volume of liquid delivered in a time t. Antonym: fluidity. Cf. *poise, centipoise, Engler degree, Redwood, Saybolt seconds, Arrhenius, Einstein, Meyer's formula, softening.* **relative-** The v. of a liquid as compared with that of water at 20°C., *i.e.,* 1.005 centipoises. **Woolwich-** The time taken (secs.) for a steel ball 1/16 th. in. in diameter to fall 15 cms. through a solution at 20°C.

v. index. A value indicating the relation of the v. of a petroleum lubricating oil to its temperature: v.i. = $\left(\frac{L - U}{L - H}\right) \times 100$; where L and H are the viscosities at the low and high temperature, respectively. Cf. *S.A.E. number.*

viscum. Mistletoe. The leaves and branches of *V. flavescens,* a Loranthaceae. It contains viscin, bassorin, gum and tannin. Used medicinally as an antispasmodic and tonic.

visibility. The property of being able to be seen, or perceptible to sight. The visibility, K, of a particular wave-length of light is the ratio of luminous flux, F, to the radiant power producing it. **mean-** The average visibility, K_m, over any range of wave-lengths or the entire spectrum, K_m = (F)/(erg/sec.) where (F) is the total luminous flux in lumens and (erg/sec.), the total radiant energy in watts or erg/sec.

visible. Perceptible by the eye; as, v. light, v. spectrum.

vistanex. A synthetic fiber produced by spinning a viscous solution of polyisobutylene in n-hexane (cf. *vinyon*).

vitagen. A substance having vitamin (q.v.) activity, but also providing energy for life. *E.g.,* essential fatty acids, as linoleic, linolenic and arachidonic acids (vitamins F, F_1); carbohydrates (*e.g.,* inositol); amino acids (lysine, tryptophane, etc.); choline and its derivatives (*e.g.,* betaine, methionine); and sulfur organic compounds.

vitaglass. A colorless, transparent window glass which allows the passage of ultra-violet light.

vital. Pertaining to life.

vitamer. One of a group of substances capable of relieving a specific avitaminosis. *Ex.,* a D vitamer is one of the vitamins D.

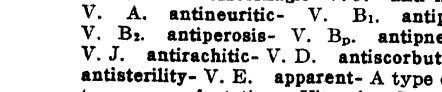
vitamin. Accessory (food) factor (Hopkins, 1906), vitamin "e" (essential to life, Funk 1912), advitant, exogenous hormone, food hormone, vitol, biosterin. An organic substance which is essential in small quantities for maintaining the life of an animal, but which cannot be synthesised by the animal, and does not itself provide energy; cf. *vitagen, vitazyme, vitasterol, biocatalyst.* Antonym toxamin. An absence or deficiency of one or more vitamins in a diet results in characteristic diseases or disorders (avitaminosis); an excess of some vitamins may also have ill-effects (hypovitaminosis). Vitamins have been classified according to their solubility or the effects they produce, and were known by letters. A number however, have now been synthesised, and the chemical structures of others are known; also, what were

formerly regarded as single vitamins are now known to consist of a "complex" of several vitamins, often having similar but different properties. The known vitamins and their commonest synonyms are (H. R. Rosenberg, *Chemistry and Physiology of Vitamins*, 1942):

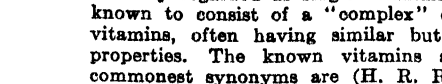
	Identified	Non-identified
Vitamins A...	A (axerophthol)	
	A_2	
	A_3 (?)	
Vitamin B complex	B_1 (thiamin)	B_3 (pantothenic acid?)
	B_2 (riboflavin)	B_4 (biotin, arginine and glycine?)
	B_6 (pyridoxin)	B_5 (nicotinic acid?)
	B_5 (nicotinic acid)	B_7 (vitamin I)
	B_3 (pantothenic acid)	B_8 (adenylic acid)
	inositol (q.v.)	B_c
	p-amino benzoic acid (q.v.)	B_p (anti-perosis v.)
Vitamin C....	ascorbic acid	J, vC_2 (anti-pneumonia v.)
Vitamins D...	D_2 (viosterol, calciferol).	Factor T
	D_3, D_4, D_5 and D_6	L and L (lactation v.)
Vitamins E...	α-, β- and γ-tocopherols	M (mouse factor, q.v.)
	H (biotin)	Factor U
	K_1 and K_2	Folic acid (q.v.)
	P (citrin)	Grass time factor (q.v.)

antiberiberi- V. B. **anticanitic-** *p*-Aminobenzoic acid. **antiencephalitic-, antidermatitic-** V. B_5. **antihemorrhagic-** V. J. **anti-infection-** V. A. **antineuritic-** V. B_1. **antipellagric-** V. B_2. **antiperosis-** V. B_p. **antipneumonia-** V. J. **antirachitic-** V. D. **antiscorbutic-** V. C. **antisterility-** V. E. **apparent-** A type of reductone, q.v. **lactation-** Vitamins L. **pro-** See *provitamin*. **sunshine-** V. D. **weight-restoring-** V. B_3.

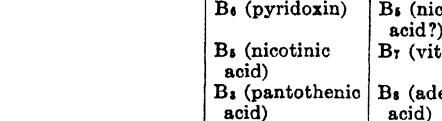
v. A. $C_{20}H_{30}O$ = 286.2. Vitasterol A, biosterin A, v.A_2, ophthalin, anti-infection v. The trimethyl cyclohexenyl dimethyl octatetraene carbinol,



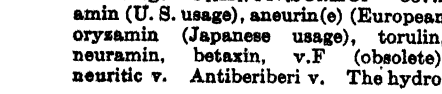
A readily-oxidised, fat-soluble and water-insoluble alcohol in butter, milk, egg-yolk, green vegetables, fish livers (especially of cod, halibut, mackerel and black sea bass), and in glandular fat; yellow isotopic plates, m.63. It has epithelium-protecting and anti-xerophthalmic properties, and is essential to growth; a deficiency of it also results in the common cold. It is derived from carotene, q.v. Activity, 4.5×10^6 I.U. per gm. **v. A_2, v. A_3.** Vitamins similar to v. A, from fish oils; they are probably β-apo-5-carotinols (cf. *cholane*). **v. B.** A complex (see table) now known to consist of the 12 following: $C_{12}H_{17}ON_4SCl.HCl$ = 337.2. Thiamin (U. S. usage), aneurin(e) (European usage), oryzamin (Japanese usage), torulin, polyneuramin, betaxin, v.F (obsolete). **antineuritic v.** Antiberiberi v. The hydrochloride of the aminopyridine sulfonic acid.



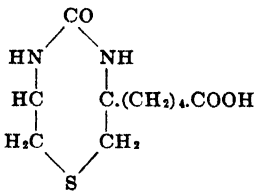
A heat-labile, antineuritic powder, m.249, soluble in water or alcohol, insoluble in ether or benzene; found in the outer coatings of grains, fruits and vegetables (*e.g.*, ripe peas and beans) and in yeast, often with riboflavin (see *v. B_2*). It is oxidised to thiochrome. Activity 3,333,000 I.U. per grm. **v. B_2.** $C_{17}H_{20}N_4O_6$ = 376.2. Riboflavin (U. S. usage), lactoflavin (European usage), uvoflavin, ovoflavin, hepatoflavin. **v. G.** Pellagra-preventing v. The heat stable-lyochromic lactoflavin (q.v.).



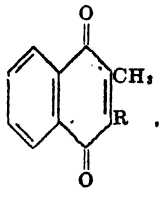
Orange-yellow crystals, m.282 (decomp.), soluble in alkali, slightly soluble in water or alcohol (green-yellow fluorescence), insoluble in ether or acetone. It is widely distributed in plant and animal cells, milk and urine, and has pellagra-preventing properties. Activity, 400,000 Bourquin-Sherman units per gm. **v. B_3.** $C_{19}H_{17}O_5N$ = 339.2. Pantothenic acid (from Greek, "everywhere"), pantothen, antidermatosis factor, chick antidermatitis factor, yeast filtrate factor, chick A.P. (anti-pellagra) factor, liver factor 2. The pale, yellow viscous oil, $OH.CH_2.CMe_2.CHOH.CO.NH.CH_2.COOH$, $[\alpha]_D^{25} + 37.5°$, soluble in water, slightly soluble in ether, insoluble in benzene. It occurs in animal tissues, livers and kidneys, and its absence results in loss of weight; it has been identified with v. B_2 and B_4. Activity, 70,000–75,000 chick units per g. **v. B_4.** Biotin, arginine, glycine (?). A v. of which little is known; it prevents pellagra in rats. **v. B_5.** Nicotinic acid (q.v.) nicotinamide, niacin, niacinamide, P.P. factor, pellagramine, niamid. A v. from living cells, liver and yeast, which prevents pellagra and lesions of the mucous membrane. **v. B_6.** $C_{18}H_{11}O_3N$ = 289.1. Pyridoxin (U. S. usage), adermin (European usage), rat-antidermatitis factor, yeast eluate factor, factor 1, factor Y, v. H., complementary factor. 3-Hydroxy-4.5-di(hydroxymethyl)-2-methylpyridine. Colorless crystalline powder, with a slightly bitter taste, m.160, soluble in water, acetone or alcohol, slightly soluble in ether or chloroform. It occurs in yeast and rice polishings and in seed husks, and prevents dermatitis. **v. B_7.** V.I. A supposed v., which prevents digestive disturbances in pigeons. **v. B_8.** Adenylic acid. A supposed v., the absence of which prevents the development of lactic bacteria. **v. B_c.** A supposed vitamin, which prevents anemia in chicks. **v. B_p.** Antiperosis v. A supposed v., which prevents the deformation of chicks' legs. **v. B_u.** V. H. **v. B_x.** $C_6H_8O_6$ = 176.1. *p*-Amino benzoic acid. **v. C.** Ascorbic acid, hexuronic acid, cevitamic acid, antiskorbutin, scorbutamin. The hexuronic acid,



White colorless, odorless crystals, m.191, soluble in water, slightly soluble in ether or benzene, insoluble in alcohol. It occurs in citrus fruits and green vegetables, and its absence from a diet causes scurvy. Activity, 20,000 I.U. per gm. **v. C_2.** See table. **v. D.** $C_{27}H_{42}O$ = 382.3. Viosterol, vitasterol D, biosterin 2, antirachitic v., rachitamin, irradiated ergosterol, acterol. A fat-soluble v. from milk and fish (cod)-liver oils, produced by activation of provitamins D (q.v.) by ultra-violet light; its absence causes rickets. It is believed to be composed of 10 vitamins, but only 5 have been prepared; viz: **v. D_1.** A mixture of v. D_2 and lumisterol (q.v.). **v. D_2.** $C_{28}H_{43}OH$, activated ergosterol, califerol, viosterol, m.116, an isomer of ergosterol. **v. D_3.** Activated 7-dehydrocholesterol, m.82. **v. D_4.** Activated 2,2-dehydroergosterol, m.107. **v. D_5.** Activated 7-dehydrositosterol. All are white crystalline solids, soluble in fats or organic solvents, insoluble in water. **v. E.** Tocopherol (Greek, "childbirth"), antiencephalomalacin v., factor x, antisterility v., reproductive v., fertility v., sterilamin, vitasterol E, biosterin 3. It comprises: α-tocopherol, $C_{29}H_{50}O_2$; β-tocopherol, $C_{28}H_{48}O_2$; γ-tocopherol, $C_{28}H_{48}O_2$ (activities, 400, 200 and 200 rat units per gm., respectively). They occur principally in plants and vegetable oils. **v. F.** (1) V. B_1. (2) See *vitagens*. (3) A supposed anti-pernicious anemia v. **v. G.** V. B_2. **v. H.** $C_{10}H_{16}O_3N_2S$ = 244.3. Biotin, bios II, bios II B, factor X, factor W, coenzyme R, skin factor.



A v. which occurs widely in nature (*e.g.*, in vegetables and yeast). Its absence causes injury to white of egg, and prevention of the growth of *Saccharomycetes* yeasts and rats. Activity, 27×10^6 rat units = $25{,}000 \times 10^6$ S.U. per gm.; 1 S.U. = the amount of v. H to increase the cell-growth of yeast by 100%. **v. I.** V. B_7. **v. J.** See table. **v. K_1, K_2** . . . etc. α-, β- . . . etc. phylloquinones, coagulation v., anthemorrhagic v., prothrombin F. General formula



where R varies according to the v. K; v. K_1 ($C_{31}H_{46}O_2$) and v. K_2 ($C_{41}H_{56}O_2$) are known for certainty. They occur in hog-liver, leafy vegetables and cereals, and their absence inhibits the clotting of blood. There is as yet no international standard. **v. L.** See table. **v. M.** A supposed vitamin, whose absence causes anemia in and loss in weight of monkeys. **v. P.** (1) Citrin, permeability v. A crude extract from paprika, rose hips or citrus fruits consisting principally of eriodictin (5.7.3′.4′-tetraxhydroxy flavanol) and hesperitin (4′-methyl eriodictin); it decreases the permeability of cells to albumin. (2) V. B_1. (3) V. B_2. **v. T.** A supposed v., the absence of which causes thrombocytosis. **v. U.** A supposed v., which promotes the growth of chicks. **v. units.** The existing (1942) International Units (I.U.) are defined as the activities of:

v. A—0.6 μgm. of pure β-carotene.
v. B—3 μgm. of pure anhydrous aneurin hydrochloride.
C—50 μgm. of pure ascorbic acid.
D—1 μgm. of a certain solution of crude, irradiated ergosterol.
E—1 μgm. of synthetic, racemic tocopheryl acetate.

For v. C: 1 Sherman unit = 0.5–0.6 mgm. ascorbic acid = 1 minimum protective dose (guinea-pig); formerly based on 1 ml. of fresh lemon juice.

For v. D: I.U. = 1 U.S.P. unit = 1 Medical Research Council unit = 1 Coward unit = 0.025γ. v. D_2 = 1.66 Oslo unit = 2.6 prophylactic units = 10^{-6} standard units; 1 clinical unit = 12.5–17.1 I.U.; 1 Steenbock unit = 3.2 I.U.

See also under individual vitamins.

VITAMINS

	A	C	D	E	F, B_1	G, B_2
Apples	1	2	..	..	2	2
Asparagus	..	..	..	..	3	3
Beans	1	..	..	..	3	2
Beets	..	1	..	..	1	1
Bread, white	..	..	..	..	1	1
Bread, whole wheat	2	..	1	1	2	2
Butter	3	..	1	..	..	..
Cabbage	2	3	..	..	2	2
Carrots	2	2	..	..	1	1
Celery	2	2	..	..	2	2
Cheese	2	..	1	..	2	2
Codliver oil	3	..	4	..	..	..
Cream	3	1	1	..	..	..
Eggs	3	..	1	..	1	1
Lard	..	..	..	..	..	..
Lemons	..	3	..	..	2	2
Lettuce	2	3	..	2	2	1
Liver	3	..	1	..	1	1
Meat, lean	1	..	..	1	2	3
Milk	3	2	2	1	2	2
Nuts	..	..	..	..	3	2
Orange juice	..	3	..	..	2	2
Peaches	2	2	..	..	..	..
Peas	2	3	..	..	2	..
Pineapple	2	3	..	..	2	2
Potato	1	2	..	..	2	2
Rice, whole	1	..	..	..	2	2
Spinach	3	3	..	..	2	1
Sugar	..	..	..	..	..	..
Tomato	2	3	..	..	3	3
Turnip	..	3	..	..	2	1
Wheat, whole	2	..	..	3	3	2
Yeast	..	..	..	..	3	3

1, small amount; 2, fair amount; 3, large amount; 4, very large amount.

vitaminosis. Hypovitaminosis. The effect of overdosage with vitamins; cf. *avitaminosis.*
vitasterol. Vitamins A, D, and E.
vitazyme. Homozyme. Ergon. A substance having the properties of both a vitamin (q.v.) and an enzyme. Cf. *biocatalyst, egrine.*
vitellin. A globulin from egg-yolk. Similar proteins occur in lentils, corn and other cereals.
silver- Argyrol.
vitellolutein. The yellow coloring matter of eggs.
vitexine. $C_{21}H_{14}O_6$ = 362.09. A coloring matter and flavone glucoside in *Vitex litoralis*, a Verbenaceae.
vitiatine. $C_8H_{14}N_6$ = 158.07. A meat base.
vitol. Vitamin.
vitrain. A constituent of *coal*, q.v.
vitreosil. A translucent variety of prepared silica, made by fritting sand with a hot carbon plate; used for heat-resisting apparatus.
vitreous. Glassy. **v. copper ore.** Redruthite. **v. silver ore.** Argentite.
vitrescence. The property of becoming hard and transparent like glass.
vitrification. The conversion of a material into a glass or glass-like substance, having increased hardness and brittleness.
vitrify. To sinter or melt to a glassy mass.
vitrinite. A uniform brown constituent of coal, which has a low ash content, and consists mainly of ulmin compounds. Cf. *vitrain.*
vitriol. A surface of a heavy metal; as,

blue- or Roman-	copper sulfate (chalcanthite)
green-	ferrous sulfate (copperas)
red- or rose-	cobaltous sulfate (bieberite)
uran-	uranium sulfate (johannite)
white-	zinc sulfate (goslarite)

oil of- Sulfuric acid. Cf. *B.O.V., D.O.V., R.O.V.* **salt of-** Zinc sulfate.
vitriolate. An obsolete term for the sulfate of a metal. **v. of soda.** Sodium sulfate. **v. of tartar.** Potassium sulfate.
vitro- A Latin prefix, which means glass and indicates a mineral or rock of glassy texture; as vitrophyric. **in v.** See *in vitro.*
vitrophyric. Describing an igneous rock having a glassy base.
vivianite. $Fe_3(PO_4)_2.8H_2O$. Blue ocher, blue iron ore. A native ferrous phosphate which, when freshly broken is white, and becomes bluish on oxidation.
vivo. Pertaining to life. **in v.-** See *in vivo.*
vocoder. An instrument for synthesising speech and other sound-effects by electrical methods.
Vogel, August. 1817–1889. A German agricultural chemist, noted for his methods and text books.
volatile. Describing a substance that evaporates rapidly. **v. alkali.** Ammonia. **v. oils.** Essential oils. **v. poisons.** A poisonous substance that forms vapors:
non-metallic poisons: Br, Cl, I, F, HF, P, AsH_3, SbH_3, BiH_3, PH_3 and H_2S.
organic poisons: chloral, chloroform, ether, aniline, acetanilide, etc.
volatility product. A conception analogous to that of the solubility product (q.v.), applied to a solid substance (as ammonium carbonate) which dissociates into two volatile gases when heated. The product of the concentrations of the constituent gases is constant.
volatilization. Vaporisation: the conversion of a solid into a vapor or gas without chemical change.
volatilize. To convert into a gas or vapor.
volborthite. A native hydrous copper-calcium vanadate.
volcanic. Pertaining to molten rock or lava. **v. ash.** Tuff. **v. glass.** A volcanic igneous rock; as, obsidian or pitchstone. **v. mud.** A mud consisting of fine grained ash or tuff mixed with water.
volemite. Volemitol.
volemitol. $C_7H_{16}O_7$ = 212.2. Heptahydroxyheptane, heptaheptanol, volemite, α-sedoheptitol. The heptatomic alcohol, $CH_2OH(CHOH)_5CH_2OH$, m.150, $[\alpha]_D$ + 2.25–2.65, from *Lactarius volemus* and *Primula* species. Cf. *primulite.*
Volhard, Jakob. 1834–1910. A German organic chemist, noted for his analytical methods. **V.'s solution.** A decinormal solution of potassium thiocyanate. **V.'s volumetric method.** The determination of halogens by means of standard thiocyanate solutions.
volkonskoite. A magnesium chromium silicate containing 30 % Cr_2O_3; used as zeolite, q.v.
volt. A unit of electromotive force and potential difference. It is the potential or electrical pressure which, if steadily applied to a conductor of one ohm resistance, will produce a current of one ampere.

$$1 \text{ International volt} = 10^8 \text{ e.m.u.} = \frac{1}{300} \text{ e.s.u.}$$
$$= 1.00043 \text{ absolute volt.}$$

The electromotive force of a Weston normal cell at 20°C. is 1.0183 international volts. **ampere-** Watt. **electron-** See *electronvolt.*
Volta, Count Alessandro. 1745–1827. An Italian physiologist; noted for his early electrical experiments, and the construction of the first electric pile. **v. couple.** An electric cell which consists of a zinc anode and copper cathode and has a potential of 0.98 volt. **v. effect.** The change in the sign of the charge on a metal electrode after it has been heated. **v. series.** Displacement series.
voltage. The electromotive force measured in volts. See *potential.*
voltaic. Pertaining to a direct electric current. **v. battery.** A number of v. cells. **v. cell.** An electric cell or device in which an oxidation-reduction reaction occurs in such manner that an electromotive force is produced. Classification:

A. Double fluid cells—
(see) Bunsen cell
Dichromate cell
Daniell cell
Grove cell
Marie-Davy cell
Partz cell
B. Single fluid cells—
(see) Léclanché cell
Chaperon cel
Edison-Lelande cell
Gassner cell
Regnault cell
Poggendorff cell
C. Standard cells—
(see) Weston normal cell
Cadmium cell
Clark standard cell
D. Secondary cells—
(see) Lead accumulator
Reguir cell
Edison cell

v. couple. A pair of metallic electrodes used to produce a potential when set up as a cell; as a volta couple. **v. electricity.** Galvanic electricity, chemical electricity. A continuous stream of electrons caused by a chemical reaction; a direct current of electricity, q.v. **v. pile.** A series of metallic discs forming a v. battery.

