THE
NATIONAL FORMULARY

EIGHTH EDITION

NATIONAL FORMULARY VIII

N. F. VIII

PREPARED BY THE COMMITTEE ON NATIONAL FORMULARY
UNDER THE SUPERVISION OF THE COUNCIL
BY AUTHORITY OF THE
AMERICAN PHARMACEUTICAL ASSOCIATION

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By virtue of the authority conveyed in Chapter III, Article VI and Chapter VIII, Article V of the By-Laws of the American Pharmaceutical Association, the Council of the Association has appointed the Committee on National Formulary, has approved the text prepared by this Committee, and authorized the printing and distribution thereof, and has fixed April 1, 1947, as the date upon which the National Formulary, Eighth Edition, shall become official.

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Ann Arbor, Mich. (1953)

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[1] Absent on leave from Committee on National Formulary because of military duty outside the continental United States, August 16, 1942, to November 2, 1945.
[2] Elected September 12, 1943, to replace H. A. K. Whitney.
[3] Elected April 23, 1944, to replace Adley B. Nichols.
[4] Elected to replace R. A. Deno, August 16, 1942, to November 2, 1945
[5] Resigned March 30, 1944.
[6] Resigned September 10, 1943.

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PREFACE

Authority—The National Formulary is revised by the Committee on National Formulary under the direct authority and supervision of the Council of the American Pharmaceutical Association, as provided in Chapter VIII, Article V, of the By-Laws of the Association, which follows:

"ARTICLE V. *Committee on National Formulary.* The Committee on National Formulary shall consist of a Chairman elected by the Council for a term of ten years and ten members elected by the Council to serve for a term of one, two, three, four, five, six, seven, eight, nine, and ten years, respectively; each vacancy occurring from expiration of term shall be filled by election for a term of ten years; other vacancies shall be filled by election for the unexpired term. The Committee shall elect a Vice-Chairman and a Secretary from its own membership. This Committee shall serve as an executive committee of revision of the National Formulary; the members shall serve as chairmen of the sub-committees of the Committee and shall nominate to the Council additional participating members of each subcommittee to the number of not more than five, at least one member of each subcommittee to be a retail pharmacist. The Committee on National Formulary shall report annually, or as often as required, to the Council."

Copyright Use—By action of the Council of the American Pharmaceutical Association, adopted March 8, 1916, and published on pages 433 and 551 of Volume V of the *Journal of the American Pharmaceutical Association,* the use of the copyright text of the National Formulary is permitted under the following conditions:

"The *partial reproduction* of the text of the National Formulary by periodicals, text-books and works of reference, for the purpose of comment, *such as cannot be used as a substitute for the National Formulary,* will be permitted, provided the form of reproduction is first approved by the Committee on Publications of the American Pharmaceutical Association. The *substantial reproduction* of the text of the National Formulary in such a way as to permit of such reproduction being used in lieu of the National Formulary is prohibited, except after approval of the form and under an agreement for compensation to be determined in each particular case by the Committee on Publications and approved by the Council of the American Pharmaceutical Association."

Applications for use of the copyright should be made to the Secretary

of the American Pharmaceutical Association, DR. ROBERT P. FISCHELIS, 2215 Constitution Avenue, N. W., Washington 7, D. C.

Accelerated Revision—The eighth edition of the National Formulary is the second to be published under a plan adopted by the Council of the American Pharmaceutical Association in 1938 for the publication of revisions at five- instead of ten-year intervals. This plan together with a provision for the issuance of supplements makes it possible for the National Formulary to keep abreast with the rapid development of new drugs and to issue interim revisions promptly when needed.

N. F. Scope—The General Principles followed by the Committee on National Formulary in the compilation of the eighth edition have not been materially changed from previous editions. The purpose continues to be the establishment and promulgation of official standards for drugs. The admission of drugs to this edition has, as in the past, been based not only on therapeutic value, but also upon the extent of use.

Style—The arrangement of monographs on drugs and titles is different from the plan followed in previous editions. Latin titles are continued but are preceded by English titles. Monographs are arranged in alphabetic sequence but in a different order than heretofore so that a monograph on a basic drug is followed by monographs on its official preparations. In order to facilitate the use of the new arrangement, a marginal index is included. This departure from traditional arrangement is one of the most noticeable innovations to be found in this edition. Greater emphasis than heretofore has been placed upon the use of the metric system. All doses are expressed in the metric system of weights or measures, printed in boldface type and followed in parentheses by the approximate equivalent in the Apothecaries' system in less prominent type.

Publicity—During the period since the publication of N. F. VII information on all revision plans has been made available by means of the Association's bi-monthly publication, the *Bulletin of the National Formulary Committee*. Galley proof and page proof for the text of the National Formulary were widely distributed to representatives of all branches of the pharmaceutical profession. Through the use of these media many helpful suggestions and recommendations were received and adopted by the Committee on National Formulary.

Coupon—A coupon will be found on the back of the title page as in previous editions of the National Formulary, bearing the number of the copy and the following words: "National Formulary, Eighth Edition,

Official Copy. Copyright, 1946, by the American Pharmaceutical Association." This coupon serves to identify an official copy of the National Formulary and should not be removed.

Official Date—The Council of the American Pharmaceutical Association has determined the date on which N. F. VIII is to supersede the seventh edition of the National Formulary. This date is April 1, 1947.

Assistance—The Committee on National Formulary has had the benefit of valuable cooperation from many who are not members of the Committee, but who have voluntarily given of their time and knowledge in supplying information upon which many decisions have been based. Special appreciation is expressed for their services. The voluntary character of a large proportion of the work of revision has been supplemented by the utilization of the services of the American Pharmaceutical Association Laboratory which has been in operation since 1936. The contributions of the staff of this laboratory to the revision program of the National Formulary has more than met the expectations of the American Pharmaceutical Association at the time of the establishment of the laboratory.

Valuable advice and assistance have been furnished by several departments of the government and particularly by the Food and Drug Administration, the U. S. Bureau of Standards, and the National Institute of Health of the U. S. Public Health Service.

Of great value to the Committee on National Formulary has also been the assistance rendered by the members of the Combined Contact Committee of the American Drug Manufacturers Association and the American Pharmaceutical Manufacturers Association. Several individual pharmaceutical manufacturers have also supplied the Committee on National Formulary with information upon which some specifications have been based.

Members of the Scientific Section of the Essential Oil Association of U. S. A. have contributed greatly to the revision of the monographs on essential oils and aromatic chemicals. Specifications for reagent chemicals have been adapted from those established by the Committee on Analytical Reagents of the American Chemical Society. In the development of monographs for several of the newly admitted drugs, we have drawn freely on specifications prepared by the Council on Pharmacy and Chemistry of the American Medical Association and published in "New and Nonofficial Remedies." The assistance of the American Dental Association and the use of information in "Accepted Dental Remedies" is also acknowledged with thanks. Information on

biological stains furnished by Dr. H. J. Conn and Mrs. A. P. Bradshaw, of the Biological Stain Commission, has been particularly useful in the revision of specifications for dyes used as biological stains.

Through the cordial cooperation of Dr. E. Fullerton Cook, Chairman of the Revision Committee of the United States Pharmacopœia, several features which the Pharmacopœia and the National Formulary have in common have been made uniform. The sections on General Notices and General Tests, Processes and Apparatus of the National Formulary have been brought into complete agreement with comparable sections in the United States Pharmacopœia. We wish to express our appreciation to the Board of Trustees of the U. S. Pharmacopœia for permission to reproduce parts of the section on General Tests, Processes and Apparatus of U. S. P. XIII in N. F. VIII.

The Chairman wishes to acknowledge gratefully the assistance of Dr. Melvin W. Green, Chief Chemist of the American Pharmaceutical Association Laboratory, in directing the laboratory work essential to the development of specifications for newly admitted drugs and for writing the preliminary drafts of many of the monographs on these drugs.

The Chairman also acknowledges with gratitude, the constant encouragement, advice, and assistance rendered during the revision period by Dr. George D. Beal, Chairman of the Council, and of the Committee on Publications, and by Dr. Robert P. Fischelis, Secretary and General Manager of the American Pharmaceutical Association.

Many individuals not officially connected with the Committee on National Formulary have contributed to this edition. Following is a list of those who have given outstanding assistance.

LIST OF THOSE NOT MEMBERS OF THE COMMITTEE OR SUB-COMMITTEES WHO HAVE BEEN OF ESPECIAL ASSISTANCE DURING THE REVISION

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HISTORY OF THE NATIONAL FORMULARY

THE National Formulary is a product of the American Pharmaceutical Association.

One of the earliest problems of the Association was found to be the standardizing of formulas for unofficial preparations which were being used by physicians, and many of which, while intended for practically the same purposes, varied in unimportant characteristics or proportions. The multiplicity of preparations which differed in non-essential proportions of constituents, or in colors or flavors, burdened both the pharmacist and the physician, and some method of standardizing such preparations by a recognized authority was needed.

As early as 1856, four years after the organization of the American Pharmaceutical Association, a committee was appointed by the President "to collect and present to the next meeting . . . unofficial formulas in local use with many physicians of our Union." At the meeting in 1857, this committee of ten reported formulas for eighty-one preparations which were accepted by the Association as a basis for an unofficial formulary. The committee was continued, and the following year eighteen additional formulas were submitted. But the second report contained a hint that unfavorable criticism had been voiced, and to avoid dissension, the committee was discontinued.

This criticism was due to a prejudice against formulas for elixirs, which were then a new and interesting development in pharmacy, but which were suffering from an excess of liberties in formulas and in variety which amounted in many cases to an abuse. The interest in this new type of preparations led the committee to offer formulas for the leading kinds, and these formulas met a persistent opposition which resulted in a temporary abandonment of the work. Succeeding years witnessed a series of periodic efforts to revive the work by the appointment of new committees, but these committees often failed to report or made reports which were met by debates, sometimes acrimonious, which discouraged interest in them. Such conditions prevailed until 1883, when two books appeared which acted as a decided stimulus to the Association's program for a formulary.

One of these was a book on *Elixirs* containing 283 formulas for these preparations, compiled and published by Professor John Uri Lloyd of

Cincinnati. The other work was the *New York and Brooklyn Formulary*, issued by a joint committee appointed by the College of Pharmacy of the City of New York, the German Apothecaries' Society of New York City, and the King's County Pharmaceutical Association.

This second book was designed particularly to meet the needs of the pharmacists of New York City and vicinity, but it immediately found a wider field. It contained 81 formulas, of which 52 were for elixirs, 10 for emulsions, and the remaining 19 for miscellaneous preparations.

Stimulated by the interest in these books, the Association appointed another committee on unofficial formulas, including the following prominent members of the Association: J. W. Colcord, J. T. Shinn, N. Hynson Jennings, Charles Becker, J. D. Wells, S. A. D. Sheppard, A. Vogeler, W. M. Alexander, Emlen Painter, and C. L. Keppler.

The next year, this committee reported that a number of formulas had been collected, some of which had been tested, and the work was well begun. Professor Lloyd had offered the use of any formulas in his book on *Elixirs* which might be desired, and a request had been made to the committee in charge of the *New York and Brooklyn Formulary* for permission to use that work as a basis for a national formulary. The committee work was severely handicapped by the wide geographical distribution of its members, which prevented meetings and required much time for correspondence.

The committee therefore recommended that another committee be appointed to continue the work, to consist of five members in some locality where meetings could be held frequently.

The following committee was then appointed by the President: Chairman, Charles Rice, P. W. Bedford, W. P. DeForest, S. J. Bendiner, and A. Tsheppe, all of New York or Brooklyn. This committee reported later that an agreement had been made with the societies controlling the *New York and Brooklyn Formulary*, and the following resolution was presented by A. E. Ebert and adopted by the Association:

"WHEREAS, Our Committee on Unofficial Formulas reports that the several pharmaceutical bodies under whose auspices the *New York and Brooklyn Formulary* has been published have signified their willingness, without remuneration and for the benefit of the profession at large, to surrender to the American Pharmaceutical Association all interest in said Formulary; therefore,

"*Resolved*, That the American Pharmaceutical Association accept and publish the same in the forthcoming Proceedings with its approval and endorsement, and that its Committee on Unofficial Formulas be directed

to continue and complete the revised edition of the Formulary now well under way, with a view to making it national in character; and,

"*Resolved*, That said revision when completed, be published by the American Pharmaceutical Association in such form as to place it within easy reach of all pharmacists."

The committee was then reappointed for the succeeding year, and held meetings weekly during that time, being assisted by committees specially appointed for the purpose by the pharmaceutical organizations of New York and of Brooklyn, and by correspondence with various state pharmaceutical associations.

The report of the committee, made in 1886, embodied a draft for a national formulary of unofficial preparations consisting of 414 titles, with, in most cases, the formulas offered therefor, which was published in the Proceedings of that year.

The committee of five was again continued and there was added to it one representative of each state pharmaceutical association.

The name of the committee was then changed to "The Committee on National Formulary."

The first edition of the *National Formulary of Unofficial Preparations*, as it was entitled, was published in 1888. The reason for this title is shown in the following significant paragraph in the final report of the committee: "Your Committee is convinced that it only expresses the unanimous sense, not alone of the members of the Association, but of all progressive and fair-minded pharmacists throughout the land, that there is and shall be only one standard as to quality and strength to be followed for all official preparations, viz., the United States Pharmacopœia; and that therefore the National Formulary—which is, at most, intended only as a stepping-stone from and to that authority—is a standard only for those preparations which are not provided for by this official work; and further, that from the moment when the United States Pharmacopœia shall provide a formula, or a standard for any article or preparation now or hereafter contained in the National Formulary, the authority of the latter regarding this article or preparation ceases and is abolished."*

The first edition contained only formulas for preparations, of which

* This statement is of historical interest only. It has not been reaffirmed by any Committee on National Formulary since 1888. It must not be construed as a statement of principle by this or any other Committee on National Formulary since that date. By the terms of the Federal Food and Drugs Law of 1906, and the Federal Food, Drug, and Cosmetic Act of 1938, the National Formulary occupies the same official position as the U. S. Pharmacopœia.

there were 435. The titles were arranged alphabetically and the apothecaries' system of weights and measures was employed with few exceptions. The book included 86 elixirs, 51 fluidextracts, 41 solutions, 35 syrups, 32 tinctures, 27 pills, 11 emulsions, 19 mixtures, 15 powders, and smaller numbers of the other classes of preparations.

Regarding the scope of this edition the report of the committee says: "The National Formulary to be published under the authority of the American Pharmaceutical Association may contain the formulas of such preparations as were either formerly official in the United States Pharmacopœia and have been discarded, though still in demand, or such as have never been official but deserve recognition because more or less in general use. Among the latter may be any preparation contained in foreign pharmacopœias, if there is known to be sufficient demand for it in any section of the country. It shall also contain the preparations belonging to the so-called 'elegant pharmacy,' but it shall not be encumbered with purely technical, trivial or fancy preparations."

This policy has prevailed throughout subsequent editions of the book.

The Second Edition of the National Formulary

By direction of the Association, another committee of five was immediately appointed to revise the book, headed by Professor C. Lewis Diehl. This committee was supplemented by one member representing each state pharmaceutical association and also the pharmaceutical associations of Canada.

A new issue to follow closely the seventh revision of the Pharmacopœia was decided upon. The seventh revision of the Pharmacopœia appeared in 1894, and the first revision of the National Formulary was submitted in 1895, and published in 1896.

The second edition contained 454 formulas for pharmaceutical preparations. The formulas were in the metric system, but, for convenience of dosage, the apothecaries' system was used in stating the amount of active constituents in the preparations.

In 1900 an *Epitome of the National Formulary*, prepared by Chairman Diehl, was published by the Council of the Association. This Epitome contained statements of the amount of active component constituents in each preparation, but not the complete formulas, and gave the average doses of each in both the metric and the apothecaries' systems. It also included therapeutic suggestions for the use of the preparations, and a therapeutic index. No epitome has been prepared for the successive editions.

The Third Edition of the National Formulary

In 1899, the Association authorized an addendum, to consist of additional formulas; but on consideration, the chairman advised against it, and recommended a second revision of the book to follow as closely as possible the eighth revision of the Pharmacopœia. He also recommended that for this revision the committee should consist of the five members appointed by the President of the Association and an additional ten selected by the chairman. This plan was followed, and the revision committee of the third edition consisted of fifteen members, under the chairmanship of C. Lewis Diehl.

The third edition was published in 1906, about a year after the publication of the eighth revision of the Pharmacopœia. It contained a total of 617 formulas, of which 502 were in the main part of the book and 115 were in an appendix, the latter including all the formulas which had been deleted from the Pharmacopœia. In this revision, 49 preparations were added and 17 were dropped. Formulas were printed in both the metric and the apothecaries' systems, but not as equivalents, and the double system gave rise to some criticism and confusion. Doses were introduced, and in this edition, the previous practice of numbering the formulas was abandoned.

Very soon after the publication of this third edition, the passage of the Federal Food and Drugs Act made the Pharmacopœia and the National Formulary the legal standards for drugs and medicines, and placed a new responsibility upon them. This unexpected situation caused a new scrutiny of the book by the committee, and a few corrections in formulas were made at once. But the work stood the test well, and remained substantially without change until the next revision.

The Fourth Edition of the National Formulary

The revision committee for the fourth edition consisted of fifteen members, again under the chairmanship of C. Lewis Diehl. This committee was appointed by the Council of the Association for the full period of revision. In September, 1908, the committee held a meeting at Hot Springs, Arkansas, and for three days discussed plans for revision, and considered each formula in the book.

The title was changed to *The National Formulary* because, under its new legal status, it could no longer be considered as containing "unofficial" formulas. The term "Addendum" was dropped to avoid misunderstanding regarding the legal status of any part of the book.

Also to meet the needs as a legal authority, standards were prepared for those ingredients of the formulas that were not contained in the current Pharmacopœia.

These monographs for drugs and chemicals used in the formulas were prepared in cooperation with the Committee on Standards of the Association, and were largely the work of the latter committee; they were placed together in the Fourth Edition, thus dividing the book into Part I and Part II, the formulas constituting the first part.

The Fourth Edition was published in 1916, soon after the appearance of the ninth revision of the Pharmacopœia. It contained 596 articles in Part I, of which 584 were formulas for preparations and 12 were general monographs on some of the classes of preparations. In this edition, the policy of including all formulas which were dropped from the Pharmacopœia was discontinued, and only such deleted formulas as were in continuous demand were selected for admission to the National Formulary. Of the 584 formulas, 201 were new; 183 formulas of the third edition were not included. Part II contained 188 articles, all of which were new to the National Formulary, and were used in the formulas of Part I.

A chapter on "Sterilization" was introduced as a guide for operations and methods in this field. Fluidglycerates were introduced in this revision.

A supplement to the N. F. IV was authorized, but was not found necessary.

In this revision an effort was made to secure the cooperation of the American Medical Association, and a committee from that Association met with the National Formulary Committee on two different occasions. The results were disappointing, mainly because of the attitude of the medical men in favor of a strictly therapeutic judgment, while the policy of the National Formulary as to scope is necessarily that of therapeutic non-responsibility. The relations with the medical men were cordial, and help in revision was received from them.

In 1917, the Council of the American Pharmaceutical Association adopted a resolution by which the financial accounts of the National Formulary were to be kept separate, and half of the net profits were to be continuously set aside as a Research Fund of the Association, the income to be used to promote pharmaceutical research. This is to be exclusive of the expenses of the Revision Committee in the work that it may do to improve or devise formulas, or to obtain scientific or other information relating directly to the revision in course.

In 1918, the Council of the Association decided that future committees of revision should consist of fifteen members, appointed for a period of ten years, and should conduct the revision simultaneously with that of the U. S. Pharmacopœia.

The Fifth Edition of the National Formulary

The revision committee was appointed by the Council in 1919, and the Committee elected Wilbur L. Scoville as chairman. The plan of dividing the book into Part I and Part II was continued, and Part III was added. An attempt was made to enlist the interest and cooperation of allied professions by special invitations to the National Dental Association and the American Association of Veterinary Physicians, to appoint cooperating committees. Both associations responded, and those committees submitted special dental and veterinary formulas which found a place in the Fifth Edition.

Two conference meetings were held by the committee. The first convened at Longport, New Jersey, in 1920, at which the general principles to govern the revision were adopted. The second conference was held at Atlantic City, New Jersey, in June, 1921.

The Fifth Edition was published early in 1926, and became official on July 1, 1926. It contained 565 articles in Part I, of which 550 were formulas for preparations, and 15 were descriptive monographs on the leading types of preparations. One hundred and twenty of the articles in Part I were new, including 7 ampul solutions and 7 tablet formulas, which were forms of medication not hitherto officially recognized. One hundred and fifty-four of the formulas in Part I of the Fourth Edition were not admitted to the Fifth Edition.

Part II contained 214 drug and chemical titles, all of which were ingredients of the formulas in Part I. Fifty-four of these were new to the Formulary, and 28 of those in the Fourth Edition were not included in the Fifth Edition.

The total number of titles in Parts I and II of the Fifth Edition was 779.

Part III contained 101 pages of Tests, Reagents, and Tables. The reagents included Diagnostic Reagents and Clinical Tests, and the tables were under the headings: Alcohol Strengths, Average Doses, Solubilities, and Active Components of Preparations.

The chapter on Sterilization was continued. Those preparations of

the U. S. P. IX which were not admitted to the U. S. P. X were admitted to the N. F. V only if they were considered to be in sufficient demand.

The Sixth Edition of the National Formulary

In 1929, the Council appointed a committee of fifteen members to prepare the Sixth Edition. Edmund N. Gathercoal was elected as chairman, and the committee was divided into nine subcommittees for the work of revision. The Chairman of the Committee of Revision of the United States Pharmacopœia was made an associate member by the Council and given voting powers by the committee, but was not asked to do active work in revision problems. The National Dental Association appointed a special associate committee of its members for the consideration of dental formulas, and an associate committee was appointed by the American Veterinary Medical Association for the consideration of veterinary formulas. Thus were established direct contacts with these associations. An associate committee was also appointed by the American Pediatric Society. Four special subcommittees were formed, as the work developed.

The outstanding features of the Sixth Edition may be summarized as follows:

1. The admission of monographs for drugs and chemicals which are not included in the U. S. Pharmacopœia XI, or in the formulas of National Formulary VI.

The action to permit such admissions was initiated by the National Formulary Committee and confirmed by the Council of the American Pharmaceutical Association. Under this permission, five vegetable drugs and twenty-one chemicals have been admitted. Some of these were formerly official in U. S. Pharmacopœia IX and U. S. Pharmacopœia X, and others were unofficial. Many are extensively used in prescriptions.

2. The admission of items on the basis of a *definite* extent of use in medical practice in the United States.

The extent of use was determined by four surveys undertaken by the National Formulary Committee as follows:

(*a*) A survey to determine the extent of use of the preparations of National Formulary V in the drug stores and dispensaries of the United States was conducted in 1930. Carefully prepared check-lists on the extent of use of these preparations were returned by 213 prescription pharmacies, 75 hospital pharmacies, and 625 drug stores, representing nearly every state in the Union.

(*b*) A similar survey to determine the extent of use of a large list of unofficial preparations was conducted in the same group of pharmacies and stores.

(*c*) A survey was initiated by the National Formulary Committee to determine the number of prescriptions compounded in drug stores in the United States. Dr. Robert L. Swain, of Baltimore, took the leading part in this survey, and determined the number of prescriptions filled during the year 1930 in every drug store in Maryland. Work of this kind was also done, though not so extensively, in Illinois, Florida, Indiana, and other places. This survey indicated that about two prescriptions per inhabitant of the United States were compounded annually in the drug stores of the United States.

(*d*) A survey of the ingredients used in prescriptions was conducted by the National Formulary Committee during the years 1930 and 1931 under the direct advice of the Bureau of the Census of the United States. The prescriptions were read under a carefully prepared plan by expert pharmacists engaged for the purpose in New York, Maryland, Missouri, and California. A total of 121,924 prescriptions was read, and the ingredients listed. The results of this survey and of six earlier surveys extending back to 1886 were incorporated into a published report, in book form, known as *The Prescription Ingredient Survey.*

On the basis of this extensive study of the use of medicines in the United States, the National Formulary Committee adopted the tentative rule that items to be admitted must be used in at least 20 per cent of the drug stores in the United States or must be an ingredient in at least one of each 10,000 prescriptions compounded in the United States. Only a few exceptions to this rule have been permitted, mostly for items that were "pharmaceutical necessities."

3. The omission of formulas from many monographs of simple preparations, such as the extracts, fluidextracts, ampuls, tablets, etc.

This was done to eliminate certain restrictions on the manufacture of these preparations. In the general monograph covering each of these types of preparations, ample directions in detail are included to guide in the manufacture of larger or smaller quantities of the preparation.

4. The extensive development of ampul and tablet monographs and of the section on Materials and Preparations for Diagnostic Use.

Especial credit is given to the Combined Contact Committee of the American Drug Manufacturers' Association and the American Pharmaceutical Manufacturers' Association for important contributions to

the ampul and tablet monographs. The tolerance statements and assay processes have been largely contributed by this Committee.

5. The admission of glandular powders and the development of histological descriptions of them.

Credit is to be given to a special subcommittee appointed for the study of these glandular products, and particularly to Dr. H. W. Youngken, of Boston, for the preparation of the histological descriptions of these powders, thus insuring adequate means for the determination of their identity and purity.

6. The development and use of many additional assays of the chemical type, the proximate type, and the biological type.

7. The arrangement of all of the monographs alphabetically, thus eliminating Parts I, II, and III. Also the placing of the history of the National Formulary at the rear of the book so that the general notices and monographs follow immediately after a short preface.

The Sixth Edition was issued in 1935, and became official June 1, 1936. It contained 481 preparation monographs and 208 monographs on drugs and chemicals. Of these items, 232 were new to National Formulary VI, and of these, 84 were items from U. S. Pharmacopœia X. The total number of monographs in National Formulary V not admitted to National Formulary VI, was 321, of which 246 were monographs of preparations, and 75 were monographs of drugs and chemicals.

Since this edition completed about fifty years of National Formulary history as a published authority, a comparison of the contents of the several editions, particularly with regard to the leading classes of pharmaceutical preparations, is instructive as indicating the main developments of pharmacy during this fifty-year period.

	N. F. I	N. F. V	N. F. VI
Ampuls	0	7	28
Elixirs	86	65	54
Emulsions	11	5	4
Extracts	2	13	14
Fluidextracts	51	104	71
General Monographs	2	15	7
Glandular Products	0	0	7
Glycerites	7	5	6
Infusions	2	4	3
Liniments	8	10	9
Lotions	4	7	6

	N. F. I	N. F. V	N. F. VI
Miscellaneous	54	75	42
Mixtures	19	13	4
Ointments	5	19	21
Pastes	0	7	8
Petroxolins	0	17	3
Pills	27	23	12
Powders	15	13	7
Salts, Effervescent	10	9	9
Solutions	41	37	32
Spirits	12	11	10
Sprays	0	5	4
Syrups	35	37	25
Tablets	0	7	48
Tinctures	32	55	46
Troches	0	2	1
Wines	12	0	0
Total Preparations	435	565	481
Drug and Chemical Monographs	0	214	208
Total Monographs	435	779	689

During this period fluidglycerates, glycerogelatins, mulls, and wines have had their day and have been replaced. Formulas for preparations have steadily decreased in the Pharmacopœia, and now a diminishing demand is indicated in the National Formulary. Biological products have replaced some of the old drugs and remedies. The National Formulary now functions under very different conditions and purposes from those which it faced in its beginning.

The Seventh Edition of the National Formulary

Following the publication of N. F. VI late in 1935, it soon became apparent that it was necessary for revision work to continue. Correction lists and supplements had to be issued, and it appeared to be desirable to continue the revision program with the thought that the Seventh Edition should be issued as nearly as possible at the end of a five-year instead of a ten-year period. Accordingly, the Committee on National Formulary, elected in 1929, continued its revision program.

The work of the Committee on National Formulary was supplemented by the special committees listed below:

Ampul and Tablet Committee
Committee on Antisepticity Tests
Committee on Clinical Laboratory Preparations
Committee on Color Names in the Botanical Monographs
Committee on Color Names in the Chemical Monographs
Committee on Extractive Preparations
Committee on Ingredients of Bacteriological Media
Committee on Standards for Glandular Powders
Advisory Subcommittee of the Combined Contact Committee

Thus, for the first time in the history of the National Formulary plans were formulated and became effective leading to two revisions within a decade.

In 1938, the Council of the American Pharmaceutical Association formally adopted a plan for the publication of more frequent revisions of the National Formulary. It approved plans for the issuance of the Seventh Edition of the National Formulary in 1940 or 1941, approximately five years after the publication of the Sixth Edition. The Committee on National Formulary which had revised N. F. V, and produced N. F. VI, was charged at that time with the responsibility of preparing the manuscript for the Seventh Edition, and directed to have it as nearly completed as possible by May, 1940. So that the revised plan might become effective for the future, the By-Laws of the American Pharmaceutical Association were changed in 1939 to provide for a Committee on National Formulary consisting of a full-time chairman and ten instead of fifteen members. Provision was made for the election of these ten members so that the term of one would expire each year, whereupon a successor would be elected for a ten-year term. Thus, one member will be elected annually, and it becomes unnecessary to elect at any one time an entirely new Committee. Revision activity under this plan can be carried on continuously and without interruption since the majority of the members of the Committee are at all times experienced. This group serves as an executive committee of revision, and the individual members serve as chairmen of subcommittees. Each subcommittee may consist of five members in addition to the chairman. Through this type of organization, provision is made for a revision committee consisting of sixty members.

The same year, the Council elected a committee of ten members to take over the work of the previous committee and proceed with the preparation of the Seventh Edition. E. N. Gathercoal was requested to continue temporarily as Chairman, and organize the new Committee. The new Committee was divided into ten subcommittees for the work of revision. When the Council of the American Pharmaceutical Association met for its semi-annual meeting in December, 1939, Justin L. Powers was elected Chairman for a ten-year term. Provision was made for him to assume office on March 1, 1940, with the understanding that Chairman Gathercoal would continue in an advisory capacity until May, 1940. The office of the Chairman was maintained in Chicago until May 1, 1940, when it was transferred to the American Institute of Pharmacy, in Washington, D. C.

The special subcommittees which had been organized under the direction of E. N. Gathercoal were continued and other special committees were organized. A special Committee on Dental Preparations and another on Labeling Information were organized late in 1940. Early in 1941, a special Committee on Veterinary Preparations and one on Podiatry Preparations were also organized. The transfer of the duties of the Committee on National Formulary appointed in 1929 to the Committee appointed in 1939 was a gradual process. The Seventh Edition of the National Formulary is the result of the work of these two committees.

The outstanding features of the Seventh Edition may be summarized as follows:

1. A completely revised and greatly expanded chapter on Materials and Preparations for Diagnostic Use (now designated as Reagents and Preparations for Use in the Clinical Laboratory). This chapter was developed under the capable leadership of Louis Gershenfeld and a Committee of 91 members possessing special qualifications for the particular type of work involved. Especial credit is given to this Committee in connection with the development of this chapter.

2. The admission of a new chapter on Ingredients of Reagents and Preparations for Use in the Clinical Laboratory. This chapter was developed through the joint effort of the Committee on Ingredients of Bacteriological Media and the Committee on National Formulary.

3. A complete change in the editorial style of the monographs on chemicals and preparations containing chemicals, whereby the name of the test precedes the description instead of being placed at the end, and the arrangement of these tests in a definite order.

4. A change in the editorial style of the monographs on crude drugs, which promotes clarity, and improves the appearance of these monographs.

5. The introduction of a scientific system of color nomenclature in the crude drug monographs and in the chapter on Ingredients of Reagents and Preparations for Use in the Clinical Laboratory.

6. The development of new, and the improvement of old standards for strength, quality, and purity in many of the monographs on drugs, chemicals, and preparations. This has been made possible to a great extent by the establishment in 1936 of the American Pharmaceutical Association Laboratory.

The Seventh Edition of the National Formulary, issued in 1942, became official November 1, 1942. It contained 459 preparation monographs and 273 monographs on drugs and chemicals. Of these monographs, 97 were new to the National Formulary, and among them 71 were monographs from U. S. P. XI. The total number of monographs in N. F. VI not admitted to N. F. VII was 51, of which 40 were deleted by reason of their adoption for admission to U. S. P. XII. The deletions included 40 monographs on preparations, and 11 monographs on drugs and chemicals.

ARTICLES ADDED TO THE NATIONAL FORMULARY, EIGHTH EDITION

English Title	Latin Title
Acetarsone	Acetarsonum
Acetarsone Tablets	Tabellæ Acetarsoni
Acetic Acid	Acidum Aceticum
Acetone	Acetonum
Alcohol, Dehydrated	Alcohol Dehydratum
Alcohol Rubbing Compound	Alcohol Fricamentum Compositum
Allyl Isothiocyanate	Allylis Isothiocyanas
Almond Oil, Bitter	Oleum Amygdalæ Amaræ
Althea	Althæa
Aminoacetic Acid	Acidum Aminoaceticum
Aminoacetic Acid Elixir	Elixir Acidi Aminoacetici
Anise Spirit	Spiritus Anisi
Antipyrine	Antipyrina
Arecoline Hydrobromide Tablets	Tabellæ Arecolinæ Hydrobromidi
Arsenious Acid Solution	Liquor Acidi Arseniosi
Barium Chloride	Barii Chloridum
Barium Chloride Tablets	Tabellæ Barii Chloridi
Belladonna Plaster	Emplastrum Belladonnæ
Belladonna Root	Belladonnæ Radix
Benzyl Alcohol	Alcohol Benzylicum
Bismuth Subnitrate	Bismuthi Subnitras
Brandy	Spiritus Vini Vitis
Calcium Gluconate Tablets	Tabellæ Calcii Gluconatis
Calcium Levulinate	Calcii Levulinas
Calcium Levulinate Ampuls	Ampullæ Calcii Levulinatis
Calcium Phosphate, Tribasic	Calcii Phosphas Tribasicus
Camphor Spirit	Spiritus Camphoræ
Carbarsone Tablets	Tabellæ Carbarsoni
Carbon Tetrachloride	Carbonei Tetrachloridum
Carbon Tetrachloride Capsules	Capsulæ Carbonei Tetrachloridi
Castor Oil Capsules	Capsulæ Olei Ricini
Cerate	Ceratum
Cetyl Alcohol	Alcohol Cetylicum
Chalk Powder, Compound	Pulvis Cretæ Compositus
Chaulmoogra Oil	Oleum Chaulmoograe
Chenopodium Oil	Oleum Chenopodii
Chenopodium Oil Capsules	Capsulæ Olei Chenopodii
Chloramine-T	Chloramina-T
Chloroform Water	Aqua Chloroformi
Cinnamon, Ceylon	Cinnamomum Zeylanicum
Coconut Oil	Oleum Cocois
Codeine	Codeina
Colchicum Seed	Colchici Semen
Colchicum Seed Tincture	Tinctura Colchici Seminis
Dioctyl Sodium Sulfosuccinate	Dioctylis Sulfosuccinas Sodicum
Ephedrine Sulfate and Phenobarbital Capsules	Capsulæ Ephedrinæ Sulfatis et Phenobarbitalis
Ephedrine Sulfate Capsules	Capsulæ Ephedrinæ Sulfatis
Ergot	Ergota
Ergot Fluidextract	Fluidextractum Ergotæ
Ergot, Prepared	Ergota Præparata
Eriodictyon	Eriodictyon
Eriodictyon Fluidextract	Fluidextractum Eriodictyi
Ethyl Chaulmoograte	Æthylis Chaulmoogras

Eucaine Hydrochloride	Eucainæ Hydrochloridum
Ferric Ammonium Citrate, Green	Ferri Ammonii Citras Viridis
Ferric Cacodylate	Ferri Cacodylas
Ferric Cacodylate Ampuls	Ampullæ Ferri Cacodylatis
Ferrous Carbonate Mass	Massa Ferri Carbonatis
Ferrous Carbonate, Saccharated Capsules	Capsulæ Ferri Carbonatis Saccharatis
Ferrous Carbonate Pills	Pilulæ Ferri Carbonatis
Ferrous Gluconate	Ferri Gluconas
Ferrous Sulfate Syrup	Syrupus Ferri Sulfatis
Glyceryl Monostearate	Glycerylis Monostearas
Glyceryl Trinitrate Spirit	Spiritus Glycerylis Trinitratis
Gold and Sodium Thiosulfate	Auri et Sodii Thiosulfas
Halazone	Halazonum
Halazone Tablets	Tabellæ Halazoni
Histidine Monohydrochloride	Histidinæ Monohydrochloridum
Homatropine Methylbromide	Homatropinæ Methylbromidum
Homatropine Methylbromide Tablets	Tabellæ Homatropinæ Methylbromidi
Honey	Mel
Hydroxystearin Sulfate	Hydroxystearini Sulfas
Hyoscyamus Extract	Extractum Hyoscyami
Iodine Ointment	Unguentum Iodi
Iodine Solution	Liquor Iodi
Iodine Tincture, Strong	Tinctura Iodi Fortis
Iodochlorohydroxyquinoline	Iodochlorohydroxyquinolinum
Iodochlorohydroxyquinoline Tablets	Tabellæ Iodochlorohydroxyquinolini
Iron, Reduced	Ferrum Reductum
Iron, Reduced, Capsules	Capsulæ Ferri Reducti
Isopropyl Alcohol Rubbing Compound	Alcohol Isopropylicum Fricamentum Compositum
Juniper Oil	Oleum Juniperi
Lactic Acid	Acidum Lacticum
Linseed	Linum
Linseed Oil	Oleum Lini
Lycopodium	Lycopodium
Magnesium Hydroxide	Magnesii Hydroxidum
Magnesium Hydroxide Tablets	Tabellæ Magnesii Hydroxidi
Magnesium Phosphate, Tribasic	Magnesii Phosphas Tribasicus
Magnesium Phosphate, Tribasic, Tablets	Tabellæ Magnesii Phosphatis Tribasici
Malt Extract	Extractum Malti
Mandelic Acid	Acidum Mandelicum
Mercuric Cyanide	Hydrargyri Cyanidum
Mercuric Salicylate	Hydrargyri Salicylas
Mercuric Salicylate Ampuls	Ampullæ Hydrargyri Salicylatis
Mercuric Succinimide	Hydrargyri Succinimidum
Mercury Bichloride	Hydrargyri Bichloridum
Mercury Bichloride Tablets, Large Poison	Toxitabellæ Hydrargyri Bichloridi Magnæ
Mercury Bichloride Tablets, Small Poison	Toxitabellæ Hydrargyri Bichloridi Parvæ
Mercury with Chalk	Hydrargyrum cum Creta
Methylrosaniline Chloride Jelly	Gelatum Methylrosanilinæ Chloridi
Nitric Acid	Acidum Nitricum
Nitromersol	Nitromersol
Nitromersol Solution	Liquor Nitromersolis
Nitromersol Tincture	Tinctura Nitromersolis
Nutgall	Galla
Nutgall Ointment	Unguentum Gallæ
Nux Vomica	Nux Vomica
Nux Vomica Tincture	Tinctura Nucis Vomicæ

Oleyl Alcohol	Alcohol Oleylicum
Pamaquine Naphthoate	Pamaquinæ Naphthoas
Papain	Papain
Pelletierine Tannate	Pelletierinæ Tannas
Pentobarbital Elixir	Elixir Pentobarbitali
Phenylmercuric Chloride	Phenylhydrargyri Chloridum
Phenylmercuric Nitrate	Phenylhydrargyri Nitras
Phenyl Salicylate	Phenylis Salicylas
Phosphoric Acid	Acidum Phosphoricum
Phosphoric Acid, Diluted	Acidum Phosphoricum Dilutum
Pine Needle Oil, Dwarf	Oleum Pini Pumilionis
Pine Oil	Oleum Pini
Pine Oil Emulsion Concentrate	Emulsum Olei Pini Concentratum
Pine Tar Syrup	Syrupus Picis Pini
Potash, Sulfurated	Potassa Sulfurata
Potassium Bitartrate	Potassii Bitartras
Potassium Nitrate	Potassii Nitras
Proflavine Dihydrochloride	Proflavinæ Dihydrochloridum
Proflavine Sulfate	Proflavinæ Sulfas
Propylene Glycol	Glycol Propylenum
Pyrethrum	Pyrethrum
Quinine and Urea Hydrochloride	Quininæ et Ureæ Hydrochloridum
Quinine Ethylcarbonate	Quininæ Æthylcarbonas
Quinine Sulfate Capsules	Capsulæ Quininæ Sulfatis
Resorcinol Monoacetate	Resorcinolis Monoacetas
Rhubarb Extract	Extractum Rhei
Rosin	Resina
Rosin Cerate	Ceratum Resinæ
Santonin and Mild Mercurous Chloride Tablets	Tabellæ Santonini et Hydrargyri Chloridi Mitis
Santonin Tablets	Tabellæ Santonini
Serum Antimeningococcic	Serum Antimeningococcicum
Serum Antipneumococcic	Serum Antipneumococcicum
Serum, Human Measles Immune	Serum Immune Morbillosi Humanum
Serum, Human Scarlet Fever Immune	Serum Immune Scarlatinæ Humanum
Sherry Wine	Vinum Xericum
Silver Chloride, Colloidal	Argenti Chloridum Colloidale
Silver Iodide, Colloidal	Argenti Iodidum Colloidale
Silver, Strong Protein	Argentum Proteinicum Forte
Sodium Alginate	Sodii Alginas
Sodium Bicarbonate and Calcium Carbonate Powder	Pulvis Sodii Bicarbonatis et Calcii Carbonatis
Sodium Bicarbonate and Calcium Carbonate Tablets	Tabellæ Sodii Bicarbonatis et Calcii Carbonatis
Sodium Bicarbonate and Magnesium Oxide Powder	Pulvis Sodii Bicarbonatis et Magnesii Oxidi
Sodium Bicarbonate and Magnesium Oxide Tablets	Tabellæ Sodii Bicarbonatis et Magnesii Oxidi
Sodium Cacodylate	Sodii Cacodylas
Sodium Chloride and Dextrose Tablets	Tabellæ Sodii Chloridi et Dextrosi
Sodium Chloride Tablets	Tabellæ Sodii Chloridi
Sodium Indigotindisulfonate	Sodii Indigotindisulfonas
Sodium Indigotindisulfonate Ampuls	Ampullæ Sodii Indigotindisulfonatis
Sodium Propionate	Sodii Propionas
Sterculia Gum	Gummi Sterculiæ
Stibophen	Stibophenum
Stibophen Ampuls	Ampullæ Stibopheni
Stramonium Capsules	Capsulæ Stramonii
Strophanthin	Strophanthinum
Strophanthin Ampuls	Ampullæ Strophanthini

Succinchlorimide	Succinchlorimidum
Succinchlorimide Tablets	Tabellæ Succinchlorimidi
Suet, Prepared	Sevum Præparatum
Sulfapyridine	Sulfapyridinum
Sulfapyridine Sodium, Sterile	Sulfapyridinum Sodicum Sterile
Sulfapyridine Tablets	Tabellæ Sulfapyridini
Sulfuric Acid	Acidum Sulfuricum
Sulfuric Acid, Diluted	Acidum Sulfuricum Dilutum
Sun Cream, N. F.	Cremor Solis, N. F.
Tar Oil, Rectified	Oleum Picis Rectificatum
Terpin Hydrate	Terpini Hydras
Thymol Iodide	Thymolis Iodidum
Titanium Dioxide	Titanii Dioxidum
Trinitrophenol	Trinitrophenol
Turpentine Oil	Oleum Terebinthinæ
Turpentine Oil Emulsion	Emulsum Olei Terebinthinæ
Turpentine Oil, Rectified	Oleum Terebinthinæ Rectificatum
Whisky	Spiritus Frumenti
Zinc Acetate	Zinci Acetas
Zinc Chloride	Zinci Chloridum

ARTICLES OFFICIAL IN N. F. VII BUT NOT ADMITTED TO N. F. VIII

Latin Title	English Title
Acidum Gallicum	Gallic Acid
Acidum Hydrocyanicum Dilutum	Hydrocyanic Acid, Diluted
Adonis	Adonis
Ammonii Hypophosphis	Ammonium Hypophosphite
Apii Fructus	Celery Fruit
Asarum	Asarum
Avena	Oat
Berberis	Berberis
Cactus Grandiflorus	Cactus Grandiflorus
Calcii Creosotas	Calcium Creosotate
Calendula	Calendula
Castanea	Castanea
Chimaphila	Chimaphila
Chionanthus	Chionanthus
Chloral Camphoratum	Camphorated Chloral
Cocculus	Cocculus
Collodium Stypticum	Styptic Collodion
Condurango	Condurango
Corydalis	Corydalis
Crocus	Crocus
Damiana	Damiana
Dentilinimentum Aconiti et Iodi Compositum	Compound Dental Liniment of Aconite and Iodine
Dioscorea	Dioscorea
Elixir Bismuthi	Elixir of Bismuth
Elixir Buchu	Elixir of Buchu
Elixir Buchu Compositum	Compound Elixir of Buchu
Elixir Buchu et Potassii Acetatis	Elixir of Buchu and Potassium Acetate
Elixir Calcii Lactophosphatis	Elixir of Calcium Lactophosphate
Elixir Euphorbiæ Compositum	Compound Elixir of Euphorbia

Elixir Gentianæ et Ferri	Elixir of Gentian and Iron
Elixir Guaranæ et Apii	Elixir of Guarana and Celery
Elixir Hydrangeæ et Lithii	Elixir of Hydrangea and Lithium
Elixir Hydrastis Compositum	Compound Elixir of Hydrastis
Elixir Pepsini, Bismuthi, et Strychninæ	Elixir of Pepsin, Bismuth, and Strychnine
Elixir Pepsini et Bismuthi	Elixir of Pepsin and Bismuth
Elixir Phosphori	Elixir of Phosphorus
Elixir Viburni Opuli Compositum	Compound Elixir of Viburnum Opulus
Emplastrum Cantharidis	Plaster of Cantharides
Emulsum Olei Morrhuæ cum Hypophosphitibus	Emulsion of Cod Liver Oil with Hypophosphites
Emulsum Olei Morrhuæ cum Ovo	Emulsion of Cod Liver Oil with Egg
Euonymus	Euonymus
Euphorbia Pilulifera	Euphorbia Pilulifera
Extractum Aloes	Extract of Aloe
Extractum Gelsemii	Extract of Gelsemium
Extractum Sumbul	Extract of Sumbul
Extractum Taraxaci	Extract of Taraxacum
Extractum Valerianæ	Extract of Valerian
Ferri Oxidum Saccharatum	Saccharated Ferric Oxide
Ferri Pyrophosphas Solubilis	Soluble Ferric Pyrophosphate
Fluidextractum Aletridis	Fluidextract of Aletris
Fluidextractum Apii Fructus	Fluidextract of Celery Fruit
Fluidextractum Apocyni	Fluidextract of Apocynum
Fluidextractum Avenæ	Fluidextract of Oat
Fluidextractum Berberis	Fluidextract of Berberis
Fluidextractum Buchu Compositum	Compound Fluidextract of Buchu
Fluidextractum Calendulæ	Fluidextract of Calendula
Fluidextractum Calumbæ	Fluidextract of Calumba
Fluidextractum Castaneæ	Fluidextract of Castanea
Fluidextractum Caulophylli	Fluidextract of Caulophyllum
Fluidextractum Chionanthi	Fluidextract of Chionanthus
Fluidextractum Condurango	Fluidextract of Condurango
Fluidextractum Convallariæ	Fluidextract of Convallaria
Fluidextractum Cubebæ	Fluidextract of Cubeb
Fluidextractum Damianæ	Fluidextract of Damiana
Fluidextractum Dioscoreæ	Fluidextract of Dioscorea
Fluidextractum Echinaceæ	Fluidextract of Echinacea
Fluidextractum Guaranæ	Fluidextract of Guarana
Fluidextractum Humuli	Fluidextract of Humulus
Fluidextractum Hydrangeæ	Fluidextract of Hydrangea
Fluidextractum Jalapæ	Fluidextract of Jalap
Fluidextractum Juniperi	Fluidextract of Juniper
Fluidextractum Kolæ	Fluidextract of Kola
Fluidextractum Krameriæ	Fluidextract of Krameria
Fluidextractum Lappæ	Fluidextract of Lappa
Fluidextractum Leptandræ	Fluidextract of Leptandra
Fluidextractum Phytolaccæ	Fluidextract of Phytolacca
Fluidextractum Quassiæ	Fluidextract of Quassia
Fluidextractum Rhamni Catharticæ	Fluidextract of Rhamnus Cathartica
Fluidextractum Rosæ	Fluidextract of Rose
Fluidextractum Sanguinariæ	Fluidextract of Sanguinaria
Fluidextractum Sarsaparillæ Compositum	Compound Fluidextract of Sarsaparilla
Fluidextractum Serpentariæ	Fluidextract of Serpentaria
Fluidextractum Stillingiæ	Fluidextract of Stillingia
Fluidextractum Trifolii	Fluidextract of Trifolium
Fluidextractum Trillii	Fluidextract of Trillium
Fluidextractum Viburni Opuli	Fluidextract of Viburnum Opulus

Fluidextractum Xanthoxyli	Fluidextract of Xanthoxylum
Fluidglycerata	Fluidglycerates
Frangula	Frangula
Glyceritum Bismuthi	Glycerite of Bismuth
Glyceritum Ovi Vitelli	Glycerite of Egg Yolk
Glyceritum Pepsini	Glycerite of Pepsin
Guaiacolis Carbonas	Guaiacol Carbonate
Guarana	Guarana
Helonias	Helonias
Humulus	Humulus
Hydrangea	Hydrangea
Infusum Gentianæ Compositum	Compound Infusion of Gentian
Infusum Sennæ cum Magnesii Sulfate	Infusion of Senna with Magnesium Sulfate
Iris Versicolor	Blue Flag
Krameria	Krameria
Lac Vaccinum	Cow's Milk
Lappa	Lappa
Liquor Ferri Peptonati	Solution of Peptonized Iron
Lupulinum	Lupulin
Manna	Manna
Mel Rosae et Sodii Boratis	Honey of Rose and Sodium Borate
Menthol Camphoratum	Camphorated Menthol
Mitchella	Mitchella
Oleosaccharа	Oil-Sugars
Oleum Phosphoratum	Phosphorated Oil
Oleum Tiglii	Croton Oil
Ovi Vitellus	Egg Yolk
Ovum	Egg
Petroxolinum Iodi	Iodine Petroxolin
Petroxolinum Liquidum	Liquid Petroxolin
Phosphorus	Phosphorus
Phytolacca	Phytolacca
Pilulæ Aloes et Myrrhæ	Pills of Aloe and Myrrh
Pilulæ Ferri Iodidi	Pills of Ferrous Iodide
Pilulæ Ferri, Quininæ, Strychninæ et Arseni	Pills of Iron, Quinine, Strychnine and Arsenic
Pilulæ Rhei et Aloes	Pills of Rhubarb and Aloe
Potassii Sulfas	Potassium Sulfate
Pulsatilla	Pulsatilla
Pulvis Pancreatini Compositus	Compound Powder of Pancreatin
Rhamnus Cathartica	Rhamnus Cathartica
Salia Effervescentia	Effervescent Salts
Sal Carolinum Factitium	Artificial Carlsbad Salt
Sal Carolinum Factitium Effervescens	Effervescent Artificial Carlsbad Salt
Sal Kissingense Factitium	Artificial Kissingen Salt
Sal Kissingense Factitium Effervescens	Effervescent Artificial Kissingen Salt
Sal Lithii Citratis Effervescens	Effervescent Salt of Lithium Citrate
Sal Magnesii Sulfatis Effervescens	Effervescent Salt of Magnesium Sulfate
Sal Potassii Bromidi Effervescens Compositum	Compound Effervescent Salt of Potassium Bromide
Sal Vichyanum Factitium	Artificial Vichy Salt
Sal Vichyanum Factitium Effervescens	Effervescent Artificial Vichy Salt
Sambucus	Sambucus
Santalum Album	White Sandalwood
Scutellaria	Scutellaria
Sodii Sulfas Exsiccatus	Exsiccated Sodium Sulfate
Spiritus Oleorum Volatilium	Spirits of Volatile Oils
Stillingia	Stillingia
Sumbul	Sumbul

Suppositoria Boroglycerini	Suppositories of Boroglycerin
Syrupus Ammonii Hypophosphitis	Syrup of Ammonium Hypophosphite
Syrupus Asari Compositus	Compound Syrup of Asarum
Syrupus Calcii Lactophosphatis	Syrup of Calcium Lactophosphate
Tinctura Aloes et Myrrhæ	Tincture of Aloe and Myrrh
Tinctura Antimonii	Tincture of Antimony
Tinctura Bryonia	Tincture of Bryonia
Tinctura Cacti Grandiflori	Tincture of Cactus Grandiflorus
Tinctura Calendulæ	Tincture of Calendula
Tinctura Calumbæ	Tincture of Calumba
Tinctura Capsici et Myrrhæ	Tincture of Capsicum and Myrrh
Tinctura Cimicifugæ	Tincture of Cimicifuga
Tinctura Cocculi	Tincture of Cocculus
Tinctura Cubebæ	Tincture of Cubeb
Tinctura Guaiaci	Tincture of Guaiac
Tinctura Jalapæ	Tincture of Jalap
Tinctura Pulsatillæ	Tincture of Pulsatilla
Tinctura Quassiæ	Tincture of Quassia
Tinctura Quillajæ	Tincture of Quillaja
Tinctura Sanguinariæ	Tinctura of Sanguinaria
Tinctura Scillæ	Tincture of Squill
Tinctura Serpentariæ	Tincture of Serpentaria
Tinctura Viburni Opuli Composita	Compound Tincture of Viburnum Opulus
Tincturæ Æthereæ	Ethereal Tinctures
Tincturæ Medicamentorum Recentium	Tinctures of Fresh Drugs
Trifolium	Trifolium
Trillium	Trillium
Trochisci Ulmi	Troches of Elm
Unguentum Potassii Iodidi	Ointment of Potassium Iodide
Unguentum Sinapis	Ointment of Mustard
Unguentum Zinci Stearatis	Ointment of Zinc Stearate
Xanthoxyli Fructus	Xanthoxylum Fruit
Xanthoxylum	Xanthoxylum

CHANGES IN OFFICIAL ENGLISH TITLES

N. F. VII	*N. F. VIII*
Ampuls of Green Iron and Ammonium Citrate	Green Ferric Ammonium Citrate Ampuls
Compound Elixir of Sodium Salicylate	Compound Sodium Salicylate and Gelsemium Elixir
Compound Pills of Cascara	Aloin, Belladonna, Cascara and Podophyllum Pills
Elixir of Beef and Iron	Beef, Iron and Wine

CHANGES IN OFFICIAL LATIN TITLES

N. F. VII	*N. F. VIII*
Ampullæ Ferri et Ammonii Citratum Viridum	Ampullæ Ferri Ammonii Citratis Viridis
Elixir Carnis et Ferri	Caro, Ferrum et Vinum
Elixir Sodii Salicylatis Compositum	Elixir Sodii Salicylatis et Gelsemii Compositum
Pilulæ Cascaræ Compositæ	Pilulæ Aloini, Belladonnæ, Cascaræ et Podophylli

GENERAL PRINCIPLES FOLLOWED IN THE PREPARATION OF NATIONAL FORMULARY VIII

The following general principles for this edition were initiated by the Committee on National Formulary and approved by the Council of the American Pharmaceutical Association.

1. **Purpose.** The basic purpose of the National Formulary is the establishment and promulgation of official standards of identity, strength, quality, and purity for drugs admitted thereto.

2. **Admissions.** The admission of monographs on drugs to the National Formulary VIII is based upon therapeutic value as well as upon extent of use of the drug and the apparent need for official standards of certain drugs not necessarily widely used, but possessing inherent qualities which indicate the need for official standards as an added protection of the public health.

No monograph on any drug shall be included in the National Formulary VIII under the proprietary or trademark name, or if the composition or process of manufacture is secret.

3. **Therapeutic Authority Disclaimed.** Since admissions of monographs to the National Formulary are not based entirely on therapeutic value, the Committee on National Formulary and the American Pharmaceutical Association make no claim for such value.

4. **Nomenclature.** The primary title of each drug monograph in the National Formulary VIII shall be in English. The secondary title shall be a Latinized version of the English title.

The titles of monographs shall be, as far as possible, convenient for prescribing and dispensing and in harmony with general usage.

Short titles wherever needed shall be coined for synthetic organic chemicals with cumbersome names. Such titles preferably shall be based upon rational chemical names and in the case of drugs of a definite chemical composition, the rational chemical names may also be given in the monograph.

When considered advisable there may be inserted after each official Latin title, an abbreviated form of that title to be known as the official abbreviation.

Commonly used names may be inserted as synonyms in the monograph after the official titles. Any drug designated by an official synonym must comply with the standards of the drug in the official monograph.

Botanical and zoölogical names shall conform to the rules of the

International Botanical Congress and the International Zoölogical Congress.

5. **Formulas.** A specific formula with working directions for the making of each preparation shall be included in each monograph where it is possible or desirable to manufacture the preparation on a small scale and without extensive manufacturing equipment.

General formulas for the manufacture of pharmaceutical preparations that are made in the same general manner, or on a large manufacturing scale, may be given when practicable; application of these formulas may be indicated by reference in the individual monographs.

6. **Official Definitions.** A definition of identity shall be given where possible in each monograph.. The official definition of vegetable drugs shall indicate, as far as possible, the part or parts of the plant constituting the drug and the botanical name or names of the plant or plants yielding the drug. The established minimum and maximum percentages of active constituents shall also be stated in definitions of vegetable drugs for which suitable and significant methods of assay are provided.

Official definitions of inorganic medicinal chemicals shall include a statement of the composition based upon the established minimum or minimum and maximum percentage of the chemical which may be determined by an official assay.

Official definitions of synthetic organic chemicals shall include a statement of the composition based upon the established minimum or minimum and maximum percentage of the chemical which may be determined by an official assay. If no assay is provided, no statement in addition to the structural formula may be made.

In the absence of an assay, natural products of known structure may include only the structural formula as an official definition.

7. **Standards for Strength, Quality, and Purity.** In order to insure high medicinal and pharmaceutical values of drugs, suitable standards of identity, strength, quality, and purity shall be provided in the monographs on drugs in the National Formulary VIII. Allowance will be made in these standards for unavoidable and innocuous impurities. Reference may be made in any monograph to any official general or specific tests, assays, or processes.

Statements of the distinctive microscopic structural elements in powdered drugs of vegetable or animal origin may be included in the monographs as a means of determining identity, strength, quality, and purity.

8. **Doses.** An average dose for adults may be stated in the monograph on each drug in National Formulary VIII generally employed internally for medicinal purposes. This average dose is to be interpreted as the amount which may be expected to produce the intended therapeutic effect for which the drug is most commonly employed. It is to be understood that the Committee on National Formulary does not intend that these doses shall be regarded as obligatory by the physician or as forbidding him to exceed those stated. A declaration to this effect shall be made in the General Notices of National Formulary VIII.

In certain instances, where deemed advisable, an average dose for children may be stated.

If the drug is used extensively or exclusively by veterinarians, the average doses for specific animals may be stated in the monograph.

There shall be appended to the statement of dose of each compound preparation, the approximate amount of each active ingredient in the average dose stated.

Preparations for external use may be so indicated and if dilution of a preparation for such use is desirable, the average extent of such dilution may be stated in the monograph.

9. **International Standards.** Potent remedies included in the National Formulary VIII shall be made to conform to the standards of the International Conference for the Unification of Formulas for Potent Medicaments in so far as it is deemed advisable by the Committee on National Formulary.

10. **Atomic Weights** used in the National Formulary VIII shall be in accordance with the latest available report of the International Committee on Chemical Elements.

11. **Weights and Measures**—The metric system of weights and measures shall be retained in the National Formulary VIII.

12. **Physical Tests.** The methods for making physical tests prescribed in the monographs of the National Formulary VIII shall be those official in either the United States Pharmacopœia XIII or the National Formulary VIII.

13. **Solubilities** in various solvents shall be given as completely as is practicable in the monograph of each chemical substance.

14. **Standard Temperature.** The standard temperature of 25° C. (77° F.) shall be retained in the National Formulary VIII except for alcohol or other special cases. (An alcoholometric table with temperature corrections is found in the U. S. Pharmacopœia XIII.)

15. **Powdered Drugs** shall be required to represent the entire drug, unless specifically stated otherwise. Where the drug can be powdered without residue, this should be required; in other cases, the amount of allowable residue should be stated.

16. **Alcohol in Preparations.** The permissible range for the content of C_2H_5OH, by volume, in each National Formulary VIII preparation, where present in readily determinable quantity, shall be stated in the monograph.

17. **General Notices.** The use of general notices in a section just preceding the individual monographs shall be continued, and shall contain reference to such matters as pertain in a general way to the text of the National Formulary VIII.

18. **General Tests, Processes, Etc.** A section following the individual monographs shall be continued in the National Formulary VIII, and shall set forth methods and standards for general tests, general processes, general apparatus, reagents, test solutions, indicators, volumetric solutions, etc., that are used in one or more of the individual monographs. Reference may be made in the National Formulary VIII to the United States Pharmacopœia XIII where deemed desirable.

19. **Publicity.** The Committee on National Formulary in 1938, with the approval of the Council, authorized the publication and distribution of the Bulletin of the National Formulary Committee upon a subscription basis. The purpose of this publication is to announce promptly, contemplated action and decisions reached by the Committee, and to present all comments, suggestions, and information relating to National Formulary revision to the members of the Committee and to subscribers. The Bulletin is usually published bimonthly.

20. **Supplements.** If necessary, supplements to the National Formulary VIII may be published. Such supplements may be published in the *Journal of the American Pharmaceutical Association* and reprints made available, upon request, either free or at a nominal charge. If it becomes necessary to issue an extensive supplement it may be printed separately, and a suitable charge made for it.

GENERAL NOTICES APPLYING TO THE STANDARDS OF THE NATIONAL FORMULARY

All National Formulary text is subject to the following general provisions and interpretations.

TITLE

The title of this book, including Supplements thereto, is The National Formulary, Eighth Edition. This title may be abbreviated to National Formulary VIII, or to N. F. VIII. When the term N. F. is used, without further qualification, during the period in which this National Formulary is official, it refers to N. F. VIII, including any Supplements thereto.

OFFICIAL

The word "official," as used in this National Formulary or with reference thereto, is synonymous with "National Formulary" and with "pharmacopœial."

COLOR NAMES

A method for the naming of colors by the use of simple English words, but based on a sound scientific foundation, has been developed jointly by the Inter-Society Color Council, The National Bureau of Standards, the U. S. Pharmacopœia, and the National Formulary. This method is known as the ISCC-NBS system of Color Naming. The color terms in the botanical monographs, in the monographs for certain certified biological dyes, and in certain chemical monographs of the National Formulary VIII, have been translated into this system.

Each complete color name consists of a hue name, or of a hue name and one or two modifiers, the latter to describe the value (lightness) and chroma (strength) of the hue. The hue names are as follows and are arranged in the color name charts in the following order:

pink	yellow	greenish blue
red	olive-brown	blue
reddish orange	greenish yellow	purplish blue
reddish brown	olive	bluish-purple
orange-pink	yellow-green	purple
orange	olive-green	reddish purple
brown	yellowish green	purplish pink
yellowish orange	green	red-purple
yellowish brown	bluish green	purplish red
	blue-green	

gray	brownish gray	greenish gray
pinkish gray	yellowish gray	bluish gray
reddish gray	olive-gray	purplish gray

white	bluish white	olive-black
pinkish white	purplish white	greenish black
yellowish white	black	bluish black
greenish white	reddish black	purplish black
	brownish black	

The modifiers describing lightness are: light, moderate, and dark; those describing strength are: weak, moderate, strong, and vivid; and those combining the two are: pale, brilliant, dusky, deep, and faint. One adverb, namely, "very," is also used.

The ISCC-NBS System of Color Naming is flexible, in that it permits varying degrees of color specification. The most definite specification is applied to the whole crude drug, to the powdered drug, and to certain specific tests where color is of qualitative or quantitative value. The more general terms of specification are used in the description of colors observed under the microscope, in most chemical tests, and for purposes of minor identification. Very indefinite color specifications are occasionally used, where a wide range of color is to be expressed, but where the necessity for definite specification is not required. Examples may be quoted as follows:

Definite specification—External color of Belladonna Root: "weak brown to moderate yellowish brown;" Powdered Belladonna Root: "pale brown to weak yellow."

General specification—Medullary rays in Hydrastis: "yellowish orange to greenish yellow."

Indefinite specification—Cambium of Calumba: "dark."

The determination of color names by this system is described on page 695. Additional publications describing the system of color naming and its application, as well as color name charts, may be obtained from the American Pharmaceutical Association, 2215 Constitution Avenue, Washington 7, D. C.*

The ISCC-NBS System of Color Naming is based on the Munsell Book of Color which is a tri-dimensional system of color designation. The samples (chips) of the Munsell Book of Color have been determined in fundamental units, so that the ISCC-NBS names can be translated into any system of color designation which is also expressed in these units.

Where definite color specifications are included in the monographs of National Formulary VIII they are to be considered as official requirements of equal importance to size and other descriptive specifications.

DEVIATIONS PERMITTED

The standards prescribed in this National Formulary apply to the substances, preparations and their ingredients, herein named when intended for medicinal use, and, when bought, sold, or dispensed, for this purpose, or when used in the tests and assays herein provided.

Ingredients and Processes—Official preparations for which processes are given in the National Formulary, unless exempted in the General Notices or in the individual monographs, are to be made only from the official ingredients named in the formulas, and by the official processes.

In the manufacture of any official preparations, deviation in detail from the official directions is permissible, provided that the finished preparation conforms to the standards prescribed by the National Formulary, and to those produced by following the official directions. Unless specifically exempted elsewhere in the National Formulary the identity, strength, quality, and purity of an official article are determined by the definition, description, general description of physical properties, tests, assay methods, and other specifications relating to

* "Method of Designating Colors," Deane B. Judd and Kenneth L. Kelly, *Journal of Research, National Bureau of Standards*, Vol. 23, 355–386 (1939); "Instructions for Determining the Color Names of Drugs and Chemicals," Kenneth L. Kelly, *Bulletin of the National Formulary Committee*, Vol. 8, 359–369 (1939–1940).

the article, whether incorporated in the monograph itself or occurring in any general introductory monograph, or in the general notices or in the section on general tests, processes, and apparatus.

Use of Denatured Alcohol—In the manufacture of National Formulary preparations in which alcohol is used as a solvent only, and does not remain in the finished product, it is permissible to use alcohol denatured by the addition of not more than 10 per cent by volume of methanol or acetone, in place of the alcohol, in accordance with Federal Statutes and Regulations of the Bureau of Internal Revenue, but the preparations so made must be identical with those prepared by the processes given in the monographs and must conform to the standards of the National Formulary.

Capsules and Tablets—In the manufacture of tablets and capsules it is permissible to use suitable diluents, bulking agents, colors, lubricants, and adhesives, such as starches, lactose, sucrose, and other innocuous materials.

In the case of a liquid in capsules, innocuous agents may be added to achieve physical consistency which may enhance the effectiveness, safety, or stability of the product, unless specifically excepted in an individual monograph.

A coating may be applied to official tablets and capsules, provided that it will disintegrate in the alimentary tract and that it is composed of harmless ingredients.

Ointments—In official ointments, which contain petrolatum, white petrolatum, yellow wax, or white wax, the proportions of these may be varied to maintain a suitable consistence under different climatic conditions, provided that the proportion of active ingredients is not varied.

Vegetable and Animal drugs—The official standards apply to vegetable and animal drugs as they enter commerce, in any form, with the exception that when used solely for the manufacture or isolation of volatile oils, alkaloids, glycosides, or other active principles, they may differ from the standards of strength, quality or purity prescribed by the National Formulary.

DOSES

Average Dose—In modern medicine drugs are given in order to produce certain therapeutic effects. The amount required for this purpose varies with the disease, as well as with the weight, age, and other characteristics of the patient.

The average doses stated in this National Formulary are those which may be expected ordinarily to produce the therapeutic effect for which the ingredient or preparation is most commonly employed. Unless otherwise specified, the average doses are for oral administration to human adults.

Table of Metric Doses with Approximate Apothecary Equivalents

Liquid Measure		Liquid Measure	
Metric	Approximate Apothecary Equivalents	Metric	Approximate Apothecary Equivalents
1000 cc.	1 quart	3 cc.	45 minims
750 cc.	1½ pints	2 cc.	30 minims
500 cc.	1 pint	1 cc.	15 minims
250 cc.	8 fluidounces	0.75 cc.	12 minims
200 cc.	7 fluidounces	0.6 cc.	10 minims
100 cc.	3½ fluidounces	0.5 cc.	8 minims
50 cc.	1¾ fluidounces	0.3 cc.	5 minims
30 cc.	1 fluidounce	0.25 cc.	4 minims
15 cc.	4 fluidrachms	0.2 cc.	3 minims
10 cc.	2½ fluidrachms	0.1 cc.	1½ minims
8 cc.	2 fluidrachms	0.06 cc.	1 minim
5 cc.	1¼ fluidrachms	0.05 cc.	¾ minim
4 cc.	1 fluidrachm	0.03 cc.	½ minim

Weight		Weight	
Metric	Approximate Apothecary Equivalents	Metric	Approximate Apothecary Equivalents
30 Gm.	1 ounce	30 mg.	½ grain
15 Gm.	4 drachms	25 mg.	⅜ grain
10 Gm.	2½ drachms	20 mg.	⅓ grain
7.5 Gm.	2 drachms	15 mg.	¼ grain
6 Gm.	90 grains	12 mg.	⅕ grain
5 Gm.	75 grains	10 mg.	⅙ grain
4 Gm.	60 grains (1 drachm)	8 mg.	⅛ grain
3 Gm.	45 grains	6 mg.	1/10 grain
2 Gm.	30 grains (½ drachm)	5 mg.	1/12 grain
1.5 Gm.	22 grains	4 mg.	1/15 grain
1 Gm.	15 grains	3 mg.	1/20 grain
0.75 Gm.	12 grains	2 mg.	1/30 grain
0.6 Gm.	10 grains	1.5 mg.	1/40 grain
0.5 Gm.	7½ grains	1.2 mg.	1/50 grain
0.4 Gm.	6 grains	1 mg.	1/60 grain
0.3 Gm.	5 grains	0.8 mg.	1/80 grain
0.25 Gm.	4 grains	0.6 mg.	1/100 grain
0.2 Gm.	3 grains	0.5 mg.	1/120 grain
0.15 Gm.	2½ grains	0.4 mg.	1/150 grain
0.12 Gm.	2 grains	0.3 mg.	1/200 grain
0.1 Gm.	1½ grains	0.25 mg.	1/250 grain
75 mg.	1¼ grains	0.2 mg.	1/300 grain
60 mg.	1 grain	0.15 mg.	1/400 grain
50 mg.	¾ grain	0.12 mg.	1/500 grain
40 mg.	⅔ grain	0.1 mg.	1/600 grain

Note: A cubic centimeter (cc.) is the approximate equivalent of a milliliter (ml.).

It is to be understood that these doses serve only as a guide to the physician, and that he may exceed the doses given whenever in his judgment this seems advisable.

Dose Equivalents—Doses are expressed primarily in the metric system but approximate equivalents are given for those individuals still using the apothecary system.

The *approximate* dose equivalents in the preceding Table represent the quantities which would be prescribed, under identical conditions, by physicians trained, respectively, in the metric or in the apothecary system of weights and measures.

When prepared dosage forms such as tablets, capsules, pills, etc., are prescribed in the metric system, the pharmacist may dispense the corresponding *approximate* equivalent in the apothecary system, and *vice versa* as indicated in the preceding table.

For the conversion of specific quantities in a prescription which requires compounding, or in converting a pharmaceutical formula from one system of weights or measures to the other, *exact* equivalents must be used (see table entitled: *Equivalents of Weights and Measures*, U. S. P. XIII).

Usually Available Sizes—The usually available sizes of capsules and tablets listed under the several monographs are not necessarily identical with the average doses and are intended solely as information to physicians and pharmacists.

OFFICIAL TITLES

Many of the English titles of monographs in this National Formulary have been derived primarily by a transposition of the word order of former official English titles. The former official English titles, and other names derived by transposition of the definitive words of an official title, shall be considered to be synonyms of the official title.

PACKAGING, STORAGE, and PRESERVATION

Containers

Container—The container is the device which holds the drug and which is or may be in direct contact with the drug. The *closure* of the container is a part of the container.

The container shall not interact physically or chemically with the drug which it holds so as to alter the strength, quality, or purity of the drug beyond the official requirements.

Well-Closed Container—A well-closed container shall protect the contents from extraneous solids or from loss of the drug under the ordinary or customary conditions of handling, shipment, storage, or sale.

Tight Container—A tight container shall protect the contents from contamination by extraneous solids or moisture, from loss of the drug, and from efflorescence, deliquescence, or evaporation under the ordinary or customary conditions of handling, shipment, storage, or sale, and shall be capable of tight reclosure.

Where a tight container is specified, it may be replaced by a *hermetic container* for a single dose of a drug.

Hermetic Container—A hermetic container shall be impervious to air or any other gas under the ordinary or customary conditions of handling, shipment, storage, or sale.

Light-Resistant Container—A light-resistant container is a container which is opaque, or designed to prevent photo-chemical deterioration of the contents beyond the official limits of strength, quality, or purity, under the ordinary or customary conditions of handling, shipment, storage, or sale.

Unless otherwise directed, a light-resistant container shall be composed of a substance which in a thickness of 2 mm. shall not transmit more than 10 per cent of the incident radiation of any wave length between 2900 and 4500 Angström units, page 703.

If the walls of a container are less than 2 mm. in thickness, the same 10 per cent limit of light transmission shall apply.

If the container is not light-resistant, it must be provided with an opaque covering, be enclosed in an opaque covering or in an opaque container.

Temperatures

Cold place—A cold place shall be a place having a temperature not exceeding 15° (59° F.).

Refrigerator—When a refrigerator is specified, a temperature between 2° and 15° (36° and 59° F.) is indicated.

Excessive heat or excessive temperature—When the terms *excessive heat* or *excessive temperature* are used, a temperature which exceeds 49° (120° F.) is indicated.

Bulk Packages—Unless otherwise directed in the monograph, storage requirements shall not apply to bulk packages from manufacturers or wholesale distributors, when the products are intended for manufacturing or for subsequent repackaging for the dispenser or retail distributor.

Non-Specific Storage Conditions—Where no reference is made to specific storage conditions or to the necessity of keeping in a "cold place" or of the avoidance of "excessive heat" normal living conditions are suitable for the storage of such drugs.

Added Substances—For the preservation of solutions of organic substances intended for parenteral administration or topical application, in addition to Ampuls, there may be added to the solutions, unless otherwise directed in the monograph, not more than 0.5 per cent of chlorobutanol, cresol, phenol, sulfur dioxide, sodium bisulfite, or other suitable preservative. The presence and proportion of a preservative shall be plainly declared upon the label of the container in which the product is sold or dispensed. Not more than 0.9 per cent of sodium chloride may be present, and the air in the container may be evacuated or be replaced by carbon dioxide or by nitrogen.

Substances, unless otherwise provided in the individual monograph, may be added to National Formulary preparations to assure the permanency or usefulness of the products, but these substances must be non-toxic and harmless in the amounts administered, and must not interfere with the therapeutic efficacy of the preparation.

TESTING

Apparatus—When a container or implement of definite size and shape is recommended in the directions for a test or an assay, it is not obligatory except when volumetric flasks, measuring burettes, or other exact measuring apparatus or classifying or sorting implements are specified.

Assays and Tests—The strength of drugs or preparations for which assay processes are provided, and the limit of other substances in official drugs are to be determined by the official processes.

Tests for the presence of foreign substances are intended to limit such substances to amounts which would be unobjectionable under conditions in which the medicinal agents are employed.

In stating the quantities to be used for assays, an appropriate amount is specified. The word "about" is used to indicate that this amount need not be the exact quantity specified, but it should not deviate more than plus or minus 10 per cent. This quantity is accurately weighed, and the result of the test or assay is based upon this exact weight.

Chemical Formulas—Chemical formulas, other than those in the definitions, tests, and assays, are given in this National Formulary for the purpose of information and calculation.

Concentrations of Solutions for Testing—Such phrases as "(1 in 10)," "(1 in 20)," etc., are understood to mean that 1 part by volume of a liquid is to be diluted with, or 1 part by weight of a solid dissolved in, sufficient of the solvent to make the volume of the finished solution 10 or 20 parts by volume.

Distilled Water—Where water is referred to in tests, Distilled Water shall be used.

Drying to Constant Weight—The term "dried to constant weight" means that two consecutive weighings do not differ by more than 0.5 mg. per Gm. of substance taken for the determination, the second weighing following an additional hour of drying.

Negligible—The term "negligible" means a quantity not exceeding 0.5 mg.

Percentage Figures—Percentage figures, except those for alcohol, refer to *percentage by weight*, unless otherwise specified in the monograph. Percentage figures without decimals signify *exactly* the minimum or maximum: thus 99 per cent means 99.00 per cent. All statements of percentages of alcohol refer to percentage, by volume, of C_2H_5OH at 15.56°.

Physical Tests—Official methods only are to be used for conducting the physical tests, except in specific cases where other methods are permitted. The ranges specified are inclusive. The methods and details are among the general tests.

Reference Standards—To provide a greater degree of uniformity in certain assays, and other tests, Reference Standards have been provided to be used as controls, page 744.

Solubilities—The statements concerning solubilities given under the paragraph entitled "Solubility," in the National Formulary monographs are not intended as standards or tests for purity, but primarily

as information required by those employed in connection with the preparation and dispensing of medicines, except when a special test involving solubility is given, or in case of solubility of volatile oils in alcohol of specific strengths, the test for such solubility is intended as a test for purity and the substance must conform to the test.

The solubility of National Formulary compounds in the given solvents is considered to be of minor importance as a means of identification or determination of purity; for these purposes dependence is placed upon the other tests directed in the monographs.

Solutions—Unless otherwise specified in the individual monograph, all solutions referred to are solutions in distilled water.

Specific Gravity—Unless otherwise stated, the specific gravity basis is $\frac{25^\circ}{25^\circ}$, i.e., the ratio of the weight of a substance in air at 25° to that of an equal volume of water at the same temperature.

Sterile Products—National Formulary substances required to be sterile, must meet the *Sterility Test for Liquids and Solids*, page 746. They must be kept in containers so closed that sterility is maintained until the containers are opened for use.

Temperatures—Unless otherwise specified, all temperatures in this National Formulary are expressed in centigrade degrees. All measurements are made at 25° unless otherwise directed.

Time Limitations—In testing National Formulary chemicals for impurities (*chloride, sulfate, etc.*), 5 minutes shall be allowed for the reaction to be observed unless otherwise specified.

Unofficial Methods for Detecting Added Foreign Substances—Inasmuch as the primary object of the National Formulary is to assure the user of official medicinal substances of their identity, strength, quality, and purity, and as it is manifestly impossible to include in each monograph a test for every impurity or adulterant that might be present, it is to be understood that the presence of any added foreign substance, which could not have resulted from the use of the ingredients in an official formula, constitutes a variation from the official standard. The proof of such variation may be based upon the application of recognized scientific methods, whether such methods appear in the National Formulary or not.

Water Bath and Steam Bath—The terms *water bath* and *steam bath* are used synonymously. When a water bath is directed, the water shall

be boiling unless otherwise specified. When a water bath is directed a bath of actively flowing steam or other form of regulated heat, corresponding in temperature to that of a water bath, may be used.

VEGETABLE and ANIMAL DRUGS

Vegetable and Animal Drugs—Vegetable and animal drugs are to be as free as practicable from molds, insects, and other animal contamination and animal excreta. They shall show no abnormal discoloration, abnormal odor, sliminess, or evidence of deterioration.

Foreign Inorganic Matter—The amount of foreign inorganic matter in vegetable or animal drugs, estimated as *Acid-insoluble ash*, shall not exceed 2 per cent of the weight of the drug unless otherwise specified in the individual monograph. Before vegetable drugs are ground or powdered, stones, dust, lumps of dirt, or other foreign inorganic matter which can be separated by mechanical means must be removed.

Foreign Organic Matter—In commerce it is not always possible to obtain vegetable drugs in a state of absolute purity, and a limited amount of innocuous extraneous, or foreign matter adhering to the drug or admixed with it is usually not detrimental. The presence or admixture of any poisonous, dangerous, or otherwise noxious foreign substance, however, is not permissible. Foreign organic matter refers to any part of the plant or plants yielding the drug, except that part or those parts designated as constituting the drug, and to any other plant parts, vegetable tissues, or substances.

Preservation—For the protection of vegetable or animal substances from the ravages of insects, it is directed in special cases that they be preserved in suitable containers into which is introduced at intervals a suitable quantity of chloroform, carbon tetrachloride, or other suitable fumigant.

For additional information concerning the standards for vegetable and animal drugs, see pages 759 to 765.

WEIGHTS and MEASURES

Metric—The metric system of weights and measures is the official system used in this National Formulary. The units of the metric

system commonly employed are designated by abbreviations, as follows:

M.	= meter	Kg.	= kilogram	μg.	= microgram†
dm.	= decimeter	Gm.	= gram	L.	= liter
cm.	= centimeter	dg.	= decigram	dl.	= deciliter
mm.	= millimeter	cg.	= centigram	ml.	= milliliter
μ	= micron*	mg.	= milligram	cc.‡	= cubic centimeter

In metric abbreviations, the numerals precede the abbreviation, and are always written in arabic characters, thus: 5 Gm.; 2 cc. To distinguish the abbreviation for gram (Gm.) from that for grain (gr.) the former is written with a capital, the latter with a small letter.

Apothecary—The units of this system are designated in prescribing by symbols or abbreviations as follows:

℥	= apothecaries ounce	= 8 drachms	= 480 grains
ʒ	= drachm	= 3 scruples	= 60 grains
℈	= scruple	= 20 grains	
gr.	= grain		
O	= pint	= 16 fluidounces	
f℥	= fluidounce	= 8 fluidrachms	= 480 minims
fʒ	= fluidrachm	= 60 minims	
♏	= minim		

In writing prescriptions in the apothecaries system, Roman, not Arabic, numerals are employed, and these are always placed after the symbol or abbreviation, thus: f℥ ii; gr. xv.

Concentrations of Solutions on Prescriptions—Percentage concentrations of solutions are expressed as follows:

Per cent weight in weight—(*w/w*) expresses the number of grams of an active constituent in 100 grams of solution.

Per cent weight in volume—(*w/v*) expresses the number of grams of an active constituent in 100 cubic centimeters of solution, and is used in prescription practice regardless of whether water or some other liquid is the solvent.

Per cent volume in volume—(*v/v*) expresses the number of cubic centimeters of an active constituent in 100 cubic centimeters of solution.

* 1 micron = 0.001 mm.

† 1 microgram, sometimes called 1 gamma, equals 0.001 mg.

‡ 1 cubic centimeter (cc.) is used in this National Formulary as the equivalent of 1 milliliter (ml.).

When *per cent* is used in prescriptions without qualification, it means: for solutions of solids in liquids, per cent weight in volume; for solutions of liquids in liquids, per cent volume in volume; and for solutions of gases in liquids, per cent weight in volume. For example, a 1 per cent solution is prepared by dissolving 1 gram of a solid or 1 cubic centimeter of a liquid in sufficient of the solvent to make 100 cubic centimeters of the solutions. A solution of the same strength may be prepared by apothecaries weight and measure by dissolving 4.5 grains (more accurately 4.5638 grains) of a solid or 4.8 minims of a liquid in sufficient of the solvent to make 1 fluidounce of the solution.

In dispensing prescriptions, slight changes in volume owing to variations in room temperature may be disregarded.

MONOGRAPHS ON DRUGS, CHEMICALS, AND PREPARATIONS

ACACIA SYRUP

Syrupus Acaciæ

Syr. Acac.

Acacia, granulated or powdered	100 Gm.
Sodium Benzoate	1 Gm.
Vanilla Tincture	5 cc.
Sucrose	800 Gm.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Mix the acacia, sodium benzoate, and sucrose; then add 425 cc. of distilled water, and mix well. Heat the mixture on a water bath until solution is completed. When cool, remove the scum, add the vanilla tincture and sufficient distilled water to make the product measure 1000 cc., and strain, if necessary.

Storage—Preserve Acacia Syrup in tight containers, and avoid excessive heat.

COMPOUND ACETANILID POWDER

Pulvis Acetanilidi Compositus

Pulv. Acetanil. Comp.

Acetanilid	700 Gm.
Caffeine	100 Gm.
Sodium Bicarbonate	200 Gm.
To make	1000 Gm.

Reduce the ingredients to a fine powder and mix them thoroughly.

Description—Compound Acetanilid Powder occurs as a white, crystalline, odorless powder.

Identification—

A: The residue upon ignition of Compound Acetanilid Powder responds to the tests for *Sodium*, page 727, and for *Carbonate*, page 723.

B: Boil 0.1 Gm. of Compound Acetanilid Powder with 5 cc. of sodium hydroxide T.S.: an oily layer and the characteristic odor of aniline are noticed (*acetanilid*). The addition of 1 drop of chloroform to the above mixture produces the odor of phenyl isocyanide (*Caution: poisonous*).

C: Dissolve 0.1 Gm. of Compound Acetanilid Powder in 1 cc. of hydrochloric acid; add 0.1 Gm. of potassium chlorate, and heat to dryness in a suitable

dish on a water bath; invert the dish over a few drops of ammonia T.S.: the residue acquires a red-purple color, which is destroyed upon the addition of a caustic alkali (*caffeine*).

Storage—Preserve Compound Acetanilid Powder in well-closed containers.

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains).

One average metric dose contains 0.21 Gm. of Acetanilid, 30 mg. of Caffeine, and 60 mg. of Sodium Bicarbonate.

Acetanilid Tablets

ACETANILID TABLETS
Tabellæ Acetanilidi

Tab. Acetanil.

Acetanilid Tablets contain not less than 92.5 per cent and not more than 107.5 per cent of the labeled amount of C_8H_9ON.

Identification—

A: Powder several of the Tablets and boil a quantity of the powder, equivalent to about 0.1 Gm. of acetanilid, with 5 cc. of sodium hydroxide T.S.: the characteristic odor of aniline becomes noticeable. Add 1 drop of chloroform and heat the mixture: the disagreeable odor of phenyl isocyanide (*Caution: poisonous*) is evolved.

Assay—*Preparation of standard solution:* Dissolve 14 Gm. of potassium bromate and 55 Gm. of potassium bromide in sufficient distilled water to make 1000 cc. Weigh accurately about 0.3 Gm. of acetanilid, previously dried in a desiccator for 24 hours, transfer it to an Erlenmeyer flask, add 10 cc. of dilute sulfuric acid (1 in 10), and digest the mixture, with frequent agitation, on a water bath for 3 hours, maintaining the contents of the flask at not less than 4 cc. by the addition of distilled water if necessary. Add 20 cc. of distilled water and 10 cc. of hydrochloric acid, and titrate the mixture with the bromide-bromate solution until a distinct and permanent yellow color is formed. Calculate the amount of acetanilid equivalent to each cc. of this solution.

Determination of acetanilid: Weigh not less than 20 of the Tablets, reduce them to a fine powder without appreciable loss, and macerate an accurately weighed portion, equivalent to about 0.3 Gm. of acetanilid, with 20 cc. of chloroform, agitating the mixture occasionally during 30 minutes. Filter the mixture into an Erlenmeyer flask, rinse the original container with several small portions of chloroform, pouring the washings over the residue on the filter, and continue to wash the residue until it is free from chloroform-soluble material. Evaporate most of the chloroform, add 10 cc. of dilute sulfuric acid (1 in 10), and digest the mixture, with frequent agitation, on a water bath for 3 hours, maintaining the contents of the flask at not less than 4 cc. by the addition of distilled water if necessary. Add 20 cc. of distilled water and 10 cc. of hydrochloric acid, and titrate the mixture with the standardized bromide-bromate solution.

From the acetanilid equivalent of the standardized solution, calculate the amount of acetanilid present in the portion of powdered tablets taken.

Storage—Preserve Acetanilid Tablets in well-closed containers.

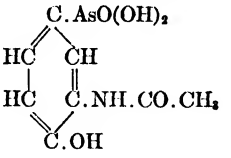
Sizes—Acetanilid Tablets usually available contain the following amount of acetanilid: **0.2 Gm.** (approximately 3 grains).

AVERAGE DOSE—**0.2 Gm.** (approximately 3 grains) of Acetanilid.

ACETARSONE

Acetarsonum

3-Acetylamino-4-hydroxyphenylarsonic Acid



$C_8H_{10}AsNO_5$ Mol. wt. 275.08

Acetarsone, when dried over sulfuric acid for 3 hours, contains not less than 26.9 per cent and not more than 27.6 per cent of As.

Description—Acetarsone occurs as a white or slightly yellow, odorless powder. It is stable at ordinary temperatures.

Solubility—Acetarsone dissolves in solutions of alkali hydroxides or carbonates. It is slightly soluble in water and insoluble in alcohol. Its saturated aqueous solution is acid to litmus paper.

Identification—

A: Dissolve 1 Gm. of Acetarsone in 10 cc. of sodium hydroxide T.S., dilute with 10 cc. of water, then add 2 Gm. of sodium hydrosulfite and heat in a water bath for 20 minutes: a yellow precipitate is formed, which, after decanting the supernatant liquid, dissolves in an excess of sodium hydroxide T.S.

B: The solution resulting from the *Assay for arsenic* yields with hydrogen sulfide, a yellow precipitate which is soluble in ammonium carbonate T.S.

C: Dissolve 0.1 Gm. of Acetarsone in 5 cc. of sodium hydroxide T.S. and evaporate to about 3 cc. Cool, add 2 or 3 drops of alcohol, then add 2 cc. of sulfuric acid and heat gently: the odor of ethyl acetate is evolved.

Loss on drying—When dried over sulfuric acid for 3 hours, Acetarsone loses not more than 2 per cent of its weight.

Residue on ignition—Acetarsone yields not more than 0.2 per cent of residue on ignition, page 745.

Solubility in sodium carbonate—One Gm. of Acetarsone dissolves almost completely in 10 cc. of sodium carbonate T.S., yielding a practically clear solution, which is not darker than pale yellow.

Aminohydroxyphenylarsonic acid—Shake 1 Gm. of Acetarsone with 10 cc. of a mixture of equal volumes of diluted hydrochloric acid and water, filter, and add to the filtrate 2 drops of a solution of potassium dichromate (1:30): no red or brown color is produced.

Inorganic arsenates—To a solution of 0.5 Gm. of Acetarsone in 10 cc. of water and a slight excess of ammonia T.S., add 2 cc. of magnesia mixture T.S.: no precipitate forms, but after heating for 10 or 15 minutes, a precipitate will form.

Assay—Place about 0.2 Gm. of Acetarsone, previously dried for 3 hours over sulfuric acid and accurately weighed, in a glass-stoppered, 200- to 300-cc. flask. Add 1 Gm. of finely powdered potassium permanganate and 5 cc. of diluted sulfuric acid, and allow to stand for 10 minutes, rotating the contents of the flask during this time to insure thorough mixing. Cautiously add 10 cc. of sulfuric acid in portions of about 2 cc., rotating the flask after each addition. When the reaction has ceased, add sufficient hydrogen peroxide T.S. to dissolve completely the brown precipitate (about 5 to 7 cc.). Toward the end of the reaction the hydrogen peroxide T.S. is to be added dropwise to avoid any great excess. Dilute with 25 cc. of distilled water, and boil gently over an asbestos-wire gauze for 15 or 20 minutes, or until the excess of hydrogen peroxide is expelled. Dilute with 50 cc. of distilled water, and add 0.1 *N* potassium permanganate until the liquid is faintly pink, then

discharge the pink color by the addition of 1 drop of 0.1 *N* oxalic acid. Cool the solution, add 2.5 Gm. of potassium iodide, stopper the flask tightly, and allow it to stand in a cool, dark place for 1 hour. Then titrate the liberated iodine with 0.1 *N* sodium thiosulfate without the use of a starch indicator. Perform a blank test with the same quantities of the same reagents, and in the same manner and make any necessary correction. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.003746 Gm. of As.

Storage—Preserve Acetarsone in well-closed containers.

AVERAGE DOSE—**0.25 Gm.** (approximately 4 grains).

Acetarsone Tablets

ACETARSONE TABLETS

Tabellæ Acetarsoni

Tab. Acetarson.

Acetarsone Tablets contain not less than 92.5 per cent and not more than 107.5 per cent of the labeled amount of $C_8H_{10}AsNO_5$.

Identification—Place about 1 Gm. of the pulverized Tablets in a test tube, add 10 cc. of sodium hydroxide T.S. and 10 cc. of distilled water, shake vigorously and filter. To the clear filtrate add 2 Gm. of sodium hydrosulfite and warm the mixture in a water bath for 20 minutes: a yellow precipitate is formed which, after decanting the supernatant liquid, dissolves in an excess of sodium hydroxide T.S.

Assay—Weigh a counted number of not less than 20 of the Tablets and reduce them to a fine powder without appreciable loss. Weigh accurately a portion of the powder equivalent to about 0.2 Gm. of acetarsone, and transfer, quantitatively, to a 300-cc. glass-stoppered flask, and continue as directed in the *Assay* under *Acetarsone*, page 17, beginning with, "Add 1 Gm. of finely powdered potassium permanganate. . . ." Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.01375 Gm. of $C_8H_{10}AsNO_5$.

Storage—Preserve Acetarsone Tablets in tight containers.

Sizes—Acetarsone Tablets usually available contain the following amounts of acetarsone: **50 mg.**, and **0.1** and **0.25 Gm.** (approximately 3/4, 1 1/2 and 4 grains).

AVERAGE DOSE—**0.25 Gm.** (approximately 4 grains) of Acetarsone.

Acetic Acid

ACETIC ACID

Acidum Aceticum

Acid. Acet.

$HC_2H_3O_2$ CH_3COOH Mol. wt. 60.05

Acetic Acid is an aqueous solution containing not less than 36 per cent and not more than 37 per cent of $HC_2H_3O_2$.

Description—Acetic Acid is a clear, colorless liquid, having a strong, characteristic odor, and a sharply acid taste. It is acid to litmus paper.

Solubility—Acetic Acid is miscible with water, with alcohol, and with glycerin.

Specific gravity—The specific gravity of Acetic Acid is about 1.045 at 25°.
Identification—Acetic Acid responds to the tests for *Acetate*, page 722.
Non-volatile residue—Evaporate 20 cc. of Acetic Acid in a tared porcelain dish on a water bath, and dry at 105° for 1 hour: the weight of the residue does not exceed 1 mg.
Chloride—The addition of 5 drops of silver nitrate T.S. to 10 cc. of an aqueous solution of Acetic Acid (1 in 10) produces no opalescence.
Sulfate—The addition of 5 drops of barium chloride T.S. to 10 cc. of an aqueous solution of Acetic Acid (1 in 10) produces no turbidity.
Heavy metals—Evaporate 5 cc. of Acetic Acid to dryness in a porcelain dish on a water bath. Warm the residue with 2 cc. of 0.1 *N* hydrochloric acid, and dilute to 25 cc. with distilled water: the heavy metals limit, page 721, for Acetic Acid is 10 parts per million.
Readily oxidizable substances—Dilute 4 cc. of Acetic Acid in a glass-stoppered flask with 20 cc. of distilled water, and add 0.3 cc. of 0.1 *N* potassium permanganate: the pink color is not changed to brown at once, and the liquid does not become entirely brown or free from a pink tint in less than 30 seconds.
Assay—Place about 6 cc. of Acetic Acid in a tared, glass-stoppered flask, and weigh accurately. Dilute with 40 cc. of distilled water, and titrate with 1 *N* sodium hydroxide, using phenolphthalein T.S. as the indicator. Each cc. of 1 *N* sodium hydroxide is equivalent to 0.06005 Gm. of $HC_2H_3O_2$.
Storage—Preserve Acetic Acid in tight containers.

DILUTED ACETIC ACID

Acidum Aceticum Dilutum

Acid. Acet. Dil.

Diluted Acetic Acid is an aqueous solution containing, in each 100 cc., not less than 5.7 Gm. and not more than 6.3 Gm. of $HC_2H_3O_2$.

Diluted Acetic Acid may be prepared as follows:

Acetic Acid	**158 cc.**
Distilled Water, a sufficient quantity,	
To make	**1000 cc.**

Mix the ingredients.

Description—Diluted Acetic Acid is a clear, colorless liquid having a characteristic odor and a sharply acid taste. It is acid to litmus paper.
Solubility—Diluted Acetic Acid is miscible with water, with alcohol, and with glycerin.
Specific gravity—The specific gravity of Diluted Acetic Acid is about 1.008 at 25°.
Identification—Diluted Acetic Acid responds to the tests for *Acetate*, page 722.
Other tests—Diluted Acetic Acid meets the requirements of the tests for *Non-volatile residue*, *Chloride*, *Sulfate*, *Heavy metals*, and *Readily oxidizable substances* under *Acetic Acid*, page 18, allowance being made for the difference in strength.
Assay—Measure exactly 25 cc. of Diluted Acetic Acid into a flask, and add 15 cc. of recently boiled and cooled distilled water. Titrate with 1 *N* sodium hy-

droxide, using phenolphthalein T.S. as the indicator. Each cc. of 1 *N* sodium hydroxide is equivalent to 0.06005 Gm. of $HC_2H_3O_2$.

Storage—Preserve Diluted Acetic Acid in tight containers.

AVERAGE DOSE—2 cc. (approximately 30 minims).

Acetic Larkspur Tincture, page 292
Acetic Turpentine Liniment, page 542

Acetone

ACETONE
Acetonum

Dimethyl Ketone

C_3H_6O $CH_3.CO.CH_3$ Mol. wt. 58.08

Acetone contains not less than 99 per cent of $(CH_3)_2CO$.

Description—Acetone is a transparent, colorless, mobile, volatile liquid, having a characteristic odor. It boils at about 56°, but volatilizes even at low temperatures. It is inflammable.

Solubility—Acetone is miscible with water, with alcohol, with ether, with chloroform, and with most volatile oils.

Specific gravity—The specific gravity of Acetone is about 0.790 at 25°.

Identification—

A: Add 1 cc. of sodium hydroxide T.S. to 1 cc. of an aqueous solution of Acetone (1 in 200), warm the mixture, and add a few cc. of iodine T.S.: a yellow precipitate of iodoform appears in the liquid immediately.

B: Mix 1 cc. of an aqueous solution of Acetone (1 in 200) with 5 drops of sodium nitroferricyanide T.S. and 2 cc. of sodium hydroxide T.S., and add a slight excess of acetic acid: a deep red color is produced which develops a bluish purple tint when diluted with several volumes of distilled water.

Non-volatile residue—Evaporate 50 cc. of Acetone in a tared porcelain dish on a water bath, and dry at 105° for 2 hours: the weight of the residue does not exceed 2 mg.

Reaction—An aqueous solution of Acetone (1 in 2) is neutral to litmus paper which has been previously moistened with distilled water.

Readily oxidizable substances—Mix 20 cc. of Acetone with 0.1 cc. of 0.1 *N* potassium permanganate in a glass-stoppered bottle: the permanganate color of the mixture does not wholly disappear within 15 minutes.

Assay—Determine the exact weight of a glass-stoppered weighing bottle containing 15 cc. of distilled water, add about 1 cc. of Acetone, and again weigh accurately. Transfer the contents of the bottle to a 1000-cc. volumetric flask, rinse the weighing bottle with several portions of distilled water, and add the rinsings to the flask. Fill the flask to the mark with distilled water, and mix the contents thoroughly. Place 25 cc. of 1 *N* sodium hydroxide in a 250-cc. glass-stoppered flask, add exactly 25 cc. of the Acetone solution and 35 cc. of 0.1 *N* iodine, with constant shaking of the flask, and allow the mixture to stand for 15 minutes. Add 26 cc. of 1 *N* hydrochloric acid, and at once titrate the residual iodine with 0.1 *N* sodium thiosulfate, adding starch T.S. as the indicator when the liquid is nearly decolorized.

Perform a blank test with the same quantities of the same reagents and in the same manner, and make any necessary correction. Each cc. of 0.1 *N* iodine is equivalent to 0.0009680 Gm. of $(CH_3)_2CO$.

Storage—Preserve Acetone in tight containers, remote from fire.

ACETOPHENETIDIN AND PHENYL SALICYLATE TABLETS

Tabellæ Acetophenetidini et Phenylis Salicylatis

Tab. Acetphen. et Phenyl. Salicyl. Phenacetin and Salol Tablets

Acetophenetidin and Phenyl Salicylate Tablets contain not less than 90 per cent and not more than 110 per cent of the labeled amounts of acetophenetidin and of phenyl salicylate.

Identification—

A: The Tablets respond to the *Identification tests* under *Phenyl Salicylate Tablets*, page 392.

B: Powder several of the Tablets, and boil a portion of the powder, equivalent to about 0.1 Gm. of acetophenetidin, with 1 cc. of hydrochloric acid for 1 minute, add 10 cc. of distilled water, cool, filter, and add 1 drop of potassium dichromate T.S. to the filtrate: a purplish color is produced in the liquid.

Assay for acetophenetidin—Weigh not less than 20 of the Tablets, reduce them to a fine powder without appreciable loss, and macerate an accurately weighed portion, equivalent to not more than 80 mg. of phenyl salicylate, in a flask, with 20 cc. of chloroform for 30 minutes, agitating the mixture frequently. Filter the mixture, wash the flask with several portions of chloroform, pour the washings through the residue on the filter, and continue to wash the residue with chloroform until all the chloroform-soluble material has been dissolved. Evaporate the chloroform in a current of dry air without heat, add 10 cc. of a 2.5 per cent solution of sodium hydroxide, heat the mixture on a water bath for 15 minutes, and cool it quickly to room temperature by immersing the flask in running water to prevent the partial hydrolysis of the acetophenetidin. Transfer the liquid with a minimum quantity of distilled water to a separator, and rinse the flask with the first 20-cc. portion of chloroform to be used in the following extractions: extract the alkaline solution with three 20-cc. portions of chloroform, washing each portion in a second separator with 5 cc. of distilled water and passing the chloroform solution through a small, dry filter into a suitable flask. Reserve the combined alkaline solution and washings for the determination of the phenyl salicylate as directed below. Evaporate the combined chloroform extracts on a water bath in a current of dry air, and dry the acetophenetidin to constant weight at 60°.

Assay for phenyl salicylate—Transfer the combined alkaline solution and washings remaining after the extraction of the acetophenetidin in the assay above, to a separator and proceed as directed under *Phenyl Salicylate Tablets*, page 392, beginning with, "acidify it with hydrochloric acid T.S. . . ."

Storage—Preserve Acetophenetidin and Phenyl Salicylate Tablets in tight containers at a temperature not above 35°.

Sizes—Acetophenetidin and Phenyl Salicylate Tablets usually available contain the following amounts of acetophenetidin and phenyl salicylate: of each, **0.15 Gm.** (approximately $2^1/_2$ grains).

AVERAGE DOSE—**0.15 Gm.** (approximately $2^1/_2$ grains) each of Acetophenetidin and Phenyl Salicylate.

Aconite Fluidextract

ACONITE FLUIDEXTRACT
Fluidextractum Aconiti

Fldext. Aconit.

Aconite Fluidextract possesses a potency per cc., equivalent to 1.5 mg. of Reference Aconitine, page 744.

Prepare the Fluidextract from aconite, in moderately coarse powder, by Process C, as modified for assayed fluidextracts, page 719. Use a mixture of 3 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 48 hours, and percolate at a moderate rate.

Add sufficient hydrochloric acid to adjust the hydrogen-ion concentration of the percolate to fall within the range of *p*H 2.75 and *p*H 3.25. Adjust the concentrated fluid to contain, in each 1 cc., a potency equivalent to 1.5 mg. of Reference Aconitine, page 744, and 63 per cent, by volume, of C_2H_5OH. Then readjust the hydrogen-ion concentration so that it is within the range previously stated.

Assay—Proceed as directed in the *Assay* under *Aconite Tincture*, page 25, using the Fluidextract properly diluted with distilled water.
Alcohol content—From 60 to 66 per cent, by volume, of C_2H_5OH.
Storage—Preserve Aconite Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**0.06 cc.** (approximately 1 minim).

Aconite Tincture

ACONITE TINCTURE
Tinctura Aconiti

Tr. Aconit. Tinctura Aconiti P.I.

Aconite Tincture possesses a potency per cc. equivalent to 0.15 mg. of Reference Aconitine, page 744.

Aconite, in fine powder	**100 Gm.**
Alcohol,	
Water, each, a sufficient quantity,	
To make about	**1000 cc.**

Prepare the Tincture by Process P as modified for assayed tinctures, page 758, using a mixture of 3 volumes of alcohol and 1 volume of water as the menstruum. Macerate the drug during 24 hours, and then percolate it at a moderate rate. Immediately add sufficient hydrochloric

acid to this percolate to produce a *p*H of 3 ± 0.2. Assay a portion of the percolate, and adjust the volume of the remaining liquid by dilution with the above menstruum, including sufficient hydrochloric acid to produce a *p*H of 3 ± 0.2, so that the finished Tincture will conform to the above biological standard.

Assay—In this assay use guinea pigs weighing from 250 Gm. to 350 Gm. from a colony of guinea pigs kept under identical conditions. For each assay the animals used for both the preparation being tested and for the reference aconitine must not vary by more than 50 Gm. in weight.

Dilute a portion of the percolate (or of Aconite Tincture if the finished Tincture is being assayed), using sufficient distilled water to make the dose about 1 cc., and inject this dilution under the skin of the abdomen of the guinea pigs.

Prepare a solution of reference aconitine in 70 per cent alcohol, by volume, in a proportion of exactly 15 mg. of the aconitine in each 100 cc., and adjust the *p*H of the solution, by the addition of hydrochloric acid, to 3 ± 0.2. This alcohol solution may be preserved in sealed ampuls, but such solutions must be checked for potency against freshly prepared solutions at least every 6 months, and discarded if not of standard potency.

Dilute this solution of aconitine with sufficient distilled water to make the dose about 1 cc., and inject it as directed for the preparation.

By this means determine the doses of the reference aconitine and of the preparation being assayed which will kill not more than 7 and not less than 3 animals of groups of 10 animals, within 6 hours. If the respective mortalities from the reference standard and the preparation being assayed differ by not more than 2 animals the doses may be considered equivalent.

NOTE: Owing to many variable factors in this assay which make it difficult for different operators to obtain identical results, the evidence of potency within 20 per cent above or 20 per cent below the standard is accepted.

Alcohol content—From 65 to 70 per cent, by volume, of C_2H_5OH.

Storage—Preserve Aconite Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—0.6 cc. (approximately 10 minims).

Acriflavine

ACRIFLAVINE

Acriflavina

Acriflav. Acriflavine Base Neutral Acriflavine

Acriflavine is a mixture of 2,8-diamino-10-methylacridinium chloride and 2,8-diaminoacridine containing, when dried at 105° for 2 hours, not less than 13.3 per cent and not more than 15.8 per cent of Cl.

Description—Acriflavine occurs as a deep orange, odorless, granular powder.

Solubility—One Gm. of Acriflavine dissolves in about 3 cc. of water. It is incompletely soluble in alcohol, is nearly insoluble in ether, in chloroform, and in fixed oils.

Identification—

A: Aqueous solutions of Acriflavine are reddish orange in color and fluoresce on dilution. Add a few drops of hydrochloric acid to an aqueous solution of Acriflavine that is diluted just sufficiently to show fluorescence: the fluores-

cence disappears, but partially reappears on further dilution with distilled water.

B: Add 2 drops of sulfuric acid to 1 cc. of an aqueous solution of Acriflavine (1 in 250) and agitate the mixture: a reddish orange crystalline precipitate is produced.

C: Add 5 cc. of an aqueous solution of Acriflavine to an equal volume of a saturated aqueous solution of sodium bicarbonate: no effervescence is produced (*distinction from acriflavine hydrochloride*).

Loss on drying—When dried at 105° for 2 hours, Acriflavine loses not more than 8 per cent of its weight.

Residue on ignition—Moisten 1 Gm. of Acriflavine, accurately weighed, with 1 cc. of sulfuric acid and ignite to constant weight: the weight of the residue on ignition does not exceed 35 mg.

Water-insoluble substances—Dissolve about 1 Gm. of Acriflavine, accurately weighed, in 250 cc. of warm distilled water, collect the insoluble residue, if any, in a tared Gooch crucible, wash the residue thoroughly with warm distilled water, and dry it to constant weight at 105°: the insoluble matter does not exceed 0.5 per cent.

Arsenic—Heat a crucible to redness and introduce, in small portions, an intimate mixture of 0.2 Gm. of Acriflavine, 0.5 Gm. of potassium nitrate, and about 0.3 Gm. of anhydrous sodium carbonate. Maintain a red heat until the reaction ceases, cool, and then boil the cooled residue for 5 minutes with 10 cc. of diluted sulfuric acid, filter, and wash the undissolved residue with 10 cc. of distilled water. Evaporate the filtrate and washings until sulfuric acid vapors begin to evolve. The resulting residue, when dissolved in 5 cc. of distilled water, conforms to the requirements of the test for *Arsenic*, page 689.

Assay for chlorine—Transfer about 0.25 Gm. of Acriflavine, previously dried at 105° for 2 hours and accurately weighed, to a suitable beaker, dissolve in 10 cc. of distilled water, and add about 0.5 Gm. of silver nitrate previously dissolved in about 10 cc. of distilled water; add 10 cc. of sulfuric acid, finally add about 2 Gm. of powdered potassium permanganate in several portions; cover the beaker with a watch glass and digest on a water bath for at least 30 minutes; decolorize the mixture by the addition of either hydrogen peroxide or alcohol with the aid of heat. Filter through a tared Gooch crucible and wash the precipitate of silver chloride thoroughly with nitric acid (1 in 3) followed by a small quantity of distilled water. Dry to constant weight at 105°. Each Gm. of silver chloride is equivalent to 0.2474 Gm. of Cl.

Storage—Preserve Acriflavine in tight containers.

Acriflavine Hydrochloride

ACRIFLAVINE HYDROCHLORIDE

Acriflavinæ Hydrochloridum

Acriflav. Hydrochlor.

Acriflavine Hydrochloride is a mixture of the hydrochlorides of 2,8-diamino-10-methylacridinium chloride and 2,8-diaminoacridine containing, when dried for 1 hour at 105°, not less than 23 per cent and not more than 24.5 per cent of Cl.

Description—Acriflavine Hydrochloride occurs as a strong reddish brown, odorless, crystalline powder.

Solubility—One Gm. of Acriflavine Hydrochloride dissolves in about 3 cc. of water, and is soluble in alcohol. It is nearly insoluble in ether, in chloroform, in liquid petrolatum, and in fixed or volatile oils.

Stability of solutions—One Gm. of Acriflavine Hydrochloride, dissolved in 50 cc. of warm distilled water, forms a clear solution, which remains clear and free from sediment on standing in the dark for 24 hours.

Dissolve 0.2 Gm. of Acriflavine Hydrochloride in 100 cc. of isotonic sodium chloride solution: a clear solution is obtained, which remains clear and free from sediment on standing in the dark for 24 hours.

Identification—

A: Solutions of Acriflavine Hydrochloride are dark red in color and become fluorescent on dilution. Add a few drops of hydrochloric acid to an aqueous solution of Acriflavine Hydrochloride that is just sufficiently diluted to show fluorescence: the fluorescence disappears, but partially reappears on further dilution with water.

B: Add 2 drops of sulfuric acid to 1 cc. of an aqueous solution of Acriflavine Hydrochloride (1 in 250) and agitate the mixture: a reddish orange crystalline precipitate is produced.

C: Add 5 cc. of an aqueous solution of Acriflavine Hydrochloride (1 in 5) to an equal volume of a saturated aqueous solution of sodium bicarbonate: a marked effervescence is produced (*distinction from acriflavine base*).

Loss on drying—When dried at 105° for 1 hour Acriflavine Hydrochloride loses not more than 7 per cent of its weight.

Residue on ignition—Moisten 1 Gm. of Acriflavine Hydrochloride with 0.5 cc. of sulfuric acid and ignite to constant weight: the weight of the residue on ignition does not exceed 10 mg.

Arsenic—Acriflavine Hydrochloride complies with the requirements of the test for *Arsenic* under *Acriflavine*, page 26.

Assay for chlorine—Proceed as directed in the *Assay for chlorine* under *Acriflavine*, page 26.

Storage—Preserve Acriflavine Hydrochloride in tight containers.

Alcohol, Dehydrated

DEHYDRATED ALCOHOL

Alcohol Dehydratum

Alcohol Dehyd. Dehydrated Ethanol "Absolute Alcohol"

Dehydrated Alcohol is a liquid containing not less than 99 per cent by weight of C_2H_5OH.

Description—Dehydrated Alcohol is a transparent, colorless, mobile, and volatile liquid, having a characteristic odor, and a burning taste. It is hygroscopic and inflammable. Dehydrated Alcohol is readily volatilized even at low temperatures and boils at about 78°.

Solubility—Dehydrated Alcohol is miscible with water without any trace of cloudiness. It is also miscible with ether and with chloroform.

Specific gravity—The specific gravity of Dehydrated Alcohol is not more than 0.798 at 15.56° (the U. S. Government standard temperature for Alcohol).

Free acid—To 50 cc. of Dehydrated Alcohol in a glass-stoppered flask add 50 cc. of recently boiled distilled water. Add a few drops of phenolphthalein T.S. and titrate with 0.02 *N* sodium hydroxide to a pink color that persists for 30 seconds: not more than 0.9 cc. of 0.02 *N* sodium hydroxide is required for neutralization.

Total solids—Evaporate 40 cc. of Dehydrated Alcohol in a platinum or porcelain dish on a water bath, and dry at 105°: the weight of the residue does not exceed 1 mg.

Fusel oil constituents—Mix 10 cc. of Dehydrated Alcohol with 5 cc. of distilled water and 1 cc. of glycerin, and allow the mixture to evaporate spontaneously from clean, odorless absorbent paper: no foreign odor is perceptible when the last traces of Dehydrated Alcohol leave the paper.

Amyl alcohol or non-volatile, carbonizable impurities, etc.—Allow 25 cc. of De-

hydrated Alcohol to evaporate spontaneously in a porcelain dish, carefully protected from dust, until the surface of the dish is barely moist: no reddish or brownish color is produced upon the addition of a few drops of sulfuric acid.

Aldehydes, organic impurities, etc.—Place 20 cc. of Dehydrated Alcohol in a glass-stoppered cylinder that has been thoroughly cleaned with hydrochloric acid, then rinsed with distilled water and finally with the Dehydrated Alcohol to be tested. Cool the contents to approximately 15° and add, by means of a carefully cleaned pipette, 0.1 cc. of 0.1 *N* potassium permanganate, noting the exact time of addition. Mix at once by inverting the stoppered cylinder, and allow it to stand at 15° for 5 minutes: the pink color does not entirely disappear.

Acetone, other ketones, isopropyl alcohol, and tertiary butyl alcohol—A mixture of 1 cc. of Dehydrated Alcohol and 1 cc. of distilled water meets the requirements of the test for *Acetone, other ketones, isopropyl alcohol,* and *tertiary butyl alcohol* under *Whisky,* page 555.

Alkaloids and formaldehyde—Dehydrated Alcohol, diluted with an equal volume of water, meets the requirements of the tests for *Alkaloids* and *Formaldehyde* under *Whisky,* page 555.

Methanol—Dilute 0.5 cc. of Dehydrated Alcohol to 1 cc. with distilled water: 0.05 cc. of the dilution meets the requirements of the test for *Methanol* under *Whisky,* page 555.

Storage—Preserve Dehydrated Alcohol in tight containers, remote from fire.

Alcohol Rubbing Compound

ALCOHOL RUBBING COMPOUND

Alcohol Fricamentum Compositum

Alcohol Fricament. Comp. Rubbing Alcohol

Alcohol Rubbing Compound and all preparations coming under the classification of Rubbing Alcohols must be manufactured in accordance with the requirements of the Bureau of Internal Revenue, U. S. Treasury Department, using specially denatured alcohol Formula 23-G (3.5 parts by volume of methyl propyl ketone, 0.5 part by volume of methyl isobutyl ketone, and 100 parts by volume of ethyl alcohol), or Formula 23-H (8 parts by volume of acetone, 1.5 parts by volume of methyl isobutyl ketone, and 100 parts by volume of ethyl alcohol). It contains not less than 68.5 per cent and not more than 71.5 per cent by volume of absolute ethyl alcohol. Alcohol Rubbing Compound contains in each 100 cc. not less than 0.355 Gm. of sucrose octaäcetate. Alcohol Rubbing Compound complies with the requirements of the Bureau of Internal Revenue of the United States Treasury Department.

NOTE: *Alcohol Rubbing Compound must be packaged, labeled, and sold in accordance with the regulations issued by the Bureau of Internal Revenue, U. S. Treasury Department.*

Description—Alcohol Rubbing Compound is a transparent, colorless, mobile, and volatile liquid. It has an extremely bitter taste, and in the absence of added odorous constituents, a characteristic odor. It is inflammable.

Specific gravity—The specific gravity of Alcohol Rubbing Compound, manufactured with specially denatured alcohol Formula 23-G, is not less than 0.8797 and not more than 0.8874, and the specific gravity of Alcohol Rubbing Compound, manufactured with specially denatured alcohol Formula 23-H, is not less than 0.8691 and not more than 0.8771 at 15.56° (the U. S. Government standard temperature for alcohol).

Total solids—Evaporate 25 cc. of Alcohol Rubbing Compound, accurately measured, in a platinum dish on a water bath, and dry the residue 30 minutes at 105°: the weight of the residue is not less than 89 mg. Retain the residue for the *Assay for sucrose octaäcetate.*

Methanol—Dilute 0.5 cc. of Alcohol Rubbing Compound to 1 cc. with distilled water: 0.5 cc. of the dilution meets the requirements of the test for *Methanol* under *Whisky*, page 555.

Assay for sucrose octaäcetate—By use of about 50 cc. of 70 per cent alcohol transfer quantitatively the residue from the test for *Total solids* into a 500-cc. Erlenmeyer flask. Neutralize the solution with 0.1 *N* sodium hydroxide using phenolphthalein T.S. as the indicator. Add 25 cc. of 0.1 *N* sodium hydroxide from a burette, attach an air condenser to the flask, and reflux on a water bath for 1 hour. Remove from the water bath, cool quickly, and titrate the excess alkali with 0.1 *N* sulfuric acid, using phenolphthalein T.S. as the indicator. Each cc. of 0.1 *N* sodium hydroxide is equivalent to 0.008478 Gm. of sucrose octaäcetate.

Storage—Preserve Alcohol Rubbing Compound in tight containers, remote from fire.

Alkaline Aromatic Solution, page 63
Alkaline Rhubarb Elixir, page 441
Alkaline Sulfur Ointment, page 520

ALLYL ISOTHIOCYANATE

Allylis Isothiocyanas

Volatile Oil of Mustard

C_3H_5NCS $CH_2{=}CH{-}CH_2{-}N{=}C{=}S$ Mol. wt. 99.15

Allyl Isothiocyanate is the oil obtained by maceration with water and subsequent distillation of the dried ripe seed (free from fixed oil) of *Brassica nigra* (Linné) Koch or of *Brassica juncea* (Linné) Czerniaew (Fam. *Cruciferæ*), or prepared synthetically. It contains not less than 93 per cent of C_3H_5NCS.

Allyl Isothiocyanate must be labeled to indicate whether it was made synthetically or distilled from either of the plants mentioned above.

Caution: Great care must be exercised in smelling Allyl Isothiocyanate. It should be tasted only when highly diluted.

Description—Allyl Isothiocyanate is a colorless or pale yellow, strongly refractive liquid, having a very pungent, irritating odor, and an acrid taste. It is optically inactive.

Solubility—Allyl Isothiocyanate is miscible with alcohol, with ether, and with carbon disulfide.

Specific gravity—The specific gravity of Allyl Isothiocyanate is not less than 1.013 and not more than 1.020 at 25°.

Refractive index—The refractive index of Allyl Isothiocyanate is not less than 1.5275 and not more than 1.5310 at 20°, page 745.

Identification—To 3 cc. of Allyl Isothiocyanate, gradually add 3 cc. of sulfuric acid, keeping the mixture cool, then cautiously agitate the liquid: the mixture evolves sulfur dioxide and retains a light yellow color, but loses the pungent odor of the oil.

Alcohol, chloroform, petroleum, or fatty oils—Allyl Isothiocyanate distils completely between 148° and 154°. Both the first and last 10 per cent portions of the distillate have practically the same specific gravity as the original substance.

Phenols—The addition of 1 drop of ferric chloride T.S. to 1 cc. of Allyl Isothiocyanate diluted with 5 volumes of alcohol does not produce a blue color immediately.

Assay—Dilute about 4 cc. of Allyl Isothiocyanate, accurately weighed, with sufficient alcohol to make exactly 100 cc. of solution. Transfer 5 cc. of this solution by means of a pipette to a 100-cc. measuring flask, and add 50 cc. of 0.1 *N* silver nitrate and 5 cc. of ammonia T.S. Connect the flask to a reflux condenser, and heat it on a water bath for 1 hour. Allow the liquid to cool to room temperature, disconnect the flask from the condenser, add sufficient distilled water to make the mixture measure 100 cc., mix well, and filter through a dry filter. Reject the first 10 cc. of filtrate. To 50 cc. of the subsequent filtrate, accurately measured, add about 5 cc. of nitric acid and 2 cc. of ferric ammonium sulfate T.S., and titrate the excess silver nitrate with 0.1 *N* ammonium thiocyanate. Beginning with the word "Transfer" in the second sentence of the assay, perform a blank test using 5 cc. of alcohol, with the same quantities of reagents and in the same manner and make any necessary correction. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.004958 Gm. of C_3H_5NCS.

Storage—Preserve Allyl Isothiocyanate in tight containers.

Almond Oil, Bitter

BITTER ALMOND OIL
Oleum Amygdalæ Amaræ

Ol. Amygd. Amar.

Bitter Almond Oil is the volatile oil obtained from the dried ripe kernels (deprived of fixed oils) of *Prunus Amygdalus* Batsch var. *amara* (DC.) Focke (Fam. *Rosaceæ*), or from other kernels containing amygdalin, by maceration with water and subsequent distillation with steam. It contains not less than 80 per cent of $C_6H_5.CHO$, and not less than 2 per cent and not more than 4 per cent of HCN.

Oil in which crystals have formed must not be dispensed.

Caution: Bitter Almond Oil is intended for medicinal use, and neither it nor its solution should be used or sold for flavoring foods.

Description—Bitter Almond Oil is a clear, colorless or yellow, strongly refractive liquid, having the characteristic odor and taste of benzaldehyde. When first prepared, Bitter Almond Oil is neutral to moistened litmus paper, but afterward develops an acid reaction, due to the formation of benzoic acid.

Solubility—Bitter Almond Oil is slightly soluble in water. It is miscible with alcohol and with ether.

Solubility in alcohol—Bitter Almond Oil is soluble in 2 volumes of 70 per cent alcohol, forming a clear solution.

Specific gravity—The specific gravity of Bitter Almond Oil is not less than 1.038 and not more than 1.060 at 25°.

Optical rotation—Bitter Almond Oil is optically inactive or has an optical rotation of not more than +0.167° when determined in a 100-mm. tube at 25°, page 737.

Refractive index—The refractive index of Bitter Almond Oil is not less than 1.5410 and not more than 1.5442 at 20°, page 745.

Heavy metals—Bitter Almond Oil meets the requirements of the test for *Heavy metals in volatile oils*, page 722.

Halogens—Rinse the interior surface of a well-cleaned, 1000-cc. beaker with successive portions of distilled water, passing the washings through a small filter until the last filtered washing, acidified with 1 drop of nitric acid and treated with 1 drop of silver nitrate T.S., shows no turbidity. Place 3 or 4 drops of the Oil on a clean watch glass supported on a triangle, ignite the Oil, and immediately invert the moistened beaker over it. Wash the products of combustion from the sides of the beaker through the washed filter with from 10 to 20 cc. of distilled water, acidify the filtrate with 1 drop of nitric acid, and add 1 drop of silver nitrate T.S.: the mixture does not become turbid.

Nitrobenzene—Add 10 drops of Bitter Almond Oil to 5 cc. of alcohol, then add a small amount of zinc dust and 2 cc. of acetic acid, and boil the mixture for about 10 seconds. Render the liquid strongly alkaline with sodium hydroxide T.S., add a few drops of chloroform, and heat the mixture: the warm mixture has no odor of phenyl isocyanide (*Caution: poisonous*).

Assay for benzaldehyde—Add 75 cc. of hydroxylamine-bromophenol blue T.S. to a flask containing about 1 Gm. of Bitter Almond Oil, accurately weighed, and mix thoroughly. Allow the mixture to stand 10 minutes and titrate with 0.5 *N* hydrochloric acid to the production of a greenish yellow color. Perform a blank determination using 75 cc. of hydroxylamine-bromophenol blue T.S. Subtract the number of cc. of 0.5 *N* hydrochloric acid used in the titration of the sample from the number of cc. used in the blank. Each cc. of 0.5 *N* hydrochloric acid is equivalent to 0.05306 Gm. of C_6H_5CHO.

Assay for hydrogen cyanide—Dissolve 0.75 Gm. of magnesium sulfate in 45 cc. of distilled water, add 5 cc. of 0.5 *N* sodium hydroxide and 2 drops of potassium chromate T.S., and titrate the solution with 0.1 *N* silver nitrate to the production of a permanent reddish color. Pour this mixture into a 100-cc. flask containing 1 Gm. of Bitter Almond Oil accurately weighed, mix well, and titrate again with 0.1 *N* silver nitrate until a red color, which does not disappear on shaking, is produced. Conduct this titration as rapidly as possible. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.002703 Gm. of HCN.

Storage—Preserve Bitter Almond Oil in well-filled, tight containers, and avoid exposure to excessive heat.

Almond Water, Bitter

BITTER ALMOND WATER

Aqua Amygdalæ Amaræ

Aq. Amygd. Amar.

Bitter Almond Oil	1 cc.
Distilled Water, recently boiled, a sufficient quantity,	
To make	1000 cc.

Dissolve the bitter almond oil, by agitation, in a sufficient quantity of recently boiled distilled water to make 1000 cc., and filter.

NOTE: Bitter Almond Water contains only a trace of hydrocyanic acid and differs from the preparation of the same name, recommended by the International Protocol, which contains 0.1 per cent of hydrocyanic acid.

Aloe and Mastic Pills

ALOE AND MASTIC PILLS
Pilulæ Aloes et Mastiches

Pil. Aloe. et Mastic. Lady Webster Dinner Pills

Aloe, in fine powder	13 Gm.
Mastic, in fine powder	4 Gm.
Rose, in fine powder	3 Gm.
Glycerin,	
Distilled Water, each, a sufficient quantity,	
To make 100 pills.	

Prepare the pills according to the General Directions, page 739.

AVERAGE DOSE—2 pills.

One average dose contains 0.26 Gm. of Aloe and 80 mg. of Mastic.

Aloe Pills

ALOE PILLS
Pilulæ Aloes

Pil. Aloe.

Aloe, finely powdered	13 Gm.
Hard Soap, finely powdered	13 Gm.
Distilled Water, a sufficient quantity,	
To make 100 pills.	

Prepare the pills according to the General Directions, page 739.

AVERAGE DOSE—2 pills.

One average dose contains 0.26 Gm. of Aloe.

Aloe Tincture

ALOE TINCTURE
Tinctura Aloes

Tr. Aloe.

Aloe, in moderately coarse powder	100 Gm.
Glycyrrhiza, in moderately coarse powder	200 Gm.
Diluted Alcohol, a sufficient quantity,	
To make	1000 cc.

Prepare the Tincture by Process M, page 758, using diluted alcohol as the menstruum.

Identification—To 10 cc. of Aloe Tincture, add 1 cc. of diluted sulfuric acid, and shake with 20 cc. of ether in a separator. Draw off the lower layer, add 20 cc. of sodium borate solution (1 in 15) to the ether solution, and shake. On separation, the sodium borate solution shows a yellowish green fluorescence.
Alcohol content—From 44 to 48 per cent, by volume, of C_2H_5OH.
Storage—Preserve Aloe Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—2 cc. (approximately 30 minims).

Aloin, Belladonna, Cascara and Podophyllum Pills

ALOIN, BELLADONNA, CASCARA AND PODOPHYLLUM PILLS

Pilulæ Aloini, Belladonnæ, Cascaræ et Podophylli

Pil. Aloin. Bellad. Casc. et Podoph. Hinkle's Pills

Cascara Sagrada Extract	**1.6 Gm.**
Aloin	**1.6 Gm.**
Podophyllum Resin	**1 Gm.**
Belladonna Extract	**0.8 Gm.**
Ginger Oleoresin	**0.4 Gm.**
Glycyrrhiza, in fine powder	**1 Gm.**
Glucose, a sufficient quantity,	
To make 100 pills.	

Prepare the pills according to the General Directions, page 739.

AVERAGE DOSE—1 pill.

One average dose contains 16 mg. each of Cascara Sagrada Extract and of Aloin, 10 mg. of Podophyllum Resin, 8 mg. of Belladonna Extract, and 4 mg. of Ginger Oleoresin.

Aloin, Strychnine and Belladonna Pills

ALOIN, STRYCHNINE AND BELLADONNA PILLS

Pilulæ Aloini, Strychninæ et Belladonnæ

Pil. A. S. et B.

Aloin	**1.3 Gm.**
Strychnine, in fine powder	**0.1 Gm.**
Belladonna Extract	**0.8 Gm.**
Glycyrrhiza, in fine powder	**4.5 Gm.**
Glucose, a sufficient quantity,	
To make 100 pills.	

Prepare the pills according to the General Directions, page 739.

AVERAGE DOSE—1 pill.

One average dose contains 13 mg. of Aloin, 1 mg. of Strychnine, and 8 mg. of Belladonna Extract.

Aloin, Strychnine, Belladonna and Cascara Pills

ALOIN, STRYCHNINE, BELLADONNA AND CASCARA PILLS

Pilulæ Aloini, Strychninæ, Belladonnæ et Cascaræ

Pil. A. S. B. et C.

Aloin	**1.30 Gm.**
Strychnine, in fine powder	**0.05 Gm.**
Belladonna Extract	**0.80 Gm.**
Cascara Sagrada Extract	**3.25 Gm.**
Glycyrrhiza, in fine powder	**1.50 Gm.**
Glucose, a sufficient quantity,	
To make 100 pills.	

Prepare the pills according to the General Directions, page 739.

AVERAGE DOSE—1 pill.

One average dose contains 13 mg. of Aloin, 0.5 mg. of Strychnine, 8 mg. of Belladonna Extract, and 32.5 mg. of Cascara Sagrada Extract.

Aloin, Strychnine, Belladonna and Ipecac Pills

ALOIN, STRYCHNINE, BELLADONNA AND IPECAC PILLS

Pilulæ Aloini, Strychninæ, Belladonnæ et Ipecacuanhæ

Pil. A. S. B. et I.

Aloin	**1.6 Gm.**
Strychnine, in fine powder	**0.1 Gm.**
Belladonna Extract	**0.8 Gm.**
Ipecac, in fine powder	**0.4 Gm.**
Glycyrrhiza, in fine powder	**3.6 Gm.**
Glucose, a sufficient quantity,	
To make 100 pills.	

Prepare the pills according to the General Directions, page 739.

AVERAGE DOSE—1 pill.

One average dose contains 16 mg. of Aloin, 1 mg. of Strychnine, 8 mg. of Belladonna Extract, and 4 mg. of Ipecac.

ALTHEA

Althæa

Marsh Mallow Root

Althea is the dried root of *Althæa officinalis* Linné (Fam. *Malvaceæ*) deprived of the brown corky layer and small roots.

Unground Althea—When entire, Althea occurs as slenderly tapering roots, up to 30 cm. in length and 2 cm. in diameter; externally pale yellow to pale brown, longitudinally furrowed, frequently spirally twisted and covered with somewhat loosened bast fibers. The fracture of the bark is fibrous, and of the wood, short and granular. Internally it is yellowish; the bark is 1 to 2 mm. thick, porous, with mucilage cells and is separated from the slightly radiating wood by a distinct darker cambium zone. Althea is frequently cut into small pieces about 5 mm. in diameter.

Histology—Althea shows a phloem area containing numerous small bundles of bast fibers arranged in more or less concentric circles, numerous mucilage cells and starch- or crystal-bearing parenchyma cells, also phloem rays of starch-bearing parenchyma 1 or 2 cells wide; a distinct cambium; a xylem area consisting of xylem rays, thin-walled starch-bearing parenchyma, mucilage cells, and a few tracheæ with bordered pores or scalariform markings.

Powdered Althea—Powdered Althea is white to weak yellow and has a slight odor and a sweetish, mucilaginous taste. It consists of numerous starch grains up to 30 microns in diameter, usually with a long central cleft; groups of fibers with thick, more or less lignified walls; tracheæ with scalariform thickenings or with bordered pores, and a few calcium oxalate crystals in rosette aggregates, from 20 to 35 microns in diameter.

Identification—Mix 1 Gm. of comminuted Althea with 10 cc. of cold distilled water, stir the mixture occasionally during 30 minutes, and then filter it through purified cotton. The mucilage so obtained has a weak yellow color and is only slightly acid to litmus paper; it assumes a moderate to strong yellow color when treated with sodium hydroxide T.S. and has neither a sour nor an ammoniacal odor.

Foreign organic matter—Althea contains not more than 1 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Althea contains not more than 1 per cent of acid-insoluble ash, page 761.

Storage—Preserve Althea against attack by insects, page 11.

ALTHEA SYRUP

Syrupus Althææ

Syr. Althæ.

Althea, cut into small pieces	**50 Gm.**
Alcohol	**30 cc.**
Glycerin	**100 cc.**
Sucrose	**700 Gm.**
Distilled Water, a sufficient quantity,	
To make	**1000 cc.**

Wash the Althea with cold distilled water. Mix 400 cc. of distilled water with the alcohol and macerate the Althea in this solution for 3 hours at room temperature, without stirring it. Strain without expressing the residue, and dissolve the sucrose in the strained liquid by agitation, without heat. Add the glycerin and sufficient distilled water to make the product measure 1000 cc., and mix thoroughly.

Alcohol content—From 2 to 3 per cent, by volume, of C_2H_5OH.
Storage—Preserve Althea Syrup in tight containers, and avoid excessive heat.

Aluminum Acetate Solution

ALUMINUM ACETATE SOLUTION

Liquor Alumini Acetatis

Liq. Alumin. Acet. Burow's Solution

Aluminum Acetate Solution yields from each 100 cc., not less than 1.2 Gm. and not more than 1.45 Gm. of Al_2O_3, and not less than 4.24 Gm. and not more than 5.11 Gm. of CH_3COOH, corresponding to not less than 4.8 Gm. and not more than 5.8 Gm. of $Al(C_2H_3O_2)_3$ in each 100 cc.

Aluminum Subacetate Solution	**545 cc.**
Glacial Acetic Acid	**15 cc.**
Water, a sufficient quantity,	
To make	**1000 cc.**

Add the glacial acetic acid to the aluminum subacetate solution and sufficient water to make the product measure 1000 cc. Mix well and filter, if necessary. Aluminum Acetate Solution may be stabilized by the addition of not more than 0.6 per cent of boric acid.

NOTE: In preparing Aluminum Acetate Solution other methods for producing aluminum acetate may be used. When other methods are used the finished product must meet the requirements of this monograph. Dispense Aluminum Acetate Solution only when clear.

Description—Aluminum Acetate Solution is a clear, colorless liquid with a faint acetous odor, and a sweetish, astringent taste.
Specific gravity—The specific gravity of Aluminum Acetate Solution is about 1.022 at 25°.
Identification—Aluminum Acetate Solution responds to the tests for *Aluminum*, page 722, and for *Acetate*, page 722.
Hydrogen-ion concentration—The hydrogen-ion concentration of Aluminum Acetate Solution expressed as *p*H, is about 4 at 25°.
Heavy metals—Dilute 1 cc. of Aluminum Acetate Solution to 25 cc. with distilled water: the heavy metals limit, page 721, for Aluminum Acetate Solution is 10 parts per million.

Limit for boric acid—Pipette a 25-cc. sample of Aluminum Acetate Solution into 75 cc. of distilled water contained in an Erlenmeyer flask. Add 3 cc. of phenolphthalein T.S., and add 0.5 *N* sodium hydroxide from a burette until a faint pink color is obtained. Heat to boiling and again neutralize. Add 150 cc. of glycerin to the neutralized solution and titrate with 0.5 *N* sodium hydroxide. Perform a blank determination in a similar manner. From the number of cc. of 0.5 *N* sodium hydroxide used in the assay after addition of the glycerin subtract the volume used in the blank. Each cc. of 0.5 *N* sodium hydroxide is equivalent to 0.03092 Gm. of H_3BO_3.

Assay for aluminum oxide—Add exactly 5 cc. of the Aluminum Acetate Solution to 100 cc. of distilled water, and then add about 1 Gm. of ammonium chloride. Heat the solution to boiling, add a slight excess of ammonia T.S., and boil, if necessary, to precipitate the aluminum hydroxide completely. Collect the precipitate on a quantitative filter, wash it thoroughly with hot distilled water, dry, ignite strongly, and weigh as Al_2O_3.

Assay for acetic acid—Pipette a 20-cc. sample of Aluminum Acetate Solution into a Kjeldahl flask containing a mixture of 20 cc. of phosphoric acid and 150 cc. of distilled water. Connect the flask to a condenser, the delivery tube from which dips beneath the surface of 50 cc. of 0.5 *N* sodium hydroxide contained in a receiving flask. Distil about 160 cc. and then remove the delivery tube from below the surface of the distillate, allow the distilling flask to cool, and add 50 cc. of distilled water and distil an additional 40 to 45 cc. into the receiving flask. Titrate the excess 0.5 *N* sodium hydroxide with 0.5 *N* sulfuric acid, using phenolphthalein T.S. as the indicator. Each cc. of 0.5 *N* sodium hydroxide is equivalent to 0.03003 Gm. of $HC_2H_3O_2$.

Storage—Preserve Aluminum Acetate Solution in tight containers.

FOR EXTERNAL USE—Dilute with 9 volumes of water.

Aluminum Chloride

ALUMINUM CHLORIDE

Alumini Chloridum

Alumin. Chlorid.

$AlCl_3.6H_2O$ Mol. wt. 241.44

Aluminum Chloride, when dried over sulfuric acid for 24 hours, contains not less than 95 per cent of $AlCl_3.6H_2O$.

Description—Aluminum Chloride occurs as a white or yellowish white, deliquescent, crystalline powder. It is nearly odorless, has a sweet, very astringent taste, and its aqueous solutions are acid to litmus paper.

Solubility—One Gm. of Aluminum Chloride dissolves in about 0.5 cc. of water and in about 4 cc. of alcohol, at 25°. It is soluble in glycerin.

Identification—An aqueous solution of Aluminum Chloride (1 in 10) responds to the tests for *Aluminum*, page 722, and for *Chloride*, page 724.

Sulfate—The addition of 0.2 cc. of barium chloride T.S. to 10 cc. of an aqueous solution of Aluminum Chloride (1 in 100), produces no turbidity in 1 minute.

Alkalies and earths—Completely precipitate the aluminum from a boiling aqueous solution of Aluminum Chloride (1 in 100) by the addition of a slight excess of ammonia T.S., and filter: upon evaporation and ignition the filtrate yields not more than 0.5 per cent of residue.

Arsenic—Aluminum Chloride, without previous treatment with sulfuric and sulfurous acids, meets the requirements of the test for *Arsenic*, page 689.

Heavy metals—Dissolve 1 Gm. of Aluminum Chloride in 1 cc. of diluted acetic acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Aluminum Chloride is 20 parts per million.

Iron—The addition of 0.3 cc. of potassium ferrocyanide T.S. to 20 cc. of an aqueous solution of Aluminum Chloride (1 in 150) does not produce a blue color immediately.
Assay—Dissolve about 0.5 Gm. of Aluminum Chloride, dried over sulfuric acid for 24 hours and accurately weighed, in 100 cc. of distilled water, and add about 1 Gm. of ammonium chloride. Heat the solution to boiling, add a slight excess of ammonia T.S., and boil, if necessary, to precipitate the aluminum hydroxide completely. Collect the precipitate on a filter, wash it thoroughly with hot distilled water, dry, ignite strongly, and weigh. Each Gm. of aluminum oxide is equivalent to 4.737 Gm. of $AlCl_3.6H_2O$.
Storage—Preserve Aluminum Chloride in tight containers.

Aluminum Chloride Solution

ALUMINUM CHLORIDE SOLUTION
Liquor Alumini Chloridi

Liq. Alumin. Chlorid.

Aluminum Chloride Solution contains, in each 100 cc., not less than 22.5 Gm. and not more than 27.5 Gm. of $AlCl_3.6H_2O$.

Aluminum Chloride	**250 Gm.**
Water, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the aluminum chloride in sufficient water to make the product measure 1000 cc.; filter, if necessary, until the product is clear.

Description—Aluminum Chloride Solution is a clear, colorless, odorless liquid, with a sweetish, very astringent taste. The specific gravity of Aluminum Chloride Solution is about 1.2 at 25°.
Identification—Aluminum Chloride Solution, when diluted with water (1 in 3), responds to the tests for *Aluminum*, page 722, and for *Chloride*, page 724.
Assay—Add exactly 5 cc. of Aluminum Chloride Solution to 100 cc. of distilled water, and proceed as directed in the *Assay* under *Aluminum Chloride*, page 38, beginning with "and add about 1 Gm. of ammonium chloride...." Each Gm. of aluminum oxide is equivalent to 4.737 Gm. of $AlCl_3.6H_2O$.
Storage—Preserve Aluminum Chloride Solution in tight containers.

FOR EXTERNAL USE—Undiluted on unbroken and non-irritated skin.

Aluminum Subacetate Solution

ALUMINUM SUBACETATE SOLUTION
Liquor Alumini Subacetatis

Liq. Alumin. Subacet.

Aluminum Subacetate Solution yields, from each 100 cc., not less than 2.30 Gm. and not more than 2.60 Gm. of Al_2O_3, and not less than 5.43 Gm. and not more than 6.13 Gm. of CH_3COOH.

Aluminum Sulfate	**160 Gm.**
Acetic Acid	**160 cc.**
Precipitated Calcium Carbonate	**70 Gm.**
Water, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the aluminum sulfate in 600 cc. of water, filter the solution, and gradually add the precipitated calcium carbonate, in several portions, with constant stirring. Then slowly add the acetic acid, mix well, and set the mixture aside during several days. Siphon off the clear liquid, transfer the magma to a strainer, press it, and pass sufficient water through the magma to make the product measure 1000 cc. Aluminum Subacetate Solution may be stabilized by the addition of not more than 0.9 per cent of boric acid.

NOTE: In preparing Aluminum Subacetate Solution other methods for producing the aluminum subacetate may be used. When other methods are used the finished product must meet the requirements of this monograph.

Description—Aluminum Subacetate Solution is a clear, colorless, or faintly yellow liquid, having an acetous odor and an acid reaction to litmus paper. It gradually becomes turbid on continued standing, due to separation of a more basic salt.
Identification—Aluminum Subacetate Solution responds to the tests for *Aluminum*, page 722, and for *Acetate*, page 722.
Limit for boric acid—Proceed as directed in the *Limit for boric acid* under *Aluminum Acetate Solution*, page 37.
Assay for aluminum oxide—Proceed as directed in the *Assay for aluminum oxide* under *Aluminum Acetate Solution*, page 37.
Assay for acetic acid—Proceed as directed in the *Assay for acetic acid* under *Aluminum Acetate Solution*, page 37.
Storage—Preserve Aluminum Subacetate Solution in tight containers.

FOR EXTERNAL USE—Dilute with 9 volumes of water.

Aluminum Sulfate

ALUMINUM SULFATE
Alumini Sulfas

Alumin. Sulf.

$Al_2(SO_4)_3.18H_2O$ Mol. wt. 666.41

Aluminum Sulfate contains not less than 99.5 per cent of $Al_2(SO_4)_3.18H_2O$.

Description—Aluminum Sulfate occurs as a white crystalline powder, as shining plates, or as crystalline fragments, and is permanent in the air. It is odorless, has a sweet taste, becoming mildly astringent, and its aqueous solutions are acid to litmus paper.
Solubility—One Gm. of Aluminum Sulfate dissolves in about 1 cc. of water at 25°. It is insoluble in alcohol.

Identification—An aqueous solution of Aluminum Sulfate (1 in 10) responds to the tests for *Aluminum*, page 722, and for *Sulfate*, page 727.

Loss on drying—Weigh accurately 1 Gm. of Aluminum Sulfate and heat it to constant weight at a temperature of from 280° to 300°: it loses not less than 42 per cent and not more than 49 per cent of its weight.

Free acid—A filtered aqueous solution of Aluminum Sulfate (1 in 10) does not become more than faintly opalescent within 5 minutes after the addition of an equal volume of 0.1 *N* sodium thiosulfate.

Alkalies and earths—Completely precipitate the aluminum from a boiling aqueous solution of Aluminum Sulfate (1 in 100) by the addition of a slight excess of ammonia T.S., and filter: upon evaporation and ignition the filtrate yields not more than 0.4 per cent of residue.

Ammonium salts—Gently heat 1 Gm. of Aluminum Sulfate with 10 cc. of sodium hydroxide T.S.: the liquid does not evolve the odor of ammonia.

Arsenic—Aluminum Sulfate meets the requirements of the test for *Arsenic*, page 689.

Heavy metals—Dissolve 0.5 Gm. of Aluminum Sulfate in 1 cc. of diluted acetic acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Aluminum Sulfate is 40 parts per million.

Iron—The addition of 0.3 cc. of potassium ferrocyanide T.S. to 20 cc. of an aqueous solution of Aluminum Sulfate (1 in 150) does not produce a blue color immediately.

Assay—Dissolve about 0.5 Gm. of Aluminum Sulfate, accurately weighed, in 100 cc. of distilled water and add about 1 Gm. of ammonium chloride. Heat the solution to boiling, add a slight excess of ammonia T.S., and boil, if necessary, to precipitate completely the aluminum hydroxide. Collect the precipitate on a filter, wash it with hot distilled water, dry, ignite strongly, and weigh. Each Gm. of aluminum oxide is equivalent to 6.537 Gm. of $Al_2(SO_4)_3.18H_2O$.

Storage—Preserve Aluminum Sulfate in well-closed containers.

Aminoacetic Acid

AMINOACETIC ACID
Acidum Aminoaceticum

Acid. Aminoacet. Glycocoll, Glycine

$C_2H_5O_2N$ $H_2N.CH_2.COOH$ Mol. wt. 75.07

Aminoacetic Acid, when dried at 105° for 4 hours, contains not less than 18.4 per cent and not more than 18.8 per cent of N, corresponding to not less than 98.5 per cent of $C_2H_5O_2N$.

Description—Aminoacetic Acid occurs as a white, odorless, crystalline powder, having a sweetish taste. Its aqueous solution is acid to litmus paper.

Solubility—One Gm. of Aminoacetic Acid dissolves in about 4 cc. of water at 25°. It is very slightly soluble in alcohol and in ether.

Identification—

A: To 5 cc. of an aqueous solution of Aminoacetic Acid (1 in 10) add 5 drops of diluted hydrochloric acid and 5 drops of a solution of sodium nitrite (1 in 2). A vigorous evolution of a colorless gas is produced.

B: Add 1 cc. of ferric chloride T.S. to 2 cc. of an aqueous solution of Aminoacetic Acid (1 in 10): a deep wine color is produced which disappears upon the addition of an excess of diluted hydrochloric acid and reappears upon the addition of an excess of stronger ammonia T.S.

C: To 2 cc. of an aqueous solution of Aminoacetic Acid (1 in 10) add 1 drop of liquefied phenol and 5 cc. of sodium hypochlorite T.S.: a blue color is produced.

Loss on drying—When dried at 105° for 4 hours, Aminoacetic Acid loses not more than 0.2 per cent of its weight,

Residue on ignition—Aminoacetic Acid yields not more than 0.1 per cent of residue on ignition, page 745.

Readily carbonizable substances—Dissolve 0.5 Gm. of Aminoacetic Acid in 5 cc. of sulfuric acid; the solution is colorless, page 743.

Chloride—A solution of 1 Gm. of Aminoacetic Acid in distilled water shows no more chloride than corresponds to 0.1 cc. of 0.02 *N* hydrochloric acid, page 758.

Sulfate—A solution of 3 Gm. of Aminoacetic Acid in distilled water shows no more sulfate than corresponds to 0.2 cc. of 0.02 *N* sulfuric acid, page 759.

Heavy metals—Dissolve 1 Gm. of Aminoacetic Acid in 15 cc. of distilled water, add 4 cc. of 1 *N* hydrochloric acid, and dilute to 25 cc. with distilled water: the heavy metals limit, page 721, for Aminoacetic Acid is 20 parts per million.

Hydrolyzable substances—Boil 10 cc. of an aqueous solution of Aminoacetic Acid (1 in 10) for 1 minute, and set aside for 2 hours: the solution appears as clear and as mobile as 10 cc. of the same solution that has not been boiled.

Assay—Determine the nitrogen content of Aminoacetic Acid as directed on page 734, using about 0.15 Gm., previously dried at 105° for 4 hours and accurately weighed. Each cc. of 0.1 *N* hydrochloric acid is equivalent to 0.001401 Gm. of N.

The percentage of nitrogen thus found, multiplied by 5.359, represents the percentage of $C_2H_5O_2N$.

Storage—Preserve Aminoacetic Acid in well-closed containers.

AVERAGE DOSE—**30 Gm.** (approximately 8 drachms).

AMINOACETIC ACID ELIXIR
Elixir Acidi Aminoacetici

Elix. Acid. Aminoacet. Glycocoll Elixir

Aminoacetic Acid Elixir contains, in each 100 cc., not less than 12.1 Gm. and not more than 14.2 Gm. of $C_2H_5O_2N$.

Aminoacetic Acid	131.5	Gm.
Raspberry Syrup	75	cc.
Syrup	60	cc.
Alcohol	53	cc.
Benzoic Acid	2	Gm.
Compound Orange Spirit	1.5	cc.
Vanillin	0.15	Gm.
Distilled Water, a sufficient quantity, To make	1000	cc.

Dissolve the aminoacetic acid in 700 cc. of distilled water, add the syrup and the raspberry syrup and mix well. Dissolve the benzoic acid and the vanillin in the alcohol and the compound orange spirit and add to the previously prepared mixture. Filter, if necessary, and add sufficient distilled water to make 1000 cc.

Assay—Transfer exactly 25 cc. of Aminoacetic Acid Elixir to a 100-cc. volumetric flask and dilute to volume with distilled water. Add 2 Gm. of activated charcoal, shake well and filter through a dry filter into a dry container. Transfer exactly

10 cc. of the filtrate into a 250-cc. Erlenmeyer flask, add 60 cc. of distilled water and 3 drops of phenolphthalein T.S. Titrate with 0.1 *N* sodium hydroxide to a pinkish end-point, record the volume of sodium hydroxide and set aside for reference. Transfer another 10 cc. of the above filtrate to a 250-cc. Erlenmeyer flask, add 40 cc. of formaldehyde T.S. and 3 drops of phenolphthalein T.S., and titrate with 0.1 *N* sodium hydroxide, until the color matches that of the first titration. Run a blank by titrating 40 cc. of formaldehyde T.S. and 10 cc. of distilled water with 0.1 *N* sodium hydroxide using phenolphthalein T.S. as the indicator. Correct the titration of the formaldehyde-aminoacetic acid complex by subtracting the volume of 0.1 *N* sodium hydroxide consumed by the blank from the volume required to neutralize the formaldehyde-aminoacetic acid complex. Subtract the volume of 0.1 *N* sodium hydroxide required for the first titration from that required for the corrected titration in the presence of the formaldehyde T.S. to obtain the volume of alkali required to neutralize the aminoacetic acid. Each cc. of 0.1 *N* sodium hydroxide is equivalent to 0.007507 Gm. of $C_2H_5O_2N$.

Alcohol content—From 5 to 7 per cent, by volume, of C_2H_5OH.

Storage—Preserve Aminoacetic Acid Elixir in tight containers.

AVERAGE DOSE—**15 cc.** (approximately 4 fluidrachms).

One average metric dose contains about 2 Gm. of Aminoacetic Acid.

Aminopyrine Elixir

AMINOPYRINE ELIXIR

Elixir Aminopyrinæ

Elix. Aminopyrin. Amidopyrine Elixir

Aminopyrine Elixir contains, in each 100 cc., not less than 3.7 Gm. and not more than 4.3 Gm. of $C_{13}H_{17}N_3O$.

Aminopyrine	**40 Gm.**
Compound Orange Spirit	**3 cc.**
Alcohol	**200 cc.**
Glycerin	**60 cc.**
Syrup	**400 cc.**
Compound Cudbear Tincture	**10 cc.**
Distilled Water, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the aminopyrine in the alcohol, add the compound orange spirit, the compound cudbear tincture, the glycerin, the syrup, and sufficient distilled water to make the product measure 1000 cc. Mix well and filter, if necessary, to make the product clear.

Assay—Transfer to a separator exactly 5 cc. of Aminopyrine Elixir, add ammonia T.S. to distinct alkalinity, and completely extract the aminopyrine by shaking with successive portions of chloroform. Combine the chloroform extracts in a separator, and wash this chloroform solution with 2 cc. of distilled water. Filter the chloroform solution through a filter moistened with chloroform into a tared beaker; extract the wash water with 5 cc. of chloroform and pass the chloroform extract through the filter; finally wash the filter with a few cc. of chloroform.

Evaporate the chloroform solution on a water bath, dry the residue at 80° for 10 minutes, cool, and weigh as $C_{13}H_{17}N_3O$.
Alcohol content—From 17 to 20 per cent, by volume, of C_2H_5OH.
Storage—Preserve Aminopyrine Elixir in tight containers.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains about 0.16 Gm. of Aminopyrine.

Ammonia Liniment

AMMONIA LINIMENT
Linimentum Ammoniæ

Lin. Ammon. Volatile Liniment Hartshorn Liniment

Diluted Ammonia Solution	**250 cc.**
Oleic Acid	**10 cc.**
Sesame Oil	**740 cc.**
To make	**1000 cc.**

Mix the oleic acid with the sesame oil, add the diluted ammonia solution, and agitate until a uniform mixture is obtained.

Storage—Preserve Ammonia Liniment in tight containers.

Ammonia Spirit, Anisated

ANISATED AMMONIA SPIRIT
Spiritus Ammoniæ Anisatus

Sp. Ammon. Anis.
Liquor Ammoniæ Anisatus Anisated Ammonia Solution

Anethole	**30 cc.**
Diluted Ammonia Solution	**200 cc.**
Alcohol, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the anethole in 770 cc. of alcohol, gradually add the diluted ammonia solution and then sufficient alcohol to make the product measure 1000 cc.

Alcohol content—From 69 to 76 per cent, by volume, of C_2H_5OH.
Storage—Preserve Anisated Ammonia Spirit in tight, light-resistant containers.

AVERAGE DOSE—**1 cc.** (approximately 15 minims).

One average metric dose contains 0.03 cc. of Anethole and 0.2 cc. of Diluted Ammonia Solution.

Ammoniacal Silver Nitrate Solution, page 465
Ammoniated Guaiac Tincture, page 243
Ammoniated Valerian Tincture, page 548

Ammonium Acetate Solution

AMMONIUM ACETATE SOLUTION

Liquor Ammonii Acetatis

Liq. Ammon. Acet.

Ammonium Acetate Solution contains, in each 100 cc., not less than 6.5 Gm. and not more than 7.5 Gm. of CH_3COONH_4, with small amounts of acetic and carbonic acids.

NOTE: Dispense only recently prepared Ammonium Acetate Solution.

Ammonium Carbonate, in hard, translucent pieces	50 Gm.
Diluted Acetic Acid, a sufficient quantity,	
To make	1000 cc.

Dissolve the ammonium carbonate in the diluted acetic acid without strong agitation.

Ammonium Acetate Solution may also be prepared as follows:

Solution No. 1

Ammonium Carbonate, in hard, translucent pieces	100 Gm.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Solution No. 2

Acetic Acid	320 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Cautiously mix the 2 solutions in equal volumes in a capacious vessel, in quantities sufficient to produce the amount of Ammonium Acetate Solution needed.

Description—Ammonium Acetate Solution is a clear, colorless liquid, free from empyreumatic odor. It has a mildly salty, acid taste, and an acid reaction to litmus paper.

Identification—Ammonium Acetate Solution responds to the tests for *Ammonium*, page 722, and for *Acetate*, page 722.

Residue on ignition—Evaporate 20 cc. of Ammonium Acetate Solution in a porcelain dish and ignite: the weight of the residue on ignition does not exceed 3 mg.

Assay—Transfer 25 cc. of Ammonium Acetate Solution to a distilling flask, dilute with 75 cc. of distilled water, add 50 cc. of sodium hydroxide T.S., and distil the liquid until all of the ammonia has been driven over (about 100 cc. of distillate), receiving

the distillate below the surface of 50 cc. of 1 *N* sulfuric acid contained in a flask. Titrate the excess of acid with 1 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 1 *N* sulfuric acid is equivalent to 0.07708 Gm. of CH_3COONH_4.

Storage—Preserve Ammonium Acetate Solution in tight containers.

AVERAGE DOSE—**15 cc.** (approximately 4 fluidrachms).

AMMONIUM BROMIDE

Ammonii Bromidum

Ammon. Bromid.

NH_4Br Mol. wt. 97.96

Ammonium Bromide, when dried over sulfuric acid for 24 hours, contains not less than 99 per cent of NH_4Br.

Description—Ammonium Bromide occurs as colorless crystals, or as a yellowish white crystalline powder, having no odor. It is somewhat hygroscopic.

Solubility—One Gm. of Ammonium Bromide dissolves in about 1.3 cc. of water and in about 12 cc. of alcohol, at 25°.

Identification—An aqueous solution of Ammonium Bromide (1 in 10) responds to the tests for *Ammonium*, page 722, and for *Bromide*, page 723.

Residue on ignition—Add 1 cc. of sulfuric acid to about 2 Gm. of Ammonium Bromide, evaporate the mixture to dryness in a porcelain dish, and ignite: it leaves not more than 0.05 per cent of residue on ignition.

Free acid—A solution of 2 Gm. of Ammonium Bromide in 20 cc. of distilled water requires not more than 0.05 cc. of 0.1 *N* sodium hydroxide for neutralization, using methyl red T.S. as the indicator.

Other halogen salts—In the *Assay* each Gm. of Ammonium Bromide is equivalent to not less than 101.1 cc. and not more than 103.0 cc. of 0.1 *N* silver nitrate.

Sulfate—The addition of barium chloride T.S. to an aqueous solution of Ammonium Bromide (1 in 20), acidified with hydrochloric acid, produces no turbidity in 1 minute.

Barium—The addition of 1 cc. of potassium sulfate T.S. to 10 cc. of an aqueous solution of Ammonium Bromide (1 in 20), acidified with hydrochloric acid, produces no turbidity in 5 minutes.

Heavy metals—Dissolve 1 Gm. of Ammonium Bromide in 1 cc. of diluted acetic acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Ammonium Bromide is 20 parts per million.

Iron—The addition of potassium ferrocyanide T.S. to 20 cc. of an aqueous solution of Ammonium Bromide (1 in 150) does not produce a blue color immediately.

Bromate—Drop 1 cc. of diluted sulfuric acid upon about 1 Gm. of powdered Ammonium Bromide: no yellow to orange color is produced immediately.

Iodide—Add a few drops of ferric chloride T.S. and 1 cc. of chloroform to 10 cc. of an aqueous solution of Ammonium Bromide (1 in 20) and shake the mixture: the chloroform remains free from even a transient red-purple or purplish color.

Assay—Dry about 0.4 Gm. of Ammonium Bromide over sulfuric acid for 24 hours and weigh accurately. Dissolve it in about 50 cc. of distilled water, add 50 cc. of 0.1 *N* silver nitrate, 2 cc. of ferric ammonium sulfate T.S., and 2 cc. of nitric acid. Titrate the excess of silver nitrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.009796 Gm. of NH_4Br.

Storage—Preserve Ammonium Bromide in tight containers.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Ammonium Bromide Elixir

AMMONIUM BROMIDE ELIXIR

Elixir Ammonii Bromidi

Elix. Ammon. Bromid.

Ammonium Bromide Elixir contains, in each 100 cc., not less than 8 Gm. and not more than 9 Gm. of NH_4Br.

Ammonium Bromide	**85 Gm.**
Syrup	**200 cc.**
Distilled Water	**460 cc.**
Aromatic Elixir, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the ammonium bromide in the distilled water, add the syrup and sufficient aromatic elixir to make the product measure 1000 cc., and filter, if necessary, until it is clear.

Assay—Dilute exactly 10 cc. of Ammonium Bromide Elixir with distilled water to 100 cc. To 25 cc. of the dilution add slowly and with agitation, 50 cc. of 0.1 *N* silver nitrate, 2 cc. of nitric acid, and 2 cc. of ferric ammonium sulfate T.S. Titrate the excess silver nitrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.009796 Gm. of NH_4Br.
Alcohol content—From 5 to 7 per cent, by volume, of C_2H_5OH.
Storage—Preserve Ammonium Bromide Elixir in tight containers.

AVERAGE DOSE—4 cc. (approximately 1 fluidrachm).

One average metric dose contains about 0.34 Gm. of Ammonium Bromide.

Ammonium Chloride Tablets

AMMONIUM CHLORIDE TABLETS

Tabellæ Ammonii Chloridi

Tab. Ammon. Chlorid.

Ammonium Chloride Tablets contain not less than 94 per cent and not more than 106 per cent of the labeled amount of NH_4Cl for tablets of 0.3 Gm. or more, and not less than 92.5 per cent and not more than 107.5 per cent for tablets of less than 0.3 Gm.

Identification—A filtered aqueous solution of the Tablets, equivalent to ammonium chloride (1 in 10), responds to the tests for *Ammonium*, page 722, and for *Chloride*, page 724.
Free acid—A filtered aqueous solution of the Tablets, equivalent to ammonium chloride (1 in 20), does not show an immediate acid reaction to 1 drop of methyl orange T.S.

Thiocyanate—Powder several of the Tablets, and acidify 10 cc. of a filtered aqueous solution of the powder, equivalent to about 1 Gm. of ammonium chloride, with hydrochloric acid. Then add a few drops of ferric chloride T.S.: no reddish orange color is produced in the liquid.

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without appreciable loss, and transfer an accurately weighed portion of the powder equivalent to about 0.15 Gm. of Ammonium Chloride to a 100-cc. volumetric flask. Dissolve in 25 cc. of water, add 50 cc. of 0.1 *N* silver nitrate, 2 cc. of nitric acid, and dilute to volume with water. Agitate thoroughly and filter, rejecting the first 10 cc. of the filtrate. Transfer 50 cc. of the subsequent filtrate to a suitable flask, add 2 cc. of ferric ammonium sulfate, T.S. and titrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.005350 Gm. of NH_4Cl.

Storage—Preserve Ammonium Chloride Tablets in tight containers.

Sizes—Ammonium Chloride Tablets usually available contain the following amounts of ammonium chloride: **0.3 Gm.** and **0.5 Gm.** (approximately 5 and $7\frac{1}{2}$ grains).

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains) of Ammonium Chloride.

AMMONIUM IODIDE

Ammonii Iodidum

Ammon. Iodid.

NH_4I Mol. wt. 144.96

Ammonium Iodide, when dried at 110° for 6 hours, contains not less than 98 per cent of NH_4I. It may contain not more than one per cent of ammonium hypophosphite as a stabilizing agent.

Description—Ammonium Iodide occurs as minute, colorless, cubic crystals, or as a white, granular powder. It is odorless, and has a sharp, salty taste. Ammonium Iodide is very hygroscopic, and soon becomes yellow or yellowish brown on exposure to air and light, owing to the loss of ammonia and the liberation of iodine, if no stabilizing agent is added. Its aqueous solutions are neutral or acid to litmus paper.

Solubility—One Gm. of Ammonium Iodide dissolves in about 0.6 cc. of water, in about 3.7 cc. of alcohol, and in about 1.5 cc. of glycerin, at 25°. One Gm. also dissolves in about 0.5 cc. of boiling water.

Identification—An aqueous solution of Ammonium Iodide (1 in 20) responds to the tests for *Ammonium*, page 722, and for *Iodide*, page 725.

Loss on drying—When dried at 110° for 6 hours, Ammonium Iodide loses not more than 5 per cent of its weight.

Residue on ignition—When strongly heated, Ammonium Iodide evolves vapor of iodine and volatilizes without fusing, and leaves not more than 0.5 per cent of residue on ignition, page 745.

Free iodine—Shake 5 cc. of an aqueous solution of Ammonium Iodide (1 in 150) with 1 cc. of chloroform: the chloroform remains free from even a transient red-purple or purplish color.

Barium—The addition of 2 cc. of an aqueous solution of sodium sulfate (1 in 10) to 10 cc. of an aqueous solution of Ammonium Iodide (1 in 20), acidfied with hydrochloric acid, produces no turbidity in 5 minutes.

Heavy metals—Dissolve 1 Gm. of Ammonium Iodide in 1 cc. of diluted acetic acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Ammonium Iodide is 20 parts per million.

Assay—Dissolve about 0.5 Gm. of Ammonium Iodide, dried at 110° for 6 hours and accurately weighed, in about 50 cc. of distilled water, add 50 cc. of 0.1 *N* silver nitrate, follow with 5 cc. of nitric acid, and digest on a water bath until the yellow precipitate of silver iodide coagulates. Cool, add 2 cc. of ferric ammonium sulfate T.S., and titrate the excess silver nitrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.01450 Gm. of NH_4I.

Storage—Preserve Ammonium Iodide in tight, light-resistant containers.

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains).

Ammonium Salicylate

AMMONIUM SALICYLATE

Ammonii Salicylas

Ammon. Salicyl.

$NH_4C_7H_5O_3$ Mol. wt. 155.15

Ammonium Salicylate, when dried over sulfuric acid for 24 hours, contains not less than 98 per cent of $C_6H_4OHCOONH_4$.

Description—Ammonium Salicylate occurs as colorless, lustrous prisms, or plates, or as a white crystalline powder. It is odorless, and has at first a slightly salty, bitter taste, with a sweet after-taste. It is stable in dry air, but is affected by light.

Solubility—One Gm. of Ammonium Salicylate dissolves in about 1 cc. of water and in about 3 cc. of alcohol, at 25°.

Identification—Ammonium Salicylate responds to the tests for *Ammonium*, page 722, and for *Salicylate*, page 727.

Free acid—A solution of 1 Gm. of Ammonium Salicylate in 20 cc. of distilled water requires not more than 0.4 cc. of 0.1 *N* sodium hydroxide for neutralization, using 1 drop of methyl red T.S. as the indicator.

Residue on ignition—When ignited, Ammonium Salicylate yields not more than 0.05 per cent of residue on ignition, page 745.

Heavy metals—Dissolve 1 Gm. of Ammonium Salicylate in 1 cc. of 0.1 *N* hydrochloric acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Ammonium Salicylate is 10 parts per million.

Assay—Dry about 0.5 Gm. of Ammonium Salicylate over sulfuric acid for 24 hours, weigh it accurately, and dissolve it in 10 cc. of distilled water in a separator. Dilute to approximately 25 cc. with distilled water, add 75 cc. of ether and 10 drops of bromophenol blue T.S. Titrate the mixture with 0.1 *N* hydrochloric acid until a permanent pale green color is produced in the aqueous layer after vigorous shaking. Transfer the aqueous layer to a second separator. Wash the ether layer once with 5 cc. of distilled water and add this to the aqueous portion. Add 75 cc. of ether to the combined aqueous solutions and mix thoroughly. Continue the titration until a permanent pale green color remains in the aqueous

layer after shaking. Each cc. of 0.1 *N* hydrochloric acid is equivalent to 0.01552 Gm. of $C_6H_4OHCOONH_4$.

Storage—Preserve Ammonium Salicylate in tight, light-resistant containers, and avoid excessive heat.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

ACID AMMONIUM VALERATE

Ammonii Valeras Acidus

Ammon. Valer. Acid. Ammonium Valerianate

Acid Ammonium Valerate yields not less than 33 per cent and not more than 38 per cent of $C_4H_9COONH_4$ (119.16), and not less than 62 per cent and not more than 67 per cent of free valeric acid, C_4H_9COOH (102.13).

Description—Acid Ammonium Valerate occurs as colorless, quadrangular plates, and is deliquescent in moist air. It has the characteristic odor of valeric acid, a sharp, sweet taste, and its aqueous solutions are acid to litmus paper.

Solubility—One Gm. of Acid Ammonium Valerate dissolves in about 0.3 cc. of water and in about 0.6 cc. of alcohol, at 25°; it also dissolves in ether.

Identification—

A: An aqueous solution of Acid Ammonium Valerate (1 in 20) responds to the tests for *Ammonium*, page 722.

B: Add 2 cc. of diluted sulfuric acid to 5 cc. of a concentrated aqueous solution of Acid Ammonium Valerate: an oily layer of valeric acid rises to the surface.

Loss on drying—When dried over sulfuric acid for 24 hours, Acid Ammonium Valerate loses not more than 2 per cent of its weight.

Residue on ignition—When heated, Acid Ammonium Valerate fuses, gives off vapors of ammonia and of valeric acid, and finally volatilizes, leaving not more than 0.05 per cent of residue.

Heavy metals—Dissolve 1 Gm. of Acid Ammonium Valerate in 1 cc. of diluted acetic acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Acid Ammonium Valerate is 10 parts per million.

Assay for ammonium valerate—Dissolve about 1.5 Gm. of Acid Ammonium Valerate, accurately weighed, in about 100 cc. of distilled water in a distilling flask and add an excess of sodium hydroxide T.S. Connect the flask to a condenser, the lower outlet tube of which is immersed beneath the surface of 25 cc. of 0.5 *N* sulfuric acid, and distil slowly, collecting the distillate in the acid. When at least one-half of the liquid in the flask has distilled, titrate the excess acid with 0.5 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.5 *N* sulfuric acid is equivalent to 0.05958 Gm. of $C_4H_9COONH_4$.

Assay for free valeric acid—Dissolve about 0.5 Gm. of Acid Ammonium Valerate, accurately weighed, in about 50 cc. of distilled water and titrate the solution with 0.1 *N* sodium hydroxide, using phenolphthalein T.S. as the indicator. Each cc. of 0.1 *N* sodium hydroxide is equivalent to 0.01021 Gm. of C_4H_9COOH.

Storage—Preserve Acid Ammonium Valerate in tight containers and avoid continuous excessive heat.

AVERAGE DOSE—**0.125 Gm.** (approximately 2 grains).

Ammonium Valerate Elixir

AMMONIUM VALERATE ELIXIR

Elixir Ammonii Valeratis

Elix. Ammon. Valer. Ammonium Valerianate Elixir

Acid Ammonium Valerate	35 Gm.
Chloroform	2 cc.
Vanilla Tincture	16 cc.
Compound Cudbear Tincture	16 cc.
Diluted Ammonia Solution,	
Aromatic Elixir, each, a sufficient quantity,	
To make	1000 cc.

Dissolve the acid ammonium valerate in about 65 cc. of aromatic elixir, and add diluted ammonia solution, dropwise, until slightly alkaline, as shown by testing with litmus paper. To this solution add the chloroform, the vanilla tincture, the compound cudbear tincture, and sufficient aromatic elixir to make the product measure 1000 cc.; mix well and filter, if necessary, until the product is clear.

Alcohol content—From 20 to 24 per cent, by volume, of C_2H_5OH.
Storage—Preserve Ammonium Valerate Elixir in tight containers.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains the equivalent of 0.14 Gm. of Acid Ammonium Valerate and 0.008 cc. of Chloroform.

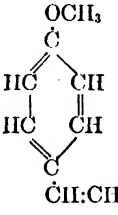
Ampuls

Calcium Chloride Ampuls, page 105
Calcium Levulinate Ampuls, page 110
Camphor Ampuls, page 113
Ephedrine Sulfate Ampuls, page 189
Ferric Cacodylate Ampuls, page 211
Green Ferric Ammonium Citrate Ampuls, page 209
Iodine Ampuls, page 262
Magnesium Sulfate Ampuls, page 313
Mercuric Salicylate Ampuls, page 331
Mercuric Succinimide Ampuls, page 333
Methenamine Ampuls, page 341
Procaine Hydrochloride Ampuls, page 416
Quinine and Urea Hydrochloride Ampuls, page 428
Quinine Dihydrochloride Ampuls, page 429
Sodium Cacodylate Ampuls, page 479
Sodium Indigotindisulfonate Ampuls, page 486

ANETHOLE

Anethole

$C_{10}H_{12}O$



Mol. wt. 148.20

Anethole is parapropenyl anisole. It is obtained from anise oil and other sources, or is prepared synthetically.

Description—Anethole is a colorless or faintly yellow liquid at or above 23°. It has a sweet taste, the aromatic odor of anise, and its alcohol solutions are neutral to litmus paper. It is affected by light.

Solubility—Anethole is readily miscible with ether and with chloroform, and forms a clear solution with 2 volumes of alcohol. It is slightly soluble in water.

Specific gravity—The specific gravity of Anethole is not less than 0.983 and not more than 0.988 at 25°.

Congealing temperature—The congealing temperature of Anethole is not less than 20°, page 699.

Distillation range—Anethole distils completely between 231° and 237° when tested by Method II, under *Boiling or Distilling Temperatures*, page 692.

Optical rotation—Anethole is optically inactive or shows a rotation of not more than 0.15° in a 100-mm. tube at 25°, page 737.

Refractive index—The refractive index of Anethole is not less than 1.5570 and not more than 1.5610 at 25°, page 745.

Aldehydes and ketones—Shake 10 cc. of Anethole with 50 cc. of a saturated aqueous solution of sodium bisulfite in a graduated cylinder, and allow the mixture to stand for 6 hours. No appreciable diminution in the volume of Anethole occurs, and no crystalline deposit separates.

Phenols—Shake 1 cc. of Anethole with 20 cc. of distilled water, and allow the liquids to separate. Filter the aqueous layer through a filter paper previously moistened

with distilled water, and to 10 cc. of the filtrate add 3 drops of ferric chloride T.S.: no purple or purplish color is produced.

Storage—Preserve Anethole in tight, light-resistant containers.

AVERAGE DOSE—**0.1 cc.** (approximately $1^1/_2$ minims).

Anisated Ammonia Spirit, page 43

Anise

ANISE
Anisum
Aniseed

Anise is the dried ripe fruit of *Pimpinella Anisum* Linné (Fam. *Umbelliferæ*).

Anise yields not less than 1.75 cc. of anise oil from each 100 Gm. of drug.

Unground Anise—The cremocarps of Anise are ovoid, laterally compressed, 3 to 6 mm. long and 2 to 3 mm. wide, and are attached to a slender pedicel 2 to 12 mm. long; the apex with a ring-like disk and 2 projecting, diverging styles. Anise is moderate brown to light yellowish brown, slightly pubescent; each mericarp having 5 light-colored filiform ridges.

Histology—Anise shows an epidermal layer with numerous papillæ and short, 1-celled non-glandular hairs having very thick papillose walls; primary ribs each with a small vascular bundle surrounded by a few fibers; a mesocarp with a more or less interrupted circle of from 15 to 45 small oil tubes on the dorsal side and 2 large oil tubes on the commissural side of each mericarp; an endocarp of narrow, tangentially elongated, thin-walled cells except near the middle line of the commissural side, where the endocarp cells and some adjacent cells in the mesocarp may have thick porous or reticulate walls resembling stone cells. The seed coat consists of 1 layer of cells with thickened inner walls of a yellow to greenish yellow color, closely united with the endocarp except where separated by a large cavity along the commissural side. The endosperm consists chiefly of polygonal, thick-walled cells filled with aleurone grains.

Powdered Anise—Powdered Anise is moderate yellowish brown to light olive-brown, and has an agreeable, aromatic and characteristic odor and taste. It contains numerous irregular fragments of pericarp showing portions of oil tubes, the latter brown to yellow in color; fragments of pericarp or pedicel with tracheæ and fibers; fragments of endosperm with aleurone grains about 6 microns in diameter, spherical or ellipsoidal, usually enclosing a rosette aggregate of calcium oxalate about 4 microns in diameter; non-glandular hairs 1-celled, up to 200 microns long, either straight or curved, and with numerous, slight, centrifugal projections on the outer surface.

Conium maculatum fruit—Heat 1 Gm. of Anise with 10 cc. of potassium hydroxide T.S.: no mouse-like odor develops.

Foreign organic matter—Anise contains not more than 3 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Anise yields not more than 1.5 per cent of acid-insoluble ash, page 761.

Assay—Place about 100 Gm. of Anise, preferably whole or coarsely comminuted and accurately weighed, in the flask of the apparatus used for volatile oil determinations and proceed with the assay as directed on page 764, Process A.

ANISE SPIRIT

Spiritus Anisi

Sp. Anisi

Anise Spirit contains, in each 100 cc., not less than 9 cc. and not more than 11 cc. of anise oil.

Anise Oil	100 cc.
Alcohol, a sufficient quantity,	
To make	1000 cc.

Mix the oil with sufficient alcohol to make the product measure 1000 cc.

Assay—Transfer exactly 5 cc. of Anise Spirit to a Babcock bottle, graduated to 8 per cent. Attach the bottle to a suction pump, and, while maintaining a relatively high degree of vacuum, evaporate most of the alcohol by repeatedly but carefully immersing the bottle in hot water and immediately withdrawing it. Throughout the operation the bottle must be vigorously rotated, and care must be taken that none of the liquid is drawn out. When most of the alcohol has been removed, cool the liquid, and add exactly 1 cc. of kerosene from a pipette calibrated to deliver that amount, and mix well. Add sufficient saturated calcium chloride solution, acidified with hydrochloric acid, almost to fill the bulb of the bottle, rotate it vigorously to insure thorough mixing, and add sufficient of the calcium chloride solution to bring the separated oil into the neck of the bottle. Centrifuge for 5 minutes at about 1500 revolutions per minute, and then read the volume of oil in the stem. Subtract 5 divisions for the kerosene added, and multiply the remaining number of divisions by 4.2 to obtain the volume of anise oil in 100 cc. of the Spirit.

Alcohol content—From 80 to 87 per cent, by volume, of C_2H_5OH.

Storage—Preserve Anise Spirit in tight, light-resistant containers.

AVERAGE DOSE—1 cc. (approximately 15 minims).

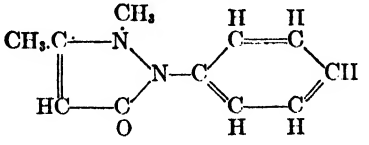
Anterior Pituitary, page 398
Antimeningococcic Serum, page 460
Antipneumococcic Serum, page 461

ANTIPYRINE

Antipyrina

Phenazone

$C_{11}H_{12}N_2O$



Mol. wt. 188.22

Description—Antipyrine occurs as colorless crystals, or as a white, crystalline powder. It is odorless, has a slightly bitter taste, and its aqueous solutions are neutral to litmus paper.

Solubility—One Gm. of Antipyrine dissolves in less than 1 cc. of water, in 1.3 cc. of alcohol, in 1 cc. of chloroform, and in 43 cc. of ether, at 25°.

Melting point—Antipyrine melts between 111° and 113°, page 731.

Identification—

A: The addition of tannic acid T.S. to an aqueous solution of Antipyrine produces an abundant white precipitate.

B: Mix 0.1 Gm. of sodium nitrite and 12 cc. of an aqueous solution of Antipyrine (1 in 100): the liquid is nearly colorless, but upon the addition of 1 cc. of diluted sulfuric acid a green color is produced.

C: One drop of ferric chloride T.S. added to 2 cc. of a dilute aqueous solution of Antipyrine (1 in 1000) produces a reddish orange color, which, upon the addition of 10 drops of sulfuric acid, becomes greenish yellow.

D: To 0.1 Gm. of Antipyrine add 0.1 Gm. of vanillin, 5 cc. of distilled water, and 2 cc. of sulfuric acid, and heat the mixture to boiling: an orange-yellow precipitate is produced.

Loss on drying—When dried over sulfuric acid for 18 hours, Antipyrine loses not more than 1 per cent of its weight.

Residue on ignition—Antipyrine yields not more than 0.15 per cent of residue on ignition, page 745.

Heavy metals—Dissolve 1 Gm. of Antipyrine in 2 cc. of diluted acetic acid and add sufficient distilled water to make 25 cc.: the heavy metals limit, page 721, for Antipyrine is 20 parts per million.

Completeness and color of solution—Antipyrine is completely soluble in its own weight of cold distilled water, the solution being colorless or not more than slightly yellow when viewed transversely in a tube having a diameter of about 20 mm.

Storage—Preserve Antipyrine in tight containers.

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains).

Antiseptic Solution, N. F.

N. F. ANTISEPTIC SOLUTION

Liquor Antisepticus N. F.

Liq. Antisept. N. F.

Boric Acid	25	Gm.
Thymol	0.5	Gm.
Chlorothymol	0.5	Gm.
Menthol	0.5	Gm.
Eucalyptol	0.1	cc.
Methyl Salicylate	0.2	cc.
Thyme Oil	0.01	cc.
Alcohol	300	cc.
Distilled Water, a sufficient quantity, To make	1000	cc.

Dissolve the boric acid in 650 cc. of hot distilled water and allow the solution to cool. Dissolve the other ingredients in the alcohol. Mix the 2 solutions and add sufficient distilled water to make the product measure 1000 cc. Keep the product in a tightly closed container during 2 hours or more; cool to 10°, then filter it at this temperature, using purified talc if necessary, to clarify the product.

NOTE: Specially denatured alcohol Formula No. 38-B, containing 6 pounds of boric acid and $1^1/_3$ pounds each of thymol, chlorothymol, and menthol added to 100 gallons of ethyl alcohol, has been approved by the U. S. Treasury Department as suitable for use in this preparation provided that adjustment be made for the quantities of the formula ingredients present in the denatured alcohol.

Description—N. F. Antiseptic Solution is a clear, colorless liquid having an aromatic odor and a characteristic taste. It is acid to litmus paper.

Specific gravity—The specific gravity of N. F. Antiseptic Solution is about 0.971 at 25°.

Quantitative test for boric acid—Dilute turmeric T.S. with 15 times its volume of alcohol. Dissolve 2.3 Gm. of boric acid in a sufficient quantity of an alcohol-aqueous mixture (30 in 100) to make 100 cc. of solution. Mix 2.0 cc. of the turmeric dilution with 25 cc. of the N. F. Antiseptic Solution and another 2.0 cc. of the turmeric dilution with 25 cc. of the boric acid solution. Allow the mixtures to stand during 10 minutes and then compare them in a colorimeter. The intensity of color developed in the mixture containing the N. F. Antiseptic Solution is not less than that developed in the mixture containing the boric acid standard solution.

Test for antiseptic value—Add 0.5 cc. of the standard culture of *Staphylococcus aureus* to 5 cc. of N. F. Antiseptic Solution, mix intimately by gentle rotation, and keep at 37.5°; the standard culture and the Antiseptic Solution both should be at this temperature before the test is made. After exactly 5 minutes, transfer 1 standard loopful of the mixture to each of 3 subculture tubes containing 10 cc. of standard culture medium. Incubate these tubes during 48 hours at 37.5°: no bacterial growth appears in the subculture tubes.