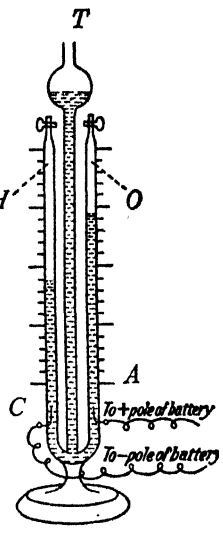
voltaite. The mineral $2(FeAl)_2O_3,5(MgFeNa_2K_2)(OH)_2(SO_4),14H_2O$.

voltameter. Coulometer. An apparatus for the electrolysis of water. The volume of the gases liberated is used to determine the number of coulombs of current flowing in the circuit during the decomposition. Cf. *voltmeter*.

voltammeter. A measuring instrument that indicates both volts and amperes.

voltampère. The equivalent of the watt power factor, q.v. It is the product of a volt and a milliampere.

voltmeter. A measuring instrument that indicates voltage. Cf. *voltammeter*.



Voltameter.

H = *hydrogen*, O = *oxygen*, C = *cathode*, A = *anode*.

voltoids. Small compressed tablets of ammonium chloride, used in the preparation of voltaic (Léclanché) cells.

voltolise. To subject to a silent electric discharge.

voltzite. Zn_3OS_4. A native zinc oxy-sulfide.

volume. The space occupied by a substance. It is generally expressed in cubic centimeters or liters according to the formula, $V = CL^3$, in which C is a constant depending on the shape of the space occupied (if a cube, C = 1) and L is the length. **atomic-** the quotient of the atomic weight and the specific gravity of a solid or liquid element: at. vol. = at. wt./d. It varies periodically with the atomic weight. **critical-** The volume occupied by 1 gram of a gas at the critical temperature and pressure. See *parachor*. **co-** The quantity *b* in van der Waals equation, q.v. **incompressible-** That which cannot be made smaller by pressure. **molecular-** The volume occupied by one gram-molecule or mole of any substance, *i.e.*, the molecular weight divided by the density. It varies for solids and liquids according to their atomic volumes, but is 22.4 liters for gases at normal temperature and pressure. See *parachor*. **specific-** The volume occupied by one mole of a substance; hence, M/D = sp. vol., where M is the molecular weight, and D the density. **standard-** The volume occupied by one mole of gas at 0°C. and 760 mm. pressure = 22.4 l.

v. susceptibility. The ratio of the intensity of magnetization of a medium to the strength (in gauss) of the magnetic field inducing it.

volumenometer. (1) An apparatus for the accurate determination of the volume of a known weight of substance, and thence its density. (2) An obsolete term for pyknometer.

volumetric. Pertaining to measurements of volumes. **v. analysis.** The quantitative analysis of a known volume of an unknown solution by adding a reagent of known concentration until the end-point of the reaction has been reached. From the amount of reagent used (volumetric solution), the amount of substance in the analysed solution can be calculated. In order to establish a definite end-point, a third substance, the indicator, may be added. Methods of volumetric analysis may be classified as:

A. Neutralization methods.
(alkalimetry, acidimetry)

Titration with acids or bases using an indicator.

1. Acids—hydrochloric, sulfuric, oxalic acid.
2. Bases—potassium, sodium ammonium or barium hydroxides, sodium carbonate.
3. Indicators—Phenolphthalein, methyl orange, litmus.
4. Strength of solutions—N, N/2 or N/10.

B. Oxidation-reduction methods.
(oxidimetry, iodometry)

Titration with oxidizing or reducing agents, and determining the end-point by decolorization or change of color.

1. Oxidizers—Potassium permanganate or iodine.
2. Reducers—arsenous acid, oxalic acid, ferrous ammonium sulfate.
3. Indicators—starch, potassium iodide, redox indicators.
4. Strength—N/10.

C. Precipitation methods.

Titration with a reagent that causes a precipitation.

1.2. Solutions—silver nitrate, ammonium thiocyanate.
3. Indicators—Potassium chromate, ferrous sulfate.
4. Strength—N/10.

v. glass ware. The graduated glass utensils used to measure definite quantities of a solution, *i.e.*, burettes, cylinders, flasks and pipettes. Their comparative accuracy is shown by their limits of error (cf. *standardized*):

Capacity	Possible error.				
	Transfer Pipet	Measuring Pipet	Buret	Flask	Cylinder
2 cc.	0.012 cc.	0.02 cc.			
5 cc.	0.02 cc.	0.04 cc.			
10 cc.	0.04 cc.	0.06 cc.	0.04 cc.	0.06 cc.	0.05 cc.
25 cc.	0.06 cc.	0.1 cc.	0.06 cc.	0.06 cc.	0.12 cc.
50 cc.	0.1 cc.		0.1 cc.	0.1 cc.	0.25 cc.
100 cc.	0.16 cc.		0.1 cc.	0.16 cc.	0.20 cc.
250 cc.	0.24 cc.			0.22 cc.	1.25 cc.
500 cc.				0.30 cc.	2.5 cc.
1000 cc.				0.6 cc.	5.0 cc.
2000 cc.				1.00 cc.	10.0 cc.

For more accurate work certified glassware is used (see *standardized buret*, etc.).

v. factor. The amount of substance corresponding with 1 cc. of normal, half-normal,

or tenth-normal solution. **v. solutions.** V.S. Solutions of known strengths used in volumetric analysis. See *normal solution.* **v. standards:**

Primary: when the composition is gravimetrically determined; as, H_2SO_4 is precipitated with $BaCl_2$ and weighed as $BaSO_4$.

Secondary: when standardized against a weighed amount of reagent, *e.g.*, NaOH soln. against pure oxalic acid.

Tertiary: when one soln. is titrated against another soln., *e.g.*, HCl titrated with NaOH (which is standardized against oxalic acid).

v. weight. The amount of substance to be weighed off in order that, on titration, the number of cubic centimeters found will equal the percentage of unknown present.

voluminal. Pertaining to three dimensions. **v. expansion.** Cubical *expansion.*

voluntal. $C_3H_4O_2NCl_3$ = 192.39. Trichloroethylurethan, β-trichloroethylcarbamate; $NH_2CO\text{-}OCH_2CCl_3$. A white crystalline powder, used as anesthetic.

volutin. A nucleo-protein from yeast.

vomicine. $C_{22}H_{24}N_2O_4$ = 382.2. An alkaloid from strychnos.

V.S. Abbreviation for volumetric solution.

vug. A cavity in a casting. **v. crystals.** The metallic crystals found inside v.

vulcanite. A hard rubber produced by heating caoutchouc or india rubber with sulfur. Cf. *ebonite.*

vulcanization. The oxidation of rubber produced by reducing sulfur to sulfides. The rubber is mixed with a vulcanizing agent (as, sulfur), and heated to 110–140°C. A gradual change takes place from a tacky, plastic mixture to a non-tacky, strong, very elastic or rigid product. Various other substances, *accelerators,* may be added to increase the quality of the product. (See *vulcanizing agent.*)

vulcanize. To produce vulcanization.

vulcanized. Having been subjected to vulcanization. **v. fiber.** See *fiber.* **v. paper.** See *fiber.*

vulcanizing agent. A substance that renders rubber less sticky and more or less elastic and rigid. *E.g.*, sulfur (chiefly), selenium, sulfur-dichloride, or *m*-dinitrobenzene; also nitrogen compounds such as, di- and triphenylguanidine, tetramethylthiuram and piperidine derivatives.

vulnerary. A substance used externally in the treatment of wounds and bruises; any agent that has a healing effect on wounds.

vulpic acid. $C_{19}H_{14}O_8$ = 322.11. Chrysopicrin. An acid from the lichen, *Cetraria vulpina.*

vulpinite. An amorphous form of anhydrite.

vuzine. $C_{27}H_{40}N_2O_2$ = 424.3. Isooctylhydrocupreine. A levorotatory quinine (q.v.) alkaloid. Colorless powder, insoluble in water, soluble in alcohol or ether. **v. hydrochloride.** $C_{27}H_{40}N_2O_2.HCl.2H_2O$ = 533.44. Colorless crystals, soluble in water; used as a powerful bactericide for deep-seated wounds.

W

W. (1) The symbol for tungsten (wolfram). An abbreviation for: (2) work, (3) watt. **W-rays.** The radiations intermediate between U.V.-(ultraviolet, *q.v.*) and X-rays.

w. An abbreviation for: (1) weight, (2) work.

Waage, Peter. 1833–1900. A Norwegian chemist noted for developments in physical chemistry.

Waals. See *van der Waals.*

wabain. $C_{36}H_{46}O_{12}$ = 670.4. A glucoside from the root of *Carissa schimperi* (waba), an apocynaceous tree of Africa. It is a heart stimulant and local anesthetic. Cf. *ouabain.*

Wackenroder's reaction. The reaction between hydrogen sulfide and sulfur dioxide in aqueous solution to form polythionic acid.

wad. (1) Bog manganese. An earthy hydrate of pyrolusite, which contains baryta. Cf. *psilomelane.* (2) Graphite.

Waelz process. A charge of low grade zinc ore is heated with fuel oil or powdered coal in a rotary kiln; volatilized Zn and ZnO are obtained.

wafer. A thin, double layer of dried paste that encloses a medicament. **w. ash.** The bark of the root of *Ptelea trifoliata*, a Rutaceae; used medicinally as a tonic and antiperiodic.

wagnerite. $Mg(MgF)PO_4$. A native magnesium fluophosphate. Cf. *adelite.*

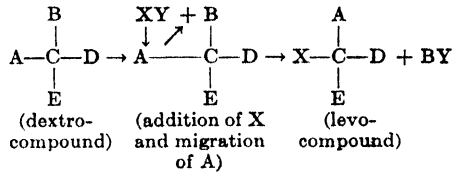
Wagner's reagent. An aqueous solution of I and KI, used as microchemical reagent for alkaloids.

wagofo. An African arrow poison, the dried juice of *Euphorbia* species.

wahoo. Euonymus.

Paul Walden.

Walden, Paul. 1863– . A German organic chemist, noted for research on organic reactions. **W. inversion.** A chemical reaction in which a reversal of the rotatory power of an optically-active compound takes place. It indicates that the mechanism of substitution does not involve the simple replacement of one group by another, but probably the loosening of all groups and atoms followed by a rearrangement.



For example: d-chlorsuccinic acid changes on treatment with potassium hydroxide to l-malic acid, instead of, as expected, to d-malic acid; while l-chlorsuccinic acid changes to d-malic acid and not to l-malic acid.

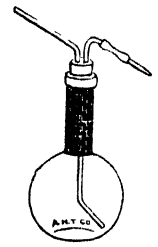
Wallach, Otto. 1847–1931. A German chemist and Nobel prize-winner noted for his research on the constitution of essential oils.

walnut. Juglans. **w. oil.** The clear, colorless oil of walnuts, $d._{25^\circ}$0.923, n_D^{25}. 1. 4750; sapon. no. 193.2, iodine no. 150.6. Used as an emulsifier in cosmetics.

warfare gas. See poison *gas.*

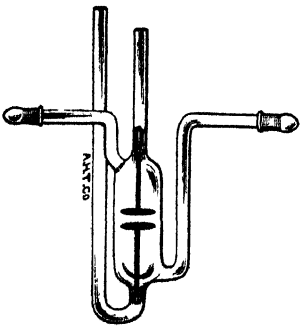
warringtonite. Domingite.

wash-bottle. A glass flask fitted with a stopper and two unequally-long tubes, so arranged that on blowing through one, a stream of water emerges from the other. Used to wash precipitates on filters, and in other chemical operations.



Wash-bottle for hot water.

Washburn cell. A glass vessel with two electrodes; used for the accurate determination of the electrical conductivity of solutions (see illustration).



Washburn cell.

washing. Rubbing and rinsing with a liquid. **w. bottle.** See *wash-bottle.* **w. soda.** Sodium carbonate.

Wassermann, August von. 1866–1925. A German biochemist. **W. reaction.** Σ test. A diagnostic reaction for syphilis, in which a series of blood samples is subjected to the ac-

tion of various hemolytic sera. Cf. *complement fixation.*

waste. Matter or energy which is not utilized. **industrial-** Materials as spent acid, flue gas, sulfite liquor, refuse, sewage, paper, metal scrap, rubber waste, distillery slop, etc. Cf. *xylan.*

water. (1) H_2O = 18.016. Hydrogen oxide. A colorless and tasteless liquid, forming the larger proportion of the earth surface, m. (or freezes) 0°C (= 32°F = 0°R), b.100°C (= 212°F = 80°R); it is the most widely-used solvent. It was regarded as an element by the alchemists, and was first recognized as a combustion product of hydrogen by Cavendish in 1781, as a compound of oxygen and hydrogen by Lavoisier in 1783, and as a mixture of isotopic compounds in 1933. (Cf. *heavy-*). Its exact structure is still undetermined but it must be a mixture of multiples of H_2O; as, H_4O_2 dihydrol, H_6O_3, trihydrol, etc. Cf. *ice w., steam w.* Water is an essential constituent of all living organisms, and occurs as "water of crystallization" in many crystals and compounds. (See *water constants.*) (2) Aqua. Pharmaceutically, a weak solution of a volatile substance in water; as, peppermint w., rose w., chlorine w., ammonia w. (3) The transparency of a precious stone, as of a diamond. **acidulous-** W. containing dissolved CO_2, together with alkali bicarbonates and common salt. The CO_2 may be liberated with effervescence when such w. is slightly warmed; *e.g.*, Appolinaris and Seltzer (*i.e.*, Selters) w. **aerated-** A water containing a gas; as, air or carbon dioxide. **alkaline-** A mineral w. containing bicarbonates of Na, and sometimes of Li and K; *e.g.*, Vichy w. **bitter-** A mineral water containing the sulfates of Na and Mg; *e.g.*, Marienbad w. **bound-** That portion which does not freeze when the system (*e.g.*, tissue, colloid, etc.) is maintained at −20°C. **capillary-** The w. of the soil held between rock interstices above the ground water. **carbonated-** A drinking water containing CO_2 under pressure. **chalybeate-** Ferruginous w. A mineral w. containing ferrous carbonate held in solution as bicarbonate; as, Pyrmont w. **cologne-** A water containing essential oils (such as bergamot, orange flower, lavender) used as a household perfume. **conductivity-** A water distilled repeatedly through silver stills; used as a solvent in electrolytic measurements. **crystal-** W. of crystallization. **distilled-** W. that has been purified by distillation. **drinking-** W. which contains neither a pathogenic organism nor a large amount of organic matter. The total solids do not exceed 1000 parts per million and the following upper limits apply: Pb 0.1, Cu 0.2, Zn 0.5, Fe 0.3, Mg 100, Cl^- 250, SO_4^{--} 250 pts. per million. **ferruginous-** Chalybeate-. **free-** That portion of a system which freezes. Cf. *bound-*. **ground-** The water which lies at a definite level beneath the soil. **hard-** W. that contains the carbonates and bicarbonates of calcium and magnesium; hence it forms insoluble compounds with soap and prevents the formation of lather. See *w. purification.* **heavy-** (1) Deuterium oxide, D_2O or H^bO = 20.0. The isotopic compound of hydrogen of mass 2 (deuterium, diplogen) with oxygen. Its physical constants as compared with light water, are:

	Light- H_2O	Heavy- D_2O
d. (20°C)	0.9982	1.1056
m	0°C	3.802°C
b	100°C	101.42°C
refractive index	1.33293	1.3281
viscosity	10.87	14.2
surface tension	72.75	67.8
Raman spectrum	3420 A.U.	2549 A.U.

(2) One of the other isotopic compounds; as, DOH, TOT, TOH, TOD, where D is hydrogen of mass 2, T hydrogen of mass 3 (tritium); or H_2O^b, H_2O^c, D_2O^b, D_2O^c, T_2O^b, T_2O^c, where O^b is oxygen of mass 17, and O^c oxygen of mass 18, or a combination of these (as, DO^bH). **hepatic-** A mineral w. containing hydrogen sulfide and alkali sulfides; *e.g.*, Harrogate w. **ice-** Freshly molten water containing smaller aggregates of $(H_2O)_x$ than does water at 4°C. Cf. *steam w.* **industrial-** W. that can be used for washing or like process work, but is not necessarily potable. **juvenile-** W. of deep-seated origin, that is supposed to have reached the surface of the earth for the first time. **light-** Protium oxide. See *heavy-*. **meteoric-** W. coming from the atmosphere; as, rain and snow. **mineral-** A natural w. used for therapeutic purposes on account of special constituents: (1) acidulous, (2) chalybeate, (3) hepatic, (4) alkaline, (5) bitter, (6) siliceous w.; (7) hot springs, which may contain traces of radium emanation to which their medical properties are attributed. **natural-** A w. as it occurs in nature. It contains various impurities and may be classified as: rain, snow, river, spring or deep well w., sea and mineral waters (cf. table). The impurities may be suspendde, or dissolved solids and gases. **potable-** W. that is fit to drink; *e.g.*, non-typhoid, non-polluted. Cf. *drinking-*. **pure-** W. that has been repeatedly distilled and subjected to purifying operations. It is very difficult to obtain and to maintain in a state of purity. **sea-** Ocean w. which contains on an average of 3.6 per cent. of solids, of which 2.6 per cent. is sodium chloride. See *hydrosphere.* **siliceous-** W. containing dissolved colloidal silica and alkali silicates, *e.g.*, the almost boiling w. of the geysers of Iceland, New Zealand, and Yellowstone Park. **soda-** q.v. **soft-** (1) Rain w. or snow w., which is naturally free from Ca and Mg salts. (2) Water that has been purified by removal of Ca and Mg salts. See *hard w., w. purification.* **steam-** Freshly-condensed w. It contains a different proportion of dihydrol and trihydrol, and has different biochemical properties to ice w. (q.v.). **sterilized-** W. in which all micro-organisms have been destroyed. **sweet-** Water containing glycerin residues; a waste product from soap manufacture.

NATURAL WATERS

Classified according to the negative or positive ions present

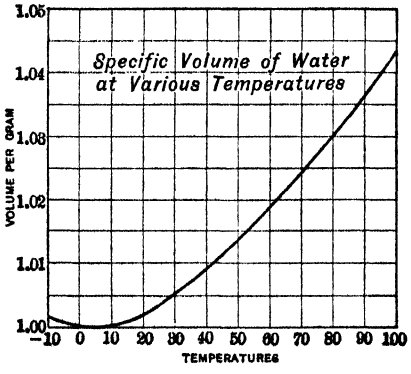
A. *Chloride* waters; principal negative ion is Cl^-.
   a. principal positive ion is sodium.
   b. principal positive ion is calcium.
   c. waters rich in magnesium.