The Standard Culture: Transfer the living organisms of *Staphylococcus aureus* to standard culture medium and incubate at 37.5°. After about 24 hours, transfer from this incubated culture to fresh standard culture medium, incubating the new culture at 37.5°. Repeat this process again after 24 hours. This standard culture is cloudy; do not filter it, but shake it thoroughly, and then allow it to settle for about 15 minutes before it is used. When tested as directed above, the living organisms in this standard culture are all killed when admixed with aqueous phenol solution (1 in 80) for 10 minutes, but are not all killed when admixed with aqueous phenol solution (1 in 90) for 10 minutes.

The Standard Culture Medium: Dissolve 5 Gm. of beef extract, 5 Gm. of sodium chloride, and 10 Gm. of peptone in 1000 cc. of distilled water. Boil for 20 minutes, cool, and make up to original volume with distilled water. Adjust with sodium hydroxide T.S. to *p*H 6.8, using bromothymol blue T.S. as the indicator. Filter through paper, place 10 cc. in each sterile, cotton-stoppered tube, and sterilize for 40 minutes at 15 pounds pressure. To maintain the *Staphylococcus aureus* strain within the required range of resistance, it is necessary to make the beef broth with a peptone especially prepared for this purpose.

The Standard Loopful: The standard loop is a 4-mm. (inside diameter) single loop at the end of a piece of No. 23 Bureau of Standards gage platinum wire, 4 to 8 cm. long, and set in a suitable holder, such as a glass or aluminum rod. The wire is bent so that the loop forms a slight angle with the straight wire. To obtain

a standard loopful from a tube containing liquid, hold the tube at an angle of about 60°, so that the plane of the loop is parallel with the surface of the liquid.
Alcohol content—From 26 to 29 per cent, by volume, of C_2H_5OH.
Storage—Preserve N. F. Antiseptic Solution in tight containers.

FOR EXTERNAL OR ORAL USE—Undiluted.

Apocynum

APOCYNUM
Apocynum

Black Indian Hemp — Canada-hemp

Apocynum consists of the dried rhizome and roots of *Apocynum cannabinum* Linné or of *Apocynum androsæmifolium* Linné (Fam. *Apocynaceæ*).

Apocynum possesses a potency such that 0.1 Gm. of it is equivalent to not less than 2 U. S. P. XIII Digitalis Units.

Unground Apocynum—Unground Apocynum occurs as cylindrical, sometimes branched segments, of varying lengths and up to 1.5 cm. in diameter. Externally it is weak reddish brown to brownish gray, longitudinally wrinkled, and occasionally has transverse fissures with vertical sides extending through the bark. The fracture is short; the bark is very pale orange to light yellowish brown, 1.5 to 3.0 mm. thick; and the wood is porous, slightly radiate and possesses large tracheæ. The pith is small and is present only in the rhizome. It shows short rootlets, root-scars, buds, or occasionally short stem bases which have a thin fibrous bark and hollow center.

Histology—Apocynum shows a cork of 5 to 15 layers of tangentially elongated cells with slightly lignified, thickened walls; a cortex having a narrow zone of starch-bearing parenchyma and numerous thick-walled latex-bearing cells, with groups of stone cells in *A. androsæmifolium*, less frequent in *A. cannabinum;* a narrow phloem; medullary rays 1 to 3 cells wide; a xylem having a broad radiating porous region of narrow wood wedges separated by narrow medullary rays; and a rhizome with intra-xylary phloem strands.

Powdered Apocynum—Powdered Apocynum is light yellowish brown, has a saponaceous odor, and a starchy, bitter, somewhat acrid taste. The starch grains are numerous, up to 20 microns in diameter, spherical, ellipsoidal, ovate, pyriform, or irregular, sometimes altered or swollen, each grain with a distinct hyaline central cleft and showing a polarization cross when viewed under polarized light. It shows numerous slender, lignified, porous wood fibers associated with tracheæ having simple pits or elliptical bordered pores; stone cells isodiametric or elongated with strongly lignified, thick walls and branching pore canals; a few fragments of cork cells with brown to yellow walls, and occasional fragments of parenchyma, bearing latex cells.

Stem bases—Apocynum contains not more than 5 per cent of attached stem bases.

Foreign organic matter—Apocynum contains not more than 2 per cent of foreign organic matter, other than attached stem bases, page 760.

Acid-insoluble ash—Apocynum yields not more than 2 per cent of acid-insoluble ash, page 761.

Assay—Determine the potency of Apocynum in terms of U. S. P. Digitalis Units, as directed for *Digitalis* in the U. S. Pharmacopœia XIII. Apocynum shall be considered to conform to the National Formulary requirement if the result of the assay by that procedure does not vary more than 20 per cent from such requirement.

AVERAGE DOSE—**60 mg.** (approximately 1 grain).

ARALIA
Aralia

American Spikenard Spignet

Aralia consists of the dried rhizome and roots of *Aralia racemosa* Linné (Fam. *Araliaceæ*).

Unground Aralia—The rhizome is oblique, about 12 cm. long and 5 cm. thick, somewhat flattened, tortuous, externally weak brown to weak yellowish orange, often scaly, somewhat annulately roughened, frequently cut longitudinally, and lighter-colored internally. The nodes are approximate, each having a prominent stem-scar about 3 cm. in width. The fracture is fibrous. Roots are numerous, of varying length and up to 25 mm. thick; externally furrowed, sometimes with transverse ridges and corky patches, pale red-purple to weak yellowish orange, usually cut longitudinally, the cut surfaces lighter-colored and spongy. The fracture of the cortex is short and of the wood short-fibrous.

Histology—The rhizome has a thick bark and a well-developed cork; a hypodermis of 1 or more layers of lignified cells; several zones of oil-secretion reservoirs surrounded by parenchyma, bearing starch and rosettes of calcium oxalate. The wood is more or less radiate.

Powdered Aralia—Powdered Aralia is light yellowish brown, has an aromatic odor and a mucilaginous, pungent, and slightly acrid taste. The starch grains are simple or compound, spherical or angular, from 5 to 25 microns in diameter. The rosettes of calcium oxalate are from 30 to 70 microns in diameter. The tracheæ have scalariform or reticulate thickenings and simple or bordered pores. The powder also shows characteristic lignified cells from the hypodermis, 40 to 100 microns in length and about one-half as broad, their walls showing simple pores (*distinction from Aralia nudicaulis root*).

Stem bases—Aralia contains not more than 5 per cent of attached stem bases.

Foreign organic matter—Aralia contains not more than 2 per cent of foreign organic matter, other than stem bases, page 760.

Acid-insoluble ash—Aralia yields not more than 2 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**2 Gm.** (approximately 30 grains).

ARECA
Areca

Arecanut Betelnut

Areca is the dried ripe seed of *Areca Catechu* Linné (Fam. *Palmæ*).

Areca yields not less than 0.35 per cent of ether-soluble alkaloids calculated as arecoline.

Unground Areca—The seed is rounded-conical, up to 3.5 cm. in length and up to 3 cm. in diameter. Externally it is weak reddish brown to light yellowish brown and is marked with a network of paler lines. Adhering portions of the silvery brittle endocarp and fibers of the mesocarp are usually found at the base of the seed. The seed is hard, the cut surface exhibiting a marbled appearance (ruminate endosperm) of brownish tissue alternating with whitish tissue.

Histology—The seed coat consists of several rows of tangentially elongated cells with the inner walls more or less thickened; the whitish endosperm is composed of cells having thick porous walls and contains oil globules and aleurone grains; the brownish perisperm tissue is composed of thin-walled cells and delicate tracheæ.

Powdered Areca—Powdered Areca is weak reddish brown to light brown, has a slight odor and an astringent, slightly bitter taste. It consists principally of fragments of the endosperm, with porous reserve-cellulose walls, irregularly thickened stone cells of the seed coat, a few aleurone grains up to 40 microns in diameter and a few oil globules. Starch is absent and tracheal tubes are few.

Pericarp—Areca contains not more than 2 per cent of adhering pericarp.

Foreign organic matter—Areca contains not more than 1 per cent of foreign organic matter, page 760.

Total ash—Areca yields not more than 2.5 per cent of total ash, page 760.

Assay—Place 8 Gm. of Areca, in moderately coarse powder and accurately weighed, into a glass-stoppered flask, add 80 cc. of ether, shake well, add 4 cc. of ammonia T.S., and shake during 10 minutes. Add 10 Gm. of anhydrous sodium sulfate and shake during 5 minutes. Allow to settle and quickly decant the ether into another glass-stoppered flask. Add 0.5 Gm. of purified talc to the decanted ether solution and shake during 3 minutes, then add 2.5 cc. of distilled water and shake during 3 minutes more. Allow to stand until clear, quickly decant 50 cc. of the ether, equivalent to 5 Gm. of Areca, and evaporate off about two-thirds of the ether. Extract the remaining ether solution in a separator with 15 cc. of 0.02 *N* sulfuric acid and then with 3 portions of distilled water using 5 cc. each time. The 15 cc. of 0.02 *N* sulfuric acid may be added directly to the ether in the glass-stoppered flask and the flask shaken for 10 minutes, after which its contents are then transferred to the separator. The flask is then washed with the three 5-cc. portions of distilled water, each being passed successively through the separator. To the combined acid and washings, add methyl red T.S. and titrate the excess acid with 0.02 *N* sodium hydroxide solution. Each cc. of 0.02 *N* sulfuric acid is equivalent to 0.003108 Gm. of alkaloids calculated as arecoline.

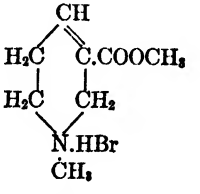
AVERAGE DOSE—Dogs, **2–4 Gm.** (approximately 30–60 grains).
Sheep, **4–8 Gm.** (approximately 1–2 drachms).
Based on the weight of the animal.

Arecoline Hydrobromide

ARECOLINE HYDROBROMIDE

Arecolinæ Hydrobromidum

Arecol. Hydrobrom.



$C_8H_{13}O_2N.HBr$

Mol. wt. 236.12

Arecoline Hydrobromide is the hydrobromide of an alkaloid obtained from the dried ripe seed of *Areca Catechu* Linné (Fam. *Palmæ*), or produced synthetically.

Description—Arecoline Hydrobromide occurs as a white, crystalline powder, or in the form of white crystals. It is odorless and has a bitter taste. It is affected by light.

Solubility—One Gm. of Arecoline Hydrobromide dissolves in about 1 cc. of water, in about 10 cc. of alcohol at 25°, and in about 2 cc. of boiling alcohol. It is slightly soluble in ether or in chloroform.

Melting point—Arecoline Hydrobromide melts between 170° and 175°, page 731.

Identification—

A: An aqueous solution of Arecoline Hydrobromide (1 in 20) responds to the tests for *Bromide*, page 723.

B: An aqueous solution of Arecoline Hydrobromide (1 in 50) yields a reddish brown precipitate with iodine T.S. and an orange precipitate with bromine T.S.

Loss on drying—When dried over sulfuric acid for 24 hours, Arecoline Hydrobromide loses not more than 1 per cent of its weight.

Residue on ignition—Arecoline Hydrobromide yields not more than 0.5 per cent of residue on ignition, page 745.

Free acid—A solution of 0.5 Gm. of Arecoline Hydrobromide in 15 cc. of distilled water requires not more than 0.2 cc. of 0.1 *N* sodium hydroxide for neutralization, using 1 drop of methyl red T.S. as the indicator.

Sulfate—The addition of 1 cc. of barium chloride T.S. to 10 cc. of an aqueous solution of Arecoline Hydrobromide (1 in 100) acidified with 5 drops of diluted hydrochloric acid, produces no precipitate or turbidity in 30 seconds.

Other alkaloids—The addition of ammonia T.S., or of sodium hydroxide T.S., to 5 cc. of an aqueous solution of Arecoline Hydrobromide (1 in 20) produces no precipitate or turbidity.

Storage—Preserve Arecoline Hydrobromide in tight, light-resistant containers.

AVERAGE DOSE—Horses, **30 mg.** (approximately 1/2 grain), subcutaneously.

Dogs, **1.5 mg.** per Kg. (approximately 1/80 grain per pound).

Arecoline Hydrobromide Tablets

ARECOLINE HYDROBROMIDE TABLETS

Tabellæ Arecolinæ Hydrobromidi

Tab. Arecol. Hydrobrom.

Arecoline Hydrobromide Tablets contain not less than 91 per cent and not more than 109 per cent of the labeled amount of $C_8H_{13}O_2NHBr$.

Identification—

A: A filtered aqueous extract of the Tablets responds to the tests for *Bromide*, page 723.

B: A filtered aqueous extract of the Tablets yields a red-brown precipitate with iodine T.S. and a yellow precipitate with bromine T.S.

Assay—Place not less than 20 of the Tablets in a 200-cc. volumetric flask, allow them to disintegrate in distilled water, shake well and let stand overnight. Dilute to volume, filter and transfer an accurately measured portion equivalent to about 0.3 Gm. of arecoline hydrobromide to a 250-cc. Erlenmeyer flask. Add 25 cc. of 0.1 *N* silver nitrate, 3 cc. of nitric acid (1 in 10) and 3 cc. of ferric ammonium sulfate

T.S. Allow to stand about 5 minutes, and titrate the excess silver nitrate with 0.1 *N* ammonium thiocyanate until a faint brown color persists after shaking. Each cc. of 0.1 *N* silver nitrate corresponds to 0.02361 Gm. of $C_8H_{13}O_2NHBr$.

Storage—Preserve Arecoline Hydrobromide Tablets in tight, light-resistant containers.

Sizes—Arecoline Hydrobromide Tablets usually available contain the following amounts of arecoline hydrobromide: **8, 15, 30,** and **60 mg.** (approximately 1/8, 1/4, 1/2, and 1 grain).

AVERAGE DOSE—Horses, **30 mg.** (approximately 1/2 grain), subcutaneously.

Dogs, **1.5 mg.** per Kg. (approximately 1/80 grain, per pound).

Arnica

ARNICA
Arnica

Arnica Flowers — European Arnica — American Arnica

Arnica is the dried flower head of *Arnica montana* Linné, known in commerce as European Arnica, or of *Arnica fulgens* Pursh, *Arnica sororia* Greene, and *Arnica cordifolia* Hooker, known in commerce as American Arnica (Fam. *Compositæ*).

Unground Arnica—Arnica occurs as entire flower heads or as tubular and ligulate florets usually with some receptacles and involucres. The heads are either hemispherical, turbinate, or campanulate, up to 2.8 cm. in height. The receptacle is flat to slightly convex (*Arnica montana*) or prominently convex (American Arnicas), deeply pitted, and covered with short hairs. The involucral bracts are lanceolate to elliptic oblong, those of *A. cordifolia* being frequently toothed or laciniate along the margins, light olive-green to weak reddish brown, puberulent and glandular-hairy, up to 25 mm. in length and from 1 to 3.5 mm. in width. The ligulate florets are yellow to moderate orange, pistillate, the ligulate corolla being up to 27 mm. in length, up to 6 mm. in width, its ligule usually 3-toothed and 7- to 12-nerved. The tubular florets are perfect, goblet-shaped, yellow to yellowish orange, their stamens bearing 2 oblong-elliptic anther lobes united by an elongated triangular connective. The achenes are oblong to spindle-shaped, appressed-hispid, longitudinally striate or dotted, 3.5 to 7 mm. in length, brownish gray to light olive-brown, with a collar near the summit bearing a single circle of barbellate pappus bristles, a little longer than the achene.

Powdered Arnica—The color is light yellowish brown to light olive-brown. The odor is characteristic and agreeable. The pollen grains are numerous, 25 to 40 microns in diameter, spheroidal and spinose.

The non-glandular hairs are of the following kinds: unicellular and uniseriate-articular, straight, curved or dagger-shaped, the uniseriate hairs up to 9-celled, rarely 11-celled, some with short basal cells and elongated distal cell, and double hairs, the latter up to 384 microns in length, mostly unequal in length of parts, with bifid summits, each with numerous pores on the dividing wall separating the 2 components, one of which is either 1- or 2-celled. The glandular hairs are of the following kinds: with a unicellular stalk and a 1- to 2-celled head, with a

uniseriate or biseriate stalk and a 1-, 2-, or 4-celled head. The pappus bristles possess a multicellular axis and unicellular branches.

Foreign organic matter—Arnica contains not more than 3 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Arnica yields not more than 2 per cent of acid-insoluble ash, page 761.

Arnica Fluidextract

ARNICA FLUIDEXTRACT

Fluidextractum Arnicæ

Fldext. Arnic. Arnica Flowers Fluidextract

Prepare the Fluidextract from arnica, in coarse powder, by Process A, page 718. Use a mixture of 3 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 48 hours, and percolate slowly.

Alcohol content—From 60 to 66 per cent, by volume, of C_2H_5OH.

Storage—Preserve Arnica Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**0.1 cc.** (approximately $1^1/_2$ minims).

Arnica Tincture

ARNICA TINCTURE

Tinctura Arnicæ

Tr. Arnic.

Arnica, in moderately coarse powder	**200 Gm.**
Alcohol,	
Water, each, a sufficient quantity,	
To make	**1000 cc.**

Prepare the Tincture by Process P, page 758. Use a mixture of 3 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 48 hours, percolate slowly, and repeat the maceration during 24 hours after 500 cc. of percolate has been collected.

Alcohol content—From 63 to 69 per cent, by volume, of C_2H_5OH.

Storage—Preserve Arnica Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**0.5 cc.** (approximately 8 minims).

Aromatic Castor Oil, page 129
Aromatic Chalk Powder, page 134

Aromatic Elixir, Red

RED AROMATIC ELIXIR
Elixir Aromaticum Rubrum

Elix. Arom. Rub. Red Elixir

Cudbear Tincture	20 cc.
Aromatic Elixir	980 cc.
To make	1000 cc.

Mix the ingredients.

Alcohol content—From 22 to 24 per cent, by volume, of C_2H_5OH.
Storage—Preserve Red Aromatic Elixir in tight containers.

Aromatic Eriodictyon Syrup, page 199

Aromatic Powder

AROMATIC POWDER
Pulvis Aromaticus

Pulv. Arom.

Cinnamon, in fine powder	350 Gm.
Ginger, in fine powder	350 Gm.
Cardamom Seed, in fine powder	150 Gm.
Myristica, freshly grated	150 Gm.
To make	1000 Gm.

Triturate the cardamom seed and the myristica with a portion of the cinnamon until they are reduced to a fine powder; add the remaining powders, and continue the trituration until a uniform mixture is obtained.

Description—Aromatic Powder is moderate yellowish brown, with a strong, distinctive, aromatic odor. It shows ellipsoidal or ovoid starch grains, slightly beaked, up to 60 microns in diameter (ginger); numerous reddish brown to yellowish orange, and occasional dark gray or black fragments, with indistinct cellular structure; occasional stone cells, usually filled with a reddish orange or orange amorphous

substance; a few fragments with sclerenchymatous fibers; a few short calcium oxalate raphides and a few aleurone grains.
Storage—Preserve Aromatic Powder in well-closed containers.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Aromatic Sodium Perborate, page 487

ALKALINE AROMATIC SOLUTION

Liquor Aromaticus Alkalinus

Liq. Arom. Alk.

Potassium Bicarbonate	20 Gm.
Sodium Borate	20 Gm.
Thymol	0.5 Gm.
Eucalyptol	1 cc.
Methyl Salicylate	0.5 cc.
Cudbear Tincture	20 cc.
Alcohol	50 cc.
Glycerin	100 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Mix the potassium bicarbonate and sodium borate with 100 cc. of distilled water, and add the glycerin; when the effervescence has ceased, add the mixture to 500 cc. of distilled water. Dissolve the thymol, eucalyptol, methyl salicylate, and cudbear tincture in the alcohol; then add the solution of the salts to the alcohol solution, with constant agitation; finally add sufficient distilled water to make the product measure 1000 cc. Allow the mixture to stand, with occasional shaking, during 24 hours; then filter, using 10 Gm. of purified talc if necessary, to clarify the product.

Description—Alkaline Aromatic Solution is a clear, purplish red liquid, with an aromatic odor and taste. It is alkaline to litmus paper.
Specific gravity—The specific gravity of Alkaline Aromatic Solution is about 1.042 at 25°.
Residue on ignition—Incinerate the residue from 10 cc. of Alkaline Aromatic Solution: it yields not more than 0.22 Gm. and not less than 0.18 Gm. of residue on ignition, page 745.
Alcohol content—From 4 to 7 per cent, by volume, of C_2H_5OH.
Storage—Preserve Alkaline Aromatic Solution in tight containers.

FOR ORAL USE—Undiluted; or, for use in a dental spray bottle, dilute with 5 volumes of water.

Aromatic Spray

AROMATIC SPRAY
Nebula Aromatica

Nebul. Arom.

Phenol	2 Gm.
Menthol	2 Gm.
Thymol	1 Gm.
Camphor	3 Gm.
Benzoic Acid	3 Gm.
Eucalyptol	2 cc.
Cinnamon Oil	2 cc.
Clove Oil	2 cc.
Methyl Salicylate	5 cc.
Light Liquid Petrolatum, a sufficient quantity,	
To make	1000 cc.

Mix the phenol, menthol, thymol, and camphor in a flask; warm the mixture on a water bath until liquefied; then add the aromatic oils, eucalyptol, methyl salicylate, benzoic acid, and sufficient light liquid petrolatum to make the product measure 1000 cc.; mix thoroughly and filter if necessary.

Storage—Preserve Aromatic Spray in tight containers.

Arsenic and Mercuric Iodides Solution

ARSENIC AND MERCURIC IODIDES SOLUTION
Liquor Arseni et Hydrargyri Iodidorum

Liq. Arsen. et Hydrarg. Iodid. Donovan's Solution

Arsenic and Mercuric Iodides Solution is an aqueous solution containing, in each 100 cc., not less than 0.95 Gm. and not more than 1.05 Gm. of AsI_3, and not less than 0.95 Gm. and not more than 1.05 Gm. of HgI_2.

Arsenic Triiodide	10 Gm.
Red Mercuric Iodide	10 Gm.
Sodium Bicarbonate	9 Gm.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Triturate the arsenic triiodide and the red mercuric iodide in a mortar; add 150 cc. of distilled water, and continue the trituration until solution is effected. Filter the solution, and pass sufficient distilled

water through the filter to make the product measure 800 cc. Place the filtrate in an open vessel, and cautiously stir in the sodium bicarbonate. When effervescence has ceased, filter, and add sufficient distilled water through the filter to make the product measure 1000 cc.

NOTE: Do not dispense Arsenic and Mercuric Iodides Solution if darker than pale yellow in color.

Description—Arsenic and Mercuric Iodides Solution is a clear, colorless, or faint yellow liquid. It is affected by light.

Identification—

A: Lead acetate T.S. produces a yellow-green precipitate in Arsenic and Mercuric Iodides Solution, diluted with 10 volumes of distilled water.

B: Add 5 drops of Arsenic and Mercuric Iodides Solution to a mixture of about 0.5 Gm. of zinc and 5 cc. of diluted hydrochloric acid in a test tube, and cover the mouth of the test tube with mercuric bromide test paper: a yellow stain appears upon the inner surface of the test paper within 1 minute.

C: Arsenic and Mercuric Iodides Solution responds to the tests for *Mercury*, page 726.

Assay for arsenic triiodide—Measure accurately 25 cc. of Arsenic and Mercuric Iodides Solution into a flask, and dilute with 25 cc. of distilled water; then dissolve 2 Gm. of sodium bicarbonate in this solution, and titrate with 0.1 *N* iodine, using starch T.S. as the indicator. Each cc. of 0.1 *N* iodine is equivalent to 0.02278 Gm. of AsI_3.

Assay for mercuric iodide—Measure accurately 25 cc. of Arsenic and Mercuric Iodides Solution into a flask, add 5 cc. of potassium hydroxide T.S. and 5 cc. of formaldehyde T.S., and warm the mixture on a water bath until the mercuric salt has been reduced completely to metallic mercury. Carefully decant the clear, supernatant liquid from the residue of metallic mercury, and wash the mercury carefully by decantation with 2 successive portions of 25 cc. each of distilled water. Dissolve the residue of metallic mercury in 5 cc. of nitric acid by the application of gentle heat, dilute the solution with 50 cc. of distilled water, add 2 cc. of ferric ammonium sulfate T.S., and titrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* ammonium thiocyanate is equivalent to 0.02272 Gm. of HgI_2.

Storage—Preserve Arsenic and Mercuric Iodides Solution in tight, light-resistant containers.

AVERAGE DOSE—**0.1 cc.** (approximately $1^1/_2$ minims).

One average metric dose contains 1 mg. each of Arsenic Triiodide and Red Mercuric Iodide.

Arsenic Triiodide

ARSENIC TRIIODIDE
Arseni Triiodidum

Arsen. Triiodid. Arsenous Iodide

AsI_3 Mol. wt. 455.67

Arsenic Triiodide, when dried to constant weight over sulfuric acid, contains not less than 99 per cent of AsI_3.

Caution: Arsenic Triiodide is extremely poisonous.

Description—Arsenic Triiodide occurs as an orange to red, odorless or nearly odorless, crystalline powder. It is affected by light.

Solubility—One Gm. of Arsenic Triiodide dissolves in about 12 cc. of water at 25° with almost complete hydrolysis. It is soluble in alcohol, in chloroform, in ether, and in carbon disulfide.

Identification—

A: To 5 cc. of an aqueous solution of Arsenic Triiodide (1 in 50) add 10 cc. of hydrogen sulfide T.S.: a yellow precipitate is produced at once, which dissolves on the addition of ammonium carbonate T.S.

B: The addition of ferric chloride T.S. to an aqueous solution of Arsenic Triiodide (1 in 50) liberates iodine which is recognized by giving a blue color with starch T.S.

Residue on ignition—Arsenic Triiodide leaves not more than 0.5 per cent of residue on ignition, page 745.

Free iodine—Dissolve 0.25 Gm. of Arsenic Triiodide in 10 cc. of freshly boiled and cooled distilled water. Make the solution in a test tube of such size that the liquid nearly fills it, and while making the solution protect it from sunlight. As soon as solution has been effected, add 2 drops of starch T.S.: no color is produced immediately.

Assay—Transfer to a suitable flask about 0.5 Gm. of Arsenic Triiodide, previously dried to constant weight over sulfuric acid and accurately weighed. Dissolve the Arsenic Triiodide in about 50 cc. of distilled water, add 2 Gm. of sodium bicarbonate, and titrate the solution with 0.1 *N* iodine, using starch T.S. as the indicator. Each cc. of 0.1 *N* iodine is equivalent to 0.02278 Gm. of AsI_3.

Storage—Preserve Arsenic Triiodide in tight, light-resistant containers, and avoid excessive heat.

AVERAGE DOSE—**5 mg.** (approximately $^1/_{12}$ grain).

Arsenic Trioxide Tablets

ARSENIC TRIOXIDE TABLETS

Tabellæ Arseni Trioxidi

Tab. Arsen. Trioxid. Arsenous Acid Tablets

Arsenic Trioxide Tablets contain not less than 92.5 per cent and not more than 107.5 per cent of the labeled amount of As_2O_3.

Identification—Powder a number of the Tablets, equivalent to about 10 mg. of arsenic trioxide, mix the powder with 10 cc. of distilled water, heat the mixture to boiling, filter it, and add 2 cc. of hydrogen sulfide T.S.: a greenish yellow color is produced in the filtrate. Upon the addition of a few drops of hydrochloric acid to the colored solution, a yellow precipitate of arsenic trisulfide is produced.

Assay—Weigh not less than 20 of the Tablets, and reduce them to a fine powder without appreciable loss. Transfer to a flask an accurately weighed portion, equivalent to about 60 mg. of arsenic trioxide, add 40 cc. of distilled water, and boil until the volume has been reduced to approximately 20 cc.; cool, and add 35 cc. of hydrochloric acid and 6 cc. of chloroform. Stopper the flask and allow the mixture to stand during 2 hours, with occasional agitation, and then titrate with 0.02 *M* potassium iodate. Each cc. of 0.02 *M* potassium iodate is equivalent to 0.003956 Gm. of As_2O_3.

Storage—Preserve Arsenic Trioxide Tablets in well-closed containers.

Sizes—Arsenic Trioxide Tablets usually available contain the following amount of arsenic trioxide: **2 mg.** (approximately $^1/_{30}$ grain).

AVERAGE DOSE—**2 mg.** (approximately $^1/_{30}$ grain) of Arsenic Trioxide.

ARSENIOUS ACID SOLUTION

Liquor Acidi Arseniosi

Liq. Acid. Arsen.

Hydrochloric Solution of Arsenic — Arsenic Chloride Solution

Arsenious Acid Solution contains, in each 100 cc., the equivalent of not less than 0.975 Gm. and not more than 1.025 Gm. of As_2O_3.

Arsenic Trioxide	**10 Gm.**
Diluted Hydrochloric Acid	**50 cc.**
Distilled Water, a sufficient quantity,	
To make	**1000 cc.**

Mix the diluted hydrochloric acid with 250 cc. of distilled water in a flask, add the arsenic trioxide, and boil the liquid until the arsenic trioxide is completely dissolved. Allow the solution to cool, transfer it to a 1000-cc. graduated flask or cylinder, rinse the vessel in which the solution was boiled with several portions of distilled water, and add the rinsings and enough distilled water to make the product measure 1000 cc. Filter if necessary.

Description—Arsenious Acid Solution is a clear, colorless and odorless liquid, having an acid reaction to litmus paper.

Identification—Hydrogen sulfide T.S. added to Arsenious Acid Solution produces a yellow precipitate of arsenic trisulfide, which is completely soluble in ammonium carbonate T.S.

Assay—Measure accurately 20 cc. of Arsenious Acid Solution, and dilute with 50 cc. of distilled water. Dissolve enough sodium bicarbonate in this solution to make it distinctly alkaline (usually about 2 Gm.), and titrate with 0.1 *N* iodine, using starch T.S. as the indicator. Each cc. of 0.1 *N* iodine is equivalent to 0.004946 Gm. of As_2O_3.

Storage—Preserve Arsenious Acid Solution in tight containers.

AVERAGE DOSE—**0.2 cc.** (approximately 3 minims).

ASAFETIDA

Asafœtida

Asafœt. — Gum Asafetida

Asafetida is the oleo-gum-resin obtained by incising the living rhizomes and roots of *Ferula Assa-fœtida* Linné and *Ferula fœtida* (Bunge) Regel and of other species of *Ferula* (Fam. *Umbelliferæ*).

Asafetida yields not less than 50 per cent of alcohol-soluble extractive.

Description—Asafetida occurs as a soft mass sometimes almost semi-liquid, or as irregular, more or less pliable masses composed of agglutinated tears imbedded in a weak brown to moderate yellowish brown matrix, or as loose ovoid tears, from 1 to 4 cm. in diameter, with a few vegetable fragments. It becomes hard and occasionally brittle on drying. The surface of the freshly fractured tears is white to moderate yellowish brown, changing gradually on exposure to air or light to a strong pink and finally to a moderate yellowish brown. When moistened with water the tears become moderate orange to weak yellow. The odor is persistent and alliaceous, and the taste is bitter, alliaceous, and acrid.

Identification—

A: Asafetida, triturated with water, yields a yellowish orange emulsion which becomes greenish yellow upon the addition of alkalies.

B: A reddish brown solution is formed when a fragment of Asafetida is heated with sulfuric acid. Greatly dilute this solution with water, filter, and render it alkaline: the solution acquires a purplish blue fluorescence.

C: A few drops each of phloroglucinol T.S. and of hydrochloric acid added to 10 cc. of the alcohol extract obtained in the assay produce a pink color in the mixture.

Most foreign resins—Add a few drops of ferric chloride T.S. to 5 cc. of the alcohol extract obtained in the assay: the mixture has a yellowish brown color.

Galbanum—Add to 10 cc. of the alcohol extract from the assay enough hydrochloric acid to produce a faint turbidity: the mixture has a bluish green color which fades as the mixture stands.

Ammoniac—Triturate 0.5 Gm. of Asafetida with 12 cc. of distilled water until an emulsion is formed; mix 2 cc. of this emulsion with 5 cc. of distilled water and add 5 cc. of sodium hypobromite T.S. to form a separate layer: no momentary yellowish orange to red color is produced in the mixture.

Rosin—Triturate 1 Gm. of Asafetida with 10 cc. of petroleum benzin for 2 minutes, filter into a test tube, and add to the filtrate 10 cc. of a fresh aqueous solution of copper acetate (1 in 200); shake well and allow the liquids to separate: the benzin layer should not show a green color.

Acid-insoluble ash—Asafetida yields not more than 15 per cent of acid-insoluble ash, page 761.

Assay—Place about 2 Gm. of Asafetida, accurately weighed, in a tared extraction thimble and extract with alcohol in a Soxhlet or other suitable extraction apparatus for 3 hours, or until completely extracted. Dry the insoluble residue at 105° for 4 hours and weigh. Determine the amount of moisture in the drug by the *Toluene Distillation Method*, page 761; calculate the weight of moisture in the Asafetida, and subtract this weight of moisture from the original weight of the Asafetida taken. The difference between this result and the weight of the residue determined above represents the alcohol-soluble extractive.

AVERAGE DOSE—**0.4 Gm.** (approximately 6 grains).

Asafetida Pills

ASAFETIDA PILLS

Pilulæ Asafœtidæ

Pil. Asafœt.

Asafetida	**20 Gm.**
Hard Soap, in fine powder	**6 Gm.**
Distilled Water, a sufficient quantity,	
To make 100 pills.	

Prepare the pills according to the General Directions, page 739, and coat them with a suitable coating, preferably of gelatin.

NOTE: The pill mass may also be dispensed in gelatin capsules.

AVERAGE DOSE—2 pills.

One average metric dose contains 0.4 Gm. of Asafetida.

Asafetida Tincture

ASAFETIDA TINCTURE
Tinctura Asafœtidæ

Tr. Asafœt.

Asafetida, comminuted	**200 Gm.**
Alcohol, a sufficient quantity,	
To make	**1000 cc.**

Prepare the Tincture by Process M, page 758, using alcohol as the menstruum.

Alcohol content—From 78 to 85 per cent, by volume, of C_2H_5OH.
Storage—Preserve Asafetida Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—1 cc. (approximately 15 minims).

Barbital Elixir

BARBITAL ELIXIR
Elixir Barbitali

Elix. Barbital.

Barbital Elixir contains, in each 100 cc., not less than 3.2 Gm. and not more than 3.8 Gm. of $C_8H_{12}N_2O_3$.

Barbital	**35 Gm.**
Caramel	**20 Gm.**
Compound Vanillin Spirit	**30 cc.**
Alcohol	**335 cc.**
Glycerin, a sufficient quantity,	
To make	**1000 cc.**

Mix the barbital with the alcohol and the compound vanillin spirit, add 600 cc. of the glycerin, and agitate until the barbital is dissolved; add the caramel and sufficient glycerin to make the product measure 1000 cc. Mix well and filter, if necessary, to make the product clear.

Assay—Transfer to a separator exactly 10 cc. of Barbital Elixir and add 5 cc. of sodium hydroxide T.S., previously saturated with sodium chloride. Wash the mixture with two 15-cc. portions of ether and discard the washings. Add 2 cc. of hydrochloric acid and 5 cc. of distilled water, and completely extract the barbital by shaking with successive portions of a solvent composed of 1 volume of ether and 9 volumes of chloroform. Wash the extract with 5 cc. of distilled water, acidified with 1 drop of hydrochloric acid. Filter the extract and wash the filter with small portions of the solvent. Evaporate the combined filtrate and washings on a water bath, dry the residue to constant weight at a temperature not exceeding 100°, and weigh as $C_8H_{12}N_2O_3$.

Alcohol content—From 31 to 34 per cent, by volume, of C_2H_5OH.

Storage—Preserve Barbital Elixir in tight containers.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains about 0.14 Gm. of Barbital.

Barium Chloride

BARIUM CHLORIDE
Barii Chloridum

$BaCl_2.2H_2O$ Mol. wt. 244.31

Barium Chloride contains not less than 99 per cent of $BaCl_2.2H_2O$.

Caution: Barium Chloride is extremely poisonous.

Description—Barium Chloride occurs as white or colorless crystals or as white granules. It is odorless.

Solubility—One Gm. of Barium Chloride dissolves in about 2.8 cc. of water, and in about 8 cc. of glycerin at 25°. It is insoluble in alcohol. One Gm. of Barium Chloride is soluble in about 1.5 cc. of boiling water.

Identification—An aqueous solution of Barium Chloride responds to the tests for *Barium*, page 723, and for *Chloride*, page 724.

Alkali salts—Dissolve 5 Gm. of Barium Chloride in 150 cc. of distilled water, add 1 cc. of hydrochloric acid and heat to boiling. Add 25 cc. of diluted sulfuric acid and cool, dilute to 250 cc. and allow to stand overnight. Decant through a filter, evaporate 100 cc. to dryness in a tared dish, ignite, and weigh: not more than 10 mg. of residue remains.

Strontium and calcium—Add 20 cc. of absolute alcohol to 2 Gm. of finely powdered Barium Chloride and allow to stand 30 minutes with occasional shaking. Filter, evaporate the filtrate and ignite gently to constant weight. Not more than 10 mg. of residue remains.

Sulfate—Heat a solution of 10 Gm. of Barium Chloride in 100 cc. of distilled water on a water bath for 1 hour and allow to stand overnight: the solution is clear and shows no precipitate.

Heavy metals—Dissolve 1 Gm. of Barium Chloride in 1 cc. of diluted acetic acid and enough distilled water to make 25 cc.: the heavy metals limit, page 721, of Barium Chloride is 30 parts per million.

Assay—Weigh accurately about 0.6 Gm. of Barium Chloride, dissolve in 20 cc. of distilled water and add 1 cc. of hydrochloric acid. Heat to boiling, add diluted sulfuric acid in small portions until all the barium is precipitated and let stand overnight, or for 3 hours on a water bath. Filter, wash the precipitate with hot distilled water and ignite. Cool, add 2 drops of sulfuric acid, and re-ignite cautiously to constant weight. Each Gm. of $BaSO_4$ is equivalent to 1.0466 Gm. of $BaCl_2.2H_2O$.

Storage—Preserve Barium Chloride in tight containers.

BARIUM CHLORIDE TABLETS

Tabellæ Barii Chloridi

Tab. Bar. Chlorid.

Barium Chloride Tablets contain not less than 91 per cent and not more than 109 per cent of the labeled amount of $BaCl_2.2H_2O$.

Identification—A filtered aqueous extract of the Tablets responds to the tests for *Barium*, page 723, and for *Chloride*, page 724.

Assay—Dissolve not less than 20 of the Tablets in distilled water in a 500-cc. volumetric flask, allowing to stand overnight if insoluble matter is present. Dilute to volume and transfer an accurately measured portion of the solution equivalent to about 0.3 Gm. of barium chloride to an Erlenmeyer flask, filtering if necessary. Add 50 cc. of 0.1 *N* silver nitrate and 2 cc. of nitric acid and agitate the mixture until the precipitate is coagulated. Filter, then add 2 cc. of ferric ammonium sulfate T.S. to the filtrate, and titrate the excess silver nitrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.01222 Gm. of $BaCl_2.2H_2O$.

Storage—Preserve Barium Chloride Tablets in tight containers.

AVERAGE DOSE—Horses, **2 Gm.** (approximately 30 grains).

BEEF EXTRACT

Extractum Carnis

Ext. Carnis

Beef Extract is a residue from beef broth obtained by extracting fresh, sound, lean beef by cooking with water and evaporating the broth at a low temperature, usually in vacuum, until a thick pasty residue is obtained.

Description—Beef Extract occurs as a yellowish brown to dark brown, slightly acid, pasty mass, having an agreeable meat-like odor and taste.

Solubility—Twenty-five Gm. of Beef Extract, dissolved in sufficient distilled water to make 250 cc., yields a nearly clear solution, free from sediment. Separate portions of this solution respond to the following tests: . .

Nitrate—Boil 10 cc. of the solution for 1 minute with 1.5 Gm. of purified animal charcoal, add distilled water to replace that lost by evaporation, and filter: no blue color is produced when 1 drop of the filtrate is added to 3 drops of a solution of diphenylamine (1 in 100) in sulfuric acid.

Total solids—Distribute 10 cc. of the solution over clean, dry sand or asbestos, tared in a porcelain dish, and dry to constant weight at 105°: the yield of residue is not less than 0.75 Gm., equivalent to 75 per cent of total solids in the original Extract.

Ash—Incinerate the residue obtained from the test above by heating the dish to a dull red heat: the ash does not exceed 30 per cent of the total solids.

Chlorides calculated as sodium chloride—Dissolve the ash obtained from the test above in about 50 cc. of distilled water and carefully transfer to a 100-cc. volumetric flask. Add to the solution a few drops of nitric acid and 10 cc. of 0.1 *N* silver nitrate. Dilute to volume with distilled water and mix thoroughly. Filter into a dry flask through a dry filter and reject the first 10 cc. of the filtrate. To exactly 50 cc.

of the subsequent filtrate add 1 cc. of ferric ammonium sulfate T.S. and titrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.005845 Gm. of NaCl. The weight of chlorides calculated as sodium chloride obtained when multiplied by 2, does not exceed 6 per cent of the total solids.

Alcohol-insoluble solids—Transfer 25 cc. of the solution to a 100-cc. Erlenmeyer flask, add 50 cc. of alcohol, and shake the mixture thoroughly. Collect the precipitate upon a counterpoised filter, wash it 3 times with a mixture of 2 volumes of alcohol and 1 volume of distilled water, and dry to constant weight at 105°: the weight of this precipitate, representing the alcohol-insoluble solids, does not exceed 10 per cent of the total solids in the solution taken. (*Reserve the filtrate and washings for the following determination of nitrogen.*)

Assay for nitrogen content of alcohol-soluble substances—Measure an aliquot portion of the alcohol filtrate remaining from the preceding test, corresponding to 1 Gm. of the alcohol-soluble solids, into a 500-cc. Kjeldahl flask. Add about 10 Gm. of powdered potassium sulfate and 20 cc. of sulfuric acid. Heat the mixture at a low temperature until frothing has ceased; then raise the temperature and boil the mixture until it acquires a pale yellow color, or is nearly colorless. Cool the flask, add about 250 cc. of distilled water, and cautiously add a 30 per cent solution of sodium hydroxide until the contents of the flask are alkaline, and then add 5 cc. more. Connect the flask at once by means of a spray trap to a condenser, the lower outlet tube of which dips beneath the surface of 50 cc. of 0.1 *N* sulfuric acid, and distil the mixture until about 100 cc. of distillate has been collected in the acid. Titrate the excess acid with 0.1 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.001401 Gm. of N. The amount of nitrogen thus found is not less than 60 mg.

Assay for nitrogen as ammonia—To 100 cc. of the solution of the Extract, contained in a 500-cc. Kjeldahl flask, add 5 Gm. of barium carbonate and 100 cc. of distilled water, and connect the flask to a condenser by means of a spray trap, the lower outlet tube of which dips beneath the surface of 50 cc. of 0.1 *N* sulfuric acid contained in a receiving flask. Distil the mixture until about 100 cc. of distillate has been collected, and titrate the excess acid with 0.1 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.001703 Gm. of NH_3. The amount of ammonia thus found does not exceed 0.35 per cent of the total solids in the solution taken.

Storage—Preserve Beef Extract in tight, light-resistant containers.

Beef, Iron and Wine

BEEF, IRON AND WINE
Caro, Ferrum et Vinum

Beef, Iron and Wine contains, in each 100 cc., an amount of ferric ammonium citrate corresponding to not less than 0.75 Gm. and not more than 0.975 Gm. of Fe.

Beef Extract	30 Gm.
Distilled Water	60 cc.
Ferric Ammonium Citrate	50 Gm.
Syrup	100 cc.
Alcohol	50 cc.
Compound Orange Spirit	1 cc.
Diluted Ammonia Solution,	
Sherry Wine, each, a sufficient quantity,	
To make	1000 cc.

Dissolve the beef extract in the distilled water with the aid of heat, cool, and add the compound orange spirit, the syrup and the alcohol, previously mixed. Dissolve the ferric ammonium citrate in 750 cc. of sherry wine, and add this solution to the mixture just prepared. Add sufficient diluted ammonia solution to render the resulting product neutral or slightly alkaline to litmus paper and then add enough sherry wine to make 1000 cc. Set the solution aside for 2 days and filter.

Assay—Transfer exactly 10 cc. of Beef, Iron and Wine to an evaporating dish and evaporate to dryness on a water bath. Ignite the residue until most of the carbon is gone, cool, add sulfuric acid and again ignite until the residue is free from organic matter. Dissolve the residue of iron oxide in 20 cc. of hydrochloric acid by warming on a water bath. Add 10 cc. of hydrogen peroxide T.S. and evaporate almost to dryness. Warm the residue with 6 cc. of hydrochloric acid and add 25 cc. of distilled water. Transfer to an iodine flask with the aid of about 25 cc. of distilled water, add 3 Gm. of potassium iodide, allow to stand for 15 minutes, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.005585 Gm. of Fe.
Alcohol content—From 17 to 25 per cent, by volume, of C_2H_5OH.
Storage—Preserve Beef, Iron and Wine in tight, light-resistant containers.

AVERAGE DOSE—**8 cc.** (approximately 2 fluidrachms).

One average metric dose contains 0.24 Gm. of Beef Extract and 0.4 Gm. of Ferric Ammonium Citrate.

BELLADONNA LEAF FLUIDEXTRACT

Fluidextractum Belladonnæ Folii

Fldext. Bellad. Fol.

Belladonna Leaf Fluidextract yields, from each 100 cc., not less than 0.27 Gm. and not more than 0.33 Gm. of the alkaloids of belladonna leaf.

Prepare the Fluidextract from belladonna leaf, in moderately coarse powder, by Process A, as modified for assayed fluidextracts, page 718, or by Process E, page 720.

By Process A, use a mixture of 3 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 48 hours, and percolate at a moderate rate.

By Process E, use a mixture of 2 volumes of alcohol and 1 volume of water as the menstruum and proceed as follows: Mix 1000 Gm. of ground drug with 400 cc. of the menstruum, so that it is evenly and distinctly damp. Allow the dampened drug to stand for about 1 hour,

then pack into a cylindrical percolator, or a series of such percolators joined together, with a length equal to about 30 times the diameter. Saturate the drug at a slow rate by forcing the menstruum under 6 to 15 pounds of air pressure through the packed drug. Allow to macerate during 48 hours, and proceed with percolation by forcing the menstruum through under pressure at a rate of about 1.5 cc. per minute until 950 cc. has been collected.

Adjust the concentrated fluid to contain, in each 100 cc., 0.3 Gm. of the alkaloids of belladonna, and 60 per cent by volume, of C_2H_5OH.

Assay—Evaporate 10 cc. of Belladonna Leaf Fluidextract, accurately measured, on a water bath until the alcohol is all removed. Transfer this extract to 20 cc. of chloroform in a separator, using about 15 cc. of water and 1 cc. of ammonia T.S. to complete the transfer. Shake the mixture vigorously for 1 minute, separate the chloroform layer, and complete the extraction of the alkaloid with successive portions of chloroform. From the combined chloroform extractions in a separator, extract the alkaloids completely by shaking with successive small portions of dilute sulfuric acid (about 1 in 100). Filter the acid solutions successively through a small filter or pledget of cotton into a separator. Add a slight excess of ammonia water, and completely extract the alkaloids from the aqueous layer by shaking with successive portions of chloroform. Evaporate the combined chloroform extractions to dryness on a water bath and keep the dry residue at this temperature for 15 minutes. Again dissolve the residue in chloroform, evaporate to dryness on a water bath, and continue the heating for 15 minutes. Repeat this treatment for the third time. Dissolve the resulting residue in chloroform, add 15 cc. of 0.02 *N* sulfuric acid, remove the chloroform by evaporation, and titrate the excess acid with 0.02 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.02 *N* sulfuric acid is equivalent to 0.005787 Gm. of the alkaloids of belladonna calculated as atropine.

Alcohol content—From 57 to 63 per cent, by volume, of C_2H_5OH.

Storage—Preserve Belladonna Leaf Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**0.06 cc.** (approximately 1 minim).

Belladonna Liniment

BELLADONNA LINIMENT
Linimentum Belladonnæ

Lin. Bellad.

Camphor	50 Gm.
Belladonna Root Fluidextract, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the camphor in about 800 cc. of the fluidextract, and then add enough of the latter to make the product measure 1000 cc. Mix them thoroughly.

Alcohol content—From 62 to 67 per cent, by volume, of C_2H_5OH.
Storage—Preserve Belladonna Liniment in tight containers.

BELLADONNA PLASTER

Emplastrum Belladonnæ

Emp. Bellad.

Belladonna Plaster is a mixture of adhesive plaster mass and an extract prepared from belladonna root, spread evenly upon fine cotton cloth or other suitable backing material. The plaster mass yields not less than 0.25 per cent and not more than 0.30 per cent of the alkaloids of belladonna root.

Each 100 square centimeters of the spread plaster contains at least 2.5 Gm. of the belladonna plaster mass.

Assay—Measure accurately the area of a piece of Belladonna Plaster, equivalent to about 10 Gm., then weigh it accurately. Cut the weighed plaster into small strips and place them in a small flask. Add 50 cc. of chloroform, and shake the mixture until the plaster mass is disintegrated. Pour the chloroform solution into a 250-cc. beaker, and wash the cloth upon which the plaster was spread with two successive portions of 25 cc. each of chloroform, adding the washings to the chloroform solution. Then wash the cloth with 50 cc. of alcohol containing 1 cc. of ammonia T.S., and add the washing to the chloroform solution. Again wash the cloth with 40 cc. of alcohol, and add the washing to the chloroform solution in the beaker. Stir the mixture gently but thoroughly, and allow it to stand until any coagulum which forms has separated into a compact mass. Dry the cloth upon which the plaster was spread, weigh it, and subtract its weight from the first weight of the spread plaster. The difference represents the weight of the plaster mass. From the weight thus found calculate the weight of plaster mass per 100 square centimeters of the spread plaster. Filter the chloroform-alcohol solution into a separator through a small pledget of purified cotton, knead the coagulum, if any, with a glass rod to force out the retained chloroform-alcohol solution, and rinse the coagulum and the beaker with 10 cc. of alcohol. Pour the rinsing through the cotton pledget into the separator, and force the solution retained by the cotton into the separator by pressure with a glass rod. Completely remove the alkaloids from the chloroform-alcohol solution by repeated extraction with approximately 0.5 *N* sulfuric acid. (See *Purification of Alkaloids*, page 740, under *Proximate Assays*.) Render the combined acid solutions distinctly alkaline with ammonia T.S., and completely remove the alkaloids at once by extracting with successive portions of chloroform. Evaporate the combined chloroform extractions to dryness on a water bath, and continue the heating for 15 minutes. Redissolve the residue in a small volume of chloroform, evaporate to dryness on a water bath, and continue the heating for 15 minutes. Repeat this treatment for the third time. Dissolve the resulting residue in a few cc. of chloroform, add 15 cc. of 0.02 *N* sulfuric acid, remove the chloroform by evaporation, cool, and titrate the excess acid with 0.02 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.02 *N* sulfuric acid is equivalent to 0.005787 Gm. of the alkaloids of belladonna root calculated as atropine.

Storage—Preserve Belladonna Plaster in well-closed containers at a temperature which does not exceed 30°. Protect it from direct sunlight.

Belladonna Root

BELLADONNA ROOT

Belladonnæ Radix

Deadly Nightshade Root

Belladonna Root is the dried root of *Atropa Belladonna* Linné (Fam. *Solanaceæ*).

Belladonna Root yields not less than 0.45 per cent of the alkaloids of Belladonna Root.

Unground Belladonna Root—Unground Belladonna Root is cylindrical or tapering, slightly branched, often split longitudinally or broken transversely; from 0.5 to 4 cm. in thickness; weak brown to moderate yellowish brown externally, light yellowish brown to pale yellow internally; somewhat wrinkled longitudinally, the soft periderm being frequently abraded. The fracture is short and mealy, emitting a puff of dust consisting chiefly of starch grains.

Histology—Belladonna Root shows a cork composed of a few layers of thin-walled cells, a secondary cortex consisting of a few to many layers of parenchyma cells, the most of which are filled with starch, and some with microcrystals, the latter relatively numerous in younger roots; a relatively narrow phloem devoid of bast fibers and traversed by starch- and microcrystal-bearing medullary rays; a conspicuous cambium zone and a broad xylem composed of numerous wood wedges separated by starch- and microcrystal-bearing xylem rays; the xylem wedges with large porous or reticulate tracheæ in scattered groups separated by starch- and crystal-bearing wood parenchyma and in the older roots, associated with wood fibers. The medullary rays are from 1 to 5 cells wide.

Powdered Belladonna Root—Powdered Belladonna Root is pale brown to weak yellow; nearly odorless when dry but having a characteristic odor when moistened, and a sweet, then bitter and acrid taste. It consists of numerous simple and compound starch grains, the single grains up to 30 microns in diameter and showing a distinct, somewhat eccentric hilum, the polarizing bands increasing in distinctness in direct ratio to the size of the grains; numerous sphenoidal microcrystals from 3 to 10 microns in length; a few fragments of tracheæ and wood fibers and occasionally long, thin-walled pericyclic fibers from belladonna stem. Old fibrous roots contain an excess of lignified tissue.

Phytolacca root—Belladonna Root contains neither raphides nor rosette aggregates of calcium oxalate nor tracheæ with diamond-shaped pores.

Stem bases—Belladonna Root contains not more than 10 per cent of its stem bases and woody crowns.

Foreign organic matter—Belladonna Root contains not more than 2 per cent of foreign organic matter, other than stem bases and woody crowns, page 760.

Acid-insoluble ash—Belladonna Root yields not more than 4 per cent of acid-insoluble ash, page 761.

Assay—Place 10 Gm. of Belladonna Root, in moderately coarse powder, in an extraction thimble, and insert the thimble in a Soxhlet, or similar extractor. Moisten the drug with a mixture of 3 cc. of stronger ammonia T.S., 10 cc. of alcohol, and 20 cc. of ether, thoroughly mix and allow to macerate overnight, and then extract it for not less than 3 hours or until the alkaloids are completely extracted (see *Extraction of Drugs*, page 740), using ether as the solvent. The following alternative process may be used: Moisten 10 Gm. of Belladonna Root, in moderately coarse powder (if a powder finer than "moderately coarse" is used for the assay, washed

sand or asbestos fibers may be used to facilitate extraction) with a mixture of 3 cc. of stronger ammonia T.S., 20 cc. of ether, and 10 cc. of chloroform, in a small percolator, the outlet of which has been packed with a pledget of purified cotton. Macerate the mixture overnight, pack it in the percolator, and extract by percolating slowly with a mixture of 3 volumes of ether and 1 volume of chloroform. Continue the percolation until the last 3 or 4 cc. of percolate, when evaporated to dryness and the residue dissolved in approximately 0.5 *N* sulfuric acid and treated with mercuric potassium iodide T.S., shows only a faint turbidity.

If the volume of liquid obtained by either the Soxhlet or percolation method of extraction is large, reduce it to a convenient volume by evaporating on a water bath.

Transfer the liquid to a separator, rinse the container with 1 or more small volumes of the solvent, and add the rinsings to the separator. Completely remove the alkaloids from the immiscible solvents by extracting with successive portions of approximately 0.5 *N* sulfuric acid (see *Purification of the Alkaloids*, page 740, under *Proximate Assays*, page 739), filtering each portion drawn off. Render the combined acid solutions distinctly alkaline with ammonia T.S., and completely remove the alkaloids at once by extracting with successive portions of chloroform. Evaporate the combined chloroform extractions to dryness on a water bath, and continue heating for 15 minutes. Redissolve the residue in a small volume of chloroform, evaporate to dryness on a water bath, and continue heating for 15 minutes. Repeat this treatment for the third time. Dissolve the resulting residue in a few cc. of chloroform, add 15 cc. of 0.02 *N* sulfuric acid, remove the chloroform by evaporation, cool, and titrate the excess acid with 0.02 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.02 *N* sulfuric acid is equivalent to 0.005787 Gm. of the alkaloids of Belladonna Root, calculated as atropine.

Storage—Preserve Belladonna Root against attack by insects, page 11.

BELLADONNA ROOT FLUIDEXTRACT

Fluidextractum Belladonnæ Radicis

Fldext. Bellad. Rad.

Belladonna Root Fluidextract yields, from each 100 cc., not less than 0.405 Gm. and not more than 0.495 Gm. of the alkaloids of belladonna root.

Prepare the fluidextract from belladonna root, in coarse powder, by Process A, as modified for assayed fluidextracts, page 718. Use a mixture of 4 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 48 hours, and percolate at a moderate rate.

Adjust the concentrated fluid to contain, in each 100 cc., 0.45 Gm. of the alkaloids of belladonna root, and 69 per cent, by volume, of C_2H_5OH.

Assay—Proceed as directed in the *Assay* under *Belladonna Leaf Fluidextract*, page 74. Each cc. of 0.02 *N* sulfuric acid is equivalent to 0.005787 Gm. of the alkaloids of belladonna calculated as atropine.

Alcohol content—From 66 to 71 per cent, by volume, of C_2H_5OH.
Storage—Preserve Belladonna Root Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

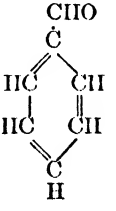
AVERAGE DOSE—**0.05 cc.** (approximately $^3/_4$ minim).

Benzaldehyde

BENZALDEHYDE

Benzaldehydum

Benzald.



$C_6H_5.CHO$ Mol. wt. 106.12

Benzaldehyde contains not less than 98 per cent of $C_6H_5.CHO$.

Description—Benzaldehyde is a colorless, strongly refractive liquid, having an odor resembling that of bitter almond oil, and a burning, aromatic taste. It is affected by light.
Solubility—Benzaldehyde dissolves in about 350 volumes of water, and is miscible with alcohol, with ether, and with fixed or volatile oils.
Specific gravity—The specific gravity of Benzaldehyde is not less than 1.041 and not more than 1.046 at 25°.
Refractive index—The refractive index of Benzaldehyde is not less than 1.5440 and not more than 1.5465 at 20°, page 745.
Hydrocyanic acid—Shake 0.5 cc. of Benzaldehyde with 5 cc. of distilled water, add 0.5 cc. of sodium hydroxide T.S. and 0.1 cc. of ferrous sulfate T.S., and warm the mixture gently. Upon the addition of a slight excess of hydrochloric acid, no greenish blue color or blue precipitate is produced within 15 minutes.
Chlorinated compounds—Wind a strip of 20 mesh copper gauze 1.5 cm. wide and 5 cm. long around the end of a copper wire. Heat the gauze in a non-luminous flame of the Bunsen burner until it glows without coloring the flame green. Permit the gauze to cool and re-heat several times until a good coat of oxide has formed. Apply with a medicine dropper, 2 drops of Benzaldehyde to the cooled gauze, ignite, and permit it to burn freely in the air. Again cool the gauze and add 2 more drops of Benzaldehyde and burn as before. This process is continued until a total of 6 drops has been added and ignited. Then hold the gauze in the outer edge of the Bunsen flame, adjusted to a height of about 4 cm.: not even a transient yellow green color is imparted to the flame.
Nitrobenzene—Dissolve 1 cc. of Benzaldehyde in 20 cc. of alcohol and add distilled water until a slight turbidity is produced. Add zinc and diluted sulfuric acid, maintaining a brisk evolution of hydrogen for 1 hour. Filter, evaporate the liquid to about 20 cc., and boil 10 cc. of the evaporated liquid with 1 drop of potassium dichromate T.S.: no purplish color is produced.
Assay—Proceed as directed in the *Assay for benzaldehyde* under *Bitter Almond Oil*, page 31. Each cc. of 0.5 *N* hydrochloric acid is equivalent to 0.05306 Gm. of C_6H_5CHO.
Storage—Preserve Benzaldehyde in well-filled, tight, light-resistant containers.

AVERAGE DOSE—**0.03 cc.** (approximately $^1/_2$ minim).

COMPOUND BENZALDEHYDE ELIXIR

Elixir Benzaldehydi Compositum

Elix. Benzald. Comp.

Benzaldehyde	0.5 cc.
Vanillin	1 Gm.
Orange Flower Water	150 cc.
Alcohol	50 cc.
Syrup	400 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the benzaldehyde and the vanillin in the alcohol; add the syrup, the orange flower water, and sufficient distilled water, in several portions, shaking the mixture thoroughly after each addition, to make the product measure 1000 cc.; then filter, if necessary, until the product is clear.

Alcohol content—From 3 to 5 per cent, by volume, of C_2H_5OH.
Storage—Preserve Compound Benzaldehyde Elixir in tight containers.

BENZALDEHYDE SPIRIT

Spiritus Benzaldehydi

Sp. Benzald.

Benzaldehyde	10 cc.
Alcohol	800 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the benzaldehyde in the alcohol, and add sufficient distilled water to make the product measure 1000 cc.

Alcohol content—From 71 to 78 per cent, by volume, of C_2H_5OH.
Storage—Preserve Benzaldehyde Spirit in tight, light-resistant containers.

AVERAGE DOSE—**0.5 cc.** (approximately 8 minims).

One average metric dose contains 0.005 cc. of Benzaldehyde.

Benzoic and Salicylic Acid Ointment

BENZOIC AND SALICYLIC ACID OINTMENT

Unguentum Acidi Benzoici et Salicylici

Ung. Acid. Benz. et Salicyl. Whitfield's Ointment

Benzoic Acid	120 Gm.
Salicylic Acid	60 Gm.
Wool Fat	50 Gm.
White Petrolatum, a sufficient quantity, To make	1000 Gm.

Powder the acids very finely, and incorporate them with the wool fat and a portion of the white petrolatum until a smooth, homogeneous mixture is obtained. Add the remainder of the white petrolatum, and mix thoroughly.

Storage—Preserve Benzoic and Salicylic Acid Ointment in tight containers and avoid prolonged exposure to temperatures above 30°.

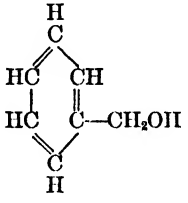
Benzyl Alcohol

BENZYL ALCOHOL

Alcohol Benzylicum

Phenylcarbinol

C_7H_8O



Mol. wt. 108.13

Description—Benzyl Alcohol is a colorless liquid with a faint, aromatic odor and a sharp burning taste. Benzyl Alcohol boils without decomposition at about 206° and is neutral to litmus paper.

Solubility—One Gm. of Benzyl Alcohol dissolves in about 25 cc. of water. One volume of Benzyl Alcohol dissolves in 1.5 volumes of 50 per cent alcohol. It is miscible with alcohol, with ether and with chloroform.

Specific gravity—The specific gravity of Benzyl Alcohol is not less than 1.040 and not more than 1.050 at 25°.

Distillation range—Not less than 94 per cent, by volume, of Benzyl Alcohol distils between 202.5° and 206.5°, when determined by Method II under *Boiling or Distilling Temperatures*, page 692.

Refractive index—The refractive index of Benzyl Alcohol is not less than 1.5385 and not more than 1.5405 at 20°, page 745.

Identification—Add 2 or 3 drops of Benzyl Alcohol to 5 cc. of an aqueous solution of potassium permanganate (1 in 20), and acidify with diluted sulfuric acid: the odor of benzaldehyde is produced.

Residue on ignition—Evaporate 10 cc. of Benzyl Alcohol in a suitable crucible and ignite to constant weight: the weight of the residue on ignition is negligible.

Chlorinated compounds—Benzyl Alcohol complies with the requirements of the test for *Chlorinated compounds* under *Benzaldehyde*, page 78.
Aldehyde—Shake 5 cc. of Benzyl Alcohol with 5 cc. of sodium hydroxide T.S. and allow to stand for 1 hour: no yellow color appears in the aqueous layer.
Storage—Preserve Benzyl Alcohol in tight containers, remote from fire.

Bergamot Oil

BERGAMOT OIL
Oleum Bergamottæ

Ol. Bergam.

Bergamot Oil is a volatile oil obtained by expression from the rind of the fresh fruit of *Citrus Bergamia* Risso et Poiteau (Fam. *Rutaceæ*).

Bergamot Oil yields not less than 36 per cent of esters, calculated as linalyl acetate, $C_{10}H_{17}C_2H_3O_2$.

Description—Bergamot Oil is a yellowish brown to green liquid, having a characteristic, fragrant odor, and an aromatic, bitter taste. It is affected by light.
Solubility—Bergamot Oil dissolves in alcohol and in glacial acetic acid.
Solubility in alcohol—Bergamot Oil dissolves in 2 volumes of 90 per cent alcohol.
Specific gravity—The specific gravity of Bergamot Oil is not less than 0.875 and not more than 0.880 at 25°.
Optical rotation—The optical rotation of Bergamot Oil is not less than +8° and not more than +24° in a 100-mm. tube at 25°, page 737.
Refractive index—The refractive index of Bergamot Oil is not less than 1.4650 and not more than 1.4675 at 20°, page 745.
Reaction—A solution of Bergamot Oil in an equal volume of alcohol is neutral or acid to litmus paper.
Fixed oil—Evaporate in a tared dish on a water bath about 2 Gm. of Bergamot Oil, accurately weighed, until the odor has completely disappeared: a soft greenish residue remains, equivalent to not more than 6 per cent of the sample.
Assay—To about 2 Gm. of Bergamot Oil, accurately weighed, add 20 cc. of 0.5 *N* alcoholic potassium hydroxide, and heat the mixture in a flask on a water bath, under a reflux condenser, for 30 minutes. Cool the mixture, add 100 cc. of distilled water, and titrate the excess of potassium hydroxide with 0.5 *N* sulfuric acid, using phenolphthalein T.S. as the indicator. Each cc. of 0.5 *N* alcoholic potassium hydroxide is equivalent to 0.09814 Gm. of esters calculated as linalyl acetate.
Storage—Preserve Bergamot Oil in tight, light-resistant containers.

Birch Tar Oil, Rectified

RECTIFIED BIRCH TAR OIL
Oleum Betulæ Empyreumaticum Rectificatum

Ol. Bet. Empyr. Rect. Oleum Rusci

Rectified Birch Tar Oil is the pyroligneous oil obtained by the dry distillation of the bark and wood of *Betula pendula* Roth and related species of *Betula* (Fam. *Betulaceæ*), and rectified by steam distillation.

Description—Rectified Birch Tar Oil is a clear, dark brown liquid with a penetrating, empyreumatic odor.
Solubility—Rectified Birch Tar Oil yields clear mixtures with 3 volumes of dehy-

drated alcohol, and with ether, chloroform, glacial acetic acid, amyl alcohol, turpentine oil, and benzene.

Specific gravity—The specific gravity of Rectified Birch Tar Oil is not less than 0.886 and not more than 0.950 at 25°.

Identification—When Rectified Birch Tar Oil is mixed with 7 to 10 volumes of alcohol or 3 volumes of petroleum benzin, the solution is not more than slightly turbid, but when it is mixed with 3 volumes of methanol, a decided turbidity is produced.

Juniper tar—Warm about 2 cc. of Rectified Birch Tar Oil with 10 cc. of distilled water, agitate, and allow the mixture to cool; separate and filter the aqueous liquid: the filtrate is colorless, has a strong, empyreumatic odor, and an acid reaction. Add 2 drops of potassium dichromate T.S. to 4 cc. of the aqueous filtrate: a yellowish orange solution is formed which soon becomes darker and turbid. Add 1 drop of ferric chloride solution (1 in 100) to 4 cc. of the filtrate: a yellow-green color forms which changes to yellowish brown and the mixture becomes turbid.

Storage—Preserve Rectified Birch Tar Oil in tight, light-resistant containers.

Rectified Birch Tar Oil stored in metal containers rapidly darkens in color and becomes unsuitable for use.

Bismuth Magma

BISMUTH MAGMA

Magma Bismuthi

Magma Bism. Milk of Bismuth Bismuth Cream

Bismuth Magma contains bismuth hydroxide and bismuth subcarbonate in suspension in water, and yields not less than 5.2 per cent and not more than 5.8 per cent of Bi_2O_3.

Bismuth Subnitrate	80 Gm.
Nitric Acid	120 cc.
Ammonium Carbonate	10 Gm.
Diluted Ammonia Solution,	
Distilled Water, each, a sufficient quantity,	
To make	1000 cc.

Mix the bismuth subnitrate with 60 cc. of distilled water and 60 cc. of nitric acid in a suitable container, and agitate, warming gently until solution is effected. Pour this solution, with constant stirring, into 5000 cc. of distilled water containing 60 cc. of nitric acid. Dilute 480 cc. of diluted ammonia solution with 4000 cc. of distilled water in a glazed or glass vessel of at least 12,000-cc. capacity. Dissolve the ammonium carbonate in this solution, and then pour the bismuth solution quickly into it with constant stirring. If the mixture is not distinctly alkaline, add sufficient diluted ammonia solution to make it so, and allow it to stand until the precipitate has subsided; then pour or siphon off the supernatant liquid, and wash the precipitate twice with distilled water, by decantation. Afterward transfer the magma to a strainer of close texture, so as to provide continuous washing with dis-

tilled water, the outlet tube being elevated to prevent the surface of the magma from becoming dry, and allow the operation to proceed until the washings cease to yield a pink color with phenolphthalein T.S. Then drain the moist magma, transfer it to a graduated vessel, add sufficient distilled water to make the product measure 1000 cc., and mix it thoroughly.

NOTE: The method of preparation as given above may be varied provided the product meets the requirements given below.

Description—Bismuth Magma is a thick, white, opaque, liquid mixture which separates upon standing. It is odorless and almost tasteless.

Solubility—Bismuth Magma is miscible with water and with alcohol.

Identification—

A: Bismuth Magma responds to the tests for *Bismuth*, page 723, and for *Carbonate*, page 723.

B: One cc. of diluted hydrochloric acid added to 1 cc. of Bismuth Magma produces a clear solution. Pour the clear solution into 10 volumes of distilled water: a white precipitate is produced.

Soluble salts—Boil 10 cc. of Bismuth Magma with 90 cc. of distilled water for 10 minutes, cool, add sufficient distilled water to make the total volume 100 cc., mix well, and filter. Evaporate 50 cc. of the filtrate to dryness, and ignite it gently: the weight of the residue does not exceed 5 mg.

Alkalies and earths—Dissolve 2 cc. of Bismuth Magma in 5 cc. of hydrochloric acid, dilute with distilled water to 100 cc., pass in hydrogen sulfide to precipitate the bismuth completely, and filter. To 50 cc. of the clear filtrate add 5 drops of sulfuric acid, evaporate to dryness and ignite. The weight of the residue does not exceed 3 mg.

Arsenic—Five-tenths Gm. of the residue from the *Assay* does not respond to the modified Fleitmann's test for *Arsenic*, page 691.

Lead—To 5 cc. of the Bismuth Magma add warm nitric acid, dropwise, until it is just dissolved, and pour the solution into 50 cc. of distilled water: a white precipitate is produced. Filter, evaporate the filtrate on a water bath to 15 cc., again filter, and to 10 cc. of the filtrate add an equal volume of diluted sulfuric acid: no precipitate is produced.

Assay—Evaporate to dryness an accurately weighed quantity of Bismuth Magma, and ignite the residue to constant weight. From the weight of the Bi_2O_3 so obtained determine the percentage in the Magma.

Storage—Preserve Bismuth Magma in tight containers and protect it from freezing.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

BISMUTH PASTE
Pasta Bismuthi

Past. Bism. Beck's Bismuth Paste

Bismuth Subnitrate	**300 Gm.**
White Wax	**50 Gm.**
Paraffin	**50 Gm.**
White Petrolatum	**600 Gm.**
To make	**1000 Gm.**

Melt the wax, paraffin, and white petrolatum together, and sterilize the mixture in an autoclave or by immersing the mixture in a suitable container in boiling water for 1 hour. Cool the mixture, and incorporate the bismuth subnitrate by thorough trituration under aseptic conditions.

Storage—Preserve Bismuth Paste in a sterile condition in tubes or jars.

Bismuth Subcarbonate Tablets

BISMUTH SUBCARBONATE TABLETS

Tabellæ Bismuthi Subcarbonatis

Tab. Bism. Subcarb.

Bismuth Subcarbonate Tablets yield an amount of Bi_2O_3, not less than 83 per cent and not more than 97 per cent of the labeled amount of bismuth subcarbonate.

Identification—The Tablets respond to the tests for *Bismuth*, page 723, and for *Carbonate*, page 723.

Alkalies and earths—Gently ignite 1 Gm. of the powdered Tablets, dissolve the residue by warming with 5 cc. of a mixture of equal volumes of distilled water and nitric acid, dilute with distilled water to 100 cc., completely precipitate the bismuth by passing hydrogen sulfide gas into the solution, and filter. Evaporate 50 cc. of the filtrate to dryness and ignite: the weight of the residue does not exceed 5 mg.

Assay—Weigh not less than 20 of the Tablets and reduce them to a fine powder without appreciable loss. Weigh accurately a portion equivalent to 0.6 Gm. of bismuth subcarbonate and transfer to a 500-cc. Kjeldahl flask. Add 25 cc. of sulfuric acid and 25 cc. of nitric acid, and heat until the solution is colorless or no more than light yellow. If necessary, add additional portions of nitric acid before the digestion is completed. Add about 100 cc. of water, cool and transfer the acid solution to a 200-cc. volumetric flask and dilute to volume with distilled water. Mix thoroughly and filter if necessary, rejecting the first portion of the filtrate. Transfer 100 cc. of the subsequent filtrate to a beaker and add about 50 cc. of water. If a precipitate forms, add just sufficient nitric acid to give a clear solution. Add ammonia T.S., dropwise, until a faint precipitate is permanent, then add 2 cc. of nitric acid and heat to boiling. To the boiling solution add 50 cc. of an aqueous solution of dibasic ammonium phosphate (1.3 in 100), dropwise, with continuous stirring, until the bismuth is all precipitated, and then the remainder more rapidly. Allow to stand on a water bath until the supernatant liquid is practically clear, then filter through an ignited, weighed Gooch crucible, and wash with ammonium nitrate solution (3 in 100) containing 5 drops of nitric acid per 100 cc. Dry the precipitate and ignite, gently at first and finally at dull redness to constant weight. Each Gm. of $BiPO_4$ is equivalent to 0.7664 Gm. of Bi_2O_3.

Storage—Preserve Bismuth Subcarbonate Tablets in tight containers.

Sizes—Bismuth Subcarbonate Tablets usually available contain the following amounts of bismuth subcarbonate: **0.3 Gm.** and **0.6 Gm.** (approximately 5 and 10 grains).

AVERAGE DOSE—**1 Gm.** (approximately 15 grains) of Bismuth Subcarbonate.

BISMUTH SUBGALLATE

Bismuthi Subgallas

Bism. Subgall. Basic Bismuth Gallate Dermatol

Bismuth Subgallate is a basic salt which, when dried at 105° for 3 hours, yields not less than 52 per cent and not more than 57 per cent of Bi_2O_3.

Description—Bismuth Subgallate occurs as an amorphous, bright yellow powder. It is odorless and tasteless. It is stable in the air, but is affected by light.

Solubility—Bismuth Subgallate dissolves readily with decomposition in warm, moderately dilute hydrochloric, nitric, or sulfuric acid; and is readily dissolved by solutions of alkali hydroxides, forming a clear, yellow liquid, which rapidly assumes a deep red color. Bismuth Subgallate is nearly insoluble in water, in alcohol, and in ether. It is insoluble in very dilute mineral acids.

Identification—

A: When heated to redness, Bismuth Subgallate at first chars, leaving finally a yellow residue. This residue responds to the tests for *Bismuth*, page 723.

B: Agitate thoroughly about 0.1 Gm. of Bismuth Subgallate with an excess of hydrogen sulfide T.S., filter, boil the filtrate to expel the dissolved gas, cool, and add 1 drop of ferric chloride T.S.: a purplish blue mixture is produced.

Nitrate—Mix thoroughly about 0.1 Gm. of Bismuth Subgallate with 5 cc. of diluted sulfuric acid and 5 cc. of ferrous sulfate T.S., filter the mixture, and carefully superimpose the filtrate, without mixing, on 5 cc. of sulfuric acid, in a test tube: no reddish brown color appears at the zone of contact of the two liquids.

Alkalies and earths—Boil 1 Gm. of Bismuth Subgallate with 20 cc. of a mixture of equal volumes of acetic acid and distilled water, cool the solution, and filter. Free the filtrate from bismuth by the addition of hydrogen sulfide, boil the mixture, and again filter. Add to the filtrate 5 drops of sulfuric acid, evaporate to dryness, and ignite to constant weight: the weight of the residue does not exceed 5 mg.

Arsenic—Triturate intimately 0.2 Gm. of Bismuth Subgallate with an equal weight of calcium hydroxide and ignite the mixture. Dissolve the residue in 5 cc. of diluted hydrochloric acid: the solution without further treatment meets the requirements of the test for *Arsenic*, page 689.

Copper, lead, and silver—Ignite 3 Gm. of Bismuth Subgallate in a porcelain crucible, cool, and cautiously add, dropwise, just sufficient nitric acid to dissolve the residue upon warming. Evaporate the solution to dryness, again ignite, and cool. Cautiously dissolve the residue in just sufficient nitric acid with the aid of gentle heat, concentrate the solution to about 4 cc., pour it into 100 cc. of distilled water, filter, evaporate the filtrate on a water bath to 20 cc., again filter, and divide this filtrate into portions of 5 cc. each. These portions severally do not respond to the tests for *Copper*, *Lead*, and *Silver* under *Bismuth Subnitrate*, page 87.

Free gallic acid—Shake 1 Gm. of Bismuth Subgallate with 20 cc. of alcohol for 1 minute, filter, and evaporate the filtrate to dryness on a water bath: the weight of the residue does not exceed 5 mg.

Assay—Dry about 1 Gm. of Bismuth Subgallate at 105° for 3 hours, then weigh accurately and ignite it in a porcelain crucible. Allow it to cool and add nitric acid to the residue, dropwise, warming until complete solution has been effected. Evaporate the solution to dryness and carefully ignite the residue to constant weight. The residue of Bi_2O_3 is not less than 52 per cent and not more than 57 per cent of the weight of Bismuth Subgallate taken.

Storage—Preserve Bismuth Subgallate in tight, light-resistant containers.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Bismuth Subgallate Tablets

BISMUTH SUBGALLATE TABLETS
Tabellæ Bismuthi Subgallatis

Tab. Bism. Subgall.

Bismuth Subgallate Tablets yield an amount of Bi_2O_3, not less than 48 per cent and not more than 61 per cent of the labeled amount of bismuth subgallate.

Identification—
A: When heated to redness, the Tablets first char, leaving finally a yellow residue which is blackened by hydrogen sulfide T.S. A solution of this residue in a slight excess of warm nitric or hydrochloric acid produces a white turbidity when added to 25 volumes of distilled water.
B: Powder several of the Tablets, and thoroughly agitate a portion of the powder, equivalent to about 0.1 Gm. of bismuth subgallate, with an excess of hydrogen sulfide T.S.; filter, boil the filtrate to remove the dissolved gas, cool, and add 1 drop of ferric chloride T.S.: a purplish blue color is produced.

Alkalies and earths—Gently ignite 1 Gm. of the powdered Tablets, dissolve the residue by warming with 5 cc. of a mixture of equal volumes of distilled water and nitric acid, dilute with distilled water to 100 cc., completely precipitate the bismuth by passing hydrogen sulfide gas into the solution, and filter. Evaporate 50 cc. of the filtrate to dryness and ignite: the weight of the residue does not exceed 5 mg.

Assay—Proceed as directed in the *Assay* under *Bismuth Subcarbonate Tablets*, page 84.

Storage—Preserve Bismuth Subgallate Tablets in tight, light-resistant containers.

Sizes—Bismuth Subgallate Tablets usually available contain the following amount of bismuth subgallate: **0.3 Gm.** (approximately 5 grains).

AVERAGE DOSE—**1 Gm.** (approximately 15 grains) of Bismuth Subgallate.

Bismuth Subnitrate

BISMUTH SUBNITRATE
Bismuthi Subnitras

Bism. Subnit. Basic Bismuth Nitrate

Bismuth Subnitrate is a basic salt which, when dried over sulfuric acid for 18 hours, yields upon ignition not less than 79 per cent of Bi_2O_3.

Description—Bismuth Subnitrate occurs as a white, slightly hygroscopic powder.

Solubility—Bismuth Subnitrate is practically insoluble in water, and in alcohol, but is readily dissolved by hydrochloric or nitric acid.

Identification—Bismuth Subnitrate responds to the tests for *Bismuth*, page 723, and for *Nitrate*, page 726.

Reaction—When brought in contact with moistened blue litmus paper, Bismuth Subnitrate shows an acid reaction.

Loss on drying—When dried over sulfuric acid for 18 hours, Bismuth Subnitrate loses not more than 3 per cent of its weight.

Carbonate—Add 3 Gm. of Bismuth Subnitrate to 3 cc. of warm nitric acid: no effervescence occurs. Retain this solution for use in tests for *Sulfate*, *Copper*, *Lead* and *Silver*.

Chloride—One Gm. of Bismuth Subnitrate shows no more chloride than corresponds to 0.5 cc. of 0.02 *N* hydrochloric acid, page 758.

Ammonia—Boil about 0.1 Gm. of Bismuth Subnitrate with 5 cc. of sodium hydroxide T.S.: the vapor does not turn moistened red litmus paper blue.

Alkalies and earths—Boil 1 Gm. of Bismuth Subnitrate with 20 cc. of a mixture of equal volumes of acetic acid and distilled water, cool, and filter. Add 2 cc. of diluted hydrochloric acid, remove the bismuth by the addition of hydrogen sulfide, boil the mixture, and filter. Add to the filtrate 5 drops of sulfuric acid, evaporate to dryness, and ignite to constant weight: the weight of the residue does not exceed 5 mg.

Arsenic—Mix 0.2 Gm. of Bismuth Subnitrate with 2 cc. of sulfuric acid, heat the mixture until the fumes of sulfur trioxide are copiously evolved, and then cautiously dilute with distilled water until the solution measures 5 cc. This solution without further treatment meets the requirements of the test for *Arsenic*, page 689.

Pour the solution obtained in the test for carbonate into 100 cc. of distilled water: a white precipitate is produced. Filter, evaporate the filtrate on a water bath to 30 cc., again filter the liquid, divide the latter filtrate into portions of 5 cc. each, and use these several portions in the tests for sulfate, copper, lead, and silver.

Sulfate—A 5-cc. portion of the test liquid is not at once visibly affected by a few drops of barium nitrate T.S.

Copper—To a 5-cc. portion of the test liquid, add a slight excess of ammonia T.S.: the supernatant liquid does not exhibit a bluish color.

Lead—Mix another 5-cc. portion of the test liquid with an equal volume of diluted sulfuric acid: the liquid does not become cloudy.

Silver—In another 5-cc. portion of the test liquid, hydrochloric acid produces no precipitate which is insoluble in a slight excess of hydrochloric acid, but soluble in ammonia T.S.

Assay—Weigh accurately in a porcelain crucible about 1 Gm. of Bismuth Subnitrate, previously dried over sulfuric acid for 18 hours, and ignite to constant weight. The residue of Bi_2O_3 corresponds to not less than 79 per cent of the weight of Bismuth Subnitrate taken.

Storage—Preserve Bismuth Subnitrate in well-closed containers.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Bismuth Subnitrate Tablets

BISMUTH SUBNITRATE TABLETS

Tabellæ Bismuthi Subnitratis

Tab. Bism. Subnit.

Bismuth Subnitrate Tablets yield an amount of Bi_2O_3, not less than 73 per cent and not more than 85 per cent of the labeled amount of bismuth subnitrate.

Identification—

A: The Tablets respond to the tests for *Bismuth*, page 723, and for *Nitrate*, page 726.

B: When heated to redness, the Tablets evolve brown vapors of nitrogen oxides, leaving a yellow residue.

Ammonium compounds—Powder several of the Tablets, and boil a portion of the powder, equivalent to about 10 mg. of bismuth subnitrate, with 5 cc. of sodium hydroxide T.S.: the vapor does not turn moistened red litmus paper blue.

Assay—Proceed as directed in the *Assay* under *Bismuth Subcarbonate Tablets*, page 84.

Storage—Preserve Bismuth Subnitrate Tablets in well-closed containers.
Sizes—Bismuth Subnitrate Tablets usually available contain the following amounts of bismuth subnitrate: **0.3** and **0.6 Gm.** (approximately 5 and 10 grains).

AVERAGE DOSE—**1 Gm.** (approximately 15 grains) of Bismuth Subnitrate.

Bitter Almond Oil, page 30
Bitter Almond Water, page 31
Bitter Orange Elixir, page 367
Bitter Orange Oil, page 367

Black Lotion

BLACK LOTION
Lotio Nigra

Lot. Nig. Black Wash Aqua Phagedænica Nigra

Mild Mercurous Chloride	**9 Gm.**
Acacia, in fine powder	**1 Gm.**
Water	**100 cc.**
Calcium Hydroxide Solution, freshly prepared, a sufficient quantity,	
To make	**1000 cc.**

Triturate the mild mercurous chloride and acacia in a mortar. Gradually add the water, mixing thoroughly, and then add this mixture slowly, with constant agitation, to sufficient of the calcium hydroxide solution to make 1000 cc.

NOTE: Shake Black Lotion thoroughly before dispensing. Black Lotion should be freshly prepared. The precipitate has a tendency to coagulate into larger particles on standing for some time.

Storage—Preserve Black Lotion in tight containers.

Boric Acid Solution

BORIC ACID SOLUTION
Liquor Acidi Borici

Liq. Acid. Boric. Saturated Boric Acid Solution

Boric Acid Solution contains, in each 100 cc., not less than 4.25 Gm. of H_3BO_3.

Boric Acid	**50 Gm.**
Distilled Water, a sufficient quantity,	
To make	**1000 cc.**

Heat 350 cc. of distilled water to boiling, add the boric acid to the hot distilled water, agitate until solution is effected, and immediately add cold distilled water to make 1000 cc.; filter if necessary, until the product is clear.

NOTE: Upon chilling or upon evaporation of the solvent, Boric Acid Solution tends to deposit crystals or become slightly turbid because of the formation of minute crystals of boric acid. These do not readily redissolve except upon heating the solution. Dispense Boric Acid Solution only when perfectly clear and without a deposit of crystals.

Description—Boric Acid Solution is a clear, colorless, odorless liquid, with a faintly bitter taste. It is acid to litmus paper.

Identification—Boric Acid Solution responds to the tests for *Borate*, page 723.

Arsenic—Boric Acid Solution meets the requirements of the test for *Arsenic*, page 689.

Heavy metals—To 20 cc. of Boric Acid Solution add 1 cc. of diluted acetic acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Boric Acid Solution is 10 parts per million.

Assay—Accurately measure 25 cc. of Boric Acid Solution, and add to it 30 cc. of glycerin, previously neutralized to phenolphthalein T.S. Titrate with 1 *N* sodium hydroxide, using phenolphthalein T.S. as the indicator. Discharge the pink color by the addition of 30 cc. of glycerin, neutral to phenolphthalein T.S., and titrate again until the pink color reappears. Each cc. of 1 *N* sodium hydroxide is equivalent to 0.06184 Gm. of H_3BO_3.

Storage—Preserve Boric Acid Solution in tight containers, and avoid temperatures below 20°.

FOR EXTERNAL USE—Undiluted, except for ophthalmic use, for which purpose it may be diluted with an equal volume of distilled water.

BRANDY
Spiritus Vini Vitis

Sp. Vin. Vit.

Brandy is an alcoholic liquid obtained by the distillation of the fermented juice of sound ripe grapes and containing not less than 48 per cent and not more than 54 per cent, by volume, of C_2H_5OH, at 15.56°. It must have been stored in wood containers for a period of not less than 2 years.

Description—Brandy is a pale amber-colored liquid, having a characteristic odor and taste. It is acid to litmus paper.

Specific gravity—The specific gravity of Brandy is not less than 0.921 and not more than 0.933 at 25°.

Free acid—A 25-cc. portion of Brandy, diluted with 50 cc. of recently boiled distilled water, requires not more than 3.8 cc. of 0.1 *N* sodium hydroxide for neutralization, using 3 drops of phenolphthalein T.S. as the indicator.

Total solids—Evaporate 20 cc. of Brandy in a tared dish on a water bath, and dry the residue to constant weight at 105°: the weight of the residue does not exceed 0.3 Gm.

Storage in wood—Treat the residue from the test for *Total solids* with 5 cc. of distilled water, filter, and add to the filtrate 1 drop of diluted ferric chloride T.S. (1 in 10): the mixture has a greenish black color.

Other tests—Brandy meets the requirements of the tests for *Acetone*, *Other ketones*, *Isopropyl alcohol*, *Tertiary butyl alcohol*, *Alkaloids*, *Caramel and certain coal tar dyes*, *Formaldehyde*, *Methanol*, and *Heavy metals* under *Whisky*, page 555.

Storage—Preserve Brandy in tight containers.

Bromides, Five, Elixir

FIVE BROMIDES ELIXIR
Elixir Bromidorum Quinque

Elix. Bromid. Quinq.

Five Bromides Elixir contains, in each 100 cc., the equivalent of not less than 18.5 Gm. and not more than 20.0 Gm. of Br.

Sodium Bromide	87 Gm.
Potassium Bromide	70 Gm.
Calcium Bromide	52 Gm.
Lithium Bromide	35 Gm.
Ammonium Bromide	17 Gm.
Glycyrrhiza Syrup	225 cc.
Raspberry Syrup	150 cc.
Aromatic Elixir	200 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Mix the bromides with 250 cc. of distilled water, add the syrups and the aromatic elixir, and agitate until the bromides are completely dissolved. Then add enough distilled water to make the product measure 1000 cc., mix well and filter, if necessary, until the product is clear.

Assay—Dilute exactly 10 cc. of Five Bromides Elixir with distilled water to 250 cc. To 25 cc. of the dilution add slowly and with agitation 50 cc. of 0.1 *N* silver nitrate, 2 cc. of nitric acid, and 2 cc. of ferric ammonium sulfate T.S. Titrate the excess silver nitrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.007992 Gm. of Br.

Alcohol content—From 4 to 6 per cent, by volume, of C_2H_5OH.

Storage—Preserve Five Bromides Elixir in tight containers.

AVERAGE DOSE—4 cc. (approximately 1 fluidrachm).

One average metric dose contains about 0.35 Gm. of Sodium Bromide, 0.28 Gm. of Potassium Bromide, 0.21 Gm. of Calcium Bromide, 0.14 Gm. of Lithium Bromide, and 70 mg. of Ammonium Bromide.

BROMIDES SYRUP

Syrupus Bromidorum

Syr. Bromid.

Potassium Bromide	80 Gm.
Sodium Bromide	80 Gm.
Ammonium Bromide	50 Gm.
Calcium Bromide	25 Gm.
Lithium Bromide	8 Gm.
Vanilla Tincture	32 cc.
Compound Cudbear Tincture	16 cc.
Sucrose	425 Gm.
Distilled Water	225 cc.
Compound Sarsaparilla Syrup, a sufficient quantity,	
To make	1000 cc.

Dissolve the bromides in the distilled water with the aid of heat, and dissolve the sucrose in the hot solution. Cool this solution, add the tinctures and sufficient compound sarsaparilla syrup to make the product measure 1000 cc., and mix well.

Alcohol content—From 4 to 6 per cent, by volume, of C_2H_5OH.
Storage—Preserve Bromides Syrup in tight containers and avoid excessive heat.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains 0.32 Gm. each of Potassium Bromide and Sodium Bromide, 0.2 Gm. of Ammonium Bromide, 0.1 Gm. of Calcium Bromide, and 32 mg. of Lithium Bromide.

THREE BROMIDES ELIXIR

Elixir Bromidorum Trium

Elix. Bromid. Tri.

Three Bromides Elixir contains, in each 100 cc., not less than 23 Gm. and not more than 25 Gm. of total bromides.

Ammonium Bromide	80 Gm.
Potassium Bromide	80 Gm.
Sodium Bromide	80 Gm.
Amaranth Solution	3 cc.
Compound Benzaldehyde Elixir, a sufficient quantity,	
To make	1000 cc.

Dissolve the bromides in 800 cc. of compound benzaldehyde elixir, add the amaranth solution and sufficient compound benzaldehyde elixir to make the product measure 1000 cc.; then filter, if necessary, until the product is clear.

Assay—Dilute exactly 10 cc. of Three Bromides Elixir with distilled water to 250 cc. To 25 cc. of the dilution add slowly and with agitation 50 cc. of 0.1 *N* silver nitrate, 2 cc. of nitric acid, and 2 cc. of ferric ammonium sulfate T.S. Titrate the excess silver nitrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.01059 Gm. of the total bromides.
Alcohol content—From 3 to 5 per cent, by volume, of C_2H_5OH.
Storage—Preserve Three Bromides Elixir in tight containers.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains about 0.32 Gm. each of Ammonium Bromide, Potassium Bromide, and Sodium Bromide.

Bromides, Three, Tablets

THREE BROMIDES TABLETS
Tabellæ Bromidorum Trium

Tab. Bromid. Tri. Triple Bromide Tablets

Three Bromides Tablets (consisting of ammonium bromide, potassium bromide, and sodium bromide in equal proportions) show a content of bromine not less than 70 per cent and not more than 81 per cent of the labeled amount of total bromides, including all tolerances. The tablets show a content of ammonium bromide not less than 30.8 per cent and not more than 35.8 per cent of the labeled amount of total bromides.

Identification—A filtered aqueous solution of the Tablets, equivalent to 1 in 10 of the mixed bromides, responds to the tests for *Ammonium*, page 722, *Potassium*, page 727, *Sodium*, page 727, and *Bromide*, page 723.
Chloride—Dissolve 1 Gm. of the powdered Tablets in 50 cc. of distilled water. Dilute 10 cc. of this solution with 30 cc. of distilled water, add 35 cc. of ammonium carbonate T.S., then add slowly and with agitation, 45 cc. of silver nitrate solution (1 in 20). Allow this mixture to stand 10 minutes and filter. To 30 cc. of the filtrate add, carefully, 5 cc. of nitric acid, and dilute with distilled water to 50 cc. The turbidity produced is not greater than that produced in a control test made by adding 1.3 cc. of 0.02 *N* hydrochloric acid to 5 cc. of the same solution of the sample and treating this mixture in the same manner as in the test.
Assay for bromine—Weigh not less than 20 of the Tablets, reduce them to a fine powder without an appreciable loss, and mix a portion, equivalent to about 0.5 Gm. of the mixed bromides, with 25 cc. of distilled water; add 50 cc. of 0.1 *N* silver nitrate, 2 cc. of ferric ammonium sulfate T.S., and 2 cc. of nitric acid, and titrate the excess silver nitrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.007992 Gm. of Br.
Assay for ammonium bromide—Weigh not less than 20 of the Tablets, reduce them to a fine powder without an appreciable loss, and place an accurately weighed portion, equivalent to about 0.6 Gm. of ammonium bromide, in a distillation flask provided with a trap and a condenser. Add 300 cc. of distilled water and an excess

of an aqueous sodium hydroxide solution (1 in 2). Distil the ammonia into 20 cc. of 0.5 *N* sulfuric acid. Titrate the excess acid with 0.1 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.5 *N* sulfuric acid is equivalent to 0.04898 Gm. of NH_4Br.

Storage—Preserve Three Bromides Tablets in tight containers.

Sizes—Three Bromides Tablets usually available contain the following amounts of ammonium bromide, potassium bromide, and sodium bromide in each tablet: **0.15** and **0.3 Gm.** (approximately 2½ and 5 grains).

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains) each of Ammonium Bromide, Potassium Bromide, and Sodium Bromide.

BRUCINE SULFATE

Brucinæ Sulfas

Brucin. Sulf.

$(C_{23}H_{26}O_4N_2)_2.H_2SO_4.7H_2O$ Mol. wt. 1013.10

Description—Brucine Sulfate occurs as small, white crystals or powder. It is odorless and has a very bitter taste. It is affected by light.

Solubility—One Gm. of Brucine Sulfate dissolves in about 70 cc. of water at 25°; it is more soluble in boiling water, but sparingly soluble in alcohol.

Identification—

A: Add a few drops of nitric acid to about 10 mg. of Brucine Sulfate: a vivid red color is produced. Dilute the red solution with a few drops of water and add a few drops of stannous chloride T.S.: a reddish purple color is produced.

B: An aqueous solution of Brucine Sulfate (1 in 100) responds to the tests for *Sulfate*, page 727.

Free acid—A solution of 0.5 Gm. of Brucine Sulfate in 40 cc. of distilled water requires not more than 0.5 cc. of 0.02 *N* sodium hydroxide for neutralization, using 2 drops of methyl red T.S. as the indicator.

Loss on drying—When dried to constant weight at 105°, Brucine Sulfate loses not more than 13 per cent of its weight.

Residue on ignition—Brucine Sulfate yields not more than 0.1 per cent of residue on ignition, page 745.

Strychnine—Dissolve 0.5 Gm. of Brucine Sulfate in a mixture of 5 cc. of diluted sulfuric acid and 15 cc. of distilled water, warming, if necessary, to effect solution. Cool to about 25° and add 5 cc. of a mixture of equal volumes of nitric acid and distilled water, also at a temperature of about 25°. Rotate the liquid a few times and let it stand for 10 minutes, shaking 3 or 4 times during this interval and keeping the temperature below 25°. Then transfer the red solution into a separator containing 40 cc. of an aqueous sodium hydroxide solution (1 in 10) cooled to about 15° and extract immediately with 2 successive portions of 20 cc. and then with 10 cc. of chloroform. Draw off the chloroform through a filter moistened with chloroform into a small porcelain dish and evaporate the chloroform to a few cc. Wash down the sides of the dish with a few cc. of warm chloroform and evaporate to dryness. Cool, add to the residue in the dish 2 cc. of sulfuric acid, rotating the acid to dissolve any substance adhering on the sides of the dish; then add a small crystal of potassium dichromate: no purple color is produced.

Storage—Preserve Brucine Sulfate in tight, light-resistant containers.

AVERAGE DOSE—**2 mg.** (approximately 1/30 grain).

Bryonia

BRYONIA
Bryonia
Bryony

Bryonia is the dried root of *Bryonia alba* Linné, or of *Bryonia dioica* Jacquin (Fam. *Cucurbitaceæ*).

Unground Bryonia—Unground Bryonia usually occurs as circular or elliptical slices, from 1.5 to 10 cm. in diameter and up to 15 mm. thick. Externally it is weak yellowish orange to moderate yellow, rough and striate. The cut surface shows a thin cortex, and a wood with numerous projecting, bicollateral fibro-vascular bundles arranged in concentric zones. The fracture is short and mealy.

Powdered Bryonia—Powdered Bryonia is weak yellowish orange to weak yellow, has a faint but distinct and characteristic odor, and a bitter, nauseous taste. It shows starch grains, simple or 2- or more compound, rounded, up to 25 microns in diameter, frequently with a central cleft; tracheæ up to 250 microns wide, reticulate or with bordered pores; and large cork cells.

Identification—Add sulfuric acid to the powdered drug: it becomes brown and then red-purple.

Foreign organic matter—Bryonia contains not more than 2 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Bryonia yields not more than 2 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Buchu

BUCHU
Buchu

Buchu is the dried leaf of *Barosma betulina* (Thunberg) Bartling et Wendland, known in commerce as Short Buchu, or of *Barosma crenulata* (Linné) Hooker, known in commerce as Oval Buchu, or of *Barosma serratifolia* (Curtis) Willdenow, known in commerce as Long Buchu (Fam. *Rutaceæ*).

Buchu yields not less than 1.25 cc. of volatile buchu oil from each 100 Gm. of drug.

Unground Short Buchu—Unground Short Buchu occurs as rhomboidally oval or obovate leaves from 9 to 30 mm. in length and from 4 to 20 mm. in breadth. The apex is obtuse or rounded and sometimes recurved; the base wedge-shaped or obtuse; and the margin finely dentate, glandular punctate, with an oil gland at the base of each tooth. The surface is papillose and longitudinally striate beneath. The texture is coriaceous; and the petiole about 1 mm. in length. The leaf has a pale olive to dusky yellow-green color.

Unground Oval Buchu—Unground Oval Buchu occurs as oblong-ovate leaves, from 7 to 28 mm. in length and from 3 to 12 mm. in breadth having a serrate margin, and a petiole about 2 mm. in length. The color is light olive-brown to dusky yellow-green. Otherwise it resembles Short Buchu.

Unground Long Buchu—Unground Long Buchu occurs as linear-lanceolate leaves from 8 to 40 mm. in length and from 4 to 10 mm. in breadth; having an acute apex, somewhat rounded; and a sharply serrate margin. Otherwise it resembles Short Buchu.

Histology—Buchu shows a somewhat uneven, striate, and thick cuticle; a few simple, 1-celled, non-lignified hairs, up to 145 microns in length (Short Buchu), or up to 180 microns in length (Long Buchu). Stomata are absent on the upper surface, but numerous on the lower, broadly oval, up to 45 microns in length and surrounded by from 4- to 8-neighbor cells. The epidermal cells have inner mucilaginous walls and contain colorless sphero-crystals or crystal aggregates of hesperidin which strongly polarize light giving a brilliant display of colors. A single row of large hypodermal cells occurs beneath the upper epidermis, containing mucilage and frequently dark, feather-like crystal aggregates; the palisade cells occur in a single row below the mucilage cells, and border a loose mesophyll, the cells of which contain numerous plastids and a few rosette aggregates of calcium oxalate. Oil cavities occur mostly near the margin of the leaf, are circular in outline and contain globules of oil. Collateral fibro-vascular bundles of the midrib and larger veins occur in crescent-shaped groups, composed chiefly of tracheæ, sieve tubes, and non-lignified fibers, and are separated from the lower epidermis by collenchyma.

Powdered Buchu—Powdered Buchu is dusky greenish yellow to moderate greenish yellow; has an aromatic, mint-like odor, and a camphoraceous taste. It shows fragments of epidermis with sphero-crystals, or crystal aggregates of hesperidin in the cells; rosette aggregates of calcium oxalate from 15 to 30 microns in diameter; a few non-glandular hairs (from stems) up to 180 microns in length; fragments of chlorenchyma with oil secretion sacs and oil globules; and fragments of fibro-vascular bundles.

Stems—Buchu contains not more than 8 per cent of the stems of the plants yielding Buchu.

Foreign organic matter—Buchu contains not more than 2 per cent of foreign organic matter, other than stems, page 760.

Acid-insoluble ash—Buchu yields not more than 1 per cent of acid-insoluble ash, page 761.

Assay—Place about 100 Gm. of Buchu, coarsely comminuted or powdered and accurately weighed, into the flask of the apparatus used for volatile oil determinations and proceed with the assay as directed on page 764, Process A.

AVERAGE DOSE—**2 Gm.** (approximately 30 grains).

BUCHU FLUIDEXTRACT

Fluidextractum Buchu

Fldext. Buchu

Prepare the Fluidextract from buchu, in moderately coarse powder, by Process C, as modified for assayed fluidextracts, page 719. Use a mixture of 9 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 24 hours, and percolate at a moderate rate. Adjust the concentrated fluid by dilution with alcohol or a mixture of alcohol and water so that the Fluidextract contains 75 per cent, by volume, of C_2H_5OH.

Alcohol content—From 71 to 78 per cent, by volume, of C_2H_5OH.
Storage—Preserve Buchu Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—2 cc. (approximately 30 minims).

Buchu, Juniper and Potassium Acetate Elixir

BUCHU, JUNIPER AND POTASSIUM ACETATE ELIXIR

Elixir Buchu, Juniperi et Potassii Acetatis

Elix. Buchu, Junip. et Pot. Acet.

Buchu, in moderately coarse powder	150 Gm.
Juniper, in moderately coarse powder	75 Gm.
Potassium Acetate	50 Gm.
Sucrose	225 Gm.
Compound Orange Spirit	10 cc.
Alcohol,	
Water, each, a sufficient quantity,	
To make	1000 cc.

Mix the compound orange spirit with 400 cc. of alcohol, and add 400 cc. of water. Use this mixture as Menstruum I for extracting the mixed drugs by Process P for Tinctures, page 758, and diluted alcohol as Menstruum II for completing the extraction; macerate the mixed drugs during 24 hours, and percolate at a moderate rate. Dissolve the sucrose and the potassium acetate by agitation in the first 850 cc. of the percolate. Then add sufficient of the percolate to make the product measure 1000 cc., mix well, and filter, if necessary, until the product is clear.

Alcohol content—From 35 to 38 per cent, by volume, of C_2H_5OH.
Storage—Preserve Buchu, Juniper and Potassium Acetate Elixir in tight containers.

AVERAGE DOSE—4 cc. (approximately 1 fluidrachm).

One average metric dose contains the equivalent of 0.6 Gm. of Buchu, 0.3 Gm. of Juniper, and 0.2 Gm. of Potassium Acetate.

CACAO

Cacao

Cocoa

Cacao is a powder prepared from the roasted, cured kernels of the ripe seed of *Theobroma Cacao* Linné (Fam. *Sterculiaceæ*).

Cacao yields not more than 22 per cent of non-volatile ether-soluble extractive.

Description—Cacao occurs as a weak reddish brown to moderate brown powder; having a chocolate-like odor and taste, free from sweetness; and showing numerous broken parenchyma cells containing a reddish brown to yellowish orange pigment; numerous starch grains, oil globules, and protein grains. The starch grains are simple or occasionally 2- or 3-compound, up to 15 microns in diameter and stain slowly with iodine T.S.

Ether-insoluble residue—The residue, insoluble in ether, obtained in the assay, shows upon microscopical examination, few or no cocoa shells, and no cereal starch grains.

Crude fiber—The ether-insoluble residue, dried to constant weight, yields not more than 7 per cent of crude fiber, page 762.

Total ash—The ether-insoluble residue, dried to constant weight, yields not more than 8 per cent of total ash, page 760.

Acid-insoluble ash—The ether-insoluble residue, dried to constant weight, yields not more than 0.4 per cent of acid-insoluble ash, page 761.

Assay—Extract about 10 Gm. of Cacao, accurately weighed, with dehydrated ether in a continuous extraction apparatus for 8 hours. Evaporate the ether spontaneously from the ether solution in a suitable tared container and dry the residue to constant weight at 105°. The weight obtained represents the non-volatile, ether-soluble extractive. Retain the residue insoluble in ether for the test for *Crude fiber*, *Total ash*, and *Acid-insoluble ash*.

Storage—Preserve Cacao in well-closed containers.

CACAO SYRUP

Syrupus Cacao

Syr. Cacao

Chocolate-flavored Syrup

Cocoa Syrup

Cacao	**175 Gm.**
Vanilla Tincture	**50 cc.**
Gelatin	**10 Gm.**
Sucrose	**800 Gm.**
Distilled Water, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the gelatin in 400 cc. of water on a water bath, add the sugar, and heat until dissolved. Warm the cacao in a suitable container, add the sugar-gelatin solution slowly, keeping the temperature at about 80° and stirring constantly until all is added. Cool the syrup slowly, occasionally stirring it, and when cool add the tincture and sufficient water to make 1000 cc. Mix thoroughly.

Alcohol content—From 2 to 3 per cent, by volume, of C_2H_5OH.
Storage—Preserve Cacao Syrup in tight containers, and avoid excessive heat.

Caffeine and Sodium Benzoate Tablets

CAFFEINE AND SODIUM BENZOATE TABLETS
Tabellæ Caffeinæ et Sodii Benzoatis

Tab. Caff. et Sod. Benz.

Caffeine and Sodium Benzoate Tablets yield an amount of $C_8H_{10}O_2N_4$, not less than 43.5 per cent and not more than 53.5 per cent of the labeled amount of caffeine and sodium benzoate.

Identification—
A: Ferric chloride T.S. produces a yellowish orange precipitate, and diluted hydrochloric acid produces a white precipitate in a filtered aqueous solution of the Tablets.
B: The residue obtained in the *Assay*, when recrystallized from hot distilled water and dried to constant weight at 80°, has the melting point of caffeine, and responds to the *Identification tests* under *Caffeine*, U. S. Pharmacopœia XIII.

Assay—Proceed as directed in the *Assay* under *Citrated Caffeine Tablets*, page 100.
Storage—Preserve Caffeine and Sodium Benzoate Tablets in tight containers.
Sizes—Caffeine and Sodium Benzoate Tablets usually available contain the following amount of caffeine and sodium benzoate: **0.3 Gm.** (approximately 5 grains).

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains) of Caffeine and Sodium Benzoate.

Caffeine and Sodium Salicylate

CAFFEINE AND SODIUM SALICYLATE
Caffeina et Sodii Salicylas

Caff. et Sod. Salicyl.

Caffeine and Sodium Salicylate, when dried to constant weight at 80°, contains, in each 100 Gm., not less than 48 Gm. and not more than 52 Gm. of $C_8H_{10}O_2N_4$ and not less than 48 Gm. and not more than 52 Gm. of $C_6H_4OH.COONa$.

Caffeine, dried to constant weight at 80°	500 Gm.
Sodium Salicylate	500 Gm.
Alcohol, a sufficient quantity,	
To make	1000 Gm.

Triturate the caffeine with the sodium salicylate and this mixture with a sufficient quantity of alcohol to produce a smooth paste. Dry the paste by exposure to the air in a moderately warm place. Reduce the dry mass to a powder.

Assay for caffeine—Dissolve about 2 Gm. of Caffeine and Sodium Salicylate, dried to constant weight at 80° and accurately weighed, in sufficient distilled water to make 100 cc. Transfer a 10-cc. portion to a separator, add 1 drop of phenolphthalein T.S., and 0.1 *N* sodium hydroxide until a permanent pink color is produced. Extract the caffeine completely with successive portions of chloroform, passing each portion through a filter which has been moistened with chloroform, into a tared beaker, and wash the filter and funnel with a few cc. of chloroform to remove any adhering caffeine. Evaporate the combined chloroform filtrate on a water bath, adding 2 cc. of alcohol just before the chloroform is all evaporated, dry the residue to constant weight at 80°, and weigh as $C_8H_{10}O_2N_4$.

Assay for sodium salicylate—Transfer the aqueous liquid, from which the caffeine has been removed in the above assay for caffeine, to a 500-cc. glass-stoppered flask, rinsing the separator with small portions of distilled water. Also wash the filter and funnel used in the caffeine determination with small portions of water, adding the washings to the 500-cc. flask. Add sufficient distilled water to make the volume in the flask measure about 100 cc. Add 50 cc. of 0.1 *N* bromine and 10 cc. of hydrochloric acid, then stopper and shake during 1 minute, then at intervals for 30 minutes. Add 10 cc. of potassium iodide T.S., stopper and shake at short intervals for 5 minutes. Titrate the liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Each cc. of 0.1 *N* bromine is equivalent to 0.002667 Gm. of $C_6H_4OH.COONa$.

Storage—Preserve Caffeine and Sodium Salicylate in tight containers.

AVERAGE DOSE—**0.2 Gm.** (approximately 3 grains).

One average metric dose contains about 0.1 Gm. each of Caffeine and of Sodium Salicylate.

Caffeine, Citrated, Tablets

CITRATED CAFFEINE TABLETS

Tabellæ Caffeinæ Citratæ

Tab. Caff. Cit.

Citrated Caffeine Tablets yield an amount of $C_8H_{10}O_2N_4$, not less than 45 per cent and not more than 55 per cent of the labeled amount of citrated caffeine.

Identification—

A: The residue obtained in the *Assay*, when recrystallized from hot distilled water and dried to constant weight at 80°, has the melting point of caffeine, and responds to the *Identification tests* under *Caffeine*, U. S. Pharmacopœia XIII.

B: To 5 cc. of a filtered aqueous solution of the Tablets, equivalent to about 50 mg. of citrated caffeine, add 1 cc. of mercuric sulfate T.S.; heat the mixture to

boiling and add 1 cc. of potassium permanganate T.S.: a white precipitate is produced.

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without appreciable loss, transfer an accurately weighed portion, equivalent to about 0.5 Gm. of citrated caffeine, to a separator, and dissolve it, as completely as possible, in 10 cc. of distilled water. Add 1 drop of phenolphthalein T.S., and sodium hydroxide T.S. until a permanent pink color is produced. Extract the caffeine completely from the mixture with successive portions of chloroform, pass each portion through a filter which has been previously moistened with chloroform, and wash the stem of the funnel and the filter with a few cc. of hot chloroform. Evaporate the filtrate on a water bath, adding 2 cc. of alcohol just before the chloroform is all evaporated, and dry the residue to constant weight at 80°. The weight of residue obtained represents the yield of $C_8H_{10}O_2N_4$.

Storage—Preserve Citrated Caffeine Tablets in tight containers.

Sizes—Citrated Caffeine Tablets usually available contain the following amounts of citrated caffeine: **60 mg.** and **0.12 Gm.** (approximately 1 and 2 grains).

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains) of Citrated Caffeine.

Calamine Liniment

CALAMINE LINIMENT
Linimentum Calaminæ

Lin. Calam.

Calamine	**80 Gm.**
Zinc Oxide	**80 Gm.**
Olive Oil	**500 cc.**
Calcium Hydroxide Solution, a sufficient quantity,	
To make	**1000 cc.**

Mix the calamine and zinc oxide with the olive oil, and gradually add the calcium hydroxide solution with constant agitation.

NOTE: Shake Calamine Liniment thoroughly before dispensing.

Storage—Preserve Calamine Liniment in tight containers.

Calamine Lotion, Phenolated

PHENOLATED CALAMINE LOTION
Lotio Calaminæ Phenolata

Lot. Calam. Phenol. Compound Calamine Lotion

Liquefied Phenol	**10 cc.**
Calamine Lotion	**990 cc.**
To make	**1000 cc.**

Mix the ingredients.

NOTE: Shake the Lotion thoroughly before dispensing.

Storage—Preserve Phenolated Calamine Lotion in tight containers.

CALAMINE OINTMENT
Unguentum Calaminæ

Ung. Calam.	Turner's Cerate
Calamine	170 Gm.
Yellow Wax	40 Gm.
Wool Fat	40 Gm.
Petrolatum	750 Gm.
To make	1000 Gm.

Melt the yellow wax with the wool fat and petrolatum and mix the calamine thoroughly with the melted mixture to produce a smooth, homogeneous ointment.

Storage—Preserve Calamine Ointment in tight containers and avoid prolonged exposure to temperatures above 30°.

CALAMUS
Calamus
Sweetflag

Calamus is the peeled, dried rhizome of *Acorus Calamus* Linné (Fam. *Araceæ*).

NOTE: Calamus intended for extractive preparations may be unpeeled. Such unpeeled Calamus yields not more than 2 per cent of acid-insoluble ash, and in all other respects meets the requirements for peeled Calamus.

Calamus yields not less than 1.2 cc. of volatile oil of calamus from each 100 Gm. of drug.

Unground Calamus—Unground Calamus is subcylindrical, usually split longitudinally, up to 22 cm. long and up to 2 cm. thick. It is very pale orange to weak yellowish orange in color externally, with small, darker-colored, slightly raised root-scars distributed over the lower surface in zigzag arrangement. The upper surface is longitudinally furrowed; and the fracture is short, granular, and porous, exhibiting a distinct endodermal line.

Histology—Calamus shows a broad cortex, composed of chains of parenchyma cells, surrounding large intercellular air spaces, the cells usually being filled with starch grains, each chain containing 1 or more spheroidal secretion sacs with volatile oil of a yellowish orange color; an endodermis of small thin-walled cells; and a large

stele, resembling the cortex in structure, but with phlocentric vascular bundles without fibers, distributed throughout, though more numerous near the endodermis. Occasional root-trace bundles, with fibers, are found in the cortex.

Powdered Calamus—Powdered Calamus is weak yellowish orange; has an aromatic odor, and an aromatic, bitter, and acrid taste. It shows abundant starch, in spheroidal grains up to 10 microns in size, mostly from 2 to 6 microns; usually single, rarely 2- or 3-compound; a few tracheæ, reticulate or scalariform, rarely spiral; and occasional fragments of parenchyma with cell contents becoming dark gray to black upon the addition of ferric chloride T.S. The walls of some of the parenchyma cells become purplish red to reddish brown upon the addition of vanillin-hydrochloric acid. Fibers are few and slightly lignified.

Cereal flours and althea—Powdered Calamus contains no starch grains over 10 microns in size.

Unpeeled Calamus—Powdered Calamus contains no excess of sclerenchyma or crystal fibers.

Foreign organic matter—Calamus contains not more than 1 per cent of foreign organic matter, page 760.

Total ash—Calamus yields not more than 6 per cent of total ash, page 760.

Acid-insoluble ash—Calamus yields not more than 0.5 per cent of acid-insoluble ash, page 761.

Assay—Weigh accurately about 100 Gm. of Calamus, coarsely comminuted or powdered, and place about one-half of it in a 1000-cc. flask of the apparatus used for volatile oil determinations; add 750 cc. of water and proceed with the assay as directed on page 764, Process A. After distillation is complete, empty the flask and treat the second portion of the sample in the same way. The combined oil distillates in the receiving apparatus are then measured.

Calcium and Sodium Glycerophosphates Elixir

CALCIUM AND SODIUM GLYCEROPHOSPHATES ELIXIR

Elixir Calcii et Sodii Glycerophosphatum

Elix. Calc. et Sod. Glycerophos. Glycerophosphates Elixir

Calcium Glycerophosphate	9 Gm.
Sodium Glycerophosphate	18 Gm.
Phosphoric Acid	8 cc.
Glycerin	300 cc.
Aromatic Elixir	300 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the glycerophosphates and the acid in 300 cc. of distilled water; add the glycerin, the aromatic elixir, and sufficient distilled water to make the product measure 1000 cc.; then filter, if necessary, until the product is clear.

Alcohol content—From 5 to 7 per cent, by volume, of C_2H_5OH.
Storage—Preserve Calcium and Sodium Glycerophosphates Elixir in tight containers.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains about 35 mg. of Calcium Glycerophosphate and 70 mg. of Sodium Glycerophosphate.

CALCIUM BROMIDE

Calcii Bromidum

Calc. Bromid.

$CaBr_2$ Mol. wt. 199.91

Calcium Bromide is a hydrated salt, containing not less than 84 per cent and not more than 94 per cent of $CaBr_2$.

Description—Calcium Bromide occurs as a white, granular salt, having no odor. It is very deliquescent. An aqueous solution of Calcium Bromide is neutral or alkaline to litmus paper.
Solubility—One Gm. of Calcium Bromide dissolves in about 0.7 cc. of water and in about 1.3 cc. of alcohol, at 25°. One Gm. of Calcium Bromide dissolves in about 0.4 cc. of boiling water. It is insoluble in chloroform and in ether.
Identification—An aqueous solution of Calcium Bromide (1 in 20) responds to the tests for *Calcium*, page 723, and for *Bromide*, page 723.
Chloride—Dissolve 0.1 Gm. of Calcium Bromide in 5 cc. of distilled water, add an excess of silver nitrate T.S. and a few drops of nitric acid, and filter. Wash the precipitate with distilled water, digest it for 10 minutes with 5 cc. of ammonium carbonate T.S., and filter. Dilute the filtrate with enough distilled water to make it measure 40 cc.: a 10-cc. portion of this dilution, acidified with nitric acid and further diluted with enough distilled water to measure 50 cc., shows no more chloride than corresponds to 0.5 cc. of 0.02 *N* hydrochloric acid.
Bromate—Drop 1 cc. of diluted sulfuric acid on about 1 Gm. of Calcium Bromide: it does not produce a yellow color immediately.
Iodide—Add a few drops of ferric chloride T.S. and 1 cc. of chloroform to 10 cc. of an aqueous solution of Calcium Bromide (1 in 20), and shake the mixture: the chloroform does not acquire a violet tint.
Sulfate—The addition of 1 cc. of barium chloride T.S. to 5 cc. of an aqueous solution of Calcium Bromide (1 in 20) acidified with 1 drop of hydrochloric acid, produces no turbidity immediately.
Barium—Dissolve 1 Gm. of Calcium Bromide and 1 Gm. of sodium acetate in 5 cc. of distilled water and acidify with from 3 to 5 drops of diluted acetic acid. Boil and cool the solution. Add 5 drops of potassium dichromate T.S. and agitate the solution: no turbidity is produced in 5 minutes.
Heavy metals—Dissolve 1 Gm. of Calcium Bromide in 1 cc. of diluted acetic acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Calcium Bromide is 10 parts per million.
Iron—The addition of several drops of potassium ferrocyanide T.S. to 20 cc. of an aqueous solution of Calcium Bromide (1 in 200) does not produce a blue color immediately.
Magnesium and alkali salts—Dissolve 1 Gm. of Calcium Bromide in about 40 cc. of distilled water and add 0.5 Gm. of ammonium chloride. Heat the solution to boiling and add ammonium oxalate T.S. to precipitate the calcium completely.

Heat on a water bath for 1 hour, cool, dilute to 100 cc. with distilled water, mix well, and filter. To 50 cc. of the filtrate add 0.5 cc. of sulfuric acid, evaporate to dryness, and ignite to constant weight. The weight of the residue does not exceed 4 mg.

Assay—Weigh accurately in a glass-stoppered weighing bottle about 0.4 Gm. of Calcium Bromide, transfer it into a beaker, dissolve it in 100 cc. of distilled water, and add 1 cc. of hydrochloric acid. Heat the solution to boiling and add, with stirring, an excess of hot ammonium oxalate T.S., add 2 drops of methyl orange T.S. and make alkaline with ammonia T.S. Heat the mixture on a water bath for 2 hours, filter through an asbestos mat on a Gooch crucible, and wash with hot distilled water until the filtrate is oxalate-free. Place the Gooch crucible in the beaker used for the precipitation and dislodge the asbestos by means of a glass rod. Add 100 cc. of hot distilled water and 10 cc. of sulfuric acid, heat, if necessary, to 70° and titrate with 0.1 *N* potassium permanganate. Each cc. of 0.1 *N* potassium permanganate is equivalent to 0.009996 Gm. of $CaBr_2$.

Storage—Preserve Calcium Bromide in tight containers holding not more than 120 Gm.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Calcium Carbonate Tablets

CALCIUM CARBONATE TABLETS
Tabellæ Calcii Carbonatis

Tab. Calc. Carb.

Calcium Carbonate Tablets contain not less than 92.5 per cent and not more than 107.5 per cent of the labeled amount of $CaCO_3$.

Identification—The addition of acetic acid to the Tablets produces effervescence, and the resulting solution, after being boiled to expel carbon dioxide and neutralized with ammonia T.S., responds to the tests for *Calcium*, page 723.

Barium or strontium—Powder several of the Tablets, mix a portion of the powder, equivalent to about 2 Gm. of calcium carbonate, with 100 cc. of distilled water, and add hydrochloric acid, dropwise, with agitation, until no more effervescence takes place: this solution does not impart a yellowish green or red color to a non-luminous flame.

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without appreciable loss, and transfer an accurately weighed portion of the powder, equivalent to about 0.6 Gm. of calcium carbonate, to a 200-cc. volumetric flask; add enough diluted hydrochloric acid to dissolve the calcium carbonate and 5 cc. in excess; add distilled water to the graduation mark, and mix well. Filter, reject the first 20 cc. of the filtrate, transfer 50 cc. of the subsequent filtrate to a large beaker, and add 50 cc. of distilled water. Proceed as directed in the *Assay* under *Calcium Bromide*, page 104, beginning with "Heat the solution to boiling and add. . . ." Each cc. of 0.1 *N* potassium permanganate is equivalent to 0.005005 Gm. of $CaCO_3$.

Storage—Preserve Calcium Carbonate Tablets in well-closed containers.

Sizes—Calcium Carbonate Tablets usually available contain the following amounts of calcium carbonate: **0.6** and **1 Gm.** (approximately 10 and 15 grains).

AVERAGE DOSE—**1 Gm.** (approximately 15 grains) of Calcium Carbonate.

CALCIUM CHLORIDE AMPULS

Ampullæ Calcii Chloridi

Ampul. Calc. Chlorid. Calcium Chloride Injection

Calcium Chloride Ampuls contain a sterile solution of calcium chloride in water for injection, and yield $CaCl_2$, equal to not less than 72 per cent and not more than 79 per cent of the labeled amount of $CaCl_2.2H_2O$.

Prepare the ampul solution and fill the cleansed ampuls according to the requirements given on pages 687 to 689. Sterilize the filled ampuls by Process C, page 751, or by any other adequate and suitable method of sterilization, and test for sterility according to the method described on page 746. The Ampuls also conform to the other requirements under *Ampuls*, page 687.

Assay—Transfer to a beaker an accurately measured volume of the ampul solution, containing about 0.2 Gm. of calcium chloride. Add 2 cc. of hydrochloric acid and 100 cc. of distilled water. Proceed as directed in the *Assay* under *Calcium Bromide*, page 104, beginning with the words: "Heat the solution to boiling and add. . . ." Each cc. of 0.1 *N* potassium permanganate is equivalent to 0.005550 Gm. of $CaCl_2$.

AVERAGE DOSE—**1 Gm.** of Calcium Chloride.

CALCIUM GLUCONATE TABLETS

Tabellæ Calcii Gluconatis

Tab. Calc. Glucon.

Calcium Gluconate Tablets contain not less than 92.5 per cent and not more than 107.5 per cent of the labeled amount of $Ca(C_6H_{11}O_7)_2.H_2O$.

Identification—A filtered aqueous solution of the Tablets responds to the tests for *Calcium*, page 723.

Assay—Weigh a counted number of not less than 20 of the Tablets and reduce them to a fine powder without appreciable loss. Weigh accurately a portion of the powder equivalent to about 0.5 Gm. of calcium gluconate, completely transfer it into a crucible and ignite until free from organic matter. Dissolve the residue in 10 cc. of diluted hydrochloric acid and transfer quantitatively with the aid of 100 cc. of distilled water into a beaker. Proceed as directed in the *Assay* under *Calcium Bromide*, page 104, beginning with "Heat the solution to boiling and add. . . ." Each cc. of 0.1 *N* potassium permanganate is equivalent to 0.02242 Gm. of $Ca(C_6H_{11}O_7)_2.H_2O$.

Storage—Preserve Calcium Gluconate Tablets in well-closed containers.
Sizes—Calcium Gluconate Tablets usually available contain the following amounts of calcium gluconate: 0.5 and 1 Gm. (approximately 7½ grains and 15 grains).

AVERAGE DOSE—**5 Gm.** (approximately 75 grains) of Calcium Gluconate.

Calcium Glycerophosphate

CALCIUM GLYCEROPHOSPHATE

Calcii Glycerophosphas

Calc. Glycerophos.

$CaC_3H_5(OH)_2PO_4$ Mol. wt. 210.15

Calcium Glycerophosphate is the normal calcium salt of glycerophosphoric acid and, when dried to constant weight at 130°, contains not less than 98 per cent of $CaC_3H_5(OH)_2PO_4$.

Description—Calcium Glycerophosphate occurs as a fine, white, odorless, almost tasteless powder. It is somewhat hygroscopic.
Solubility—One Gm. of Calcium Glycerophosphate dissolves in about 50 cc. of water at 25°. It is more soluble in water at a lower temperature, and citric acid increases its solubility in water. It is insoluble in alcohol.
Identification—
A: A saturated aqueous solution of Calcium Glycerophosphate responds to the tests for *Calcium*, page 723, and for *Glycerophosphate*, page 725.
B: Prepare a cold, saturated aqueous solution of Calcium Glycerophosphate and boil it: white, iridescent scales of anhydrous calcium glycerophosphate form.
C: When heated above 170°, Calcium Glycerophosphate is decomposed, evolving inflammable vapors, and at a red heat is converted into calcium pyrophosphate.
D: With lead acetate T.S., a saturated aqueous solution of Calcium Glycerophosphate yields a white, curdy precipitate, which is soluble in nitric acid.
Free alkali—A solution of 1 Gm. of Calcium Glycerophosphate in 60 cc. of distilled water requires not more than 1.5 cc. of 0.1 *N* sulfuric acid for neutralization using 3 drops of phenolphthalein T.S. as the indicator.
Loss on drying—When dried to constant weight at 130°, Calcium Glycerophosphate loses not more than 12 per cent of its weight.
Alcohol-soluble substances—Shake 1 Gm. of the finely powdered Calcium Glycerophosphate with 25 cc. of dehydrated alcohol, filter the mixture, evaporate the filtrate on a water bath, and dry the residue for 1 hour at a temperature not exceeding 70°: the weight of the residue does not exceed 10 mg.
Chloride—One Gm. of Calcium Glycerophosphate shows no more chloride than corresponds to 1 cc. of 0.02 *N* hydrochloric acid, page 758.
Phosphate—Prepare a standard solution containing 0.192 Gm. of potassium biphosphate in sufficient distilled water to make 100 cc. Dilute 3 cc. of this solution with sufficient diluted nitric acid to make 100 cc. To 10 cc. of the diluted standard solution add 10 cc. of cold ammonium molybdate T.S., and to 10 cc. of a solution of Calcium Glycerophosphate (1 in 10) in diluted nitric acid, add 10 cc. of cold ammonium molybdate T.S. Shake each suspension, allow them to stand 10 minutes, and shake again, if necessary, before comparison. The turbidity of the calcium glycerophosphate suspension is not greater than that of the diluted standard solution suspension.

Sulfate—Two-tenths Gm. of Calcium Glycerophosphate shows no more sulfate than corresponds to 1 cc. of 0.02 *N* sulfuric acid, page 759.
Arsenic—Calcium Glycerophosphate meets the requirements of the test for *Arsenic*, page 689.
Heavy metals—Dissolve 0.5 Gm. of Calcium Glycerophosphate in 3 cc. of diluted acetic acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Calcium Glycerophosphate is 40 parts per million.
Assay—Dry about 0.4 Gm. of Calcium Glycerophosphate to constant weight at 130°, weigh accurately, dissolve in 100 cc. of distilled water and add 1 cc. of hydrochloric acid. Heat the solution to boiling and add, with stirring, an excess of hot ammonium oxalate T.S., add 2 drops of methyl orange T.S. and make alkaline with ammonia T.S. Heat the mixture on a water bath for 2 hours, filter through an asbestos mat on a Gooch crucible, and wash with hot distilled water until the filtrate is oxalate-free. Dry the precipitate to constant weight at 105° and weigh. Each Gm. of $CaC_2O_4.H_2O$ is equivalent to 1.4362 Gm. of $CaC_3H_5(OH)_2PO_6$.
Storage—Preserve Calcium Glycerophosphate in tight containers.

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains).

CALCIUM HYPOPHOSPHITE

Calcii Hypophosphis

Calc. Hypophos.

$Ca(H_2PO_2)_2$ Mol. wt. 170.07

Calcium Hypophosphite, when dried for 24 hours over sulfuric acid, contains not less than 98 per cent of $Ca(H_2PO_2)_2$.

Caution should be observed in compounding Calcium Hypophosphite with other substances, as an explosion may occur if it is triturated or heated with nitrates, chlorates, or other oxidizing agents.

Description—Calcium Hypophosphite occurs as colorless, transparent, monoclinic prisms, as small, lustrous scales, or as a white, crystalline powder. It is odorless, and has a nauseous, bitter taste.
Solubility—One Gm. of Calcium Hypophosphite dissolves slowly in about 6.5 cc. of water at 25°. It is insoluble in alcohol.
Identification—An aqueous solution of Calcium Hypophosphite (1 in 20) responds to the tests for *Calcium*, page 723, and for *Hypophosphite*, page 725.
Free acid—A solution of 1 Gm. of Calcium Hypophosphite in 20 cc. of distilled water requires not more than 1 cc. of 0.1 *N* sodium hydroxide for neutralization, using 3 drops of phenolphthalein T.S. as the indicator.
Loss on drying—When dried for 24 hours over sulfuric acid, Calcium Hypophosphite loses not more than 3 per cent of its weight.
Water-insoluble substances—Dissolve 1 Gm. of Calcium Hypophosphite in 20 cc. of distilled water: the weight of the residue does not exceed 5 mg.
Phosphorus compounds—Place 5 cc. of an aqueous solution of Calcium Hypophosphite (1 in 10) in a test tube with 0.5 cc. of diluted hydrochloric acid and heat on a water bath for 30 minutes: no offensive odor is developed.

Arsenic—Pour 5 cc. of an aqueous solution of Calcium Hypophosphite (1 in 25) into a beaker containing 3 cc. of nitric acid diluted with about 10 cc. of distilled water, and evaporate it to dryness on a water bath: the residue meets the requirements of the test for *Arsenic*, page 689.

Heavy metals—Dissolve 2 Gm. of Calcium Hypophosphite in enough distilled water to make 40 cc. of solution. To 10 cc. of this solution add 2 cc. of standard lead solution, page 721, dilute to 30 cc. with distilled water, and add 1 cc. of diluted acetic acid (A). To the remaining 30 cc. add 1 cc. of diluted acetic acid (B). To each solution add 10 cc. of hydrogen sulfide T.S. (B) is not darker than (A). The heavy metals limit of Calcium Hypophosphite is 20 parts per million.

Assay—Accurately weigh about 0.12 Gm. of Calcium Hypophosphite, dried over sulfuric acid for 24 hours, and dissolve it in sufficient water to make 100 cc. Transfer 50 cc. of the solution to a 250-cc. glass-stoppered iodine flask, add 50 cc. of 0.1 *N* bromine solution and 20 cc. of diluted sulfuric acid, stopper the flask, place a few cc. of a saturated potassium iodide solution in the lip around the stopper, shake the flask well, and allow to stand for 3 hours. Place the flask in an ice bath for 5 minutes, then carefully remove the stopper and allow the potassium iodide solution around the stopper to be drawn into the flask. Add 2 Gm. of potassium iodide, dissolved in 10 cc. of recently boiled distilled water, shake the flask, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Each cc. of 0.1 *N* bromine is equivalent to 0.002126 Gm. of $Ca(H_2PO_2)_2$.

Storage—Preserve Calcium Hypophosphite in well-closed containers.

AVERAGE DOSE—**0.5 Gm.** (approximately $7\frac{1}{2}$ grains).

Calcium Lactate Tablets

CALCIUM LACTATE TABLETS

Tabellæ Calcii Lactatis

Tab. Calc. Lact.

Calcium Lactate Tablets contain not less than 92.5 per cent and not more than 107.5 per cent of the labeled amount of $Ca(C_3H_5O_3)_2.5H_2O$.

Identification—A filtered aqueous solution of the Tablets, equivalent to calcium lactate (1 in 20), responds to the tests for *Calcium*, page 723, and for *Lactate*, page 725.

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without appreciable loss, and transfer an accurately weighed portion, equivalent to about 1.5 Gm. of calcium lactate, to a crucible, and ignite. Cool and add diluted hydrochloric acid to dissolve the calcium carbonate which was formed. Transfer the mixture to a 200-cc. volumetric flask, add distilled water to the mark, and mix well. Filter, reject the first 20 cc. of the filtrate, transfer the next 50 cc. of filtrate to a beaker, and add 100 cc. of distilled water. Proceed as directed in the *Assay* under *Calcium Bromide*, page 104, beginning with "Heat the solution to boiling and add. . . ." Each cc. of 0.1 *N* potassium permanganate is equivalent to 0.01542 Gm. of $Ca(C_3H_5O_3)_2.5H_2O$.

Storage—Preserve Calcium Lactate Tablets in tight containers.

Sizes—Calcium Lactate Tablets usually available contain the following amounts of calcium lactate: **0.3** and **0.6 Gm.** (approximately 5 and 10 grains).

AVERAGE DOSE—**1 Gm.** (approximately 15 grains) of Calcium Lactate.

CALCIUM LEVULINATE

Calcii Levulinas

$(C_5H_7O_3)_2.Ca.2H_2O$ $(CH_3.CO.(CH_2)_2.COO)_2.Ca.2H_2O$ Mol. wt. 306.32

Calcium Levulinate is a hydrated calcium salt of levulinic acid and contains not less than 97.5 per cent and not more than 100.5 per cent of $(CH_3.CO.(CH_2)_2.COO)_2Ca$ calculated on a dry basis, the loss on drying being determined on a separate portion by drying at 105° for 24 hours.

Description—Calcium Levulinate occurs as a white, crystalline or amorphous powder, having a faint odor suggesting burnt sugar and a bitter, salty taste.

Solubility—Calcium Levulinate is freely soluble in water, and slightly soluble in alcohol. It is insoluble in ether and in chloroform.

Melting point—Calcium Levulinate melts between 119° and 125°, when the bath is preheated to 100° before introducing the sample, page 731.

Hydrogen-ion concentration—The hydrogen-ion concentration expressed as *p*H of an aqueous solution of Calcium Levulinate (1 in 10) is not less than 7.0 and not more than 8.5.

Identification—

A: An aqueous solution of Calcium Levulinate (1 in 10) responds to the tests for *Calcium*, page 723.

B: To 5 cc. of an aqueous solution of Calcium Levulinate (1 in 10) add 5 cc. of sodium hydroxide T.S. and filter. To the filtrate add 5 cc. of iodine T.S.: a precipitate of iodoform is produced.

C: Dissolve 0.1 Gm. of Calcium Levulinate in 2 cc. of distilled water and add 5 cc. of dinitrophenylhydrazine T.S. Allow the mixture to stand in an ice bath for 1 hour, filter, and wash the precipitate with cold distilled water. The resulting hydrazone melts between 198° and 206°.

Loss on drying—When dried at 105° for 24 hours, Calcium Levulinate loses not less than 10.5 per cent and not more than 12 per cent of its weight.

Water-insoluble substances—Five Gm. of Calcium Levulinate yields no more than 5 mg. of water-insoluble substances.

Chloride—One Gm. of Calcium Levulinate shows no more chloride than corresponds to 1 cc. of 0.02 *N* hydrochloric acid, page 758.

Sulfate—Two Gm. of Calcium Levulinate shows no more sulfate than corresponds to 1 cc. of 0.02 *N* sulfuric acid, page 759.

Arsenic—Dissolve 1 Gm. of Calcium Levulinate in 10 cc. of sulfuric acid (1 in 20), add 1 cc. of bromine T.S., and heat during 5 minutes. Five cc. of this solution meets the requirements of the test for *Arsenic*, page 689.

Heavy metals—Dissolve 2 Gm. of Calcium Levulinate in 2 cc. of diluted acetic acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Calcium Levulinate is 20 parts per million.

Readily oxidizable substances—To 5 cc. of an aqueous solution of Calcium Levulinate (1 in 10) add 1 cc. of 0.1 *N* potassium permanganate maintaining the temperature at 20° throughout the test: the pink color does not disappear in 2 minutes.

Limit of color—Transfer 50 cc. of an aqueous solution of Calcium Levulinate (1 in 10) into a Nessler tube. In another Nessler tube place 50 cc. of a solution prepared by adding 2.5 cc. of ferric chloride C.S. and 0.1 cc. of cobaltous chloride C.S. to sufficient distilled water to make 100 cc. The color of the Calcium Levulinate solution is not deeper than the color standard.

Reducing sugars—Dissolve 0.5 Gm. of Calcium Levulinate in 10 cc. of distilled water, add 2 cc. of diluted hydrochloric acid, and boil the solution for about 2 minutes.

Cool, add 5 cc. of approximately 2 *N* sodium carbonate, let stand for 5 minutes, dilute to 20 cc. with distilled water, and filter. Add 5 cc. of the clear filtrate to 2 cc. of alkaline cupric tartrate T.S. and boil for 1 minute: no red precipitate is produced.

Assay—Transfer about 3 Gm. of Calcium Levulinate, accurately weighed, to a 500-cc. volumetric flask. Add 10 cc. of hydrochloric acid and sufficient distilled water to make 500 cc. Transfer 100 cc. of the solution to a beaker. Proceed as directed in the *Assay* under *Calcium Bromide*, page 104, beginning with, "Heat the solution to boiling and add. . . ." Each cc. of 0.1 *N* potassium permanganate is equivalent to 0.01352 Gm. of $(CH_3.CO.(CH_2)_2.COO)_2Ca$.

Storage—Preserve Calcium Levulinate in tight containers.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Calcium Levulinate Ampuls

CALCIUM LEVULINATE AMPULS
Ampullæ Calcii Levulinatis

Ampul. Calc. Levulin. Calcium Levulinate Injection

Calcium Levulinate Ampuls contain a sterile solution of calcium levulinate in water for injection, and yield not less than 95 per cent and not more than 105 per cent of the labeled amount of $(C_5H_7O_3)_2Ca.2H_2O$.

Prepare the ampul solution and fill the cleansed ampuls according to the requirements given on pages 687 to 689. Sterilize the filled ampuls by Process C, page 751, or by any other adequate and suitable method of sterilization, and test for sterility according to the method described on page 746. The Ampuls also conform to the other requirements under *Ampuls*, page 687.

Identification—The contents of the Ampuls respond to the tests for *Identification* under *Calcium Levulinate*, page 109.

Assay—Transfer an accurately measured volume of the ampul solution containing about 3 Gm. of calcium levulinate to a 500-cc. volumetric flask and proceed as directed in the *Assay* under *Calcium Levulinate*, page 110. Each cc. of 0.1 *N* potassium permanganate is equivalent to 0.01532 Gm. of $(C_5H_7O_3)_2Ca.2H_2O$.

AVERAGE DOSE—**1 Gm.** of Calcium Levulinate.

Calcium Phosphate, Tribasic

TRIBASIC CALCIUM PHOSPHATE
Calcii Phosphas Tribasicus

Calc. Phos. Tribas. Precipitated Calcium Phosphate

$Ca_3(PO_4)_2$ Mol. wt. 310.20

Tribasic Calcium Phosphate, after ignition to constant weight, contains an amount of phosphate (PO_4) corresponding to not less than 90 per cent of $Ca_3(PO_4)_2$.

Description—Tribasic Calcium Phosphate occurs as a white, odorless, and tasteless powder, which is permanent in air.

Solubility—Tribasic Calcium Phosphate dissolves readily in diluted hydrochloric and nitric acids. It is insoluble in alcohol and almost insoluble in water.

Identification—Ammonium molybdate T.S. added in excess to a solution of Tribasic Calcium Phosphate in diluted nitric acid, precipitates yellow ammonium phosphomolybdate; gentle heating hastens the precipitation. Tribasic Calcium Phosphate gives the flame test characteristic of calcium.

Loss on ignition—Tribasic Calcium Phosphate loses not more than 8 per cent of its weight on ignition.

Acid-insoluble matter—If an insoluble residue remains in the test below for *Carbonate*, filter the solution, wash well with hot distilled water until the last washing is free from chloride, and ignite the residue to constant weight: the weight of the residue does not exceed 4 mg.

Soluble salts—Digest 2 Gm. of Tribasic Calcium Phosphate with 100 cc. of distilled water for 30 minutes on a water bath, cool, add sufficient distilled water to restore the original volume, stir well, and filter. Evaporate to dryness 50 cc. of the filtrate in a tared porcelain dish on a water bath, and gently ignite the residue to constant weight: the weight of the residue does not exceed 5 mg.

Carbonate—Mix 2 Gm. of Tribasic Calcium Phosphate with 20 cc. of distilled water, and add diluted hydrochloric acid, dropwise, to effect solution: no effervescence occurs when the acid is added.

Chloride—Dissolve 0.5 Gm. of Tribasic Calcium Phosphate in 25 cc. of diluted nitric acid, and add 1 cc. of silver nitrate T.S.: the turbidity is no greater than that produced by 1 cc. of 0.02 *N* hydrochloric acid, page 758.

Nitrate—Mix 0.2 Gm. of Tribasic Calcium Phosphate with 5 cc. of distilled water, and add just sufficient hydrochloric acid to effect solution. Dilute with distilled water to 10 cc., add 0.1 cc. of indigo carmine T.S., then add, with stirring, 10 cc. of sulfuric acid: the blue color persists for at least 5 minutes.

Sulfate—Dissolve 0.5 Gm. of Tribasic Calcium Phosphate in the smallest possible amount of diluted hydrochloric acid, dilute to 100 cc. with distilled water, filter if necessary, and to 25 cc. of the filtrate add 1 cc. of barium chloride T.S.: the turbidity is not greater than that produced by 1 cc. of 0.02 *N* sulfuric acid, page 759.

Arsenic—A 5-cc. portion of a solution of Tribasic Calcium Phosphate (1 in 25) in diluted hydrochloric acid meets the requirements of the test for *Arsenic*, page 689, omitting the preliminary treatment with sulfurous and sulfuric acids.

Barium—Mix 0.5 Gm. of Tribasic Calcium Phosphate with 10 cc. of distilled water, heat, and add hydrochloric acid, dropwise, until solution is effected, then add 2 drops of the acid in excess. Filter, and add to the filtrate 1 cc. of potassium sulfate T.S.: no turbidity appears within 15 minutes.

Dibasic salt and calcium oxide—Weigh accurately about 2 Gm. of Tribasic Calcium Phosphate, and dissolve it by warming with 50 cc. of 1 *N* hydrochloric acid. Cool, add 1 or 2 drops of methyl orange T.S., and slowly titrate the excess of 1 *N* hydrochloric acid with 1 *N* sodium hydroxide to a yellow color, vigorously shaking the mixture during titration. Not less than 12.5 cc. and not more than 13.8 cc. of 1 *N* hydrochloric acid is consumed for each Gm. of salt, calculated on a water-free basis.

Fluorine—Place 2 Gm. of Tribasic Calcium Phosphate, 5 cc. of perchloric acid, 15 cc. of distilled water, and a few glass beads in a 50-cc. distilling flask connected with a condenser and carrying a thermometer and a capillary tube, both of which must extend into the liquid. Connect a small dropping funnel, filled with distilled water, to the capillary tube. Support the flask on an asbestos mat with a hole which exposes about one-third of the flask to the flame. Distil until the temperature reaches 135°, receiving the distillate under the surface of a few cc. of distilled water; then maintain at from 135° to 140° by adding distilled water from the funnel. Continue the distillation until 70 cc. has been collected, dilute the distillate to 80 cc., and mix well. Place 40 cc. of the solution in a 50-cc. Nessler tube. In another similar Nessler tube, place 40 cc. of distilled water as a control. Add to each tube 0.1 cc. of sodium alizarinsulfonate T.S., and mix well. Add, dropwise,

and with stirring, 0.05 *N* sodium hydroxide to the tube containing the distillate until its color just matches that of the control, which is faintly pink. Then add to each tube exactly 1 cc. of 0.1 *N* hydrochloric acid, and mix well. From a burette, graduated in 0.05 cc., add slowly to the tube containing the distillate enough reagent thorium nitrate solution, made by dissolving 0.25 Gm. of thorium nitrate in 1000 cc. of distilled water, so that after mixing, the color of the liquid just changes to a faint pink. Note the volume of thorium nitrate solution added, add exactly the same volume to the control, and mix. Now add to the control sodium fluoride T.S. from a burette to make the colors of the two tubes match after dilution to the same volume. Mix well, and allow all air bubbles to escape before making the final color comparison. Check the end-point by adding 1 or 2 drops of sodium fluoride T.S. to the control: a distinct change in color should take place. Not more than 5 cc. of the sodium fluoride T.S. is required. Each cc. of sodium fluoride T.S. is equivalent to 0.01 mg. of fluorine (F).

Heavy metals—Mix thoroughly 2 Gm. of Tribasic Calcium Phosphate with 9 cc. of diluted hydrochloric acid, dilute to 50 cc. with distilled water, and heat to boiling. Cool to room temperature, and filter. Use 25 cc. of the filtrate for the test: the heavy metals limit, page 721, for Tribasic Calcium Phosphate is 30 parts per million.

Assay—Weigh accurately about 0.2 Gm. of Tribasic Calcium Phosphate, previously ignited to constant weight, and dissolve it in a mixture of 25 cc. of distilled water and 10 cc. of diluted nitric acid. Filter, if necessary, wash any precipitate, add sufficient ammonia T.S. to the filtrate to produce a slight precipitate, then dissolve the precipitate by the addition of 1 cc. of diluted nitric acid. Adjust the temperature to about 50°, add 75 cc. of ammonium molybdate T.S., and maintain the temperature at about 50° for 30 minutes, stirring occasionally. Wash the precipitate once or twice with distilled water by decantation, using from 30 to 40 cc. each time. Transfer the precipitate to a filter, and wash with cold distilled water until the last washing is not acid to litmus paper. Transfer the precipitate and filter to the precipitating vessel, add 40 cc. of 1 *N* sodium hydroxide, agitate until the precipitate is dissolved, and then titrate the excess of alkali with 1 *N* sulfuric acid, using 3 drops of phenolphthalein T.S. as the indicator. Each cc. of 1 *N* sodium hydroxide corresponds to 0.006745 Gm. of $Ca_3(PO_4)_2$.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Calumba

CALUMBA
Calumba
Colombo

Calumba is the dried root of *Jateorrhiza palmata* (Lamarck) Miers (Fam. *Menispermaceæ*).

Unground Calumba—Unground Calumba occurs as circular or oval disks, attaining a diameter of 10 cm. and seldom exceeding 2 cm. in thickness; or as longitudinal or oblique slices, attaining a length of 30 cm. The edge is pale reddish brown to light olive-brown and roughly wrinkled; the cut surfaces are weak yellowish orange to moderate greenish yellow, indistinctly radiate in the region of the dark cambium, and often depressed in the central portion. The fracture is short and mealy.

Histology—Calumba shows a thick cork of small cells; a starch-bearing parenchyma layer with a few characteristic stone cells scattered singly or in small groups; numerous, narrow, distinct wood bundles, separated by broad, starch-bearing medullary rays; a sieve tissue with cells mostly collapsed; and a xylem portion consisting of tracheæ in small groups, separated from small groups of wood fibers by starch-bearing parenchyma, especially abundant in the inner portion.

Powdered Calumba—Powdered Calumba is dusky yellow to moderate greenish yellow, has a slight odor, and a slightly aromatic and very bitter taste. It shows numerous starch grains, mostly single, occasionally 2- to 3-compound; the individual grains being up to 85 microns in length, ovoid, ellipsoidal, frequently very irregular, slightly lamellated, with eccentric linear, X-shaped or branching clefts; a few stone cells, with irregularly thickened, strongly lignified, coarsely porous walls, and often containing 1 or more prisms of calcium oxalate up to 30 microns in length, or numerous sphenoidal microcrystals; a few tracheæ, with reticulate thickenings or bordered pores, and associated with wood fibers having long, oblique, slit-like pores, and a few lignified parenchyma cells having large simple pores.

Foreign organic matter—Calumba contains not more than 1 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Calumba yields not more than 2.5 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Camphor Ampuls

CAMPHOR AMPULS

Ampullæ Camphoræ

Ampul. Camph. Camphor Injection Camphor in Oil Ampuls

Camphor Ampuls contain a sterile solution of camphor in a suitable fixed oil, and yield not less than 93 per cent and not more than 103 per cent of the labeled amount of $C_{10}H_{16}O$.

To prepare the solution, heat a quantity of the oil in a suitable container on a water bath, introduce the camphor, and dissolve it by agitation without further heating; add enough of the oil to make the required volume of the solution; mix thoroughly and filter the solution, if necessary, to render the product clear. Fill the ampuls and sterilize them by heating to 100° for 30 minutes, or by any other adequate and suitable method of sterilization, and test for sterility as given below.

Test for sterility—Prepare 500-cc. flasks, each containing 250 cc. of *Fluid Thioglycollate Medium*, page 746; fill fermentation tubes with the same medium, and sterilize by Process C, page 751.

Take 3 ampuls from each lot of sterilized ampuls and plant the contents of each ampul (but not more than 5 cc.) into a flask containing 250 cc. of the medium. Incubate the flasks for 4 days at 37°, agitating the contents of each flask thoroughly twice each day. At the end of the incubation period, transplant from each flask, by means of a sterile pipette, 5 drops each into 3 fermentation tubes and 20 drops each into 3 fermentation tubes. Incubate the fermentation tubes for 7 days at 37° and examine them for evidence of growth on the second, fourth, and seventh days. None of them should show growth.

Assay—Deliver exactly 5 cc. of the ampul solution by means of a graduated pipette or burette into a dry, tared, 120-cc. Erlenmeyer flask, and weigh. Connect the flask to a U-shaped drying tube by a gas delivery tube so that the orifice of the gas delivery tube is about 15 mm. above the solution. Put the flask and tubes into an air oven maintained at 110°, and pass a stream of carbon dioxide through the delivery tube and flask for 2 hours. Expel the carbon dioxide from the flask by blowing out with air, cool the flask in a desiccator, and weigh. The loss in

weight represents the weight of $C_{10}H_{16}O$ present in the sample of the ampul solution taken.

AVERAGE DOSE—**0.2 Gm.** of Camphor.

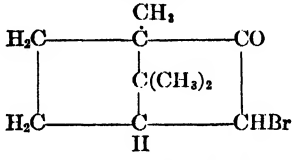
Camphor, Monobromated

MONOBROMATED CAMPHOR

Camphora Monobromata

Camph. Monobrom.

$C_{10}H_{15}OBr$



Mol. wt. 231.14

Description—Monobromated Camphor occurs as colorless, prismatic needles or scales, or as a powder with a mild, but characteristic, camphoraceous odor and taste. It is permanent in the air, but is decomposed by prolonged exposure to sunlight.

Solubility—One Gm. of Monobromated Camphor dissolves in about 6.5 cc. of alcohol, in about 0.5 cc. of chloroform, and in about 1.6 cc. of ether, at 25°. It is almost insoluble in water.

Melting point—Monobromated Camphor melts between 74° and 76°, page 731.

Identification—Heat a mixture of about 0.1 Gm. each of Monobromated Camphor and silver nitrate, and 2 cc. each of nitric acid and sulfuric acid, until nitrous vapors are no longer evolved: a greenish yellow precipitate of silver bromide is produced.

Residue on ignition—Monobromated Camphor yields not more than 0.05 per cent of residue on ignition, page 745.

Bromide ions—Shake about 0.5 Gm. of powdered Monobromated Camphor with 10 cc. of distilled water, and filter. The filtrate is neutral to litmus paper, and is not rendered more than slightly opalescent by the addition of a few drops of silver nitrate T.S.

Storage—Preserve Monobromated Camphor in well-closed, light-resistant containers.

AVERAGE DOSE—**0.125 Gm.** (approximately 2 grains).

Camphor Ointment

CAMPHOR OINTMENT

Unguentum Camphoræ

Ung. Camph.

Camphor Ointment contains not less than 20.0 per cent and not more than 24.0 per cent of $C_{10}H_{16}O$.

Camphor, in coarse powder	**220 Gm.**
White Wax	**220 Gm.**
Lard	**560 Gm.**
To make	**1000 Gm.**

Melt the white wax and lard on a water bath; then dissolve the camphor in the melted mixture without further heating, and stir the Ointment until it is cold.

Assay—Place approximately 5 Gm. of Camphor Ointment in a dried and tared 100-cc. weighing bottle, accurately weigh, and fit with a 2-hole rubber stopper. Through 1 hole pass an aeration tube leading to within 15 mm. to 20 mm. of the bottom of the weighing bottle. Through the other hole pass a glass tube, of the same diameter as that of the aeration tube, which will extend about 1 cm. above and below the stopper. Connect the aeration tube with a cylinder of air-free carbon dioxide. Place the weighing bottle and ointment thus prepared in an air oven at 100° and pass a steady stream of carbon dioxide through the apparatus for 2 hours or until no further loss of weight is detectable. Remove the apparatus from the oven, blow out the remaining carbon dioxide with dry air, cool the weighing bottle in a desiccator, and weigh. The loss in weight is not less than 20 per cent and not more than 24 per cent of the weight of Camphor Ointment taken.

Storage—Preserve Camphor Ointment in tight containers and avoid prolonged exposure to temperatures above 30°.

CAMPHOR SPIRIT

Spiritus Camphoræ

Sp. Camph.

Camphor Spirit is an alcohol solution containing, in each 100 cc., not less than 9.0 Gm. and not more than 10.2 Gm. of $C_{10}H_{16}O$, at 25°.

Camphor	**100 Gm.**
Alcohol, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the camphor in about 800 cc. of alcohol, and then add enough additional alcohol to make the product measure 1000 cc. Filter if necessary.

Specific gravity—The specific gravity of Camphor Spirit is not less than 0.824 and not more than 0.826 at 25°.

Added water—Add 50 mg. of anhydrous potassium carbonate to 5 cc. of Camphor Spirit: the potassium carbonate does not liquefy and does not adhere to the bottom of the vessel.

Assay—Accurately measure 2 cc. of Camphor Spirit into a 300-cc. Erlenmeyer flask containing 75 cc. of freshly prepared dinitrophenylhydrazine T.S. and 25 cc. of aldehyde-free alcohol. Connect the flask with a reflux condenser, and heat on a water bath for 4 hours. Add 50 cc. of 1 *N* sulfuric acid, allow the mixture to cool, add an additional 150 cc. of 1 *N* sulfuric acid, and allow the mixture to stand overnight. Transfer the precipitate to a previously dried and weighed filtering crucible, and wash with 10-cc. portions of cold distilled water until the last washing is not acid to litmus paper. Continue the suction until the excess water is removed, and dry the crucible and precipitate to constant weight at 80°. Each Gm. of camphor dinitrophenylhydrazone is equivalent to 0.4580 Gm. of $C_{10}H_{16}O$.

Alcohol content—From 80 to 87 per cent, by volume, of C_2H_5OH.
Storage—Preserve Camphor Spirit in tight containers.

AVERAGE DOSE—1 cc. (approximately 15 minims).

Camphorated Phenol, page 385

Cantharides

CANTHARIDES
Cantharis

Spanish Flies Russian Flies Pulvis Cantharidis P.I.

Cantharides consists of the dried insects, *Cantharis vesicatoria* (Linné) DeGeer (Fam. *Meloidæ*).

Cantharides yields not less than 0.6 per cent of cantharidin.

Caution: Cantharides having an ammoniacal odor must not be used.

Unground Cantharides—Unground Cantharides are from 15 to 25 mm. in length and 5 to 8 mm. in breadth, oblong, somewhat compressed above, externally iridescent, and having a brown through olive-brown, green, blue to bluish purple color. The head is triangular, separated into two lateral lobes by a faint median line. The mandibles are stout and partly concealed; the antennæ filiform, of 11 joints, the basal clavate, the second globular, and the remaining somewhat conical. The eyes are comparatively small; the prothorax angulate; the first and second pairs of legs have 5 tarsal joints, the hind pair has 4 tarsal joints, and all legs have 2 distal claws. The posterior wings are membranous and yellowish brown or yellowish orange. The elytra or wing sheaths each have 2 parallel lines and are finely wrinkled.

Powdered Cantharides—Powdered Cantharides is moderate yellowish brown to moderate olive-brown, often containing iridescent particles, and having a strong, disagreeable odor, and a slight, acrid taste. It shows long, pointed spicules about 500 microns in length and 20 microns in width at the base; fragments of striated muscles, of chitinous body wall, and of wings and frequently fragments of mites and their eggs.

Mylabris beetles—Unground Cantharides should show no insects with black and yellowish orange striped elytra.

Moisture—Cantharides yields not more than 10 per cent of moisture, page 761.

Assay—Place 15 Gm. of Cantharides, in moderately coarse powder, in a pressure bottle of not less than 250-cc. capacity, add 150 cc. of a mixture of benzene, 2 volumes, and petroleum benzin, 1 volume, and then add 2 cc. of hydrochloric acid. Stopper the bottle tightly, shake it well, and allow it to stand for about 10 hours. Now gradually warm the bottle and its contents to about 40°, and maintain it at approximately that temperature with frequent shaking during 3 hours, avoiding evaporation. Cool the mixture, decant or filter off 100 cc. of the clear solution, and evaporate this rapidly in a tared beaker or wide-necked flask to a volume of about 5 cc. Add 5 cc. of chloroform to the residue and set it aside in a moderately warm place. When the solvent has all evaporated, add to the crystals 10 cc. of a mixture of equal volumes of dehydrated alcohol and petroleum benzin, which has previously been saturated with pure cantharidin, allow the mixture to stand during 15 minutes, and then decant the liquid through a pledget of purified cotton. Wash the crystals with successive portions of a saturated solution of cantharidin, similar to that directed above, until free from fat and coloring matter, and pass the washings through the same pledget of purified cotton. Then wash the cotton with a small quantity of warm chloroform to dissolve any adhering

crystals, collecting the chloroform in the tared flask or beaker containing the washed crystals, evaporate the solvent with the aid of a current of air, dry the crystals at 60° for 30 minutes, and weigh. The resulting weight represents the amount of cantharidin obtained from 10 Gm. of Cantharides.

Storage—Preserve Cantharides in tight containers.

Cantharides Cerate

CANTHARIDES CERATE

Ceratum Cantharidis

Blistering Cerate

Cantharides, in very fine powder	350 Gm.
Glacial Acetic Acid	25 cc.
Turpentine Oil	150 cc.
Yellow Wax	175 Gm.
Rosin	175 Gm.
Benzoinated Lard	200 Gm.
To make	1000 Gm.

Moisten the cantharides with the turpentine oil and the glacial acetic acid, previously mixed, and macerate in a well-covered container in a warm place for 48 hours. Melt together the rosin, yellow wax, and benzoinated lard, strain the mixture through muslin, add the macerated cantharides, and keep the mixture in a liquid condition by heating it on a water bath, stirring it occasionally, until it is reduced in weight to 1000 Gm. Discontinue the heating, and stir the Cerate until it congeals.

Storage—Preserve Cantharides Cerate in well-closed containers at a temperature below 40°.

Cantharides Tincture

CANTHARIDES TINCTURE

Tinctura Cantharidis

Tr. Canthar. Tinctura Cantharidis P.I.

Cantharides, in fine powder	100 Gm.
Glacial Acetic Acid,	
Alcohol, each, a sufficient quantity,	
To make	1000 cc.

Mix the cantharides with 100 cc. of glacial acetic acid and 100 cc. of alcohol, and macerate the mixture in a suitable closed vessel during 4 days in a warm place. Then transfer the mixture to a percolator, and percolate slowly, using alcohol as additional menstruum until the Tincture measures 1000 cc. Mix the product thoroughly.

Alcohol content—From 78 to 84 per cent, by volume, of C_2H_5OH.
Storage—Preserve Cantharides Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**0.1 cc.** (approximately $1^1/_2$ minims).

Capsicum

CAPSICUM
Capsicum
Cayenne Pepper

Capsicum is the dried ripe fruit of *Capsicum frutescens* Linné, known in commerce as African Chillies, or of *Capsicum annuum* Linné var. *conoides* Irish, known in commerce as Tabasco Pepper, or of *Capsicum annuum* var. *longum* Sendt, known in commerce as Louisiana Long Pepper, or of a hybrid between the Honka variety of Japanese Capsicum and the Old Louisiana Sport Capsicum known in commerce as Louisiana Sport Pepper (Fam. *Solanaceæ*).

Capsicum must be labeled to indicate which of the above varieties is contained in the package.

Capsicum yields not less than 12 per cent of a non-volatile ether-soluble extractive.

Unground Capsicum—Unground Capsicum is oblong-conical, often curved (Louisiana Long Pepper), usually laterally compressed, from 10 to 25 mm. in length and from 4 to 8 mm. in diameter (African Chillies), or up to 15 cm. in length and 2.5 cm. in diameter (Louisiana Long Pepper), or up to 5.5 cm. in length and up to 13 mm. in diameter (Louisiana Sport Pepper), or up to 4 cm. in length and up to 9 mm. in diameter (Tabasco Pepper). The fruit is 2-3-locular, the dissepiments being united to a conical, central placenta at the base. The pericarp is thin and membranous, its outer surface dark reddish brown to dusky yellowish orange, glabrous, shrivelled, its inner surface striate with 2 to 3 distinct longitudinal ridges representing the parietal placentæ; the seeds are light brown to weak yellowish orange, suborbicular or irregular, flattened, from 2 to 4 mm. in diameter, with a thickened edge and a prominent, pointed micropyle. The calyx is moderate brown to dusky yellowish orange, gamosepalous, inferior, 5-toothed, and sometimes attached to a long, straight peduncle.

Histology—The epicarp consists of mostly quadrangular or rectangular cells up to 80 microns in length, and up to 20 microns deep, arranged in regular rows, with thickened and cutinized outer and radial walls, the surface of the cuticle finely striated, the radial walls somewhat wavy (African Chillies), or of polygonal, quadrangular, triangular, or irregular cells up to 76 microns in length and up to 30.5 microns deep (Tabasco Pepper), or up to 125 microns in length and up to 38 microns deep (Louisiana Long Pepper), or up to 76 microns in length and up to 38 microns deep (Louisiana Sport Pepper), with cuticularized outer and radial walls, the latter usually prominently beaded. The mesocarp consists of thin-walled parenchyma (African Chillies), or of an outer hypodermis of tangentially elongated collenchymatous cells (Louisiana Long Pepper and Tabasco Pepper), or of from 1 to 3 rows of hypodermal cells with cuticularized walls (Louisiana Sport Pepper), a broad middle zone of thin-walled parenchyma containing yellow to red chromoplastids, oil droplets, and elaioplastids, occasionally microcrystals, and traversed by vascular bun-

dles, and an inner zone consisting of a layer of giant cells. The endocarp consists of a layer of elongated cells, some of them very thin walled and containing chromoplastids, and others in large oval areas with thickened, beaded, lignified walls. Epidermal cells of the seed are irregular in outline and up to 342 microns in length, have very sinuous, contorted, lignified walls, the cells from the edge of the seed being much thicker walled than those from the flat surface of the seed. The embryo is curved and embedded in the endosperm, the latter consisting of small-celled parenchyma containing fixed oil droplets and aleurone grains.

Powdered Capsicum—Powdered Capsicum is dark orange or dark reddish orange to strong yellowish brown; has a characteristic odor, an intensely pungent taste and is sternutatory. It shows numerous fragments of thin-walled parenchyma containing oil globules and orange, red, or yellow chromoplastids; fragments of epicarp with either striated, rectangular cells arranged in parallel series (African Chillies), or with polygonal, triangular, or irregular cells, with or without beaded walls. The endocarp contains stone cells with slightly wavy, lignified walls and broad lumina. Numerous fragments of spermoderm composed of stone cells are present, showing in surface view, deeply sinuate, greatly thickened and lignified vertical walls containing numerous pore canals. Fragments of small-celled parenchyma of the endosperm containing fixed oil and aleurone grains, the latter up to 5.5 microns in diameter, are also present as well as occasional fibro-vascular elements and calyx tissues.

Stems and calyxes—Capsicum contains not more than 3 per cent of its stems and calyxes.

Foreign organic matter—Capsicum contains not more than 1 per cent of foreign organic matter, other than stems and calyxes, page 760.

Acid-insoluble ash—Capsicum yields not more than 1.25 per cent of acid-insoluble ash, page 761.

Assay—Proceed as directed for the determination of *Non-volatile Ether-soluble Extractive*, page 764.

Storage—Preserve Capsicum in well-closed containers, adding a few drops of chloroform or carbon tetrachloride from time to time to prevent attack by insects.

AVERAGE DOSE—**60 mg.** (approximately 1 grain).

CAPSICUM OINTMENT

Unguentum Capsici

Ung. Capsic.

Capsicum Oleoresin	**50 Gm.**
Paraffin	**100 Gm.**
Petrolatum	**850 Gm.**
To make	**1000 Gm.**

Melt the paraffin, add the petrolatum, and continue the heat until completely liquefied. Then remove from the heat, add the capsicum oleoresin, mix thoroughly, and stir frequently until the Ointment congeals.

Storage—Preserve Capsicum Ointment in well-closed containers and avoid prolonged exposure to temperatures above 30°.

Capsicum Oleoresin

CAPSICUM OLEORESIN
Oleoresina Capsici

Oleores. Capsic.

Extract the oleoresin from capsicum, in coarse powder, by percolation, using either acetone or ether as the menstruum. Recover the greater part of the volatile solvent from the percolate by distillation, transfer the residue to a dish, and allow the remainder of the volatile solvent to evaporate spontaneously in a warm place, remote from flame. Separate the liquid oleoresin from the fatty matter by decantation or by draining in a funnel provided with a pledget of absorbent cotton, and reject the fatty matter.

Storage—Preserve Capsicum Oleoresin in tight containers.

AVERAGE DOSE—**15 mg.** (approximately 1/4 grain).

Capsicum Tincture

CAPSICUM TINCTURE
Tinctura Capsici

Tr. Capsic.

Capsicum, in moderately coarse powder	**100 Gm.**
Alcohol,	
Water, each, a sufficient quantity,	
To make	**1000 cc.**

Prepare the Tincture by Process P, page 758, using a mixture of 9 volumes of alcohol and 1 volume of water as the menstruum. Macerate the drug during 3 hours, and then percolate rapidly.

Alcohol content—From 80 to 85 per cent, by volume, of C_2H_5OH.
Storage—Preserve Capsicum Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**0.5 cc.** (approximately 8 minims).

Capsules

Carbon Tetrachloride Capsules, page 123
Castor Oil Capsules, page 129
Chenopodium Oil Capsules, page 137
Ephedrine Sulfate and Phenobarbital Capsules, page 190
Ephedrine Sulfate Capsules, page 191
Quinine Sulfate Capsules, page 433

Reduced Iron Capsules, page 280
Saccharated Ferrous Carbonate Capsules, page 224
Stramonium Capsules, page 503

Caramel

CARAMEL
Caramel
Burnt Sugar Coloring

Caramel is a concentrated aqueous solution of the product obtained by heating sugar or glucose until the sweet taste is destroyed and a uniform dark brown mass results, a small amount of alkali, alkaline carbonate or a trace of mineral acid being added while heating.

Description—Caramel is a thick, dark brown liquid with the characteristic odor of burnt sugar, and a pleasant, bitter taste. One part of Caramel dissolved in 1000 parts of distilled water yields a clear solution having a distinct yellowish orange color. The color of this solution is not changed, and no precipitate is formed after exposure to sunlight for 6 hours. Caramel spread in a thin layer on a glass plate appears homogeneous, reddish brown, and transparent.
Solubility—Caramel is miscible with water in all proportions, and is miscible with dilute alcohol up to 55 per cent by volume. It is immiscible with ether, chloroform, acetone, benzene, petroleum benzin, or turpentine oil.
Specific gravity—The specific gravity of Caramel is not less than 1.30 at 25°.
Purity—The addition of 0.5 cc. of phosphoric acid to 20 cc. of an aqueous solution of Caramel (1 in 20) produces no precipitate.
Residue on ignition—Caramel swells, when incinerated, and forms a coke-like charcoal, which burns off only after prolonged heating at a high temperature. It yields not more than 8 per cent of residue on ignition.
Storage—Preserve Caramel in tight containers.

Caraway Oil

CARAWAY OIL
Oleum Cari
Ol. Cari

Caraway Oil is a volatile oil distilled from the dried, ripe fruit of *Carum Carvi* Linné (Fam. *Umbelliferæ*).

Caraway Oil yields not less than 50 per cent, by volume, of carvone.

Description—Caraway Oil is a colorless to pale yellow liquid, with the characteristic odor and taste of caraway.
Solubility in alcohol—One volume of Caraway Oil is soluble in 8 volumes of 80 per cent alcohol.
Specific gravity—The specific gravity of Caraway Oil is not less than 0.900 and not more than 0.910 at 25°.
Optical rotation—The optical rotation of Caraway Oil is not less than +70° and not more than +80° when determined in a 100-mm. tube at 25°, page 737.
Refractive index—The refractive index of Caraway Oil at 20° is not less than 1.484 and not more than 1.488, page 745.

Assay—Introduce 10 cc. of Caraway Oil, accurately measured, into a cassia flask, and add 50 cc. of a saturated solution of sodium sulfite which has been carefully rendered neutral to 2 drops of phenolphthalein T.S. by means of a saturated sodium bisulfite solution. Heat the flask in boiling water and shake it repeatedly, neutralizing the mixture from time to time by the addition of a few drops of the saturated sodium bisulfite solution. When no coloration appears upon adding a few more drops of phenolphthalein T.S. and heating for 15 minutes, cool the mixture to room temperature, and when the liquids have separated completely, add sufficient sodium sulfite solution to raise the lower limit of the oily layer within the graduated portion of the neck of the flask. Note the volume of the residual oily liquid. This volume does not exceed 5 cc., indicating the presence in Caraway Oil of not less than 50 per cent, by volume, of carvone ($C_{10}H_{14}O$).

Storage—Preserve Caraway Oil in tight, light-resistant containers.

AVERAGE DOSE—**0.1 cc.** (approximately $1^1/_2$ minims).

Carbarsone Tablets

CARBARSONE TABLETS
Tabellæ Carbarsoni

Tab. Carbarson.

Carbarsone Tablets contain not less than 92.5 per cent and not more than 107.5 per cent of the labeled amount of $C_7H_9AsN_2O_4$.

Identification—Place about 1 Gm. of the pulverized Tablets in a test tube, add 10 cc. of sodium hydroxide T.S. and 10 cc. of distilled water. Agitate vigorously and filter the mixture. To the clear filtrate add 2 Gm. of sodium hydrosulfite and warm the mixture to 50°: a light yellow precipitate is formed which is insoluble in an excess of sodium hydroxide T.S.

Assay—Weigh a counted number of not less than 20 of the Tablets and reduce them to a fine powder without appreciable loss. Weigh accurately a portion of the powder, equivalent to about 0.2 Gm. of carbarsone, and transfer quantitatively to a 300-cc. glass-stoppered flask and continue as directed in the *Assay* under *Acetarsone*, page 17, beginning with, "Add 1 Gm. of finely powdered potassium permanganate. . . ." Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.013004 Gm. of $C_7H_9AsN_2O_4$.

Storage—Preserve Carbarsone Tablets in well-closed containers.

Sizes—Carbarsone Tablets usually available contain the following amounts of Carbarsone: **50 mg.** and **0.25 Gm.** (approximately $^3/_4$ and 4 grains).

AVERAGE DOSE—**0.2 Gm.** (approximately 3 grains) of Carbarsone.

Carbon Tetrachloride

CARBON TETRACHLORIDE
Carbonei Tetrachloridum

CCl_4 Mol. wt. 153.84

Description—Carbon Tetrachloride is a clear, colorless, mobile liquid. It has a characteristic odor, resembling that of chloroform. Carbon Tetrachloride is not inflammable, but is slowly decomposed by light and by various metals if moisture is present.

Solubility—Carbon Tetrachloride dissolves in about 2000 times its volume of water, and is miscible with alcohol, with chloroform, and with ether. It dissolves most of the fixed and volatile oils.

Specific gravity—The specific gravity of carbon tetrachloride is not less than 1.588 and not more than 1.590 at 25°.

Distillation range—Carbon Tetrachloride distils completely between 76° and 78° when tested by Method I, under *Boiling or Distilling Temperatures*, page 692.

Non-volatile residue—Evaporate 50 cc. of Carbon Tetrachloride in a tared porcelain dish on a water bath to a volume of about 1 cc., and allow it to evaporate spontaneously to dryness: the residue, if any, is odorless. Dry the residue at 100° for 1 hour and weigh: the weight of the residue does not exceed 1 mg.

Readily carbonizable substances—Measure 40 cc. of Carbon Tetrachloride into a glass-stoppered separator previously rinsed with sulfuric acid. Add 5 cc. of sulfuric acid, shake the mixture vigorously for 5 minutes, allow it to separate completely, and transfer the sulfuric acid layer to a comparison vessel: the color is not deeper than matching fluid A, page 744.

Acid, chloride ion, and free chlorine—Shake 15 cc. of Carbon Tetrachloride with 25 cc. of recently boiled and cooled distilled water during 5 minutes, and allow the liquids to separate completely: the aqueous layer is neutral to litmus paper, and separate, 10-cc. portions are not affected by a few drops of silver nitrate T.S., or colored blue by the addition of a few drops each of potassium iodide T.S. and starch T.S.

Carbon disulfide—Mix 10 cc. of Carbon Tetrachloride with an equal volume of a 10 per cent solution of potassium hydroxide in alcohol, and allow the mixture to stand for 1 hour. Add 5 cc. of acetic acid, and follow this with 1 cc. of cupric sulfate T.S.: no yellow precipitate appears in the mixture within 2 hours.

Storage—Preserve Carbon Tetrachloride in tight, light-resistant containers.

AVERAGE DOSE—*Caution: As an anthelmintic for adults, single dose,* **2.5 cc.** (approximately 40 minims).

CARBON TETRACHLORIDE CAPSULES

Capsulæ Carbonei Tetrachloridi

Cap. Carbon. Tetrachlor.

Carbon Tetrachloride Capsules contain not less than 92 per cent and not more than 108 per cent of the labeled amount of CCl_4.

Identification—Shake the carbon tetrachloride obtained in the assay with about 1 Gm. of anhydrous sodium sulfate, and filter through a pledget of dry cotton into a dry flask. The filtrate has a specific gravity of 1.588 to 1.590 at 25°, and distils completely between 76° and 78°.

Assay—Place in the flask of a toluene moisture apparatus, page 761, having a graduated receiving tube of 20-cc. capacity, a sufficient number of Carbon Tetrachloride Capsules to yield about 15 cc. of carbon tetrachloride. Add 25 cc. of glycerin, and heat the flask over a small flame until the lower layer in the receiving tube does not increase. Cool the receiving tube at 25°, and adjust the meniscus if necessary, by washing the walls with a spray of about 2 cc. of distilled water. The volume of the lower layer represents the volume of carbon tetrachloride in the number of Capsules taken for the assay.

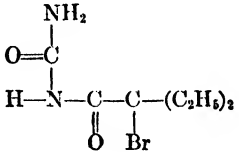
Storage—Preserve Carbon Tetrachloride Capsules in well-closed containers, at a temperature which does not exceed 35°.
Sizes—Carbon Tetrachloride Capsules usually available contain the following amount of carbon tetrachloride: 1 cc. (approximately 15 minims).

AVERAGE DOSE—**2.5 cc.** (approximately 40 minims) of Carbon Tetrachloride.

Carbromal

CARBROMAL
Carbromalum

Carbrom. Bromodiethylacetylurea



$C_7H_{13}N_2O_2Br$ Mol. wt. 237.11

Description—Carbromal occurs as a white, odorless, crystalline powder.
Solubility—One Gm. of Carbromal dissolves in about 3000 cc. of water, in about 18 cc. of alcohol, in about 3 cc. of chloroform, and in about 14 cc. of ether, at 25°. It is very soluble in boiling alcohol, and dissolves in sulfuric, nitric, or hydrochloric acids, from which acid solutions it is precipitated by the addition of water. It is dissolved by solutions of alkali hydroxides.
Melting point—Carbromal melts between 116° and 119°, page 731.
Identification—
A: On boiling about 0.2 Gm. of Carbromal with 5 cc. of an aqueous solution of sodium hydroxide (1 in 10), ammonia is evolved.
B: Mix 0.1 Gm. of Carbromal with 0.5 Gm. of anhydrous sodium carbonate, and ignite the mixture gently until the decomposition is complete. Dissolve the residue in 5 cc. of hot distilled water, cool the solution, acidify with acetic acid, and filter. Add 2 cc. of chloroform to the filtrate and then chlorine T.S., dropwise, shaking the mixture: the chloroform acquires an orange color.
Free acid—Shake 1 Gm. of Carbromal with 20 cc. of distilled water during 5 minutes, and filter the mixture: the filtrate is neutral to litmus paper. Retain this filtrate for use in tests for *Chloride* and *Sulfate*.
Residue on ignition—Carbromal yields not more than 0.1 per cent of residue on ignition, page 745.
Chloride—A 5-cc. portion of the filtrate shows no more chloride than corresponds to 0.1 cc. of 0.02 *N* hydrochloric acid, page 758.
Sulfate—A 5-cc. portion of the filtrate shows no more sulfate than corresponds to 0.1 cc. of 0.02 *N* sulfuric acid, page 759.
Readily carbonizable substances—The color of a solution produced by dissolving 0.5 Gm. of Carbromal in 5 cc. of sulfuric acid is not deeper than matching fluid A, page 744.
Storage—Preserve Carbromal in well-closed containers.

AVERAGE DOSE—**0.5 Gm.** (approximately $7\frac{1}{2}$ grains).

COMPOUND CARDAMOM ELIXIR

Elixir Cardamomi Compositum

Elix. Cardam. Comp.

Compound Cardamom Spirit	10 cc.
Alcohol	90 cc.
Syrup	400 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Mix the compound cardamom spirit with the alcohol; add the syrup and sufficient distilled water, in several portions, shaking the mixture thoroughly after each addition, to make the product measure 1000 cc.; let it stand 24 hours, shaking occasionally; then filter, using 10 Gm. of purified talc, if necessary, to clarify the product.

Alcohol content—From 7 to 9 per cent, by volume, of C_2H_5OH.
Storage—Preserve Compound Cardamom Elixir in tight containers.

CARDAMOM OIL

Oleum Cardamomi

Ol. Cardam.

Cardamom Oil is a volatile oil distilled from the seed of *Elettaria Cardamomum* (Linné) Maton (Fam. *Zingiberaceæ*).

Description—Cardamom Oil is a colorless or very pale yellow liquid with the aromatic, penetrating, and somewhat camphoraceous odor of cardamom, and a persistently pungent, strongly aromatic taste. It is affected by light. An alcohol solution of Cardamom Oil is neutral or acid to litmus paper.
Solubility—Cardamom Oil is miscible with alcohol.
Solubility in alcohol—Cardamom Oil dissolves in 5 volumes of 70 per cent alcohol.
Specific gravity—The specific gravity of Cardamom Oil is not less than 0.917 and not more than 0.947 at 25°.
Optical rotation—The optical rotation of Cardamom Oil is not less than +22° and not more than +44° when determined in a 100-mm. tube at 25°, page 737.
Refractive index—The refractive index of Cardamom Oil is not less than 1.4630 and not more than 1.4660 at 20°, page 745.
Storage—Preserve Cardamom Oil in tight, light-resistant containers.

Cardamom Spirit, Compound

COMPOUND CARDAMOM SPIRIT
Spiritus Cardamomi Compositus

Sp. Cardam. Comp.

Cardamom Oil	100 cc.
Orange Oil	100 cc.
Cinnamon Oil	10 cc.
Clove Oil	5 cc.
Anethole	5 cc.
Caraway Oil	0.5 cc.
Alcohol, a sufficient quantity,	
To make	1000 cc.

Mix the oils and the anethole with sufficient alcohol to make the product measure 1000 cc.

Alcohol content—From 68 to 74 per cent, by volume, of C_2H_5OH.
Storage—Preserve Compound Cardamom Spirit in tight, light-resistant containers.

Carminative Mixture

CARMINATIVE MIXTURE
Mistura Carminativa

Mist. Carminat. Dalby's Carminative

Magnesium Carbonate	65 Gm.
Potassium Carbonate	3 Gm.
Opium Tincture	25 cc.
Caraway Oil	0.5 cc.
Fennel Oil	0.5 cc.
Peppermint Oil	0.5 cc.
Syrup	160 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Triturate the oils with the magnesium carbonate and 750 cc. of the water, gradually added. Then add the other ingredients and sufficient distilled water to make the product measure 1000 cc., and mix thoroughly.

Alcohol content—Not more than 1 per cent, by volume, of C_2H_5OH.
Storage—Preserve Carminative Mixture in tight containers.

AVERAGE DOSE—For infants: **0.5 cc.** (approximately 8 minims).

One average metric dose (for infants) contains 32.5 mg. of Magnesium Carbonate, 1.5 mg. of Potassium Carbonate, and 0.0125 cc. of Opium Tincture.

CARMINE
Carminum

Carmine is the aluminum lake of the coloring principle obtained from cochineal.

Description—Carmine occurs as irregular, angular, vivid red fragments or as a powder, without odor or taste. When burned, it emits an odor resembling that of burned feathers.

Solubility—Carmine is slightly soluble in water, to which it imparts a red color; it is freely soluble in diluted ammonia solution or alkaline liquids, forming a strong to deep red solution.

Loss on drying—When dried to constant weight at 105°, Carmine loses not more than 25 per cent of its weight.

Residue on ignition—Carmine yields not more than 12 per cent of residue on ignition, page 745.

Tin, lead, and soluble barium compounds—Under a hood, fuse the ash from 1 Gm. of Carmine with 1 Gm. of sodium cyanide, dissolve the fused mass in hydrochloric acid with the addition of a few drops of nitric acid, dilute it with distilled water to 30 cc., and filter the solution: separate portions of 10 cc. each of this solution yield no precipitate with hydrogen sulfide T.S. or with sulfuric acid.