B. *Sulfate* waters; the principal negative ion is SO_4^{--}.
   a. principal positive ion is sodium.
   b. principal positive ion is calcium.
   c. principal positive ion is magnesium.
   d. waters rich in iron or aluminum.
   e. waters containing heavy metals.
C. *Sulfate-chloride* waters; both SO_4^{--} and Cl^- are abundant.
D. *Carbonate* waters; the principal negative ion is CO_3^{--} or HO^-.
   a. principal positive ion is sodium.
   b. principal positive ion is calcium.
   c. chalybeate waters.
E. *Sulfate-carbonate* waters; SO_4^{--} and CO_3^{--} abundant.
F. *Chloro-carbonate* waters; Cl^- and CO_3^{--} abundant.
G. Triple waters containing Cl^-, SO_4^{--} and CO_3^{--} in notable amounts.
H. *Siliceous* waters, rich in silica.
I. *Borate* waters; the principal negative radical is $B_4O_7^{--}$.
J. *Nitrate* waters; the principal negative ion is NO_3^-.
K. *Phosphate* waters; the principal negative ion is PO_4^{---}.
L. *Acid* waters, containing free acids
   a. chiefly sulfuric acid.
   b. chiefly hydrochloric acid.

(From Clarke, Data on Geochemistry.) See *mineral waters.*

w. of constitution. W. which is chemically combined, as in hydroxides and acids. **w. of crystallization.** W. that is a physical constituent of crystals or hydrated salts, and may be removed at 100°C. **w. of hydration.** *W. of crystallization*, or *w. of constitution*, cf. *hydrates.*

w. analysis: (1) Sanitary-. The determination of the harmful constituents of water, both bacteriologically and chemically. This includes determinations of the different types of nitrogen (ammoniacal n., albumenoid ammonia



Specific volumes of water.

n., nitrite n., nitrate n.), oxygen consumed, total solids, alkalinity, hardness and halogens. Decaying vegetable and animal matter is indicated by the nitrogen present. (2) Complete. The determination of all inorganic constituents of w. These methods are illustrated by the following analyses of the same sample: (from F. W. Clarke, Data on Geochemistry).

(1) Results stated as oxides:

SiO_2	0.891	*grains per gal.*
SO_3	32.601	
CO_2	4.554	
Cl	2.681	
Na_2O	11.463	
K_2O	0.355	
CaO	13.117	
MgO	5.530	
$(FeAl)_2O_3$	0.189	
Mn_2O_3	0.189	
loss on ignition	2.397	
	73.967	
Less O = Cl	0.604	
	73.363	

(2) Results in terms of salts:

$CaSO_4$	457.7	*parts per mill.*
$MgSO_4$	236.0	
K_2SO_4	9.4	
Na_2SO_4	62.5	
NaCl	63.2	
Na_2CO_3	156.9	
Na_2SiO_3	21.9	
$(FeAl)_2O_3$	2.7	
Mn_2O_3	2.7	
loss on ignition	34.2	
excess SiO_2	1.3	
	1048.5	

(3) Results recorded in ions and radicals.

SiO_3	1.26	*% of total solids*
SO_4^{--}	55.28	
CO_3^{--}	8.78	
Cl^-	3.79	
Na^+	12.02	
K^+	0.41	
Ca^{++}	13.24	
Mg^{++}	4.49	
R_2O_3	0.53	
	100.00	

Ignition loss (organic matter) is omitted. Salinity 1014 parts.

w. bath. A vessel of boiling water used in the laboratory to evaporate substances placed in a smaller vessel above it. **w. constants.** The physical properties of ordinary water: (Cf. *heavy w.*).

(a) density—greatest at 4°C.; hence, one cc. water at this temperature is taken as the unit of mass = 1 gram. The density varies slightly with temperature:

0°C	0.99987
1°C	0.99993
2°C	0.99997
3°C	0.99999
4°C	1.00000
5°C	0.99999
6°C	0.99997
7°C	0.99993
8°C	0.99988
9°C	0.99981
10°C	0.99973

(b) heat of fusion..... 79 calories per gram.
(c) heat of vaporization. 536 calories per gram.
(d) specific heat..... 1.00477 at 5°C
1.00000 at 15°C
0.99765 at 25°C
0.99829 at 50°C
1.00001 at 60°C
1.00645 at 100°C

(e) critical temperature... 370°C
(f) critical pressure..... 195.5 atm.
(g) critical volume..... 2.33
(h) degree of ionization... 10^{-7} moles per liter;

The concentration of hydrogen ions and hydroxyl ions is each 0.000 0001 gram per liter. **w. culture.** An experimental method of growing plants by using alternately a nutrient 0.01 molar solution of KNO_3, $CaSO_4$ and $MgHPO_4$ with or without some other salt or ion in minute quantity. Cf. *bioelements, hydroponics, nutrient media, plant food.* **w. detection.** Minute traces of water or moisture are recognized by: (1) Potassium-lead iodide paper (filter paper saturated with a solution of potassium lead iodide in acetone), which becomes yellow. (2) Anhydrous copper sulfate, which is colorless and turns blue. **w. distillation.** The evaporation and condensation of w. To remove all dissolved material distil in a quartz or silver vessel first from an alkaline solution of permanganate, then from sulfuric acid. Cf. *conductivity w.* **w. flowers.** Ice flowers. **w. gas.** A mixture of hydrogen and carbon monoxide, obtained by the action of steam on glowing coal. **w. glass.** Sodium silicate. **w. metabolism.** The daily balance of water in the human body; *e.g.*, in 24 hours:

Intake	
solid food	700 cc
drinking water	600 cc
beverages	600 cc
metabolic water	300 cc
total	2200 cc

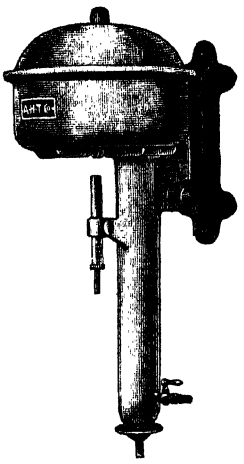
Output	
urine	800 cc
skin	700 cc
lungs	600 cc
feces	100 cc
total	2200 cc

w. pollution. The contamination of natural waters by the influx of wastes (q.v.) from sewage or an agricultural or industrial plant. **w. proof.** Rain proof. Impermeable to water. See *india-rubber.* **w. purification.** The more or less complete removal or destruction of salts or organisms which occur in natural waters; *e.g.*, by

softening	partial removal of salts.
distillation	complete removal of salts
filtration	partial removal of organisms
sterilization	complete destruction of organisms.

w. softening. The removal of Ca^{++} or Mg^{++} either by: (a) filtration through permutite or natural zeolites, in which calcium ions are replaced by sodium ions; (b) heating, which removes Ca^{++} as calcium carbonate (boiler scale); (c) chemical treatment with lime, alumina, etc. **w. sterilization.** The destruction of bacteria and spores by heat, or their removal in porcelain filters. **w. still.** A device for the continuous production of distilled water (see illustration).

watermint. The dried leaves of *Mentha aquatica*, a Labiatae, containing essential oils and tannin. Used medicinally as an antispasmodic and stimulant.



Water still.

waterpepper. Smartweed. The dried herb of *Polygonum punctatum*, a Polygonaceae. Used, as the fluid extract, as a stimulant and diuretic.

waterproofing. Making a substance impermeable to moisture.

Watt, James. 1736–1819. The Scottish inventor of the first steam engine (1769).

watt. Ampere-volt, volt-ampere. A unit of power, or time-rate at which work is done: 1 watt = 1 joule (ten million ergs) per second, or the energy expended per second by an unvarying current of 1 ampere under a potential of 1 volt. Conversion formulas:

watts = volts × amperes = amp.^{2} × ohms = volts^2 ÷ ohms
1 kilowatt = 1000 watts
1 watt = $\frac{1}{746}$ horsepower
1 watt-hour = 3600 joules = 1 kelvin
1 kilowatt-hour = 3,600,000 joules

international watt- The energy expended per sec. by an unvarying electric current of 1 international ampere under an electrical pressure of 1 international volt.

wattage. The amperage multiplied by the voltage.

wattle gum. Australian gum. A gum from *Acacia pycnantha*, a Leguminosae of Australia and South Africa.

Watts, Henry. 1815–1884. An English chemist, noted as editor and author (*Journal of the Chemical Society* and *Dictionary of Chemistry*).

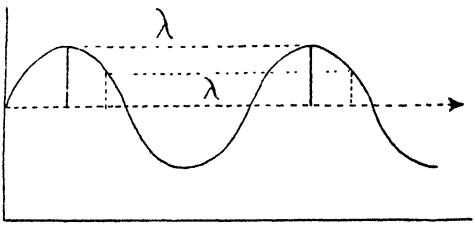
wave. (1) A to-and-fro motion of the particles of a solid, liquid or gas. (2) The harmonic curve obtained on plotting distance and time for points representing either particles or centers of force in rhythmic motion. **longitudinal-** Forward and backward motion of particles in the direction in which the wave moves, as sound waves in air. **transverse-** Up and down motion, or motion at right angles to the direction in which the wave moves. Cf. *radiations, electromagnetic-*.

w. front. The surface of propagation, at right angles to the direction of motion, which passes through corresponding points of a number of waves. **w. function.** The factor ψ in Schrödinger's equation, q.v. **w. length.** The distance between corresponding points on two adjacent waves. (For wavelength of radiations see *spectrum;* of sound, see *sound.*) **w. mechanics.** Quantum mechanics. A mathematical theory which aims to explain the velocity (v) and position (p) of electrons from statistical determinations, where one value (*e.g.*, v) can be determined and the other (*e.g.*, p) is undeterminable, by predicting the probable range of values. It is assumed that the motion of each

particle of mass (m) is associated with a wave of wave-length λ, and that $\lambda = h/mv$; also $mc^2 = h\nu$, where c is the velocity of light. The velocity of the wave is $\mu = \lambda\nu$. Cf. *Heisenberg principle*. The λ of any line is related to the corresponding energy change (in volts) by $\lambda = 12{,}336/V$; thus for sodium in the lowest energy state, 3s, the following transition is possible:

	λ_c	λ_a
to 3p, absorbing 2.09 V	= 5901	or 5896
to 4p, absorbing 3.73 V	= 3310	or 3303
to 5p, absorbing 4.32 V	= 2860	or 2853

where the calculated lines, λ_c, agree fairly well with the actual lines, λ_a. **w. motion.** The progressive disturbance of particles in a medium. The speed with which this disturbance is propagated is the velocity of the wave, c; this depends on the wave-length, λ, and the time period, T, or on the frequency, ν; hence $c = \lambda/T$, $= \nu\lambda$, and $\nu = c/\lambda$. **w. number.** The number of waves per unit length; for light, $n = 1/\lambda$ (if λ is measured in cm.), or $n = 10^8/\lambda$ (if λ is measured in Angström units), where n is the number of waves per centimeter. Cf. *Ritz formula*. **w. theory.** Radiations comprise a moving electric (E) and magnetic (M) field at right angles to each other, and in the direction of propagation. Cf. *quantum theory*.



Wave theory.

The vector (E) is accompanied by (M) at right angles. Wave-length (λ) is the distance between points having the same magnitude of force. Frequency (ν) is the number of oscillations in unit time at a given point.

wavellite. $Al_3(OH.F)_3.(PO_4)_2$. A native aluminum phosphate, containing some fluorine.

wax. (1) A material consisting of mixtures of esters, fatty acids, high atomic alcohols and even hydrocarbons. Cf. *sterols*. (2) One of a group of plastic substances obtained from plants or deposited by insects, which consists of the esters of fatty acids with high-atomic alcohol radicals; as,

bees-wax . . . myricyl palmitate, $C_{30}H_{61}.C_{16}H_{31}O_2$

spermaceti . . . cetyl palmitate, $C_{16}H_{33}.C_{16}H_{31}O_2$

Waxes differ from fats in that they are the esters of monohydric, high-atomic alcohols; whereas, fats are the esters of trihydric, low-atomic alcohols (as glycerol). **bees-** See *beeswax*. **carnauba-** See *carnauba wax*. **Chinese-** q.v. **C.K.- seekay-** A synthetic wax prepared by chlorinating naphthalene. **cochineal-** Coccerin. **earth-** Ceresin. **fossil-** Ozokerite. **insect-** Chinese-. **Japan-** q.v. **Java-** Ceryl alcohol. **mineral-** Paraffin-. **montan-** q.v. **palm-** q.v. **paraffin-** q.v. **peat-** See *peat*. **pisang-** q.v. **sealing-** q.v. **sugar cane-** Cerosin. **white-** Cera alba. A bleached beeswax. **yellow-** Cera flava. Beeswax. A soft yellow solid, obtained by melting and purifying the honeycombs of the bee; insoluble in water, slightly soluble in alcohol, soluble in ether, chloroform or oils. **wool-** See *wool fat*.

w. tailings. The residual product remaining after the destructive distillation of petroleum; it consists of the solid hydrocarbons, chrysene, picene and other products. It resembles asphalt, and is used for waterproofing and as a filler in cheap greases.

weak. (1) Not strong. (2) Not ionizing greatly. **w. acid.** An acid that does not ionize greatly. **w. base.** A base which does not ionize greatly. **w. salt.** A salt that does not greatly ionize. Cf. *ionization*.

weathering. Describing group of chemical reactions which change the composition of rocks; such as the effect of air, water, bacteria, and the physical action of heat and freezing which disintegrate the rock.

weber. Coulomb.

Weber's law. The sensation is proportional to the natural logarithm of the stimulus; the increase of a stimulus necessary to cause an increase in sensation is a constant fraction of the whole stimulus.

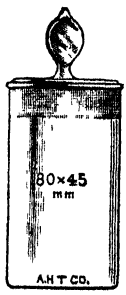
websterite. $Al_2SiO_6,9H_2O$. A native hydrous aluminum silicate. Cf. *cecilose*.

wedge. A solid object with a triangular section, used to separate surfaces by the forcible introduction of the pointed end **w. photometer.** A photometer in which the illuminations on two faces of a wedge are matched.

Weigert effect. The dichroism shown by a colloidal suspension or gel.

weighing. The act of measuring the gravitational attraction of an object. **double-** A method of finding the weight of an object independently of any variation in length of the two balance arms. If the object weighs *a* when placed on one pan, and *b* when on the other, then the weight is given by $\sqrt{ab}$.

w. bottle. A small, stoppered, thin-walled, light glass vessel, used to weigh quantities of a substance for analytical purposes. **w. by substitution.** A method used to obtain the weight of an object independently of the lengths of the arms of the balance. The object is counterpoised by lead shot, then removed, and the lead shot counterpoised by weights. **w. by swings.** A method in which the lack of sensitiveness of the balance is compensated by noting the swings of the balance-pointer, and the distances traversed to left and right. The equivalent in milligrams of a fraction of a division on the pointer-scale is then calculated from the means of the scale-divisions of a number of swings on each side, and thence that also of the mean of the swings on both sides.



Weighing bottle.

weight. The degree of heaviness or the force with which a body is attracted by the earth. It differs according to the geographical location, cf. *mass*. **atomic-** The relative weight of an atom of an element as compared with an atom of hydrogen. **carrier-** The weight of

substance (*e.g.*, protein) which carries 1 gm.-equivalent of prosthetic groups. **combining-** Equivalent weight. **equivalent-** The weight of a substance that can combine with or displace one unit-weight of hydrogen, or its equivalent of another substance. **isotopic-** The relative mass of an isotope, q.v.; it approaches a whole number. **molecular-** The sum of the atomic weights of the atoms contained in a compound. **specific-** See *specific gravity*.

w. buret. A small bottle with a tap and jet, used for accurate titration. The bottle is weighed before and after titration in order to determine the weight (instead of the volume) of the titrating solution used. **w. concentration.** The number of gm. of substance per kg. of solution. **w. normality.** Normality expressed per kg. instead of per liter.

weights. The units of weight in common use are:

A. METRIC WEIGHTS

Milli-gram	*Gram*	*Kilo-gram*	*Ton*	
1	0.001	10^{-6}	10^{-9}	0.015 grain
1000	1	0.001	10^{-6}	15.4 grains
10^6	1000	1	0.001	2.2 pounds
10^9	10^6	1000	1	1.1 ton

B. APOTHECARIES' WEIGHTS

Troy grains	*Scru-ples*	*Drams*	*Troy-ounces*	*Pound*	*Grams*
20	1	0.33	0.0417	0.00347	1.296
60	3	1	0.125	0.01042	3.888
480	24	8	1	0.833	31.035
5760	288	96	12	1	373.242

C. AVOIRDUPOIS WEIGHTS

Troy grains	*Drams*	*Ounces*	*Pound*	*Grams*
27.347	1	0.0625	0.0039	1.772
437.5	16	1	0.0625	28.35
7000	256	16	1	453.63

D. TROY WEIGHTS

Troy grains	*Penny-weights*	*Ounces*	*Pound*	*Grams*
24	1	0.05	0.0042	1.555
480	20	1	0.833	31.104
5760	240	12	1	373.2417

Weil-Felix reaction. An agglutination test for diagnosing typhoid fever.

weinschenkite. $(YEr)PO_4.2H_2O$. A native rare earth phosphate, resembling gypsum in structure.

weissite. Cu_2Te_2. Telluride. Lens-shaped crystals in veins of pyrites.

weld. To join metals by pressure at a temperature somewhat below that of complete fusion. **dyers-** A yellow dye obtained from *Reseda lutea*.

welding. (1) The joining of metals by heat; as: (a) **plastic-** united by pressure without a weld metal (forge, electrical resistance heater or thermite); (b) **fluid-** united by a weld metal without pressure (torch, arc or thermite). (2) To heat a metal to white heat and press the pieces together; or to heat a metal to fusion and let it flow into the joint. Cf. *thermite* process. **cold-** To hammer metal foils together into a compact piece; as, gold-foil restorations in dentistry. **spot-** Fluid welding at adjacent spots, which are subsequently run together by heat to form a continuous weld.

Weldon, Walter 1832–1885. An English industrial chemist, noted for his industrial processes. **W. process.** The manufacture of chlorine from hydrochloric acid by the action of manganese dioxide, and the regeneration of the W. mud by treatment with lime, followed by reoxidation to manganese dioxide. **W. mud.** The slime containing manganese and calcium manganites obtained in the Weldon process.

Welsbach, Carl Freiherr Auer von. 1858–1929. An Austrian chemist noted for his studies of the rare earths. **W. mantles.** Incandescent gas mantles, which consist of cellulose impregnated with cerium and thorium nitrates. On ignition a mixture of ceria (1 %) and thoria (99 %), remains.

Welter's rule. The heat of combustion of an organic compound is obtained approximately by subtracting the oxygen and hydrogen in the proportion of H_2O, and then adding the heats of combustion of the residual carbon and hydrogen atoms.

weltformat. A standard size for publications proposed by Ostwald, 16 × 22.6 cm. (about $6\frac{1}{4}$ × 9 inches, or the size of *Chemical Abstracts*).

welvic. Trade name for a polyvinyl type plastic.

Wenzel's law. Richter's law.

Werner, Alfred. 1866–1919. A Swiss chemist noted for his theories of the constitution of

Alfred Werner.

complex compounds; Nobel prize-winner (1923). **W.'s theory.** The affinity of an atom is an attractive force toward the center of the atom evenly distributed over its spherical shell. Valence numbers are the empirical numerical proportions in which atoms combine, and depend on the nature of the combining elements. In a combination of two atoms, the attractive force concentrates itself in a definite area, and this distribution is dependent on the nature of the combining atoms and may vary within wide limits. Thus, "in compounds such as H_2O and SO_2 the principal valencies of the atoms are saturated," and the molecules are incapable of uniting with another univalent atom. By reason of the residual valencies

however, the two molecules may combine, forming probably first an association held together by residual valencies: $O{=}S(=O)_2 \cdots\cdots (OH_2)$.