Insoluble barium salts—Fuse the ash from 1 Gm. of Carmine with a mixture of 1 Gm. of sodium cyanide and 1 Gm. of potassium carbonate, and extract the fused mass with boiling distilled water; filter, wash the residue with hot distilled water, and dissolve the residue in diluted hydrochloric acid: the addition of 5 drops of diluted sulfuric acid produces no turbidity.

Storage—Preserve Carmine in well-closed containers.

CARMINE SOLUTION
Liquor Carmini

Liq. Carmin.

Carmine	**65 Gm.**
Diluted Ammonia Solution	**365 cc.**
Glycerin	**365 cc.**
Distilled Water, a sufficient quantity,	
To make	**1000 cc.**

Triturate the carmine to a fine powder, gradually add the diluted ammonia solution, and then the glycerin, with constant trituration. Transfer the mixture to a porcelain dish, and heat it on a water bath, stirring constantly, until the liquid is entirely free from ammoniacal odor. Then cool the liquid, and add sufficient distilled water to make the product measure 1000 cc.

Description—Carmine Solution is a deep red, rather viscous liquid, free from ammoniacal odor. In aqueous dilution (1 in 1500) and viewed in a 1-cm. depth, the color is light purplish red. This aqueous dilution viewed in a 1-cm. depth becomes moderate red-orange in color upon the addition of hydrochloric acid and strong red-purple in color upon the addition of an aqueous solution of sodium hydroxide (4 in 10). The specific gravity of Carmine Solution is about 1.116 at 25°.

Residue on ignition—Incinerate the residue from 10 cc. of Carmine Solution: it yields not more than 80 mg. of residue on ignition, page 745.

Lead precipitate residue—Dilute 5 cc. of Carmine Solution with 100 cc. of distilled water and precipitate the carmine with lead acetate T.S.: a faintly pink, transparent, supernatant liquid remains, and the residue, collected on a tared filter and dried to constant weight at 105°, weighs not less than 0.3 Gm.

Absence of coal-tar dyes—To a mixture of 10 cc. of Carmine Solution and 50 cc. of water, add 10 cc. of diluted sulfuric acid; immerse in the mixture a piece of white woolen cloth about 5 cm. square. Boil the solution for 15 minutes; then remove the cloth, wash it thoroughly in cold water, and place it in a solution of about 20 cc. of water and 1 cc. of ammonia T.S., and heat gently for 15 minutes. Remove the cloth, dilute the solution to 50 cc., and acidify with 2 cc. of hydrochloric acid; place a new piece of cloth of the same size in the solution, and boil for 10 minutes; the second piece of cloth should be colorless.

Color standard—To 1 cc. of Carmine Solution add sufficient distilled water to make 2000 cc., and mix well. Compare the color of this freshly prepared dilution, in Nessler tubes or in a colorimeter, with a standard color solution freshly prepared as follows: to 3.6 cc. of freshly prepared 0.01 *N* potassium permanganate add 96.4 cc. of 0.1 *N* cobaltous chloride and mix well. The color tint of this dilution of Carmine Solution approximates that of the standard color solution; the intensity of color of the standard color solution in a column 50 mm. in height closely matches the intensity of color of the diluted carmine solution in a column ranging from 31 to 34 mm. in height.

Storage—Preserve Carmine Solution in tight containers.

Cascara Sagrada Elixir

CASCARA SAGRADA ELIXIR

Elixir Cascaræ Sagradæ

Elix. Casc. Sagr.

Aromatic Cascara Sagrada Fluidextract	**500 cc.**
Glycyrrhiza Syrup, a sufficient quantity,	
To make	**1000 cc.**

Mix the ingredients and filter, if necessary, until the product is clear.

Alcohol content—From 11 to 13 per cent, by volume, of C_2H_5OH.

Storage—Preserve Cascara Sagrada Elixir in tight containers.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains 2 cc. of Aromatic Cascara Sagrada Fluidextract.

AROMATIC CASTOR OIL
Oleum Ricini Aromaticum
Ol. Ricin. Arom.

Cinnamon Oil	**3 cc.**
Clove Oil	**1 cc.**
Saccharin	**0.5 Gm.**
Vanillin	**1 Gm.**
Coumarin	**0.1 Gm.**
Alcohol	**30 cc.**
Castor Oil, a sufficient quantity, To make	**1000 cc.**

Dissolve the volatile oils and the solids in the alcohol, add the castor oil, and mix thoroughly.

Alcohol content—From 2 to 3 per cent, by volume, of C_2H_5OH.
Storage—Preserve Aromatic Castor Oil in tight containers.

AVERAGE DOSE—**15 cc.** (approximately 4 fluidrachms).

CASTOR OIL CAPSULES
Capsulæ Olei Ricini
Cap. Ol. Ricin.

Castor Oil Capsules contain not less than 95 per cent and not more than 105 per cent of the labeled amount of castor oil, and the oil from the Capsules complies with the requirements of this monograph for Castor Oil.

Description—Castor Oil is a pale yellowish or almost colorless, transparent, viscid liquid. It has a faint, mild odor, and a bland, afterward slightly acrid and usually nauseating taste.
Solubility—Castor Oil dissolves in alcohol and is miscible with dehydrated alcohol, with glacial acetic acid, with chloroform, and with ether.
Specific gravity—The specific gravity of Castor Oil is not less than 0.945 and not more than 0.965 at 25°.
Saponification value—The saponification value of Castor Oil is not less than 179 and not more than 185, page 713.
Iodine value—The iodine value of Castor Oil is not less than 83 and not more than 88, page 713.
Acid value—The free fatty acids in 10 Gm. of Castor Oil require for neutralization not more than 7.5 cc. of 0.1 *N* sodium hydroxide, page 712.

Assay—Weigh accurately 20 Castor Oil Capsules in a tared weighing bottle. Carefully open the capsules without any loss of shell material, and transfer the contents to a suitable container. Remove any oil from the emptied capsules by washing with small quantities of ether, and allow the capsules to dry at room temperature until the odor of ether is no longer perceptible. Weigh the empty capsules in the original tared weighing bottle. The difference represents the weight of castor oil in the 20 capsules.

Storage—Preserve Castor Oil Capsules in well-closed containers, preferably at a temperature not exceeding 35°.

Sizes—Castor Oil Capsules usually available contain the following amounts of castor oil: **0.6, 1, 1.25, 2.5, and 5 cc.** (approximately 10, 15, 20 and 40 minims; and $1^1/_4$ fluidrachms).

AVERAGE DOSE—**15 cc.** (approximately 4 fluidrachms) of Castor Oil.

Cataplasm, Kaolin, page 288

Cataria

CATARIA
Cataria

Catnip Catmint

Cataria consists of the dried leaves and flowering tops of *Nepeta Cataria* Linné (Fam. *Labiatæ*).

Unground Cataria—Unground Cataria consists of tops from 10 to 20 cm. long, much branched, or crushed and broken. The stems are quadrangular, downy, and up to 4 mm. in diameter. The leaves are opposite, the larger ones petiolate, from 2 to 7 cm. long, ovate or oblong, rounded or heart-shaped at the base, pointed at the apex, light olive to weak olive-green, sparsely hairy above, downy beneath; the margin deeply crenate; the floral leaves are small and bract-like. The flowers are small, in dense interrupted spikes. The calyx is hairy, tubular, curved obliquely and subequally 5-toothed. The corolla is light colored, has a dilated throat, the limb being bilabiate, the upper lip erect and 2-cleft, the lower spreading and 3-cleft, the middle lobe largest, crenulate. Stamens in 2 pairs ascend under the upper lip, the lower pair shorter.

Powdered Cataria—Powdered Cataria is light olive-brown to light olive. It has a faintly aromatic and mint-like odor and a bitter, pungent, aromatic taste. It shows numerous fragments of parenchyma, the palisade tissue containing plastids; non-glandular hairs are numerous, 1- to 5-celled, tapering, frequently papillose and more or less broken, the basal cells up to 50 microns in diameter; glandular hairs have a 1-celled stalk and a many-celled secreting head, the latter up to 70 microns in diameter. The tracheæ have spiral, reticulate, annular, or simple pore markings. The epidermis is composed of sinuous-walled cells and broadly elliptical stomata up to 30 microns in length. Collenchyma and lignified wood fibers are few. Pollen grains are few, spherical, smooth, and grooved.

Stems and other foreign organic matter—Cataria contains not more than 5 per cent of its stems over 4 mm. in diameter or other foreign organic matter, page 760.

Acid-insoluble ash—Cataria yields not more than 2 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**4 Gm.** (approximately 60 grains).

CATARIA AND FENNEL ELIXIR
Elixir Catariæ et Fœniculi

Elix. Catar. et Fœnic. Catnip and Fennel Elixir

Cataria, in moderately coarse powder	**100 Gm.**
Fennel, in coarse powder	**40 Gm.**
Spearmint, in moderately coarse powder	**20 Gm.**
Sodium Bicarbonate	**18 Gm.**
Sucrose	**170 Gm.**
Alcohol,	
Distilled Water, each, a sufficient quantity,	
To make	**1000 cc.**

Mix 1 volume of alcohol with 3 volumes of distilled water, and use the mixture as the menstruum for extracting the mixed drugs by Process P for Tinctures, page 758. Dissolve the sodium bicarbonate and the sucrose by gentle agitation in the first 850 cc. of the percolate collected. Then add sufficient of the percolate to make the product measure 1000 cc., mix well, and filter, if necessary, until the product is clear.

Alcohol content—From 17 to 20 per cent, by volume, of C_2H_5OH.
Storage—Preserve Cataria and Fennel Elixir in tight containers.

AVERAGE DOSE—For infants: **0.5 cc.** (approximately 8 minims).

One average metric dose contains the equivalent of 50 mg. of Cataria, 20 mg. of Fennel, and 9 mg. of Sodium Bicarbonate.

CAULOPHYLLUM
Caulophyllum

Cauloph. Blue Cohosh

Caulophyllum consists of the dried rhizome and roots of *Caulophyllum thalictroides* (Linné) Michaux (Fam. *Berberidaceæ*).

Unground Caulophyllum—Unground Caulophyllum shows a rhizome of horizontal growth, from 7 to 25 cm. long and from 5 to 15 mm. thick, much branched, with large cup-shaped stem-scars on the upper surface and numerous roots from all surfaces. It is dusky brown to light yellowish brown in color. The fracture of the rhizome is rough and woody, and of the roots is tough. Internally it is light brown to light yellowish brown with a waxy luster. It shows a thin bark; a narrow xylem zone, consisting of numerous thin wood-wedges and medullary rays; and a large, parenchymatous pith. The roots occur in a tangled or matted mass, and are long, tortuous, thin, wiry, dusky brown to light yellowish brown in color.

Histology—Caulophyllum shows a rhizome with a single layer of orange to greenish yellow epidermal cells; a narrow cortex, made up of compact parenchyma cells with abundant starch; a circular band of numerous narrow-ovate open collateral bundles separated by medullary rays up to 10 cells wide; and a xylem of tracheæ and tracheids, embedded in a matrix of thick-walled wood fibers. The root shows a persistent endodermis, and a stele containing a 2- to 9-arch radial bundle during primary growth, which develops into a triangular, cruciform or stellate group of open collateral bundles separated by short, wedge-shaped medullary rays.

Powdered Caulophyllum—Powdered Caulophyllum is pale brown to weak yellowish orange. It is odorless, but sternutatory, and has a bitter and acrid taste. It shows numerous starch grains up to 18 microns in diameter, mostly simple, spherical, or ovate, with an indistinct hilum; fragments of epidermis having polygonal-shaped cells; yellowish tracheæ and tracheids with irregularly circular, bordered pores; wood fibers with thick lignified walls, a few oblique pores, and usually curved ends; and many fragments of starch parenchyma.

Foreign organic matter—Caulophyllum contains not more than 3 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Caulophyllum yields not more than 4 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**0.5 Gm.** (approximately $7^1/_2$ grains).

Cement, Zinc Compounds and Eugenol, page 562

Cerate

CERATE
Ceratum

Simple Cerate

White Wax	**300 Gm.**
Benzoinated Lard	**700 Gm.**
To make	**1000 Gm.**

Melt the white wax on a water bath, add the benzoinated lard, and heat until it is liquefied. Strain the liquid, if necessary, and stir it constantly until it congeals.

Storage—Preserve Cerate in well-closed containers, preferably at a temperature which does not exceed 35°.

Cerates

Cantharides Cerate, page 117
Compound Rosin Cerate, page 446
Lead Subacetate Cerate, page 294
Rosin Cerate, page 446

CERIUM OXALATE

Cerii Oxalas

Cerii Oxal.

Cerium Oxalate is a mixture of the oxalates of cerium, neodymium, praseodymium, lanthanum, and other associated elements.

Description—Cerium Oxalate occurs as a fine, white, or slightly pink powder, without odor or taste, and is permanent in the air.

Solubility—Cerium Oxalate is insoluble in water, in alcohol, in ether, in solutions of the alkali hydroxides, in cold diluted sulfuric acid, and in cold diluted hydrochloric acid, but it is dissolved by these acids when heated.

Identification—

A: Boil Cerium Oxalate with sodium hydroxide T.S., filter, and add an excess of acetic acid to the filtrate: the addition of calcium chloride T.S. produces a white precipitate, insoluble in acetic acid but soluble in hydrochloric acid.

B: Dissolve Cerium Oxalate in a mixture of equal parts of hydrochloric acid and distilled water by means of heat: sodium hydroxide T.S., added in slight excess, precipitates white hydroxides, which do not redissolve in an excess of the reagent, but gradually turn yellow in contact with air. Ammonium carbonate T.S., added in slight excess to a similar acid solution, produces a white precipitate of the mixed carbonates of cerium and associated elements, which is somewhat soluble in an excess of the reagent.

Minimum per cent of oxides—When heated to redness, Cerium Oxalate is decomposed, leaving not less than 47 per cent of a reddish brown residue.

Carbonates—When Cerium Oxalate is dissolved in diluted hydrochloric acid no effervescence is produced.

Aluminum and zinc—Boil 0.3 Gm. of Cerium Oxalate with 15 cc. of sodium hydroxide T.S., and filter. No precipitate is produced in a portion of the filtrate by boiling with an excess of ammonium chloride T.S. (*aluminum*), or in another portion of the filtrate by the addition of sodium sulfide T.S. (*zinc*).

Arsenic—A solution of Cerium Oxalate (1 in 25) in hot dilute sulfuric acid (1 in 3) meets the requirements of the test for *Arsenic*, page 689.

Lead—Dissolve 1 Gm. of Cerium Oxalate in 50 cc. of nitric acid (1 in 2) by boiling, cool, transfer to a 100-cc. volumetric flask and dilute to volume with distilled water. A 10-cc. portion of this solution contains no more than 5 micrograms of lead (corresponding to not more than 50 parts per million) when determined according to the *Lead limit test*, page 729, using 5 cc. of ammonium citrate solution, 1 cc. of potassium cyanide solution, and 0.5 cc. of hydroxylamine hydrochloride solution.

Storage—Preserve Cerium Oxalate in well-closed containers.

AVERAGE DOSE—**0.2 Gm.** (approximately 3 grains).

CETYL ALCOHOL

Alcohol Cetylicum

$C_{16}H_{34}O$ Mol. wt. 242.43

Cetyl Alcohol is a mixture of solid alcohols consisting chiefly of cetyl alcohol, $[CH_3(CH_2)_{14}CH_2OH]$.

Description—Cetyl Alcohol occurs as unctuous, white flakes, granules, cubes or castings. It has a faint characteristic odor and a bland, mild taste.
Solubility—Cetyl Alcohol dissolves in alcohol and in ether, the solubility increasing with an increase in temperature. It is insoluble in water.
Melting point—Cetyl Alcohol melts between 45° and 50°, page 731.
Distillation range—Not less than 90 per cent of Cetyl Alcohol distils between 316° and 336° when tested by Method II, under *Boiling or Distilling Temperatures*, page 692.
Acid value—The acid value of Cetyl Alcohol is not more than 2, page 712.
Iodine value—The iodine value of Cetyl Alcohol is not more than 5, page 713.
Hydroxyl number—Transfer into a dry 250-cc. iodine flask about 2 Gm. of Cetyl Alcohol, accurately weighed, and add exactly 2 cc. of pyridine followed by 10 cc. of toluene, using the latter to rinse the neck of the flask. To the mixture add exactly 10 cc. of approximately 1.5 *M* acetyl chloride in toluene, stopper the flask and immerse in a water bath heated to 60° to 65° for 20 minutes. Add 25 cc. of distilled water, stopper the flask and shake it vigorously for 1 or 2 minutes and allow to stand for 5 minutes to decompose the excess acetyl chloride. Titrate to a permanent pink end point, shaking the flask vigorously toward the end of the titration to maintain the contents in an emulsified condition, with 1 *N* sodium hydroxide, using 1 cc. of phenolphthalein T.S. as the indicator. Run a blank under identical conditions, using the same amounts of reagents as in the determination. Subtract the number of cc. of 1 *N* sodium hydroxide used for the sample from the number of cc. used for the blank. Multiply the difference by 56.10 and divide by the weight of sample to obtain the hydroxyl number which is the number of mg. of potassium hydroxide equivalent to the hydroxyl content of 1 Gm. of the sample. The hydroxyl number of Cetyl Alcohol is not less than 218 and not more than 238.
Storage—Preserve Cetyl Alcohol in well-closed containers.

Ceylon Cinnamon, page 154

Chalk Powder, Aromatic

AROMATIC CHALK POWDER

Pulvis Cretæ Aromaticus

Pulv. Cret. Arom.

Cinnamon, in fine powder	80 Gm.
Myristica, freshly grated	60 Gm.
Clove, in fine powder	30 Gm.
Cardamom Seed, in fine powder	20 Gm.
Prepared Chalk	250 Gm.
Sucrose, in fine powder	560 Gm.
To make	1000 Gm.

Triturate the myristica with the prepared chalk until they are reduced to a fine powder; add the remaining ingredients, and continue the trituration until a uniform mixture is obtained.

Storage—Preserve Aromatic Chalk Powder in well-closed containers.

AVERAGE DOSE—**2 Gm.** (approximately 30 grains).

One average metric dose contains 0.5 Gm. of Prepared Chalk and 0.38 Gm. of mixed aromatics.

COMPOUND CHALK POWDER

Pulvis Cretæ Compositus

Pulv. Cret. Comp.

Prepared Chalk	**300 Gm.**
Acacia, in fine powder	**200 Gm.**
Sucrose, in fine powder	**500 Gm.**
To make	**1000 Gm.**

Mix the powders thoroughly by trituration and pass the product through a No. 60 sieve.

AVERAGE DOSE—**2 Gm.** (approximately 30 grains).

PURIFIED ANIMAL CHARCOAL

Carbo Animalis Purificatus

Carb. Anim. Purif.

Purified Animal Charcoal is charcoal prepared from bone and purified by removing the substances which are dissolved by hot hydrochloric acid and water.

Description—Purified Animal Charcoal occurs as a dull black, amorphous, odorless, and tasteless powder, which burns with a red glow but without a flame.

Solubility—Purified Animal Charcoal is insoluble in water, in alcohol, or in other common solvents.

Loss on drying—When dried at 105° for 2 hours, Purified Animal Charcoal loses not more than 12 per cent of its weight.

Reaction—Boil 1 Gm. of Purified Animal Charcoal with 20 cc. of distilled water, and filter: the filtrate is neutral to litmus paper.

Impurities soluble in hydrochloric acid—Heat 1 Gm. of Purified Animal Charcoal with 10 cc. of hydrochloric acid and 20 cc. of distilled water for 5 minutes; cool, filter through a dry filter, and wash the residue with sufficient distilled water to make the filtrate measure 50 cc. In 25 cc. of the filtrate, dissolve 1 Gm. of ammonium sulfate, evaporate to dryness, and ignite to constant weight: the weight of the residue does not exceed 30 mg.

Adsorptive power—Add 1 Gm. of finely powdered Purified Animal Charcoal, previously dried at 105° for 2 hours, to 100 cc. of an aqueous solution of methylene blue (1 in 1000) in a glass-stoppered container. Shake the mixture vigorously for 1 minute, and filter: the filtrate is colorless.

Shake vigorously 0.2 Gm. of finely powdered Purified Animal Charcoal, previously dried at 105° for 2 hours, with 50 cc. of 0.1 *N* iodine for 30 minutes in a glass-stoppered container. Filter, rejecting the first 10 cc. of the filtrate, and titrate 25 cc. of the subsequent filtrate with 0.1 *N* sodium thiosulfate: not more than 15 cc. of 0.1 *N* sodium thiosulfate is required.

Storage—Preserve Purified Animal Charcoal in well-closed containers.

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains).

Chaulmoogra Oil

CHAULMOOGRA OIL
Oleum Chaulmoogræ

Ol. Chaulmoog. Hydnocarpus Oil

Chaulmoogra Oil is the fixed oil expressed from the ripe seed of *Taraktogenos Kurzii* King, *Hydnocarpus Wightiana* Blume, or *Hydnocarpus anthelmintica* Pierre (Fam. *Flacourtiaceæ*). The fixed oil expressed from the ripe seed of other species of *Hydnocarpus* (Fam. *Flacourtiaceæ*), when designated as such and when conforming to the description and physical properties and meeting the requirements of the tests prescribed below, may be used.

Description—Chaulmoogra Oil is a yellow or brownish yellow liquid, or at temperatures below about 25°, a whitish, soft solid. It has a characteristic odor, and a somewhat acrid taste. It is affected by light.

Solubility—Chaulmoogra Oil dissolves in benzene, in chloroform, in ether, and in petroleum benzin, but is only partially soluble in alcohol.

Specific gravity—The specific gravity of Chaulmoogra Oil is not less than 0.940 and not more than 0.960 at 25°.

Optical rotation—The specific rotation $[\alpha]_D^{25}$ of Chaulmoogra Oil determined in a chloroform solution containing 10 Gm. of the Oil in each 100 cc., is not less than +48° and not more than +60°, page 737.

Castor oil or free fatty acids—Place 25 cc. of Chaulmoogra Oil in a measuring tube consisting of a glass-stoppered, pear-shaped bulb of not less than 100-cc. capacity, joined at its lower tapering end to a tube about 30 cm. long, and graduated to 25 cc. in divisions of 0.1 cc. Add 100 cc. of alcohol, and shake the mixture thoroughly for not less than 10 minutes. Allow the tube to stand for 48 hours, and observe the volume of the lower layer: its volume is not less than 23.5 cc.

Saponification value—The saponification value of Chaulmoogra Oil is not less than 196 and not more than 213, page 713.

Iodine value—The iodine value of Chaulmoogra Oil is not less than 93 and not more than 104, page 713.

Acid value—The free fatty acids in 10 Gm. of Chaulmoogra Oil require not more than 40 cc. of 0.1 *N* sodium hydroxide for neutralization, page 712.

Storage—Preserve Chaulmoogra Oil in well-filled, tight, light-resistant containers.

AVERAGE DOSE—1 cc. (approximately 15 minims).

Chenopodium Oil

CHENOPODIUM OIL
Oleum Chenopodii

Ol. Chenopod. American Wormseed Oil

Chenopodium Oil is the volatile oil distilled with steam from the fresh, over-ground parts of the flowering and fruiting plant of *Chenopodium ambrosioides* Linné var. *anthelminticum* (Linné) A. Gray (Fam. *Chenopodiaceæ*). It contains not less than 65 per cent, by weight, of ascaridol, $C_{10}H_{16}O_2$.

Description—Chenopodium Oil is a pale yellow to orange-yellow liquid, having a peculiar, unpleasant odor, and a bitter, burning taste.
Solubility in alcohol—Chenopodium Oil dissolves in 8 volumes of 70 per cent alcohol.
Specific gravity—The specific gravity of Chenopodium Oil is not less than 0.950 and not more than 0.980 at 25°.
Optical rotation—The optical rotation of Chenopodium Oil is not less than −4° and not more than −8° in a 100-mm. tube at 25°, page 737.
Refractive index—The refractive index of Chenopodium Oil is not less than 1.4740 and not more than 1.4790 at 20°, page 745.
Heavy metals—Chenopodium Oil meets the requirements of the test for *Heavy metals in volatile oils*, page 722.
Assay—Place about 2.5 Gm. of Chenopodium Oil, accurately weighed, in a 50-cc. volumetric flask, fill to the mark with 90 per cent acetic acid, mix well, and transfer a portion of this freshly prepared solution to a burette, graduated in twentieths of a cc. Into a glass-stoppered tube, about 150 mm. in length and 25 mm. in diameter, measure, from graduated pipettes, 3 cc. of a solution of potassium iodide (prepared by dissolving 8.3 Gm. of potassium iodide in sufficient distilled water to make 10 cc. of solution), 5 cc. of hydrochloric acid, and 10 cc. of glacial acetic acid. Immerse the tube in a freezing mixture until the temperature is reduced to −3°, add about 5 cc. of the acetic acid solution of the Oil, mix it with the cooled reagent as rapidly as possible, and observe the volume withdrawn from the burette after 2 minutes, to allow for draining. Set the stoppered tube aside at a temperature between 5° and 10°, for exactly 5 minutes, then, without diluting, titrate the liberated iodine with 0.1 *N* sodium thiosulfate. At the same time, conduct a blank test, but dilute the reagent with 20 cc. of distilled water before titrating the liberated iodine. The difference between the two titrations represents the iodine liberated by ascaridol. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.00665 Gm. of ascaridol, $C_{10}H_{16}O_2$.
Storage—Preserve Chenopodium Oil in tight containers and avoid exposure to excessive heat.

AVERAGE DOSE—*Caution: As an anthelmintic for adults, single dose,* 1 cc. (approximately 15 minims).

CHENOPODIUM OIL CAPSULES
Capsulæ Olei Chenopodii

Cap. Ol. Chenopod. American Wormseed Oil Capsules

Chenopodium Oil Capsules contain not less than 95 per cent and not more than 105 per cent of the labeled amount of chenopodium oil, and the oil from the Capsules contains not less than 65 per cent of ascaridol, $C_{10}H_{16}O_2$. Chenopodium Oil Capsules must not contain bulking agents, diluents, or similar substances.

Assay—Weigh accurately a counted number of not less than 20 Chenopodium Oil Capsules in a tared weighing bottle. Carefully open the capsules without any loss

of the shell material, transfer the contents to another tared weighing bottle, and weigh. Remove any of the oil remaining in the emptied capsules by washing first with small portions of alcohol and once with ether, and allow the capsules to dry at room temperature until the odor of ether is no longer perceptible, then weigh the empty capsules in the same tared bottle in which the full capsules were weighed. The difference represents the weight of chenopodium oil in the number of capsules taken.

Transfer the weighed oil to a 50-cc. volumetric flask with the aid of a funnel, and wash the weighing bottle and funnel with 90 per cent acetic acid, then add 90 per cent acetic acid to make 50 cc., mix well, and transfer to a burette. Into a glass-stoppered cylinder of about 150 mm. in length and 25 mm. in diameter measure, from graduated pipettes, 3 cc. of a solution of potassium iodide (prepared by dissolving 8.3 Gm. of potassium iodide in sufficient distilled water to measure 10 cc.), 5 cc. of hydrochloric acid, and 10 cc. of glacial acetic acid. Immerse the tube in a freezing mixture until the temperature is reduced to −3°, then add from the burette a volume of the acetic acid solution of the oil, equivalent to about 0.25 Gm. of chenopodium oil, mixing it with the cooled reagent as rapidly as possible. Stopper the cylinder, and set it aside in a cold place for 5 minutes. Note the volume drawn from the burette after 2 minutes. Finally, without diluting, titrate the liberated iodine with 0.1 *N* sodium thiosulfate. Perform a blank determination with the same quantities of the reagents and in the same manner, but dilute the reagents to 25 cc. with distilled water before titrating the liberated iodine, and make any necessary correction. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.00665 Gm. of $C_{10}H_{16}O_2$.

Storage—Preserve Chenopodium Oil Capsules in a well-closed container, and protect the oil in the capsules from light. Keep the Capsules preferably at a temperature which does not exceed 35°.

Sizes—Chenopodium Oil Capsules usually available contain the following amounts of chenopodium oil: **0.3** and **0.6 cc.** (approximately 5 and 10 minims).

AVERAGE DOSE—1 cc. (approximately 15 minims) of Chenopodium Oil.

Cherry Juice

CHERRY JUICE

Succus Cerasi

Suc. Ceras.

Cherry Juice is the liquid expressed from the fresh ripe fruit of *Prunus Cerasus* Linné (Fam. *Rosaceæ*).

Cherry Juice contains not less than 1.0 per cent of malic acid.

Coarsely crush washed, stemmed, unpitted, sour cherries in a grinder so as to break the pits but not mash the kernels; dissolve 0.1 per cent of benzoic acid in the mixture and allow it to stand at room temperature

(possibly for several days) until a small portion of the filtered juice produces a clear solution when mixed with one-half of its volume of alcohol; this solution does not become cloudy within 30 minutes. Press out the juice from the mixture and filter it.

Description—Cherry Juice is a clear liquid with an aromatic, characteristic odor, and a sour taste. It is affected by light. The color of the freshly prepared Juice is red to reddish orange.

Specific gravity—The specific gravity of Cherry Juice is not less than 1.045 and not more than 1.075 at 25°.

Refractive index—The refractive index of Cherry Juice is not less than 1.3500 at 25°, page 745.

Residue on ignition—Evaporate 10 cc. of Cherry Juice and ignite the residue: the residue on ignition is not less than 35 mg. and not more than 55 mg.

Hydrogen-ion concentration—The hydrogen-ion concentration expressed as *p*H is not less than 3.0 and not more than 4.0 at 25°.

Total solids—Evenly spread 5 cc. of Cherry Juice over the bottom of a tared half petri dish and place on an actively boiling water bath for 1 hour. Place in a vacuum desiccator, evacuate, and allow to stand 16 hours and weigh: the weight of the residue is not less than 0.5 Gm.

Reducing sugars—Add lead acetate T.S. to 5 cc. of Cherry Juice until the mixture, when filtered, gives no further precipitation with the lead acetate solution. Then filter the mixture and add to the clear filtrate 5 cc. of an aqueous solution of potassium oxalate (1 in 10) to remove the excess lead. Again filter and add 5 cc. of alkaline cupric tartrate T.S. to 5 cc. of the clear filtrate: upon warming a red precipitate is produced.

Volatile acids—Distil 25 cc. of Cherry Juice with steam to obtain 100 cc. of distillate: not more than 1.5 cc. of 0.1 *N* sodium hydroxide is required for neutralization of this distillate using phenolphthalein T.S. as the indicator.

Arsenic—To 50 cc. of Cherry Juice in a Kjeldahl flask add 10 cc. of nitric acid and 5 cc. of sulfuric acid; heat the mixture until the volume is reduced to about 10 cc. and the color becomes brownish or black; add a further small portion of nitric acid and continue the heating, adding small portions of nitric acid as often as browning recurs, until the organic matter is destroyed and dense, white fumes are liberated; then dilute the solution with about 10 cc. of water and add 0.5 Gm. of ammonium oxalate. Continue the heating until dense, white fumes are again evolved and the solution is colorless to weak yellow. Cool the mixture, dilute cautiously with distilled water to a volume of 50 cc., and, using 5 cc. of the dilution, apply the test for *Arsenic*, page 689. The stain produced from the 5 cc. of the solution does not exceed the stain produced by 0.002 mg. of arsenic trioxide.

Lead—Add 1 cc. of Cherry Juice to 10 cc. of nitric acid in a 250-cc. Erlenmeyer flask and boil for 5 to 10 minutes. Cool in an ice bath and transfer to a separatory funnel with the aid of 5 cc. of lead-free distilled water. This solution shall contain no more than 5 micrograms of lead (corresponding to not more than 5 parts per million) when tested according to the *Lead limit test*, page 729, using 15 cc. of ammonium citrate solution, 3 cc. of potassium cyanide solution, and 0.5 cc. of hydroxylamine hydrochloride solution.

Assay—Place 10 cc. of Cherry Juice, accurately measured, into a 125-cc. flask and add 1 Gm. of calcium carbonate. Heat on a water bath for 15 minutes, mixing occasionally, and filter. Wash the filter with five 5-cc. portions of distilled water. To the combined filtrate and washings add 1 cc. of ammonia T.S. and 15 cc. of ammonium oxalate T.S. Heat on a water bath for 15 minutes, collect the precipitate on a suitable filter, wash the flask and filter with 25 cc. of aqueous ammonia solution (1 in 50) in 5-cc. portions. Puncture the filter paper on the funnel with a small glass rod and wash the calcium oxalate into a suitable flask with water. Complete the washing of the filter paper with 50 cc. of diluted sulfuric acid, collecting the washings in the flask and digest the contents of the flask on a water bath for 15 minutes. Titrate the liberated oxalic acid with 0.1 *N* potas-

sium permanganate. Each cc. of 0.1 *N* potassium permanganate is equivalent to 0.006704 Gm. of malic acid.

Storage—Preserve Cherry Juice in tight, light-resistant containers, and avoid excessive heat.

Cherry Syrup

CHERRY SYRUP

Syrupus Cerasi

Syr. Ceras.

Cherry Juice	475 cc.
Sucrose	800 Gm.
Alcohol	20 cc.
Distilled Water, a sufficient quantity, To make	1000 cc.

Dissolve the sucrose in the juice by heating on a water bath, cool and remove the scum. Add the alcohol and sufficient distilled water to make 1000 cc. of the syrup. Mix well.

Alcohol content—From 1 to 2 per cent, by volume, of C_2H_5OH.

Storage—Preserve Cherry Syrup in tight, light-resistant containers, and avoid excessive heat.

Cherry, Wild, Fluidextract

WILD CHERRY FLUIDEXTRACT

Fluidextractum Pruni Virginianæ

Fldext. Prun. Virg.

Prepare the Fluidextract from wild cherry, in coarse powder, by Process B, page 718. Moisten the drug with a mixture of 1 volume of glycerin and 2 volumes of water (using about 600 cc. of the mixture for 1000 Gm. of drug); pack loosely in a cylindrical percolator, and macerate during 1 hour. Then add a mixture of 2 volumes of alcohol and 1 volume of water (375 cc. per 1000 Gm. of drug), and macerate during 2 hours longer. Percolate rapidly, and complete the extraction with a mixture of 1 volume of alcohol and 3 volumes of water as the menstruum.

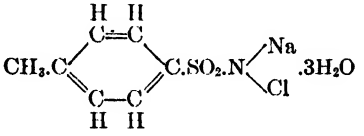
Alcohol content—From 14 to 18 per cent, by volume, of C_2H_5OH.
Storage—Preserve Wild Cherry Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—2 cc. (approximately 30 minims).

Chloramine-T

CHLORAMINE-T
Chloramina-T

Chloram.-T Chloramine



$C_7H_7ClNO_2SNa.3H_2O$ Mol. wt. 281.70

Chloramine-T contains the equivalent of not less than 11.5 per cent and not more than 13 per cent of active Cl.

Description—Chloramine-T occurs as a white to light yellow, crystalline powder, having a slight odor of chlorine. It slowly decomposes on exposure to air, losing chlorine, and is affected by light. When heated to between 95° and 100°, Chloramine-T loses its water of hydration without decomposition.
Solubility—One Gm. of Chloramine-T dissolves in 7 cc. of water at 25° and in about 2 cc. of boiling water. It dissolves in alcohol but the solution decomposes on standing. It is insoluble in chloroform, and in ether.
Identification—
A: The addition of potassium iodide T.S. to an aqueous solution of Chloramine-T (1 in 20) causes the liberation of iodine. Chloramine-T does not similarly displace bromine from alkali bromides unless the mixture is acidified (*difference from dichloramine-T*).
B: Acids produce in an aqueous solution of Chloramine-T (1 in 20) a white turbidity or precipitate which dissolves in an excess of an alkali hydroxide solution. When strong mineral acids are used, chlorine is also liberated.
Readily carbonizable substances—The color of a solution produced by dissolving 0.2 Gm. of Chloramine-T in 5 cc. of sulfuric acid is not deeper than matching fluid A, page 744.
Reaction—An aqueous solution of Chloramine-T (1 in 20) is alkaline to litmus paper and to phenolphthalein T.S.
Assay—Dissolve about 0.5 Gm. of Chloramine-T, accurately weighed, in 50 cc. of distilled water, add 5 cc. of potassium iodide T.S. and 5 cc. of acetic acid, and allow the mixture to stand in a glass-stoppered flask for 10 minutes. Titrate the liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.001773 Gm. of active Cl.
Storage—Preserve Chloramine-T in tight, light-resistant containers.

Chlorinated Paraffin, page 373

Chloroform Spirit

CHLOROFORM SPIRIT
Spiritus Chloroformi
Sp. Chlorof.

Chloroform Spirit contains, in each 100 cc., not less than 5.55 cc. and not more than 6.30 cc. of $CHCl_3$ at 25°.

Chloroform	60 cc.
Alcohol, a sufficient quantity,	
To make	1000 cc.

Mix the chloroform with sufficient alcohol to make the product measure 1000 cc.

Assay—Determine the chloroform in 50 cc. of Chloroform Spirit, accurately measured at 25°, as directed under *Chloroform Determination*, page 693. The volume of chloroform obtained, multiplied by 2, represents the volume of $CHCl_3$ in 100 cc. of Chloroform Spirit.
Alcohol content—From 85 to 91 per cent, by volume, of C_2H_5OH.
Storage—Preserve Chloroform Spirit in tight, light-resistant containers.

AVERAGE DOSE—2 cc. (approximately 30 minims).

Chloroform Water

CHLOROFORM WATER
Aqua Chloroformi
Aq. Chlorof.

Chloroform,
Distilled Water, each, a sufficient quantity.

To a convenient quantity of distilled water contained in a dark amber-colored bottle, add enough chloroform to maintain a slight excess after the mixture has been repeatedly and thoroughly agitated, taking care that there is always an excess of chloroform present.

When Chloroform Water is to be dispensed, decant the quantity required from the separated chloroform.

Storage—Preserve Chloroform Water in tight, light-resistant containers.

AVERAGE DOSE—**15 cc.** (approximately 4 fluidrachms).

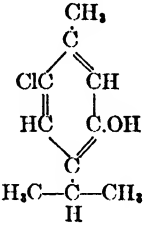
Chloroformic Coal Tar Solution, page 156

CHLOROTHYMOL

Chlorothymol

Monochlorothymol

$C_{10}H_{13}OCl$



Mol. wt. 184.66

Description—Chlorothymol occurs as white crystals, or as a crystalline, granular powder, possessing a characteristic odor, and an aromatic, very pungent taste. It usually becomes discolored with age, acquiring a yellowish or brownish color, and is affected by light.

Solubility—One Gm. of Chlorothymol dissolves in about 0.5 cc. of alcohol, in about 2 cc. of benzene, in about 2 cc. of chloroform, in about 1.5 cc. of ether, and in about 10 cc. of petroleum benzin, at 25°. One-tenth Gm. of Chlorothymol dissolves completely in 100 cc. of a mixture of 1 volume of alcohol and 3 volumes of distilled water. It is soluble in dilute aqueous solution of sodium hydroxide, but is almost insoluble in water.

Melting point—Chlorothymol melts between 59° and 61°, page 731.

Identification—

A: Dissolve about 1 Gm. of Chlorothymol in 5 cc. of an aqueous solution of sodium hydroxide (1 in 10), boil for 1 minute, cool to about 50°, and add about 0.5 cc. of chloroform: a pink color is produced in a few minutes, becoming red or brownish red on standing for a few minutes longer.

B: Mix about 0.2 Gm. of Chlorothymol with about 1 Gm. of anhydrous sodium carbonate, place the mixture in a crucible (preferably platinum), cover the mixture with about 1 Gm. of anhydrous sodium carbonate, and heat over a free flame until it is all decomposed. Treat the residue with 10 cc. of distilled water, and acidify with nitric acid; filter, and add to the filtrate, silver nitrate T.S.: a copious, white precipitate is produced, which is soluble in ammonia T.S.

Reaction—Agitate 0.5 Gm. of Chlorothymol with 10 cc. of hot distilled water: the liquid is neutral to litmus paper.

Residue on ignition—Chlorothymol yields not more than 0.05 per cent of residue on ignition, page 745.

Storage—Preserve Chlorothymol in well-closed, light-resistant containers, and avoid continuous excessive heat.

Chondrus

CHONDRUS
Chondrus
Irish-moss

Chondrus is the dried, bleached plant of *Chondrus crispus* (Limé) Stackhouse, or of *Gigartina mamillosa* (Goodenough et Woodward) J. Agardh (Fam. *Gigartinaceæ*).

Whole Chondrus—Chondrus occurs as matted masses consisting of entire plants from 5 to 15 cm. in length, with slender stalks from which arise a series of dichotomously branching, more or less flattened segments having emarginate or deeply cleft tips up to 10 mm. in width; translucent, frequently coated with a calcareous deposit which effervesces with hydrochloric acid; sometimes with sporangia embedded near the apex of the segments (in *C. crispus*) or with sporangia borne on short tuberculated projections or stalks, more or less scattered over the upper portion of the segments (in *G. mamillosa*). The plants are somewhat cartilaginous and have a pale yellow to moderate yellow color, a slight, seaweed-like odor and a salty, mucilaginous taste.

Identification—

A: Boil 1 part of Chondrus for about 10 minutes with 30 parts of water, replacing the water lost by evaporation: the strained liquid forms a thick jelly upon cooling.

B: When softened in cold water, Chondrus becomes gelatinous and transparent, the thallus remaining nearly smooth and uniform, and not swollen except slightly at the tips.

Gelatin and starch—Boil 0.3 Gm. of Chondrus in 100 cc. of water for 1 minute; filter the mixture and cool: the filtrate produces no precipitate on the addition of tannic acid T.S. (*gelatin*), and no blue color on the addition of iodine T.S. (*starch*).

Sulfites—Warm 5 Gm. of Chondrus with 30 cc. of water and 5 cc. of phosphoric acid in a suitable flask: no bluish purple color is developed within 15 minutes on potassium iodate-starch paper suspended in the flask above the fluid. A transient color usually indicates a higher sulfite content than a permanent color.

Foreign organic matter—Chondrus contains not more than 2 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Chondrus yields not more than 2 per cent of acid-insoluble ash, page 761.

Chondrus Mucilage

CHONDRUS MUCILAGE
Mucilago Chondri

Mucil. Chond. Irish Moss Mucilage

Chondrus	**30 Gm.**
Water, a sufficient quantity,	
To make	**1000 cc.**

Wash the chondrus quickly with cold water. Place it in a suitable vessel, add 1000 cc. of boiling water, and heat the mixture on a water bath during 10 minutes, stirring it frequently. Then strain it through muslin with pressure, add sufficient hot water through the strainer to make the product measure 1000 cc., and mix it thoroughly.

Storage—Preserve Chondrus Mucilage in tight containers.

CIMICIFUGA
Cimicifuga

Black Cohosh Black Snakeroot

Cimicifuga consists of the dried rhizome and roots of *Cimicifuga racemosa* (Linné) Nuttall (Fam. *Ranunculaceæ*).

Unground Cimicifuga—Unground Cimicifuga occurs as more or less branching rhizomes from 2 to 15 cm. in length and from 1 to 2.5 cm. in thickness. The rhizome and roots are dusky brown to dark yellowish brown, slightly annulate, the upper surface having numerous hard, erect, somewhat curved branches having deep, cup-shaped, radiating scars; and the lower and lateral surfaces marked by numerous root-scars and occasional short roots. The fracture is horny and mealy internally. The bark is thin and the wood distinctly radiate and light-colored, the medullary rays and pith usually being dark-colored. The pith is about equal in diameter to the width of the woody zone. The roots are nearly cylindrical or obtusely quadrangular, from 3 to 12 cm. in length and from 1 to 3 mm. in thickness, and longitudinally wrinkled. The fracture is short and exhibits a thin and dark-colored cortex and a light-colored wood.

Histology—The rhizome shows an epidermal layer, a cortex of starch-bearing parenchyma cells; tracheæ with bordered pores and numerous, thin-walled and strongly lignified wood fibers. The pith and medullary ray cells resemble those of the cortex. The root shows a thin epidermis, a distinct endodermis, a 4- to 6-rayed fibro-vascular bundle which develops in older roots as separate collateral bundles.

Powdered Cimicifuga—Powdered Cimicifuga is pale brown to moderate yellowish brown having a slight odor, and an acrid and bitter taste. It shows numerous starch grains, single or compound, the individual grains being spherical or more or less polygonal, each with a somewhat central cleft, from 3 to 15 microns in diameter. Also present are fragments of tracheæ and of wood fibers, and irregular, reddish brown to yellow fragments of suberized epidermis of more or less tabular cells, which are sometimes elongated and considerably thickened.

Attached stem bases—Cimicifuga contains not more than 5 per cent of attached stem bases.

Foreign organic matter—Cimicifuga contains not more than 2 per cent of foreign organic matter, other than attached stem bases, page 760.

Acid-insoluble ash—Cimicifuga yields not more than 4 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Cimicifuga Fluidextract

CIMICIFUGA FLUIDEXTRACT
Fluidextractum Cimicifugæ

Fldext. Cimicif. Black Cohosh Fluidextract

Prepare the Fluidextract from cimicifuga, in moderately coarse powder, by Process A, page 718. Use a mixture of 9 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 48 hours, and percolate at a moderate rate.

Alcohol content—From 71 to 78 per cent, by volume, of C_2H_5OH.
Storage—Preserve Cimicifuga Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**1 cc.** (approximately 15 minims).

Cinchona

CINCHONA
Cinchona

Cinchona Bark Peruvian Bark

Cinchona is the dried bark of the stem or of the root of *Cinchona succirubra* Pavon et Klotzsch or its hybrids, known in commerce as Red Cinchona, or of *Cinchona Ledgeriana* (Howard) Moens et Trimen, *Cinchona Calisaya* Weddell or hybrids of these with other species of *Cinchona*, known in commerce as Calisaya Bark or as Yellow Cinchona (Fam. *Rubiaceæ*).

Cinchona yields not less than 5 per cent of the alkaloids of Cinchona.

Unground Cinchona—Unground Cinchona occurs as quills or chips, curved pieces or broken fragments. The bark is from 2 to 9 mm. in thickness; externally weak reddish brown to moderate yellowish brown, usually with lighter-colored lichens (stem bark) more or less roughened with corky ridges or protuberances, and with transverse or irregular fissures, rarely numerous or much intersected and having their sides sloping (Red Cinchona stem bark), or with numerous intersecting transverse and longitudinal fissures having nearly vertical sides (Yellow Cinchona stem bark). The inner surface is moderate brown to dusky yellowish orange and striate. The fracture is short and granular in the outer region, rather splintery in the inner region of the stem bark or finely fibrous in root bark. The inner surface of the root bark is frequently fissured.

Histology—Cinchona shows a cork, frequently bearing dense masses of lichen tissue on its outer surface (stem bark); consisting of rectangular, thin-walled cells with reddish brown to yellowish brown contents. The parenchyma has brown to yellowish orange walls and contains starch grains, or in some widely scattered cells microcrystals. Laticiferous ducts, when present, are widely separated in a single row near the inner edge of the cortex, are circular or oval in transverse section, and up to 120 microns in diameter. The medullary rays are usually 1 to 3 cells wide with rectangular thin-walled cells, frequently tangentially elongated in the outer

part of the ray. Bast fibers are numerous, isolated or in small groups between the medullary rays.

Powdered Cinchona—Powdered Cinchona is light brown to moderate yellowish brown, has a faintly aromatic odor and an astringent, bitter taste. Bast fibers are frequently entire, spindle-shaped, from 300 to 1350 microns in length and from 50 to 135 microns in width, and have thick strongly lignified, lamellated walls showing numerous simple or branched pores. Parenchyma and cork fragments are reddish brown to yellowish orange; the starch grains being inconspicuous, single or 2- to 5-compound, and usually from 6 to 10 microns in diameter but occasionally up to 21 microns in diameter. Sphenoidal microcrystals of calcium oxalate are very minute.

Identification—Heat about 0.5 Gm. of ground Cinchona in the bottom of a test tube: red-purple vapors arise which condense as a distillate in red to orange drops on the walls of the upper part of the test tube. The distillate is soluble in diluted alcohol.

Foreign organic matter—Cinchona contains not more than 2 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Cinchona yields not more than 2 per cent of acid-insoluble ash, page 761.

Assay—Place 5 Gm. of Cinchona, in fine powder, and 15 cc. of 3 per cent hydrochloric acid in a 500-cc. flask and heat the mixture on a water bath for 1 hour. Cool and add 200 cc. of ether-chloroform solution (ether 3 volumes, chloroform 1 volume) and 10 cc. of stronger ammonia T.S. Stopper the flask tightly and shake it for 1 hour in a mechanical shaker. Allow the mixture to stand overnight, again shake it for 30 minutes, and then allow the drug to settle. (If the supernatant liquid is not clear, add a few cc. of distilled water, again shake the contents of the flask vigorously, and allow the drug to settle.)

Quickly decant 160 cc. of the clear, ether-chloroform solution, measured at approximately the same temperature as the original ether-chloroform solution and representing 4 Gm. of the drug. Transfer the solution to a separator, rinse the measuring vessel with a small quantity of the original menstruum, and add the rinsings to the separator. Completely extract the alkaloids with approximately 5 per cent sulfuric acid, and collect the acid solution of the alkaloids in a second separator.

Make the acid solution strongly alkaline with ammonia T.S., and completely extract the alkaloids with chloroform. Evaporate or distil the chloroform in a tared beaker or flask and dry the alkaloidal residue to constant weight at 100°. The weight obtained, multiplied by 25, represents the per cent of the alkaloids of Cinchona in the drug.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Cinchona Alkaloids Elixir

CINCHONA ALKALOIDS ELIXIR

Elixir Cinchonæ Alkaloidorum

Elix. Cinch. Alk. Elixir Calisaya, Alkaloidal

Quinine Sulfate	2 Gm.
Cinchonidine Sulfate	1 Gm.
Cinchonine Sulfate	1 Gm.
Compound Cudbear Tincture	50 cc.
Aromatic Elixir, a sufficient quantity,	
To make	1000 cc.

Dissolve the alkaloidal salts in 900 cc. of aromatic elixir; add the compound cudbear tincture and sufficient aromatic elixir to make the product measure 1000 cc., and filter, if necessary, until the product is clear.

Alcohol content—From 20 to 24 per cent, by volume, of C_2H_5OH.
Storage—Preserve Cinchona Alkaloids Elixir in tight containers.

AVERAGE DOSE—**8 cc.** (approximately 2 fluidrachms).

One average metric dose contains 16 mg. of Quinine Sulfate, and 8 mg. each of Cinchonidine Sulfate and Cinchonine Sulfate.

Cinchona Tincture, Compound

COMPOUND CINCHONA TINCTURE

Tinctura Cinchonæ Composita

Tr. Cinch. Comp.

Compound Cinchona Tincture yields, from each 100 cc., not less than 0.4 Gm. and not more than 0.5 Gm. of the alkaloids of cinchona.

Cinchona, in moderately coarse powder	100 Gm.
Bitter Orange Peel, in moderately coarse powder	80 Gm.
Serpentaria, in fine powder	20 Gm.
Alcohol,	
Glycerin,	
Water,	
Diluted Hydrochloric Acid, each, a sufficient quantity,	
To make about	1000 cc.

Dampen the mixed drugs with sufficient of a mixture of 130 cc. of alcohol, 15 cc. of diluted hydrochloric acid, and 50 cc. of water, pack in a percolator, pour on the remainder of the above menstruum, and macerate the drugs during 2 hours. Then percolate rapidly, completing the extraction with a mixture of 2 volumes of alcohol and 1 volume of water and collecting 875 cc. of percolate. To this add 70 cc. of glycerin; mix well, and assay.

Finally adjust the Tincture by dilution with a mixture of 20 volumes of alcohol, 2.5 volumes of glycerin, 0.5 volume of diluted hydrochloric acid, and 7 volumes of water so that it will contain, in each 100 cc., 0.45 Gm. of the alkaloids of cinchona.

Assay—Accurately measure 50 cc. of Compound Cinchona Tincture and evaporate it, at a temperature not exceeding 100°, to a volume of about 10 cc. Add sufficient asbestos fiber or paper pulp to absorb the liquid, and continue the evaporation to dryness. Transfer the residue to a flask or bottle, add 200 cc., accurately measured

at room temperature, of ether-chloroform mixture (ether 4 volumes, chloroform 1 volume) and sufficient ammonia T.S. (which may be used to rinse out the adhering portions of the Tincture from the evaporating dish) to render the mixture strongly alkaline. Securely stopper the container and shake mechanically during 1 hour, or intermittently during 2 hours, and then allow the mixture to stand overnight. Again shake the mixture intermittently for 30 minutes, allow to settle, quickly decant 160 cc. (representing 40 cc. of the Tincture) of the approximately clear liquid. Filter this into a separator and wash the measuring vessel with sufficient of the ether-chloroform mixture, adding the rinsings to the filter. Extract the alkaloids from the clear liquid with acidified water, using sufficient diluted sulfuric acid to render the contents of the separator and each extract distinctly acid to litmus paper. Pass the acid extracts in succession through a moistened, double filter into a second separator. Render the combined liquids distinctly alkaline with stronger ammonia T.S., and extract with chloroform. Pass the chloroform extracts through a double filter, which is kept saturated with chloroform, into a suitable, tared receptacle. Evaporate the chloroform on a water bath, dry the residue to constant weight at 100°, and weigh. The weight multiplied by 2.5 indicates the weight of alkaloids in 100 cc. of the Compound Cinchona Tincture.

Alcohol content—From 56 to 62 per cent, by volume, of C_2H_5OH.

Storage—Preserve Compound Cinchona Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

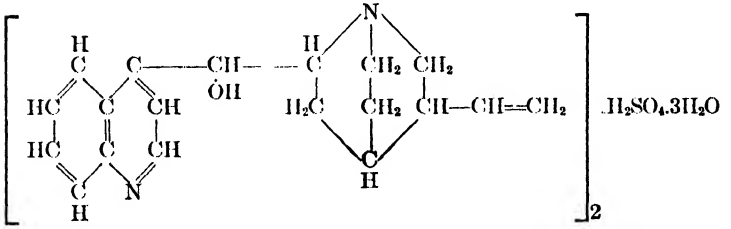
AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

Cinchonidine Sulfate

CINCHONIDINE SULFATE

Cinchonidinæ Sulfas

Cinchonid. Sulf.



$(C_{19}H_{22}ON_2)_2.H_2SO_4.3H_2O$ Mol. wt. 740.89

Cinchonidine Sulfate is the sulfate of an alkaloid obtained from cinchona.

Description—Cinchonidine Sulfate occurs as white, glistening, silky needles, or prisms. It is odorless, has a very bitter taste, and is affected by light.

Solubility—One Gm. of Cinchonidine Sulfate dissolves in about 65 cc. of water, in about 90 cc. of alcohol, and in about 620 cc. of chloroform, at 25°. One Gm. of Cinchonidine Sulfate dissolves in about 22 cc. of water at 80°, and in about 41 cc. of alcohol at 60°. It is nearly insoluble in ether.

Optical rotation—An aqueous solution of Cinchonidine Sulfate is lævorotatory.

Identification—

A: A saturated aqueous solution of Cinchonidine Sulfate responds to the tests for *Sulfate*, page 727.

D: The addition of ammonia T.S. to an aqueous solution of Cinchonidine Sulfate (1 in 100) produces a white precipitate of cinchonidine, which is but slightly soluble in ammonia T.S. or in ether.

Reaction—A saturated aqueous solution of Cinchonidine Sulfate is neutral or alkaline to litmus paper.

Loss on drying—When dried to constant weight at 105°, Cinchonidine Sulfate loses not more than 8 per cent of its weight.

Residue on ignition—Cinchonidine Sulfate yields not more than 0.1 per cent of residue on ignition, page 745.

Readily carbonizable substances—The color of a solution produced by dissolving 0.25 Gm. of Cinchonidine Sulfate in 5 cc. of sulfuric acid is not deeper than matching fluid E, page 744.

Distinction from cinchonine—Sodium tartrate T.S. produces in an aqueous solution of Cinchonidine Sulfate (1 in 100) a white precipitate of cinchonidine tartrate.

Cinchonine and quinidine sulfates—Macerate 0.5 Gm. of Cinchonidine Sulfate, with frequent agitation, at room temperature, in 20 cc. of distilled water; then add 0.5 Gm. of potassium and sodium tartrate, and continue the maceration with repeated agitation for 1 hour at 15°; filter the mixture: the addition of 1 drop of ammonia T.S. to the filtrate produces not more than a slight turbidity.

Quinine or quinidine—A solution of Cinchonidine Sulfate (1 in 1000) in diluted sulfuric acid produces only a faint blue fluorescence.

Storage—Preserve Cinchonidine Sulfate in tight, light-resistant containers.

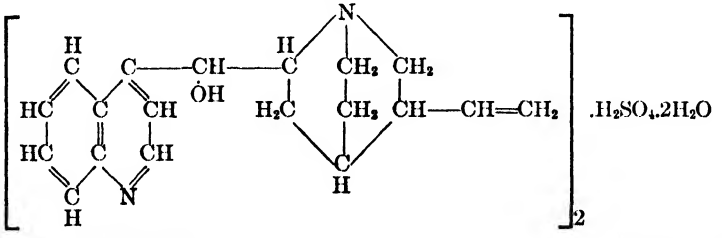
AVERAGE DOSE—**0.15 Gm.** (approximately $2^1/_2$ grains).

Cinchonine Sulfate

CINCHONINE SULFATE

Cinchoninæ Sulfas

Cinchonin. Sulf.



$(C_{19}H_{22}ON_2)_2.H_2SO_4.2H_2O$ Mol. wt. 722.87

Cinchonine Sulfate is the sulfate of an alkaloid obtained from cinchona.

Description—Cinchonine Sulfate occurs as white, lustrous, prismatic crystals, and is permanent in the air. It is odorless, has a very bitter taste, and is affected by light.

Solubility—One Gm. of Cinchonine Sulfate dissolves in about 60 cc. of water, in about 12.5 cc. of alcohol, in about 47 cc. of chloroform, or in about 3230 cc. of ether, at 25°. One Gm. of Cinchonine Sulfate dissolves in about 33 cc. of water at 80°, and in about 7 cc. of alcohol at 60°.

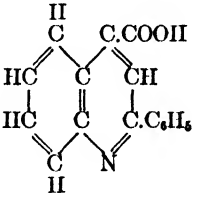
Optical rotation—An aqueous solution of Cinchonine Sulfate is dextrorotatory.

Identification—A saturated aqueous solution of Cinchonine Sulfate responds to the tests for *Sulfate*, page 727.
Reaction—A saturated aqueous solution of Cinchonine Sulfate is neutral or alkaline to litmus paper.
Loss on drying—When dried to constant weight at 105°, Cinchonine Sulfate loses not more than 5 per cent of its weight.
Residue on ignition—Cinchonine Sulfate yields not more than 0.1 per cent of residue on ignition, page 745.
Readily carbonizable substances—The color of a solution produced by dissolving 0.25 Gm. of Cinchonine Sulfate in 5 cc. of sulfuric acid is not deeper than matching fluid E, page 744.
Distinction from cinchonidine and quinine—Sodium tartrate T.S. does not produce a white precipitate with an aqueous solution of Cinchonine Sulfate (1 in 100).
Quinine sulfate and cinchonidine sulfate—One-tenth Gm. of powdered Cinchonine Sulfate dissolves completely, or nearly so, when shaken with 10 cc. of chloroform at ordinary temperatures.
Quinine or quinidine—A solution of Cinchonine Sulfate (1 in 1000) in diluted sulfuric acid produces only a slight blue fluorescence.
Distinction from quinine and quinidine—Add 1 or 2 drops of bromine T.S. to 5 cc. of an aqueous solution of Cinchonine Sulfate (1 in 1000), and then add 1 cc. of ammonia T.S.: the liquid does not acquire an emerald-green color of thalleoquin.
Storage—Preserve Cinchonine Sulfate in tight, light-resistant containers.

AVERAGE DOSE—**0.15 Gm.** (approximately $2^1/_2$ grains).

CINCHOPHEN
Cinchophenum

Phenylcinchoninic Acid — Phenyl-quinoline-carboxylic Acid



$C_{16}H_{11}O_2N$ — Mol. wt. 249.26

Cinchophen, when dried to constant weight at 105°, contains not less than 99.5 per cent of $C_{16}H_{11}O_2N$.

Description—Cinchophen occurs as small, white or almost white, needle-like crystals, or as a fine powder, and is stable in the air. It is nearly odorless, has a slightly bitter taste, and is affected by light.
Solubility—One Gm. of Cinchophen dissolves in about 400 cc. of chloroform, in about 100 cc. of ether, and in about 120 cc. of alcohol, at 25°. It is practically insoluble in water.
Melting point—Cinchophen melts between 213° and 216°, page 731.
Identification—
A: A saturated solution of Cinchophen in hot diluted hydrochloric acid yields, with platinic chloride T.S., a precipitate of yellow brown crystals.

B: Dissolve 0.5 Gm. of Cinchophen in 3 cc. of 1 *N* sodium hydroxide and add 3 cc. of ammonium chloride T.S.: upon standing the mixture develops a white crystalline precipitate.

C: Heat about 0.5 Gm. of Cinchophen in a test tube held in a nearly horizontal position. It first melts to a clear yellow liquid; then as the heating is continued, it evolves carbon dioxide and yields a light yellow distillate of phenylquinoline, which crystallizes as it cools. Scrape the phenylquinoline from the walls of the test tube, dissolve it in 3 cc. of warm alcohol, and add 3 cc. of a saturated solution of trinitrophenol in alcohol: a yellow, crystalline precipitate of phenylquinoline picrate is produced.

Loss on drying—When dried to constant weight at 105°, Cinchophen loses not more than 2 per cent of its weight.

Residue on ignition—Cinchophen yields not more than 0.25 per cent of residue on ignition, page 745.

Readily carbonizable substances—The color of a solution produced by dissolving 0.1 Gm. of Cinchophen in 5 cc. of sulfuric acid is not deeper than matching fluid O, page 744. Add 3 drops of nitric acid: no reddish orange color is produced.

Aniline derivatives—Warm 1 Gm. of Cinchophen with 5 cc. of 1 *N* sodium hydroxide and 20 cc. of distilled water: a clear, almost colorless solution is produced. Add to this solution 10 cc. of sodium hypochlorite T.S., and allow the mixture to stand for 15 minutes: the solution remains clear and does not turn yellowish brown.

Assay—Accurately weigh about 0.5 Gm. of Cinchophen, dried to constant weight at 105°, and dissolve it in 60 cc. of neutralized alcohol, warming the mixture gently to facilitate solution. Cool the solution and titrate it with 0.1 *N* sodium hydroxide, using 3 drops of phenolphthalein T.S. as the indicator. Each cc. of 0.1 *N* sodium hydroxide is equivalent to 0.02493 Gm. of $C_{16}H_{11}O_2N$.

Storage—Preserve Cinchophen in tight, light-resistant containers.

AVERAGE DOSE—**0.5 Gm.** (approximately 7½ grains).

Cinchophen Tablets

CINCHOPHEN TABLETS

Tabellæ Cinchopheni

Tab. Cinchophen.

Cinchophen Tablets contain not less than 92.5 per cent and not more than 107.5 per cent of the labeled amount of $C_{16}H_{11}O_2N$.

Identification—

A: A filtered saturated solution of the Tablets in hot diluted hydrochloric acid yields with platinic chloride T.S. a precipitate of yellowish orange crystals.

B: Powder several of the Tablets, and mix a portion of the powder, equivalent to about 1 Gm. of cinchophen, with 20 cc. of ammonia T.S.; filter the mixture and evaporate the filtrate on a water bath to dryness, or until free from the odor of ammonia; dissolve the residue in 20 cc. of distilled water, and filter the solution: separate portions of the filtrate yield a white, flocculent precipitate with silver nitrate T.S.; a yellowish, flocculent precipitate with lead acetate T.S.; and a green, flocculent precipitate with cupric sulfate T.S.

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without appreciable loss, and extract an accurately weighed portion, equivalent to

about 1 Gm. of cinchophen, with a total of 10 cc. of cold chloroform. Pass the chloroform through a filter and discard the filtrate, dissolve the residue in 180 cc. of neutralized alcohol, heating the mixture to 65° to 70° and rotating the flask to facilitate solution of the cinchophen. Filter on a filter paper previously moistened with neutralized alcohol, and wash with five 10-cc. portions of neutralized alcohol heated to 70°. Combine the filtrate and washings, cool to about room temperature, and titrate with 0.1 *N* sodium hydroxide, using phenolphthalein T.S. as the indicator. Each cc. of 0.1 *N* sodium hydroxide is equivalent to 0.02493 Gm. of $C_{16}H_{11}O_2N$.

Storage—Preserve Cinchophen Tablets in tight, light-resistant containers.

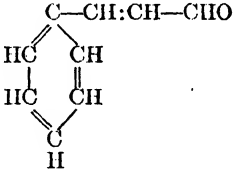
Sizes—Cinchophen Tablets usually available contain the following amounts of cinchophen: **0.3** and **0.5 Gm.** (approximately 5 and $7^1/_2$ grains).

AVERAGE DOSE—**0.5 Gm.** (approximately $7^1/_2$ grains) of Cinchophen.

Cinnamaldehyde

CINNAMALDEHYDE
Cinnamaldehydum

Cinnamal. Cinnamic Aldehyde



C_9H_8O Mol. wt. 132.15

Cinnamaldehyde contains not less than 98 per cent of C_6H_7CHO.

Description—Cinnamaldehyde is a yellow, strongly refractive liquid, having an odor resembling that of cinnamon oil, and a burning, aromatic taste. It is affected by light.

Solubility—Cinnamaldehyde dissolves in about 700 parts of water and is miscible with alcohol, with chloroform, with ether, and with fixed or volatile oils.

Solubility in alcohol—Cinnamaldehyde dissolves in 7 volumes of 60 per cent alcohol, forming a clear solution.

Specific gravity—The specific gravity of Cinnamaldehyde is not less than 1.048 and not more than 1.052 at 25°.

Refractive index—The refractive index of Cinnamaldehyde is not less than 1.618 and not more than 1.623 at 20°, page 745.

Chlorinated compounds—To 1 cc. of Cinnamaldehyde in a large test tube, add 10 cc. of isopropyl alcohol, 1 cc. of nitric acid (1 in 2), and 1 cc. of silver nitrate solution (1 in 10), shaking well after the addition of each reagent. Heat to the boiling point and permit to stand 5 minutes: any opalescence produced is not greater than that produced by 0.1 cc. of 0.01 *N* hydrochloric acid when treated with the same reagents, omitting the Cinnamaldehyde, in exactly the same manner.

Hydrocarbons—Place 10 cc of Cinnamaldehyde, measured from a pipette, in a 100-cc. Cassia flask and add 75 cc. of a freshly prepared solution of sodium bisulfite (12 in 100) previously heated to a temperature of 85°. Shake the flask vigorously until solution is complete, then add sufficient sodium bisulfite solution to raise the meniscus within the graduated portion of the neck: no oil separates.

Assay—Add 75 cc. of hydroxylamine-bromophenol blue T.S. to a flask containing about 1 Gm. of Cinnamaldehyde, accurately weighed, mix thoroughly, and proceed as directed in the *Assay for benzaldehyde* under *Bitter Almond Oil*, page 31. Each cc. of 0.5 *N* hydrochloric acid is equivalent to 0.06608 Gm. of C_8H_7CHO.

Storage—Preserve Cinnamaldehyde in well-filled, tight, light-resistant containers protected from excessive heat.

Cinnamon, Ceylon

CEYLON CINNAMON

Cinnamomum Zeylanicum

Cinnam. Zeylan.

Ceylon Cinnamon is the dried inner bark of the shoots of coppiced trees of *Cinnamomum zeylanicum* Nees (Fam. *Lauraceæ*).

Ceylon Cinnamon yields not less than 0.5 cc. of volatile Ceylon cinnamon oil from each 100 Gm. of the drug.

Unground Ceylon Cinnamon—Unground Ceylon Cinnamon occurs in closely rolled congeries of quills, composed of from 7 to 12 thin layers of separate pieces of bark, up to about 1 meter in length and from 8 to 13 mm. in diameter; the individual pieces of bark attaining a thickness of 1 mm. The outer surface of the bark is light yellowish brown to weak orange, smooth, longitudinally striate with narrow yellowish groups of bast fibers, and shows circular or irregular brownish patches and occasional perforations marking the nodes. The inner surface is light yellowish brown to weak orange and shows faint longitudinal striations. The fracture is short, with projecting bast fibers.

Histology—Sections of Ceylon Cinnamon usually show no cork, but in the outer region exhibit a pericycle containing an almost continuous zone of stone cells among which are small groups of pericyclic fibers with thickened and slightly lignified walls and a few parenchyma cells. The phloem region is broad and is traversed by medullary rays from 1 to 2 cells wide, the cells containing either starch or raphides of calcium oxalate. The phloem patches consist largely of parenchyma cells among which occur bast fibers, isolated or in small groups, mucilage and oil cells and inconspicuous sieve. The parenchyma cells of the phloem patch contain starch, raphides of calcium oxalate, or reddish brown contents.

Powdered Ceylon Cinnamon—Powdered Ceylon Cinnamon is light yellowish brown to light brown and has a delicately aromatic odor and a sweetish and warmly aromatic taste. It contains spheroidal, plano-convex or polygonal starch grains mostly less than 10 microns in diameter and occasionally up to 4-compound; numerous colorless stone cells up to 150 microns in diameter, occasionally with 1 wall much thinner than the others and sometimes containing starch grains; almost colorless pericyclic fibers and slightly lignified bast fibers from 300 to 800 microns long and up to 30 microns in diameter, spindle shaped and having thick, more or less wavy, porous walls; elongated secretion cells containing volatile oil or mucilage, fragments of parenchyma tissue with reddish brown walls, and raphides of calcium oxalate from 5 to 8 microns in length. The parenchyma cells, stone cells and fibers frequently contain an amorphous reddish brown substance, which is for the most part insoluble in ordinary reagents.

Other cinnamons—Powdered Ceylon Cinnamon contains not more than a trace of lignified cork cells, few starch grains exceeding 10 microns in diameter and no fibers over 30 microns in breadth.

Meals—Powdered Ceylon Cinnamon contains no aleurone grains nor seed-coat tissues characteristic of linseed, cottonseed or other oil-seeds.

Foreign organic matter—Ceylon Cinnamon contains not more than 2 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Ceylon Cinnamon yields not more than 2 per cent of acid-insoluble ash, page 761.

Assay—Place about 100 Gm. of Ceylon Cinnamon, preferably coarsely comminuted and accurately weighed, in the flask of the apparatus used for volatile oil determinations and proceed as directed on page 764, using the separator for oils heavier than water.

Storage—Preserve Ceylon Cinnamon in well-closed containers.

CINNAMON SYRUP

Syrupus Cinnamomi

Syr. Cinnam.

Cinnamon Oil	0.5 cc.
Compound Cudbear Tincture	60 cc.
Syrup, a sufficient quantity,	
To make	1000 cc.

Mix well the cinnamon oil with the tincture and a sufficient quantity of syrup to make the product measure 1000 cc.

Alcohol content—From 1 to 2 per cent, by volume, of C_2H_5OH.

Storage—Preserve Cinnamon Syrup in tight containers, and avoid excessive heat.

CINNAMON TINCTURE

Tinctura Cinnamomi

Tr. Cinnam.

Cinnamon, in coarse powder	200 Gm.
Glycerin	75 cc.
Alcohol,	
Water, each, a sufficient quantity,	
To make	1000 cc.

Prepare the Tincture by Process P, page 758. Use a mixture of 3 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 2 hours, and percolate rapidly, collecting 925 cc. of percolate. To this add the glycerin and mix thoroughly.

Alcohol content—From 60 to 66 per cent, by volume, of C_2H_5OH.
Storage—Preserve Cinnamon Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—1 cc. (approximately 15 minims).

Citrated Caffeine Tablets, page 99

Coal Tar Solution

COAL TAR SOLUTION
Liquor Picis Carbonis

Liq. Pic. Carbon. Liquor Carbonis Detergens

Coal Tar	200 Gm.
Quillaja, in moderately coarse powder	100 Gm.
Alcohol, a sufficient quantity,	
To make	1000 cc.

Mix the coal tar with 700 cc. of alcohol, add the quillaja, and macerate the mixture during 7 days in a closed vessel, with occasional agitation. Then filter, and wash the contents of the filter with sufficient alcohol to make the product measure 1000 cc.

Description—Coal Tar Solution is a reddish orange, alcohol liquid, with a characteristic, empyreumatic odor.
Identification—Mix 5 cc. of Coal Tar Solution with 100 cc. of water: an opalescent liquid results, which froths abundantly when shaken in a closed vessel. The addition of acids or alkalies in small amounts does not noticeably affect the frothing property.
Alcohol content—From 83 to 88 per cent, by volume, of C_2H_5OH.
Storage—Preserve Coal Tar Solution in tight containers.

FOR EXTERNAL USE—Dilute with 9 volumes of water.

Coal Tar Solution, Chloroformic

CHLOROFORMIC COAL TAR SOLUTION
Liquor Picis Carbonis Chloroformicus

Liq. Pic. Carbon. Chlorof.

Coal Tar	50 Gm.
Chloroform, a sufficient quantity,	
To make	1000 cc.

Mix the coal tar with 800 cc. of chloroform, and shake until dissolved. Filter if necessary, and add sufficient chloroform through the filter to make 1000 cc. of solution.

Description—Chloroformic Coal Tar Solution is yellowish brown in color with the empyreumatic odor of coal tar, associated with the characteristic odor of chloroform.

Storage—Preserve Chloroformic Coal Tar Solution in tight containers.

FOR EXTERNAL USE—Paint on the skin undiluted.

COCAINE HYDROCHLORIDE TABLETS
Tabellæ Cocainæ Hydrochloridi

Tab. Cocain. Hydrochlor.

Cocaine Hydrochloride Tablets contain not less than 91 per cent and not more than 109 per cent of the labeled amount of $C_{17}H_{21}O_4N.HCl$.

Identification—

A: Add 5 drops of a solution of chromium trioxide (1 in 20) to 5 cc. of a filtered aqueous solution of the Tablets, equivalent to cocaine hydrochloride 1 in 50: a yellow precipitate is produced which redissolves when the mixture is shaken. On the addition of 1 cc. of hydrochloric acid, a permanent, yellowish orange crystalline precipitate is formed.

B: A filtered solution of the Tablets, equivalent to about 10 mg. of cocaine hydrochloride, in 1 cc. of distilled water, yields on the addition of 2 cc. of 0.1 *N* potassium permanganate, a red-purple, crystalline precipitate which appears brown when collected on a filter, and shows characteristic, crystalline aggregates under the low power of a microscope.

C: Silver nitrate T.S. produces in a filtered aqueous solution of the Tablets, equivalent to cocaine hydrochloride 1 in 20, a white precipitate, insoluble in nitric acid.

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without appreciable loss, and dissolve an accurately weighed portion, equivalent to about 60 mg. of cocaine hydrochloride, in 10 cc. of distilled water. Render the solution slightly alkaline with ammonia T.S., and completely extract the cocaine with small successive portions of ether. Evaporate the combined ether extracts to one-half their volume on a water bath, transfer the remaining liquid to a separator, and wash it with three 5-cc. portions of distilled water. Shake the water washings with a small portion of ether and add the ether washing to the combined ether extracts. Add 10 cc. of 0.05 *N* sulfuric acid to the ether solution, agitate the mixture thoroughly, and draw off the acidified aqueous layer into a beaker. Again wash the ether with 2 small portions of distilled water, add the washings to the acid liquid, and titrate the excess acid with 0.02 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.05 *N* sulfuric acid is equivalent to 0.01699 Gm. of $C_{17}H_{21}O_4N.HCl$.

Storage—Preserve Cocaine Hydrochloride Tablets in well-closed, light-resistant containers.

Sizes—Cocaine Hydrochloride Tablets usually available contain the following amounts of cocaine hydrochloride: **7.5 and 15 mg.** (approximately 1/8 and 1/4 grain).

AVERAGE DOSE—**15 mg.** (approximately 1/4 grain) of Cocaine Hydrochloride.

Cochineal Solution

COCHINEAL SOLUTION
Liquor Cocci

Liq. Cocci — Cochineal Color

Cochineal, in fine powder	65 Gm.
Potassium Carbonate	32 Gm.
Alum	32 Gm.
Potassium Bitartrate	65 Gm.
Glycerin	450 cc
Distilled Water, a sufficient quantity, To make	1000 cc.

Triturate the cochineal intimately with the potassium carbonate; add 500 cc. of distilled water, the alum, and the potassium bitartrate, successively. Heat the mixture slowly to boiling, in a capacious vessel, and set it aside to cool; then add the glycerin, and filter the mixture, passing enough distilled water through the filter to make the product measure 1000 cc.

Description—Cochineal Solution is very dark purplish red in color with a somewhat aromatic odor. The color of an aqueous dilution of Cochineal Solution (1 in 500) viewed through a depth of 1 cm. is light red-purple. The aqueous dilution, prepared above and viewed in 1 cm. depth, becomes orange upon being acidified with hydrochloric acid and red-purple upon being made alkaline with an aqueous solution of sodium hydroxide (4 in 10).

Identification—Add 1 cc. of Cochineal Solution to 500 cc. of water; a reddish orange solution results, which darkens upon the addition of ammonia T.S.

Absence of coal-tar dyes—To a mixture of 10 cc. of Cochineal Solution and 40 cc. of water, add 1 cc. of diluted hydrochloric acid; immerse in the mixture a piece of white woolen cloth about 5 cm. square. Boil the solution for 15 minutes; then remove the cloth, wash it thoroughly in cold water, and place it in a solution of about 20 cc. of water and 1 cc. of ammonia T.S., and heat gently for 15 minutes. Remove the cloth, dilute the solution to 50 cc., and acidify with 2 cc. of diluted hydrochloric acid; place a new piece of cloth of the same size in the solution, and boil for 10 minutes: the second piece of cloth is colorless.

Color standard—To 1 cc. of Cochineal Solution add sufficient distilled water to make 500 cc., and mix well. Compare the color of this freshly prepared dilution in Nessler tubes or in a colorimeter, with the standard color solution freshly prepared as follows: to 2.1 cc. of freshly prepared 0.01 *N* potassium permanganate add 18.0 cc. of 0.1 *N* cobaltous chloride and 4.9 cc. of distilled water. The color of this dilution of Cochineal Solution approximates that of the standard color solution:

the strength of color, when expressed in mm. of column height, is not more than 10 per cent above or not more than 10 per cent below the height in mm. of the column of the standard color solution.
Storage—Preserve Cochineal Solution in tight containers.

COCONUT OIL
Oleum Cocois

Coconut Oil is the fixed oil obtained by expression or extraction from the kernels of the seeds of *Cocos nucifera* Linné (Fam. *Palmæ*).

Coconut Oil that has become rancid must not be used.

Description—Coconut Oil is a pale yellow to colorless liquid at temperatures of 28° to 30°. It becomes semi-solid at a temperature of 20° and is hard and somewhat brittle, and has a characteristic fracture below 15°. Its odor and taste are faintly characteristic of coconut; or it is odorless and tasteless. It is readily subject to hydrolytic rancidity, and is affected by light.
Solubility—Coconut Oil is readily soluble in ether, in chloroform, in carbon disulfide, and in petroleum benzin. It is insoluble in water.
Melting point—Coconut Oil melts between 22° and 25°, page 731.
Specific gravity—The specific gravity of Coconut Oil is not less than 0.916 and not more than 0.920 at 25°.
Refractive index—The refractive index of Coconut Oil is not less than 1.4477 and not more than 1.4495 at 40°, page 745.
Acid value—The free fatty acids in 10 Gm. of Coconut Oil require for neutralization not more than 0.55 cc. of 0.1 *N* sodium hydroxide solution, page 712.
Saponification value—The saponification value of Coconut Oil is not less than 251 and not more than 262, page 713.
Iodine value—The iodine value of Coconut Oil is not less than 7 and not more than 10, page 713.
Storage—Preserve Coconut Oil in tight, light-resistant containers.

COD LIVER OIL EMULSION WITH MALT
Emulsum Olei Morrhuæ cum Malto

Emuls. Ol. Morrh. c. Malt. Malt and Cod Liver Oil

Cod Liver Oil	300 cc.
Tragacanth, in fine powder	3 Gm.
Distilled Water	150 cc.
Malt Extract, a sufficient quantity,	
To make	1000 cc.

Mix the oil and tragacanth thoroughly, add the distilled water, and agitate the mixture until a homogeneous emulsion is formed. Finally add the malt extract in portions, shaking the mixture thoroughly after each addition, until the product measures 1000 cc.

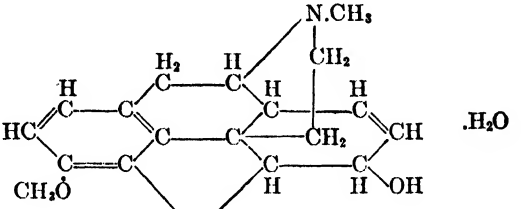
Storage—Preserve Cod Liver Oil Emulsion with Malt in tight containers.

AVERAGE DOSE—**15 cc.** (approximately 4 fluidrachms).

One average metric dose contains 4.5 cc. of Cod Liver Oil and about 8.25 cc. of Malt Extract.

Codeine

CODEINE
Codeina



$C_{18}H_{21}O_3N.H_2O$ Mol. wt. 317.37

Codeine is an alkaloid obtained from opium or prepared from morphine by methylation.

Description—Codeine occurs as colorless or white crystals, or as a white, crystalline powder. It effloresces slowly in dry air and is affected by light. In acid or alcohol solutions it is lævorotatory. A saturated aqueous solution of Codeine is alkaline to litmus paper.

Solubility—One Gm. of Codeine dissolves in 120 cc. of water, in 2 cc. of alcohol, in about 0.5 cc. of chloroform, and in 50 cc. of ether, at 25°. When heated in an amount of water insufficient for complete solution, Codeine melts to oily drops which crystallize on cooling.

Melting point—Codeine, rendered anhydrous by drying at 80°, melts between 154° and 156°, page 731.

Identification—

A: Sulfuric acid containing 5 mg. of selenous acid in each cc. produces with Codeine a green color, which changes rapidly to blue, then slowly back to green.

B: Dissolve about 10 mg. of Codeine in 5 cc. of sulfuric acid, add a drop of ferric chloride T.S., and warm the mixture: the solution becomes blue, but changes to reddish brown on the addition of 1 drop of nitric acid.

Loss on drying—When dried to constant weight at 80°, Codeine loses not more than 6 per cent of its weight.

Residue on ignition—The residue on ignition from 0.5 Gm. of Codeine is negligible.

Readily carbonizable substances—Dissolve 10 mg. of Codeine in 5 cc. of sulfuric acid: the solution has no more color than matching fluid S, page 744.

Morphine—Dissolve about 50 mg. of potassium ferricyanide in 10 cc. of distilled water, and add 1 drop of ferric chloride T.S. and 1 cc. of a neutral or slightly acid aqueous solution of Codeine (1 in 100) made with the aid of sulfuric acid: no blue color is produced immediately.

Storage—Preserve Codeine in tight, light-resistant containers.

AVERAGE DOSE—**30 mg.** (approximately 1/2 grain).

COLCHICUM CORM

Colchici Cormus

Colchicum-root

Colchicum Corm is the dried corm of *Colchicum autumnale* Linné (Fam. *Liliaceæ*).

Colchicum Corm yields not less than 0.35 per cent of anhydrous colchicine.

Unground Colchicum Corm—Unground Colchicum Corm usually occurs as reniform transverse slices or as ovate longitudinal slices from 2 to 5 mm. in thickness. The flat surfaces are yellowish white to pale yellowish orange, slightly roughened and of a crystalline appearance under a hand lens. The epidermal surface is pale brown to dusky yellowish orange and finely wrinkled. The fracture is short and mealy.

Powdered Colchicum Corm—Powdered Colchicum Corm is weak yellowish orange; has a slight odor and a bitter, acrid taste. Starch grains are numerous, single or 2- to 6-compound, the individual grains varying from spherical or ovoid to polygonal, from 3 to 30 microns in diameter, and marked with a triangular or star-shaped central cleft. Tracheæ are few and with spiral or scalariform thickenings. There are also occasional fragments of epidermal cells with thin walls.

Acid-insoluble ash—Colchicum corm yields not more than 0.5 per cent of acid-insoluble ash, page 761.

Assay—Proceed as directed in the *Assay* under *Colchicum Seed*, page 163, using 15 Gm. of Colchicum Corm in moderately fine powder.

COLCHICUM CORM FLUIDEXTRACT

Fluidextractum Colchici Cormi

Fldext. Colch. Corm.

Colchicum Corm Fluidextract yields, from each 100 cc., not less than 0.30 Gm. and not more than 0.40 Gm. of colchicine.

Prepare the Fluidextract from colchicum corm, in moderately coarse powder, by Process A, as modified for assayed fluidextracts, page 718. Use a mixture of 2 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 48 hours, and percolate slowly.

Adjust the concentrated fluid to contain, in each 100 cc., 0.35 Gm. of colchicine and 54 per cent, by volume, of C_2H_5OH.

Assay—To 15 cc. of Colchicum Corm Fluidextract add 275 cc. of distilled water and 10 cc. of lead subacetate T.S., accurately measuring each. Agitate the mixture frequently during 1 hour, and filter. Proceed as directed in the *Assay* under *Colchicum Seed*, page 163, beginning with, "To 200 cc. of the clear filtrate . . ." The result obtained represents the yield of colchicine, $C_{22}H_{25}NO_6$, from 5 cc. of the Colchicum Corm Fluidextract.

Alcohol content—From 51 to 57 per cent, by volume, of C_2H_5OH.

Storage—Preserve Colchicum Corm Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**0.25 cc.** (approximately 4 minims).

Colchicum Corm Tincture, Strong

STRONG COLCHICUM CORM TINCTURE

Tinctura Colchici Cormi Fortis

Tr. Colch. Corm. Fort.

NOTE: Strong Colchicum Corm Tincture may be dispensed when Colchicum Corm Wine is ordered.

Strong Colchicum Corm Tincture yields, from each 100 cc., not less than 0.12 Gm. and not more than 0.16 Gm. of colchicine.

Colchicum Corm Fluidextract	400 cc.
Alcohol,	
Water, each, a sufficient quantity,	
To make about	1000 cc

Mix the fluidextract with 400 cc. of water, allow to stand 1 hour, and filter. Wash the filter with sufficient of a mixture of 1 volume of alcohol and 3 volumes of water to obtain 950 cc.

Adjust to make a Tincture containing, in each 100 cc., 0.140 Gm. of colchicine.

Assay—Evaporate 45 cc. of Strong Colchicum Corm Tincture, accurately measured, to about 15 cc.; pour the fluid into a suitable flask and rinse the dish with small portions of distilled water until all of the content has been transferred to the flask; add more distilled water, up to about 275 cc.; then add 10 cc. of lead subacetate T.S. and sufficient distilled water to make 300 cc. of the mixture. Agitate it frequently during 1 hour, and filter. Proceed as directed in the *Assay* under *Colchicum Seed*, page 163, beginning with, "To 200 cc. of the clear filtrate . . ." The result obtained represents the yield of colchicine, $C_{22}H_{25}NO_6$, from 15 cc. of Strong Colchicum Corm Tincture.

Alcohol content—From 24 to 28 per cent, by volume, of C_2H_5OH.

Storage—Preserve Strong Colchicum Corm Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**0.6 cc.** (approximately 10 minims).

COLCHICUM SEED

Colchici Semen

Colchici Semen P.I.

Colchicum Seed is the dried ripe seed of *Colchicum autumnale* Linné (Fam. *Liliaceæ*).

Colchicum Seed yields not less than 0.45 per cent of colchicine.

Unground Colchicum Seed—Colchicum Seed is ovoid or irregularly globular in shape, amphitropous, minutely pointed at the hilum, and with a distinct beak or caruncle approximately opposite the hilum; from 2 to 3 mm. in diameter and, when fresh, has a tendency to cohere in small clumps. It is tough and of bony hardness finely pitted and weak reddish brown to dark brown externally and pale yellow, yellowish gray or light brown internally.

Histology—Colchicum Seed possesses a seed coat of a few layers of more or less collapsed cells with thin, reddish brown, orange or olive brown walls, the inner rows of cells of which contain a brownish pigment; an endosperm consisting of parenchyma with thick, porous walls containing fixed oil and aleurone grains, the latter from 3 to 15 microns in diameter; and a small embryo. The beaked portion or swollen raphe consists largely of thin-walled parenchyma containing ovoid, ellipsoidal or polygonal starch grains from 5 to 20 microns in diameter.

Powdered Colchicum Seed—Powdered Colchicum Seed is dark yellowish brown to moderate brown, nearly inodorous and has a bitter and acrid taste. It consists of fragments of endosperm comprised of cells with thick porous walls, the cells containing oil globules and aleurone grains, and fragments of seed coat composed of parenchyma with brownish walls and dark brown pigment cells. Starch grains and spiral tracheæ occur sparingly.

Foreign organic matter—Colchicum seed contains not more than 1 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Colchicum Seed yields not more than 1 per cent of acid-insoluble ash, page 761.

Assay—Weigh accurately 15 Gm. of Colchicum Seed, in moderately fine powder, and place it in a suitable flask. Add exactly 290 cc. of distilled water and exactly 10 cc. of lead subacetate T.S., and weigh the flask and contents. Digest the mixture at a temperature of from 60° to 70° for 3 hours with frequent agitation. Cool, add distilled water to the flask to restore the original weight, and filter into a dry flask, rejecting the first 20 cc. of the filtrate. To 200 cc. of the clear filtrate add, in small portions, sufficient sodium phosphate (about 2 Gm.) to precipitate the lead completely, shake the mixture frequently during 30 minutes, and filter into a dry flask, rejecting the first 20 cc. of the filtrate. Extract the alkaloids completely from 100 cc. of the filtrate by shaking with successive portions of chloroform (see *Extraction of Drugs*, page 740). Test for complete extraction with iodine T.S.

Carefully evaporate the combined chloroform extracts in a tared flask to dryness on a water bath, then add to the residue 1 cc. of alcohol, and again evaporate to dryness. Again evaporate the residue with 1 cc. of alcohol, and then dry to constant weight at 105°.

Add to the residue 1 cc. of chloroform, 5 cc. of 0.1 *N* sulfuric acid, and 5 cc. of distilled water, and heat the mixture at 70° for about 10 minutes, to dissolve the alkaloid and to evaporate the chloroform completely. Filter the solution through a pledget of purified cotton or a small filter paper, and wash the flask and the filter with distilled water until the washings show not more than a faint turbidity with iodine T.S. Drain the filter by application of suction to remove as much water as possible, and discard the filtrate and washings. Dissolve any residue on the filter by washing it first with alcohol and then with ether. Collect the alcohol and ether filtrates in the flask in which the alkaloid was weighed, evaporate to dryness, and dry the residue to constant weight at 105°. Deduct this weight from the weight of the residue previously obtained: the difference represents the quantity of colchicine yielded by 5 Gm. of Colchicum Seed.

Storage—Preserve Colchicum Seed in well-closed containers.

Colchicum Seed Fluidextract

COLCHICUM SEED FLUIDEXTRACT

Fluidextractum Colchici Seminis

Fldext. Colch. Sem.

Colchicum Seed Fluidextract yields, from each 100 cc., not less than 0.4 Gm. and not more than 0.5 Gm. of colchicine.

Extract the fatty matter from colchicum seed, in moderately coarse powder, by percolation with petroleum benzin. Reject the benzin percolate. Prepare the Fluidextract from the defatted and dried drug by Process A, as modified for assayed fluidextracts, page 718. Use a mixture of 2 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 48 hours, and percolate at a moderate rate.

Adjust the concentrated fluid to contain, in each 100 cc., 0.45 Gm. of colchicine and 56 per cent, by volume, of C_2H_5OH.

Assay—To 15 cc. of Colchicum Seed Fluidextract, add 275 cc. of distilled water and 10 cc. of lead subacetate T.S., accurately measuring each. Agitate the mixture frequently during 1 hour, and filter. Proceed as directed in the *Assay* under *Colchicum Seed*, page 163, beginning with, "To 200 cc. of the clear filtrate..." The result obtained represents the yield of colchicine, $C_{22}H_{25}NO_6$, from 5 cc. of the Colchicum Seed Fluidextract.

Alcohol content—From 53 to 58 per cent, by volume, of C_2H_5OH.

Storage—Preserve Colchicum Seed Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**0.2 cc.** (approximately 3 minims).

COLCHICUM SEED TINCTURE

Tinctura Colchici Seminis

Tr. Colch. Sem. Tinctura Colchici P.I.

Colchicum Seed Tincture yields, from each 100 cc., not less than 0.04 Gm. and not more than 0.05 Gm. of colchicine.

Colchicum Seed, in moderately coarse powder	**100 Gm.**
To make about	**1000 cc.**

Prepare a tincture by Process P as modified for assayed tinctures, page 758, using a mixture of 2 volumes of alcohol and 1 volume of water as the menstruum. Finally adjust the Tincture to contain, in each 100 cc., 0.040 Gm. of colchicine.

Assay—Measure accurately 150 cc. of Colchicum Seed Tincture, and evaporate it on a water bath to about 15 cc. Cool, dissolve the residue in sufficient distilled water to make exactly 290 cc., add exactly 10 cc. of lead subacetate T.S., and weigh the flask and contents. Proceed as directed in the *Assay* under *Colchicum Seed*, page 163, beginning with the words "Digest the mixture at a temperature of from 60° to 70° for 3 hours." The result obtained represents the yield of colchicine, $C_{22}H_{25}NO_6$, from 50 cc. of Colchicum Seed Tincture.

Alcohol content—From 59 to 63 per cent, by volume, of C_2H_5OH.

Storage—Preserve Colchicum Seed Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**2 cc.** (approximately 30 minims).

SALICYLIC COLLODION

Collodium Salicylicum

Collod. Salicyl.

Salicylic Acid	**100 Gm.**
Flexible Collodion, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the salicylic acid in about 750 cc. of flexible collodion, and add sufficient flexible collodion to make the product measure 1000 cc. Mix the ingredients.

Storage—Preserve Salicylic Collodion in tight containers, and avoid excessive heat.

Colloidal Silver Chloride, page 464
Colloidal Silver Iodide, page 464

Colocynth

COLOCYNTH
Colocynthis

Colocynth Pulp Bitter Apple

Colocynth is the dried pulp of the unripe but full-grown fruit of *Citrullus Colocynthis* (Linné) Schrader (Fam. *Cucurbitaceæ*).

Colocynth yields not more than 2 per cent of anhydrous extractive with petroleum benzin.

Unground Colocynth—Unground Colocynth occurs as light, spongy, easily broken pieces; light yellowish orange to pale yellow, with occasional small patches of darker epicarp. The fruits, before removal of seed, are nearly globular, from 4 to 10 cm. in diameter with 3 large lenticular cavities between the 3 carpels, hence being easily separable longitudinally into 3 parts. The seeds are ovoid, compressed, strong brown to weak yellowish orange.

Histology—The parenchyma consists of large, thin-walled, pitted cells; the vascular bundles are bicollateral, with spiral tracheæ, and occasionally accompanied by irregular, tubular, laticiferous vessels.

Powdered Colocynth—Powdered Colocynth is weak yellowish orange to yellowish gray; has a slight odor and an intensely bitter taste. It is characteristically flaky, and consists chiefly of fragments of the parenchyma and vascular bundles.

Epicarp and seed—Colocynth contains not more than 5 per cent of seed and not more than 2 per cent of epicarp.

In the powder, characteristic stone cells are few or absent (epicarp and seed); as are also aleurone grains and globules of fixed oil (seed).

Acid-insoluble ash—Colocynth yields not more than 4 per cent of acid-insoluble ash, page 761.

Petroleum benzin extractive—Extract 2 Gm. of Colocynth, in moderately fine powder and accurately weighed, with petroleum benzin in a suitable continuous extraction apparatus for 8 hours or until completely extracted. Transfer to a suitable tared container and allow the benzin to evaporate spontaneously, dry the residue over sulfuric acid for about 18 hours, and weigh. The weight obtained represents the yield of anhydrous extractive with petroleum benzin from 2 Gm. of Colocynth.

AVERAGE DOSE—**0.125 Gm.** (approximately 2 grains).

COMPOUND COLOCYNTH AND JALAP PILLS

Pilulæ Colocynthidis et Jalapæ Compositæ

Pil. Colocynth. et Jalap. Comp. Vegetable Cathartic Pills

Compound Colocynth Extract	**6 Gm.**
Hyoscyamus Extract	**3 Gm.**
Jalap Resin, in fine powder	**2 Gm.**
Leptandra Extract	**1.5 Gm.**
Podophyllum Resin	**1.5 Gm.**
Peppermint Oil	**0.8 cc.**

Diluted Alcohol, a sufficient quantity,

To make 100 pills.

Prepare the pills according to the General Directions, page 739.

AVERAGE DOSE—1 pill.

One average metric dose contains 60 mg. of Compound Colocynth Extract, 30 mg. of Hyoscyamus Extract, 20 mg of Jalap Resin, and 15 mg. each of Leptandra Extract and of Podophyllum Resin.

COLOCYNTH EXTRACT

Extractum Colocynthidis

Ext. Colocynth. Bitter Apple Extract

One Gm. of the Extract represents 4 Gm. of colocynth.

Prepare the Extract from colocynth, in coarse powder, by percolation and evaporation. Use 4 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 24 hours, and percolate at a moderate rate. Evaporate the percolate to dryness, reduce the residue to a fine powder, and mix it thoroughly, if necessary, with sufficient dry starch to make the Extract weigh one-fourth of the weight of the colocynth taken.

Storage—Preserve Colocynth Extract in tight, light-resistant containers, preferably at a temperature not above 30°.

AVERAGE DOSE—**30 mg.** (approximately $^1/_2$ grain).

Colocynth Extract, Compound

COMPOUND COLOCYNTH EXTRACT

Extractum Colocynthidis Compositum

Ext. Colocynth. Comp.

Colocynth Extract	160 Gm.
Ipomea Resin, in fine powder	140 Gm.
Aloe, in fine powder	650 Gm.
Cardamom Seed, in fine powder	50 Gm.
To make	1000 Gm.

Mix the ingredients.

Storage—Preserve Compound Colocynth Extract in tight, light-resistant containers preferably at a temperature not above 30°.

AVERAGE DOSE—**0.25 Gm.** (approximately 4 grains).

One average metric dose contains 40 mg. of Colocynth Extract, 35 mg. of Ipomea Resin, and 0.1625 Gm. of Aloe.

Compounds (Preparations)

Compound Senna Powder, page 457
Compound Serenoa and Sandalwood Elixir, page 458
Compound Sodium Borate Solution, page 476
Compound Sodium Salicylate and Gelsemium Elixir, page 490
Compound Soft Soap Liniment, page 467
Compound Squill Syrup, page 499
Compound Sulfur Ointment, page 521
Compound Tar Ointment, page 527
Compound Taraxacum Elixir, page 529
Compound Vanillin Elixir, page 550
Compound Vanillin Spirit, page 550
Compound White Pine Syrup, page 557
Compound White Pine Syrup with Codeine, page 558
Compound Zinc Sulfate Powder, page 567

CONVALLARIA
Convallaria

Convall. Lily-of-the-Valley Root

Convallaria consists of the dried rhizome and roots of *Convallaria majalis* Linné (Fam. *Liliaceæ*).

Convallaria possesses a potency such that 0.1 Gm. of it is equivalent to not less than 3 U. S. P. XIII Digitalis Units.

Unground Convallaria—Unground Convallaria shows a horizontal or oblique rhizome, elongated, usually branched, cylindrical, and from 1 to 3 mm. in diameter. Externally it is light brown to moderate yellow. The rhizome shows nodes with an occasional circular, hollow stem-scar, and with 3 to 9 thin, tortuous, branching roots moderate brown to moderate yellowish brown in color, or root remnants or root-scars at each node; occasional terminal or lateral buds up to 8 mm. in thickness and with numerous scales; and occasional groups of annulate leaf-scars. The fracture is short or somewhat fibrous.

Histology—Convallaria shows a rhizome with an epidermis bearing a thick layer of cutin; a cortex made up of about 20 rows of parenchyma cells, some of which contain starch, and others raphides of calcium oxalate; a prominent endodermis of 2 layers, or, occasionally, 1 or 3 layers of irregularly polygonal cells with the radial and inner walls thickened and lignified. Adjacent to the inner surface of the endodermis is an interrupted circle of closed collateral fibro-vascular bundles, the woody portion V-shaped in cross-sections; a few phloem-centric fibro-vascular bundles scattered in the stele; and numerous intercellular spaces in the parenchyma tissue. The roots show a hairy epidermal layer; a hypodermis of a single layer of cells; a cortex of about 6 layers of cells, some of which contain starch, raphides of calcium oxalate or oil; the endodermal cells are thin-walled and bear casparyan spots on the radial walls; and a stele with a polyarch wood bundle.

Powdered Convallaria—Powdered Convallaria is light brown to moderate yellowish brown. It has a faint odor and a sweetish taste, becoming bitter and acrid. It shows a few simple or 2- to 4-compound starch grains, the simple grains nearly spherical and from 3 to 12 microns in diameter; a few raphides of calcium oxalate, mostly from 20 to 60 microns in length, rarely up to 150 microns long, numerous silica crystals; fragments of parenchyma occasionally bearing endodermal cells with slightly oblique ends and strongly lignified, porous walls, or slightly lignified fiber

tracheids with oblique walls, and fragments of trachœæ with spiral, reticulate, or scalariform markings.

Foreign organic matter—Convallaria contains not more than 5 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Convallaria yields not more than 6 per cent of acid-insoluble ash, page 761.

Assay—Determine the potency of Convallaria in terms of U. S. P. Digitalis Units, as directed for *Digitalis* in the U. S. Pharmacopœia XIII. Convallaria shall be considered to conform to the National Formulary requirement if the result of the assay by the above procedure does not vary more than 20 per cent from such requirement.

AVERAGE DOSE—**30 mg.** (approximately 1/2 grain).

Copaiba

COPAIBA
Copaiba
Copaiba Balsam

Copaiba is an oleoresin obtained from South American species of *Copaifera* Linné (*Copaiba* Adanson) (Fam. *Leguminosæ*).

Description—Copaiba is a pale yellow to yellowish brown, more or less viscid liquid, either without fluorescence or with only a slight greenish fluorescence. It has a peculiar, aromatic odor, and a persistent bitter, acrid taste.

Solubility—Copaiba dissolves in carbon disulfide, in fixed or volatile oils, in chloroform, and in ether. Copaiba dissolves in an equal volume of petroleum benzin, the further addition of the solvent producing a flocculent precipitate. It is almost completely soluble in dehydrated alcohol, partially soluble in alcohol, but is insoluble in water.

Specific gravity—The specific gravity of Copaiba is not less than 0.915 and not more than 0.995 at 25°.

Paraffin, turpentine, or fatty oils—Heat about 2 Gm. of Copaiba, accurately weighed, in a shallow dish on a water bath: it evolves no odor of turpentine oil. Continue the heating until all of the volatile oil has been driven off: a resin remains corresponding to not less than 27 per cent of the weight of the Copaiba taken. This resin when cooled is hard and brittle

Paraffin oils—Shake 5 cc. of Copaiba with 15 cc. of alcohol in a 50-cc. test tube, boil the mixture for 1 minute, stopper the test tube, cool, and allow it to stand: no oily liquid separates within 1 hour.

Gurjun balsam—Mix 1 drop of nitric acid and 3 cc. of glacial acetic acid in a test tube, and carefully add 4 drops of the oil separated from the Copaiba by distillation with steam: no reddish zone appears, nor does the liquid become reddish or purplish after being shaken.

Dehydrated alcohol-insoluble matter—Dissolve 2 Gm. of Copaiba in 40 cc. of dehydrated alcohol, filter through a tared filtering crucible, and wash with small portions of dehydrated alcohol until the washings are colorless or nearly so: the weight of the residue dried at 80° does not exceed 5 per cent of the weight of the Copaiba taken.

African copaiba—The volatile oil separated from Copaiba by distillation with steam does not boil below 250°, and shows an angle of rotation, in a 100-mm. tube, of not less than −7° at 25°.

Storage—Preserve Copaiba in tight containers.

AVERAGE DOSE—**1 cc.** (approximately 15 minims).

COPAIBA MIXTURE
Mistura Copaibæ

Mist. Copaib. Lafayette Mixture

Copaiba	125 cc.
Sodium Nitrite	3 Gm.
Compound Lavender Tincture	125 cc.
Potassium Hydroxide Solution	30 cc.
Syrup	300 cc.
Acacia, in fine powder	35 Gm.
Distilled Water, a sufficient quantity, To make	1000 cc.

Make an emulsion of the copaiba with the acacia and 70 cc. of distilled water. Add the potassium hydroxide solution and then in portions, 200 cc. of distilled water in which the sodium nitrite is dissolved; finally add the syrup, the tincture, and sufficient distilled water to make the product measure 1000 cc. Mix well after each addition.

Alcohol content—From 8 to 10 per cent, by volume, of C_2H_5OH.
Storage—Preserve Copaiba Mixture in tight containers.

AVERAGE DOSE—**8 cc.** (approximately 2 fluidrachms).

One average metric dose contains 1 cc. of Copaiba, 24 mg. of Sodium Nitrite, and 0.24 cc. of Potassium Hydroxide Solution.

CORIANDER
Coriandrum
Coriander-seed

Coriander is the dried ripe fruit of *Coriandrum sativum* Linné (Fam. *Umbelliferæ*).

Coriander yields not less than 0.25 cc. of volatile coriander oil from each 100 Gm. of drug.

Unground Coriander—The mericarps of Coriander are usually coherent; the cremocarps nearly globular, from 2 to 5 mm. in diameter; externally weak yellowish orange to moderate yellowish brown, frequently with a purplish red blush. The apex has 5 calyx teeth and a short stylopodium, each mericarp has 5 prominent, straight, longitudinal primary ribs and 4 indistinct, undulate secondary ribs. The mericarps are easily separated and are deeply concave on the commissural surface.

Histology—Coriander shows an epidermis of small cells with thick walls; a layer of several rows of thin-walled, more or less collapsed parenchyma separated from a broad zone of strongly lignified fibers, which extends as a continuous layer in the mesocarp of each of the mericarps; 2 or 3 layers of large, tangentially elongated, thin-walled parenchyma cells, enclosing numerous large intercellular spaces; 2 large elliptical oil tubes on each commissural side, and an endocarp of large tabular cells, the inner yellowish walls considerably thickened and closely coherent to the darker cells of the seed coat, except on the commissural side, where the endocarp is separated from the seed coat forming a large elliptical cavity. The endosperm is distinctly reniform in outline, and consists of tabular or polygonal thick-walled cells containing fixed oil, and numerous large aleurone grains, each with a rosette or prism of calcium oxalate.

Powdered Coriander—Powdered Coriander is moderate yellowish brown; has a fragrant odor and an aromatic, characteristic taste. It consists chiefly of endosperm and lignified tissues of the pericarp; calcium oxalate crystals are numerous, and up to 10 microns in diameter, mostly in rosettes, either isolated or in aleurone grains. The fibers are irregularly curved and have thick, lignified walls and numerous simple pores. Numerous globules of fixed oil and a few fragments of yellow oil tubes, associated with elongated polygonal, epidermal cells are also present.

Foreign organic matter—Coriander contains not more than 5 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Coriander yields not more than 1.5 per cent of acid-insoluble ash, page 761.

Assay—Place about 200 Gm. of Coriander, preferably whole or coarsely comminuted and accurately weighed, in the flask of the apparatus used for volatile oil determinations and proceed with the assay as directed on page 764, Process A.

AVERAGE DOSE—**2 Gm.** (approximately 30 grains).

Corpus Luteum

CORPUS LUTEUM
Corpus Luteum

Desiccated Corpus Luteum

Corpus Luteum is the dried, undefatted, and powdered corpus luteum from the ovary of cattle, sheep, or swine.

Corpus Luteum is derived from sound, clean glands freed as far as practicable from other ovarian tissue, and containing no diluents or preservatives.

One part of Corpus Luteum is obtained from approximately 5 parts by weight of the fresh corpus luteum. It should be dried in a vacuum, at a temperature not exceeding 60°.

Description—Corpus Luteum occurs as a yellow or light brown powder having a characteristic malt-like odor.

Solubility—Corpus Luteum only partially dissolves in water, alcohol, ether, or petroleum benzin.

Histological characters—Corpus Luteum shows numerous lutein cells of yellowish green color as observed in water mounts, occurring singly or in small groups, the individual cells large, polyhedral, with spheroidal, central nuclei and with fat globules and lutein granules which become black upon the addition of osmic acid T.S. The groups of lutein cells are intermingled with collagen fibers, the latter staining a deep red with acid fuchsin T.S. Occasional capillaries and somewhat cylindrical fragments of arterioles and veins whose ends exhibit somewhat rounded lumina and serrate margins of endothelial cells having dark outlines when mounted in silver nitrate T.S., are also present.

Moisture—Corpus Luteum yields not more than 6 per cent of moisture when determined by Method VII, page 761.

Total ash—Corpus Luteum yields not more than 6 per cent of total ash, page 760.

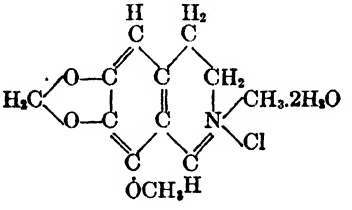
Storage—Preserve Corpus Luteum in tight containers and avoid excessive heat.

AVERAGE DOSE—To be determined by the prescriber.

COTARNINE CHLORIDE

Cotarninæ Chloridum

Cotarn. Chlorid. Cotarnine Hydrochloride



$C_{12}H_{14}O_3NCl.2H_2O$ Mol. wt. 291.73

Cotarnine Chloride is the chloride of an alkaloid obtained by the oxidation of narcotine.

Description—Cotarnine Chloride occurs as a weak greenish yellow, odorless, crystalline powder. It is deliquescent in moist air and is affected by light. An aqueous solution of Cotarnine Chloride (1 in 20) is neutral to litmus paper.

Solubility—One Gm. of Cotarnine Chloride dissolves in about 1 cc. of water and in about 4 cc. of dehydrated alcohol.

Identification—

A: An aqueous solution of Cotarnine Chloride (1 in 20) responds to the tests for *Chloride*, page 724.

B: Dissolve about 0.5 Gm. of Cotarnine Chloride in 10 cc. of distilled water, and add 2 cc. of an aqueous solution of sodium hydroxide (15 in 100): a yellow precipitate is produced which dissolves on agitation, but is reprecipitated from the solution after standing for some time, leaving the supernatant liquid clear, but greenish yellow.

C: Dissolve about 0.2 Gm. of Cotarnine Chloride in 10 cc. of distilled water, and add 10 cc. of 0.1 *N* iodine: a brown precipitate of cotarnine periodide is formed. When this precipitate is collected on a filter and dried to constant weight over sulfuric acid, its melting point is between 142° and 144°.

Loss on drying—When dried over sulfuric acid for 24 hours, Cotarnine Chloride loses not more than 1 per cent of its weight.

Residue on ignition—The residue on ignition from 0.1 Gm. of Cotarnine Chloride is negligible, page 745.

Storage—Preserve Cotarnine Chloride in tight, light-resistant containers.

AVERAGE DOSE—**60 mg.** (approximately 1 grain).

Cotton Root Bark

COTTON ROOT BARK
Gossypii Radicis Cortex

Gossyp. Rad. Cort.

Cotton Root Bark is the recently gathered, air-dried bark of the root of one or more of the cultivated varieties of *Gossypium hirsutum* Linné, or of other species of *Gossypium* (Fam. *Malvaceæ*).

Unground Cotton Root Bark—Unground Cotton Root Bark occurs as flexible bands or quilled pieces, attaining a length of 30 cm. and a thickness of about 1 mm. It shows an outer surface weak brown to moderate yellowish brown in color, sometimes smooth, but usually finely wrinkled, fissured longitudinally and roughened from the tendency of the corky layers to exfoliate; and an inner surface light brown to pale yellowish orange, longitudinally striate. The fracture is tough and fibrous; and the inner bark readily separable into fibrous layers.

Histology—Cotton Root Bark shows a cork of 4 to 6 layers of tabular cells with thin walls; a thin secondary cortex of starch-bearing parenchyma and an occasional large secretion reservoir with colorless to yellowish orange contents; an inner bark with closely adjacent V-shaped groups consisting of layers of strongly lignified bast fibers, sieve tissue and tannin-containing cells, and traversed by medullary rays, the arrangement giving a deeply incised appearance to the outer edge of the bast ring when viewed in transverse section.

Powdered Cotton Root Bark—Powdered Cotton Root Bark is light yellowish brown, has a slight odor and a very slightly acrid taste. It shows numerous bast fibers up to 1000 microns in length and about 15 microns in width, with thickened strongly lignified walls, a few pores, and the ends of the fibers acute and markedly attenuate. Also present are numerous fragments of cortical and medullary-ray parenchyma; starch grains simple or compound, up to 20 microns in diameter; rosette crystals of calcium oxalate from 9 to 25 microns in diameter.

Wood and other foreign organic matter—Cotton Root Bark contains not more than 5 per cent of adhering wood or other foreign organic matter, page 760.

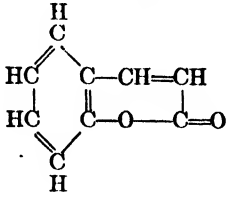
Acid-insoluble ash—Cotton Root Bark yields not more than 2 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**2 Gm.** (approximately 30 grains).

COUMARIN
Coumarinum

Coumar.

$C_9H_6O_2$



Mol. wt. 146.14

Description—Coumarin occurs as colorless, prismatic crystals, with a characteristic, fragrant odor, and a bitter, aromatic, burning taste.

Solubility—One Gm. of Coumarin dissolves in about 400 cc. of cold water and in about 50 cc. of hot water. It is freely soluble in alcohol, in ether, in chloroform, and in fixed or volatile oils.

Melting point—Coumarin melts between 68° and 70°, page 731.

Identification—

A: Coumarin dissolves slowly in a solution of sodium or potassium hydroxide, producing a greenish yellow color and forming sodium or potassium coumarinate. The Coumarin is precipitated from this solution by the addition of carbon dioxide, or by the addition of hydrochloric acid.

B: A saturated aqueous solution of Coumarin forms a precipitate upon the addition of iodine T.S. The precipitate is at first brown and flocculent, and afterward coalesces when shaken, forming a greenish, curdy mass, and leaving the supernatant liquid clear (*distinction from vanillin*).

Distinction from vanillin—Coumarin is not extracted from its solution in ether by ammonia T.S.

Acetanilid—Warm 0.1 Gm. of Coumarin with 1 cc. of an alcohol solution of sodium hydroxide (1 in 4); add a few drops of chloroform, and warm again: the mixture does not possess the disagreeable odor of phenyl isocyanide.

Storage—Preserve Coumarin in well-closed containers.

CREOSOTE
Creosotum

Creasote Wood Creosote

Creosote is a mixture of phenols obtained from wood tar.

Description—Creosote is an almost colorless or yellowish, highly refractive, oily liquid, having a penetrating, smoky odor, and a burning, caustic taste. It does not readily become brownish on exposure to light. Creosote is inflammable, burning with a luminous, smoky flame. It is neutral or acid to moistened litmus paper.

Solubility—Creosote is slightly soluble in water, but is miscible with alcohol, with ether, and with fixed or volatile oils.

Specific gravity—The specific gravity of Creosote is not less than 1.076 at 25°.

Distillation range—Creosote begins to distil at about 203°, and not less than 90 per cent of it, by volume, distils between 203° and 220°, when determined by Method II under *Boiling or Distilling Temperatures*, page 692.

Identification—Add 1 drop of ferric chloride T.S. to 10 cc. of a saturated aqueous solution of Creosote: a purple color, which is very transient, develops in the mixture. The liquid becomes cloudy almost instantly, its color changing rapidly from blue through green, finally producing a brown precipitate.

So-called coal-tar creosote—Mix 4 cc. of Creosote and 4 cc. of glycerin, add 1 cc. of distilled water, shake the mixture gently, and allow it to stand: the volume of the creosote layer which separates, equals or exceeds the volume of the Creosote taken.

Hydrocarbons and bases—Two cc. of Creosote requires not less than 10 cc. and not more than 18 cc. of 1 *N* sodium hydroxide to produce a clear liquid. This liquid remains clear on diluting it with 50 cc. of distilled water.

Phenol and so-called coal-tar creosote—Mix equal volumes of Creosote and collodion in a dry test tube: no permanent coagulum is produced.

Other impurities—Shake gently 1 cc. of Creosote with 2 cc. of petroleum benzin and 2 cc. of freshly prepared barium hydroxide T.S. until a uniform mixture results: upon standing, the liquid separates into 3 distinct layers, the upper layer being neither blue nor brown.

Storage—Preserve Creosote in tight, light-resistant containers, and avoid excessive heat.

AVERAGE DOSE—**0.25 cc.** (approximately 4 minims).

Creosote Carbonate

CREOSOTE CARBONATE

Creosoti Carbonas

Creosot. Carb.

Creosote Carbonate is a mixture of the carbonates of various constituents of creosote.

Description—Creosote Carbonate is a clear, colorless or yellowish, viscid liquid. It is odorless and tasteless, or has a slight odor and taste of creosote. On prolonged exposure to a low temperature, it may deposit crystals, which redissolve on warming.

Solubility—Creosote Carbonate is miscible with alcohol, with petroleum benzin, with fixed oils, with chloroform, and with benzene. It is immiscible with water.

Specific gravity—The specific gravity of Creosote Carbonate is not less than 1.145 at 25°.

Boiling point of creosote—Heat 25 cc. of Creosote Carbonate on a water bath for 30 minutes with a solution of 15 Gm. of potassium hydroxide in 100 cc. of alcohol, add about 50 cc. of distilled water, and evaporate the alcohol. Treat the residue with an excess of hydrochloric acid, and allow the liquid to separate into 2 layers. Separate the creosote layer, wash it by shaking first with 15 cc. of an aqueous solu-

tion of sodium chloride (1 in 5), then with 10 cc. of distilled water, and distil it as directed under Method II under *Boiling or Distilling Temperatures*, page 692. Not less than eighty-five per cent of the creosote thus obtained, allowance being made for adhering moisture, distils between 200° and 220°. The distillate after the separation of adhering water, does not respond to the tests for the *So-called coal-tar creosote*, and *Hydrocarbons and bases* under *Creosote*, page 176.

Identification—Heat about 0.5 cc. of Creosote Carbonate for a few minutes with 10 cc. of alcoholic potassium hydroxide T.S., then cool the mixture: a crystalline precipitate which effervesces with acids is produced.

Residue on ignition—Creosote Carbonate yields not more than 0.1 per cent of residue on ignition, page 745.

Free creosote—An alcohol solution of Creosote Carbonate (1 in 5) is neutral to moistened litmus paper, and acquires only a greenish yellow color on the addition of 1 drop of ferric chloride T.S.

Storage—Preserve Creosote Carbonate in tight containers.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

CUBEB

Cubeba

Cubeb-berries

Cubeb is the dried, nearly full-grown, unripe fruit of *Piper Cubeba* Linné filius (Fam. *Piperaceæ*).

Cubeb yields not less than 13.0 cc. of volatile cubeb oil from each 100 Gm. of drug.

Unground Cubeb—Unground Cubeb consists of a fruit, the upper portion of which is nearly globular, from 3 to 6 mm. in diameter, the lower portion being abruptly contracted into a slender stem-like portion seldom exceeding 7 mm. in length. The pericarp is dusky red to moderate brown, rarely grayish in color, coarsely reticulate, and about 0.3 mm. in thickness. The fruit is 1-locular, and 1-seeded, the seed being attached at the base of the pericarp and usually not completely filling the loculus.

Histology—Cubeb shows a pericarp with an outer epidermis of tabular cells with thickened, undulate outer walls; a nearly continuous hypodermis of stone cells; a wide parenchyma with numerous, large, oval secretion cells containing volatile oil and occasionally crystals in the form of short rods, the contents of the secretion cells becoming purplish red upon the addition of sulfuric acid; a layer of several rows of collapsed cells in which occurs occasionally a small collateral bundle with a few lignified fibers; and an endocarp of 1 or 2 rows of isodiametric stone cells. The seed has a seed coat of several rows of dark-colored, tangentially elongated, more or less collapsed cells; a perisperm of thin-walled parenchyma cells, more or less polygonal in shape, and containing small starch grains, globules of fixed oil, or occasionally a crystal of calcium oxalate; and a small endosperm near the apex of the seed embedding a very small embryo.

Powdered Cubeb—Powdered Cubeb is moderate yellowish brown to dusky brown, has an aromatic, characteristic odor, and a strongly aromatic and pungent taste. The starch grains are numerous, single and compound, the individual grains being up to 12 microns in diameter. The stone cells are numerous, in palisade-like groups, with rather prominent dark lumina and yellowish, much thickened, lamellated, porous walls. Fragments of wood bundles are few, with spiral tracheæ and fibers, the latter up to 1 mm. in length with blunt, rounded, or very much attenuated ends, the walls being strongly lignified and having numerous oblique pores.

Identification—Mix Cubeb, powdered or crushed, with 1 drop of sulfuric acid on a glass slide, and view downward against a white background: a purplish red color is produced in the acid.

Shriveled and immature fruits—Cubeb contains not more than 10 per cent of shriveled and immature fruits.

Stems—Cubeb contains not more than 5 per cent of the stems of the plant.

Foreign organic matter—Cubeb contains not more than 2 per cent of foreign organic matter, other than shriveled and immature fruits and stems, page 760.

Acid-insoluble ash—Cubeb yields not more than 2 per cent of acid-insoluble ash, page 761.

Assay—Place about 20 Gm. of Cubeb, preferably coarsely comminuted and accurately weighed, in the flask of the apparatus used for volatile oil determinations and proceed with the assay as directed in Process A, page 764.

AVERAGE DOSE—**2 Gm.** (approximately 30 grains).

Cubeb Oleoresin

CUBEB OLEORESIN

Oleoresina Cubebæ

Oleores. Cubeb.

Cubeb Oleoresin yields not less than 50 cc. of volatile cubeb oil from each 100 Gm. of oleoresin.

Extract the oleoresin from cubeb, in moderately coarse powder, by percolation with alcohol as the menstruum. Recover the greater part of the alcohol from the percolate by distillation, transfer the residue to a dish, and allow the remaining alcohol to evaporate in a warm place, stirring frequently. Allow the extract to stand for at least 24 hours; then separate the liquid portion from the waxy and crystalline precipitate by decantation or by draining in a funnel provided with a pledget of absorbent cotton, and reject the waxy and crystalline portion.

Assay—Place about 5 Gm. of Cubeb Oleoresin, accurately weighed, in the flask of the apparatus used for volatile oil determinations, and proceed as directed in Process A, page 764, beginning with "and fill it one-half with water. . . ."
Storage—Preserve Cubeb Oleoresin in tight containers.

AVERAGE DOSE—**0.5 Gm.** (approximately $7^1/_2$ grains).

CUDBEAR
Persio

Cudbear is a powder prepared from species of *Roccella* DeCandolle, *Lecanora* Acharius, or other lichens (Fam. *Parmeliaceæ*).

Description—Cudbear occurs as a very dusky red-purple to very dusky red powder showing under the microscope fragments of hyphæ from the subhymenial layer of the lichen and fragments of undifferentiated pseudo-parenchyma. Woody and leafy tissue should be present only in limited amounts.
Identification—An aqueous or an alcohol preparation of Cudbear is a deep red color which is rendered lighter by the addition of acids, and is changed to purplish red by the addition of alkalies.
Logwood—Add 2 Gm. of Cudbear to 200 cc. of water, agitate the mixture intermittently during 30 minutes, and then filter. Add to 5 cc. of this filtrate 5 drops of glacial acetic acid and boil for 1 minute; then add 5 drops of stannous chloride T.S. and boil again for 1 minute: the liquid is only faintly pink (logwood produces a solution of a reddish purple color).
Coal tar colors—Add 25 Gm. of kaolin to 100 cc. of the filtrate obtained in the test for logwood, shake frequently during 1 hour and then filter. The filtrate is almost entirely decolorized in comparison with some of the original filtrate.
Starch—A microscopical examination does not show potato or cereal starch grains.
Arsenic—Mix 4 Gm. of Cudbear with 20 cc. of sulfuric acid and 50 cc. of nitric acid in a Kjeldahl flask. Heat gently at first to prevent vigorous frothing, then digest strongly, adding small quantities of nitric acid from time to time as the mixture becomes brownish or black, until the liquid is colorless to pale yellow. Continue the heating until the copious evolution of sulfur trioxide vapors takes place. Cool and dilute to 100 cc.; 5 cc. of this diluted sample meets the requirements of the test for *Arsenic*, page 689. (No further treatment with sulfuric acid is necessary.)
Total ash—Cudbear yields not more than 12 per cent of total ash, page 760.
Assay for color—Weigh accurately 1 Gm. of Cudbear, and macerate it, with occasional shaking, during 18 hours in 100 cc. of a mixture of 3 volumes of alcohol and 1 volume of distilled water, cooled to room temperature before measuring. Allow the drug to settle and to 5 cc. of the clear liquid, accurately measured, add 15 cc. of alcohol; then gradually add sufficient distilled water to make 1000 cc., and mix well. Compare the color of this freshly prepared solution in Nessler tubes or in a colorimeter, with the color of a standard solution freshly prepared as follows:

To 1.5 cc. of cobaltous chloride C.S. add successively 3 cc. of 0.005 *N* potassium dichromate, 30 cc. of ammonium carbonate T.S., and sufficient distilled water to make 100 cc. The hue of the dilute Cudbear solution approximates that of the standard color solution; the strength of the color of the dilute Cudbear solution is not less than that of an equal depth of the standard color solution.

Cudbear Tincture

CUDBEAR TINCTURE
Tinctura Persionis

Tr. Persion.

Cudbear, in fine powder	**100 Gm.**
Alcohol,	
Water, each, a sufficient quantity,	
To make about	**1000 cc.**

Mix the cudbear with about twice its weight of clean sand and prepare the Tincture by Process P, page 758. Use a mixture of 3 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 24 hours, and percolate slowly.

Adjust to make the tincture conform to the assay requirements.

Assay for color—To 0.5 cc. of the Tincture, accurately measured, add 15 cc. of alcohol; then gradually add sufficient distilled water to make 1000 cc., and mix well. Compare the color of this freshly prepared solution, in Nessler tubes or in a colorimeter, with the color of a standard solution freshly prepared as follows: To 1.5 cc. of cobaltous chloride C.S. add successively 2.4 cc. of 0.005 *N* potassium dichromate, 25 cc. of ammonium carbonate T.S., and sufficient distilled water to make 100 cc.

The color tint of this dilution of the Tincture approximates that of the standard color solution; the strength of color, when expressed in mm. of column height, is not more than 10 per cent above or not more than 10 per cent below the height of the column of the standard color solution.

Alcohol content—From 60 to 67 per cent, by volume, of C_2H_5OH.

Storage—Preserve Cudbear Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

Cudbear Tincture, Compound

COMPOUND CUDBEAR TINCTURE
Tinctura Persionis Composita

Tr. Persion. Comp.

Cudbear Tincture	**150 cc.**
Caramel	**100 Gm.**
Alcohol	**150 cc.**
Water, a sufficient quantity,	
To make	**1000 cc.**

Mix the cudbear tincture with the alcohol and 300 cc. of water. Dissolve the caramel in 300 cc. of water, and add to the cudbear mixture; then add sufficient water to make the product measure 1000 cc., and mix well.

Alcohol content—From 20 to 24 per cent, by volume, of C_2H_5OH.
Storage—Preserve Compound Cudbear Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

Dehydrated Alcohol, page 27

N. F. DENTIFRICE
Dentifricium N. F.

Dentif. N. F. N. F. Tooth Powder

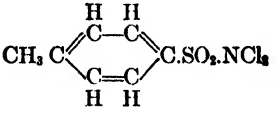
Hard Soap, in fine powder	**50 Gm.**
Precipitated Calcium Carbonate	**935 Gm.**
Soluble Saccharin	**2 Gm.**
Peppermint Oil	**4 cc.**
Cinnamon Oil	**2 cc.**
Methyl Salicylate	**8 cc.**
To make about	**1000 Gm.**

Thoroughly triturate the soluble saccharin, the oils, and the methyl salicylate with about one-half of the precipitated calcium carbonate, and mix the soap with the remainder of the precipitated calcium carbonate. Mix the two powders thoroughly, and pass through a fine sieve.

Storage—Preserve N. F. Dentifrice in well-closed containers.

DICHLORAMINE-T
Dichloramina-T

Dichloram.-T Dichloramine

$C_7H_7Cl_2NO_2S$  Mol. wt. 240.11

Dichloramine-T contains the equivalent of not less than 28 per cent and not more than 30 per cent of active Cl.

Description—Dichloramine-T occurs as pale greenish yellow crystals or as a crystalline powder, having the odor of chlorine. It gradually decomposes on exposure to air, losing chlorine, and is affected by light.

Solubility—One Gm. of Dichloramine-T dissolves in about 1 cc. of petroleum benzin, in about 1 cc. of chloroform, and in about 2.5 cc. of carbon tetrachloride. Dichloramine-T dissolves in eucalyptol, in chlorinated paraffin, and in glacial acetic acid. It is soluble in alcohol, the solution decomposing rapidly on warming, but is almost insoluble in water.

Melting point—Dichloramine-T melts at about 80°, page 731.

Identification—

A: Add about 0.1 Gm. of Dichloramine-T to 5 cc. of an aqueous solution of sodium bromide (1 in 10): bromine is liberated from the mixture (*difference from Chloramine-T*).

B: Upon the addition of strong mineral acids to Dichloramine-T chlorine is liberated.

Chloroform-insoluble substances—One Gm. of Dichloramine-T dissolves completely in 5 cc. of chloroform.

Assay—Dissolve about 0.1 Gm. of Dichloramine-T, accurately weighed, in 20 cc. of glacial acetic acid, in a dry, glass-stoppered flask. Add 10 cc. of potassium iodide T.S. and 50 cc. of distilled water, allow the mixture to stand for 10 minutes, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.001773 Gm. of active Cl.

Storage—Preserve Dichloramine-T in tight, light-resistant containers.

Digitalis Extract

DIGITALIS EXTRACT

Extractum Digitalis

Ext. Digit.

Digitalis Extract, when assayed by the prescribed method, possesses a potency such that 0.1 Gm. of it is equivalent to 3 U. S. P. Digitalis Units.

One Gm. of the Extract represents 3 Gm. of powdered digitalis, U. S. P.

Extract the fat from powdered digitalis by percolation with petroleum benzin until a few drops of the percolate leave no greasy stain when evaporated from filter paper. Air-dry the defatted drug until the odor of benzin is no longer noticeable, and prepare the Extract from it by percolation and evaporation. Use alcohol as the menstruum, macerate the drug during 24 hours, and percolate slowly. Evaporate the percolate to a dry residue at a temperature not exceeding 60°. Reduce the residue to a fine powder, assay it, and adjust it, by admixture with sufficient dry starch or other suitable diluent, so that 0.1 Gm. is equivalent to 3.00 U. S. P. Digitalis Units.

Assay—Weigh accurately a suitable quantity of the Extract, and transfer it to a suitable container. Add a sufficient amount of menstruum consisting of 4 parts of alcohol, by volume, and 1 part of distilled water, by volume, so that the total volume of menstruum added corresponds to 1 cc. for each expected U. S. P. Digitalis Unit. After thoroughly mixing, allow the product to stand at room temperature for 3 hours. Decant the clear supernatant liquid obtained by sedimentation, or centrifuge the mixture, and use this liquid for the assay. Complete the assay as directed for *Digitalis Tincture*, U. S. Pharmacopœia XIII.

Storage—Preserve Digitalis Extract in tight, light-resistant containers, preferably at a temperature not above 30°.

AVERAGE DOSE—**30 mg.** (approximately 1/2 grain).

DIGITALIS INFUSION

Infusum Digitalis

Inf. Digit.

Powdered Digitalis	**15 Gm.**
Alcohol	**100 cc.**
Cinnamon Spirit	**5 cc.**
Distilled Water, a sufficient quantity, To make	**1000 cc.**

Pour 900 cc. of boiling distilled water upon the powdered digitalis, contained in a suitable vessel; cover tightly, and infuse 1 hour in a warm place. Then add the alcohol, in which the cinnamon spirit has been dissolved; filter, and pass enough distilled water through the residue on the filter to make the product measure 1000 cc.

Alcohol content—From 7 to 10 per cent, by volume, of C_2H_5OH.

Storage—Dispense Digitalis Infusion in tight containers.

Caution: Only the U. S. P. XIII Powdered Digitalis is to be used in this preparation, and the Infusion must not be dispensed unless freshly prepared.

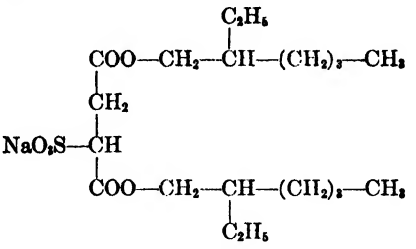
AVERAGE DOSE—**6 cc.** (approximately 1 1/2 fluidrachms).

Diluted Acetic Acid, page 19
Diluted Lead Subacetate Solution, page 296
Diluted Nitrohydrochloric Acid, page 354
Diluted Phosphoric Acid, page 393
Diluted Sodium Hypochlorite Solution, page 483
Diluted Sulfuric Acid, page 523

Dioctyl Sodium Sulfosuccinate

DIOCTYL SODIUM SULFOSUCCINATE

Dioctylis Sulfosuccinas Sodicum



$C_{20}H_{37}O_7SNa$ Mol. wt. 444.55

Dioctyl Sodium Sulfosuccinate contains not less than 7.00 per cent and not more than 7.23 per cent of S.

Description—Dioctyl Sodium Sulfosuccinate occurs as a white, wax-like, plastic solid with a characteristic odor suggestive of octyl alcohol. It usually occurs in pellets.

Solubility—One Gm. of Dioctyl Sodium Sulfosuccinate dissolves slowly in approximately 70 cc. of distilled water at 25°. It is freely soluble in alcohol and in glycerin and very soluble in petroleum benzin.

Loss on drying—When dried at 105° for 4 hours, Dioctyl Sodium Sulfosuccinate loses not more than 2.5 per cent of its weight.

Residue on ignition—Dioctyl Sodium Sulfosuccinate yields not less than 16 per cent and not more than 17 per cent of residue on ignition, page 745.

Saponification value—The saponification value of Dioctyl Sodium Sulfosuccinate is not less than 240 and not more than 253, page 713.

Assay for sulfur—Accurately weigh about 0.2 Gm. of Dioctyl Sodium Sulfosuccinate and mix well with 10 Gm. of sodium peroxide, 0.1 Gm. of potassium chlorate and 0.1 Gm. of sucrose, and place in the bottom of the fusion cup of a Parr peroxide bomb, page 755. Place the cover on the cup, seal the bomb, and mix the contents by thoroughly shaking for 2 minutes. Ignite the charge, allow 1 minute for complete combustion to take place, and cool the bomb in a stream of cold water, afterward rinsing the surface of the bomb with distilled water. Remove the fusion cup and place it in a 400-cc. beaker. Add enough hot distilled water to cover the fusion cup and rinse the cover of the bomb with a jet of hot distilled water, recovering the rinsings in the beaker. Cover the beaker with a watch glass and dissolve the fused mass. When solution is complete, remove the fusion cup, rinse it with a jet of hot distilled water, and add the rinsings to the solution. Cautiously acidify the solution with hydrochloric acid, adding an additional 2 cc. of acid, and dilute with distilled water to approximately 125 cc. Neutralize with ammonia T.S. and add 5 cc. in excess and filter. Wash the precipitate with three 25-cc. portions of hot distilled water and add the washings to the filtrate. To the combined filtrate and washings add sufficient hydrochloric acid to render the solution neutral to litmus paper, add 2 cc. excess and sufficient distilled water to make about 200 cc. Heat the solution to boiling and add 10 cc. of barium chloride T.S., stirring the solution cautiously during the addition. Keep the mixture just below the boiling temperature for 1 hour, stirring frequently. Collect the precipitate on a quantitative filter paper or in a previously prepared and tared filtering crucible, wash the precipitate with hot distilled water until free from chloride, dry, and ignite to constant weight. Each Gm. of barium sulfate is equivalent to 0.1374 Gm. of S.

Storage—Preserve Dioctyl Sodium Sulfosuccinate in well-closed containers.

Dwarf Pine Needle Oil, page 395

ECHINACEA
Echinacea
Echin.

Echinacea consists of the dried rhizome and roots of *Echinacea pallida* (Nuttall) Britton, or of *Echinacea angustifolia* (De Candolle) Heller (Fam. *Compositæ*).

NOTE: Do not dispense Echinacea which has lost its characteristic odor and taste.

Unground Echinacea—Unground Echinacea occurs as nearly entire rhizome and roots, cylindrical, or very slightly tapering and sometimes spirally twisted, from 10 to 20 cm. long and from 4 to 15 mm. in diameter. Externally it is pale brown to moderate yellowish brown. The rhizome is slightly annulate in the upper portion with occasional stem-scars or sometimes with remnants of aerial stems; the lower portion is somewhat longitudinally wrinkled or furrowed. The fracture is short or somewhat fibrous. The bark is about 1 mm. thick, the wood cylinder being composed of alternate light- and dark-colored wedges. The rhizome shows a small circular or angular pith.

Histology—Echinacea shows a cork of several rows of tabular cells containing oil globules or granular masses; about 8 rows of tangentially elongated, somewhat thick-walled parenchyma cells and a broad layer of ordinary cortical parenchyma, with a few small bundles of strongly lignified bast fibers in the rhizome portion; sieve tissue and tracheæ in narrow radial strands separated by broad medullary rays; a distinct cambium of several rows of thin-walled cells; numerous stone cells scattered throughout the parenchyma and associated with phytomelane, a carbon-like material found in the intercellular spaces adjacent to the stone cells; schizogenous oleoresin canals scattered throughout the parenchyma; inulin in spherocrystals in the parenchyma cells.

Powdered Echinacea—Powdered Echinacea is pale brown to pale olive. It has a faint, aromatic odor, and a sweetish taste, followed by a tingling sensation suggesting aconite, but lacking the persistent and benumbing effect produced by that drug. It shows numerous stone cells or fibers up to 300 microns long and from 18 to 42 microns in diameter, strongly lignified and carrying the characteristic carbon-like deposits; numerous fragments of tracheæ, the latter from 25 to 75 microns in diameter and with simple pores, annular or reticulate markings, occasionally with bordered pores or double spiral markings; fragments of inulin-bearing parenchyma; oleoresin canals from 80 to 145 microns in diameter and filled with a yellow to yellowish orange oleoresin, deteriorating to a reddish brown resin; a few fragments of cork and a few bast fibers.

Foreign organic matter—Echinacea contains not more than 3 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Echinacea yields not more than 2 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Elixirs

Alkaline Rhubarb Elixir, page 441
Aminoacetic Acid Elixir, page 41
Aminopyrine Elixir, page 42

Ammonium Bromide Elixir, page 46
Ammonium Valerate Elixir, page 50
Barbital Elixir, page 69
Bitter Orange Elixir, page 367
Buchu, Juniper and Potassium Acetate Elixir, page 96
Calcium and Sodium Glycerophosphates Elixir, page 102
Cascara Sagrada Elixir, page 128
Cataria and Fennel Elixir, page 131
Cinchona Alkaloids Elixir, page 147
Compound Benzaldehyde Elixir, page 79
Compound Cardamom Elixir, page 125
Compound Glycerophosphates Elixir, page 238
Compound Pepsin Elixir, page 382
Compound Serenoa and Sandalwood Elixir, page 458
Compound Sodium Salicylate and Gelsemium Elixir, page 490
Compound Taraxacum Elixir, page 529
Compound Vanillin Elixir, page 550
Five Bromides Elixir, page 90
Gentian Elixir, page 234
Glycerinated Gentian Elixir, page 234
Glycyrrhiza Elixir, page 240
Iron, Quinine and Strychnine Elixir, page 277
Iron, Quinine and Strychnine Phosphates Elixir, page 278
Iso-Alcoholic Elixir, page 280
Pentobarbital Elixir, page 378
Pepsin and Rennin Elixir, page 380
Pepsin Elixir, page 381
Potassium Bromide Elixir, page 405
Red Aromatic Elixir, page 62
Sodium Bromide Elixir, page 477
Sodium Salicylate Elixir, page 492
Sodium Thiocyanate Elixir, page 494
Terpin Hydrate and Codeine Elixir, page 530
Terpin Hydrate Elixir, page 531
Three Bromides Elixir, page 91
Viburnum Prunifolium Elixir, page 554

Elm

ELM
Ulmus

Elm Bark — Slippery Elm

Elm is the dried inner bark of *Ulmus fulva* Michaux (Fam. *Ulmaceæ*).

Unground Elm—Unground Elm usually occurs as broad, flat, oblong pieces from 1 to 4 mm. in thickness. The outer surface is weak yellowish orange, roughened by longitudinal striæ and partially detached bundles of bast fibers, and has occasional

thin, brown patches of adhering cork; while the inner surface is weak yellowish orange, and finely striate. The fracture is fibrous, with projections of fine bast bundles.

Histology—Elm shows bast fibers individual or in small bundles, and arranged in numerous tangential rows alternating with rows of mucilage cells, the latter from 100 to 400 microns in diameter; medullary rays 4 to 6 cells wide and bearing starch; sieve strands associated with parenchyma cells, the latter containing starch, or monoclinic prisms or twin crystals of calcium oxalate, the crystal cells frequently so elongated and the crystals so superimposed as to form short, non-lignified crystal fibers.

Powdered Elm—Powdered Elm is weak yellowish orange, has a distinctive odor, and a mucilaginous taste. Bast fibers are numerous, very long, usually broken, up to 25 microns in diameter, thick-walled, unlignified or with only a thin outer sheath of the wall lignified; calcium oxalate prisms from 10 to 35 microns in length; starch grains spheroidal or polygonal, usually from 3 to 15 microns in diameter, occasionally up to 25 microns in length; and numerous mucilage fragments, frequently lamellated. Cork cells are few or absent.

Identification—Macerate 1 Gm. of finely powdered Elm with 40 cc. of water for 1 hour: the mixture is of a thick mucilaginous consistence and yellowish brown in color.

Outer bark—Elm contains not more than 2 per cent of adhering outer bark.

Acid-insoluble ash—Elm yields not more than 1 per cent of acid-insoluble ash, page 761.

Emulsions

Cod Liver Oil Emulsion with Malt, page 159
Liquid Petrolatum Emulsion with Phenolphthalein, page 384
Pine Oil Emulsion Concentrate, page 397
Turpentine Oil Emulsion, page 544

Ephedrine Hydrochloride Tablets

EPHEDRINE HYDROCHLORIDE TABLETS

Tabellæ Ephedrinæ Hydrochloridi

Tab. Eph. Hydrochlor.

Ephedrine Hydrochloride Tablets contain not less than 91 per cent and not more than 109 per cent of the labeled amount of $C_{10}H_{15}NO.HCl$.

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without appreciable loss, and dissolve an accurately weighed portion, equivalent to about 0.25 Gm. of ephedrine hydrochloride, in 10 cc. of distilled water in a separator or extraction apparatus, and complete as directed in the *Assay* under *Ephedrine Sulfate Ampuls*, page 190, beginning with, "and then 5 cc. of 0.5 *N* sodium hydrox-

ide. . . ." Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.02017 Gm. of $C_{10}H_{15}NO.HCl$.

Storage—Preserve Ephedrine Hydrochloride Tablets in tight, light-resistant containers.

Sizes—Ephedrine Hydrochloride Tablets usually available contain the following amounts of ephedrine hydrochloride: **15, 25, 30,** and **50 mg.** (approximately 1/4, 3/8, 1/2, and 3/4 grain).

AVERAGE DOSE—**25 mg.** (approximately 3/8 grain) of Ephedrine Hydrochloride.

Ephedrine Spray

EPHEDRINE SPRAY

Nebula Ephedrinæ

Nebul. Ephed.

Ephedrine Spray contains, in each 100 cc., not less than 0.90 Gm. and not more than 1.10 Gm. of $C_{10}H_{15}NO$.

Ephedrine, dried over sulfuric acid	**10 Gm.**
Methyl Salicylate	**2 cc.**
Light Liquid Petrolatum, anhydrous, a sufficient quantity,	
To make	**1000 cc.**

Warm the ephedrine and the methyl salicylate in a suitable container on a water bath at 40° until a solution is obtained. Then add sufficient light liquid petrolatum, rendered anhydrous but not heated at a temperature above 40°, to make 1000 cc., and agitate the mixture until the solution is clear.

Assay—Transfer into a separator 10 cc. of Ephedrine Spray, accurately measured, completing the transfer with three 5-cc. portions of ether. Extract the alkaloid with 10 cc., followed by not less than three 5-cc. portions of sulfuric acid (1 in 50). Collect the aqueous acid extracts in a second separator, add aqueous sodium hydroxide solution (1 in 10) until the mixture is alkaline to litmus paper, and add 1 cc. in excess. Completely extract the alkaloid with ether. Combine the ether extracts in a separator and wash with two 5-cc. portions of distilled water. Collect the wash water in a separator, wash with 10 cc. of ether, and add this ether to the combined ether extracts. Extract the alkaloid with 10 cc. of 0.1 *N* sulfuric acid followed by five 10-cc. portions of distilled water. Combine the aqueous extracts in a beaker, and completely evaporate the ether on a water bath, not exceeding 40°. Cool, and titrate the excess acid with 0.02 *N* sodium hydroxide, using methyl red T.S. as indicator. Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.01652 Gm. of $C_{10}H_{15}NO$.

Storage—Preserve Ephedrine Spray in tight, light-resistant containers, and avoid excessive heat.

COMPOUND EPHEDRINE SPRAY

Nebula Ephedrinæ Composita

Nebul. Ephed. Comp. Compound Ephedrine Inhalant

Compound Ephedrine Spray contains, in each 100 cc., not less than 0.90 Gm. and not more than 1.10 Gm. of $C_{10}H_{15}NO$.

Ephedrine, dried over sulfuric acid	**10 Gm.**
Camphor	**6 Gm.**
Menthol	**6 Gm.**
Thyme Oil	**3 cc.**
Light Liquid Petrolatum, anhydrous, a sufficient quantity,	
To make	**1000 cc.**

Warm the ephedrine, camphor, menthol, and thyme oil in a suitable container on a water bath at 40° until a uniform liquid is obtained. Then add sufficient light liquid petrolatum, rendered anhydrous but not heated at a temperature above 40°, to make 1000 cc., and agitate the mixture until the solution is clear.

Assay—Transfer to a separator 10 cc. of Compound Ephedrine Spray, accurately measured, and proceed as directed in the *Assay* under *Ephedrine Spray*, page 188. Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.01652 Gm. of $C_{10}H_{15}NO$.

Storage—Preserve Compound Ephedrine Spray in tight, light-resistant containers, and avoid excessive heat.

EPHEDRINE SULFATE AMPULS

Ampullæ Ephedrinæ Sulfatis

Ampul. Ephed. Sulf. Ephedrine Sulfate Injection

Ephedrine Sulfate Ampuls contain a sterile solution of ephedrine sulfate in water for injection, and yield $C_{10}H_{15}NO$, equal to not less than 73.0 per cent and not more than 80.0 per cent of the labeled amount of $(C_{10}H_{15}NO)_2.H_2SO_4$.

Prepare the solution and fill the cleansed ampuls according to the requirements given on pages 687 to 689. Sterilize the filled ampuls by Process D, page 752, or by any other adequate and suitable method of sterilization, and test for sterility according to the method described on page 746. The Ampuls also conform to the other requirements under *Ampuls*, page 687.

Assay—Transfer an accurately measured volume of the ampul solution, containing about 0.25 Gm. of ephedrine sulfate, to a continuous extraction apparatus, or to a separator, add sufficient distilled water to make about 10 cc. and then 5 cc. of 0.5 *N* sodium hydroxide, and extract the alkaloid completely in the continuous extraction apparatus, or by shaking with successive portions of ether using not less than 20 cc., 15 cc., 10 cc., 10 cc., 10 cc., and 10 cc., respectively. Collect the ether extractions in a separator, wash with 5 cc. of distilled water, and transfer the washing to another separator. Extract the water washing with 10 cc. of ether and add this ether extraction to the previous ether extractions in the separator. Discard the residual water. Extract the combined ether solutions with 15 cc. of 0.1 *N* sulfuric acid, followed by 10-cc. and 5-cc. portions of distilled water. Collect these acid and water extractions in a beaker and warm on a water bath until the odor of ether is no longer perceptible. Cool, and titrate the excess acid with 0.02 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.01652 Gm. of $C_{10}H_{15}NO$.

AVERAGE DOSE—**50 mg.** of Ephedrine Sulfate.

Ephedrine Sulfate and Phenobarbital Capsules

EPHEDRINE SULFATE AND PHENOBARBITAL CAPSULES

Capsulæ Ephedrinæ Sulfatis et Phenobarbitalis

Cap. Eph. Sulf. et Phenobarb.

Ephedrine Sulfate and Phenobarbital Capsules contain not less than 91 per cent and not more than 109 per cent of the labeled amounts of $(C_{10}H_{15}NO)_2.H_2SO_4$ and of $C_{12}H_{12}N_2O_3$.

Identification—

A: Mix the contents of a sufficient number of Ephedrine Sulfate and Phenobarbital Capsules, equivalent to about 0.2 Gm. of ephedrine sulfate, with 25 cc. of distilled water. Filter into a separator, add 2 cc. of ammonia T.S. and extract with 2 successive 15-cc. portions of chloroform. Filter the chloroform solutions through a chloroform saturated pledget of cotton into a beaker and let the chloroform evaporate spontaneously: white crystals of ephedrine hydrochloride are produced.

B: Mix the contents of a sufficient number of Ephedrine Sulfate and Phenobarbital Capsules, equivalent to about 0.5 Gm. of phenobarbital, with 25 cc. of distilled water and 4 cc. of sodium hydroxide T.S. Filter into a separator, acidify with hydrochloric acid and add 1 cc. in excess. Extract with 3 successive 15-cc. portions of chloroform and pass the chloroform solution through a chloroform-moistened filter, collect it in a beaker and evaporate to dryness. The residue responds to the tests for *Identification* under *Phenobarbital*, United States Pharmacopœia XIII.

Assay for phenobarbital—Transfer as completely as possible the contents of a counted number of not less than 20 Ephedrine Sulfate and Phenobarbital Capsules to a beaker and mix well with 25 cc. of distilled water, and 15 cc. of sodium hydroxide T.S. Filter into a 100-cc. volumetric flask using distilled water to effect the transfer. Wash the filter with sufficient distilled water to bring the contents of the flask to 100 cc. Mix well and transfer a convenient measured volume of the filtrate, equivalent to about 0.3 Gm. of phenobarbital to a separator, add 20 cc

of ether and sufficient hydrochloric acid to render the aqueous layer distinctly acid. Extract the aqueous layer with 5 successive 10-cc. portions of ether collecting the ether extracts in a separator. Wash the combined ether extracts with 10 cc. of distilled water containing 3 drops of diluted hydrochloric acid and add the washings to the aqueous layer. Retain the aqueous layer for the determination of ephedrine sulfate. Transfer the ether extracts to a tared beaker, evaporate to dryness, dry the residue to constant weight at 105° and weigh as $C_{12}H_{12}N_2O_2$.

Assay for ephedrine sulfate—Transfer the aqueous layer, or a convenient portion of it, equivalent to about 0.3 Gm. of ephedrine sulfate, from the *Assay for phenobarbital*, to a 300-cc. Kjeldahl flask with the aid of distilled water and assay as directed under *Ephedrine Sulfate Capsules*, page 191, beginning with, "Add 40 cc. of distilled water, 25 cc. of hydrochloric acid and an antibump tube. . . ." Each cc. of 0.02 *N* hydrochloric acid is equivalent to 0.004285 Gm. of $(C_{10}H_{15}NO)_2.H_2SO_4$.

Storage—Preserve Ephedrine Sulfate and Phenobarbital Capsules in well-closed containers.

Sizes—Ephedrine Sulfate and Phenobarbital Capsules usually available contain the following amounts of ephedrine sulfate: **25** and **50 mg.** (approximately $^3/_8$ and $^3/_4$ grain) and of phenobarbital, **30** and **60 mg.** (approximately $^1/_2$ and 1 grain).

AVERAGE DOSE—**25 mg.** (approximately $^3/_8$ grain) of Ephedrine Sulfate; **30 mg.** (approximately $^1/_2$ grain) of Phenobarbital.

EPHEDRINE SULFATE CAPSULES

Capsulæ Ephedrinæ Sulfatis

Cap. Ephed. Sulf.

Ephedrine Sulfate Capsules contain not less than 91 per cent and not more than 109 per cent of the labeled amount of $(C_{10}H_{15}NO)_2.H_2SO_4$.

Identification—Macerate the contents of a sufficient number of capsules, equivalent to about 0.2 Gm. of ephedrine sulfate, in warm alcohol for 20 minutes. Filter and evaporate the filtrate to dryness on a water bath. The residue of ephedrine sulfate so obtained responds to the following identification tests:

A: Dissolve 10 mg. in 1 cc. of distilled water and add 0.1 cc. of cupric sulfate T.S., followed by 1 cc. of sodium hydroxide solution (1 in 5): a reddish purple color develops. To the mixture add 1 cc. of ether and shake well: the ether layer becomes purple and the aqueous layer blue.

B: Barium chloride T.S. produces in an aqueous solution of the residue a white precipitate insoluble in hydrochloric acid.

Assay—Transfer, as completely as possible, the contents of a counted number of not less than 20 Ephedrine Sulfate Capsules into a 200-cc. volumetric flask. Add 50 cc. of distilled water, shake well, and allow to stand for 10 minutes. Now add sufficient distilled water to make the mixture measure 200 cc., mix well, and filter through an asbestos pad into a Gooch crucible or through a sintered glass crucible. Transfer an accurately measured volume of the clear filtrate, equivalent to about 0.3 Gm. of ephedrine sulfate, into a 500-cc. Kjeldahl flask. Add 40 cc. of distilled water, 25 cc. of hydrochloric acid and an antibump tube. Heat to boiling and continue to boil under a reflux condenser for 1 hour and 30 minutes. Cool and wash

the condenser with 50 cc. of distilled water. Add sufficient distilled water to the Kjeldahl flask to make the contents measure approximately 225 cc. Now add 1 Gm. of zinc dust and connect the flask with a condenser and a receiver containing exactly 20 cc. of 0.1 *N* hydrochloric acid and about 20 cc. of distilled water. To the flask add 50 cc. of sodium hydroxide solution (1 in 2) and distil until about 150 cc. of distillate has been collected. Cool the distillate, if necessary, and titrate the excess of acid with 0.02 *N* sodium hydroxide, using methyl red T.S. as the indicator. Perform a blank determination with the same quantities of the same reagents and in the same manner, and make any necessary corrections. Each cc. of 0.02 *N* hydrochloric acid is equivalent to 0.004285 Gm. of $(C_{10}H_{15}NO)_2.H_2SO_4$.

Storage—Preserve Ephedrine Sulfate Capsules in well-closed containers.

Sizes—Ephedrine Sulfate Capsules usually available contain the following amounts of ephedrine sulfate: **25, 30,** and **50 mg.** (approximately 3/8, 1/2, and 3/4 grain).

AVERAGE DOSE—**25 mg.** (approximately 3/8 grain) of Ephedrine Sulfate.

Ephedrine Sulfate Jelly

EPHEDRINE SULFATE JELLY
Gelatum Ephedrinæ Sulfatis

Gel. Eph. Sulf. Ephedrine Jelly

Ephedrine Sulfate Jelly yields, from each 100 Gm., not less than 0.65 Gm. and not more than 0.85 Gm. of $C_{10}H_{15}NO$.

Ephedrine Sulfate	10	Gm.
Tragacanth	10	Gm.
Methyl Salicylate	0.1	cc.
Eucalyptol	1	cc.
Dwarf Pine Needle Oil	0.1	cc.
Glycerin	150	Gm.
Distilled Water	830	cc.
To make about	1000	Gm.

Dissolve the ephedrine sulfate in the distilled water, add the glycerin, the tragacanth, and the remaining ingredients. Mix well, and keep in a closed container for 1 week, with occasional agitation or mixing.

NOTE: To each 1000 Gm. of Ephedrine Sulfate Jelly, 1.6 Gm. of Sodium Phosphate may be added as a stabilizer.

Assay—Transfer into a separator approximately 10 Gm. of Ephedrine Sulfate Jelly, accurately weighed, using small portions of distilled water to accomplish the transfer; add 10 cc. of an aqueous solution of sodium hydroxide (1 in 10), shake well and completely extract, using not less than 40 cc., 30 cc., 25 cc., 20 cc., and 20 cc. portions of ether. Proceed as directed in the *Assay* under *Ephedrine Sulfate*

Ampuls, page 190, beginning with, "Collect the ether extractions in a separator...." Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.01652 Gm. of $C_{10}H_{15}NO$.

Storage—Preserve Ephedrine Sulfate Jelly in tight containers, preferably in collapsible dispensing tubes.

EPHEDRINE SULFATE SOLUTION

Liquor Ephedrinæ Sulfatis

Liq. Ephed. Sulf.

Ephedrine Sulfate Solution yields, from each 100 cc., not less than 2.1 and not more than 2.4 Gm. of $C_{10}H_{15}NO$.

Ephedrine Sulfate	**30**	**Gm.**
Chlorobutanol	**5**	**Gm.**
Sodium Chloride	**3.6**	**Gm.**
Distilled Water, a sufficient quantity, To make	**1000**	**cc.**

Dissolve the salts and the chlorobutanol in sufficient distilled water to make the product measure 1000 cc., and filter if necessary, until the product is clear.

Description—Ephedrine Sulfate Solution is a clear, colorless solution with a slightly camphoraceous odor and taste. It is neutral or acid to litmus paper.

Optical rotation—The specific optical rotation of the ephedrine sulfate in Ephedrine Sulfate Solution at 25°, determined in a 200-mm. tube, the concentration of the solution being calculated on the result of the assay, is not less than −29° and not more than −32°.

Identification—

A: Ephedrine Sulfate Solution responds to the tests for *Sulfate*, page 727.

B: To 1 cc. of Ephedrine Sulfate Solution add 0.1 cc. of cupric sulfate T.S., followed by 1 cc. of sodium hydroxide T.S.: a purple color develops. To the mixture add 1 cc. of ether and shake well: the ether layer is colored purple.

C: Place 10 cc. of Ephedrine Sulfate Solution in a separator, and shake with 3 successive 5-cc. portions of petroleum benzin. Separate the aqueous liquid, add 1 cc. of ammonia T.S., and extract with 2 successive portions of chloroform of 15 cc. each. Filter the chloroform solutions through cotton saturated with chloroform, stopper the flask and allow the filtrate to stand for about 12 hours; then allow the chloroform to evaporate spontaneously: white crystals appear which, when washed with a little chloroform and dried, melt between 214° and 220°.

Assay—Transfer 10 cc. of Ephedrine Sulfate Solution, accurately measured, into a continuous extraction apparatus or separator, and proceed as directed in the *Assay* under *Ephedrine Sulfate Ampuls*, page 190, beginning with, "and then 5 cc. of 0.5 *N* sodium hydroxide...." Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.01652 Gm. of $C_{10}H_{15}NO$.

Storage—Preserve Ephedrine Sulfate Solution in tight containers.

FOR USE ON MUCOUS MEMBRANES—Dilute with an equal volume of isotonic sodium chloride solution.

Ephedrine Sulfate Syrup

EPHEDRINE SULFATE SYRUP
Syrupus Ephedrinæ Sulfatis

Syr. Ephed. Sulf.

Ephedrine Sulfate	4 Gm.
Distilled Water	20 cc.
Alcohol	20 cc.
Cherry Syrup, a sufficient quantity,	
To make	1000 cc.

Dissolve the ephedrine sulfate in the distilled water; add the solution and the alcohol to a sufficient quantity of the cherry syrup to make the product measure 1000 cc., and mix well.

Alcohol content—From 2 to 4 per cent, by volume, of C_2H_5OH.
Storage—Preserve Ephedrine Sulfate Syrup in tight, light-resistant containers, and avoid excessive heat.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains 16 mg. of Ephedrine Sulfate.

Ergot

ERGOT
Ergota

Rye Ergot Secale cornutum P.I.

Ergot is the dried sclerotium of *Claviceps purpurea* (Fries) Tulasne (Fam. *Hypocreaceæ*) developed on rye plants.

Unground Ergot—Ergot is cylindraceous, obscurely 3-angled, somewhat curved, and usually tapers toward both ends, the ends being more or less obtuse. The sclerotium is from 0.7 to 4.5 cm. in length and up to 5 mm. thick. It is longitudinally furrowed, occasionally transversely fissured, and is nearly black or purplish brown externally. The fracture is short and the internal color is usually white although occasional sclerotia may be tinged with pink, lavender, or gray.

Histology—Ergot shows a thin outer portion of small compact hyphal cells generally deep violet in color, which turns red with 50 per cent sulfuric acid or with chloral hydrate T.S. Within this is a large central area of pseudo-parenchyma composed of colorless hyphal cells usually less than 20 microns in diameter, but occasionally up to 28 microns in diameter. These hyphal cells are slightly elongated in longitudinal section, have thin, chitinous walls, and contain protein and numerous globules of fixed oil.

Powdered Ergot—Powdered Ergot is grayish to purplish brown and has a characteristic odor free from mustiness or rancidity and an oily, somewhat acrid, disagreeable taste. It contains fragments of the outer tissue and of the thin-walled hyphal cells.

Identification—Shake 1 Gm. of Powdered Ergot in a closed flask for about 5 minutes with 20 cc. of ether and about 15 drops of 20 per cent sulfuric acid. Filter, and shake the filtrate thoroughly with 15 drops of a cold, saturated aqueous solution of sodium bicarbonate. The separated lower, aqueous layer is red or violet (*sclererythrin*).

Purity—When crushed or powdered, Ergot does not develop a rancid or ammoniacal odor upon the addition of hot water.

Seeds, fruits and other foreign organic matter—Ergot contains not more than 4 per cent of seeds, fruits and other foreign organic matter, page 760.

Moisture—Ergot contains not more than 8 per cent of moisture when determined by Method VII or Method IX, page 761.

Storage—Preserve Ergot in a dry place under all conditions of storage and transportation.

ERGOT EXTRACT

Extractum Ergotæ

Ext. Ergot.

Ergot Extract is prepared so that 1 Gm. is made from 4 Gm. of ergot.

Extract the fat from ergot, recently ground and in coarse powder, in a cylindrical percolator, by slow percolation with petroleum benzin until a few drops of the percolate leave no greasy stain when evaporated from filter paper. Air-dry the defatted drug until the odor of benzin is no longer noticeable. Extract the dry defatted drug by Process C, page 740, using a menstruum consisting of 2 volumes of hydrochloric acid and 98 volumes of diluted alcohol. Concentrate this liquid extract to a pilular consistence at a temperature not exceeding 60° in a suitable acid-resistant container, and preferably at a reduced pressure. Mix the mass thoroughly, and adjust it by admixture with a suitable diluent, so that 1 Gm. of the finished product is equivalent to 4 Gm. of ergot.

Storage—Preserve Ergot Extract in tight, light-resistant containers, preferably at a temperature not above 30°.

AVERAGE DOSE—**0.5 Gm.** (approximately 7½ grains).

Ergot Fluidextract

ERGOT FLUIDEXTRACT
Fluidextractum Ergotæ

Fldext. Ergot. Extractum secalis cornuti fluidum acidum P.I.

Pack the ergot, recently ground and in coarse powder, in a cylindrical percolator, and slowly percolate with petroleum benzin until a few drops of the percolate last collected leave no greasy stain when evaporated from filter paper. Reject the benzin solution, remove the drug from the percolator, and dry by exposure to the air. Then make a fluidextract by Process C, page 719, using a menstruum consisting of 2 volumes of hydrochloric acid and 98 volumes of diluted alcohol, macerating during 48 hours and obtaining 1000 cc. of finished Fluidextract.

This Fluidextract may also be prepared as follows:

Prepare a Fluidextract by Process C, page 719, using a menstruum consisting of 2 volumes of hydrochloric acid and 98 volumes of diluted alcohol. Chill the 1000 cc. of combined reserve percolates to −14°, and remove the congealed fat by filtration, maintaining the temperature at −14°. Finally add sufficient of the original menstruum to make the finished Fluidextract measure 1000 cc.

Alcohol content—From 37 to 42 per cent, by volume, of C_2H_5OH.
Storage—Preserve Ergot Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**2 cc.** (approximately 30 minims).

Ergot, Prepared

PREPARED ERGOT
Ergota Præparata

Ergot. Præp. Powdered Defatted Ergot

Prepared Ergot is ergot which has been powdered and immediately deprived of most of its fat.

Percolate ergot, recently reduced to a moderately coarse powder (No. 40), with petroleum benzin until 1 cc. of the percolate, leaves not more than a barely perceptible film, when evaporated in a beaker. Dry the powder by exposure to air at a temperature not exceeding 40°.

Description—Prepared Ergot conforms to the description of *Powdered Ergot* under *Ergot*, page 195.
Moisture—Prepared Ergot contains not more than 6 per cent of moisture when determined by Method VII or Method IX, page 761.
Purity—Prepared Ergot yields, on extraction with petroleum benzin in a continuous extraction apparatus, not more than 5 per cent of fat.
Storage—Preserve Prepared Ergot in tight containers in a cool place. A suitable cartridge containing a non-liquefying, inert, dehydrating substance may be inserted in the container to maintain low humidity.

AVERAGE DOSE—**1.5 Gm.** (approximately 22 grains).

ERIODICTYON
Eriodictyon
Yerba Santa

Eriodictyon is the dried leaf of *Eriodictyon californicum* (Hooker et Arnott) Torrey (Fam. *Hydrophyllaceæ*).

Unground Eriodictyon—Unground Eriodictyon usually occurs in fragments, but when it is entire the leaf is lanceolate, from 5 to 15 cm. in length and from 1 to 3 cm. in breadth. The apex is acute and the base tapers slightly into a short petiole. The margin is irregularly serrate or crenate-dentate. The upper surface is weak brown to moderate olive-brown, and is covered with a more or less glistening resin while the lower surface is yellowish brown to weak greenish yellow, reticulate with conspicuous veins, and minutely tomentose between the reticulations. The leaf is quite thick and brittle.
Histology—The upper epidermis consists of large cells, the outer walls of which are very uneven, as seen in cross-section, owing to indentations, which appear as striations in surface view. Also located on the upper epidermis are numerous, deep-seated glandular hairs, possessing a 1- to 3-celled stalk, and a multicellular glandular head consisting usually of 8 cells. Non-glandular hairs are absent on the upper epidermis. The palisade cells are very narrow and are arranged in rows from 2 to 6 cells deep. Interspersed between them are regularly arranged perpendicular rows of parenchyma cells, nearly each one of which contains a calcium oxalate rosette aggregate. The cells of the spongy parenchyma comprise but a few layers and the vascular tissues are not strongly developed except in the midrib and in the more prominent veins. In cross-section, the lower surface shows numerous sinuses lined by the lower epidermis from which emanate occasional deep-seated glandular hairs and many curved non-glandular hairs; the latter nearly filling the sinuses and frequently concealing the stomata.

Powdered Eriodictyon—Powdered Eriodictyon is yellow and has an aromatic odor and a balsamic, bitter taste which becomes sweetish and slightly acrid. It contains unicellular, undulate, thick-walled, non-glandular hairs up to 250 microns in length and up to 10 microns in width; glandular hairs with 1- to 3-celled stalks and multicellular heads consisting usually of 8 cells, the heads being up to 120 microns in diameter; fragments of palisade tissue containing regularly arranged columnar parenchyma cells, most of which contain a rosette aggregate of calcium oxalate; and tracheæ with spiral thickenings or simple pores usually associated with lignified fibers. The calcium oxalate rosette aggregates are numerous and are from 5 to 30 microns in diameter.

Eriodictyon californicum stems—The stems show a subepidermal cork, a primary cortex of 10 to 20 rows of rounded parenchyma cells, a pericycle containing a nearly closed ring of lignified sclerenchyma, a narrow phloem; a xylem region consisting of wood-wedges separated by medullary rays 1 cell in width, the xylem-wedges containing numerous strongly lignified wood fibers and spiral and pitted tracheæ, and a broad pith.

Stems—Eriodictyon contains not more than 5 per cent of its stems.

Foreign organic matter—Eriodictyon contains not more than 2 per cent of foreign organic matter other than stems, page 760.

Acid-insoluble ash—Eriodictyon yields not more than 2 per cent of acid-insoluble ash, page 761.

Eriodictyon Fluidextract

ERIODICTYON FLUIDEXTRACT

Fluidextractum Eriodictyi

Fldext. Eriodict. Yerba Santa Fluidextract

Eriodictyon, in moderately coarse powder . . . . . **1000 Gm.**

Prepare the Fluidextract by Process A, page 718, using a mixture of 4 volumes of alcohol and 1 volume of water as the menstruum. Macerate the drug during 48 hours, then percolate at a moderate rate, and reserve the first 800 cc. of percolate.

Alcohol content—From 57 to 62 per cent, by volume, of C_2H_5OH.

Storage—Preserve Eriodictyon Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—1 cc. (approximately 15 minims).

AROMATIC ERIODICTYON SYRUP

Syrupus Eriodictyi Aromaticus

Syr. Eriodict. Arom. Aromatic Yerba Santa Syrup Syrupus Corrigens

Eriodictyon Fluidextract	32 cc.
Potassium Hydroxide Solution	25 cc.
Compound Cardamom Tincture	65 cc.
Sassafras Oil	0.5 cc.
Lemon Oil	0.5 cc.
Clove Oil	1 cc.
Alcohol	32 cc.
Sucrose	800 Gm.
Magnesium Carbonate	5 Gm.
Distilled Water, a sufficient quantity, To make	1000 cc.

Dissolve the oils in the alcohol, add the fluidextract and the tincture, then the potassium hydroxide solution and 325 cc. of distilled water. Add the magnesium carbonate, shake the mixture, allow it to stand overnight, filter, and add sufficient distilled water through the filter to make the liquid measure 500 cc. Pour this filtrate upon the sucrose contained in a bottle, and dissolve by placing the bottle in hot water, agitating the contents frequently. Cool the solution, and add sufficient distilled water to make the product measure 1000 cc.

Alcohol content—From 6 to 8 per cent, by volume, of C_2H_5OH.
Storage—Preserve Aromatic Eriodictyon Syrup in tight, light-resistant containers, and avoid excessive heat.

AVERAGE DOSE—**8 cc.** (approximately 2 fluidrachms).

ETHER SPIRIT

Spiritus Ætheris

Sp. Æth. Hoffmann's Drops

Ethyl Oxide	325 cc.
Alcohol, a sufficient quantity, To make	1000 cc.

Mix the ethyl oxide with a sufficient quantity of the alcohol to make the product measure 1000 cc.

Description—Ether Spirit is a transparent, colorless liquid having an ether odor and a burning, sweetish taste. It is affected by light. The color of moistened blue litmus paper is not changed to red when the paper is immersed in Ether Spirit for 10 minutes.
Solubility—Ten cc. of Ether Spirit mixed with 10 cc. of water yields a clear solution.
Specific gravity—The specific gravity of Ether Spirit is not less than 0.784 and not more than 0.794 at 25°.
Non-volatile residue—Evaporate 25 cc. of Ether Spirit in a tared porcelain dish to dryness on a water bath: the weight of the residue does not exceed 1 mg.
Alcohol content—From 60 to 65 per cent, by volume, of C_2H_5OH.
Storage—Preserve Ether Spirit in tight, light-resistant containers.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains about 1.3 cc. of Ethyl Oxide.

Ether Spirit, Compound

COMPOUND ETHER SPIRIT
Spiritus Ætheris Compositus

Sp. Æth. Comp. Hoffmann's Anodyne

Ethyl Oxide	**325 cc.**
Alcohol	**650 cc.**
Ethereal Oil	**25 cc.**
To make about	**1000 cc.**

Mix the ingredients.

Alcohol content—From 58 to 63 per cent, by volume, of C_2H_5OH.
Storage—Preserve Compound Ether Spirit in tight, light-resistant containers.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains about 1.3 cc. of Ethyl Oxide.

Ethereal Oil

ETHEREAL OIL
Oleum Ætheream

Ol. Æth.

Ethereal Oil is a volatile liquid consisting of equal volumes of heavy oil of wine and ether.

Add 1 volume of sulfuric acid slowly to 1 volume of alcohol, mix them thoroughly, and allow the mixture to stand, in a closed flask, for 24 hours, or until the liquid is clear; then pour the clear liquid into a tubulated retort of such capacity that the mixture nearly fills it. In-

sert a thermometer through the tubulure, so that the bulb is deeply immersed in the liquid, and having connected the retort with a well-cooled condenser and also having connected a bent glass tube with the receiver for conducting the uncondensed gases into water, distil, by means of a sand bath, at a temperature between 150° and 160°, until oily drops cease to come over, or until a black froth, which forms on the surface, rises in the retort. Separate the yellow, ethereal liquid from the remainder of the distillate, and expose it to the air for 24 hours, in a shallow dish. Then transfer it to a moistened filter, and when the aqueous portion has drained off, wash the oil that is left on the filter with distilled water, which must be as cold as possible. When this also has drained off, transfer the oil to a graduated measure and add to it an equal volume of ether.

Description—Ethereal Oil is a transparent, nearly colorless, volatile liquid. It has a peculiar, aromatic, ether odor, and a pungent, refreshing, and bitter taste. Ethereal Oil is neutral to dry litmus paper.
Specific gravity—The specific gravity of Ethereal Oil is about 0.9 at 25°.
Storage—Preserve Ethereal Oil in tight containers.

ETHYL ACETATE
Æthylis Acetas

Æthyl. Acet. Acetic Ether

$C_4H_8O_2$ $CH_3COOC_2H_5$ Mol. wt. 83.10

Ethyl Acetate contains not less than 99 per cent of $CH_3COO.C_2H_5$, the remainder consisting chiefly of alcohol and water.

Description—Ethyl Acetate is a transparent, colorless liquid, with a fragrant, refreshing, slightly acetous odor, and a peculiar, acetous, burning taste.
Solubility—One cc. of Ethyl Acetate is miscible with about 10 cc. of water at 25°. It is miscible with alcohol, ether, fixed oils, or volatile oils.
Specific gravity—The specific gravity of Ethyl Acetate is not less than 0.892 and not more than 0.898 at 25°.
Refractive index—The refractive index of Ethyl Acetate is not less than 1.3725 and not more than 1.3745 at 20°, page 745.
Boiling point—The boiling point of Ethyl Acetate is between 75° and 77°.
Identification—Ethyl Acetate is readily volatilized even at low temperatures and is inflammable; when burned, a yellow flame and an acetous odor are produced.
Non-volatile residue—Evaporate Ethyl Acetate in a tared porcelain dish on a water bath and dry at 105° to constant weight: not more than 0.02 per cent of residue remains.

Readily carbonizable substances—Pour 2 cc. of Ethyl Acetate carefully upon 10 cc. of sulfuric acid so as to form separate layers: no dark zone is developed within 15 minutes.

Free acid—A solution of 2 cc. of Ethyl Acetate in 10 cc. of neutralized alcohol requires not more than 0.1 cc. of 0.1 *N* sodium hydroxide for neutralization using 2 drops of phenolphthalein T.S. as the indicator.

Butylic or amylic derivatives—Allow 10 cc. of Ethyl Acetate to evaporate spontaneously from clean, odorless blotting-paper: the final odor does not resemble that of pineapple or banana.

Methyl compounds—Mix 20 cc. of Ethyl Acetate with a solution of 20 Gm. of sodium hydroxide in 50 cc. of distilled water; allow the mixture to stand, agitating occasionally, or heat it gently under a reflux condenser until a homogeneous liquid results; then distil about 25 cc.: this distillate meets the requirements of the test for *Methanol* under *Whisky*, page 555.

Assay—Transfer about 1.5 Gm. of Ethyl Acetate, accurately weighed in a tared, stoppered weighing bottle, to a suitable flask; add 50 cc. of 0.5 *N* sodium hydroxide, and heat on a water bath under a reflux condenser for 1 hour. Allow it to cool, and titrate the excess sodium hydroxide with 0.5 *N* hydrochloric acid, using phenolphthalein T.S. as the indicator. Each cc. of 0.5 *N* sodium hydroxide is equivalent to 0.04405 Gm. of $CH_3COO.C_2H_5$.

Storage—Preserve Ethyl Acetate in tight containers and avoid excessive heat.

AVERAGE DOSE—**1 cc.** (approximately 15 minims).

Ethyl Chaulmoograte

ETHYL CHAULMOOGRATE

Æthylis Chaulmoogras

Æthyl. Chaulmoog.

Ethyl Chaulmoograte consists of the ethyl esters of the mixed acids of chaulmoogra oil.

Description—Ethyl Chaulmoograte is a clear, pale yellow liquid, having a slight, fruity odor.

Solubility—Ethyl Chaulmoograte is miscible with alcohol, with chloroform, and with ether, but is insoluble in water.

Specific gravity—The specific gravity of Ethyl Chaulmoograte is about 0.904 at 25°.

Optical rotation—The specific rotation, $[\alpha]_D^{25}$, of Ethyl Chaulmoograte in a chloroform solution containing 5 cc. of Ethyl Chaulmoograte in each 10 cc., is not less than +44.5°, page 737.

Saponification value—The saponification value of Ethyl Chaulmoograte is not less than 190 and not more than 196, page 713.

Iodine value—The iodine value of Ethyl Chaulmoograte is not less than 90 and not more than 100, page 713.

Free acid—A solution of 1 cc. of Ethyl Chaulmoograte in 10 cc. of neutralized alcohol requires not more than 0.1 cc. of 0.1 *N* sodium hydroxide for neutralization, using 2 drops of phenolphthalein T.S. as the indicator.

Storage—Preserve Ethyl Chaulmoograte in tight containers.

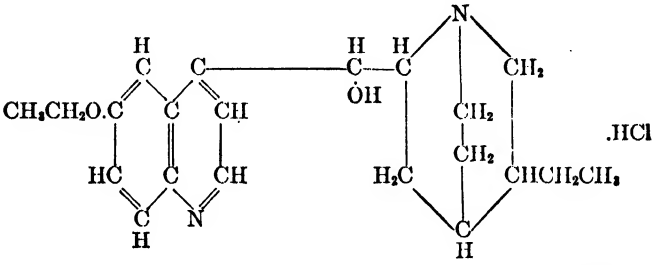
AVERAGE DOSE—Oral or intramuscular, **2 cc.** (approximately 30 minims).

Ethylhydrocupreine Hydrochloride

ETHYLHYDROCUPREINE HYDROCHLORIDE

Æthylhydrocupreinæ Hydrochloridum

Æthylhydrocup. Hydrochlor.



$C_{21}H_{28}O_2N_2.HCl$ Mol. wt. 376.92

Ethylhydrocupreine Hydrochloride contains, when dried over sulfuric acid for 4 hours, not less than 90 per cent of $C_{21}H_{28}O_2N_2$.

Description—Ethylhydrocupreine Hydrochloride occurs as a white or light yellowish white, odorless, crystalline powder, having a very bitter taste. It is affected by light. An aqueous solution of Ethylhydrocupreine Hydrochloride (1 in 20) is neutral or alkaline to litmus paper.

Solubility—One Gm. of Ethylhydrocupreine Hydrochloride dissolves in about 2 cc. of water, in about 5 cc. of alcohol, and in about 2.5 cc. of chloroform at 25°. It is nearly insoluble in ether and in petroleum benzin.

Identification—

A: Add 2 or 3 drops of bromine T.S. to 5 cc. of an aqueous solution of Ethylhydrocupreine Hydrochloride (1 in 1000), and then add 1 cc. of ammonia T.S.: a greenish color is produced.

B: An aqueous solution of Ethylhydrocupreine Hydrochloride (1 in 10) responds to the tests for *Chloride*, page 724.

C: To 5 cc. of an aqueous solution of Ethylhydrocupreine Hydrochloride (1 in 10) add, dropwise, sodium hydroxide T.S.: a white curdy precipitate is produced which is insoluble in an excess of the reagent (*distinction from cupreine*).

Loss on drying—When dried over sulfuric acid for 4 hours, Ethylhydrocupreine Hydrochloride loses not more than 1 per cent of its weight.

Residue on ignition—Add 5 drops of sulfuric acid to about 1 Gm. of Ethylhydrocupreine Hydrochloride, accurately weighed, and ignite: the residue on ignition does not exceed 0.15 per cent, page 745.

Readily carbonizable substances—The color of a solution produced by dissolving 0.25 Gm. of Ethylhydrocupreine Hydrochloride in 5 cc. of sulfuric acid is not deeper than matching fluid O, page 744.

Ammonium salts—To 5 cc. of an aqueous solution of Ethylhydrocupreine Hydrochloride (1 in 10) add an excess of sodium hydroxide T.S., heat the mixture to boiling, and hold a piece of moistened red litmus paper in the vapor: the color of the litmus paper is unchanged.

Quinine salts and readily oxidizable substances—Dissolve 0.1 Gm. of Ethylhydrocupreine Hydrochloride in 20 cc. of distilled water and add 0.3 cc. of 0.1 *N* potassium permanganate: the permanganate color persists for at least 1 minute.

Assay—Weigh accurately about 0.5 Gm. of Ethylhydrocupreine Hydrochloride, previously dried over sulfuric acid in a desiccator for 4 hours, and dissolve it in about 20 cc. of distilled water in a separator. Render the solution slightly alkaline with ammonia T.S. Completely extract the mixture successively with at least 15, 10, 10, and 5 cc. of chloroform. Carefully evaporate the combined chloroform extracts in a tared dish on a water bath, when nearly dry add 2 cc. of alcohol, evaporate to apparent dryness, and dry the residue to constant weight at 105°. The weight of the residue is equivalent to not less than 90 per cent of the weight of Ethylhydrocupreine Hydrochloride taken.

Storage—Preserve Ethylhydrocupreine Hydrochloride in tight, light-resistant containers.

Ethyl Nitrite Spirit

ETHYL NITRITE SPIRIT
Spiritus Æthylis Nitritis

Sp. Æth. Nitrit. Spirit of Nitrous Ether Sweet Spirit of Nitre

Ethyl Nitrite Spirit is an alcohol solution of ethyl nitrite containing not less than 3.5 per cent and not more than 4.5 per cent of C_2H_5ONO.

Description—Ethyl Nitrite Spirit is a clear, mobile liquid with a pale yellow or faintly greenish yellow tint. It has a fragrant, ethereal, pungent odor free from acridity, and a sharp, burning taste. It is volatile and inflammable, and rapidly decomposes on exposure to light and air. When recently prepared or even after being kept for some time with but little exposure to light and air, Ethyl Nitrite Spirit is neutral to dry litmus paper. After long standing or upon being exposed to light and air, it acquires an acid reaction.

Specific gravity—The specific gravity of Ethyl Nitrite Spirit is not more than 0.823 at 25°.

Identification—Immerse a test tube, half filled with Ethyl Nitrite Spirit, in a water bath heated to 65° until the Spirit has acquired that temperature: the Spirit distinctly boils upon the addition of a few small pieces of broken glass.

Free acid—Effervescence does not occur when a crystal of potassium bicarbonate is added to 5 cc. of Ethyl Nitrite Spirit.

Aldehyde—Mix 10 cc. of Ethyl Nitrite Spirit with 5 cc. of potassium hydroxide T.S. previously diluted with 5 cc. of distilled water: the mixture assumes a yellow color which does not become decidedly brown upon standing overnight.