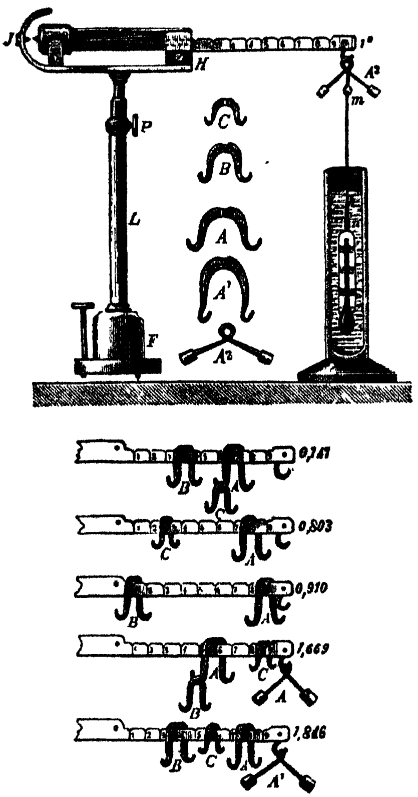
When association has occurred, the affinities may redistribute themselves uniformly with the formation of radicals (such as SO_4) having affinities capable of binding univalent atoms (such as 2H) to form H_2SO_4. Such hydrogen atoms exist outside the sphere of the complex radical SO_4, and are therefore easily split off in solution as ions. In this way *e.g.*, the curious behavior of the chlorine atoms in chloroplatinic acid, H_2PtCl_6, is explained." (Partington: "Inorganic Chemistry.") Cf. *coordination number, coordination hypothesis.*

wernerite. Scapolite.

Wesson tube. An absorption tube for carbon dioxide, containing soda-lime and calcium chloride.

West, Clarence Jay. 1886– . An American chemist noted for chemical literature.

Weston, Edward. 1850–1936. An English-born American electrical engineer. **W. normal cell.** Cadmium cell.



Westphal balance.

Westphal balance. A beam balance for determining the specific gravity of liquids and solids (see illustration).

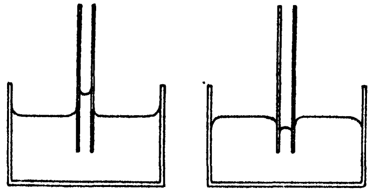
westron. Carbon tetrachloride.

wet. Moist. **w. analysis.** Qualitative analysis by means of reagents in solutions, as compared with dry, or blow-pipe, analysis. **w. bulb thermometer.** Psychrometer. **w. combustion.** A method of determining organic carbon with chromic acid, or other liquid reagents. **w. process.** An industrial method involving solutions; as, metallurgy, and the extraction of ores by acids or solvents.

wetness. See *freeness.*

wettability. The degree of wetting of a solid by a liquid, measured by the adhesion tension between a solid and liquid phase. Cf. *introfaction, zone.*

wetting. The adhesion of a liquid onto a surface. Cf. *flotation, adhesion, tension, introfier.*



A **B**

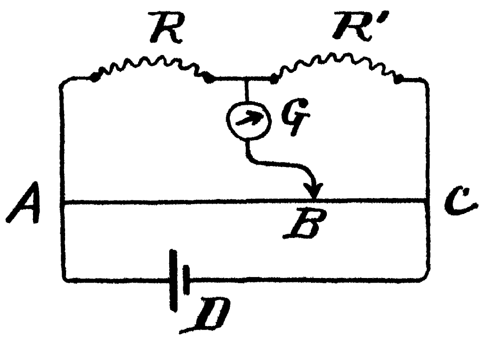
A = *Wetting* B = *Non-wetting*

whale. An aquatic ammal of the order *Cetaceae.* **w. bone.** Baleen. The horny, elastic substance from the upper jaw of the Greenland whale. **w. guano, w. meal.** A fertilizer made from dried and ground w. meat, containing 6–8 % N, 4–8 % P_2O_5. **w. oil.** Blubber oil. An oil from whales, d.0.92–0.93, used as a leather dressing, lubricant, illuminant, and for soap manufacture. **w. shot.** Crude spermaceti.

wheat. The seeds of *Triticum* species, Gramineae, used as food. The world output in 1941 was 183,000,000 long tons grown in U.S.S.R. > U. S. > China > Canada > India > Argentina > France and other countries. The chief varieties are:

T. monococcum	one-grained w.
T. polonicum	Polish w.
T. sativum	common w.
T. durum	flint w.
T. turgidum	rivet w.
T. compactum	dwarf w.

Wheatstone, Sir Charles. 1802–1875. An English physicist, noted for his electrical devices.



W. bridge. An instrument, for the measurement of electrical resistance (see diagram). A point *B* on the graduated resistance wire, *AC* is found such that no current flows through a galvanometer *G* from the accumulator *D.* The

ratio of the lengths *AB/BC* then equals the ratio of the resistances R/R', of which one is known. The other may then be calculated.

whey. Milk serum. The thin liquid remaining after the fat and casein have been removed from milk.

whisk(e)y. A grain spirit obtained from malted barley or other cereal by mashing and fermentation, followed by distillation and ageing.

white. A color (q.v.) produced by the reflection of all the visible rays, or of two complementary rays. **w. agate.** Chalcedony. **w. antimony.** Valentinite. **w. arsenic.** Arsenous oxide. **w. ash.** The dried bark of *Fraxinus americana*, an Oleaceae; used medicinally, as fluid extract. **w. bole.** Kaolin. **w. bryony.** Bryonia. The dried roots of *Bryonia alba;* used medicinally as a cathartic. **w. cedar.** Thuja. **w. coal.** Water power; power obtained from hydroelectric plants. **w. lead.** A basic lead carbonate, used as a white pigment. **e. lead ore.** Cerussite. **w. lead paper.** A filter paper impregnated with lead carbonate. **w. mustard.** Sinapis alba. **w. nickel ore.** $NiAs_2$. A native nickel arsenide. **w. oak.** Quercus. **w. olivine.** Forsterite. **w. pigments.** An opaque and colorless pigment; as, lead carbonate, sulfate or oxychloride, barium sulfate, zinc sulfide, kaolin, lithopone or titanium oxide. **w. pine.** Pinus alba. The dried bark of *Pinus strobus*, a Pinaceae; used medicinally as an expectorant. **w. pond lily.** The dried roots of *Castalia odorata*, a Salicaceae; used, as the fluid extract, as an astringent. **w. poplar.** The dried bark of *Populus tremuloides*, a Nymphaceae; used medicinally as a tonic and febrifuge. **w. precipitate.** Ammoniated mercury. **w. olivine.** Forsterite. **w. vitriol.** Zinc sulfate. **w. wash.** A suspension of chalk in water, used for decorative purposes. **w. zinc.** Zinc oxide.

whiting. Whitening. A washed chalk or calcium carbonate, used as a pigment for polishing.

whitlockite. $Ca_3(PO_4)_2$. A late hydrothermal mineral in New Hampshire granite pegmatites.

Whitney, Willis Rodney. 1868– . An American physicist, noted for his work on colloids.

whitneyite. Cu_9As. A native copper arsenide.

whortleberry. Vaccinium.

widia (from the German "*wie diamant*"). Cemented tungsten carbide.

Wiedemann, Gustaf Heinrich. 1828– . A German physical chemist, noted as editor of *Poggendorff's Annalen.* **W-Franz's law.** The *thermal* and *electrical* conductivities of the metals follow the same order.

Wieland, Heinrich. 1877– . A German chemist and Nobel Prize winner (1927), noted for biochemical research (bile acids, chlorophyll and hemoglobin).

Wien, Wilhelm. 1864–1928. A German physicist, noted for his research on spectra and radiations. **W. constant.** The constants, c_1 and c_2 in W.'s equation of radiation; $c_2 = 1.4312$. **W. equation.** The intensity, I, of a radiation is given by $I = c_1\lambda^{-5}.e^{c_2/\lambda T}$, where λ is the wave-length, and T the absolute temperature, e the base of natural logarithms and c_1, c_2 are constants. **W. law.** From a perfect radiator energy radiates over a wide range of temperature, but the intensity is a maximum for a certain wave-length, λ_m, depending upon the absolute temperature, T. Measured in centimeters, $\lambda_m = 0.289/T$; hence, the higher the temperature, the shorter is the wave-length of maximum intensity.

Wijs solution. A solution of iodine monochloride in glacial acetic acid; used for the determination of iodine values. **W. value.** Iodine number.

wild. (1) In pharmacy, not cultivated (plants); not domesticated (animals). (2) In metallurgy, over-oxidized; as, steel which will spit and fly owing to the escape of gases. **w. cherry.** Prunus virginianica. The stem bark of *Prunus serotina*, a Rosaceae; it is used medicinally, as the fluid extract, as a sedative and expectorant. **w. ginger.** Asarum. **w. hyssop.** Verbena. **w. indigo.** Baptisia. **w. licorice.** Abrus. **w. mint.** *Mentha canadensis*, a plant resembling pennyroyal. **w. rosemary.** q.v. **w. rue.** Harmel. **w. yam.** Dioscorea.

Wiley, Harvey Washington. 1844–1930. An American chemist, noted for his work on food laws.

Will, Heinrich. 1812–1890. A German chemist, noted for analytical methods.

willemite. Zn_2SiO_4. A native zinc silicate.

willesden goods. Articles made by impregnating paper or pulp in cupra-ammonium solution, washing, rolling, or pressing into a shape (*e.g.*, in several layers) and drying. They include small cheap articles such as picnic plates and spoons, combs, etc. and are hard and relatively water-resistant.

Williamson, Alexander Edward. 1824–1904. An English chemist, noted as founder of the molecule concept. **W. reaction.** The synthesis of ethers from sodium alcoholate and an alkyl-iodide: $RI + NaOR' \rightarrow ROR' + NaI$. **W.'s. violet.** $KFe[Fe(CN)_6].2H_2O$. A potassium ferric ferrous cyanide.

willow. A genus of trees of the order Salicaceae; the bark and leaves contain salicin.

Willstätter, Richard. 1872–1942. A German chemist and Nobel Prize winner (1925), noted for organic research particularly on plant pigments.

wilnite. A pale green variety of grossularite. See aluminum *garnet.*

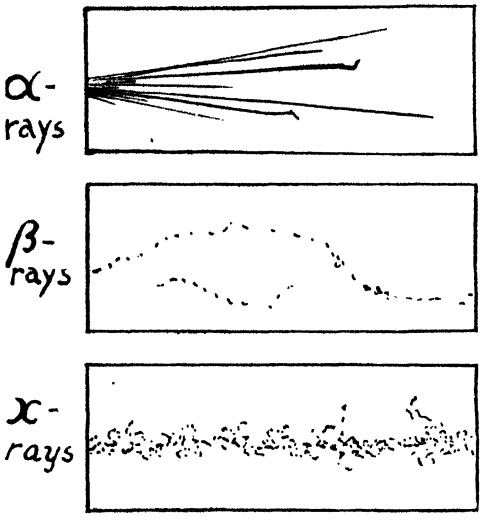
Wilson, Charles Thomas Rees. 1869– . An English physicist noted for his experimental methods of studying atomic effects. **W. method.** The fog condensation method which enables one to demonstrate and record the motions of atomic fragments by observing or photographing their path in a low-pressure fog chamber (the cloud-track apparatus). The charged ions or electrons cause condensation of the gaseous water molecules, and become visible as minute droplets. **W. tracks.** When α-, β-, γ- or x-rays are shot into a low-pressure fog chamber they cause condensation of single microscopic droplets, which appear as lines and can be photographed or kinematographed; used in the study of atomic structure (see illustrations).

winchester. A bottle of standard cylindrical shape, which is tall and has a relatively small base. **w. bushel.** See U.S.A. bushel. **w. quart.** A w. bottle which holds from 2¼ to 2½ liter.

wind gage. Anemometer.

Windaus, Adolf. 1876– . A German chemist, and Nobel Prize winner for his work on sterols.

window. An aperture in the glass of a vacuum tube which is closed with aluminum, or other metallic foil permitting the exit of cathode rays.



Wilson tracks.
Showing the path of nuclei, electrons and ions.

wine. Fermented grape juice, containing 6–22 % alcohol, traces of oenanthic and other ethers, essential oils, grape sugar, glycerol, tannic, malic, phosphoric and acetic acids, tartrates of potassium and calcium, coloring matters and some proteins. It is the result of the natural fermentation of grape juice, and exists in a great variety of types. **dry-** W. of low sugar content; as, Sauterne, Burgundy. **fortified-** W. to which alcohol has been added. **medicated-** W. to which a medicament (*e.g.*, meat extract) has been added. **sour-** W. which has begun to ferment to acetic acid. **spirit of-** Ethanol. **sweet-** W. of high sugar content; as, sherry or port.

wine-glass. An approximate liquid measure, equal to 60 cc. or 2 fluid ounces.

wing top. A triangular shaped attachment to the bunsen burner for producing a long and narrow flame.

Winkler, Clemens Alexander. (1838–1904). A German chemist, who discovered germanium and was noted for his work in gas analysis and mineralogical chemistry.

winterene. $C_{15}H_{24}$ = 204.2. A hydrocarbon found in the essential oil of winter's bark.

wintergreen. Gaultheria. **bitter-** Chimaphilia. **w. oil.** The essential oil of *Gaultheria* species, d.1.175–1.187, which contains 99 % methyl salicylate. *artificial-* Methylsalicylate.

winter's bark. The dried bark of *Drimys winteri*, a Magnoliaceae containing an essential oil, tannin and resin; used medicinally as an aromatic and stomachic. Cf. *drimin*.

wipla [from the German "*wie platin*"]. A chromium-nickel steel, used as a platinum substitute in dentistry.

wire. A metal or other rod drawn out to a high degree of fineness. **cross-** Two thin crossing wires placed in the objective of an optical instrument to enable the position of the object under examination to be fixed.

wiring. An electrical circuit.

Wislicenus, Johannes. 1835–1902. A German chemist noted for his work on stereochemistry, lactic acid and aceto-acetic ester isomerism.

wismuth. Bismuth.

wistarin. A crystalline glucoside from *Wistaria chinensis*, a Leguminosae.

witchhazel. Hamamelis.

withania. The plant *W. somnifera*, geneesblaar, vimba, a Solanaceae of South Africa, used by natives as an antiseptic and hypnotic. It contains somnirol, somnitol, withaniol, etc.

withanic acid. $C_{30}H_{46}O_8$ = 534.35. A monobasic acid from withania.

withaniol. $C_{35}H_{34}O_5$ = 534.25. A monohydric alcohol from withania.

witherite. $BaCO_3$. A native barium carbonate, d.4.29–4.35, hardness 3–3.75; used in the glass and sugar industries, and in pyrotechnics.

witness. A tube which usually contains calcium chloride and is placed at the beginning or end of a gas train; it is weighed at the beginning and end of the experiment, and indicates any loss of solvent sustained by the absorption bulbs (cf. *guard-tube*).

Friedrich Wöhler.
(From Muldoon "Organic Chemistry.")

Witt's color theory. Certain (chromophoric) linkages in organic compounds induce color. If a compound contains in addition certain other (auxochromic) linkages, a dyestuff is produced. A colored compound is known as a chromogen.

woad. An early dye made from the Cruciferae, *Isatis tinctoria*, of the Mediterranean region; its leaves are ground to a paste and fermented. Used as a blue dye before indigo was known in Europe, and the ancient Britons stained themselves with it.

Woestyn's law. Joule's Law.

wofatite. A German trade name for phenol-formaldehyde and amino plastics having exchange-adsorption properties (cf. *zeolites*). Used for water purification and the recovery of copper from waste cuprammonium liquors.

Wöhler, Friedrich. 1800–1882. A German chemist, noted for his isolation of aluminum and beryllium, discovery of isomerism and the first synthesis of an organic compound (urea) in 1828. **W.'s law.** A dynamic deformation of a

material may take place as a reults of vibrations, none of which attains the breaking limit; ultimately they may result in rupture.

wöhlerite. A native mixture of oxides of sodium, calcium, niobium, silicon and zirconium.

Wohl's reaction. Boiling with ammoniacal silver nitrate hydrolyzes acetyl groups and eliminates HCN from the oxime of an acetylated sugar:

$$R.CHOAc.CN \rightarrow R.CHOH.CN \rightarrow R.CHO + HCN.$$

Wohlwill process. The electrolytic refining of gold from a weak acid solution.

Wolf process. A flotation process involving the use of sulfo-chlorated oils.

Wolffram's salt. The platinum chloride, $[PtCl]Cl_2.(H_2O)_2$; used as microchemical reagent.

Wolf-Rayet type. A spectrum which shows wide emission lines; class O of stellar spectra, q.v.

wolfram. (1) Tungsten. (2) Wolframite. **w. ocher.** Tungstite.

wolframate. Tungstate.

wolframine. Tungstite.

wolframites. A group of iron and manganese tungstates of the general formula, $(Fe,Mn)WO_4$, intermediate between ferberite, $FeWO_4$, and hübernite, $MnWO_4$.

wolframium. Tungsten.

wolfsbane. (1) See *arnica flowers*.

wolfsbergite. (1) Chalcostibite. (2) Essonite.

Wollaston, William. 1766–1828. An English physicist and chemist who discovered palladium and rhodium, and investigated the wave-theory of light. **W. wires.** Fine platinum wires (0.001 mm. diameter) drawn inside a silver sheath, which is subsequently removed in nitric acid.

wollastonite. $CaSiO_3$. Tabular spar, scale stone. A native triclinic calcium silicate of the pyroxene group. **para-** The monoclinic form of w. **pseudo-** A third modification of w.

Wolpert's air tester. See *air tester*.

wondrpack. An oral surgical dressing: 70 % zinc oxide, 30 % rosin and 0.625 % asbestos, made into a paste with 80 % oil of cloves and 20 % olive oil.

wood. The dried stem or the structural and supporting part of a tree or shrub. Its chief constituent is cellulose, cf. *lignin, lignoceric acid, lignone, lignose, xylose*. The following woods are official (U.S.P.):

Dulcamara	Quassia
Guaiacum	Red Sanders
Hematoxylon	

Commercial woods may be classified:

Soft woods:

Pine	*Pinus* species
Spruce	*Picea* species
Hemlock	*Tsuga* species
Fir	*Abies* species
Redwood	*Sequoia sempervirens*
Cedar	*Thuja* and *juniperus* species

Hard woods:

Poplar	*Populus* species
Oak	*Quercus* species
Linden	*Tilia* species
Maple	*Acer* species
Birch	*Betula* species
Sycamore	*Plantans* and *Acer* species
Beech	*Fagus* species
Chestnut	*Castanea* species
Walnut	*Juglans* species
Ash	*Fraxinus* species
Hickory	*Hicoria* or *Carya* species
Elm	*Ulmus* species

Cabinet woods:

Mahogany	*Khaya* species
Teak	*Tectona grandis*
Ebony	*Diospyros* species
Rosewood	*Dalbergia* species

w. alcohol. Methanol. **w. ashes.** The residue remaining from burning wood, and containing 4 % K_2O; used as fertilizer. **w. cellulose.** Xylon. Cellulose obtained from wood. **w. charcoal.** Carbo lignis. **w. extract.** The waste liquor from the cooking of wood with alkali or sulfite liquor to make pulp. **w. flour.** W. meal, sawdust, pulverized w. A finely-powdered wood, generally white pine. Used as a filler in moldings, linoleum, flooring, rubber, soap, and as absorbent for nitroglycerin (dynamite). **w. free.** Describing a paper which contains no groundwood pulp, and which usually contains only chemical wood pulp. **w. march.** Sanicula. **w. meal.** W. flour. **w. metal.** See *Wood's alloy*. **w. naphtha.** Methanol. **w. oil.** Tung oil. **w. opal.** Xylopal. Fossilized wood, in which silica replaces the woody fibers. **w. preservative.** A preparation (*e.g.*, tar or creosote) to make w. withstand the effects of moisture and bacteria. **w. pulp.** (Cf. *wood flour, pulpwood*.) A mechanically-ground or chemically-digested wood used in the manufacture of paper or rayon. **w. spirit.** Methanol. **w. stain.** See *table top impregnation*. **w. stone.** Xylolith. **w. sugar.** Xylose. **w. tar.** See *tar*. **w. vinegar.** See *pyroligneous acid*. **w. waste.** The materials made from lumber-"waste," such as

wood pulp (for paper, twine, yarn, rayon),
wood flour (dynamite, linoleum, plastics),
ethyl alcohol, motor fuels,
cattle food and carbohydrates
rosins, turpentine, pine oil and tar
tannin, fatty acids, dyes and potash.