Assay—Transfer about 40 cc. of Ethyl Nitrite Spirit, which has been previously shaken with 0.5 Gm. of powdered potassium bicarbonate, to a tared, 100-cc. volumetric flask, and weigh accurately. Add sufficient alcohol to bring the volume to exactly 100 cc., and mix thoroughly. Introduce into the funnel top of a nitrometer, page 734, which has previously been filled with a saturated aqueous solution of sodium chloride, exactly 10 cc. of the alcohol solution, and after drawing this into the measuring tube of the nitrometer without the admission of air, follow it successively with 5 cc. of alcohol as a rinse, then with 10 cc. of potassium iodide T.S., and afterward with 5 cc. of diluted sulfuric acid, introducing each reagent separately into the measuring tube. When the volume of gas has become constant

(within 30 to 60 minutes), note the volume of gas collected and also the temperature at the nitrometer as well as the barometric pressure. Multiply this volume in cc. by 0.307, and divide the product by one-tenth of the weight of the Ethyl Nitrite Spirit taken. At 25° and 760 mm. pressure, the quotient represents the percentage of ethyl nitrite in the liquid. The temperature correction is $^1/_{275}$ of the total percentage just found for each degree of temperature, added if the temperature is below, subtracted if above, 25°. The barometric correction is $^1/_{760}$ of the total percentage, after correction for temperature, for each mm., added if above, subtracted if below, 760 mm.

Alcohol content—From 85 to 93 per cent, by volume, of C_2H_5OH.

NOTE: In determining the alcohol content, Ethyl Nitrite Spirit must be treated with a slight excess of sodium hydroxide before being distilled. The use of this expedient necessitates that a suitable correction be subtracted from the apparent result of the alcohol determination to compensate for the alcohol produced during the decomposition of the ethyl nitrite.

Storage—Preserve Ethyl Nitrite Spirit in small, well-filled tight containers, in a cold, dark place, remote from fire.

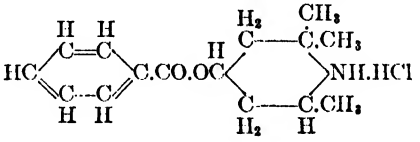
AVERAGE DOSE—**2 cc.** (approximately 30 minims).

Eucaine Hydrochloride

EUCAINE HYDROCHLORIDE

Eucainæ Hydrochloridum

Eucain. Hydrochlor. Betaeucaine Hydrochloride



$C_{15}H_{21}O_2N.HCl$ Mol. wt. 283.79

Eucaine Hydrochloride, when dried at 105° for 3 hours, contains not less than 99 per cent of $C_{15}H_{21}O_2N.HCl$.

Description—Eucaine Hydrochloride occurs as a white, odorless, crystalline powder. It is stable in air, but is affected by light. An aqueous solution of Eucaine Hydrochloride (1 in 50) is neutral to litmus paper.

Solubility—One Gm. of Eucaine Hydrochloride dissolves in 30 cc. of water, in 35 cc. of alcohol, and in about 6 cc. of chloroform, at 25°. It is more soluble in boiling water and in boiling alcohol.

Identification—

A: Dissolve about 0.1 Gm. of Eucaine Hydrochloride in 1 cc. of sulfuric acid. Keep the solution at 100° for 5 minutes, and then mix it cautiously with 2 cc. of distilled water: the mixture develops an aromatic odor of methyl benzoate, and on cooling deposits crystals of benzoic acid.

B: Separate 10-cc. portions of a saturated, aqueous solution of Eucaine Hydrochloride yield a white, curdy precipitate on the addition of mercuric chloride T.S., and a yellowish, curdy precipitate with a few drops of a mixture of equal volumes of potassium chromate T.S. and diluted sulfuric acid.

C: Silver nitrate T.S. produces in an aqueous solution of Eucaine Hydrochloride (1 in 100) a white precipitate which is insoluble in nitric acid.

Loss on drying—When dried at 105° for 3 hours, Eucaine Hydrochloride loses not more than 1 per cent of its weight.

Cocaine hydrochloride—Triturate about 50 mg. of Eucaine Hydrochloride with about 5 times its weight of mild mercurous chloride, and moisten the mixture with a few drops of distilled water: no black color is produced.

Residue on ignition—The residue on ignition from 0.5 Gm. of Eucaine Hydrochloride is negligible.

Readily carbonizable substances—Dissolve 0.1 Gm. of Eucaine Hydrochloride in 1 cc. of sulfuric acid: the solution is colorless.

Cocaine and alphaeucaine—Add 5 cc. of mercuric chloride T.S. to 5 cc. of an aqueous solution of Eucaine Hydrochloride (1 in 100): no permanent precipitate is produced.

Assay—Dissolve about 0.5 Gm. of Eucaine Hydrochloride, previously dried at 105° for 3 hours and accurately weighed, in 100 cc. of neutralized alcohol. Titrate this alcohol solution with 0.1 *N* sodium hydroxide, using phenolphthalein T.S. as the indicator. Each cc. of 0.1 *N* sodium hydroxide is equivalent to 0.02838 Gm. of $C_{15}H_{21}O_2N.HCl$.

Storage—Preserve Eucaine Hydrochloride in tight, light-resistant containers.

Eupatorium

EUPATORIUM
Eupatorium

Eupator. Thoroughwort Boneset

Eupatorium consists of the dried leaves and flowering tops of *Eupatorium perfoliatum* Linné (Fam. *Compositæ*).

Unground Eupatorium—Unground Eupatorium usually occurs as more or less broken leaves and flowering tops. The leaves are opposite, the pair being united at the base, from 8 to 20 cm. long and from 1.5 to 5 cm. in width, tapering regularly from near the base to an acute apex, crenate-serrate, rugosely veined, rough and light olive to dark yellowish green above, and tomentose, resin-dotted and paler beneath. The flower heads are small, numerous, and corymbed, with a campanulate involucre of lance-linear, imbricated scales, and with from 10 to 15 light-colored tubular florets, having a bristly pappus in a single row.

Powdered Eupatorium—Powdered Eupatorium is weak yellow to light olive; has a faintly aromatic odor and a strongly bitter taste. It shows multicellular, non-glandular hairs with thin, finely striate walls and end cells pointed or somewhat rounded; glandular hairs, short-stalked with heads up to 80 microns in diameter; ellipsoidal pollen grains up to 25 microns in diameter, with numerous spiny, centrifugal projections; hairs of the pappus, in the form of a multicellular axis with numerous short, unicellular, alternate branches; tracheæ spiral, annular, or with bordered pores; numerous fragments of leaf epidermis showing elliptical stomata from 18 to 36 microns in length; many fragments of achene pericarp composed of cells with thick, characteristic brown to yellow walls; fragments of stem tissue showing epidermal cells, parenchyma associated with non-lignified, thin-walled porous fibers, tracheæ and pith parenchyma; and numerous fragments of corolla tissue.

Stems—Eupatorium contains not more than 10 per cent of its stems.

Foreign organic matter—Eupatorium contains not more than 2 per cent of foreign organic matter, other than stems, page 760.

Acid-insoluble ash—Eupatorium yields not more than 2 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**2 Gm.** (approximately 30 grains).

Expectorant Mixture

EXPECTORANT MIXTURE
Mistura Pectoralis

Mist. Pect.	Stoke's Expectorant
Ammonium Carbonate	18 Gm.
Senega Fluidextract	35 cc.
Squill Fluidextract	35 cc.
Camphorated Opium Tincture	175 cc.
Distilled Water	85 cc.
Tolu Balsam Syrup, a sufficient quantity, To make	1000 cc.

Mix the fluidextracts with the camphorated opium tincture, and add the ammonium carbonate, previously dissolved in the water; then add sufficient tolu balsam syrup to make the product measure 1000 cc., and mix it thoroughly.

Alcohol content—From 10 to 12 per cent, by volume, of C_2H_5OH.
Storage—Preserve Expectorant Mixture in tight containers.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains 72 mg. of Ammonium Carbonate, 0.14 cc. each of Senega Fluidextract and Squill Fluidextract, and 0.7 cc. of Camphorated Opium Tincture.

Exsiccated Sodium Arsenate, page 471

Extracts

Beef Extract, page 71
Colocynth Extract, page 167
Compound Colocynth Extract, page 168
Digitalis Extract, page 182
Ergot Extract, page 195
Gentian Extract, page 235
Hydrastis Extract, page 253
Hyoscyamus Extract, page 256
Leptandra Extract, page 298
Malt Extract, page 314
Nux Vomica Extract, page 361
Opium Extract, page 366
Rhubarb Extract, page 442

Fennel

FENNEL
Fœniculum

Fennelseed

Fennel is the dried, ripe fruit of cultivated varieties of *Fœniculum vulgare* Miller (Fam. *Umbelliferæ*).

Unground Fennel—Unground Fennel occurs as nearly cylindrical cremocarps, from 4 to 15 mm. in length and from 1 to 3.5 mm. in breadth, some having a slender stalk from 2 to 10 mm. in length. The cremocarp is light brown to light olive, with 5 prominent, light-colored, longitudinal primary ribs on each mericarp, and at the summit a short, conical stylopodium. The commissural surface of the mericarp is flat, with 3 narrow, light-colored, longitudinal areas separated by 2 darker areas containing oil tubes.

Histology—The mericarp of Fennel is pentagonal, the 4 dorsal sides nearly equal and slightly concave, and the commissural side much broader and more or less undulate. The pericarp shows large elliptical oil tubes having thick, brown walls which alternate with the primary ribs; 2 tubes being located on the commissural side and occasionally with 1 or 2 additional tubes. Each rib has a central, nearly circular bundle composed of a few tracheæ and numerous thin-walled, strongly lignified fibers. The endocarp is closely united with the seed coat and the large endosperm is more or less rounded-pentagonal or reniform, composed of numerous, rather thick-walled, polygonal cells filled with aleurone grains and fixed oil.

Powdered Fennel—Powdered Fennel is yellowish brown and has an aromatic and characteristic odor and taste, resembling that of anise. It shows colorless, irregular, angular fragments of endosperm, the cells being filled with aleurone grains, each containing a rosette of calcium oxalate 2 to 5 microns in diameter; and fragments containing oil tubes, the latter being from 100 to 200 microns in width. Fibers are few and strongly lignified, with numerous oblique, simple pores, and occasional reticulate thickenings. Tracheæ with spiral or annular thickenings are few. Numerous globules of fixed oil separate in mounts made with chloral hydrate T.S.

Foreign organic matter—Fennel contains not more than 4 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Fennel yields not more than 1.5 per cent of acid-insoluble ash, page 761.

Storage—Preserve Fennel in tight containers.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Ferric Ammonium Citrate, Green

GREEN FERRIC AMMONIUM CITRATE
Ferri Ammonii Citras Viridis

Ferr. Ammon. Cit. Virid.

Green Ferric Ammonium Citrate contains ferric citrate equivalent to not less than 14.5 per cent and not more than 16 per cent of Fe.

Description—Green Ferric Ammonium Citrate occurs as thin, transparent, green scales, granules or as a powder. It is odorless, and has a mildly ferruginous taste. It is deliquescent in air and is affected by light. Its solutions are acid to litmus paper.

Solubility—Green Ferric Ammonium Citrate is very soluble in water. It is insoluble in alcohol.

Identification—

A: Heat about 0.1 Gm. of Green Ferric Ammonium Citrate with about 5 cc. of potassium hydroxide T.S.: a reddish brown precipitate is produced and ammonia is evolved.

B: Ammonia T.S. added to an aqueous solution of Green Ferric Ammonium Citrate (1 in 100) produces no precipitate, but the yellow-green color changes to orange or reddish brown, the color darkening upon standing.

C: To 5 cc. of a solution of Green Ferric Ammonium Citrate (1 in 100) add 0.3 cc. of potassium permanganate T.S. and 4 cc. of mercuric sulfate T.S., and heat the mixture to boiling: a white precipitate is produced.

D: Remove the iron from 10 cc. of an aqueous solution of Green Ferric Ammonium Citrate (1 in 10) by boiling it with an excess of potassium hydroxide T.S., filter, and then slightly acidify 4 cc. of the filtrate with acetic acid: a portion of the cooled filtrate, when mixed with 2 cc. of calcium chloride T.S., and again heated to boiling, gradually deposits a white, crystalline precipitate.

Tartrate—The remainder of the filtrate obtained in *Identification test D*, when acidified more strongly with acetic acid and allowed to stand for 24 hours, does not yield a white, crystalline precipitate.

Assay—Weigh accurately about 1 Gm. of Green Ferric Ammonium Citrate, dissolve it in 25 cc. of distilled water in a glass-stoppered flask, add 5 cc. of hydrochloric acid and 4 Gm. of potassium iodide, stopper the flask, and allow it to stand for 15 minutes in the dark. Dilute with 100 cc. of distilled water, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Perform a blank test with the same quantities of the reagents and in the same manner, and make any necessary correction. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.005585 Gm. of Fe.

Storage—Preserve Green Ferric Ammonium Citrate in tight, light-resistant containers.

AVERAGE DOSE—Intramuscular, **0.1 Gm.** (approximately $1\frac{1}{2}$ grains).

Ferric Ammonium Citrate, Green, Ampuls

GREEN FERRIC AMMONIUM CITRATE AMPULS
Ampullæ Ferri Ammonii Citratis Viridis

Ampul. Ferr. Ammon. Cit. Virid. Green Ferric Ammonium Citrate Injection

Green Ferric Ammonium Citrate Ampuls contain a sterile solution of green ferric ammonium citrate, and may contain 0.5 per cent of quinine and urea hydrochloride, in water for injection, and yield Fe, equal to not less than 14.5 per cent and not more than 16.0 per cent of the labeled amount of green ferric ammonium citrate.

Prepare the solution and fill the cleansed ampuls according to the requirements given on pages 687 to 689. Protect the solution from daylight throughout all operations. Use ampuls of amber-colored light-resistant glass, or if uncolored ampuls are used, the filled ampuls must be placed in suitable cartons to protect them from light. Sterilize the filled ampuls by Process E, page 753, or by any other adequate and suitable method of sterilization, and test for sterility according to the method described on page 746. The Ampuls also conform to the other requirements under *Ampuls*, page 687.

Assay—Transfer to a separator an accurately measured volume of the ampul solution, containing about 1 Gm. of green ferric ammonium citrate, add ammonia T.S. to render alkaline, and extract any alkaloid present by shaking with 3 portions of chloroform. Wash the combined chloroform extracts once with distilled water, add the washing to the alkaline liquid in a glass-stoppered flask, neutralize it with hydrochloric acid, and add an excess of 5 cc. of the acid; dilute with distilled water, if necessary, to make 25 cc.; then add 4 Gm. of potassium iodide, and stopper the flask securely. Allow the mixture to stand 15 minutes; then add 50 cc. of distilled water, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.005585 Gm. of Fe.

AVERAGE DOSE—**0.1 Gm.** of Green Ferric Ammonium Citrate.

Ferric Cacodylate

FERRIC CACODYLATE
Ferri Cacodylas

Iron Cacodylate

$Fe[(CH_3)_2AsO_2]_3$ Mol. wt. 466.78

Ferric Cacodylate, when dried to constant weight at 105°, contains not less than 11 per cent and not more than 16 per cent of Fe, and not less than 41 per cent and not more than 45 per cent of As.

Description—Ferric Cacodylate occurs as a yellowish, amorphous powder.

Solubility—One Gm. of Ferric Cacodylate dissolves in about 30 cc. of water at 25°. It is very slightly soluble in alcohol.

Identification—

A: Ferric Cacodylate burns with a bluish flame, emitting a garlic-like odor.

B: A mixture of a few drops of an aqueous solution of Ferric Cacodylate (1 in 100) with 2 cc. of hypophosphorous acid T.S., allowed to stand in a stoppered tube, develops the odor of cacodyl within 1 hour.

Loss on drying—When dried to constant weight at 105°, Ferric Cacodylate loses not more than 5 per cent of its weight.

Monomethylarsenate—No turbidity is produced in 10 cc. of an aqueous solution of Ferric Cacodylate (1 in 20) by the addition of 1 cc. of calcium chloride T.S., either in the cold or on heating.

Arsenate or phosphate—Dissolve 1 Gm. of Ferric Cacodylate in 20 cc. of distilled water, and add a few drops of hydrochloric acid. Heat to boiling, add a slight excess of stronger ammonia T.S., and filter. Add 5 cc. of magnesia mixture T.S. to the filtrate. There should be no turbidity within 1 hour.

Chloride—One Gm. of Ferric Cacodylate shows no more chloride than corresponds to 0.3 cc. of 0.02 *N* hydrochloric acid, page 758.

Sulfate—The addition of 5 drops of barium chloride T.S. to 10 cc. of an aqueous solution of Ferric Cacodylate (1 in 50) acidified with 2 drops of hydrochloric acid, produces no turbidity in 30 seconds.

Assay for iron—Accurately weigh about 0.5 Gm. of Ferric Cacodylate, previously dried to constant weight at 105°, dissolve in 75 cc. of distilled water and 2 cc. of hydrochloric acid and heat to boiling. Add 10 cc. of ammonia T.S. slowly with stirring. Boil 5 minutes. Filter, and wash the precipitate with hot water. Dissolve the precipitate from the filter paper with 20 cc. of warm hydrochloric acid (1 in 2). Wash the filter paper with warm distilled water, collecting both the filtrate and washings in a 250-cc. glass-stoppered flask. Dilute to 100 cc. and add 3 Gm. of potassium iodide. Let stand for 10 minutes and titrate with 0.1 *N* sodium

thiosulfate, using starch T.S. as the indicator. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.005585 Gm. of Fe.

Assay for arsenic—Accurately weigh about 0.2 Gm. of Ferric Cacodylate, previously dried to constant weight at 105°, into a 300-cc. Kjeldahl flask with a ground glass joint that fits the delivery tube described below. Add 10 Gm. of potassium sulfate, 0.3 Gm. of starch, and 20 cc. of sulfuric acid. Digest over low heat until frothing has ceased and continue the digestion over a slightly higher flame until the mixture is colorless. Cool, and add 20 cc. of distilled water. Dry the neck of the flask over a small flame. Cool the contents, and add 30 Gm. of sodium chloride, 5 Gm. of ferrous sulfate, 1 Gm. of sodium bromide, and 25 cc. of hydrochloric acid. Mix the contents of the flask and connect the delivery tube after moistening the ground glass joint with 1 drop of sulfuric acid. The size of delivery tube should be about 13 mm. in internal diameter and about 40 cm. long. It should be bent at an angle of 45° about 3 inches above the ground joint and drawn to a tip about 5 mm. in diameter on the long end of the tube. Fix the flask in an inclined position with the tip of the outlet tube about 1 cm. under the surface of 150 cc. of distilled water in an Erlenmeyer flask surrounded by ice or by cold water. Distil at such a rate that the bend at the top of the tube becomes warm in 4 minutes and the lower end in about 8 minutes from the time heat is applied. Discontinue the distillation at the end of 10 minutes, but before removing the flame, lift the distillation flask until the tip of the outlet tube is above the water in the receiving flask. Let the outlet tube drain, and remove the receiver. Nearly neutralize the distillate with sodium hydroxide T.S., add 4 or 5 Gm. of sodium bicarbonate, and titrate with 0.1 *N* iodine solution, using starch T.S. as the indicator. Conduct a blank using the same quantities of the same reagents. Each cc. of 0.1 *N* iodine consumed is equivalent to 0.003746 Gm. of As.

Storage—Preserve Ferric Cacodylate in tight containers.

AVERAGE DOSE—**60 mg.** (approximately 1 grain).

FERRIC CACODYLATE AMPULS

Ampullæ Ferri Cacodylatis

Amp. Ferr. Cacodyl. Ferric Cacodylate Injection Iron Cacodylate Ampuls

Ferric Cacodylate Ampuls contain a sterile solution of ferric cacodylate in water for injection, and yield As equal to not less than 38.7 per cent and not more than 47.3 per cent of the labeled amount of $Fe[(CH_3)_2AsO_2]_3$.

Prepare the solution and fill the cleansed ampuls according to the requirements on pages 687 to 689. Sterilize the filled ampuls by Process C at 121.5° for 20 minutes, page 751, or by any other adequate and suitable method for sterilization, and test for sterility according to the method described on page 746. The Ampuls also conform to the other requirements under *Ampuls*, page 687.

Assay—Transfer an accurately measured volume of the ampul solution diluted, if necessary, and containing about 0.2 Gm. of ferric cacodylate into a 300-cc. Kjeldahl flask, add a few glass beads and evaporate to a volume of 5 cc. or less. Proceed as directed in the *Assay for arsenic* under *Ferric Cacodylate*, page 211.

beginning with "Add 10 Gm. of potassium sulfate. . . ." Each cc. of 0.1 *N* iodine consumed is equivalent to 0.003746 Gm. of As.

Storage—Preserve Ferric Cacodylate Ampuls in light-resistant containers.

AVERAGE DOSE—**60 mg.** of Ferric Cacodylate.

Ferric Chloride Solution

FERRIC CHLORIDE SOLUTION
Liquor Ferri Chloridi

Liq. Ferr. Chlorid. Iron Perchloride Solution

Ferric Chloride Solution is an aqueous solution containing ferric chloride ($FeCl_3$), corresponding to not less than 10 per cent and not more than 11 per cent of Fe, and not less than 3 per cent and not more than 5 per cent of HCl.

Description—Ferric Chloride Solution is a yellowish orange liquid, having a faint odor of hydrochloric acid and an acid reaction. It is affected by light.

Solubility—Ferric Chloride Solution is miscible in all proportions with alcohol.

Specific gravity—The specific gravity of Ferric Chloride Solution is not less than 1.29 and not more than 1.35 at 25°.

Identification—An aqueous dilution of Ferric Chloride Solution (1 in 10) responds to the tests for *Ferric Salts*, page 725, and for *Chloride*, page 724.

Alkalies and earths—Weigh about 2 cc. of Ferric Chloride Solution, dilute to 50 cc. with distilled water, and precipitate the iron completely by boiling and adding a slight excess of ammonia T.S., and filter: the residue obtained upon the evaporation and ignition of the filtrate does not exceed 0.1 per cent of the weight of Ferric Chloride Solution taken.

Nitrate—Dilute 2 cc. of Ferric Chloride Solution with 10 cc. of distilled water, heat to boiling and pour it into a mixture of 10 cc. of distilled water and 10 cc. of ammonia T.S. Filter while hot, and wash the filter with hot distilled water until the filtrate measures 30 cc. Mix the filtrate well and to 5 cc. of it add 2 drops of indigo carmine T.S. and 10 cc. of sulfuric acid: the blue color should not disappear in 1 minute.

Ferrous salts—Add a few drops of freshly prepared potassium ferricyanide T.S. to an aqueous dilution of Ferric Chloride Solution (about 1 in 20): a brown color is produced which does not at once turn green or greenish blue.

Copper or zinc—Dilute 2 cc. of Ferric Chloride Solution to 50 cc. with distilled water, precipitate the iron completely by boiling and adding a slight excess of ammonia T.S., and filter: the filtrate is colorless, and does not yield a precipitate with hydrogen sulfide T.S.

Lead—Pipette exactly 1 cc. of Ferric Chloride Solution into a 100-cc. volumetric flask, add 3 cc. of nitric acid (1 in 2). Add a sufficient quantity of distilled water to make 100 cc. and mix well. A 10-cc. portion of this solution shall contain no more than 5 micrograms of lead (corresponding to not more than 50 parts per million) when treated according to the *Lead limit test*, page 729, using 10 cc. of ammonium citrate solution, 5 cc. of potassium cyanide solution, and 1 cc. of hydroxylamine hydrochloride solution.

Assay for iron—Transfer about 2 Gm. of Ferric Chloride Solution to a tared flask, stopper, weigh accurately, and add 5 cc. of hydrochloric acid, 25 cc. of distilled water, and about 3 Gm. of potassium iodide. Allow the mixture to stand during

15 minutes, dilute it with 50 cc. of distilled water, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.005585 Gm. of Fe.

Assay for hydrochloric acid—To about 0.5 Gm. of Ferric Chloride Solution, accurately weighed, and contained in a 100-cc. volumetric flask add 10 cc. of distilled water and 50 cc. of 0.1 *N* silver nitrate, shake vigorously, then add 2 cc. of nitric acid and sufficient distilled water to measure exactly 100 cc., and mix well. Pass the mixture through a dry filter, reject the first 10-cc. portion, and determine the excess of silver nitrate in 50 cc. of the filtrate by adding about 2 cc. of ferric ammonium sulfate T.S. and titrating with 0.1 *N* ammonium thiocyanate. Calculate the per cent of HCl and subtract from it the per cent of iron (see assay above) multiplied by 1.959. The difference represents chlorine not combined with iron as HCl. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.003647 Gm. of HCl.

Storage—Preserve Ferric Chloride Solution in tight, light-resistant containers, and avoid continuous excessive heat.

AVERAGE DOSE—**0.1 cc.** (approximately $1^1/_2$ minims).

FERRIC CHLORIDE TINCTURE

Tinctura Ferri Chloridi

Tr. Ferr. Chlor. Iron Tincture

Ferric Chloride Tincture is a hydro-alcohol solution containing, in each 100 cc., about 13 Gm. of $FeCl_3$, corresponding to not less than 4.5 Gm. of Fe.

Ferric Chloride Solution	**350 cc.**
Alcohol, a sufficient quantity,	
To make	**1000 cc.**

Mix the solution with enough alcohol to make 1000 cc.

Description—Ferric Chloride Tincture is a yellowish orange liquid, having a slightly ethereal odor, a very astringent taste, and an acid reaction.

Specific gravity—The specific gravity of Ferric Chloride Tincture is about 1.00 at 25°.

Identification—Ferric Chloride Tincture responds to the tests for *Ferric Salts*, page 725, and for *Chloride*, page 724. After Ferric Chloride Tincture has been exposed to daylight for some time, it yields a greenish or bluish color with potassium ferricyanide T.S. (*presence of some ferrous salt*).

Nitrate—Dilute 4 cc. of Ferric Chloride Tincture with 10 cc. of distilled water, heat the solution to boiling and pour it into a mixture of 10 cc. of distilled water and 10 cc. of ammonia T.S. Filter the mixture while hot, and wash the filter with hot distilled water until the total filtrate measures 30 cc. Mix the filtrate well and to 5 cc. add 2 drops of indigo carmine T.S. Mix this solution with 10 cc. of sulfuric acid: the blue color does not disappear within 1 minute.

Assay—Transfer 5 cc. of Ferric Chloride Tincture, accurately measured, to a flask of suitable capacity. Add about 20 cc. of distilled water, 3 Gm. of potassium

iodide, and 3 cc. of hydrochloric acid. Allow the solution to stand during 15 minutes, dilute it with 50 cc. of distilled water, and then titrate with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.005585 Gm. of Fe.

Alcohol content—From 58 to 64 per cent, by volume, of C_2H_5OH.

Storage—Preserve Ferric Chloride Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**0.6 cc.** (approximately 10 minims).

Ferric Citrochloride Tincture

FERRIC CITROCHLORIDE TINCTURE

Tinctura Ferri Citrochloridi

Tr. Ferr. Citrochlor.

Ferric Citrochloride Tincture is a hydro-alcohol solution containing, in each 100 cc., ferric citrochloride equivalent to not less than 4.48 Gm. of Fe.

Ferric Chloride Solution	**350 cc.**
Sodium Citrate	**450 Gm.**
Alcohol	**150 cc.**
Water, a sufficient quantity,	
To make about	**1000 cc.**

Mix the ferric chloride solution with 150 cc. of water, dissolve the sodium citrate in this mixture with the aid of gentle heat, and add the alcohol. When the solution has become cold, add sufficient water to make the product measure 1000 cc. Set the Ferric Citrochloride Tincture aside in a cold place for a few days, so that the excess of saline matter may separate, and then filter.

Assay—Transfer 5 cc. of Ferric Citrochloride Tincture, accurately measured, into an iodine flask, add 7 cc. of hydrochloric acid, 25 cc. of distilled water, and heat on a water bath until clear. Cool to room temperature and add about 25 cc. of distilled water and 3 Gm. of potassium iodide, and allow the mixture to stand for 15 minutes. Then rinse the stopper and the sides of the flask with an additional 50 cc. of distilled water and titrate the liberated iodine with 0.1 *N* sodium thiosulfate. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.005585 Gm. of Fe.

Alcohol content—From 13 to 15 per cent, by volume, of C_2H_5OH.

Storage—Preserve Ferric Citrochloride Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**0.5 cc.** (approximately 8 minims).

One average metric dose represents about 22 mg. of iron in the form of ferric citrochloride.

FERRIC GLYCEROPHOSPHATE

Ferri Glycerophosphas

Ferr. Glycerophos.

$Fe_2[C_3H_5(OH)_2PO_4]_3$ Mol. wt. 621.90

Ferric Glycerophosphate, when dried to constant weight at 130°, contains not less than 17 per cent of Fe, corresponding to not less than 95 per cent of $Fe_2[C_3H_5(OH)_2PO_4]_3$.

Description—Ferric Glycerophosphate occurs as orange to greenish yellow, transparent, amorphous scales, or powder. It is odorless, and nearly tasteless. An aqueous solution of Ferric Glycerophosphate (1 in 20) is acid to litmus paper. It is affected by light.

Solubility—One Gm. of Ferric Glycerophosphate dissolves slowly in about 2 cc. of water at 25°. It is insoluble in alcohol.

Identification—An aqueous solution of Ferric Glycerophosphate (1 in 20) responds to the tests for *Ferric Salts*, page 725, and for *Glycerophosphate*, page 725.

Loss on drying—When dried to constant weight at 130°, Ferric Glycerophosphate loses not more than 12 per cent of its weight.

Chloride—Five-tenths Gm. of Ferric Glycerophosphate shows no more chloride than corresponds to 1 cc. of 0.02 *N* hydrochloric acid, page 758.

Phosphate—Prepare a standard solution containing 0.192 Gm. of potassium biphosphate in sufficient distilled water to make 100 cc. Dilute 5 cc. of this solution with sufficient distilled water to make 100 cc. To 10 cc. of this diluted standard solution add 10 cc. of cold ammonium molybdate T.S., and to 10 cc. of a solution of Ferric Glycerophosphate (1 in 60) in distilled water, add 10 cc. of cold ammonium molybdate T.S. Mix each suspension, and allow them to stand for 10 minutes; agitate again if necessary, before comparison. The turbidity of the ferric glycerophosphate suspension is not greater than that of the diluted standard solution suspension.

Sulfate—Five-tenths Gm. of Ferric Glycerophosphate shows no more sulfate than corresponds to 1 cc. of 0.02 *N* sulfuric acid, page 759.

Arsenic—An aqueous solution of Ferric Glycerophosphate meets the requirements of the test for *Arsenic*, page 689.

Lead—To 1 Gm. of Ferric Glycerophosphate add 3 cc. of nitric acid (1 in 2) and 5 cc. of distilled water. Boil until the appearance of brown fumes, add about 10 cc. of distilled water, and boil for 2 minutes. Cool and transfer to a 100-cc. volumetric flask with the aid of distilled water and add sufficient distilled water to make 100 cc. A 10-cc. portion of this solution shall contain no more than 5 micrograms of lead (corresponding to not more than 50 parts per million) when tested according to the *Lead limit test*, page 729, using 10 cc. of ammonium citrate solution, 3 cc. of potassium cyanide solution, and 1 cc. of hydroxylamine hydrochloride solution.

Assay—Dissolve about 1 Gm. of Ferric Glycerophosphate, dried to constant weight at 130° and accurately weighed, in 25 cc. of distilled water in a glass-stoppered flask. Add 3 cc. of hydrochloric acid, 1 Gm. of sodium bicarbonate in small portions, and 6 Gm. of potassium iodide; securely stopper the flask, and allow the mixture to stand for about 20 minutes at a temperature of 35° to 45°; cool to 20°, add 50 cc. of distilled water, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Perform a blank test with the same quantities of the reagents and in the same manner, and make any necessary correction. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.005585 Gm. of Fe and to 0.03110 Gm. of $Fe_2[C_3H_5(OH)_2PO_4]_3$.

Storage—Preserve Ferric Glycerophosphate in tight, light-resistant containers.

AVERAGE DOSE—**0.2 Gm.** (approximately 3 grains).

Ferric Hypophosphite

FERRIC HYPOPHOSPHITE

Ferri Hypophosphis

Ferr. Hypophos.

$Fe(H_2PO_2)_3$ Mol. wt. 250.84

Ferric Hypophosphite, when dried to constant weight over sulfuric acid, contains not less than 21.8 per cent of Fe, corresponding to not less than 98 per cent of $Fe(H_2PO_2)_3$.

Caution should be observed in compounding Ferric Hypophosphite with other substances, as an explosion may occur if it is triturated or heated with nitrates, chlorates, or other oxidizing agents.

Description—Ferric Hypophosphite occurs as a white or grayish white powder, and is permanent in the air. It is odorless, and nearly tasteless.

Solubility—One Gm. of Ferric Hypophosphite dissolves in about 2300 cc. of water at 25°, and in about 1200 cc. of boiling water. It is more readily soluble in the presence of hypophosphorous acid, or in a warm, concentrated solution of an alkali citrate, forming a greenish solution with the latter.

Identification—Dissolve 1 Gm. of Ferric Hypophosphite in 15 cc. of acetic acid by boiling; filter: the solution responds to the tests for *Ferric Salts*, page 725, and for *Hypophosphite*, page 725.

Loss on drying—When dried to constant weight over sulfuric acid, Ferric Hypophosphite loses not more than 3 per cent of its weight.

Carbonate and calcium—Add about 0.5 Gm. of Ferric Hypophosphite to 5 cc. of acetic acid: no effervescence occurs (*carbonate*). Heat the mixture to boiling and filter: the filtrate shows no turbidity within 1 minute after the addition of 0.5 cc. of ammonium oxalate T.S. (*calcium*).

Phosphate—Boil 0.5 Gm. of Ferric Hypophosphite with 10 cc. of sodium hydroxide T.S.; a reddish brown precipitate is produced. Filter this mixture, slightly acidify the filtrate with hydrochloric acid, add 0.5 cc. of magnesia mixture T.S., and render alkaline with ammonia T.S.: no crystalline precipitate is produced.

Sulfate—One Gm. of Ferric Hypophosphite, dissolved in 20 cc. of diluted hydrochloric acid with the aid of heat, shows no more sulfate than corresponds to 0.1 cc. of 0.02 *N* sulfuric acid, page 759.

Arsenic—Dissolve 0.2 Gm. of Ferric Hypophosphite in 5 cc. of nitric acid, and evaporate to dryness on a water bath: the residue meets the requirements of the test for *Arsenic*, page 689.

Lead—To 1 Gm. of Ferric Hypophosphite add 5 cc. of nitric acid (1 in 2) and 5 cc. of distilled water and boil until the volume has been reduced to a few cc. Add 15 cc. of distilled water and boil for 2 minutes. Cool and transfer to a 100-cc. volumetric flask with the aid of distilled water and add sufficient distilled water to make the volume measure 100 cc. A 10-cc. portion of this solution contains no more than 5 micrograms of lead (corresponding to not more than 50 parts per million) when tested according to the *Lead limit test*, page 729, using 24 cc. of ammonium citrate solution, 3 cc. of potassium cyanide solution, and 1 cc. of hydroxylamine hydrochloride solution.

Assay—To about 1 Gm. of Ferric Hypophosphite, dried to constant weight over sulfuric acid and accurately weighed, add 10 cc. of nitrohydrochloric acid, and evaporate to dryness on a water bath. Add 5 cc. of hydrochloric acid to the residue, and again evaporate to dryness. Dissolve the residue in 25 cc. of distilled water and 5 cc. of hydrochloric acid, and transfer the solution to a glass-stoppered flask; add 4 Gm. of potassium iodide, securely stopper the flask, and allow the mixture to stand for 15 minutes; add 50 cc. of distilled water, and titrate the liberated iodine

with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Perform a blank test with the same quantities of the reagents and in the same manner, and make any necessary correction. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.005585 Gm. of Fe and to 0.02508 Gm. of $Fe(H_2PO_2)_3$.

Storage—Preserve Ferric Hypophosphite in well-closed containers.

AVERAGE DOSE—**0.2 Gm.** (approximately 3 grains).

Ferric Oxide, Red

RED FERRIC OXIDE
Ferri Oxidum Rubrum

Ferr. Oxid. Rubr.

Red Ferric Oxide contains not less than 90 per cent of Fe_2O_3 calculated on the basis of the ignited product, the loss on ignition being determined on a separate sample.

Description—Red Ferric Oxide occurs as a moderate reddish brown powder which closely approximates the color of a mixture of 1 part scarlet-red, and 18 parts red mercuric oxide.

Solubility—Red Ferric Oxide dissolves in hydrochloric acid upon warming, a small amount of insoluble residue usually remaining. It is insoluble in water or in the organic solvents.

Particle size—Triturate Red Ferric Oxide to a smooth suspension with water, and wash it through a 200-mesh sieve: no appreciable residue remains on the sieve.

Loss on ignition—Red Ferric Oxide loses not more than 3 per cent of its weight on ignition.

Water-soluble substances and acid-insoluble substances—Red Ferric Oxide contains no more water-soluble substances or acid-insoluble substances than are prescribed in the corresponding tests under *Yellow Ferric Oxide*, page 218.

Assay—Proceed as directed in the *Assay* under *Yellow Ferric Oxide*, page 218.

Storage—Preserve Red Ferric Oxide in well-closed containers.

Ferric Oxide, Yellow

YELLOW FERRIC OXIDE
Ferri Oxidum Flavum

Ferr. Oxid. Flav.

Yellow Ferric Oxide contains not less than 97.5 per cent of Fe_2O_3, calculated on the basis of the ignited product, the loss on ignition being determined on a separate sample.

Description—Yellow Ferric Oxide occurs as a moderate yellowish orange powder, which closely approximates the color of Reference Yellow Ferric Oxide, page 744.

Solubility—Yellow Ferric Oxide dissolves in hydrochloric acid upon warming, a small amount of insoluble residue usually remaining. It is insoluble in water or in the organic solvents.

Particle size—Triturate Yellow Ferric Oxide to a smooth suspension with water and wash it through a 200-mesh sieve with water: no appreciable residue remains on the sieve.

Loss on ignition—Yellow Ferric Oxide loses not more than 12 per cent of its weight on ignition.

Water-soluble substances—Digest about 2 Gm. of Yellow Ferric Oxide, accurately weighed, in 100 cc. of distilled water on a water bath for 2 hours; filter, and wash the filter with water. Evaporate the filtrate and washings, and dry to constant weight at 100°: the weight of the residue does not exceed 1.0 per cent.

Acid-insoluble substances—Digest about 2 Gm. of Yellow Ferric Oxide, accurately weighed, in 25 cc. of hydrochloric acid, on a water bath, adding more of the acid if necessary, until the ferric oxide has dissolved; dilute the solution with 100 cc. of water, filter through a suitably prepared Gooch crucible, wash the residue with hot water, and ignite to constant weight: the weight of the residue does not exceed 1 per cent.

Assay—Digest about 1.5 Gm. of Yellow Ferric Oxide, accurately weighed, in 25 cc. of hydrochloric acid on a water bath until the ferric oxide is dissolved. Add 10 cc. of hydrogen peroxide solution, and evaporate almost to dryness on a water bath. Dissolve the residue by warming with 5 cc. of hydrochloric acid, add 25 cc. of distilled water, and filter into a 250-cc. volumetric flask washing the filter well with distilled water to make 250 cc. Transfer a 50-cc. portion into a glass-stoppered flask, add 3 Gm. of potassium iodide and 5 cc. of hydrochloric acid, and stopper the flask. Allow the mixture to stand for 15 minutes, add 50 cc. of distilled water, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Perform a blank test with the same quantities of the reagents and in the same manner, and make any necessary correction. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.007985 Gm. of Fe_2O_3.

Storage—Preserve Yellow Ferric Oxide in well-closed containers.

Ferric Phosphate, Soluble

SOLUBLE FERRIC PHOSPHATE
Ferri Phosphas Solubilis

Ferr. Phos. Sol. Ferric Phosphate with Sodium Citrate

Soluble Ferric Phosphate is ferric phosphate rendered soluble by the presence of sodium citrate, and yields not less than 12 per cent and not more than 15 per cent of Fe.

Description—Soluble Ferric Phosphate occurs as thin, bright green, transparent scales, or as granules. It is without odor, and has an acid, slightly salty taste. Soluble Ferric Phosphate is stable in dry air when protected from light, but when unprotected, soon becomes discolored. An aqueous solution of Soluble Ferric Phosphate (1 in 10) is acid to litmus paper.

Solubility—Soluble Ferric Phosphate dissolves freely in water. It is insoluble in alcohol.

Identification—

A: The addition of an excess of ammonia T.S. to an aqueous solution of Soluble Ferric Phosphate produces a reddish brown color, but no precipitate.

B: Remove the iron from 10 cc. of an aqueous solution of Soluble Ferric Phosphate (1 in 10) by boiling it with an excess of sodium hydroxide T.S.; filter, and strongly acidify the filtrate with hydrochloric acid: a cooled portion of this liquid mixed with an equal volume of magnesia mixture T.S. and treated with a slight excess of ammonia T.S. produces an abundant, white, crystalline precipitate. This precipitate, after being washed, turns greenish yellow when treated with a few drops of silver nitrate T.S. (*distinction from pyrophosphate*).

Ammonium salts—Boil about 0.1 Gm. of Soluble Ferric Phosphate with 5 cc. of sodium hydroxide T.S.: a reddish brown precipitate is produced without the evolution of ammonia.

Lead—Dissolve 1 Gm. of Soluble Ferric Phosphate in 3 cc. of nitric acid (1 in 2) in a 100-cc. volumetric flask. Add sufficient distilled water to make 100 cc., and mix

well. A 10-cc. portion of this solution contains no more than 5 micrograms of lead (corresponding to not more than 50 parts per million) when treated according to the *Lead limit test*, page 729, using 10 cc. of ammonium citrate solution, 3 cc. of potassium cyanide solution, and 1 cc. of hydroxylamine hydrochloride solution.

Assay—Dissolve about 1 Gm. of Soluble Ferric Phosphate, accurately weighed, in 25 cc. of distilled water and 5 cc. of hydrochloric acid in a glass-stoppered flask; add 4 Gm. of potassium iodide, securely stopper the flask, and allow the mixture to stand 15 minutes; add 50 cc. of distilled water, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Perform a blank test with the same quantities of the reagents and in the same manner, and make any necessary correction. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.005585 Gm. of Fe.

Storage—Preserve Soluble Ferric Phosphate in well-closed, light-resistant containers.

AVERAGE DOSE—**0.25 Gm.** (approximately 4 grains).

Ferric Subsulfate Solution

FERRIC SUBSULFATE SOLUTION

Liquor Ferri Subsulfatis

Liq. Ferr. Subsulf. Monsel's Solution Basic Ferric Sulfate Solution

Ferric Subsulfate Solution is an aqueous solution containing, in each 100 cc., basic ferric sulfate equivalent to not less than 20 Gm. and not more than 22 Gm. of Fe.

Ferrous Sulfate	1045 Gm.
Sulfuric Acid	55 cc.
Nitric Acid,	
Distilled Water, each, a sufficient quantity,	
To make	1000 cc.

Add the sulfuric acid to 800 cc. of distilled water in a suitable porcelain dish, and heat the mixture nearly to 100°; then add 75 cc. of nitric acid, and mix well. Divide the ferrous sulfate, coarsely powdered, into 4 approximately equal portions, and add these portions 1 at a time to the hot liquid, stirring after each addition until effervescence ceases. If, after the ferrous sulfate has dissolved, the solution has a black color, add nitric acid, a few drops at a time, with heating and stirring, until red fumes cease to be evolved. Boil the solution until it assumes a red color and is free from nitric acid, as indicated by the test below, maintaining the volume at about 1000 cc. by the addition of distilled water as needed. Cool, and add enough distilled water to make the product measure 1000 cc.; filter, if necessary, until the product is clear.

NOTE: If exposed to low temperatures, crystallization may take place in the Solution. The crystals will redissolve upon warming the Solution.

Description—Ferric Subsulfate Solution is a reddish brown liquid, odorless or nearly so, with a sour, strongly astringent taste. Ferric Subsulfate Solution is acid to litmus paper, and it is affected by light.

Solubility—Ferric Subsulfate Solution is miscible with water and with alcohol.

Specific gravity—The specific gravity of Ferric Subsulfate Solution is about 1.548 at 25°.

Identification—Separate portions of an aqueous dilution of Ferric Subsulfate Solution (1 in 20) yield a brownish red precipitate with ammonia T.S., a blue precipitate with potassium ferrocyanide T.S., and a white precipitate, insoluble in hydrochloric acid, with barium chloride T.S.

Nitrate—Add a clear crystal of ferrous sulfate to a cooled mixture of equal volumes of sulfuric acid and an aqueous dilution of Ferric Subsulfate Solution (1 in 10): the crystal does not become brown, nor does a brownish black color develop around it.

Ferrous salts—Add a few drops of freshly prepared potassium ferricyanide T.S. to 2 cc. of an aqueous dilution of Ferric Subsulfate Solution (1 in 20): a brown color is produced and the solution remains free from even a transient green or greenish blue color.

Assay—Dilute about 10 cc. of Ferric Subsulfate Solution, accurately measured, to 100 cc. with distilled water. Transfer 10 cc. of the dilution to a stoppered flask; add 5 cc. of hydrochloric acid and 3 Gm. of potassium iodide. Stopper the flask, and allow the mixture to stand for 15 minutes; then add 50 cc. of distilled water and titrate the liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.005585 Gm. of Fe.

Storage—Preserve Ferric Subsulfate Solution in tight, light-resistant containers, and in a moderately warm place (not under 22°).

As a styptic—Use it undiluted.

Ferric Sulfate Solution

FERRIC SULFATE SOLUTION
Liquor Ferri Tersulfatis

Liq. Ferr. Tersulf. Iron Tersulfate Solution

An aqueous solution containing $Fe_2(SO_4)_3$, corresponding to not less than 9.5 per cent and not more than 10.5 per cent of Fe.

Description—Ferric Sulfate Solution is a yellowish brown liquid, almost odorless, having an acid taste, and an acid reaction to litmus paper.

Solubility—Ferric Sulfate Solution is miscible with water and with alcohol.

Specific gravity—The specific gravity of Ferric Sulfate Solution is about 1.43 at 25°.

Identification—Ferric Sulfate Solution responds to the tests for *Ferric Salts*, page 725, and for *Sulfate*, page 727.

Nitrate—Dilute 2 cc. of Ferric Sulfate Solution with 10 cc. of distilled water, heat to boiling, and pour it into a mixture of 10 cc. of distilled water and 10 cc. of ammonia T.S. Filter while hot, and wash the filter with hot distilled water until the filtrate measures 30 cc. Mix the filtrate well and to 5 cc. of it add 2 drops of indigo carmine T.S. and 10 cc. of sulfuric acid: the blue color should not disappear in 1 minute.

Ferrous iron—Add a few drops of freshly prepared potassium ferricyanide T.S. to 2 cc. of an aqueous dilution of Ferric Sulfate Solution (1 in 20): a brown color is produced and the solution remains free from even a transient green or greenish blue color.

Assay—Transfer about 1.5 Gm. of Ferric Sulfate Solution to a tared flask, stopper, and weigh accurately, then add 5 cc. of hydrochloric acid, 25 cc. of distilled water, and 3 Gm. of potassium iodide, and allow the mixture to stand for 15 minutes. Dilute it with 50 cc. of distilled water, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.005585 Gm. of Fe.

Storage—Preserve Ferric Sulfate Solution in tight containers.

FERROUS CARBONATE MASS

Massa Ferri Carbonatis

Mass. Ferr. Carb. Vallet's Mass

Ferrous Carbonate Mass contains not less than 36 per cent and not more than 41 per cent of $FeCO_3$.

Ferrous Sulfate	**1000 Gm.**
Monohydrated Sodium Carbonate	**460 Gm.**
Honey	**380 Gm.**
Sucrose	**250 Gm.**
Syrup,	
Distilled Water, each, a sufficient quantity,	
To make	**1000 Gm.**

Dissolve the ferrous sulfate and monohydrated sodium carbonate, in separate 2000-cc. portions of boiling distilled water, and having added 200 cc. of syrup to the solution of the iron salt, filter both solutions, and cool. Place the sodium carbonate solution in a bottle having a capacity of about 5000 cc., and gradually add the solution of the iron salt, rotating the bottle frequently until carbon dioxide no longer escapes. Add sufficient distilled water to fill the bottle, stopper tightly, and set it aside so that the ferrous carbonate may subside. Pour off the supernatant liquid, and having mixed the syrup and distilled water in the proportion of 1 volume of syrup to 19 volumes of distilled water, wash the precipitate with the mixture by decantation until the washings no longer have a salty taste. Drain the precipitate on a muslin strainer, and express as much of the water as possible. Then mix the precipitate at once with the honey and sucrose in a tared dish, and by means of a water bath evaporate the mixture, with constant stirring, until its weight is reduced to 1000 Gm.

Assay—Dissolve about 1 Gm. of Ferrous Carbonate Mass, accurately weighed, in 15 cc. of diluted sulfuric acid, dilute the solution with distilled water to 150 cc., and immediately titrate with 0.1 *N* ceric sulfate, using 0.1 cc. of orthophenanthroline T.S. as the indicator. Each cc. of 0.1 *N* ceric sulfate is equivalent to 0.01159 Gm. of $FeCO_3$.

Storage—Preserve Ferrous Carbonate Mass in tight, light-resistant containers.

AVERAGE DOSE—**0.6 Gm.** (approximately 10 grains).

Ferrous Carbonate Pills

FERROUS CARBONATE PILLS

Pilulæ Ferri Carbonatis

Pil. Ferr. Carb. Chalybeate Pills Blaud's Pills Ferruginous Pills

Each Pill contains not less than 60 mg. of $FeCO_3$.

Ferrous Sulfate, in clear crystals	16 Gm.
Potassium Carbonate	8 Gm.
Sucrose, finely powdered	4 Gm.
Tragacanth, finely powdered	1 Gm.
Althea, in very fine powder	1 Gm.
Glycerin,	
Distilled Water, each, a sufficient quantity,	
To make 100 pills.	

Triturate the potassium carbonate in a mortar with a sufficient quantity (about 5 drops) of glycerin, add the ferrous sulfate and sucrose, previously triturated together to a uniform, fine powder, and mix the mass thoroughly until it assumes a greenish color. When the reaction is complete, incorporate the tragacanth and althea, and add distilled water, if necessary, to obtain a mass of pilular consistence. Divide it into 100 pills.

Assay—Carefully pulverize 5 Pills in a mortar, and triturate with 20 cc. of diluted sulfuric acid until all carbonate is dissolved. Transfer completely the contents of the mortar to a beaker of about 800-cc. capacity, and add distilled water to bring the total volume to approximately 300 cc. Add 0.1 cc. of orthophenanthroline T.S., and titrate immediately with 0.1 *N* ceric sulfate, avoiding excessive stirring. Near the end of the titration tilt the beaker at an angle of 45° to facilitate the detection of the end point. Each cc. of 0.1 *N* ceric sulfate is equivalent to 0.01159 Gm. of $FeCO_3$.

Storage—Preserve Ferrous Carbonate Pills in well-closed containers.

AVERAGE DOSE—5 pills.

SACCHARATED FERROUS CARBONATE

Ferri Carbonas Saccharatus

Ferr. Carb. Sacch.

Saccharated Ferrous Carbonate contains, in each 100 Gm., not less than 15 Gm. of $FeCO_3$.

Ferrous Sulfate	500 Gm.
Sodium Bicarbonate	350 Gm.
Lactose	100 Gm.
Sucrose, in fine powder,	
Diluted Sulfuric Acid,	
Distilled Water, each, a sufficient quantity,	
To make	1000 Gm.

Dissolve 85 Gm. of sucrose in 2000 cc. of hot distilled water; then dissolve the ferrous sulfate in that solution, add 3 cc. of diluted sulfuric acid, mix, and filter the solution. Dissolve the sodium bicarbonate in 5000 cc. of distilled water at a temperature not exceeding 50°, and filter the solution. Gradually add the ferrous sulfate solution to the sodium bicarbonate solution in a container having a capacity of about 10,000 cc., and mix the contents thoroughly by rotating the container. Fill the container with boiling distilled water, allow the precipitate to subside, and then decant the clear supernatant liquid. Wash the precipitate by decantation with a hot mixture consisting of 1 volume of syrup and 19 volumes of distilled water, until the decanted liquid gives merely a slight cloudiness with barium chloride T.S. Drain the precipitate, transfer it to a porcelain dish containing 615 Gm. of sucrose and 100 Gm. of lactose, and mix intimately. Evaporate the mixture to dryness on a water bath, reduce it to a powder, weigh it, and mix enough well-dried sucrose with it, if necessary, to make the product weigh 1000 Gm. To minimize oxidation, make this preparation in the shortest possible time.

Description—Saccharated Ferrous Carbonate occurs as a light olive-gray, odorless powder, which gradually becomes oxidized by contact with air.

Solubility—Saccharated Ferrous Carbonate is only partially soluble in water.

Identification—

A: Treat 10 to 20 mg. of Saccharated Ferrous Carbonate with 5 cc. of hydrochloric acid: solution occurs with copious evolution of carbon dioxide to form a greenish yellow liquid.

B: Dissolve 1 Gm. of Saccharated Ferrous Carbonate in 5 cc. of hydrochloric acid, and dilute the solution with distilled water until it measures 100 cc.; this solution responds to the tests for *Ferrous Salts*, page 725.

Sulfate—A 10-cc. portion of the solution prepared as directed in the preceding test,

but diluted with distilled water to 50 cc. shows no more sulfate than corresponds to 0.5 cc. of 0.02 *N* sulfuric acid, page 759.

Lead—Gently ignite 1 Gm. of Saccharated Ferrous Carbonate for 2 hours at a temperature not exceeding 480°. Cool and dissolve the residue in 3 cc. of hydrochloric acid and 1 cc. of nitric acid by the use of heat. Transfer to a 100-cc. volumetric flask with the aid of distilled water and add sufficient distilled water to make 100 cc. A 10-cc. portion of this solution contains no more than 5 micrograms of lead (corresponding to not more than 50 parts per million) when tested according to the *Lead limit test*, page 729, using 25 cc. of ammonium citrate solution, 3 cc. of potassium cyanide solution, and 1 cc. of hydroxylamine hydrochloride solution.

Assay—Dissolve about 2 Gm. of Saccharated Ferrous Carbonate, accurately weighed, in 15 cc. of diluted sulfuric acid, warming if necessary, to effect solution, and dilute with distilled water to about 150 cc.; immediately titrate with 0.1 *N* ceric sulfate, using about 0.5 cc. of orthophenanthroline T.S. as the indicator. Each cc. of 0.1 *N* ceric sulfate is equivalent to 0.01159 Gm. of $FeCO_3$.

Storage—Preserve Saccharated Ferrous Carbonate in tight containers.

AVERAGE DOSE—**0.25 Gm.** (approximately 4 grains).

Ferrous Carbonate, Saccharated, Capsules

SACCHARATED FERROUS CARBONATE CAPSULES

Capsulæ Ferri Carbonatis Saccharati

Cap. Ferr. Carb. Sacch.

Saccharated Ferrous Carbonate Capsules contain $FeCO_3$ equivalent to not less than 14.25 per cent and not more than 15.75 per cent of the labeled quantity of saccharated ferrous carbonate.

Identification—

A: To the contents of Saccharated Ferrous Carbonate Capsules equivalent to about 20 mg. of saccharated ferrous carbonate, add 5 cc. of hydrochloric acid: solution occurs with the vigorous evolution of carbon dioxide to form a medium greenish yellow liquid.

B: Dissolve the contents of Saccharated Ferrous Carbonate Capsules equivalent to about 1 Gm. of the drug in 5 cc. of hydrochloric acid, filtering if necessary: the solution responds to the tests for *Ferrous Salts*, page 725.

Assay—Empty a counted number of not less than 20 of the Capsules and dissolve a weighed portion equivalent to about 2 Gm. of saccharated ferrous carbonate in 15 cc. of diluted sulfuric acid, warming if necessary to effect solution, and dilute to 150 cc. with distilled water. Immediately titrate with 0.1 *N* ceric sulfate, using 0.5 cc. of orthophenanthroline T.S. as the indicator. Each cc. of 0.1 *N* ceric sulfate is equivalent to 0.01159 Gm. of $FeCO_3$.

Storage—Preserve Saccharated Ferrous Carbonate Capsules in tight containers.

AVERAGE DOSE—**0.25 Gm.** (approximately 4 grains) of Saccharated Ferrous Carbonate.

FERROUS GLUCONATE

Ferri Gluconas

$(CH_2OH(CHOH)_4.COO)_2Fe.2H_2O$

$Fe(C_6H_{11}O_7)_2.2H_2O$ Mol. wt. 482.18

Ferrous Gluconate contains not less than 11.5 per cent of Fe, calculated on an anhydrous basis, the moisture being determined on a separate sample by drying at 105° for 4 hours.

Description—Ferrous Gluconate occurs as a fine, yellowish gray or pale greenish yellow powder with a slight odor resembling burned sugar. An aqueous solution of Ferrous Gluconate (1 in 20) is acid to litmus.

Solubility—One Gm. of Ferrous Gluconate dissolves in about 4 cc. of water, but is nearly insoluble in alcohol.

Identification—

A: To 5 cc. of a warm aqueous solution of Ferrous Gluconate (1 in 10) add 0.65 cc. of glacial acetic acid and 1 cc. of freshly distilled phenylhydrazine, and heat the mixture on a water bath for 30 minutes. Allow it to cool and scratch the inner surface of the container with a glass stirring rod: crystals of gluconic acid phenylhydrazide form.

B: An aqueous solution of Ferrous Gluconate (1 in 20) responds to the test for *Ferrous Salts*, page 725.

Loss on drying—When dried at 105° for 4 hours, Ferrous Gluconate loses not more than 10 per cent of its weight.

Chloride—One Gm. of Ferrous Gluconate shows no more chloride than corresponds to 1.0 cc. of 0.02 *N* hydrochloric acid, page 758.

Sulfate—One Gm. of Ferrous Gluconate shows no more sulfate than corresponds to 1.0 cc. of 0.02 *N* sulfuric acid, page 759.

Oxalic acid—Dissolve 1 Gm. of Ferrous Gluconate in 5 cc. of distilled water, add 2 cc. of hydrochloric acid and transfer to a separator. Extract with two 20-cc. portions of ether. Evaporate the combined ether portions to dryness on a water bath and take up the residue in 5 cc. of distilled water. The addition of 1 drop of acetic acid and 3 cc. of calcium chloride T.S. produces no turbidity.

Ferric iron—Dissolve about 5 Gm. of Ferrous Gluconate, accurately weighed, in 100 cc. of distilled water and 10 cc. of hydrochloric acid and add 3 Gm. of potassium iodide. Shake well and allow to stand for 5 minutes. Titrate any liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.005585 Gm. of ferric iron. Ferrous Gluconate contains not more than 2 per cent of ferric iron.

Reducing sugars—Dissolve 0.5 Gm. of Ferrous Gluconate in 10 cc. of distilled water, warm and make alkaline with ammonia T.S. Pass hydrogen sulfide gas into the solution to precipitate the iron, and permit the solution to stand 30 minutes to coagulate the precipitate. Filter and wash the precipitate with two 5-cc. portions of distilled water. Acidify the combined filtrate and washings with hydrochloric acid and add 2 cc. of diluted hydrochloric acid in excess. Boil the solution until the vapors no longer darken lead acetate paper and continue to boil, if necessary, until it has been concentrated to about 10 cc. Cool, add 5 cc. of sodium carbonate T.S. and 20 cc. of distilled water and filter. To 5 cc. of the filtrate add 2 cc. of alkaline cupric tartrate T.S. and boil for 1 minute: no red precipitate is produced in 1 minute.

Assay—Dissolve about 1.5 Gm. of Ferrous Gluconate, accurately weighed, in 75 cc. of distilled water and 15 cc. of diluted sulfuric acid in a 300-cc. Erlenmeyer flask. Add 0.25 Gm. of zinc dust, close the flask with a stopper containing a Bunsen valve, made by inserting a glass tube connected to a short piece of rubber tubing with a slit on the side and a glass rod inserted in the other end arranged so that gases can

escape but air cannot enter, and allow to stand at room temperature for 20 minutes or until the solution becomes colorless. Filter the solution through a Gooch crucible containing an asbestos mat coated with a thin layer of zinc dust and wash the crucible and contents with 10 cc. of diluted sulfuric acid followed by 10 cc. of distilled water. Titrate the filtrate in the suction flask immediately with 0.1 *N* ceric sulfate using 1 cc. of orthophenanthroline T.S. as the indicator. Each cc. of 0.1 *N* ceric sulfate is equivalent to 0.005585 Gm. of Fe. Calculate the per cent of Fe on an anhydrous basis.

Storage—Preserve Ferrous Gluconate in tight containers.

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains).

Ferrous Iodide Syrup

FERROUS IODIDE SYRUP

Syrupus Ferri Iodidi

Syr. Ferr. Iod. Sirupus ferrosi iodidi concentratus P.I.

Ferrous Iodide Syrup contains, in each 100 cc., not less than 6.5 Gm. and not more than 7.5 Gm. of FeI_2, representing approximately 5 per cent of FeI_2, by weight.

Ferrous Iodide Syrup may be prepared as follows:

Iron, in the form of fine, bright wire	**20 Gm.**
Iodine	**60 Gm.**
Hypophosphorous Acid	**5 cc.**
Sucrose	**850 Gm.**
Distilled Water, a sufficient quantity, To make	**1000 cc.**

Place the iron in a flask having a capacity of about 500 cc., add the iodine and 200 cc. of distilled water, and shake the mixture occasionally, checking the reaction, if necessary, by placing the flask in cold water. When the liquid has acquired a green color and has lost the odor of iodine, heat it to boiling, and dissolve 100 Gm. of sucrose in the hot liquid. Filter the solution at once into a flask graduated to 1000 cc. and containing the remainder of the sucrose, and rinse the flask containing the iron with 240 cc. of hot distilled water in divided portions, passing the rinsings successively through the filter. Agitate the mixture until the sucrose is dissolved, warming if necessary, cool to 25°, and add the hypophosphorous acid and enough distilled water to make the product measure 1000 cc. Mix well and strain.

NOTE: For the purpose of retarding discoloration, 1.3 Gm. of citric acid may replace the hypophosphorous acid in the above formula.

Description—Ferrous Iodide Syrup is a transparent, pale, yellowish green syrupy liquid, having a sweet, ferruginous taste and a slightly acid reaction.

Specific gravity—The specific gravity of Ferrous Iodide Syrup is about 1.37 at 25°.

Identification—
A: Add a few drops of potassium ferricyanide T.S. to 5 cc. of Ferrous Iodide Syrup: a blue precipitate is produced.
B: Mix 5 cc. of Ferrous Iodide Syrup with a few drops of starch T.S., and add 3 drops of chlorine T.S.: the liquid acquires a deep blue color.
Free iodine—No blue color is produced in Ferrous Iodide Syrup by starch T.S.
Assay—Place exactly 10 cc. of Ferrous Iodide Syrup in a flask, dilute it with 30 cc. of distilled water, add 50 cc. of 0.1 *N* silver nitrate and 5 cc. of nitric acid, and heat on a water bath until the precipitate of silver iodide is greenish yellow. Cool, add 2 cc. of ferric ammonium sulfate T.S., and determine the residual silver nitrate by titration with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.01548 Gm. of FeI_2.
Storage—Preserve Ferrous Iodide Syrup in tight containers.

AVERAGE DOSE—**1 cc.** (approximately 15 minims).

One average metric dose contains about 70 mg. of Ferrous Iodide.

Ferrous Sulfate Syrup

FERROUS SULFATE SYRUP

Syrupus Ferri Sulfatis

Syr. Ferr. Sulf.

Ferrous Sulfate Syrup contains, in each 100 cc., not less than 3.75 Gm. and not more than 4.25 Gm. of $FeSO_4.7H_2O$.

Ferrous Sulfate	40	Gm.
Citric Acid	2.1	Gm.
Peppermint Spirit	2	cc.
Sucrose	825	Gm.
Distilled Water, a sufficient quantity, To make	1000	cc.

Dissolve the ferrous sulfate, the citric acid, the peppermint spirit, and 200 Gm. of sucrose in 450 cc. of distilled water; and filter the solution until clear. Then dissolve the remainder of the sucrose in the clear filtrate, and add sufficient distilled water to make 1000 cc. Mix well and strain, if necessary, through a pledget of cotton.

Assay—Transfer 25 cc. of Ferrous Sulfate Syrup, accurately measured, to a 250-cc. Erlenmeyer flask. Add 15 cc. of diluted sulfuric acid and 100 cc. of distilled water and shake well. Titrate with 0.1 *N* ceric sulfate, using 5 drops of orthophenanthroline T.S. as the indicator. Each cc. of 0.1 *N* ceric sulfate is equivalent to 0.02780 Gm. of $FeSO_4.7H_2O$.
Storage—Preserve Ferrous Sulfate Syrup in tight containers.

AVERAGE DOSE—**8 cc.** (approximately 2 fluidrachms).

One average metric dose contains 0.32 Gm. of Ferrous Sulfate.

Five Bromides Elixir, page 90

Fluidextracts

Aconite Fluidextract, page 24
Arnica Fluidextract, page 61
Belladonna Leaf Fluidextract, page 73
Belladonna Root Fluidextract, page 77
Buchu Fluidextract, page 95
Cimicifuga Fluidextract, page 146
Colchicum Corm Fluidextract, page 161
Colchicum Seed Fluidextract, page 164
Ergot Fluidextract, page 196
Eriodictyon Fluidextract, page 198
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Viburnum Prunifolium Fluidextract, page 554
Wild Cherry Fluidextract, page 140
Zea Fluidextract, page 560

Formic Acid

FORMIC ACID

Acidum Formicum

Acid. Formic.

CH_2O_2 HCOOH Mol. wt. 46.03

Formic Acid is an aqueous solution containing not less than 24 per cent and not more than 26 per cent of HCOOH.

Description—Formic Acid is a clear, colorless liquid with a characteristic, pungent odor, and an acid taste. It is acid to litmus paper.
Solubility—Formic Acid is miscible with water, and with alcohol.
Specific gravity—The specific gravity of Formic Acid is about 1.058 at 25°.

Identification—

A: A white precipitate of mercurous chloride is formed when Formic Acid is warmed with mercury bichloride T.S.

B: Neutralize 1 cc. of Formic Acid with sodium hydroxide T.S. and add 2 drops of the Acid in excess; then add about 1 cc. of ferric chloride T.S.: a deep reddish orange color results which turns to yellowish orange on the addition of mineral acids.

C: Place 2 cc. of Formic Acid in a test tube, add 5 cc. of sulfuric acid, and test the gas evolved with a lighted splinter: a blue flame characteristic of carbon monoxide is produced.

Non-volatile residue—Evaporate 20 cc. of Formic Acid in a tared porcelain dish on a water bath, and dry to constant weight at 105°: the weight of the residue does not exceed 2 mg.

Chloride—The addition of 5 drops of nitric acid and 5 drops of silver nitrate T.S. to 6 cc. of an aqueous solution of Formic Acid (1 in 6) produces no turbidity.

Oxalate—The addition of 5 drops of calcium chloride T.S. to 6 cc. of an aqueous solution of Formic Acid (1 in 6), alkalinized with ammonia T.S., produces no turbidity.

Sulfate—The addition of 5 drops of hydrochloric acid and 5 drops of barium chloride T.S. to 6 cc. of an aqueous solution of Formic Acid (1 in 6), produces no turbidity.

Sulfurous acid—Add 1 drop of 0.1 *N* iodine to 10 cc. of Formic Acid: the iodine color is not destroyed.

Heavy metals—Evaporate 1 cc. of Formic Acid to dryness on a water bath. Dissolve the residue in 1 cc. of diluted acetic acid and enough distilled water to make 25 cc.: the heavy metals limit, page 721, for Formic Acid is 5 parts per million.

Acetic acid—Heat 1 cc. of Formic Acid on a water bath with 1.5 Gm. of yellow mercuric oxide and 10 cc. of distilled water for 10 minutes, shaking frequently, and filter the liquid: the filtrate is not acid to litmus paper.

Acrolein and allyl formate—Formic Acid, when made strongly alkaline with sodium hydroxide T.S., develops no pungent or empyreumatic odor.

Assay—Transfer about 0.5 cc. of Formic Acid to a tared, stoppered container, weigh accurately, dilute with about 50 cc. of distilled water, and titrate with 0.1 *N* sodium hydroxide, using phenolphthalein T.S. as the indicator. Each cc. of 0.1 *N* sodium hydroxide is equivalent to 0.004603 Gm. of HCOOH.

Storage—Preserve Formic Acid in tight containers.

AVERAGE DOSE—**0.3 cc.** (approximately 5 minims).

FORMIC ACID SPIRIT

Spiritus Acidi Formici

Sp. Acid. Formic.

Formic Acid Spirit contains, in each 100 cc., not less than 0.95 Gm. and not more than 1.05 Gm. of HCOOH.

Formic Acid	**40 cc.**
Distilled Water	**225 cc.**
Alcohol, a sufficient quantity,	
To make	**1000 cc.**

Mix the formic acid with distilled water, and add sufficient alcohol to make the product measure 1000 cc.

Description—Formic Acid Spirit is a clear, colorless liquid having a strongly acid reaction and a characteristic pungent odor. It is affected by light.

Identification—A white precipitate of mercurous chloride is formed when 5 cc. of Formic Acid Spirit is warmed with 0.5 cc. of mercury bichloride T.S.

Purity—Separate 10-cc. portions of Formic Acid Spirit comply with the tests for *Chloride*, *Oxalate*, *Sulfate*, *Sulfurous acid*, *Heavy metals*, *Acetic acid*, and *Acrolein and allyl formate*, under *Formic Acid*, page 229.

Assay—To 40 cc. of 0.1 *N* sodium hydroxide contained in a suitable flask, add 10 cc. of Formic Acid Spirit, accurately measured; warm the flask and its contents to 50°, allow to cool, and titrate the excess alkali with 0.1 *N* sulfuric acid, using phenolphthalein T.S. as the indicator. Each cc. of 0.1 *N* sodium hydroxide is equivalent to 0.004603 Gm. of HCOOH.

Alcohol content—From 66 to 72 per cent, by volume, of C_2H_5OH.

Storage—Preserve Formic Acid Spirit in tight, light-resistant containers.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains about 0.16 cc. of Formic Acid.

Gambir

GAMBIR
Gambir
Pale Catechu

Gambir is the dried aqueous extract prepared from the leaves and twigs of *Uncaria Gambir* (Hunter) Roxburgh (Fam. *Rubiaceæ*).

Gambir yields not less than 60 per cent of alcohol-soluble extractive, and not less than 70 per cent of water-soluble extractive.

Unground Gambir—Unground Gambir occurs as approximately cubical or rectangular masses, from 20 to 30 mm. in diameter; and is dark reddish gray to light brown externally and more or less dull and porous. It is friable, and weak brown to weak yellowish orange internally.

Powdered Gambir—Powdered Gambir is light brown to moderate yellowish brown; inodorous; and has a bitterish, very astringent taste. It consists mostly of masses of interlacing acicular crystals, somewhat refractive in polarized light; starch grains are few, single or compound, of various shapes, from 5 to 30 microns in diameter. It shows very few epidermal fragments and thick-walled, wavy, non-glandular hairs up to 350 microns in length.

Identification—Macerate 1 Gm. of powdered Gambir with 50 cc. of distilled water for 1 hour, filter, and separate into several portions: upon the addition of diluted ferric chloride T.S. to one portion of the filtrate, an intense yellow-green color is produced. The addition of cupric sulfate T.S. to another portion of the filtrate produces no precipitate.

Acid-insoluble ash—Gambir yields not more than 0.5 per cent of acid-insoluble ash, page 761.

Alcohol-soluble extractive—Weigh accurately 2 Gm. of Gambir, in fine powder, and proceed as directed in the determination of *Alcohol-soluble extractive* under *Gamboge*, page 232. The weight obtained represents the yield of alcohol-soluble extractive from 1 Gm. of the drug taken.

Water-soluble extractive—Proceed as directed under *Alcohol-soluble extractive* using distilled water instead of alcohol.

AVERAGE DOSE—**0.5 Gm.** (approximately 7½ grains).

COMPOUND GAMBIR TINCTURE

Tinctura Gambir Composita

Tr. Gambir Comp. Compound Pale Catechu Tincture

Gambir, in dry, moderately coarse powder	**200 Gm.**
Cinnamon, in fine powder	**100 Gm.**
Glycerin,	
Alcohol, each, a sufficient quantity,	
To make	**1000 cc.**

Prepare the Tincture by Process P, page 758, using a mixture of 9 volumes of alcohol and 1 volume of glycerin as the menstruum. Macerate the mixed drugs during 24 hours, and percolate slowly.

Alcohol content—From 75 to 80 per cent, by volume, of C_2H_5OH.
Storage—Preserve Compound Gambir Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—2 cc. (approximately 30 minims).

GAMBOGE

Cambogia

Cambog.

Gamboge is the gum resin obtained from *Garcinia Hanburyi* Hooker filius (Fam. *Guttiferæ*).

Gamboge yields not less than 65 per cent of alcohol-soluble extractive.

Unground Gamboge—Unground Gamboge occurs as cylindrical pieces, frequently hollow at the center, from 2 to 5 cm. in diameter and up to 20 cm. in length; longitudinally striate, weak reddish brown to dark orange in color. The brittle, conchoidal fracture presents a smooth rather dull surface.
Powdered Gamboge—Powdered Gamboge is moderate yellowish orange, odorless, and has an acrid taste. When mounted in chloral hydrate T.S., nearly all the particles slowly dissolve, leaving but a few fragments of vegetable tissues and very few or no starch grains.
Identification—When triturated with water, Gamboge yields an emulsion having a strong yellow color, which, upon the addition of ammonia T.S., becomes darker, reddish, and finally almost clear.
Starch—Upon the addition of iodine T.S., the emulsion remains free from even a transient green color.
Foreign organic matter—Gamboge contains not more than 1 per cent of foreign organic matter, page 760.
Acid-insoluble ash—Gamboge yields not more than 1 per cent of acid-insoluble ash, page 761.

Alcohol-soluble extractive—Macerate about 2 Gm. of powdered Gamboge, accurately weighed, in about 70 cc. of alcohol in a suitable flask. Shake the mixture during 8 hours at 30-minute intervals and then allow it to stand during 16 hours without shaking. Filter, and wash the flask and residue with small portions of alcohol, passing the washings through the filter, until the filtrate measures 100 cc. Evaporate 50 cc. of the filtrate to dryness in a suitable tared dish on a water bath and dry to constant weight at 105°. Calculate the percentage of alcohol-soluble extractive from 1 Gm. of the drug taken.

AVERAGE DOSE—Human, **0.125 Gm.** (approximately 2 grains).
Cattle, **15.0 Gm.** (approximately $^1/_2$ ounce).

Gargle, Potassium Chlorate with Iron, page 407

Gelsemium

GELSEMIUM
Gelsemium
Yellow Jasmine Root

Gelsemium consists of the dried rhizome and roots of *Gelsemium sempervirens* (Linné) Persoon (Fam. *Loganiaceæ*).

Unground Gelsemium—Unground Gelsemium shows a cylindrical rhizome, usually in pieces from 3 to 20 cm. in length and from 3 to 30 mm. in diameter. It is moderate brown to dark yellowish orange externally, with occasional darker longitudinal lines, longitudinally wrinkled and transversely fissured. The upper surface shows a few stem-scars. The fracture is tough and splintery. Internally it is pale yellowish orange to weak yellow, having a thin bark, and distinctly radiate and eccentric wood with a disintegrated pith. The root fracture is one-half transverse, the other half oblique and splintery.

Histology—The rhizome shows a strong development of cork, the cell-walls being more or less lignified; a cortex consisting chiefly of starch-bearing parenchyma, but having small scattered groups of stone cells or fibers in the outer portion. The wood-wedges are broad, with large tracheæ and thick-walled tracheids. The medullary rays show strongly lignified cell walls in the xylem region, but non-lignified in the phloem region, the cells containing starch or, especially in the phloem region, prisms of calcium oxalate; and an internal phloem usually in 4 distinct more or less rounded strands, each partly surrounded by the pith. The root shows a structure similar to that of the rhizome except that the pith, the internal phloem, and the stone cells are absent.

Powdered Gelsemium—Powdered Gelsemium is light yellowish brown to weak yellow; has a slight odor, and a bitter taste. The tracheæ show numerous and conspicuous bordered pores. Spiral tracheæ and bast fibers are few. Thick-walled tracheids are long and narrow and strongly lignified. The starch grains are spherical, from 4 to 12 microns in diameter. Calcium oxalate occurs in monoclinic prisms from 15 to 32 microns in length. Also present are occasional groups of stone cells or fibers, the walls being very thick, porous, and strongly lignified.

Foreign organic matter—Gelsemium contains not more than 2 per cent of foreign organic matter, page 760.
Acid-insoluble ash—Gelsemium yields not more than 2 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**30 mg.** (approximately 1/2 grain).

Gelsemium Fluidextract

GELSEMIUM FLUIDEXTRACT
Fluidextractum Gelsemii

Fldext. Gelsem.

Prepare the Fluidextract from gelsemium, in moderately coarse powder, by Process A, page 718. Use a mixture of 4 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 48 hours, and percolate slowly.

Alcohol content—From 61 to 68 per cent, by volume, of C_2H_5OH.
Storage—Preserve Gelsemium Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**0.03 cc.** (approximately 1/2 minim).

Gelsemium Tincture

GELSEMIUM TINCTURE
Tinctura Gelsemii

Tr. Gelsem.

Gelsemium, in fine powder	**100 Gm.**
Alcohol,	
Water, each, a sufficient quantity,	
To make	**1000 cc.**

Prepare the Tincture by Process P, page 758. Use a mixture of 4 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 24 hours, and percolate at a moderate rate.

Alcohol content—From 70 to 75 per cent, by volume, of C_2H_5OH.
Storage—Preserve Gelsemium Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**0.3 cc.** (approximately 5 minims).

Gentian Elixir

GENTIAN ELIXIR
Elixir Gentianæ

Elix. Gentian.

Gentian Fluidextract	35 cc.
Compound Cardamom Spirit	15 cc.
Sodium Citrate	30 Gm.
Glycerin	50 cc.
Syrup	250 cc.
Alcohol	150 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the sodium citrate in 350 cc. of distilled water; to this solution add the alcohol with which the compound cardamom spirit has been mixed; then add the gentian fluidextract, the syrup, the glycerin, and sufficient distilled water to make the product measure 1000 cc.; mix well and filter, using 10 Gm. of purified talc, if necessary, to clarify the product.

Alcohol content—From 14 to 17 per cent, by volume, of C_2H_5OH.
Storage—Preserve Gentian Elixir in tight containers.

Gentian Elixir, Glycerinated

GLYCERINATED GENTIAN ELIXIR
Elixir Gentianæ Glycerinatum

Elix. Gentian. Glycerin.

Gentian Fluidextract	10 cc.
Taraxacum Fluidextract	15 cc.
Compound Cardamom Tincture	60 cc.
Raspberry Syrup	60 cc.
Sweet Orange Peel Tincture	15 cc.
Phosphoric Acid	5 cc.
Ethyl Acetate	1 cc.
Glycerin	400 cc.
Sucrose	200 Gm.
Alcohol	100 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the sucrose in 200 cc. of distilled water, and add the glycerin and the alcohol containing the sweet orange peel tincture; then add the other ingredients and sufficient distilled water to make the product measure 1000 cc.; mix well and filter, if necessary, until the product is clear.

Alcohol content—From 12 to 15 per cent, by volume, of C_2H_5OH.
Storage—Preserve Glycerinated Gentian Elixir in tight containers.

Gentian Extract

GENTIAN EXTRACT
Extractum Gentianæ

Ext. Gentian.

One Gm. of the Extract represents 2 Gm. of gentian.

Pilular Gentian Extract. Prepare the Extract from gentian, in coarse powder, by percolation and evaporation. Use water as the menstruum, macerate the drug during 3 hours, and percolate rapidly. Evaporate the percolate at 100° until it weighs about twice the weight of the drug taken, and strain it; then evaporate it to a pilular consistence. Thoroughly mix this mass, if necessary, with enough liquid glucose to make the Extract weigh one-half of the weight of the gentian taken.

Powdered Gentian Extract. Prepare the percolate as directed above and evaporate it to a thick, syrupy mass. To this add about one-fourth of its weight of dry starch, and continue the evaporation to dryness. Reduce the residue to a fine powder and, if necessary, mix it thoroughly with sufficient dry starch to make the Extract weigh one-half of the weight of the gentian taken.

Storage—Preserve Gentian Extract in tight, light-resistant containers, preferably at a temperature not above 30°.

AVERAGE DOSE—**0.5 Gm.** (approximately 7½ grains).

Gentian Fluidextract

GENTIAN FLUIDEXTRACT
Fluidextractum Gentianæ

Fldext. Gentian.

Prepare the Fluidextract from gentian, in moderately coarse powder, by Process A, page 718. Use diluted alcohol as the menstruum, macerate the drug during 48 hours, and percolate at a moderate rate.

Alcohol content—From 33 to 39 per cent, by volume, of C_2H_5OH.
Storage—Preserve Gentian Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**1 cc.** (approximately 15 minims).

Ginger Oleoresin

GINGER OLEORESIN
Oleoresina Zingiberis
Oleores. Zingib.

Ginger Oleoresin yields not less than 18 cc. and not more than 35 cc. of volatile ginger oil from each 100 Gm. of oleoresin.

Extract the oleoresin from ginger, in moderately fine powder, by percolation, using either acetone, alcohol, or ether as the menstruum. Recover the greater part of the volatile solvent from the percolate by distillation, transfer the residue to a dish, and allow the remaining volatile solvent to evaporate spontaneously in a warm place, remote from flame.

Assay—Place about 10 Gm. of Ginger Oleoresin, accurately weighed, in the flask of the apparatus used for volatile oil determinations and proceed as directed in process A, page 764, beginning with "and fill it one-half with water. . . ."
Storage—Preserve Ginger Oleoresin in tight containers.

AVERAGE DOSE—**30 mg.** (approximately $^1/_2$ grain).

Ginger Syrup

GINGER SYRUP
Syrupus Zingiberis
Syr. Zingib.

Ginger Fluidextract	**30 cc.**
Alcohol	**20 cc.**
Magnesium Carbonate	**10 Gm.**
Sucrose	**820 Gm.**
Distilled Water, a sufficient quantity,	
To make	**1000 cc.**

Mix the fluidextract and the alcohol, and triturate the liquid in a mortar with the magnesium carbonate and 60 Gm. of the sucrose.

Then gradually add 430 cc. of distilled water with constant trituration, until the sucrose is dissolved. Filter the solution, and dissolve the remainder of the sucrose in the clear filtrate with the aid of gentle heat; strain the syrup while warm; and when it is cold, add enough distilled water through the strainer if necessary, to make the product measure 1000 cc. Mix well.

Alcohol content—From 3.5 to 4.5 per cent, by volume, of C_2H_5OH.
Storage—Preserve Ginger Syrup in tight containers, and avoid excessive heat.

AVERAGE DOSE—10 cc. (approximately $2^1/_2$ fluidrachms).

One average metric dose represents 0.3 cc. of Ginger Fluidextract.

Glycerinated Gentian Elixir, page 234

Glycerites

Iodine and Zinc Iodide Glycerite, page 262
Phenol Glycerite, page 386
Tragacanth Glycerite, page 539

Glycerogelatins

GLYCEROGELATINS
Glycerogelatina

Glycerogelatins are soft masses, melting at body temperature, composed of gelatin, glycerin, water, and a medicament suitable for application in dermatological practice. Such medicaments are salicylic acid, iodoform, resorcinol, chrysarobin, etc., either by themselves or with the addition of zinc oxide. They are prepared with glycerinated gelatin as the vehicle.

The following formula will serve as a type:

Glycerinated Gelatin	300 Gm.
Glycerin	250 Gm.
Distilled Water	350 cc.
Medicinal Substance, in fine powder	100 Gm.
To make	1000 Gm.

Mix the medicinal substance thoroughly with the glycerin (or dissolve it in the glycerin), add the water, and incorporate this mixture with the glycerinated gelatin, previously melted on a water bath. Continue the heat, and stir until a homogeneous mixture is obtained; then pour it into chilled molds, and allow it to congeal.

The amount of glycerinated gelatin may be decreased and the amount of glycerin and of water may be increased to produce a mass of softer consistence and lower melting point.

Storage—Preserve Glycerogelatins in well-closed containers.

Glycerophosphates Elixir, Compound

COMPOUND GLYCEROPHOSPHATES ELIXIR
Elixir Glycerophosphatum Compositum

Elix. Glycerophos. Comp. Compound Glycerophosphates Solution

Sodium Glycerophosphate	**35 Gm.**
Calcium Glycerophosphate	**16 Gm.**
Ferric Glycerophosphate	**3 Gm.**
Manganese Glycerophosphate	**2 Gm.**
Quinine Hydrochloride	**875 mg.**
Strychnine Nitrate	**125 mg.**
Citric Acid	**600 mg.**
Lactic Acid	**20 cc.**
Compound Cardamom Spirit	**2 cc.**
Alcohol	**125 cc.**
Glycerin	**350 cc.**
Distilled Water, a sufficient quantity, To make	**1000 cc.**

Dissolve the calcium and sodium glycerophosphates in 400 cc. of distilled water containing the lactic acid. Dissolve the ferric and manganese glycerophosphates and the citric acid in 50 cc. of distilled water with the aid of heat, and add to the first solution. Dissolve the strychnine nitrate in 10 cc. of distilled water. Dissolve the quinine hydrochloride in the alcohol containing the compound cardamom spirit, and add the glycerin to the solution. Mix the three solutions, add sufficient distilled water to make the product measure 1000 cc., and filter, if necessary, until the product is clear.

Alcohol content—From 10 to 12 per cent, by volume, of C_2H_5OH.
Storage—Preserve Compound Glycerophosphates Elixir in tight, light-resistant containers.

AVERAGE DOSE—**8 cc.** (approximately 2 fluidrachms).

One average metric dose contains 0.28 Gm. of Sodium Glycerophosphate, 0.128 Gm. of Calcium Glycerophosphate, 24 mg. of Ferric Glycerophosphate, 16 mg. of Manganese Glycerophosphate, 7 mg. of Quinine Hydrochloride, and 1 mg. of Strychnine Nitrate.

GLYCERYL MONOSTEARATE

Glycerylis Monostearas

Monostearin

Description—Glyceryl Monostearate occurs as a white, wax-like solid or as white, wax-like beads or flakes. It has a slight agreeable fatty odor and taste. It is affected by light.

Solubility—Glyceryl Monostearate dissolves in hot organic solvents such as alcohol, mineral or fixed oils, benzene, ether, and acetone. It is insoluble in water but it may be dispersed in hot water with the aid of a small amount of soap or other suitable surface active agent.

Melting point—Glyceryl Monostearate melts between 56° and 58°, page 731.

Residue on ignition—Glyceryl Monostearate yields not more than 0.1 per cent of residue on ignition, page 745.

Acid value—The acid value of Glyceryl Monostearate is not more than 18, page 712.

Saponification value—The saponification value of Glyceryl Monostearate is not less than 164 and not more than 170, page 713.

Iodine value—The iodine value of Glyceryl Monostearate is not more than 6, page 713.

Storage—Preserve Glyceryl Monostearate in tight, light-resistant containers.

GLYCERYL TRINITRATE SPIRIT

Spiritus Glycerylis Trinitratis

Sp. Glyceryl. Trinitrat.

Nitroglycerin Spirit — Solutio nitroglycerini spirituosa P.I.

Glyceryl Trinitrate Spirit is an alcohol solution containing not less than 1 per cent and not more than 1.1 per cent of $C_3H_5(NO_3)_3$ (227.09).

Caution: Great care must be exercised in dispensing, handling, packing, transporting, and storing this Spirit, as a dangerous explosion may result if any considerable quantity of it is spilled, and the alcohol wholly or partly lost by evaporation. If, through accident, it is spilled, a solution of potassium or sodium hydroxide should be poured over it at once to decompose the glyceryl trinitrate.

Description—Glyceryl Trinitrate Spirit is a clear, colorless liquid, having the odor of alcohol. Glyceryl Trinitrate Spirit is neutral to moistened litmus paper, and it is affected by light.

Caution: It should not be tasted, since even a small quantity is likely to produce a violent headache. The same effect is produced when it is applied to the skin.

Specific gravity—The specific gravity of Glyceryl Trinitrate Spirit is not less than 0.814 and not more than 0.820 at 25°.

Identification—

A: Heat about 10 cc. of Glyceryl Trinitrate Spirit on a water bath with 1 cc. of potassium hydroxide T.S. until the alcohol is evaporated, and then heat a portion of the residue with about 1.5 Gm. of potassium bisulfate: the pungent odor of acrolein is evolved.

B: Dissolve the remainder of the residue from test A in 2 cc. of distilled water, acidify with diluted sulfuric acid, add a few drops of diphenylamine T.S., and pour the solution upon 2 cc. of sulfuric acid in a test tube so as to form a separate layer: a dark blue color is produced at the zone of contact.

C: On mixing 10 cc. of Glyceryl Trinitrate Spirit with 11 cc. of distilled water, both previously cooled to 15°, a clear solution results. Upon the addition of 2 cc. more of distilled water, the mixture becomes turbid at 15°.

Assay—Transfer 25 cc. of Glyceryl Trinitrate Spirit to a previously weighed, 50-cc. volumetric flask, stopper the flask, and weigh accurately. Add 3 cc. of an aqueous solution of sodium hydroxide (1 in 5), re-stopper the flask, and allow it to stand at room temperature for 1 hour. Then add sufficient aldehyde-free alcohol to make the total volume measure 50 cc., stopper, and mix thoroughly. Proceed with the determination as directed under the *Nitrite Assay*, page 733, using 20 cc. of the solution. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.01135 Gm. of $C_3H_5(NO_3)_3$.

Alcohol content—From 88 to 95 per cent, by volume, of C_2H_5OH.

Storage—Preserve Glyceryl Trinitrate Spirit in tight, light-resistant containers, preferably at a temperature not above 30°.

AVERAGE DOSE—**0.06 cc.** (approximately 1 minim).

Glycyrrhiza Elixir

GLYCYRRHIZA ELIXIR
Elixir Glycyrrhizæ

Elix. Glycyrrh. Licorice Elixir

Glycyrrhiza Fluidextract	**125 cc.**
Aromatic Elixir	**875 cc.**
To make	**1000 cc.**

Mix and filter.

Alcohol content—From 21 to 23 per cent, by volume, of C_2H_5OH.

Storage—Preserve Glycyrrhiza Elixir in tight containers.

Gold and Sodium Thiosulfate

GOLD AND SODIUM THIOSULFATE
Auri et Sodii Thiosulfas

$Na_3Au(S_2O_3)_2.2H_2O$ Mol. wt. 526.47

Gold and Sodium Thiosulfate contains not less than 36.7 per cent and not more than 37.7 per cent of Au.

Description—Gold and Sodium Thiosulfate occurs as white, needle-like or prismatic, small, glistening crystals. It slowly darkens on exposure to light.

Solubility—One Gm. of Gold and Sodium Thiosulfate dissolves in 2 cc. of water; it is insoluble in alcohol or most other organic solvents. Its aqueous solution (1 in 20) is neutral or alkaline to litmus paper.

Identification—Dissolve about 50 mg. of Gold and Sodium Thiosulfate in 1 cc. of water in a test tube, add 1 cc. of diluted hydrochloric acid and heat on a water bath: the odor of sulfur dioxide is evolved and a brown precipitate of gold sulfide is formed. Wash the precipitate well by decantation with hot water, then transfer it to a porcelain crucible, add 3 cc. of hydrochloric acid and 1 cc. of nitric acid and evaporate almost to dryness on a water bath. Treat the residue with 10 cc. of water and filter if necessary. To 2 cc. of the filtrate, previously diluted with 5 cc. of water, add 2 cc. of sodium hydroxide T.S. and 1 cc. of hydrogen peroxide T.S., and heat on a water bath. A purple-red to brown precipitate is formed. To a 1-cc. portion of the filtrate diluted with 5 cc. of water, add a few drops of stannous chloride T.S.: a purple color is produced.