Wood's alloy. A low melting-point alloy (65.5°C); 5 pts. bismuth, 2.5 pts. lead, 1.25 pts. tin and 1.25 pts. cadmium. **W. glass.** A glass which absorbs most of the visible spectrum, but transmits a band of waves in the ultra-violet. **W. light.** The filtered rays of the mercury vapor lamp of wave-length 3340–3906 A.U.

woodwardite. $CuSO_4,Al_2(SO_4)_2,H_2O$. Native copper aluminum sulfate.

wool. The fibrous hair of lambs and sheep. It contains keratin (which has a characteristic odor on burning), and about 40 % of a grease (chiefly cholesterol). It is similar in composition to horn, and is attacked by alkali, but not by acids. **casein-** Lanital. **glass-** Fine glass threads used for filtering. **mineral-** See *mineral*. **w. fat.** (1) Lanolin. (2) The wax alcohol extracted from pure wool fat on the commercia scale. **w. waste.** A fertilizer material and by-product of w. carding, consisting of sheep manure, seeds and wool fibers, 3–6 % N_2.

Woolwich viscosity. See *viscosity*.

woorara. Curare.

work. Work is performed when a force moves its point of application. It is measured by the product of the force and the distance it is displaced in the direction of the force. Units: F.P.S. system—1 foot-pound, *i.e.*, the work done when 1 pound is lifted one foot against gravity.

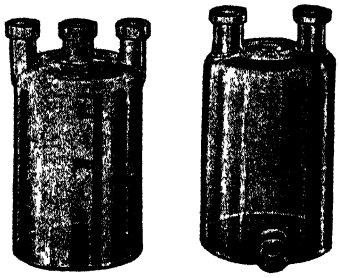
Metric system—1 centimeter-dyne = 1 erg. Gravitational unit—1 gram and 1 cm. = g. dyne cms. = g. ergs. Dimensions—FL = ML^2T^{-2}. For rate of work, see *power*. **w. of expansion.** The resistance offered by the molecules of an expanding gas, due to molecular attraction.

wormseed. (1) Santonica. (2) Chenopodium. **w. oil.** *American:* The essential oil from *Chenopodium ambrosioides*, d.0.960–0.980. *Levant:* The oil of *Artemisia maritima*, d.0.930, containing cineol.

wormwood. Absinthium. **salt of-** Potassium carbonate. **w. oil.** Absinthe oil. An essential oil from the herb of *Artemisia absinthium*. A greenish volatile liquid, d.0.925–0.955, soluble in alcohol, containing chiefly thujone, phenandrene and thujyl alcohol.

wort. Any infusion of a plant or part of a plant that is to be fermented; as beer-wort.

Woulfe bottle. A two or three-necked bottle which is used frequently in chemical experiments. It was first described by Peter Woulfe in 1784.



Woulfe bottles.

W-rays. See *W*.

Wright's stain. A microscope stain for white blood corpuscles, consisting of 1 gram of specially prepared methylene-blue-eosine mixture in 600 cc. of methanol.

wrightine. Conessine.

Wroblewski, Sigismund A. von. 1845–1888. A Polish physicist, noted for the liquefaction of gases.

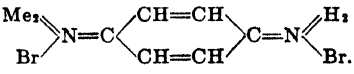
wrought iron. A pure grade of iron with a low carbon content.

Wu, Lu-Chiang. 1904–1936. A Chinese chemist, noted for historical research.

wulfenite. $PbMoO_4$. Yellow lead ore. A native lead molybdate.

Wullner's law. The lowering of the vapor pressure of water by a solute is proportional to the concentration of the solute.

Wurster's blue. An oxidation-product of tetramethyl-*p*-phenylene diamine; used as an indicator. **W. red.** An oxidation-product of *p*-amino-dimethylaniline. It is considered to be a meriquinone:



Würtz, Carl Adolphe. 1817–1884. A French chemist, noted for organic research and his statement *"La Chimie est une science française."* **W. flask.** A distillation flask with a side-arm in the neck. **W.'s reaction.** The synthesis of hydrocarbons by treating alkyl iodides in ethereal solution with sodium: 2MeI + 2Na = Me.Me + 2NaI.

wurtzite. ZnS. Aegerite. A native zinc sulfide, differing from sphalerite in its hexagonal structure.

wyomingite. A porous rock found in the Leucite Hills, Southern Wyoming, from which potash is extracted by acid treatment. It contains 11 % K_2O.

Wysor machine. A device for grinding and polishing metals for metallographic examinations.

X

X. (1) The symbol for xenon. (2) In a formula: the symbol for a halogen or acid radical, as HX.

x. The symbol for: (1) an unknown quantity; (2) molecular fraction. **x-axis.** The first dimension in coordinates, q.v. **x-ray.** See below. **x-unit.** See below.

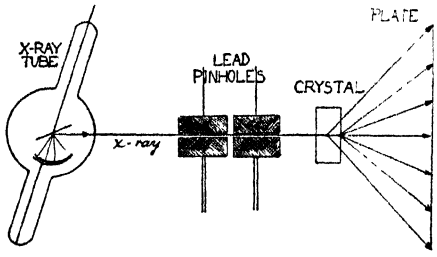
χ. The Greek letter "chi."

ξ. The Greek letter "xi."

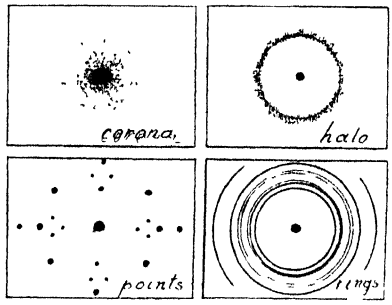
x-rays. Röntgen rays. A non-luminous radiation (q.v.) or invisible light rays of extremely short wave-lengths, ranging from 0.06 to 2 Å.U., which are produced in an x-ray tube (q.v.) by cathode rays focused upon a metal surface. They resemble the gamma-rays of radioactive substances, and are made visible by fluorescent screens or photographic plates. Their *quantity* is determined with Eder's solution; their *intensity* is expressed in Röntgen units. Cf. *spectrum, radiations.* **hard-** X-rays of relatively high penetration and short wave-length, 0.19 to 0.43 Å.U., which decrease in wave-length as they traverse a medium. **heterogeneous-** See *multifrequent-.* **homogeneous-** See *monochromatic-.* **infra-** Grenz rays. **monochromatic-** Unifrequent-, homogeneous-. X-rays consisting of rays of a single wave-length or a group of wave-lengths, depending upon the nature of the target. The shortest measured is 0.1075 Å.U. for the K-line of uranium; the longest 17.66 Å.U. for the $L\beta$ line of iron. **multifrequent-** Heterogenous-, polychromatic. X-rays consisting of rays of many different wave-lengths. **polychromatic-** Multifrequent-. **soft-** X-rays of relatively low penetration and long wave-length, 11.9 to 13.6 Å.U., which increase in wave-length as they traverse a medium. **ultra-** Cosmic rays. **unifrequent-** Monochromatic-. **white-** The common or ordinary x-rays, consisting of a band of many different wave-lengths. Their limit depends on the voltage applied, and not on the nature of the target: $Ve = h\nu_0 = hc/\lambda_0$, where V is the voltage, e the charge of an electron, h Planck's constant, c the velocity of light, λ_0 the maximum frequency and ν_0 the minimum wave-length.

Type of x-rays	Average λ Å.U.	Voltage KV.
high voltage.....	0.04	550
hard-.....	0.20	180
medium-.....	0.50	70
soft-.....	0.70	50
grenz rays.....	2.0	2.5

x-ray analysis. The determination of the internal structure of a material by means of the diffraction pattern formed when an x-ray passes through it (see illustrations):



X-ray analysis.



X-ray analysis pattern.

corona or diffuse fog, indicating the gaseous state.

halo, indicating a liquid or an amorphous substance, where the molecules are distributed in irregular or haphazard fashion (*e.g.*, unstretched rubber).

rings, indicating a regular space lattice with the molecules in definite positions and oriented to each other (*e.g.*, stretched rubber).

points, indicating a crystal, or regular space lattice in which the atoms, ions or molecules are fixed in definite positions.

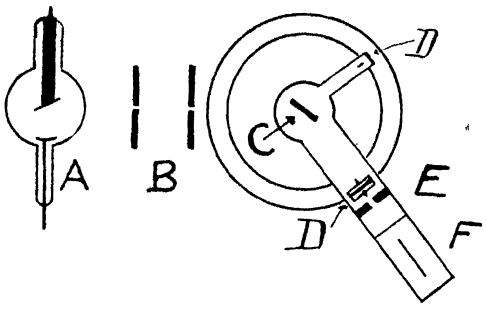
x-ray intensity unit. (International standard, 1928.) The Röntgen (r). The quantity of x-radiations which, when the secondary electrons are fully utilized and the wall-effect of the chamber avoided, produces in 1 cc. of atmospheric air at 0°C. and 760 mm. pressure, such a degree of conductivity that one e.s.u. charge is measured at saturation current.

x-ray spectrogram. A photographic record produced by the spectrograph; as, a crystallogram, q.v.

x-ray spectrograph. A spectrometer fitted with a photographic camera.

x-ray spectrometer. An arrangement for diffracting x-rays by using the space-lattice of a crystal as grating (see illustration).

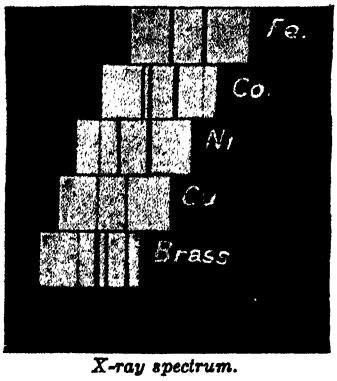
x-ray spectrum. Moseley spectrum, high-frequency spectrum. The spectrum produced (by a crystal diffraction grating) of the characteristic radiations emitted by the metal used as anticathode in an x-ray tube. Each metal produces a few, strong, characteristic lines,



X-ray spectrometer.

A—x-ray tube
B—lead slits
C—crystal
D—scale
E—lead slit
F—ionization chamber or photographic plate.

(see illustration) the square roots of the frequencies of which are in direct proportion to the atomic number of the element. It is used as a means of analysis.



X-ray spectrum.

x-ray structure. The structural arrangement of atoms in a crystal as revealed by the Laue pattern and crystallograms (q.v.) produced when x-rays pass through the crystal and fall on a photographic plate.

x-ray tube. A cathode tube or highly-evacuated tube containing three electrodes; namely, a disk concentric with the tube as cathode, a heavy, substantial and inclined plane of high melting-point metal as an anticathode, and a small wire as an anode (see illustration). The cathode rays concentrate on a small spot on the anticathode, which is heated by the bombardment of electrons and emits rays of very short wave-lengths.

x-unit. (1) A wave-length of 10^{-3} Å.U. (10^{-11} cm.). (2) More accurately, 1 x-unit = 1.00201×10^{-3} Å.U. (Craven).

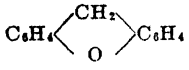
xanthaline. $C_{37}H_{36}O_9N_2$ = 652.4. An alkaloid, m.208, in opium.

xanthate. Xanthogenate. A salt of xanthic acid of the general type, EtO.CS.SM, or RO.CSSM, where M is a metal and R an alkyl radical; as, potassium ethylxanthate, EtO.CS.SK. Cf. *viscose.* **butyl-** Potassium *sec.*-butylxanthate, $MeCH_2.CHMeO.CS.SK$. An agent used in flotation as collector, giving 94 % mineral recovery. **ethyl-** Potassium ethyl xanthate, EtO.CS.SK. Used as a collector in flotation; 85 % of mineral recovery results. **propyl-** $MeCH_2CH_2O.CS.SK$. A flotation collector giving 90 % mineral recovery.

xanthein. A yellow coloring matter of plants, and a split-product of chlorophyll.

xanthematin. A yellow coloring matter and split-product of hemoglobin.

xanthene. $C_{13}H_{10}O$ = 182.1. Methylenediphenyleneoxide, dibenzo-*1.4*-pyran, diphenylenemethaneoxide,



Colorless leaflets, m.105, b.312; very slightly soluble in water, soluble in alcohol or ether. Cf. *xanthydrol.* **benzo-** See *benzoxanthene.* **dibenzo-** See *dibenzoxanthene.* **hydroxy-** Xanthydrol. **keto-** Xanthone. **thio-** Thioxanthene.

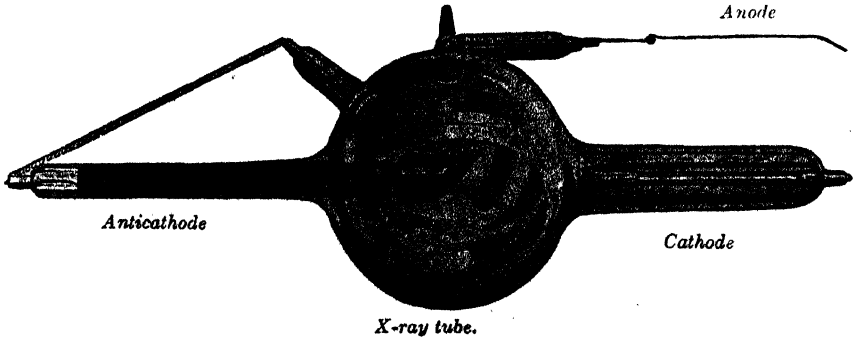
xanthenol. Xanthydrol.

xanthenone. Xanthone.

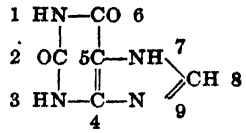
xanthic acid. $C_3H_6OS_2$ = 122.18. Xanthonic acid, xanthogenic acid, ethyloxydithiocarbonic acid, HO.CS.SEt or EtO.CS.SH. A very unstable, colorless, oily liquid, insoluble in water, decomp. to ethanol and carbon disulfide at 24°C. **x. amide.** C_3H_7ONS = 105.14. $NH_2.CS.OEt$, m.38, soluble in water, alcohol or ether. **x. disulfide.** $C_2H_2S_4O_2$ = 186.3. HO.CS.S.S.CS.OH. Colorless crystals, m.28.

-xanthin. A suffix indicating yellow; as, cox., fucox., tarax., violax., and zeax.

xanthin(e). $C_5H_4O_2N_4$ = 152.1. 2.6-Dioxypurine, 2,6-purinedione. A purine base in blood, liver, urine and some plants. A yellow crystalline powder, m.360, slightly soluble in water or alcohol, and soluble in ether. **allo-** Alloxantin. **dimethyl- 1.3-** Theophyl-



X-ray tube.



line. **3.7- Theobromine.** **1.7- Paraxanthine.** **hetero-** $C_6H_6O_2N_4$ = 166.1. 7-Methyl-2.6-dioxypurine. **hypo-** $C_5H_4ON_4$ = 136.1. 6-Oxypurine. **imido-** Guanine. **methyl-** $C_6H_6O_2N_4$ = 166.1. 1-Methyl-2.6-dioxypurine. **para-** $C_7H_8O_2N_4$ = 196.2. 1.7-Dimethyl-2.6-dioxypurine, an isomer of theophylline. **pseudo-** Tauto-. **tauto-** $C_5H_4O_2N_4$ = 152.1. Pseudoxanthine. 2.6-Dihydroxypurine. A tautomeric form of **xanthine.** **tautohypo-** $C_5H_4ON_4$ = 136.1. A tautomeric form of hypoxanthine, q.v. **trimethyl-** Caffeine.

x. bases. Alloxuric bases, purines. A group of oxypurine derivatives in vegetable and animal tissues, *e.g.*, xanthine, hypoxanthine, uric acid, carnine, theophylline, caffeine, theobromine.

xanthinine. $C_4H_3O_2N_3$ = 125.05. A compound formed by heating ammonium thiourate.

xanthium. Spiny clotbur, cocklebur. The herb of *Xanthium spinosum*, a Compositae, containing essential oils and resins; used medicinally as a diuretic. *Cf. xanthostrumarin.*

xantho- A prefix derived from the Greek "yellow," indicating a yellow color of the compound; as in xanthocobaltic.

xanthochelidonic acid. $C_7H_8O_7$ = 202.0. Acetone dioxalic acid. *2.4.6*-Dioxypimelic acid, *2.4.6*-triketopimelic acid, *2.4.6*-triketoheptanedioic acid, $CO(CH_2.CO.COOH)_2$. An unstable acid formed from chelidonic acid by treatment with excess alkali. Its salts are yellow.

xanthochromium. The divalent group $Cr(NO_2)(NH_3)_5$ which forms salts:

x. bromide	$Cr(NO_2)(NH_3)_5Br_2$
x. carbonate	$Cr(NO_2)(NH_3)_5CO_3$
x. chloride	$Cr(NO_2)(NH_3)_5Cl_2$

The xanthochromates are usually soluble in water.

xanthocobaltic. The divalent group, $Co(NO_2)(NH_3)_5$, which forms yellow salts:

x. bromide	$Co(NO_2)(NH_3)_5Br_2$
x. chloride	$Co(NO_2)(NH_3)_5Cl_2$
x. chromate	$Co(NO_2)(NH_3)_5CrO_4$

The xanthocobaltates are usually soluble in water.

xanthocreatinine. $C_6H_{10}ON_4$ = 142.1. A yellow crystalline leukomaine resembling creatinine, in muscle tissues.

xanthogenate. A compound of the type $(RO.CS.S—)_2$. **diethyl-** $C_6H_{10}O_2S_4$ = 242.32. Bisethylxanthogene. EtO.CS.S—S.CS.OEt. A yellow liquid, b.92, used in oil solutions as an antiparasitic.

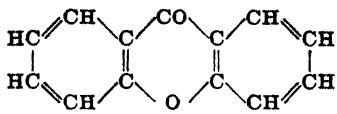
xanthogene. A coloring material of plants, producing a yellow pigment with alkalis.

xanthogenic acid. Xanthic acid.

xanthoglobulin. Hypoxanthine.

xantholine. Santonica.

xanthone. $C_{13}H_8O_2$ = 196.1. Xanthene-ketone, ketodiphenyleneoxide, dibenzo-γ-pyrone xanthenone, 9-ketoxanthene. Colorless crystals, m.173, b.$_{730mm}$.350; slightly soluble in water



or alcohol, soluble in ether. It is the nucleus of certain plant pigments; used in the synthesis of dyes (*e.g.*, euxanthone, India yellow). **dihydroxy- 1.7-** Euxanthone. **3.8- Isoeuxanthone.** **methoxydihydroxy-** Gentisin. **naphtho-** Naphthoxanthone. **thio-** See *thioxanthone*, **trihydroxy-** Gentisein.

xanthonic acid. Xanthic acid.

xanthophyll. $C_{40}H_{56}O_2$ = 568.4. A yellow vegetable pigment, m.192, similar to chlorophyll, which occurs in plants. It is a polymer of isoprene and related to carotene, q.v.

xanthophyllite. A native hydrous silicate of calcium, magnesium, iron and aluminum.

xanthopicrin. A yellow coloring matter from the bark of *Xanthoxylum cariboeum*, a Rutaceae.

xanthopicrite. A yellow resin from *Xanthoxylum* species.

xanthoprotein reaction. A reaction for proteins, in which a yellow substance is produced by boiling with nitric acid.

xanthopterin. The yellow pigment from the wings of the "brimstone" butterfly; family, *Pieridae.*

xanthopuccine. An alkaloid isolated from *Hydrastis canadensis.* Cf. *hydrastis.*

xanthopurpurin. $C_{14}H_8O_2(OH)_2$ = 240.13. 1.3-Dihydroxy anthraquinone, purpuroxanthene. A solid, m.263, soluble in alcohol.

xanthorhamnin. A glucoside and hydroxyflavone from buckthorn berries, *Rhamnus cathartica.* Cf. *rhamnoxanthin.*

xanthorhodium. The divalent group $Rh(NO_2)(NH_3)_5$, which forms a series of yellow salts:

x. bromide	$Rh(NO_2)(NH_3)_5Br_2$
x. chloride	$Rh(NO_2)(NH_3)_5Cl_2$
x. hydroxide	$Rh(NO_2)(NH_3)_5(OH)_2$

xanthorrhiza. Yellow root. The dried rhizome of *X. apiifolia*, a Ranunculaceae; used medicinally as a bitter tonic.

xanthosiderite. $Fe_2O_3.2H_2O$. A hydrated ferric oxide. Fine, yellow, stellate needles.

xanthosin. $C_{10}H_{10}N_4O_6$ = 268.14. Xanthinriboside produced from guanosin by deamination.

xanthostrumarin. A glucoside from *Xanthium strumarium*, cocklebur, a Compositae. Cf. *xanthium.*

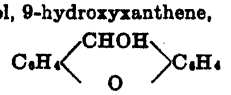
xanthoxylene. $C_{10}H_{16}$ = 136.1. **Xanthoxylin.** A terpene from the essential oil of *Xanthoxylum* species (Rutaceae).

xanthoxylin. (1) An alcoholic extract of xanthoxylum. (2) Xanthoxylene.

xanthoxylone. $C_{10}H_{12}O_4$ = 196.1. A crystalline principle from *Xanthoxylum.*

xanthoxylum. Prickly ash, yellow wood, angelica tree. The dried bark of *X. americanum*, *X. officinalis* (Rutaceae) or other species, containing xanthoxylene, essential oils, tannin and resin. Used medicinally, as fluid extract, as a diaphoretic and stimulant. Cf. *angelica tree, artar root.*

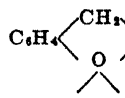
xanthydrol. $C_{13}H_{10}O_2$ = 198.08. Diphenyleneoxycarbinol, 9-hydroxyxanthene,



Used as a reagent for urea. Cf. *xanthene.*

xanthyl. The monovalent radical, $C_{13}H_9O$—, derived from xanthene. There are five isomers.

xanthylium. The radical



containing tetravalent oxygen; derived from xanthene.

xaxa. Acetylsalicylic acid.

xaxaquin. Quinine acetyl salicylate.

xble. Abbreviation for crucible.

xe. An obsolete symbol for xenon, X.

xenene. Biphenyl.

xenol. $C_{12}H_{10}O$ = 170.1. Xenenol, phenylphenol, PhC_6H_4OH. **o-** White solid, used as an antiseptic. **p-** White solid, used in the plastics industry to increase resistance to high temperatures and hot water.

xenolite. An aluminum silicate resembling fibrolite.

xenon. X or Xe = 131.3. A rare, heavy noble gas and element, atomic number 54; discovered by Ramsay and Travers, 1898, and named from the Greek, *ξενος*, strange. It occurs in small traces in the atmosphere (5/100,000 %), and consists of nine isotopes. A colorless gas, $d._{(air=1)}$4.422, $d._{(gas/liquid)}$5.887, m. −140, b. −107.1, triple point at −111.5°C and 600 mm.; insoluble in water and used in vacuum tubes.

Xenophanes. B.C. 576–480. A Greek philosopher of the Eleatic school, who suggested one of the earliest known theories of atomic structure which he believed to be continuous and completely filling space.

xenotime. YPO_4. A native yttrium phosphate, containing uranium and rare earth metals.

xenyl. The monovalent radical, PhC_6H_4— derived from diphenyl.

x. amine. $C_{12}H_{11}N$ = 169.1. *p*-Biphenylamine, *p*-phenylaniline, martylamine, $PhC_6H_4NH_2$, commercial aniline. White leaflets, d.1.160, m.53, b.302. Cf. *diphenylamine.*

xeroform. $Bi_2O_2(C_6H_2Br_3OH)$ = 796.8. Bismuth tribromphenol, bismuth tribromcarbolate. A yellowish-green powder, insoluble in water; used medicinally as an intestinal antiseptic and iodoform substitute.

xi. The Greek letter ξ or Ξ.

xiphidin. A ptomaine from the sperm of the sword fish, containing 81.5 % arginine.

xonotlite. $5CaO.5SiO_2.H_2O$. A constituent of boiler scales having a fibrous structure.

xray. See *x-ray.*

xylan. A hemicellulose in many trees and industrial wastes; *e.g.*, cotton seed hulls, corn cobs, corn stalks, peanut shells. On hydrolysis with sulfuric acid it yields xylose, q.v.

xylanbassoric acid. $C_{18}H_{28}O_{17}$ = 528.22. A hydrolysis-product of bassorin from gum tragacanth; soluble in cold water, hydrolysed to xylose.

xylene. C_8H_{10} = 106.12. Dimethylbenzene*, xylol, $C_6H_4Me_2$. **ortho-** or 1.2- A colorless liquid, d.0.881, m. −28, b.144.2; insoluble in water, soluble in alcohol or ether. **meta-** or 1.3- A colorless liquid, d.0.866, m. −54, b.139; insoluble in water, soluble in alcohol or ether. **para-** or 1.4- Colorless monoclinic crystals, m.15, b.135, insoluble in water, soluble in alcohol or ether. A mixture of all three hydrocarbons ("xylol") is used in microscopy as a solvent.

bromo- $Me_2C_6H_3Br$ = 184.99. Cf. *xylylbromide.* **4-*o*-** Liquid, d.1.369, m.0, b.214. **2-*m*-** Liquid, m. −10, b 206, **4-*m*-** b.207. **5-*m*-** b.204. **2-*p*-** d.1.356, b.206. **dihydroxy-** Xylenediol. **ethyl-** Dimethyl-ethyl*benzene.* **hydroxy-** Xylenol. **nitro-** See *nitroxylene.*

x. sulfonic acid. $C_8H_{10}O_3S$ = 186.18. (1.2.-4.)-$C_6H_2Me_2.SO_3H$. A liquid, b.19.

xylenediol. $C_8H_{10}O_2$ = 138.1. Xylylene alcohol, xylylol, phenyl-dicarbinol, benzene dicarbinol, $C_6H_4(CH_2OH)_2$. **ortho-** or α,α'-o-, or phthalyl alcohol. A solid, m.62. **meta-** or α.α'-m-, m.46. **para-** or α,α'-p-, or terephthalyl alcohol, m.112. They are used in organic synthesis.

xylenol. $C_8H_{10}O$ = 122.1. A group of dimethylphenols or hydroxy-dimethylbenzenes, $C_6H_3Me_2OH$. In the following list the first two numbers indicate the position of the two methyl groups; the third number that of the hydroxyl group; the boldface numbers refer to the methyl groups, assuming OH at position 1:

1.2.3- or **2.3**-	m.75, b.218
1.2.4- or **3.4**-	m.65, b.225
1.3.2- or **2.6**-	m.49, b.211
1.3.4- or **2.4**-	m.26, b.211
1.3.5- or **3.5**-	m.64,'b.219
1.4.2- or **2.5**-	m.74, b.211

Colorless crystalline powders; soluble in water or alcohol to varying extents.

xylenol blue. 1,4-Dimethyl-5-hydroxy benzene sulfonphthalein. An indicator used in biochemical work, which changes from red (pH = 1.2) to yellow (pH = 2.8), and from yellow (pH = 8.0) to blue (pH = 9.6).

xylic acid. $C_9H_{10}O_2$ = 150.13. Methyltoluic acid, dimethylbenzoic acid. $Me_2C_6H_3COOH$. Six isomers:

2, 3- or α-hemellitic acid	m.144
2, 4-	m.126
2, 5- or p- or *iso*xylic	m.132
2, 6- or v-	m.116
3, 4- or a-	m.165
3, 5- or mesitylinic acid	m.167

xylidene. Xylidine.

xylidic acid. $C_9H_8O_4$ = 180.1. 4-Methylisophthalic acid. The dibasic acid, $C_6H_3Me(COOH)_2$. **1.2.5.**- Colorless crystals, m.282. **1.2.4.**- Colorless crystals, m.325 (sublimes). **1.2.3**- Colorless crystals, m.144 (decomp.). Cf. *uvitic acid.*

xylidine. $C_8H_{11}N$ = 121.1. Xylidene. Methyltoluidines, dimethylanilines, aminoxylenes, $C_6H_3Me_2NH_2$. A group of aniline homologs in technical xylidine; used in the synthesis of dyes. In the following list, the first two numbers refer to the position of the methyl group; the third to that of the amino radical.

1.2.3- Liquid, d.0.991, m. −15, b.224
1.2.4- Crystals, d.1.076, m.49, b.225
1.3.2- Liquid, d.0.980, b.216
1.3.4- Liquid, d.0.990, b.212
1.3.5- Liquid, d.0.993, b.220
1.4.3- Liquid, m.15, b.217

They are slightly soluble in water, soluble in alcohol or ether.

xylidinic acid. Xylidic acid.

xylite. Xylitol.

xylitol. $C_5H_{12}O_5$ = 152.1. Xylite. The pentahydric alcohols derived from xylose, $CH_2OH(CHOH)_3CH_2OH$.

xylo- A prefix derived from the Greek "wood," and indicating a relation to wood.

xylochloral. A compound of chloral and xylose; colorless scales, m.132. Used medicinally as a hypnotic.

xyloidine. $C_6H_9O_5(NO_3)$ = 207.1. An explosive substance obtained by the action of nitric acid on starch or woody fibers.

xyloketose. $C_5H_{10}O_5$ = 150.1. A pentose-ketose corresponding with xylose and lyxose.

xylol. A mixture of xylenes, q.v.

xylolith. Wood-stone. A mixture of magnesia, magnesium chloride and sawdust which, on moistening, dries to an extremely hard mass; used for floors or laboratory tables.

xylon. Wood-cellulose.

xylonic acid. $C_5H_{10}O_6$ = 166.1. A monobasic acid, $CH_2OH(CHOH)_3COOH$, obtained by oxidation of xylose. Cf. *pentonic acid.*

xylonite. Celluloid.

xylonitrile. C_9H_9N = 131.08. Dimethylbenzonitrile. $Me_2C_6H_3CN$.

xylopal. Wood opal.

xyloquinone. $C_8H_8O_2$ = 136.1. Dimethylquinone. $C_6H_2Me_2O_2$, a homolog of quinol. **2.3-** A soluble solid, m.55 (sublimes). **2.6-** A soluble solid, m.72. **2.5-** A soluble solid, m.61 (sublimes). **3.5-** Phlorone.

xylorcinol. $C_8H_{10}O_2$ = 138.1. **1.3.4.6-** Dimethylresorcinol, methylorcinol. $C_6H_2Me_2(OH)_2$, a homolog of orcinol. White crystals, soluble in water, alcohol or ether, m.124, b.278.

xylose. $C_5H_{10}O_5$ = 150.1. Wood sugar. The pentose, $CH_2OH(CHOH)_3CHO$, obtained from xylan, straw or other vegetable fibers by heating with sulfuric acid. A colorless crystalline powder, m.140, soluble in water, slightly soluble in alcohol or ether; used in tanning, dyeing and as a diabetic food. Cf. *xylan, xylonic acid.*

xylosic acid. $C_5H_8O_6$ = 164.1. The aldehyde-acid, $CHO.(CHOH)_3COOH$, derived from xylose.

xylostein. A poisonous glucoside from the fruit of *Lonicera xylosteum*, a Caprifoliaceae and variety of honeysuckle.

xyloyl. The monovalent radical, $Me_2C_6H_3CO$—, derived from xylic acid; 7 isomers.

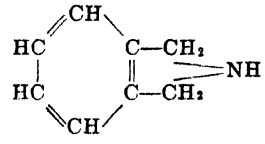
xylyl. (1) The monovalent radical, $CH_3C_6H_4CH_2$—, derived from xylene. It occurs in o-, m-, and p-types. (2) Dimethyl-phenyl. The monovalent radical, $Me_2C_6H_3$—. Cf. *tolyl.*

x. alcohol. (1) Xylenediol. (2) Tolyl carbinol. **x. bromides:** C_8H_9Br = 184.99. $MeC_6H_4CH_2Br$. Cf. bromo*xylene.* **o-** A solid, m.21, b.217.7. **m-** A liquid, d.1.371, b.215. **p-** A solid, d.1.324, m.38, b.221. The mixed isomers are a lachrymatory poison gas (T-stoff). **x. chloride.** C_8H_9Cl = 140.6. Monochlorxylene, tolylchloride, $CH_3.C_6H_4.CH_2Cl$. *ortho-* A colorless liquid, b.197; insoluble in water, soluble in alcohol or ether. *meta-* A colorless liquid, b.195; insoluble in water, soluble in alcohol or ether. *para-* A colorless liquid, b.192; insoluble in water, soluble in alcohol or ether. **x. hydrazine.** $C_8H_{12}N_2$ = 136.1. $C_6H_3Me_2NH.NH_2$. Colorless crystalline needles, m.85, soluble in ether.

xylylene. The divalent radical, $—CH_2.C_6H_4.CH_2—$, derived from xylene, in o-, m-, and p-types.

x. alcohol. Xylenediol. **x. amine.** X. diamine. **x. bromide.** $C_6H_4(CH_2Br)_2$. **x. carbinol.** Dimethylphenylethanol, $C_6H_3Me_2.CH_2.CH_2OH$. **x. chloride.** X. dichloride. **x. cyanides:** $C_{10}H_8N_2$ = 156.13. $C_6H_4(CH_2CN)_2$. *ortho-* m.59. *meta-* m.28, $b._{300mm}308$. *para-* m.98. **x. diamines:** $C_8H_{12}N_2$ = 136.2. Diaminoxylene. $C_6H_4(CH_2NH_2)_2$, and $C_6H_2Me_2(NH_2)_2$. Used in organic synthesis, in the manufacture of dyes. **x. dichlorides:** $C_8H_8Cl_2$ = 175.02. Phthalylchloride $C_6H_4(CH_2Cl)_2$. *ortho-* m.55, b.240. *meta-* m.34, b.252. *para-* m.98, b.245. **x. glycol.** Xylenediol.

xylylenimine. C_8H_9N = 119.1. Dihydroisoindole, the heterocyclic compound,



A yellowish liquid, b.213.

xylylol. Xylenediol.

xysmalobin. $C_{46}H_{70}O_{20}$ = 952.49 (with $5H_2O$ = 1122.59). A crystalline glucoside from the root of *Xysmalobium undulatum*, wild cotton, milkbush, iShongwe, an Asclepiadaceae of South Africa; used as an emetic by the Zulus.

Y

Y. The symbol for yttrium.
y. The second dimension in coordinates, q.v.
Υ. See *upsilon.*
γ. See *gamma.*
yaba bark. Andira bark, cabbage tree bark. The bark of *Andira excelsa.* Cf. *andirin, goa.*
yabine. An alkaloid from yaba bark.
yacca gum. Acaroid resin.
yajeine. Harmine.
yajenine. An alkaloid from yaje, an apocynaceous plant of Southern Columbia.
yam. The tubers of *Dioscorea* (q.v.) species, which contain much starch and are cultivated for food in the tropics; as, **cush-cush-** The y. of *D. trifida.* **negro-** The y. of *D. cayennensis.* **white-** The y. of *D. alata.*
yara-yara. β-Naphthyl-methylether.
yard. yd. A unit of length in the English system. 1 yard = 3 feet = 36 inches = 0.914402 meter. **square-.** yd.^{2} or sq. yd. = 836.13 sq. meters. **cubic-.** yd.^{3} or cu. yd. = 764.535 cubic centimeters.
yarn. A thread. **synthetic-** See *rayon.*
yarrow. The dried leaves and inflorescence of *Achillea millefolium,* a Compositae. Used medicinally, as the fluid extract, as a tonic, alterative and astringent.
yatren. Loretin.
yaw root. Stillingia.
Yb. The symbol for ytterbium.
yd. An abbreviation for yard.
year. A measure of time, q.v.; the period of the earth's revolution around the sun

anomalistic y. 365 days 6 hours 13 min. 48 sec.
ordinary y... 365 days 5 hours 48 min. 46 sec.
sidereal y.... 365 days 6 hours 9 min. 9 sec.
average civil y.365.2422 mean solar days = 3.155693×10^7 seconds.

light- A unit of astronomical distance; the distance which light travels in one year, 5.9×10^{12} miles or 9.4627×10^{12} km. **solar-** Ordinary y. **tropical-** Ordinary y.
yeast. Cerevisiæ. A group of unicellular vegetable organisms or fungi of the family *Saccharomyces.* They ferment sugars to carbon dioxide and alcohol by virtue of the enzymes (zymases) they contain. They also contain invertase, an enzyme which inverts unfermentable sugars (as cane sugar) to fermentable sugars. **baker-, beer-** Compressed y. The moist living cells of *Saccharomyces cerevisiæ* compressed with some starchy or other absorbent material. Used in baking, brewing, and fermenting; and as a vitamin-rich nutrient. **bottom-** Low-. **brewer's-** High- and low-. **copro-** A yeast that contains a large quantity of coproporphyrin. **compressed-** Baker's-. **dried-** Y. dried at a low temperature, for storage or transport purposes, without greatly impairing its vitality. **high-** Top y. It rises during fermentation and is used for brewing English beers. It is distinguished from low y. by the absence of melibiase, an enzyme which ferments raffinose. **low-** Bottom y. It falls to the bottom of the liquid it is fermenting; used in brewing German beers. (Cf. *high-.*) **pressed-** Baker's-. **top-** High-. **wild-** A yeast not grown as a pure culture. They are responsible for the diseases of beer.

y. food. A mixture of mineral substances (phosphates, etc.) added to a fermenting liquid to stimulate the activity of the y. **y. gum.** A mannan formed from a combination of the principal carbohydrates of the y. cells with glycogen. **y. nucleic acid.** A nucleic acid from the nucleoprotein of yeast.
yeatmanite. $(MnZn)_{16}Sb_2Si_4O_{29}$. A triclinic mineral from Franklin, New Jersey.
yellow. A primary color having a shade between the orange and green of the spectrum. **acid-** An amino-azo dye used in dyeing. **chrome-** Lead chromate. **fast-** An amino-azo dye used in dyeing. **indicator-** A pigment of the eye. It is yellow in acid and colorless in alkaline solutions, and serves as a light filter. **Queen's-** Mercuric subsulfate.

y. acid. *1.3*-Dihydroxynaphthalene-*5.7*-disulfonic acid. **y. arsenic.** Orpiment. **y. bark.** Cinchona. **y. brass.** Muntz metal. **y. copper.** Chalcopyrite. **y. copperas.** Copiapite. **y. dock.** Rumex. **y. dyes.** See *dyes.* **y. flag.** The root of *Iris pseudacorus,* used as astringent. **y. earth.** Ocher. **y. jasmine.** Rumex. **y. lead ore.** Wulfenite. **y. ore.** Chalcopyrite. **y. parilla.** Menispermum. **y. pigments.** See *cadmium yellow, chrome yellow, gamboge, Indian yellow, litharge, orpiment, ocher.* **y. precipitate.** Yellow mercuric oxide. **y. prussiate of potash.** Potassium ferrocyanide. **y. prussiate of soda.** Sodium ferrocyanide. **y. puccoon.** Hydrastis. **y. resin.** Acaroid resin. **y. root.** Xanthorrhiza. **y. sandalwood.** See *sandalwood.* **y. sanders.** Yellow *sandalwood.* **y. ultramarine.** Barium chromate. **y. wax.** (1) A variety of bees-wax. (2) A semisolid residue remaining after the distillation of petroleum. **y. wood.** Xanthoxylum.
yenite. Ilvaite.
yenshee. Opium dross. A poor grade quality of opium, consisting of the dregs and carbonized opium remaining after smoking. It may contain from 1 to 10 % morphine. Cf. *chandoo, mudat.*
yerba. (1) Spanish for "herb." (2) Maté. **y. buena.** Micromeria. The dried leaves of *Micromeria douglassi,* a Labiatae of the Pacific Coast. Used medicinally, as the fluid extract, as an aromatic and carminative. **y. mate.** Maté. **y. reuma.** The dried herb of *Frankenia grandifolia,* a Frankeniaceae; used medicinally as a mild astringent. **y. sagrada.** The dried herb of *Lantana braziliensis,* a Verbenaceae; it is an antipyretic. Cf. *lantanine.* **y. santa.** Eriodictyon.
yerbine. An alkaloid from *Ilex paraguayensis,* which resembles caffeine.
yew. Taxus.
yield. The proportion of finished material obtained from the raw materials used; the

percentage actually obtained of the amount obtainable theoretically.

yield-point. The stress at which a marked and permanent increase in the deformation of a substance occurs without an increase in the load.

-yl. (1) A suffix generally indicating a monovalent hydrocarbon radical; as, methyl, ethyl. (2) A suffix indicating the presence of oxygen in a radical; as hydroxyl, uranyl, vanadyl, carbonyl. Cf. *-ylene.*

ylangol. $C_{10}H_{18}O$ = 154.20. An isomer of geraniol from ylang-ylang oil.

ylang-ylang. A tree of the Philippine and Malayan Islands, *Cananga odorata*, an Anonaceae; the flowers are the source of an essential oil. **y. oil.** Cananga oil. The essential oil of the flowers of the tree, *Cananga odorata*, d.0.911–0.958, sapon. no 90–138. It is used in perfumery, and contains linalool, geraniol and pinene.

-ylene. A suffix, generally indicating a bivalent hydrocarbon radical; as, methylene, ethylene. Cf. *-yl, -ylium, -ene.*

-yne*. A suffix indicating an acetylene linkage. Cf. *-ine.*

yobirine. $C_{19}H_{16}N_2$ = 272.14. A decomposition product of yohimbine.

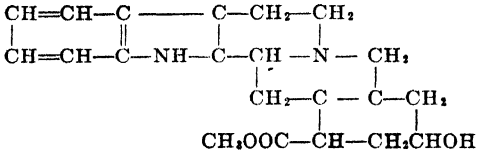
yoghurt. Soured milk used as a beverage in Hungary. Cf. *kefir.*

yohimbehe. The bark of *Corynanthe johimbe*, a Rubiaceae of the Cameroons, containing several alkaloids; used medicinally as an aphrodisiac.

yohimbenine. $C_{38}H_{45}O_6N_3$ = 603.6. Corynanthine. An alkaloid from the bark and leaves of yohimbehe.

yohimbic acid. $C_{20}H_{24}N_2O_3$ = 340.15. A monobasic acid derived from yohimbine, its methyl ester.

yohimbine. $C_{21}H_{26}O_3N_2$ = 352.15. Methyl yohimbate, corynine. An alkaloid from the bark of yohimbehe. White needles, m.234, slightly soluble in water, soluble in alcohol or ether. Cf. *aribine.*



y. hydrochloride. $C_{22}H_{28}O_3N_2.HCl$ = 404.8. Aphrodine. A colorless crystalline powder, soluble in water; used medicinally as an aphrodisiac.

yolk. The yellow part of an egg, which contains nutrient proteins and lecithins.

yoloy. A steel alloy containing small proportions of P, Ni and Cu.

yoshino. Tengujo. Kodzu. A strong thin paper used for making typewriter stencils; made in Japan from the fiber of the paper mulberry (*Broussonetia papyrifera*).

Young, James. 1811–1883. An English technical chemist noted for the development of the gas and oil industries. **Y., Sydney** 1857–1937. An English chemist, noted for boiling point laws. Cf. *Ramsay and Young equation.*

Young, Thomas. 1773–1829. An English physicist, noted for experiments in optics and mechanics. **Y.'s modulus.** Longitudinal elasticity. An elastic coefficient, or the force (dynes per cm.^{2} or pounds per in.^{2}) that will permanently deform a material by stretching, bending or twisting. The stretching modulus. $M = \text{stress/strain} = mgl/\pi r^2 s$, where s is the elongation produced by a weight, m, in a wire of length, l, and cross section of radius, r.

yperite. Mustard gas.

ysopol. $C_{10}H_{18}O$ = 154.20. A terpene-alcohol from hyssop.

Yt. Symbol for yttrium.

ytterbia. Ytterbium oxide.

ytterbite. Gadolinite.

ytterbium. Yb = 173.04. Neoytterbium, formerly supposed to be a mixture of aldebaranium and cassiopeium. A trivalent rare earth metal and element, atomic number 70, discovered by Marignac in 1878. **y. acetate.** $Yb(C_2H_3O_2)_3.4H_2O$ = 422.63. White hexagonal plates, d.2.09, soluble in water. **y. bromide.** $YbBr_3.8H_2O$ = 557.7. A green, hygroscopic crystalline powder, readily soluble in water. **y. chloride.** $YbCl_3.6H_2O$ = 388.0. Green rhombic crystals, d.2.575, m.150, soluble in water, alcohol or ether. **y. oxalate.** $Yb_2(C_2O_4)_3.10H_2O$ = 791.16. White crystals, d.2.644, insoluble in water. **y. oxide.** Yb_2O_3 = 395.2. Ytterbia. A white amorphous powder, d.0.17; insoluble in water, soluble in acids. **y. oxychloride.** YbOCl = 225.1. A white powder, insoluble in water. **y. sulfate.** $Yb_2(SO_4)_3$ = 635.41. A green crystalline powder, d.3.62, decomp. 900, soluble in water.

Ytterby. A small village in Sweden near which many rare earth minerals are found. The names *ytterbium, terbium, yttrium*, and *erbium* are derived from it.

yttergranate. A calcium-iron garnet, containing small amounts of yttrium compounds.

yttria. (1) Yttrium oxide. (2) Gadolinite. **y. group.** See *rare earth metals.*

yttrialite. $Y_2O_3.2SiO_2$. A green mineral, also containing iron and thorium.

yttrium. Y or Yt = 88.92. A trivalent rare-earth metal of the aluminum group and element, atomic number 39, discovered by Gadolin (1794) in gadolinite, which was separated by Mosander (1843) into yttria, terbia and erbia. A grayish-black, hexagonal, crystalline powder, d.3.8, which decomposes water and dilute acids; used in the manufacture of incandescent gas mantles. **y. acetate.** $Y(C_2H_3O_2)_3.8H_2O$ = 410.1. Colorless crystals, soluble in water. **y. bromide.** YBr_3 = 328.8. A white, deliquescent powder, very soluble in water. **y. carbonate.** $Y_2(CO_3)_3.3H_2O$ = 411.8. A pale reddish-white powder, insoluble in water, soluble in dilute acids. **y. chloride.** $YCl_3.6H_2O$ = 303.2. Pale red, transparent hygroscopic prisms, d.2.18, m.160, soluble in water or alcohol, insoluble in ether. **y. hydroxide.** $Y(OH)_3$ = 139.7. A white, gelatinous precipitate or amorphous powder, decomp. by heat, insoluble in water, soluble in alkalis, acids or ammonium salt solutions. **y. minerals.** The complex ores gadolinite, anerodite, rowlandite, thalenite, xenotime and yttrialite. **y. nitrate.** $Y(NO_3)_3.6H_2O$ = 382.8. Colorless or pale-red crystals, d.2.682, soluble in water or alcohol. **y. oxalate.** $Y_2(C_2O_4)_3.9H_2O$ = 603.98. A white crystalline powder, slightly soluble in water. **y. oxide.** Y_2O_3 = 225.0. Yttria. Colorless crystalline powder, d.5.035, insoluble in water and soluble in acids. **y. sulfate.** $Y_2(SO_4)_3.8H_2O$ = 610.1. Small, reddish-white crystals, d.2.612, decomp. 1000,

slightly soluble in water, soluble in sodium chloride or sulfate solutions. **y. sulfide.** Y_2S_3 = 274.0. A lemon-yellow powder, d.3.91, m.1900–1950, insoluble in water.

yttrocerite. A native mixed fluoride of yttrium, cerium, erbium and calcium.

yttrotantalite. $Y_4(Ta_2O_7)_3$. A tantalate of the rare earths, with iron and calcium. It contains helium.

yttrotitanite. A siliceous calcium titanate, which contains oxides of yttrium, aluminum and iron.

yucca. Adam's needle, Spanish bayonets. A Liliaceae, *Y. filamentosa*, of Southern California, Texas and Mexico, whose leaves furnish a fiber.

Yukawa particle. Heavy electron.

yukon. Heavy electron; a name in honor of Yukawa.

yulocrotine. $C_{19}H_{26}O_3N$ = 316.21. An alkaloid from *Julocroton Montevidensis*, an Euphorbiaceæ.

Z

Z. The symbol for: (1) atomic number (German: Atom Zahl); (2) grm.-equivalent weight.

z. (1) The third dimension of co-ordinates, q.v. (2) Symbol for the valency of an ion.

zaffer. Zaffre. A mixture or cobalt oxides and arsenates obtained by roasting cobalt ores. It is a raw material for the production of cobalt compounds.

zaffre. Zaffer.

zala. Borax.

zanaloin. The aloin from aloes of Zanzibar.

zaratite. $NiCO_3,2Ni(OH)_2.5H_2O$. Emerald nickel. A native nickel carbonate.

zea. (1) A genus of annual grasses to which Indian corn (maize) belongs. (2) Corn-silk, the fresh styles and stigmas of *Zea mays*, the maize plant; used medicinally, as the fluid extract, as a diuretic.

zearin. $C_{42}H_{88}O_4$ = 776.8. A colorless principle from various lichens.

zeaxanthin. $C_{40}H_{56}O_2$ = 568.4. A carotenoid (q.v.) coloring material from maize, egg yolk and many plants, isomer of xanthophyll and lutein. Yellow leaflets, m.101, optically inactive.

zebromal. $C_{11}H_{12}O_2Br_2$ = 336.0. Ethyldibromcinnamate, ethylphenyldibrompropionate, Ph.CHBr.CHBr.COOEt. A white, crystalline powder, insoluble in water, soluble in alcohol or oils; used medicinally as a sedative and hypnotic.

zedoary. The dried rhizomes of *Curcuma zeodaria*, a Zingiberaceae of the East Indies. It contains an essential oil, resin and mucilage, and like ginger is used as a stomachic and carminative. **z. oil.** The volatile oil of z., a dark viscid liquid, d.0.990–1.010, b.240–308, containing cineol.

Zeeman, Pieter. 1865–1943. A Dutch physicist noted for his development of the spectrum theory. **Z. effect.** A resolution of spectral lines observed when the source of light, as a flame, is placed in a strong magnetic field; the single lines are divided into three fine lines (a triplet).

zein. A prolamine from maize; it contains no tryptophane, cystine or lysine.

Zeisel method. The determination of methoxy groups by hydriodic acid. **Z. reaction.** The formation of methyl iodide from the reaction of methoxy-compounds with hydroiodic acid:

$$(1)\ ROMe + HI = R.OH + MeI$$
$$(2)\ MeI + AgNO_3 = AgI + MeNO_3$$

The silver iodide is weighed and the MeO-group calculated.

zelio paste. A rat-poison containing thallium.

Zellner's paper. Fluorescein paper.

Zenker's solution. A fixative and preservative for biological specimens: 2.5 gm. $K_2Cr_2O_7$, 1 gm. Na_2SO_4, 5 gm. $HgCl_2$, 5 cc. acetic acid in 100 cc. H_2O.

zeolite. A group of hydrated aluminum and calcium or sodium silicates capable of reacting in solution, by double decomposition, with salts of the alkali and alkali-earth metals. They are of the general type $Na_2O.2Al_2O_3.5SiO_2$ and $CaO.2Al_2O_3.5SiO_2$; some are used for water softening. Cf. *organolite*.

analcine	$NaAlSi_2O_6(H_2O)$
chabazite	$CaAl_2Si_4O_{12}(H_2O)_6$
heulandite	$CaAl_2Si_6O_{16}(H_2O)_5$
natrolite	$Na_2Al_2Si_3O_{10}(H_2O)_2$
stilbite	$CaAl_2Si_6O_{18}(H_2O)_6$
thomsonite?	$(Ca,Na_2)Al_2Si_2O_8(H_2O)_2$

artificial- Permutite. **organic-** A synthetic resin having the properties of a zeolite.

zephiran chloride. A mixture of high molecular weight alkyldimethylbenzylammonium chlorides; it is a cationic detergent and antiseptic.

zephirol. An earlier name for zephiran chloride.

zero. (1) The complete absence of a particular quantity. (2) The point at which a scale has the value of 0, *e.g.*, the zero of centigrade, the temperature of freezing water. **absolute-** See *absolute zero*.

zewaphosphate. A fertilizer (30 % P_2O_5) obtained by treating sulfite cellulose waste liquor with crude phosphates.

zeyherine. An alkaloid from the seeds of *Erythrina zeyheri*, a Leguminosae of South Africa.

zibet. Civet.

Ziehl's stain. Carbol-fuchsin.

Ziervogel process. A method of extracting silver by roasting the sulfide to produce silver sulfate, leaching this with water, and precipitating metallic silver with copper.

zinc. Zn = 65.38. A metal and element, atomic number 30, known to the Hindus and observed by Agricola, but described by Paracelsus in 1520. A bluish-white, brittle metal, d.6.7–7.2, m.419, b.918, insoluble in water, and soluble in acids or hot solutions of alkalis. Zinc occurs in nature principally as sulfide, carbonate and silicate. It is used as a reducing agent (indigo vats), in alloys, in the metal industry, and in the manufacture of zinc compounds. Chemically pure zinc is a reagent for the production of hydrogen (arsenic test). World production (spelter) 1941: 1,710,000 long tons; U.S.A. (647,000 tons) > Germany > Canada. **activated-** Zinc which has been granulated in the presence of cadmium sulfate for use in the Marsh test (q.v.) for arsenic. **butter of-** Zinc chloride. **granulated-** Metallic zinc in the form of distorted granules, prepared by pouring the molten metal into water. **powdered-** Finely powdered Zn used as reagent. Cf. *zinc dust*.

z. acetate. $Zn(C_2H_3O_2)_2.3H_2O$ = 237.5. Colorless, monoclinic plates, d.1.72, m.242, soluble in water or alcohol. Used as a reagent, as a mordant in dyeing, in the manufacture of glazes for porcelain, and medicinally as an emetic and in gargles and disinfectants. *fused-* $Zn(C_2H_3O_2)_2$ = 183.4. A white, fused mass, soluble in water. **z. albuminate.** A compound of albumin and zinc. Yellowish scales, slightly soluble in water. **z. alkyls.** A group of organic com-

pounds of the general type, ZnR_2, in which R is an alkyl radical:

zinc methide, $ZnMe_2$	(q.v.)
zinc ethide, $ZnEt_2$	(q.v.)
zinc propyl, $ZnPr_2$	b.146
zinc isopropyl, $Zn(CHMe_2)_2$	b.136
zinc isobutyl, $Zn(CH_2CHMe_2)_2$	b.166
zinc isoamyl, $Zn(CH_2CH_2CHMe_2)_2$	b.210

z. alkyl condensation. Frankland's reaction. A synthesis of hydrocarbons, in which zinc is removed from a zinc alkyl as hydrate or iodide: $2R_3CI + ZnMe_2 = 2R_3CMe + ZnI_2$. **z. alum.** Aluminum zinc sulfate. **z. amalgam.** A mixture of zinc and mercury, used as a reducing agent, or in electric batteries. **z. ammonium salts.** Complex salts of the type $Zn(NH_3)_4Cl_2.H_2O$, $Zn(NH_3)_6SO_4$ etc. analogous to copper-ammonium salts. **z. arsenate.** $ZnHAsO_4$ = 205.4. A white, amorphous powder, slightly soluble in water, soluble in acids. Cf. *adamite*. **z. arsenide.** Zn_3As_2 = 346.06. **z. arsenite.** $Zn(AsO_2)_2$ = 279.4. A colorless powder; insoluble in water, soluble in acids. **z. ashes.** The oxidized z. removed from the surface of a galvanizing bath. **z. benzoate.** $Zn(C_7H_5O_2)_2$ = 307.46. A white powder; soluble in water. **z. biborate.** Z. tetraborate. **z. bichromate.** Z. dichromate. **z. blende.** Sphalerite. **z. bloom.** Z. oxide. **z. borate.** $ZnB_4O_7.7H_2O$ = 346.7. An amorphous, white powder, used medicinally as a dusting powder and antiseptic. **z. bromate.** $Zn(BrO_3)_2$ = 321.31. A white, hygroscopic powder, m.100, soluble in water; used as an antiseptic. **z. bromide.** $ZnBr_2$ = 225.2. Colorless, hygroscopic needles, d.4.219, m.394, b.690; soluble in water, alcohol or ether. Used as a reagent, and medicinally as a sedative and antispasmodic. **z. butter.** Z. chloride. **z. carbonate.** $ZnCO_3H_2O$ = 143.40. Tutia. A white, rhombic, crystalline powder, d.4.44, decomp. 300, insoluble in water; used as an antiseptic in face powders. Cf. *zinc spar*. **z. chlorate.** $Zn(ClO_3)_2.6H_2O$ = 340.4. Colorless, hygroscopic crystals, m.60; soluble in water or alcohol. **z. chloride.** $ZnCl_2$ = 136.3. Zinc butter. A white, deliquescent, octahedral, crystalline powder, d.2.907, m.365, b.730, soluble in water, alcohol or ether. Used as a reagent for alkaloids; solvent for cellulose; medicinally as an antiseptic, astringent, and escharotic; as a preservative, in embalming material; as a mordant; and in soldering, as a flux. **z. chloroiodide.** A mixture of zinc iodide and chloride. Used as the saturated solution as a microchemical test for cellulose (blue color) and tannin (violet or red color). **z. chloroiodide solution.** Naegeli's solution. A microchemical test solution prepared by decomposing hydrochloric acid with zinc and saturating the solution with potassium iodide and iodine; cf. *Herzberg's stain*. **z. chromate.** $ZnCrO_4.7H_2O$ = 307.6. Zinc yellow, buttercup yellow. A yellow powder, soluble in water; used as a pigment. **z. citrate.** $Zn_3(C_6H_5O_7)_2.2H_2O$ = 610.3. A white amorphous powder, slightly soluble in water, used medicinally as an antiepileptic. **z. copper couple.** A sheet of zinc coated with a black deposit of copper by immersion in an acid solution of copper sulfate. It liberates nascent hydrogen from acid solutions, and will reduce nitrates to ammonia. Hence its use in water analysis for the determination of small quantities of nitrates. **z. cyanide.** $Zn(CN)_2$ = 117.4. Colorless orthorhombic prisms, decomp. by heat, insoluble in water or alcohol, soluble in cyanide solutions. Used as an insecticide, and medicinally as a disinfectant and anthelmintic. **z. dichromate.** $ZnCr_2O_7$ = 281.6. Z. bichromate. An orange-yellow powder; soluble in water. **z. diethyl.*** Z. ethide. **z. dimethyl.*** Z. methide. **z. dithiofuroate.** $(C_4H_3OCS_2)_2Zn$. Furac II. A brown powder used as accelerator in the vulcanization of rubber. **z. dust.** (1) Finely-divided zinc, used as a reducing agent. (2) The flue-dust of smelters, containing zinc, zinc oxide and impurities; used as a gray paint. **z. ethide.** $Zn(C_2H_5)_2$ = 123.5. Zinc ethyl. Diethyl zinc.* A colorless liquid which ignites on contact with air, d.1.18, m.−28, b.118; violently decomp. by water. Used in organic synthesis. **z. ethyl.** Z. ethide. **z. ethylsulfate.** $Zn(C_2H_5SO_4)_2$ = 315.5. Colorless hygroscopic leaflets, soluble in water or alcohol. **z. ferrocyanide.** $Zn_2Fe(CN)_6.3H_2O$ = 396.7. A white powder, insoluble in water or alcohol, soluble in ammonia water. Used as an antiseptic. **z. flowers.** Z. oxide. **z. fluoride.** ZnF_2 = 103.4. A white powder, slightly soluble in water. **z. fluosilicate.** $ZnSiF_6.6H_2O$ = 315.53. Hexagonal prisms, d.2.104, very soluble in water. **z. foil.** Sheets of zinc prepared by heating the metal to 100–150°C. and rolling it. **z. formate.** $Zn(CHO_2)_2$ = 155.4. Colorless crystals, d.2.36, soluble in water, insoluble in alcohol, used medicinally as an antiseptic. *dihydrate.* $Zn(CHO_2)_2.2H_2O$ = 191.43. Monoclinic white crystals, d.2.205, soluble in water. **z. glycerophosphate.** $Zn(C_3H_7O_2)PO_4$ = 235.44. A white, amorphous powder, soluble in water, insoluble in alcohol or ether; used medicinally. **z. hydroxide.** $Zn(OH)_2$ = 99.4. A white powder or rhombic prisms, d.3.053, decomp. by heat, insoluble in water, soluble in acids or alkalis. **z. hypophosphite.** $Zn(H_2PO_2)_2.H_2O$ = 245.4. White, deliquescent crystals; soluble in water. Used medicinally as an antiseptic and astringent. **z. iodate.** $Zn(IO_3)_2$ = 415.1. A white, crystalline powder; slightly soluble in water. **z. iodide.** ZnI_2 = 319.2. A colorless powder or octahedral crystals, d.4.696, m.446, b.625, decomp. by further heat, soluble in water, alcohol or ether. Used as a reagent for detecting chlorine and narceine, and medicinally as an alterant and antiseptic. **z. iodide-starch paper.** A white filter paper, impregnated with a zinc iodide-starch solution. Used to detect free chlorine, iodine or ozone (blue color). **z. iodide-starch solution.** A solution of zinc iodide and soluble starch; used as a test-reagent for oxidizing agents, and as an indicator. **z. lactate.** $Zn(C_3H_5O_3)_2.3H_2O$ = 297.5. A colorless, crystalline powder, slightly soluble in water; used medicinally as an antiepileptic. **z. malate.** $ZnC_4H_4O_5$ = 197.4. A white, crystalline powder, soluble in water. **z. methide.** $Zn(CH_3)_2$ = 95.43. Zinc methyl, dimethyl zinc.* A clear, colorless liquid which ignites on contact with air, $d._{16}°1.39$, m.−40, b.46, decomp. by water or alcohol. Used in organic synthesis. **z. methyl.** Z. methide. **z. minerals.** Zinc occurs in nature widely diffused as sulfide, carbonate and silicate:

sphalerite (regular)	ZnS
wurtzite (hexagonal)	ZnS
zincite	ZnO
gahnite, zinc spinel	$ZnAl_2O_4$
franklinite	$ZnFe_2O_4$

smithsonite, zinc spar	$ZnCO_3$
hydrozincite, zinc bloom	$Zn_5(OH)_4CO_3$
willemite	Zn_2SiO_4
calamine	$Zn_2H_2SiO_5$
goslarite	$ZnSO_4.7H_2O$

z. monochloracetate. $Zn(C_2H_2ClO_2)_2$ = 252.35. A colorless powder, soluble in water; used medicinally as an antiseptic. **z. nitrate.** $Zn(NO_3)_2.6H_2O$ = 297.50. Colorless, tetragonal crystals, d.2.065, m.36, b.130, soluble in water, alcohol or ether. Used as a reagent, medicinally as an escharotic, and as a mordant in dyeing. **z. nitride.** Zn_3N_2 = 224.16. A green powder, readily decomp. by water to zinc oxide and ammonia. **z. oleate.** $Zn(C_{18}H_{33}O_2)_2$ = 625.89. A white, greasy, granular powder; insoluble in water, soluble in alcohol, ether or benzene; used in ointments, and as a drier in varnishes. **z. oxalate.** $ZnC_2O_4.2H_2O$ = 189.4. A white powder, d.2.562, slightly soluble in water, soluble in acids or alkalis. **z. oxide.** ZnO = 81.4. Philosopher's wool. A colorless, amorphous powder or hexagonal crystals, d.5.42, insoluble in water, soluble in acids, alkalis or ammonium salt solutions. Used as a reagent and neutralizing agent, in the manufacture of rubber goods, glass, pigments, cosmetics, and dusting powders; medicinally as an antiseptic and sedative. **z. oxide cement.** See *dental cement*. **z. perborate.** $Zn(BO_3)_2$ = 183.0. A white, amorphous powder, insoluble in water; used as an oxidizing agent and antiseptic in cosmetics. **z. perhydrol.** Z. peroxide. **z. permanganate.** $Zn(MnO_4)_2.6H_2O$ = 411.5. Dark brown, nearly black, deliquescent lustrous crystals, soluble in water. Used as an oxidizing agent, astringent and antiseptic. **z. peroxide.** ZnO_2 = 97.4. Zinc perhydrol. A yellowish-white, voluminous powder, insoluble in water, decomp. by acids. Used as a bactericide and antiseptic. **z. phenate.** $Zn(C_6H_5O)_2$ = 251.46. Zinc carbonate. A white powder; slightly soluble in water. Used medicinally as a dusting powder and antiseptic. **z. phenolsulfonate.** $Zn(C_6H_5SO_4)_2$ = 411.60. Zinc sulfophenate, z. sulfocarbolate. Colorless prismatic crystals, soluble in water or alcohol; used medicinally as an antiseptic. **z. phosphate.** $Zn_3(PO_4)_2$ = 386.2. A white powder or prisms, d.3.878, m. at red-heat, insoluble in water or alcohol, soluble in acids or ammonium salt solutions. Used as a reagent, and medicinally, as an antiseptic, tonic and astringent. *ortho-* Z. phosphate. *pyro-* $Zn_2P_2O_7$ = 304.8. A white powder, insoluble in water or alcohol, soluble in acids, alkalis or ammonium salt solutions. **z. phosphide.** Zn_3P_2 = 258.2. A spongy, gray, metallic mass or a dark gray powder, d.4.72, decomp. in moist air, insoluble in water or alcohol, decomp. by acids. Used medicinally as a phosphorus substitute, and as a reagent in making hydrogen phosphide. **z. phosphite.** $ZnHPO_3$ = 145.4. A white, granular powder, soluble in water; used medicinally as a tonic and antiseptic. **z. picrate.** $Zn[C_6H_2O_2(NO_2)_3]_2$ = 489.47. A yellow, crystalline, explosive powder; used medicinally in its hydrated form as an antiseptic. **z. potassium cyanide.** $K_2Zn(CN)_4$ = 247.7. Colorless crystals, soluble in water; used medicinally as a tonic. **z. potassium iodide.** K_2ZnI_4 = 651.1. Colorless crystals, soluble in water; used as a reagent. **z. potassium sulfate.** $K_2Zn(SO_4)_2$ = 335.7. Colorless, hygroscopic crystals; soluble in water. **z. pyrophosphate.** See *z. phosphate*. **z. rhodanide.** Z. thiocyanate. **z. salicylate.** $Zn(C_6H_4OHCOO)_2.3H_2O$ = 393.5. Colorless needles, soluble in water or alcohol. **z. silicate.** $ZnSiO_3$ = 141.3. A white powder, insoluble in water. **z. silicofluoride.** $ZnSiF_6.6H_2O$ = 315.4. Colorless crystals, soluble in water. **z. spar.** $ZnCO_3$. A native zinc carbonate, and an important zinc ore. **z. spinel.** Gahnite. **z. stearate.** $Zn(C_{18}H_{35}O_2)_2$ = 632.0. A white, granular, greasy powder, insoluble in water. Used medicinally as an antiseptic and dusting powder, and as a drier for varnishes and paints. **z. succinate.** $ZnC_4H_4O_4$ = 181.4. A white powder, insoluble in water. **z. sulfanilate.** $Zn(C_6H_4NH_2SO_3)_2.4H_2O$ = 481.5. Nizin. A colorless powder, insoluble in water, soluble in alcohol; used medicinally as an astringent and antiseptic. **z. sulfate.** $ZnSO_4$ = 161.45. *anhydrous-* Colorless crystals or a white fused mass, d.3.49, soluble in water. *dihydrate-* $ZnSO_4.2H_2O$ = 197.48. Fused sticks or white powder, soluble in water. *heptahydrate-* $ZnSO_4.7H_2O$ = 287.6, crystalline or common-, zinc vitriol, white vitriol. White, rhombic, prismatic, or monoclinic crystals, d.2.015, m.50; soluble in water, alcohol or ether. Used as a reagent, for standardizing volumetric solutions; for precipitating proteins; medicinally, as an antiseptic eye-wash, gargle and emetic; as a mordant in dyeing and textile printing; as a preservative for skins and woods; as a weed killer and in the manufacture of paints and varnishes. **z. sulfide.** ZnS = 97.4. Yellowish or grayish-white hexagonal or tetragonal crystals, d.3.98, m.1049; insoluble in water, soluble in acids. Used as a pigment and as a reagent in testing the acidity of soils. Cf. *Sidot's blende*. **z. sulfite.** $ZnSO_3.2\frac{1}{2}H_2O$ = 190.49. A white, crystalline powder, slightly soluble in water, soluble in ammonium salts solutions; used as a preservative for anatomical specimens, and as an antiseptic. **z. sulfocarbolate.** Z. phenolsulfonate. **z. sulfocyanate.** Z. thiocyanate. **z. sulfhydrate.** $Zn(SH)_2$ = 131.4. A white powder, insoluble in water, decomp. when dry (so it is kept under water); used as an intestinal antiseptic. **z. tartrate.** $ZnC_4H_4O_6$ = 213.5. A white powder, slightly soluble in water. **z. tetraborate.** ZnB_4O_7 = 220.7. Zinc borate, z. biborate. A white powder, insoluble in water, soluble in acids; used as an antiseptic. **z. thiocyanate.** $Zn(CNS)_2$ = 181.5. Z. rhodanate. Z. sulfocyanate. White deliquescent crystals, soluble in water. **z. valerate.** $Zn(C_5H_9O_2)_2.2H_2O$ = 303.5. A white, crystalline powder, soluble in water or alcohol, used medicinally as an antispasmodic and astringent. **z. vitriol.** Z. sulfate. **z. white.** (1) Z. oxide. (2) A mixture of 80 % ZnO and 20 % $BaSO_4$ (German usage). **z. yellow.** Z. chromate.

zincamide. $Zn(NH_2)_2$ = 97.43.

zincate. A salt of amphoteric zinc hydroxide, of the type, M_2ZnO_2. They form various hydrated ions, in solution; as, $Zn(OH)_3^-$, $Zn(OH)_3^{--}$.

zincic acid. The amphoteric form of zinc hydroxide: $H_2ZnO_2 \rightleftharpoons Zn(OH)_2$.

zincite. A rare red, native zinc oxide, ZnO; hardness 4–4.4, d.5.4–5.7.

zincography. Process engraving. The reproduction of pictures, graphs, etc. on zinc plates, the surface of which is first coated with special wax, on which is drawn or photographed the

picture to be printed. A strong acid dissolves the zinc not covered by the drawing etc., which is thus left in relief like a printer's type.

zinethyl. Zinc ethide.

zingerone. $C_{11}H_{14}O_3$ = 194.1. *4*-Hydroxy-*3*-methoxyphenylethyl (methyl) ketone, $MeCOCH_2CH_2C_6H_3(OH)OMe$. A ketone with a pungent taste, in ginger. Colorless crystals, m.41, $b._{14mm}$188 slightly soluble in water. Cf. *capsicin*.

zingiber. Ginger.

Zingiberaceae. See *Scitaminaceae*.

zingiberene. $C_{15}H_{24}$ = 204.19. *1*-Methyl-*4*-propenylcyclohexane. A sesquiterpene from oil of ginger; d.0.872, b.279.

zingiberol. $C_{15}H_{26}O$ = 222.2. An alcohol, $b._{14mm}$157, from ginger.

zinin. Azoxybenzene.

zinkenite. $PbSb_2S_3$. A native lead sulfo-antimonite.

zinkite. Zincite.

zinnkies. Cu_2FeSnS_4. A native copper and iron sulfostannate.

zinnwaldite. $(K, Li)_2FeAl_2Si_6O_{16}F_2$. A pale violet, yellow or brown lithia-mica.

zippeite. A native uranium sulfate, which contains less than 5 % of copper oxide.

zircon. $ZrSiO_4$. Ostranite. Jargon. A native zirconium silicate. Fairly transparent, yellow crystals, d.4.68–4.70, hardness 7.5; used as a source of Zr compounds. The transparent orange-colored variety is a gem (hyacinth, jargon). See *starlite*, *malacon*, *oerstedite*, **z. alba.** Zirconium oxide.

zirconate. A salt of amphoteric zirconium hydroxide of the type, M_2ZrO_3.

zirconia. Zirconium oxide.

zirconic acid. Zirconium hydroxide. **z. anhydride.** Zirconium oxide.

zirconium. Zr = 91.22. A rare earth-metal and element of the carbon-group, atomic number 40, discovered by Klaproth in 1789. A silver-white, crystalline or gray amorphous metal, d.4.15 (cryst.) 6.53 (amorphous), m.2130, insoluble in water or acids, soluble in hydrofluoric acid, aqua regia or molten alkalis. It has a valency of four and forms 3 series of compounds: normal, Zr^{++++}; basic ZnO^{++} (zirconyl); and ZrO_3^{--} (zirconates). Used in steel manufacture as a deoxidizer, denitrifier and desulfurizer, in the form of silicon-zirconium or ferrosilicon zirconium; in many alloys for wires and filaments; as a "getter" in radio tubes; as an x-ray filter; with 40 % Mg as flash powder; coated on aluminum foil for flash bulbs; and for making Cs from $Cs_2Cr_2O_7$. World production in 1941, 14,000 short tons; U.S. > India > Brazil > Madagascar. **z. bromide.** $ZrBr_4$ = 411.0. **Z. tetrabromide.** A white powder, decomp. violently by water to form zirconyl bromide. **z. carbonate.** Zirconyl carbonate. **z. chloride.** $ZrCl_4$ = 232.8. **Z. tetrachloride.** Colorless lustrous crystals, subliming 350, decomp. by water to zirconyl chloride; used in organic synthesis (Friedel-Craft reaction). **z. dioxide.** Zirconium oxide. **z. fluoride.** ZrF_4 = 167.2. Colorless crystals d.4.433, m. at red heat, insoluble in water. **z. hydroxide** $Zr(OH)_4$ = 159.2. A colorless, amorphous powder, insoluble in water, soluble in acids with the formation of Zr^{++++} and ZnO^{++} ions, and in alkalis with formation of ZrO_3^{--} ions. **z. iodide.** ZrI_4 = 599.1. Very hygroscopic, brownish-red crystals soluble in water. **z. nitrate.** Zirconyl nitrate. **z. oxide.** ZrO_2 = 123.2. Zirconia, zircon alba, **z.** anhydride, **z.** dioxide, native as baddeleyite, zirkite and becarite. It occurs in three crystalline forms as a heavy, white powder, m.2730, insoluble in water or acids, soluble in hot sulfuric acid or hydrofluoric acid. It is a durable refractory and an effective opacifier of fused enamels, glass, and glazes; also used in the manufacture of Welsbach mantles, with silica and graphite for safe and vault walls, and medicinally in x-ray photography as a substitute for bismuth salts. **z. oxybromide.** Zirconyl bromide. **z. oxychloride.** Zirconyl chloride. **z. silicate.** See *zircon*, *auerbachite* and *azorite*. **z. sulfate.** $Zr(SO_4)_2.4H_2O$ = 355.4. A colorless, crystalline powder, soluble in water; used as a reagent for potassium. **z. tetrachloride.** Z. chloride.

zirconyl. The divalent ZrO= radical. **z. bromide.** $ZrOBr_2$ = 267.1. Zirconium oxybromide. A colorless, very deliquescent powder, decomp. in moist air. **z. carbonate.** $ZrOCO_3$ = 167.22. An amorphous, white powder, insoluble in water, soluble in acids. **z. chloride.** $ZrOCl_2$ = 178.14. Zirconium oxychloride, basic zirconium chloride. Colorless, long, silky needles; soluble in water or alcohol. **z. hydroxide.** $ZrO(OH)_2$ = 141.24. A white, amorphous powder, insoluble in water, soluble in alkalis or acids. **z. nitrate.** $ZrO(NO_3)_2$ = 231.24. A white, crystalline powder, soluble in water or alcohol; used in the manufacture of Welsbach mantles. **z. phosphate.** $(ZrO)_3(PO_4)_2.8H_2O$ = 655.79. A colorless, dense, amorphous powder; insoluble in water.

zirkite. ZrO_2. A native zirconia ore from Brazil; used as fire-brick, cement and opacifier.

zirlite. $Al(OH)_3$. A light-yellow, native, aluminum hydroxide.

Zn. The symbol for zinc.

zoetrope. An early name for the cinematograph.

zoisite. $Ca_2Al_3(OH)(SiO_4)_3$. Thulite. A native, calcium, aluminum orthosilicate, which gives its name to a group of silica minerals, q.v.

Zöller, Philipp. 1833–1885. A German chemist, noted for agricultural and biochemical work.

zone. Any area or space of interest; especially a region of oriented molecules. Cf. *orientation*. It differs from a phase (which is homogeneous with molecules in random directions) since it is heterogeneous with molecules oriented. Many colloidal phenomena and processes are thereby explained; as, adsorption (wetting and flotation), protective colloid action, gel formation, thixotropy, the passivity of metals. **interfacial-** The layer of oriented A and B molecules between two phases A and B. **micellar-** A region of oriented molecules, either isolated or continuous, in a surrounding phase (which may be absent, as, in an elastic gel). **monomolecular-** A layer of oriented C molecules between two phases A and B. **polar-** A z. which consists of oriented dipoles; as in solvates, q.v.

zoo- A prefix derived from the Greek, indicating a relation to "animals."

zoochemistry. A branch of biological chemistry dealing with the composition of and reactions occurring in animal organisms.

zoogloea, zoogloea. A firm gelatinous mass, consisting of bacteria embedded in a jelly-like matrix.

zoology. A branch of biological science that deals with the classification, structure and function of animals.

zoomaric acid. $C_{16}H_{28}O_2$ = 240.22. Hexadecenoic acid. The monobasic acid $Me(CH_2)_5CH:CH(CH_2)_8COOH$, from marine animal oils such as cod-liver and whale oils. It is probably identical with palmitoleic acid.

zoospore. A mobile spore, or swarm spore, produced by many fungi.

zoosterol. A sterol (q.v.) of animal origin; *e.g.*, cholesterol.

zootoxin. A poison derived from an animal; as, bufotalin, venoms.

Zosimos of Panopolis. Middle 5th. century B.C. A Greek writer of Egypt, who wrote 20 chemical works, and show that the term "chemistry" is not of Arabic origin (*περι της χημειας* = On Chemistry).

Zr. The symbol for zirconium.

Zsigmondy, Richard. 1865–1929. An Austrian chemist, noted for his research on colloids. **Z. filter.** A series of graded ultra-filters for separating ultramicroscopical particles or colloids from solutions, according to their sizes. They consist of semi-permeable membranes of varied compositions and degrees of permeability; used in analytical and physiological chemistry.

zuckerin. Saccharin.

zwitter-ion. A complex ion that is both positively and negatively charged; as, $R\begin{matrix}X^- \\ Y^+\end{matrix}$ *e.g.*, $^+NH_3.R.SO_3^-$ or $^+NH_3.R.COO^-$. Cf. *amphoteric.*

zygadenine. $C_{39}H_{63}O_{10}N$ = 705.5. An alkaloid from the bulbs of *Zygadenus nuttalli*, a Liliaceae of the Rocky Mountains. It resembles veratrine.

zygograph. (Greek; "zygon," a "yoke.") A diagram showing the relationship between the composition of a vapour and that of a liquid in equilibrium with it; used in distillation problems.

zygote. A fertilized cell. See *gamete.*

zyklon. Hydrocyanic acid absorbed in fuller's earth, used in fumigation.

zylonite. Celluloid.

zymase. An enzyme of yeast that splits sugar into alcohol and carbon dioxide. It can be separated from the yeast cell and still retain its activity. Cf. *invertase.*

zyme. A ferment, especially a disease-producing ferment or virus.

zymin. An acetone-dried yeast.

zymochemistry. The chemistry of fermentation.

zymo-excitor. A kinase, or substance that converts a zymogen into an active enzyme.

zymogen. The mother-substance of an enzyme; a substance secreted from tissues or glands that is split into an active enzyme and protein by the action of a kinase or zymo-excitor.

zymohexose. A monosaccharide that ferments readily; as, d-glucose, d-fructose, d-mannose.

zymohydrolysis. Zymolysis.

zymology. A branch of science that deals with the action and composition of ferments or enzymes.

zymolysis. Zymohydrolysis. A hydrolytic or other chemical reaction produced by an enzyme.

zymoplasm. Thrombase.

zymosis. Fermentation, or reactions caused by enzymes.

zymosterol. $C_{27}H_{44}O$ = 384.3. A sterol (q.v.) from yeast, m.108, $[\alpha]_D$ +17.3°, insoluble in water.

zymurgy. A branch of chemistry that deals with the application of enzymes in brewing, distilling or wine-making. In its broader meaning it includes the processes of fermentation for manufacturing purposes, as in the tobacco, cheese, indigo or leather industry.