Assay for gold—Weigh accurately about 0.5 Gm. of Gold and Sodium Thiosulfate and dissolve it in 20 cc. of water. Slowly add 5 cc. of nitric acid and warm if necessary to start the reaction, and when the reaction has subsided boil for 2 minutes. Dilute with 25 cc. of water, filter the separated gold, wash well with hot water, dry and ignite to constant weight. The weight of the Au so obtained is not less than 36.7 per cent nor more than 37.7 per cent of the weight of the sample taken.

Storage—Preserve Gold and Sodium Thiosulfate in well-closed, light-resistant containers.

AVERAGE DOSE—To be determined by the prescriber.

Green Ferric Ammonium Citrate, page 208
Green Ferric Ammonium Citrate Ampuls, page 209

GRINDELIA
Grindelia

Grindelia Robusta

Grindelia consists of the dried leaves and flowering tops of *Grindelia camporum* Greene, of *Grindelia humilis* Hooker and Arnott, or of *Grindelia squarrosa* (Pursh) Dunal (Fam. *Compositæ*).

Unground Grindelia—Unground Grindelia occurs as cylindrical stems and branches, moderate brown to moderate yellow with occasional reddish brown blotches, with alternate leaf-scars, occasionally with basal portions of leaves, sometimes irregularly flexuous and coated with resin, and terminating in resinous flower heads. The leaves are usually separate from the stem and broken, oblong to oblong-spatulate, up to 9 cm. in length, mostly sessile or amplexicaul, dentate-serrate to spinosely toothed, weak yellowish orange to weak yellow-green, resinous, somewhat coriaceous and brittle. Bracts of flowering branches are almost entire and usually more or less spreading. The flower heads are from 5 to 20 mm. in diameter, urn-shaped or conical when unexpanded, but flattened or depressed when partly open, and usually very resinous; involucre bracts are numerous, imbricated, with recurved tips; ray florets are yellowish, ligulate, and pistillate; disk florets are brownish, tubular, and perfect. The pappus consists of 2 or 3, mostly unequal, linear awns about the length of the disk florets; the disk achenes are ovoid or oblong, compressed, quadrangular, or triquetrous, and with a diauriculate, broadly unidentate or broadly truncate, corky, thickened summit.

Powdered Grindelia—Powdered Grindelia is light yellowish brown to yellow; has a balsamic odor, and an aromatic, bitter, and resinous taste. It shows numerous fibrous fragments bearing tracheæ with annular and spiral thickenings or marked

with simple or bordered pores, associated with numerous, narrow, strongly lignified wood fibers; pith cells more or less tabular and containing a layer of protoplasm in which are imbedded numerous spheroidal granules; fragments of leaf epidermis showing more or less polygonal areas containing chloroplastids and basal cells of the glandular hairs; the latter with compound heads up to 100 microns in diameter, each cell of which contains a rosette of crystals from 5 to 8 microns in diameter. The pollen grains are spherical, about 35 microns in diameter, spinose, and in section show 3 pores.

Stems—Grindelia contains not more than 10 per cent of its stems over 2 mm. in diameter.

Foreign organic matter—Grindelia contains not more than 2 per cent of foreign organic matter, other than stems, page 760.

Acid-insoluble ash—Grindelia yields not more than 2 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**2 Gm.** (approximately 30 grains).

Grindelia Fluidextract

GRINDELIA FLUIDEXTRACT

Fluidextractum Grindeliæ

Fldext. Grindel.

Prepare the Fluidextract from grindelia, in moderately coarse powder, by Process A, page 718. Use a mixture of 3 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 48 hours, and percolate at a moderate rate.

Alcohol content—From 57 to 63 per cent, by volume, of C_2H_5OH.

Storage—Preserve Grindelia Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**2 cc.** (approximately 30 minims).

Guaiac

GUAIAC

Guaiacum

Guaiac Resin

Guaiac is the resin of the wood of *Guajacum officinale* Linné, or of *Guajacum sanctum* Linné (Fam. *Zygophyllaceæ*).

Guaiac yields not more than 15 per cent of alcohol-insoluble residue.

Description—Guaiac occurs in irregular masses enclosing fragments of vegetable tissues, or in large, nearly homogeneous masses, and occasionally in more or less rounded or ovoid tears; externally brownish black to dusky brown, acquiring a greenish color on long exposure, the fractured surface having a glassy luster, the thin pieces being translucent and varying in color from brown to yellowish orange. The powder is moderate yellowish brown, becoming olive-brown on exposure to the air. It has a balsamic odor and a slightly acrid taste.

Solubility—Guaiac dissolves readily in alcohol, in ether, in chloroform, in creosote, in solutions of the alkalies, and in chloral hydrate T.S. It is slightly soluble in carbon disulfide or benzene.

Melting point—Guaiac melts between 85° and 90°, page 731.

Identification—

A: Add 1 drop of ferric chloride T.S. to 5 cc. of an alcoholic solution of Guaiac (1 in 100): a blue color is produced which gradually changes to green, finally becoming greenish yellow.

B A mixture of 5 cc. of an alcoholic solution of Guaiac (1 in 100) and 5 cc. of water becomes blue upon shaking with 20 mg. of lead peroxide. Filter, and boil a portion of the filtrate: the color disappears but may be restored by the addition of lead peroxide and shaking. Add a few drops of diluted hydrochloric acid to a second portion of the filtrate: the color is immediately discharged.

Rosin—A petroleum benzin solution of Guaiac (1 in 10) is colorless, and when shaken with an equal quantity of a fresh aqueous solution of cupric acetate (1 in 200) is not more green than a similar solution of cupric acetate and benzin.

Acid-insoluble ash—Guaiac yields not more than 2 per cent of acid-insoluble ash, page 761.

Assay—Place 2 Gm. of Guaiac, in fine powder and accurately weighed, in a dry tared thimble, and extract it with alcohol in a suitable continuous extraction apparatus for 3 hours or until completely extracted. Dry the insoluble residue in the thimble at 105° for 4 hours, and weigh. The weight of residue obtained represents the yield of alcohol-insoluble residue from the weight of the sample taken.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Guaiac Tincture, Ammoniated

AMMONIATED GUAIAC TINCTURE

Tinctura Guaiaci Ammoniata

Tr. Guaiac. Ammon.

Guaiac, in moderately coarse powder	200 Gm.
Aromatic Ammonia Spirit, a sufficient quantity,	
To make	1000 cc.

Prepare the Tincture by Process M, page 758, using aromatic ammonia spirit as the menstruum.

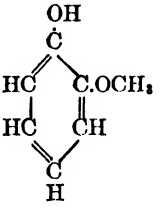
Alcohol content—From 58 to 64 per cent, by volume, of C_2H_5OH.
Storage—Preserve Ammoniated Guaiac Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**2 cc.** (approximately 30 minims).

Guaiacol

GUAIACOL
Guaiacol

$C_7H_8O_2$



Mol. wt. 124.13

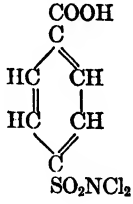
Guaiacol is a liquid consisting principally of $C_6H_4(OH)(OCH_3)$ 1:2, usually obtained from wood creosote, or a solid, consisting almost entirely of $C_6H_4(OH)(OCH_3)$ 1:2, usually prepared synthetically.

Description—Liquid Guaiacol is colorless or yellowish. Solid Guaiacol is crystalline and is colorless or yellowish. Guaiacol becomes darker on exposure to light. The liquid obtained by melting solid Guaiacol does not readily crystallize even upon chilling. Guaiacol has an agreeable, aromatic odor.
Solubility—One Gm. of Guaiacol dissolves in from 60 to 70 cc. of water and in about 1 cc. of glycerin, at 25°, but it separates from the glycerin solution when water is added. It is miscible with alcohol, with chloroform, with ether, and with glacial acetic acid.
Specific gravity—The specific gravity of liquid Guaiacol is not less than 1.112 at 25°; and the specific gravity of melted solid Guaiacol is about 1.132 at 25°.
Melting point—Solid Guaiacol melts at about 28°.
Distillation range—Not less than 85 per cent of liquid Guaiacol distils between 200° and 210° when determined by Method II, under *Boiling or Distilling Temperatures*, page 692. Solid Guaiacol distils between 204° and 206°.
Identification—The addition of 1 drop of ferric chloride T.S. to 10 cc. of an alcohol solution of Guaiacol (1 in 100) immediately imparts a blue color, which changes to green and finally becomes yellowish.
Impurities—Shake 2 cc. of liquefied solid Guaiacol with 4 cc. of petroleum benzin: on standing, the mixture separates into 2 distinct, clear layers. Permanent turbidity, or failure to separate into layers, indicates the presence of impurities.
Residue on ignition—Guaiacol yields not more than 0.1 per cent of residue on ignition, page 745.
Hydrocarbons—One cc. of Liquid Guaiacol or of melted solid Guaiacol dissolves in 2 cc. of potassium hydroxide solution (15 in 100) when heated for 1 minute in boiling water, and, on cooling, the solution congeals. Failure to congeal indicates the presence of impurities. The mass thus obtained forms a clear solution with 25 cc. of distilled water.
Storage—Preserve Guaiacol in tight, light-resistant containers.

AVERAGE DOSE—**0.5 cc.** (approximately 8 minims).

HALAZONE
Halazonum

$C_7H_5Cl_2NO_4S$



Mol. wt. 270.14

Halazone contains the equivalent of not less than 24 per cent and not more than 26.26 per cent of active Cl.

Description—Halazone occurs as a white, crystalline powder having a characteristic chlorine-like odor. It melts with decomposition at about 195°. It is affected by light.

Solubility—Halazone dissolves in glacial acetic acid and in solutions of alkali hydroxides and of alkali carbonates with the formation of a salt. It is slightly soluble in water and in chloroform.

Loss on drying—When dried over sulfuric acid for 24 hours, 1 Gm. of Halazone loses not more than 0.5 per cent of its weight.

Identification—

A: Add about 0.1 Gm. of Halazone to 5 cc. of an aqueous solution of sodium bromide (1 in 10): bromine is liberated from the mixture.

B: Add about 0.1 Gm. of Halazone to 5 cc. of potassium iodide T.S.: iodine is liberated from the mixture.

Readily carbonizable substances—Dissolve 0.1 Gm. of Halazone in 0.5 cc. of sulfuric acid: no blackening occurs although some effervescence may take place.

Assay—Add about 0.150 Gm. of Halazone, accurately weighed, to about 75 cc. of water. Add 10 cc. of sodium hydroxide solution (1 in 10), stir well and then promptly add 15 cc. of potassium iodide solution (1 in 10). Stir until all of the Halazone has dissolved, acidify by adding 10 cc. of acetic acid, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.001773 Gm. of active Cl.

NOTE: If the reagents used liberate iodine, deduct the number of cc. of 0.1 *N* sodium thiosulfate required for their decolorization from the total volume used. In determining the volume of 0.1 *N* sodium thiosulfate used to decolorize iodine liberated from the reagents, allow the same time to elapse between the steps in the blank as between the corresponding steps in the assay.

Storage—Preserve Halazone in tight, light-resistant containers.

HALAZONE TABLETS
Tabellæ Halazoni

Halazone Tablets contain not less than 90 per cent and not more than 135 per cent of the labeled amount of $C_7H_5Cl_2NO_4S$.

Identification—Finely powder a number of the Tablets equivalent to about 0.150 Gm. of halazone: separate portions equivalent to about 50 mg. of halazone respond to the tests for *Identification* under *Halazone*, page 245.
Solubility—Halazone Tablets dissolve in water at 25°. The *p*H of a solution of 1 Tablet containing 4 mg. of halazone in 200 cc. of distilled water, is not less than 7.0.
Assay—Weigh a counted number of not less than 30 of the Tablets, and reduce them to a fine powder without appreciable loss. Weigh accurately a portion of the Tablets, equivalent to about 0.150 Gm. of halazone, and proceed as directed in the *Assay* under *Halazone*, page 245. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.006754 Gm. of $C_7H_5Cl_2NO_4S$.
Storage—Preserve Halazone Tablets in tight, light-resistant containers.
Sizes—Halazone Tablets usually available contain the following amount of halazone: **4 mg.** (approximately $^1/_{16}$ grain).

Hamamelis Leaf

HAMAMELIS LEAF
Hamamelidis Folium

Witch-hazel Leaves

Hamamelis Leaf is the dried leaf of *Hamamelis virginiana* Linné (Fam. *Hamamelidaceæ*).

Unground Hamamelis Leaf—Unground Hamamelis Leaf has a petiole from 1 to 1.5 cm. long; the lamina, when entire, is broadly elliptical or rhomboid-ovate, usually inequilateral, from 8 to 12 cm. long; has an apex usually acute, sometimes rounded or acuminate; a base slightly heart-shaped and oblique; the margin being sinuate or sinuate-dentate; the upper surface light olive-brown to moderate olive-green, with a few stiff hairs; and the lower surface paler in color, somewhat hairy, with midrib and veins prominent, the secondary veins running straight to the margin.
Histology—Hamamelis Leaf shows a prominent epidermal layer; a palisade layer consisting of a single row of cells; spongy parenchyma tissue made up of 3 to 6 rows of strongly branching cells; large collateral, fibro-vascular bundles in the midrib and petiole, and a pericycle with a nearly continuous circle of pericyclic fibers associated with crystal fibers.
Powdered Hamamelis Leaf—Powdered Hamamelis Leaf is yellowish brown to light yellow; has a slight odor and an astringent, slightly aromatic and bitter taste. Fragments of epidermal tissue show narrowly elliptical stomata from 23 to 35 microns in length with 2 to 4 neighbor-cells. The hairs are stellate, with from 4 to 12 cells united at the base, the individual cells usually curved, with thick walls, narrow lumina and are up to 500 microns in length. It also shows numerous fragments of narrow tracheæ mostly spiral, and associated with narrow, strongly lignified, porous wood fibers. The calcium oxalate occurs in monoclinic prisms from 10 to 35 microns in length and is found in the cells of the mesophyll or in crystal fibers associated with strongly lignified pericyclic fibers.
Stems—Hamamelis Leaf contains not more than 5 per cent of the stems of the plant.
Foreign organic matter—Hamamelis Leaf contains not more than 2 per cent of foreign organic matter, other than stems, page 760.
Acid-insoluble ash—Hamamelis Leaf yields not more than 2 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**2 Gm.** (approximately 30 grains).

HAMAMELIS LEAF FLUIDEXTRACT

Fluidextractum Hamamelidis Folii

Fldext. Hamamel. Fol. Witch-hazel Leaves Fluidextract

Prepare the Fluidextract from hamamelis leaf, in moderately coarse powder, by Process B, page 718. Use a mixture of 9 volumes of alcohol and 1 volume of glycerin as Menstruum I, and alcohol as Menstruum II; macerate the drug during 48 hours, and percolate at a moderate rate.

Alcohol content—From 70 to 78 per cent, by volume, of C_2H_5OH.
Storage—Preserve Hamamelis Leaf Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**2 cc.** (approximately 30 minims).

HAMAMELIS WATER

Aqua Hamamelidis

Aq. Hamam.

Witch-hazel Water Distilled Witch-hazel Extract

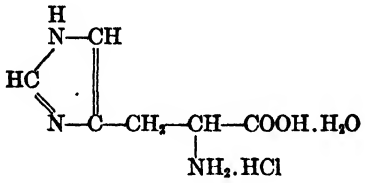
Macerate a weighed amount of the recently cut and partially dried dormant twigs of *Hamamelis virginiana* for about 24 hours in about twice their weight of water; then distil until not more than 850 cc. of distillate is obtained for each 1000 Gm. of the twigs taken; add 150 cc. of alcohol to each 850 cc. of distillate; mix thoroughly.

Description—Hamamelis Water is clear and colorless, having a characteristic odor and taste. It is free from mucoid or fungus growths and does not have an acetous odor. Hamamelis Water is neutral, or acid to litmus paper.
Specific gravity—The specific gravity of Hamamelis Water is not less than 0.979 and not more than 0.982 at 25°.
Non-volatile residue—Evaporate 100 cc. of Hamamelis Water on a water bath: the weight of the residue does not exceed 25 mg.
Acetone and isopropyl alcohol—Hamamelis Water does not respond to the tests for *Acetone* and *Isopropyl alcohol*, under *Whisky*, page 555.
Formaldehyde—Mix 2 cc. of an aqueous solution of phloroglucinol (1 in 100) with 5 cc. of sodium hydroxide T.S. and add 2 cc. of Hamamelis Water: no red color is produced.
Methanol—Three drops of Hamamelis Water meets the requirements of the tests for *Methanol* under *Whisky*, page 555.
Alcohol content—From 14 to 15 per cent, by volume, of C_2H_5OH.
Storage—Preserve Hamamelis Water in tight containers and avoid excessive heat.

Histidine Monohydrochloride

HISTIDINE MONOHYDROCHLORIDE

Histidinæ Monohydrochloridum



$C_6H_9N_3O_2.HCl.H_2O$ Mol. wt. 209.64

Histidine Monohydrochloride contains not less than 21.5 per cent and not more than 22.2 per cent of N, calculated on a moisture-free basis, corresponding to not less than 98 per cent of $C_6H_9N_3O_2.HCl$.

Description—Histidine Monohydrochloride occurs as small, glistening, colorless crystals which are nearly odorless and possess a salty taste. An aqueous solution of Histidine Monohydrochloride (1 in 20) is acid to litmus paper.

Solubility—One Gm. of Histidine Monohydrochloride dissolves in 8 cc. of distilled water at 25°. It is soluble in alcohol and insoluble in ether and in chloroform.

Optical rotation—The specific rotation $[\alpha]_D^{25}$, calculated on a moisture-free basis, of Histidine Monohydrochloride, in a solution containing 0.6 Gm. of Histidine Monohydrochloride in each 25 cc. of 1 *N* hydrochloric acid, is not less than +9.7 and not more than +11.2, page 737.

Identification—

A: To 5 cc. of an aqueous solution of Histidine Monohydrochloride (1 in 500) add bromine T.S., dropwise, until the appearance of a yellow color. Upon the application of gentle heat, the solution becomes progressively colorless, red, and dark red, and finally dark, amorphous particles separate.

B: To an aqueous solution of Histidine Monohydrochloride (1 in 10) add 1 cc. of silver nitrate T.S.: a curdy, white precipitate insoluble in nitric acid but soluble in ammonia T.S. separates.

Loss on drying—When dried at 130° for 3 hours, 0.5 Gm. of Histidine Monohydrochloride loses not more than 9 per cent of its weight.

Residue on ignition—The residue on ignition from 1 Gm. of Histidine Monohydrochloride is negligible, page 745.

Sulfate—The addition of 0.5 cc. of barium chloride T.S. to 5 cc. of an aqueous solution of Histidine Monohydrochloride (1 in 20) acidified with 2 drops of hydrochloric acid, produces no turbidity in 2 minutes.

Heavy metals—Dissolve 1 Gm. of Histidine Monohydrochloride in 15 cc. of distilled water and 4 cc. of 1 *N* hydrochloric acid and dilute to 25 cc. with distilled water: the heavy metals limit, page 721, for Histidine Monohydrochloride is 20 parts per million.

Alkaloids—To 5 cc. of a solution of Histidine Monohydrochloride (1 in 25) add 3 drops of mercuric-potassium iodide T.S.: the solution does not become turbid.

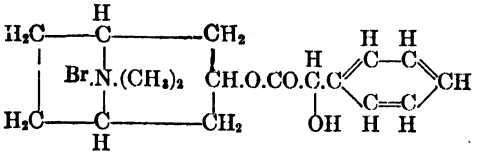
Assay—Weigh accurately about 0.25 Gm. of Histidine Monohydrochloride and transfer to a Kjeldahl flask and determine the nitrogen as directed under *Nitrogen (Total) by the Kjeldahl Method (Method I)*, page 734, and calculate on a moisture-free basis. Each cc. of 0.01 *N* sulfuric acid is equivalent to 0.0001401 Gm. of N.

Storage—Preserve Histidine Monohydrochloride in well-closed containers.

AVERAGE DOSE—**0.2 Gm.** (approximately 3 grains).

HOMATROPINE METHYLBROMIDE

Homatropinæ Methylbromidum



$C_{17}H_{24}O_3NBr$ Mol. wt. 370.29

Homatropine Methylbromide, when dried at 105° for 3 hours, contains not less than 3.7 per cent and not more than 3.85 per cent of N and not less than 21.3 per cent and not more than 21.9 per cent of Br.

Description—Homatropine Methylbromide occurs as an odorless, white, crystalline powder having a bitter taste. It is affected by light.

Solubility—Homatropine Methylbromide dissolves in water and in alcohol, but is insoluble in ether.

Melting point—Homatropine Methylbromide melts between 191° and 192°, with slight decomposition, page 731.

Identification—

A: To 2 cc. of an aqueous solution of Homatropine Methylbromide (1 in 50) add 1 cc. of mercuric-potassium iodide T.S.: a white precipitate is produced.

B: Separate 2-cc. portions of an aqueous solution of Homatropine Methylbromide (1 in 50) do not form a precipitate with 1-cc. portions of sodium carbonate T.S., sodium hydroxide T.S., or trinitrophenol T.S. (*distinction from most alkaloids of the atropine type*).

C: Add a slight excess of ammonia T.S. to 1 cc. of an aqueous solution of Homatropine Methylbromide (1 in 100), shake the mixture with chloroform, and evaporate the separated chloroform solution to dryness on a water bath. Warm the resulting residue with about 1.5 cc. of a solution made by dissolving 1 Gm. of mercuric chloride in 50 cc. of a mixture of 5 volumes of alcohol and 3 volumes of distilled water: the mixture does not develop a yellow or red color (*distinction from homatropine hydrobromide, atropine, and scopolamine*).

D: An aqueous solution of Homatropine Methylbromide (1 in 20) responds to the test for *Bromide*, page 723.

Loss on drying—When dried at 105° for 3 hours, Homatropine Methylbromide loses not more than 1 per cent of its weight.

Residue on ignition—Homatropine Methylbromide yields not more than 0.1 per cent of residue on ignition, page 745.

Atropine, hyoscyamine, or scopolamine—Add 5 drops of nitric acid to about 10 mg. of Homatropine Methylbromide, and evaporate the mixture to dryness on a porcelain dish on a water bath; the residue does not become purplish on the addition of a few drops of alcoholic potassium hydroxide T.S.

Assay for nitrogen—Determine the nitrogen content by the Kjeldahl method (Method I), page 734, using a sample of about 0.3 Gm. of Homatropine Methylbromide, accurately weighed.

Assay for bromine—Transfer about 0.3 Gm. of Homatropine Methylbromide, accurately weighed, to a 400-cc. beaker, add 50 cc. of distilled water and a few drops of nitric acid, and when dissolved add sufficient silver nitrate T.S. to precipitate the bromide ion avoiding more than a slight excess. Heat to boiling, protect from the light, and allow to stand until the precipitate is coagulated. Filter on a tared

Gooch crucible, previously dried at 140°, and wash with hot distilled water until the filtrate is free from silver. Dry the silver bromide thus obtained at 140°, cool, and weigh. Each Gm. of silver bromide is equivalent to 0.4256 Gm. of Br.

Storage—Preserve Homatropine Methylbromide in tight, light-resistant containers.

AVERAGE DOSE—**2.5 mg.** (approximately $^1/_{24}$ grain).

Homatropine Methylbromide Tablets

HOMATROPINE METHYLBROMIDE TABLETS
Tabellæ Homatropinæ Methylbromidi

Homatropine Methylbromide Tablets contain an amount of nitrogen, N, equal to not less than 3.5 per cent and not more than 4.04 per cent of the labeled quantity of $C_{17}H_{24}O_3NBr$.

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without an appreciable loss, and transfer an accurately weighed amount, equivalent to about 75 mg. of homatropine methylbromide, to a micro-Kjeldahl digestion flask and proceed as directed under *Nitrogen (Total) by the Kjeldahl Method (Method II)*, page 735. Each cc. of 0.01 *N* sulfuric acid is equivalent to 0.0001401 Gm. of N.

Storage—Preserve Homatropine Methylbromide Tablets in well-closed, light-resistant containers.

Sizes—Homatropine Methylbromide Tablets usually available contain the following amount of homatropine methylbromide: **2.5 mg.** (approximately $^1/_{24}$ grain).

AVERAGE DOSE—**2.5 mg.** (approximately $^1/_{24}$ grain) of Homatropine Methylbromide.

Honey

HONEY
Mel

Clarified Honey Strained Honey

Honey is a saccharine secretion deposited in the honeycomb by the bee, *Apis mellifera* Linné (Fam. *Apidæ*). It must be free from foreign substances such as parts of insects, leaves, etc., but may contain pollen grains.

Description—Honey is a thick, syrupy liquid of a light yellowish to reddish brown color. It is translucent when fresh, but frequently becomes opaque and granular through crystallization of dextrose. It has a characteristic odor and a sweet, faintly acrid taste. Honey is lævorotatory, and it is acid to litmus paper.

Specific gravity—When Honey is diluted with twice its weight of distilled water, the mixture is only moderately turbid, is not stringy, and has a specific gravity of not less than 1.099 at 25°.

Residue on ignition—Weigh accurately about 10 Gm. of Honey into a platinum dish, add a few drops of olive oil to prevent spattering, heat carefully until swelling ceases, and ignite at not above dull redness until a white ash is obtained: not more than 0.3 per cent of residue on ignition remains.

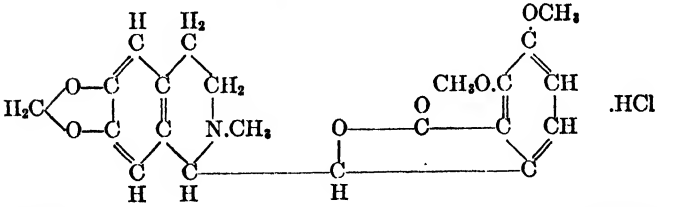
Chloride—Ten cc. of a filtered aqueous solution of Honey (1 in 10) shows no more chloride than corresponds to 0.2 cc. of 0.02 *N* hydrochloric acid, page 758.
Sulfate—Ten cc. of a filtered aqueous solution of Honey (1 in 10) shows no more sulfate than corresponds to 0.2 cc. of 0.02 *N* sulfuric acid, page 759.
Artificial honey—Triturate about 1 Gm. of Honey with 20 cc. of ether in a mortar, filter into a porcelain dish or crucible, allow the ether to evaporate, and add to the residue 1 drop of freshly prepared resorcinol T.S.: at most the mixture has only a pink color which disappears in 30 seconds, but not an orange, reddish orange, or reddish brown color.
Foreign coloring matter—An aqueous solution of Honey (1 in 2) does not immediately change its color when mixed with an equal volume of ammonia T.S.
Azo dyes—To 5 cc. of an aqueous solution of Honey (1 in 2) add a few drops of hydrochloric acid: a reddish color is not produced immediately.
Starch or dextrins—Boil about 2 Gm. of Honey with 20 cc. of distilled water, cool, and add 2 drops of iodine T.S.: the liquid is not blue, green, or reddish in color.
Free acid—A solution of 10 Gm. of Honey in 50 cc. of distilled water requires not more than 0.5 cc. of 1 *N* sodium hydroxide for neutralization, using phenolphthalein T.S. as the indicator.
Storage—Preserve Honey in well-closed containers.

Human Measles Immune Serum, page 4(
Human Scarlet Fever Immune Serum, page 4(

HYDRASTINE HYDROCHLORIDE

Hydrastinæ Hydrochloridum

Hydrastin. Hydrochlor.



$C_{21}H_{21}O_6N.HCl$ Mol. wt. 419.85

Hydrastine Hydrochloride is the hydrochloride of an alkaloid obtained from hydrastis.

Description—Hydrastine Hydrochloride occurs as a white to yellowish white powder, odorless, bitter, and hygroscopic. Its solutions are acid to litmus paper. It is affected by light.
Solubility—Hydrastine Hydrochloride is very soluble in water and in alcohol, slightly soluble in chloroform, and very slightly soluble in ether.
Identification—
A: Sulfuric acid, when added to Hydrastine Hydrochloride, produces a yellow color which becomes redder on heating; sulfuric acid containing 5 mg. of molybdic acid in each cc. produces a green color, changing to brown; sulfuric acid containing 5 mg. of selenous acid in each cc. gives a light green color, changing to brown; nitric acid produces an orange color.

B: An aqueous solution of Hydrastine Hydrochloride (1 in 20) responds to the tests for *Chloride*, page 724.

Loss on drying—When dried over sulfuric acid for 24 hours, Hydrastine Hydrochloride loses not more than 2 per cent of its weight.

Residue on ignition—The residue on ignition from 0.1 Gm. of Hydrastine Hydrochloride is negligible, page 745.

Hydrastinine—A solution of about 0.1 Gm. of Hydrastine Hydrochloride in 10 cc. of diluted sulfuric acid shows no blue fluorescence, but on the gradual addition of potassium permanganate T.S., avoiding excess, a blue fluorescence develops.

Berberine—An aqueous solution of Hydrastine Hydrochloride (1 in 20) is not reddened by chlorine T.S.

Storage—Preserve Hydrastine Hydrochloride in tight, light-resistant containers.

AVERAGE DOSE—**10 mg.** (approximately $^1/_6$ grain).

Hydrastis

HYDRASTIS
Hydrastis

Goldenseal — Hydrastidis rhizoma P.I.

Hydrastis consists of the dried rhizome and roots of *Hydrastis canadensis* Linné (Fam. *Ranunculaceæ*).

Hydrastis yields not less than 2.5 per cent of the anhydrous ether-soluble alkaloids of Hydrastis.

Unground Hydrastis—Unground Hydrastis shows a flexuous, subcylindrical rhizome, from 1 to 5 cm. in length and from 2 to 10 mm. in thickness; more or less annulate and wrinkled longitudinally; brown to dusky yellowish orange; marked by numerous stem-scars or occasional stem or leaf bases and numerous roots, the latter frequently broken, leaving circular yellowish brown to yellow scars or short protuberances. The fracture is short and waxy. The roots are numerous, filiform, up to 35 cm. in length and 1 mm. in diameter; curved, twisted, and matted together or broken. The fracture is short and brittle, and the roots and rhizomes are weak yellowish orange to moderate greenish yellow internally.

Histology—The Hydrastis rhizome shows an epidermis, or more often a thin-walled, several-rowed cork; a cortex of about 25 rows of thin-walled parenchyma, frequently broken through by root formations; 12 to 20 radially elongated fibro-vascular bundles separated by yellowish orange to greenish yellow medullary rays, the latter up to 30 cells in width; a phloem and cambium usually collapsed and indistinct; and a large pith. The root shows an epidermis of elongated cells with strongly suberized outer lamellæ and frequently developed into 1-celled root hairs; a hypodermis of closely arranged suberized cells; a cortex of about 12 rows of thick-walled, starch-bearing parenchyma; an endodermis of slightly lignified walled cells, a radial fibro-vascular bundle of 2 to 6 rays, the tracheæ having strongly lignified walls, and a small central pith.

Powdered Hydrastis—Powdered Hydrastis is dark yellow to moderate greenish yellow and has a distinctive odor and a bitter taste. It shows fragments of starch-bearing parenchyma and fibro-vascular bundles; small tracheæ with simple pores or spiral thickenings; lignified fibers from 200 to 300 microns in length with thin walls and simple pores; fragments of tabular-celled cork, and numerous starch grains from 2 to 15 microns in diameter, nearly spherical, mostly simple, a few 2- to 6-compound, the larger grains showing a central cleft. Calcium oxalate crystals are absent.

Identification—

A: Hydrastis, moistened with water and mounted in sulfuric acid, shows the formation of numerous acicular crystals, some attaining a length of 200 microns.

B: When viewed in filtered ultra-violet light, using a Corex No. 986 filter or its equivalent, broken or abraded surfaces of Hydrastis exhibit a brilliant yellow fluorescence.

Foreign organic matter—Hydrastis contains not more than 4 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Hydrastis yields not more than 3 per cent of acid-insoluble ash, page 761.

Assay—Place 10 Gm. of Hydrastis, in fine powder and accurately weighed, into a suitable container, add 100 cc. of ether, allow the mixture to stand about 5 minutes, and add 10 cc. of ammonia T.S. Shake the mixture for 1 hour in a mechanical shaker or during 2 hours intermittently, and then set it aside overnight. Again shake it during 30 minutes, allow the drug to settle, and decant 50 cc. of the clear ether solution. Extract the alkaloids from the ether solution by shaking with 5 successive 20-cc. portions of dilute sulfuric acid (about 1 per cent). Combine the acid solutions in a separator, add about an equal volume of ether, then add a slight excess of ammonia T.S., and immediately shake to extract the alkaloids. Separate the ether layer, and complete the extraction of the alkaloids from the alkaline aqueous layer by shaking with at least 6 successive 20-cc. portions of ether. A 5-cc. portion of the last ether extraction upon evaporation and drying to constant weight at 105°, must leave a residue of not more than 0.6 mg. Filter the ether extracts and evaporate the ether. Dry the residue to constant weight at 105°. The weight obtained represents the yield of anhydrous, ether-soluble alkaloids from 5 Gm. of Hydrastis.

AVERAGE DOSE—**2 Gm.** (approximately 30 grains).

Hydrastis Extract

HYDRASTIS EXTRACT

Extractum Hydrastis

Ext. Hydrast. Goldenseal Extract Powdered Hydrastis Extract

Hydrastis Extract yields, from each 100 Gm., not less than 9 Gm. and not more than 11 Gm. of the ether-soluble alkaloids of hydrastis.

Prepare the Extract from hydrastis, in moderately coarse powder, by percolation and evaporation. Use alcohol as the menstruum, macerate the drug during 48 hours, and percolate slowly. Evaporate the percolate to a soft extract at a temperature not exceeding 70°. To this add about one-fifth of its weight of a mixture of 1 part of magnesium oxide and 3 parts of dry starch or other permitted diluent, mix thoroughly, and evaporate to dryness at a temperature not exceeding 70°. Reduce the residue to a fine powder, and assay it. Thoroughly mix it, if necessary, with sufficient of the diluent to make the Extract contain, in each 100 Gm., 10 Gm. of the ether-soluble alkaloids of hydrastis.

Assay—Transfer 2 Gm. of Hydrastis Extract, accurately weighed, into a suitable container, soften with 10 cc. of ammonia T.S. and add 100 cc. of ether. Proceed as directed in the *Assay* under *Hydrastis*, page 253, beginning with "Shake the

mixture for 1 hour. . . ." The weight obtained represents the yield of anhydrous ether-soluble alkaloids from 1 Gm. of Hydrastis Extract.

Storage—Preserve Hydrastis Extract in tight, light-resistant containers preferably at a temperature not above 30°.

AVERAGE DOSE—**0.5 Gm.** (approximately 7½ grains).

Hydrastis Fluidextract

HYDRASTIS FLUIDEXTRACT
Fluidextractum Hydrastis

Fldext. Hydrast.

Goldenseal Fluidextract — Extractum hydrastidis fluidum P.I.

Hydrastis Fluidextract yields, from 100 cc., not less than 2.25 Gm. and not more than 2.75 Gm. of the ether-soluble alkaloids of hydrastis.

Prepare the Fluidextract from hydrastis, in moderately coarse powder, by Process A, as modified for assayed fluidextracts, page 718. Use a mixture of 2 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 48 hours, and percolate slowly.

Adjust the fluid to contain, in each 100 cc., 2.5 Gm. of the ether-soluble alkaloids of hydrastis and 54 per cent, by volume, of C_2H_5OH.

Assay—Dilute 10 cc. of Hydrastis Fluidextract, accurately measured, with 40 cc. of distilled water and evaporate to about 20 cc. Transfer completely into a suitable container with the aid of a mixture of 10 cc. of ammonia T.S. and 10 cc. of distilled water. Cool, add 100 cc. of ether and proceed as directed in the *Assay* under *Hydrastis*, page 253, beginning with, "Shake the mixture for 1 hour. . . ." The weight obtained represents the yield of anhydrous ether-soluble alkaloids from 5 cc. of Hydrastis Fluidextract.

Alcohol content—From 51 to 57 per cent, by volume, of C_2H_5OH.

Storage—Preserve Hydrastis Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**2 cc.** (approximately 30 minims).

Hydrastis Tincture

HYDRASTIS TINCTURE
Tinctura Hydrastis

Tr. Hydrast. — Goldenseal Tincture — Tinctura Hydrastidis P.I.

Hydrastis Tincture yields, from each 100 cc., not less than 0.45 Gm. and not more than 0.55 Gm. of the ether-soluble alkaloids of hydrastis.

Hydrastis, in fine powder	200 Gm.
Alcohol,	
Water, each, a sufficient quantity,	
To make about	1000 cc.

Prepare the Tincture by Process P, as modified for assayed tinctures, page 758. Use a mixture of 2 volumes of alcohol and 1 volume of water as menstruum, macerate the drug for 48 hours, and percolate slowly.

Adjust to make the tincture contain, in each 100 cc., 0.5 Gm. of the ether-soluble alkaloids of hydrastis.

Assay—Evaporate 50 cc. of Hydrastis Tincture, accurately measured, to about 20 cc. and transfer completely with the aid of a mixture of 10 cc. of ammonia T.S. and 10 cc. of distilled water to a suitable container and add 10 cc. of ammonia T.S. and 100 cc. of ether. Proceed as directed in the *Assay* under *Hydrastis*, page 253, beginning with "Shake the mixture for 1 hour . . . ." The weight obtained represents the yield of anhydrous ether-soluble alkaloids from 25 cc. of Hydrastis Tincture.

Alcohol content—From 57 to 63 per cent, by volume, of C_2H_5OH.

Storage—Preserve Hydrastis Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**8 cc.** (approximately 2 fluidrachms).

HYDROXYSTEARIN SULFATE

Hydroxystearini Sulfas

Sulfated Hydrogenated Castor Oil

Hydroxystearin Sulfate is a substance prepared by sulfating hydrogenated castor oil. When calculated on a moisture-free basis, it contains not less than 8.5 per cent and not more than 9.5 per cent of organically combined sulfur trioxide (SO_3).

Description—Hydroxystearin Sulfate is a pale yellow-brown, semi-soft, unctuous mass having a faint odor.

Solubility—Hydroxystearin Sulfate is dispersible in water and in alcohol. It mixes with glycerin, propylene glycol, petrolatum, liquid petrolatum, and fixed oils in all proportions.

Reaction—An aqueous solution of Hydroxystearin Sulfate (1 in 50) is acid to litmus paper and has a *p*H of approximately 6.1 to 6.5.

Moisture—Accurately weigh about 12 Gm. of Hydroxystearin Sulfate and determine the moisture by the *Moisture method by toluene distillation*, page 761. The moisture content is not greater than 25 per cent of the weight of the sample taken.

Acid value—The free fatty acids in 10 Gm. of Hydroxystearin Sulfate require for neutralization not more than 98 cc. of 0.1 *N* sodium hydroxide, page 712.

Iodine value—The iodine value of Hydroxystearin Sulfate is not more than 8, page 713.

Acetyl value of fatty acids—Carefully saponify about 75 Gm. of Hydroxystearin Sulfate by refluxing with 250 cc. of 1 *N* alcoholic potassium hydroxide. Evaporate the alcohol, dissolve the residue in distilled water and transfer to a beaker. Acidify with diluted hydrochloric acid, heat for 30 minutes. Cool, transfer to a separator and extract the fatty acids with ether. Add 10 Gm. of anhydrous sodium sulfate to the ether solution in a glass-stoppered flask, shake well, allow to stand 30 minutes and filter. Evaporate the filtrate on a water bath. The acetyl value of the fatty acids from Hydroxystearin Sulfate thus obtained is not less than 55 and not more than 95, page 711.

Melting point of free fatty acids—The melting point of the free fatty acids obtained in the preceding test is not less than 48° and not more than 54° when determined according to the method for materials in *Class II*, page 732.

Assay—*Hydrolysis of soaps.* Dissolve about 10 Gm. of Hydroxystearin Sulfate, accurately weighed, in 100 cc. of distilled water contained in a 300-cc. glass-stoppered flask, warming to obtain solution if necessary. Cool, add 30 Gm. of sodium chloride, 50 cc. of ethyl oxide and 5 drops of methyl orange T.S. Add 0.5 *N* sulfuric acid with frequent but gentle shaking until the mixture is slightly acid. Shake the contents of the flask vigorously and add a sufficient volume of 0.5 *N* sodium hydroxide to make the solution alkaline. Complete the titration with 0.5 *N* sulfuric acid adding the acid a few drops at a time. Substitute the values thus obtained into the formula below.

Hydrolysis of alkyl sulfate. Transfer about 10 Gm. of Hydroxystearin Sulfate, accurately weighed, to a 300-cc. flask fitted with a suitable reflux air condenser and add 50 cc. of 1 *N* sulfuric acid and several glass beads. Reflux the contents by boiling vigorously, but permitting little evaporation of the liquid. Continue to boil for 90 minutes or until both the water and the oil layers are clear, allow to cool and wash the condenser with a spray of distilled water from a wash bottle. Add 30 Gm. of sodium chloride, 25 cc. of ethyl oxide, 50 cc. of distilled water, and 5 drops of methyl orange T.S. Titrate with 1 *N* sodium hydroxide, frequently stoppering and shaking the flask vigorously during the titration. Perform a blank determination simultaneously, using the same procedure and the same reagents, omitting the Hydroxystearin Sulfate. Calculate the per cent of SO_3 according to the following formula:

$$X = \frac{8.006\left[\frac{(A - B)}{2N_a} + \frac{(D - C)}{N_b}\right](100)}{(100 - Y)}$$

X = per cent of organically combined SO_3 on a moisture-free basis.
A = cc. of 0.5 *N* sulfuric acid used for *Hydrolysis of soaps.*
B = cc. of 0.5 *N* sodium hydroxide used for *Hydrolysis of soaps.*
C = cc. of 1 *N* sodium hydroxide consumed by the blank in the *Hydrolysis of alkyl sulfate.*
D = cc. of 1 *N* sodium hydroxide consumed by the sample in the *Hydrolysis of alkyl sulfate.*
N_a = weight of sample in *Hydrolysis of soaps.*
N_b = weight of sample in *Hydrolysis of alkyl sulfate.*
Y = per cent of moisture, separately determined.

Storage—Preserve Hydroxystearin Sulfate in well-closed containers.

Hyoscyamus Extract

HYOSCYAMUS EXTRACT

Extractum Hyoscyami

Ext. Hyosc. Henbane Extract Extractum Hyoscyami P.I.

Hyoscyamus Extract yields, from each 100 Gm., not less than 0.135 Gm. and not more than 0.175 Gm. of the alkaloids of hyoscyamus.

Pilular Hyoscyamus Extract. Prepare an extract by percolating 1000 Gm. of hyoscyamus, in moderately coarse powder, using a mixture of 3 volumes of alcohol and 1 volume of water as the menstruum. Macerate the drug during 16 hours, and then percolate it at a moderate rate. Evaporate the percolate to a pilular consistence under reduced pressure

and at a temperature not exceeding 60°, and adjust the remaining extract, after assaying, by dilution with liquid glucose, so that the finished Extract will contain, in each 100 Gm., 0.155 Gm. of the alkaloids of hyoscyamus.

Assay—Weigh accurately 5 Gm. of Pilular Hyoscyamus Extract, and mix it with a suitable quantity of an absorbent (see *Proximate Assays*, page 739). Transfer the mixture completely, with the aid of a few cc. of alcohol or ether, to an extraction thimble, insert the thimble in a Soxhlet or similar extractor, moisten with a mixture of 3 cc. of stronger ammonia T.S., 5 cc. of alcohol, and 10 cc. of ether, and mix thoroughly. Macerate the mixture overnight, and extract it for not less than 3 hours or until completely extracted (see *Extraction of Drugs*, page 740), using ether as the solvent. Transfer the liquid to a separator, rinse the container with 1 or more small volumes of the solvent, and add the rinsings to the separator. Completely remove the alkaloids from the immiscible solvents by extracting with successive portions of approximately 0.5 *N* sulfuric acid (see *Purification of the Alkaloids*, page 740), filtering each portion drawn off. Render the combined acid solutions distinctly alkaline with ammonia T.S., and completely remove the alkaloids at once by extracting with successive portions of chloroform. Evaporate the combined chloroform extractions to dryness on a water bath, and continue the heating for 15 minutes. Redissolve the residue in a small volume of chloroform, evaporate to dryness on a water bath, and continue the heating for 15 minutes. Repeat this treatment for the third time. Dissolve the resulting residue in a few cc. of chloroform, add 15 cc. of 0.02 *N* sulfuric acid, remove the chloroform by evaporation, cool, and titrate the excess acid with 0.02 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.02 *N* acid is equivalent to 0.005787 Gm. of the alkaloids of hyoscyamus, calculated as hyoscyamine.

Powdered Hyoscyamus Extract. Prepare an extract by percolating 1000 Gm. of hyoscyamus, in moderately coarse powder, using alcohol as the menstruum. Macerate the drug during 16 hours, and then percolate it slowly. Evaporate the percolate to a soft extract under reduced pressure and at a temperature not exceeding 60°, add 50 Gm. of dry starch, continue the evaporation at the same temperature until the product is dry, and powder the residue. The Extract may be deprived of its fat by treating either the soft extract first obtained, or the dry and powdered extract, as directed under *Extracts*, page 709.

Assay the powdered residue and add sufficient starch, dried at 100°, to make the finished Extract contain, in each 100 Gm., 0.155 Gm. of the alkaloids of hyoscyamus.

Mix the powders thoroughly and pass the Extract through a fine sieve.

Assay—Weigh accurately about 5 Gm. of Powdered Hyoscyamus Extract, place it in an extraction thimble, insert the thimble in a Soxhlet or similar extractor, moisten the extract with a mixture of 3 cc. of stronger ammonia T.S., 5 cc. of alcohol, and 10 cc. of ether, and mix thoroughly. Macerate the mixture overnight, and extract it for not less than 3 hours or until completely extracted (see *Extraction of Drugs*, page 740), using ether as the solvent. Then proceed as directed under the *Assay of Pilular Hyoscyamus Extract*, page 257, beginning with the words "Transfer the liquid to a separator . . ." Each cc. of 0.02 *N* acid is

equivalent to 0.005787 Gm. of the alkaloids of hyoscyamus calculated as hyoscyamine.

Storage—Preserve Hyoscyamus Extract in tight, light-resistant containers, preferably at a temperature not above 30°.

AVERAGE DOSE—**50 mg.** (approximately $^3/_4$ grain).

Hyoscyamus Fluidextract

HYOSCYAMUS FLUIDEXTRACT
Fluidextractum Hyoscyami

Fldext. Hyosc. Henbane Fluidextract

Hyoscyamus Fluidextract yields, from each 100 cc., not less than 0.035 Gm. and not more than 0.045 Gm. of the alkaloids of hyoscyamus.

Prepare the Fluidextract from hyoscyamus, in coarse powder, by Process A, as modified for assayed fluidextracts, page 718. Use a mixture of 3 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 48 hours, and percolate at a moderate rate.

Adjust the concentrated fluid so as to contain, in each 100 cc., 0.040 Gm. of the alkaloids of hyoscyamus and 60 per cent, by volume, of C_2H_5OH.

Assay—Evaporate 25 cc. of Hyoscyamus Fluidextract, accurately measured, on a water bath until the alcohol is all removed and the Fluidextract is reduced to about 5 cc. Proceed as directed in the *Assay* under *Belladonna Leaf Fluidextract*, page 74, beginning with, "Transfer this extract to 20 cc. of chloroform . . ." Each cc. of 0.02 *N* sulfuric acid is equivalent to 0.005787 Gm. of the alkaloids of hyoscyamus calculated as hyoscyamine.

Alcohol content—From 57 to 63 per cent, by volume, of C_2H_5OH.

Storage—Preserve Hyoscyamus Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**0.2 cc.** (approximately 3 minims).

Hypophosphites Syrup

HYPOPHOSPHITES SYRUP
Syrupus Hypophosphitum

Syr. Hypophos.

Calcium Hypophosphite	**35 Gm.**
Potassium Hypophosphite	**18 Gm.**
Sodium Hypophosphite	**18 Gm.**
Hypophosphorous Acid	**1 cc.**
Glycerin	**300 cc.**
Dextrose	**250 Gm.**
Distilled Water, a sufficient quantity,	
To make	**1000 cc.**

Triturate the hypophosphites with 500 cc. of distilled water until they are dissolved. Add the hypophosphorous acid, filter the liquid, and pass sufficient distilled water through the filter to make the filtrate measure 540 cc. To this add the dextrose, dissolve by agitation without heat, add the glycerin and sufficient distilled water to make the product measure 1000 cc. Strain if necessary.

Storage—Preserve Hypophosphites Syrup in tight containers, and avoid excessive heat.

AVERAGE DOSE—**8 cc.** (approximately 2 fluidrachms).

One average metric dose contains 0.28 Gm. of Calcium Hypophosphite, and about 0.14 Gm. each of Potassium Hypophosphite and Sodium Hypophosphite.

COMPOUND HYPOPHOSPHITES SYRUP

Syrupus Hypophosphitum Compositus

Syr. Hypophos. Comp.

Calcium Hypophosphite	35 Gm.
Potassium Hypophosphite	17.5 Gm.
Sodium Hypophosphite	17.5 Gm.
Ferric Hypophosphite	2.2 Gm.
Manganese Hypophosphite	2.2 Gm.
Quinine	1.1 Gm.
Strychnine	0.1 Gm.
Sodium Citrate	3.7 Gm.
Hypophosphorous Acid	5 cc.
Dextrose	250 Gm.
Glycerin	300 cc.
Distilled Water, a sufficient quantity, To make	1000 cc.

Mix the ferric and manganese hypophosphites with the sodium citrate, add 30 cc. of distilled water, warm on a water bath, and stir until a clear solution is obtained. Dissolve the calcium, potassium, and sodium hypophosphites in 400 cc. of distilled water, to which 2 cc. of hypophosphorous acid has been added; then dissolve the quinine and strychnine in 30 cc. of distilled water, with the aid of 3 cc. of hypophosphorous acid, and add the glycerin; mix the solutions, and dissolve the dextrose in them by agitation. Add sufficient distilled water to make the product measure 1000 cc., and strain.

Storage—Preserve Compound Hypophosphites Syrup in tight, light-resistant containers, and avoid excessive heat.

AVERAGE DOSE—**8 cc.** (approximately 2 fluidrachms).

One average metric dose contains 0.28 Gm. of Calcium Hypophosphite, 0.14 Gm. each of Potassium Hypophosphite and Sodium Hypophosphite, about 18 mg. each of Ferric Hypophosphite and Manganese Hypophosphite, 9 mg. of Quinine, and 0.8 mg. of Strychnine.

Ichthammol

ICHTHAMMOL
Ichthammol

Ichtham. Ammonium Ichthosulfonate

Ichthammol is obtained by the destructive distillation of certain bituminous schists, sulfonating the distillate, and neutralizing the product with ammonia.

Ichthammol yields not less than 2.5 per cent of ammonia, not more than 8 per cent of ammonium sulfate, and not less than 10 per cent of total sulfur.

Description—Ichthammol is a reddish brown to brownish black, viscous fluid, with a strong, characteristic, empyreumatic odor.

Miscibility—Ichthammol is miscible with water and with glycerin, and with fixed oils and fats. It is partially miscible with alcohol and with ether.

Identification—

A: The addition of hydrochloric acid to an aqueous solution of Ichthammol (1 in 10) precipitates a dark, resinous mass which is insoluble in ether.

B: Ammonia is evolved when an aqueous solution of Ichthammol is boiled with sodium hydroxide T.S.

Loss on drying—When dried to constant weight at 105°, Ichthammol loses not more than 50 per cent of its weight.

Residue on ignition—Ichthammol yields not more than 0.5 per cent of residue on ignition, page 745.

Assay for ammonia—Dissolve about 5 Gm. of Ichthammol, accurately weighed, in 100 cc. of distilled water, transfer the solution to a distillation flask, and add an excess of sodium hydroxide T.S. Connect the flask to a condenser by means of a spray trap; immerse the lower outlet tube of the condenser in 30 cc. of 0.5 *N* sulfuric acid. Distil slowly and collect about 50 cc. of distillate; then titrate the excess acid with 0.5 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.5 *N* sulfuric acid is equivalent to 0.008516 Gm. of NH_3.

Assay for ammonium sulfate—Accurately weigh about 1 Gm. of Ichthammol, transfer it to a 100-cc. beaker, and add 25 cc. of alcohol. Stir thoroughly, filter, and wash the filter with a mixture of equal parts of ether and alcohol until the washings are clear and colorless. Air-dry the filter and residue, and pass 200 cc. of warm distilled water, slightly acidified with hydrochloric acid, through the residue on the filter. Heat the filtrate to boiling, add barium chloride T.S. in excess, and heat for 30 minutes on a water bath. Collect the precipitate of barium sulfate on a filter, wash it well, dry, and ignite to constant weight. Each Gm. of barium sulfate is equivalent to 0.5661 Gm. of $(NH_4)_2SO_4$.

Assay for total sulfur—Transfer from 0.5 Gm. to 0.8 Gm. of the sample, accurately weighed, into a Kjeldahl flask with the aid of 30 cc. of distilled water. Add 5 Gm. of potassium chlorate, then add slowly 30 cc. of nitric acid, and evaporate the mix-

ture to about 5 cc. Transfer the residue into a 300-cc. beaker with the aid of about 25 cc. of hydrochloric acid, and again evaporate to about 5 cc. Add 100 cc. of water, heat to boiling, filter, and wash. Precipitate the hot solution with barium chloride, filter, wash, ignite the resulting barium sulfate, and weigh. Each Gm. of barium sulfate is equivalent to 0.1374 Gm. of S.

Storage—Preserve Ichthammol in well-closed containers.

AVERAGE DOSE—**0.2 Gm.** (approximately 3 grains).

Ichthammol Ointment

ICHTHAMMOL OINTMENT

Unguentum Ichthammolis

Ung. Ichtham.

Ichthammol	**100 Gm.**
Wool Fat	**100 Gm.**
Petrolatum	**800 Gm.**
To make	**1000 Gm.**

Thoroughly incorporate the ichthammol with the wool fat, and then combine this mixture with the petrolatum.

Storage—Preserve Ichthammol Ointment in tight containers and avoid prolonged exposure to temperatures above 30°.

Infusion, Digitalis, page 183

Iodides Tincture

IODIDES TINCTURE

Tinctura Iodidorum

Tr. Iodidor.

NOTE: Iodides Tincture may be dispensed when Decolorized Iodine Tincture is ordered.

Iodine	**50 Gm.**
Potassium Iodide	**25 Gm.**
Strong Ammonia Solution	**100 cc.**
Water	**400 cc.**
Alcohol, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the potassium iodide in the water; add the iodine and 400 cc. of alcohol, and agitate the mixture frequently until the iodine is completely dissolved. Add the strong ammonia solution, and set the mixture aside until it becomes colorless. Then add sufficient alcohol to make the product measure 1000 cc., and filter.

Alcohol content—From 43 to 47 per cent, by volume, of C_2H_5OH.
Storage—Preserve Iodides Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

FOR EXTERNAL USE—Undiluted.

Iodine Ampuls

IODINE AMPULS
Ampullæ Iodi

Ampul. Iodi **Iodine Swabs**

Iodine Ampuls contain, in each 100 cc., not less than 1.8 Gm. and not more than 2.2 Gm. of I and not less than 2.1 Gm. and not more than 2.6 Gm. of NaI. Iodine Ampuls yield not less than 90 per cent and not more than 110 per cent of the labeled amount of I.

NOTE: Iodine Ampuls must contain Iodine Tincture, U. S. P.

Prepare the solution, fill the cleansed ampuls, and seal them.

Assay—Proceed as directed in the *Assay* under *Iodine Solution*, page 264.
Alcohol content—From 44 to 50 per cent, by volume, of C_2H_5OH.

Iodine and Zinc Iodide Glycerite

IODINE AND ZINC IODIDE GLYCERITE
Glyceritum Iodi et Zinci Iodidi

Glycer. Iodi et Zinc. Iodid. Diluted Talbot's Solution

Zinc Iodide	**80 Gm.**
Iodine	**100 Gm.**
Glycerin	**550 cc.**
Distilled Water, a sufficient quantity, To make	**1000 cc.**

Dissolve the zinc iodide in 130 cc. of distilled water, add the iodine, and agitate the mixture until solution is effected. Then add the glycerin and sufficient distilled water to make the product measure 1000 cc., and mix thoroughly.

Storage—Preserve Iodine and Zinc Iodide Glycerite in tight containers.

IODINE OINTMENT

Unguentum Iodi

Ung. Iodi

Caution: During its manufacture and storage this Ointment must not come in contact with metallic utensils or containers.

Iodine Ointment contains not less than 6.5 per cent and not more than 7.5 per cent of I.

Iodine	**40 Gm.**
Potassium Iodide	**40 Gm.**
Glycerin	**120 Gm.**
Yellow Ointment	**800 Gm.**
To make	**1000 Gm.**

Dissolve the iodine and the potassium iodide in the glycerin, preferably in a glass mortar, and incorporate the mixture with the yellow ointment (see page 4).

Assay—Place about 2 Gm. of anhydrous potassium carbonate in a No. 0 porcelain crucible, weigh exactly, add about 1 Gm. of Iodine Ointment and reweigh. Cover the ointment with 2 Gm. of potassium carbonate, warm on a water bath until the ointment has just melted. Fill the crucible with potassium carbonate, tapping it on the desk to compact the contents, then invert the crucible in a No. 1 crucible, the bottom of which has been covered with potassium carbonate, and seal the juncture of the two crucibles with potassium carbonate. Place the crucibles in a muffle furnace preheated to 650–675° and heat at this temperature for 25 minutes. Allow the crucibles and contents to cool, and extract the residue with 100 cc. of hot water in a beaker. Filter the hot solution into a 500 cc. flask, and wash the beaker, crucibles and filter with three 10-cc. portions of hot water. Allow the filtrate and washings to cool, and add nitric acid (1 in 2) in small portions until effervescence ceases, then add 2 cc. in excess. Now add, dropwise, a dilute solution of potassium permanganate, prepared by mixing 0.1 *N* potassium permanganate with an equal volume of water, until a faint yellow color appears. Add 0.5 cc. of starch T.S. and titrate with 0.1 *N* silver nitrate until the blue color is just discharged, leaving a canary yellow precipitate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.01269 Gm. of I.

Storage—Preserve Iodine Ointment in tight containers and avoid prolonged exposure to temperatures above 30°.

IODINE SOLUTION

Liquor Iodi

Liq. Iodi

Iodine Solution contains, in each 100 cc., not less than 1.8 Gm. and not more than 2.2 Gm. of I, and not less than 2.1 Gm. and not more than 2.6 Gm. of NaI.

Iodine	20 Gm.
Sodium Iodide	24 Gm.
Distilled Water, a sufficient quantity, To make	1000 cc.

Dissolve the iodine and sodium iodide in 50 cc. of distilled water, then add sufficient distilled water to make the product measure 1000 cc.

Description—Iodine Solution is a transparent liquid, having a reddish brown color and the odor of iodine.

Identification—Add 1 drop of Iodine Solution to a mixture of 1 cc. of starch T.S. and 9 cc. of distilled water: a deep blue color is produced.

Assay—Place exactly 5 cc. of Iodine Solution in a 500-cc. glass-stoppered flask, and add 25 cc. of distilled water. Titrate with 0.1 *N* potassium arsenite, using starch T.S. as the indicator. Each cc. of 0.1 *N* potassium arsenite is equivalent to 0.01269 Gm. of I. To the titration mixture add 50 cc. of hydrochloric acid and 5 cc. of chloroform, and cool to room temperature. Titrate with 0.05 *M* potassium iodate until the purple color of iodine disappears from the chloroform. The last portions of iodate solution must be added in drops, the mixture being agitated vigorously and continuously. After the chloroform has been decolorized, allow the mixture to stand for 5 minutes. If the chloroform develops a purple color, the mixture should be titrated further with the iodate solution. The difference between the number of cc. of 0.05 *M* potassium iodate used and the number of cc. of 0.1 *N* potassium arsenite used, multiplied by 0.01499, equals the number of Gm. of NaI in the volume of Solution taken for the assay.

Storage—Preserve Iodine Solution in tight, light-resistant containers, preferably at a temperature not above 35°.

Iodine Solution, Phenolated

PHENOLATED IODINE SOLUTION

Liquor Iodi Phenolatus

Liq. Iodi Phenol.

Boulton's Solution — French Mixture — Carbolized Iodine Solution

Strong Iodine Solution	15 cc.
Liquefied Phenol	6 cc.
Glycerin	165 cc.
Water, a sufficient quantity, To make	1000 cc.

Mix the liquefied phenol and the strong iodine solution with the glycerin, and add sufficient water to make the product measure 1000 cc. Then expose the liquid in a strong, tightly stoppered, glass container to the sunlight, or heat it at a temperature not exceeding 70°, until it has become colorless or faintly yellow.

Description—Phenolated Iodine Solution is a colorless or light yellow liquid, with the characteristic odor and taste of phenol.

Specific gravity—The specific gravity of Phenolated Iodine Solution is about 1.047 at 25°.

Identification—Add mercury bichloride T.S. to Phenolated Iodine Solution: a red precipitate is produced.
Free iodine—Phenolated Iodine Solution does not turn blue with starch T.S.
Residue on ignition—Evaporate 10 cc. of Phenolated Iodine Solution and ignite the residue to constant weight: the residue on ignition is negligible.
Storage—Preserve Phenolated Iodine Solution in tight containers.

FOR EXTERNAL USE—Undiluted.

STRONG IODINE TINCTURE
Tinctura Iodi Fortis

Tr. Iodi Fort.

NOTE: Dispense Strong Iodine Tincture when Tincture of Iodine, U. S. P. XII is ordered.

Strong Iodine Tincture is an alcohol solution of iodine and potassium iodide containing, in each 100 cc., not less than 6.8 Gm. and not more than 7.5 Gm. of I, and not less than 4.7 Gm. and not more than 5.5 Gm. of KI.

Strong Iodine Tincture may be prepared as follows:

Iodine	**70 Gm.**
Potassium Iodide	**50 Gm.**
Distilled Water	***50 cc.***
Alcohol, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the potassium iodide in the distilled water, in a container graduated to 1000 cc., add the iodine, and agitate the mixture until solution is effected. Then add sufficient alcohol to make 1000 cc. of Tincture, and mix thoroughly.

Description—Strong Iodine Tincture is a transparent liquid having a reddish brown color and the odor of iodine and of alcohol. It is affected by light.
Identification—A drop of Strong Iodine Tincture added to 1 cc. of starch T.S., diluted with 10 cc. of distilled water, produces a deep blue color.
Assay—Place exactly 5 cc. of Strong Iodine Tincture in a 500-cc. glass-stoppered flask and add 25 cc. of distilled water. Titrate with 0.1 *N* potassium arsenite, using starch T.S. as the indicator. Each cc. of 0.1 *N* potassium arsenite is equivalent to 0.01269 Gm. of I. To the titration mixture add 50 cc. of hydrochloric acid and 5 cc. of chloroform, and cool to room temperature. Titrate with 0.05 *M* potassium iodate until the purple color of iodine disappears from the chloroform. The last portions of the iodate solution must be added in drops, the mixture being agitated vigorously and continuously. After the chloroform has been decolorized, allow the mixture to stand for 5 minutes. If the chloroform develops a purple color, the mixture should be titrated further with the iodate solution. The

difference between the number of cc. of 0.05 *M* potassium iodate used and the number of cc. of 0.1 *N* potassium arsenite used, multiplied by 0.01660, equals the number of Gm. of KI in the volume of Tincture taken for the assay.

Alcohol content—From 83 to 88 per cent, by volume, of C_2H_5OH.

Storage—Preserve Strong Iodine Tincture in tight, light-resistant containers, preferably at a temperature not above 25°.

Iodized Ointment, Stainless

STAINLESS IODIZED OINTMENT

Unguentum Iodatum Denigrescens

Ung. Iod. Denig.

Iodine, in moderately coarse powder	50 Gm.
Paraffin	50 Gm.
Oleic Acid	200 Gm.
Petrolatum	700 Gm.
To make	1000 Gm.

Dissolve the iodine in the oleic acid with the aid of heat, at about 65°. Add the paraffin and continue heating at the same temperature until the iodine is absorbed, as shown by the absence of a reddish color; then add the petrolatum, and when all is liquefied, remove from the heat and stir frequently until it congeals. Contact with metallic utensils must be avoided.

NOTE: The Ointment improves upon standing for a week or 10 days.

Storage—Preserve Stainless Iodized Ointment in tight containers and avoid prolonged exposure to temperatures above 30°.

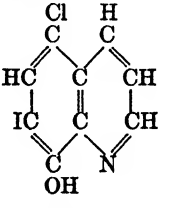
Iodochlorohydroxyquinoline

IODOCHLOROHYDROXYQUINOLINE

Iodochlorohydroxyquinolinum

5-Chloro-7-iodo-8-hydroxy-quinoline

C_9H_5NOClI



Mol. wt. 305.52

Iodochlorohydroxyquinoline contains not less than 38 per cent and not more than 41.5 per cent of I, and not less than 11.4 per cent and not more than 12.2 per cent of Cl.

Description—Iodochlorohydroxyquinoline occurs as a voluminous, spongy, brownish yellow powder, with a slight characteristic odor. It is affected by light. It melts with decomposition at about 172°.

Solubility—Iodochlorohydroxyquinoline dissolves in hot ethyl acetate and in hot glacial acetic acid. It is practically insoluble in water and in alcohol.

Identification—Boil 0.1 Gm. of Iodochlorohydroxyquinoline with 5 cc. of diluted hydrochloric acid: it dissolves slowly, evolving an odor of iodine. Heat 0.1 Gm. of Iodochlorohydroxyquinoline with 5 cc. of concentrated sulfuric acid: copious vapors of iodine are evolved.

Loss on drying—When dried over sulfuric acid for 18 hours, Iodochlorohydroxyquinoline loses not more than 0.5 per cent of its weight.

Residue on ignition—Iodochlorohydroxyquinoline yields not more than 0.5 per cent of residue on ignition, page 745.

Assay for iodine—Transfer exactly 0.25 Gm. of Iodochlorohydroxyquinoline, accurately weighed, into a 500-cc. Erlenmeyer flask and add 100 cc. of distilled water and a few glass beads. Add simultaneously 50 cc. of 50 per cent sulfuric acid and 100 cc. of aqueous potassium permanganate solution (6 in 100). Heat to boiling with a moderate flame and continue to boil until the vapors no longer color starch iodide paper blue. Then remove it from the flame and add 20 cc. of approximately 0.1 *N* silver nitrate followed by sodium sulfite crystals ($Na_2SO_3.7H_2O$) in small portions and with swirling until the permanganate color is completely discharged and no manganese dioxide remains. Boil until the vapors are no longer acid to litmus and maintain the volume by the occasional addition of distilled water. Add 5 cc. of nitric acid and continue boiling for 5 minutes. Cool, and transfer the precipitate to a tared filtering crucible, wash with distilled water, followed by 10 cc. of alcohol, and dry to constant weight at 105°. Each Gm. of silver iodide is equivalent to 0.5405 Gm. of I.

Assay for chlorine—Transfer exactly 0.25 Gm. of Iodochlorohydroxyquinoline, accurately weighed, to a wide-mouth 1000-cc. Erlenmeyer flask and add a few glass beads and 6 cc. of an aqueous solution of sodium hydroxide (1 in 2) and 130 cc. of distilled water. Heat the solution to boiling, add 70 cc. of potassium permanganate solution (6 in 100), and continue to boil for 20 minutes. To the hot solution, add 40 cc. of approximately 0.1 *N* silver nitrate. Add 50 cc. of 50 per cent sulfuric acid and sodium sulfite crystals ($Na_2SO_3.7H_2O$) in divided portions and with swirling until the permanganate color is discharged and no manganese dioxide remains. Boil until the vapors are no longer acid to litmus, keeping the volume nearly constant by the addition of distilled water. Add 5 cc. of nitric acid and continue to boil for 5 minutes. Cool and collect the precipitate on a tared filtering crucible, wash well with distilled water followed by 10 cc. of alcohol and dry to constant weight at 105°. Subtract the weight of silver iodide obtained in the *Assay for iodine* from the weight of total silver halide. Each Gm. of the resulting silver chloride is equivalent to 0.2474 Gm. of Cl.

Storage—Preserve Iodochlorohydroxyquinoline in tight, light-resistant containers.

AVERAGE DOSE—**0.250 Gm.** (approximately 4 grains).

IODOCHLOROHYDROXYQUINOLINE TABLETS
Tabellæ Iodochlorohydroxyquinolini

Iodochlorohydroxyquinoline Tablets contain not less than 92.5 per cent and not more than 107.5 per cent of the labeled amount of C_9H_5NOClI.

Assay—Weigh accurately not less than 20 of the Tablets, reduce them to a fine powder without appreciable loss, and mix an accurately weighed portion equivalent to

about 0.5 Gm. of iodochlorohydroxyquinoline with 4 Gm. of anhydrous potassium carbonate, place in a small porcelain crucible, and completely fill the crucible with the potassium carbonate well pressed down. Invert the crucible into a larger crucible and add anhydrous potassium carbonate to seal the juncture of the two crucibles, using a total of 15.0 ± 0.2 Gm. anhydrous potassium carbonate. Place the crucible in a muffle furnace, preheated to 600°, and heat for 30 minutes. Allow the crucibles and contents to cool, dissolve the residue in about 100 cc. of boiling distilled water, filter the hot solution, and wash the beaker and filter thoroughly with hot distilled water. Collect the filtrate and washings in a 250-cc. volumetric flask, cool, dilute to volume with distilled water, and mix well. Transfer 50 cc. of the solution, accurately measured, into a 500-cc. Erlenmeyer flask, add 150 cc. of distilled water, 8 cc. of bromine T.S., 9 cc. of phosphoric acid (1 in 2) and several glass beads. Let stand 1 hour, then boil until the vapors no longer color starch iodide paper blue, and continue to boil for 5 minutes. Cool, add 5 cc. of an aqueous solution of phenol (1 in 20) and 10 cc. of an aqueous solution of potassium iodide (1 in 10). Titrate immediately with 0.1 *N* sodium thiosulfate using starch T.S. as the indicator. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.005092 Gm. of C_9H_5NOClI.

Sizes—Iodochlorohydroxyquinoline Tablets usually available contain the following amount of iodochlorohydroxyquinoline: **0.25 Gm.** (approximately 4 grains).

Storage—Preserve Iodochlorohydroxyquinoline Tablets in tight, light-resistant containers.

AVERAGE DOSE—**0.25 Gm.** (approximately 4 grains) of Iodochlorohydroxyquinoline.

Iodoform

IODOFORM
Iodoformum

Iodof. Triiodomethane

CHI_3 Mol. wt. 393.78

Iodoform, previously dried over sulfuric acid for 24 hours, contains not less than 99 per cent of CHI_3.

Description—Iodoform occurs as a fine greenish yellow powder, or lustrous crystals. It has a peculiar, very penetrating, persistent odor. Iodoform is slightly volatile even at ordinary temperatures, and distils slowly with the vapor of water.

Solubility—One Gm. of Iodoform dissolves in about 60 cc. of alcohol, in about 80 cc. of glycerin, in about 10 cc. of chloroform, in about 7.5 cc. of ether, and in about 34 cc. of olive oil, at 25°. One Gm. dissolves in about 16 cc. of boiling alcohol. Iodoform is practically insoluble in water to which, however, it imparts its odor and taste.

Melting point—Iodoform melts to a brown liquid at about 115°, and decomposes at a higher temperature, emitting vapors of iodine.

Loss on drying—When dried over sulfuric acid for 24 hours, Iodoform loses not more than 1 per cent of its weight.

Residue on ignition—Iodoform yields not more than 0.2 per cent of residue on ignition, page 745.

Coloring matter, acids, and alkalies—Shake about 2 Gm. of Iodoform with 5 cc. of distilled water for 1 minute, and filter: the filtrate is colorless and free from bitter taste and is neutral to litmus paper.

Assay—Dissolve about 0.2 Gm. of Iodoform, previously dried over sulfuric acid for 24 hours and accurately weighed, in 20 cc. of alcohol in a 500-cc. glass-stoppered Erlenmeyer flask. Add 30 cc. of 0.1 *N* silver nitrate and 10 cc. of nitric acid,

stopper the flask, and set it aside overnight. Add 150 cc. of distilled water and 5 cc. of ferric ammonium sulfate T.S., and titrate the excess of silver nitrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.01313 Gm. of CHI_3.

Storage—Preserve Iodoform in tight, light-resistant containers, and avoid excessive heat.

Ipecac and Opium Powder

IPECAC AND OPIUM POWDER

Pulvis Ipecacuanhæ et Opii

Pulv. Ipecac. et Opii

Dover's Powder — Pulvis opii et ipecacuanhæ compositus P.I.

Ipecac, in very fine powder	100 Gm.
Powdered Opium	100 Gm.
Lactose, coarsely powdered	800 Gm.
To make	1000 Gm.

Triturate the ingredients together thoroughly until the mixture is reduced to a very fine, uniform powder.

Description—Ipecac and Opium Powder occurs as a very pale brown powder, exhibiting coarse, angular, frequently more or less cone-shaped, colorless fragments up to 400 microns in length, very slowly soluble in water and in chloral hydrate T.S., and polarizing light with a strong display of color (*fragments of lactose*). Other elements of identification are the tissues of ipecac and of the capsules of the opium poppy described in the U. S. Pharmacopœia.

Storage—Preserve Ipecac and Opium Powder in well-closed containers.

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains).

One average metric dose contains 30 mg. each of Ipecac and of Opium.

Ipecac and Opium Syrup

IPECAC AND OPIUM SYRUP

Syrupus Ipecacuanhæ et Opii

Syr. Ipecac. et Opii — Dover's Powder Syrup

Ipecac and Opium Tincture	85 cc.
Cinnamon Spirit	5 cc.
Syrup, a sufficient quantity,	
To make	1000 cc.

Mix the tincture and the spirit, add sufficient syrup to make the product measure 1000 cc., and mix thoroughly.

Alcohol content—From 1 to 2 per cent, by volume, of C_2H_5OH.
Storage—Preserve Ipecac and Opium Syrup in tight containers, and avoid excessive heat.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains 0.34 cc. of Ipecac and Opium Tincture.

Ipecac and Opium Tincture

IPECAC AND OPIUM TINCTURE
Tinctura Ipecacuanhæ et Opii

Tr. Ipecac. et Opii Dover's Powder Tincture

Opium Tincture	1000 cc.
Ipecac Fluidextract	100 cc.
Diluted Alcohol, a sufficient quantity, To make	1000 cc.

Evaporate the opium tincture in a tared dish on a water bath until it measures 580 cc. When it has cooled, add to it the ipecac fluidextract and sufficient diluted alcohol to make the product measure 1000 cc., and filter.

Alcohol content—From 19 to 22 per cent, by volume, of C_2H_5OH.
Storage—Preserve Ipecac and Opium Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**0.5 cc.** (approximately 8 minims).

One average metric dose represents 0.5 cc. of Opium Tincture and 0.05 cc. of Ipecac Fluidextract.

Ipecac Tincture

IPECAC TINCTURE
Tinctura Ipecacuanhæ

Tr. Ipecac. Tinctura Ipecacuanhæ P.I.

NOTE: Ipecac Tincture may be dispensed when Ipecac Wine is ordered.

Ipecac Tincture yields, from each 100 cc., not less than 0.18 Gm. and not more than 0.22 Gm. of the ether-soluble alkaloids of ipecac.

Ipecac Fluidextract	100 cc.
Diluted Hydrochloric Acid	15 cc.
Alcohol	200 cc.
Water, a sufficient quantity, To make about	1000 cc.

Mix the diluted hydrochloric acid and alcohol with 600 cc. of water, add the ipecac fluidextract, and then sufficient water to make the product measure 950 cc., and filter.

Adjust to make the Tincture contain, in each 100 cc., 0.2 Gm. of the ether-soluble alkaloids of ipecac; use 1 volume of alcohol and 4 volumes of water, if necessary, for dilution.

Assay—Evaporate 50 cc. of Ipecac Tincture to about 3 cc., and transfer the residue to a separator containing 25 cc. of ether, using as little water as possible in rinsing the dish to complete the transfer. Add a slight excess of ammonia T.S., and shake the mixture for 1 minute. Separate the ether layer, and complete the extraction of the alkaloids with successive portions of ether. Combine the ether solutions, and extract the alkaloids completely with dilute sulfuric acid (about 1 in 100), keeping the volume of the acid solutions as small as is practicable, and filtering them successively through a pledget of cotton. Render the combined acid solutions alkaline with a slight excess of ammonia T.S., and extract the alkaloids completely by shaking with successive portions of ether. Evaporate the combined ether solutions nearly to dryness, add 10 cc. of 0.1 *N* sulfuric acid, warm to dissolve the alkaloids and to expel the remaining ether, cool, and titrate the excess acid with 0.02 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.0240 Gm. of the ether-soluble alkaloids of ipecac.

Alcohol content—From 20 to 23 per cent, by volume, of C_2H_5OH.

Storage—Preserve Ipecac Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**0.6 cc.** (approximately 10 minims).

IPOMEA

Ipomœa

Orizaba Jalap Mexican Scammony

Ipomea is the dried root of *Ipomœa orizabensis* Ledenois (Fam. *Convolvulaceæ*).

Ipomea yields not less than 15 per cent of the total resins of Ipomea.

Unground Ipomea—Unground Ipomea occurs as nearly flat transverse slices, from 2 to 12 cm. in diameter, and from 1 to 5.5 cm. in thickness. It is brown externally, very deeply wrinkled, and has a tough, fibrous fracture, the cut surface showing concentric rings with protruding lighter-colored fibro-vascular bundles.

Histology—Ipomea shows a corky layer of several rows of thin-walled, narrow, tabular cells; an outer cortex of several layers of thin-walled cells; a broad cortical layer made up of thick-walled, tangentially elongated cells, containing either starch grains or crystals of calcium oxalate, and numerous large cells containing reddish brown to yellow resinous latex; rings or zones of small collateral fibro-vascular bundles, alternating with bands of parenchyma; and sieve in semi-cylindrical strands outside of the wood-wedges. The medullary rays are broad;

the resin cells numerous and distributed throughout the parenchyma; and the parenchyma cells surrounding the bundles, more or less collapsed and containing either starch or calcium oxalate crystals.

Powdered Ipomea—Powdered Ipomea is pale brown to weak yellowish orange; has a distinct, somewhat aromatic odor, and a sweet taste, becoming somewhat acrid. It shows starch grains up to 35 microns in diameter, mostly simple, and occasionally 2- to 4-compound, and usually with a central cleft. The calcium oxalate crystals are numerous, mostly in rosette aggregates, occasionally in rhombohedra, from 10 to 45 microns in length; fragments of resin cells; and tracheæ mostly with bordered pores and associated with numerous thick-walled wood fibers having simple pores.

Acid-insoluble ash—Ipomea yields not more than 3 per cent of acid-insoluble ash, page 761.

Assay—Place 10 Gm. of Ipomea, in fine powder and accurately weighed, with about 60 cc. of a mixture of 9 volumes of alcohol and 1 volume of water, into a flask provided with a reflux tube or condenser, and digest the mixture on a water bath during 30 minutes. Transfer the warm mixture to a small percolator, allow it to drain, press the marc down gently, and percolate with the warm alcohol-water mixture until 100 cc. of percolate, when cooled, is obtained. Cool and pipette 20 cc. of this percolate into a separator, add 40 cc. of chloroform and 10 cc. of hydrochloric acid (about 1 in 100), and shake for 2 minutes. Allow the mixture to separate, draw off the chloroform layer, and extract the aqueous layer twice more, using 15 cc. of mixture of 2 volumes of chloroform and 1 volume of alcohol each time. Shake the combined chloroform solutions with 10 cc. of hydrochloric acid (1 in 100), again separate and wash this acid liquid twice with 15-cc. portions of the chloroform-alcohol mixture. Pass the combined chloroform extractions through filter paper moistened with the chloroform-alcohol mixture, wash the filter with the chloroform-alcohol mixture, and evaporate the filtrate to dryness; add 2 cc. of alcohol and again evaporate. Dry the residue to constant weight at 100°. The weight obtained represents the yield of total resins from 2 Gm. of Ipomea.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Ipomea Resin

IPOMEA RESIN

Resina Ipomœæ

Mexican Scammony Resin

Extract the resin from ipomea, in moderately coarse powder, by percolation, using a mixture of 9 volumes of alcohol and 1 volume of water as the menstruum. Concentrate the percolate to the consistence of thin syrup, and pour this slowly, with constant stirring, into twice its volume of hot water. Allow the precipitated resin to settle, decant the supernatant liquid, and wash the precipitate twice with fresh portions of the same volume of hot water. Collect the resin, and dry it thoroughly.

Description—Ipomea Resin occurs as translucent masses or fragments of a brown to yellowish orange color, breaking with a glossy, resinous fracture; the odor is characteristic, and the taste is acrid.
Solubility—Ipomea Resin dissolves in alcohol and in chloroform.
Identification—Ipomea Resin is slowly soluble in 5 times its weight of ammonia T.S. and in potassium hydroxide T.S., yielding a somewhat cloudy solution which does not become gelatinous on standing.
Loss on drying—When dried to constant weight at 100°, Ipomea Resin loses not more than 4 per cent of its weight.
Residue on ignition—Ipomea Resin yields not more than 0.5 per cent of residue on ignition, page 745.
Alcohol-insoluble residue—Ipomea Resin yields not more than 0.5 per cent of alcohol-insoluble residue.
Ether-soluble residue—Not less than 80 per cent of Ipomea Resin is soluble in ether.
Benzin-soluble residue—Not more than 3 per cent of Ipomea Resin is soluble in petroleum benzin.
Soluble impurities—Triturate Ipomea Resin with distilled water: the latter does not become colored, and none of the resin dissolves.
Aloin—Add 0.5 Gm. of Ipomea Resin to 5 cc. of ammonia T.S. and shake well: no red color is produced within 15 minutes and the mixture exhibits a light blue (not an olive-green) fluorescence in filtered ultra-violet light, using a Corex No. 986 filter or its equivalent.
Guaiac—Shake 20 mg. of Ipomea Resin with 5 cc. of ether, filter, and evaporate the filtrate on filter paper: no blue color is produced by the addition of 1 drop of ferric chloride T.S. to the filter paper.
Rosin—Triturate 1 Gm. of Ipomea Resin with 10 cc. of petroleum benzin and filter; add the filtrate to 10 cc. of fresh aqueous solution of cupric acetate (1 in 200), and shake well: the benzin layer does not become pink.
Rosin, guaiac, or other resins—When the solutions from the *Identification* test are acidified with hydrochloric acid, only a slight turbidity is produced.
Storage—Preserve Ipomea Resin in well-closed containers.

AVERAGE DOSE—**0.2 Gm.** (approximately 3 grains).

IRON
Ferrum
Ferr.

Fe At. wt. 55.85

Elementary Iron (Fe) in the form of fine, bright wire, filings or powder.

Identification—Iron dissolves in diluted hydrochloric acid with the evolution of hydrogen. This solution responds to the tests for *Ferrous Salts*, page 725.
Arsenic—Iron meets the requirements of the test for *Arsenic* when treated as directed under *Reduced Iron*, page 279.
Storage—Preserve Iron in well-closed containers.

Iron and Ammonium Acetate Solution

IRON AND AMMONIUM ACETATE SOLUTION

Liquor Ferri et Ammonii Acetatis

Liq. Ferr. et Ammon. Acet. Basham's Mixture

Iron and Ammonium Acetate Solution yields, from each 100 cc., not less than 0.16 Gm. and not more than 0.20 Gm. of Fe, and not less than 0.6 Gm. and not more than 0.8 Gm. of NH_3.

Ferric Chloride Tincture	40 cc.
Diluted Acetic Acid	60 cc.
Ammonium Acetate Solution	500 cc.
Aromatic Elixir	120 cc.
Glycerin	120 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

To the ammonium acetate solution (which must be slightly acid), add successively, the diluted acetic acid, the ferric chloride tincture, the aromatic elixir, and the glycerin; add lastly enough distilled water to make the product measure 1000 cc.

NOTE: This preparation must not be dispensed unless it has been recently prepared.

Description—Iron and Ammonium Acetate Solution is a clear, reddish brown liquid, having an aromatic odor. It is acid to litmus paper.

Identification—

A: Iron and Ammonium Acetate Solution yields a blue precipitate with potassium ferrocyanide T.S. No precipitate is produced upon the addition of ammonia T.S.

B: When Iron and Ammonium Acetate Solution is heated with an excess of sodium hydroxide T S, ammonia is evolved and ferric hydroxide is precipitated.

C: Add 1 cc. each of sulfuric acid and alcohol to 5 cc. of Iron and Ammonium Acetate Solution, and boil the mixture: ethyl acetate is formed, recognizable by its odor.

Assay for iron—Evaporate exactly 25 cc. of Iron and Ammonium Acetate Solution to dryness, ignite strongly, cool, add 10 cc. of hydrochloric acid, and heat until all of the iron is dissolved; then add 10 cc. of hydrogen peroxide solution, and evaporate to dryness. Dissolve the residue in 5 cc. of hydrochloric acid, heating if necessary, and transfer the solution to a stoppered flask with the aid of 25 cc. of distilled water; add 3 Gm. of potassium iodide, stopper the flask and allow the mixture to stand for 15 minutes; then add 50 cc. of distilled water, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.005585 Gm. of Fe.

Assay for ammonia—Transfer 25 cc. of Iron and Ammonium Acetate Solution, accurately measured, to a suitable flask connected with a condenser by means of a spray trap. Add about 175 cc. of distilled water and an excess of sodium hydroxide solution (1 in 5). Distil about 150 cc., receiving the distillate in 40 cc. of 0.5 *N* sulfuric acid. Titrate the excess acid with 0.5 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.5 *N* sulfuric acid is equivalent to 0.008516 Gm. of NH_3.

Alcohol content—From 4 to 6 per cent, by volume, of C_2H_5OH.
Storage—Preserve Iron and Ammonium Acetate Solution in tight containers.

AVERAGE DOSE—**15 cc.** (approximately 4 fluidrachms).

One average metric dose represents 0.6 cc. of Ferric Chloride Tincture.

PEPTONIZED IRON
Ferrum Peptonatum

Ferr. Pepton. Iron Peptonate

Peptonized Iron is a compound of iron oxide and peptone, rendered soluble by the presence of sodium citrate, and yields not less than 16 per cent and not more than 18 per cent of Fe.

Description—Peptonized Iron occurs as dark brown, lustrous granules, or as a brown powder. It has a characteristic odor and taste, and is affected by light. An aqueous solution of Peptonized Iron (1 in 20) is neutral or alkaline to litmus paper.

Solubility—Peptonized Iron is freely soluble in water, yielding dark-colored solutions. It is almost insoluble in alcohol.

Identification—The addition of acids to an aqueous solution of Peptonized Iron produces a precipitate which dissolves upon being warmed with an excess of hydrochloric acid. The resulting solution responds to the tests for *Ferric Salts*, page 725.

Ionic iron—An aqueous solution (1 in 50) yields no blue color upon the addition of potassium ferrocyanide T.S.

Lead—To 1 Gm. of Peptonized Iron add 3 cc. of dilute nitric acid (1 in 2), 10 cc. of distilled water and 2 cc. of hydrochloric acid and boil until the appearance of brown fumes. Add 10 cc. of distilled water and boil for 2 minutes. Cool and transfer to a 100-cc. volumetric flask with the aid of distilled water and add sufficient distilled water to make 100 cc. A 10-cc. portion of this solution shall contain no more than 5 micrograms of lead (corresponding to not more than 50 parts per million) when tested according to the *Lead limit test*, page 729, using 25 cc. of ammonium citrate solution, 3 cc. of potassium cyanide solution and 1 cc. of hydroxylamine hydrochloride solution.

Sugar—Dissolve 1 Gm. of Peptonized Iron in 50 cc. of distilled water; render the solution slightly alkaline if necessary, by the addition of sodium hydroxide T.S., and precipitate the iron from the solution with hydrogen sulfide. Filter, add to the filtrate 5 cc. of diluted hydrochloric acid, and evaporate almost to dryness on a water bath. Dissolve the residue in 10 cc. of distilled water; to 5 cc. of the solution, rendered slightly alkaline with sodium hydroxide T.S., add 2 cc. of alkaline cupric tartrate T.S., and heat: no red precipitate is produced.

Assay—Weigh accurately about 0.5 Gm. of Peptonized Iron, and ignite it in a crucible to destroy the organic matter. Place the crucible containing the residue in a beaker, add 10 cc. of hydrochloric acid, heat until all of the iron is dissolved, remove the crucible, rinsing it with a little hydrochloric acid, add 10 cc. of hydrogen peroxide T.S., and evaporate almost to dryness on a water bath. Dissolve the residue by warming with 5 cc. of hydrochloric acid, add 25 cc. of distilled water, and transfer the solution completely into a glass-stoppered flask. Add to the solution 3 Gm. of potassium iodide, securely stopper the flask, and allow the mixture to stand for 15 minutes; add 50 cc. of distilled water, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Perform

a blank test with the same quantities of the reagents and in the same manner, and make any necessary correction. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.005585 Gm. of Fe.

Storage—Preserve Peptonized Iron in tight, light-resistant containers.

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains).

Iron, Peptonized, and Manganese Solution

PEPTONIZED IRON AND MANGANESE SOLUTION

Liquor Ferri Peptonati et Mangani

Liq. Ferr. Pepton. et Mangan. Solution of Iron Peptonate and Manganese

Peptonized Iron and Manganese Solution yields, from each 100 cc., not less than 0.265 Gm. and not more than 0.325 Gm. of Fe.

Peptonized Iron	17.50 Gm.
Soluble Manganese Citrate	8.75 Gm.
Orange Oil	0.15 cc.
Ethyl Acetate	0.20 cc.
Vanillin	0.02 Gm.
Alcohol	150 cc.
Syrup	50 cc.
Glycerin	50 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the peptonized iron in 500 cc. of distilled water, stirring gently. Dissolve the soluble manganese citrate in 200 cc. of distilled water, and add it to the peptonized iron solution; then add the syrup and the glycerin, and mix well. Dissolve the orange oil, the ethyl acetate, and the vanillin in the alcohol, and gradually add this solution to the aqueous solution while stirring the latter. Finally, add sufficient distilled water to make the product measure 1000 cc., and allow it to stand during 24 hours; filter if necessary, until the product is clear.

Description—Peptonized Iron and Manganese Solution is a reddish orange, transparent liquid, having an aromatic odor and a pleasant taste. It is affected by light.

Specific gravity—The specific gravity of Peptonized Iron and Manganese Solution is about 1.029 at 25°.

Identification—

A: To 1 cc. of Peptonized Iron and Manganese Solution diluted to 10 cc. with distilled water, add 1 cc. of potassium ferrocyanide T.S.: no green or blue color develops (*ionic iron*); but a turbidity appears, later separating as a white precipitate of manganese ferrocyanide. Add a few drops of diluted hydrochloric acid to this liquid: a dark blue color is produced, becoming green-blue when uniformly mixed (*ferric iron*).

B: Dilute 5 cc. of Peptonized Iron and Manganese Solution with 5 cc. of distilled water; add 4 drops of saturated solution of potassium iodide and 4 cc. of mercurous nitrate T.S.: a yellow precipitate is formed.

Assay for iron—Transfer exactly 25 cc. of Peptonized Iron and Manganese Solution into a dish, evaporate to dryness, then carefully ignite until the carbonaceous matter has burned off. Cool, add 20 cc. of hydrochloric acid and 15 cc. of hydrogen peroxide T.S., and evaporate on a water bath to about 5 cc. Add 25 cc. of distilled water, filter into a 400-cc. beaker, and wash the dish and filter thoroughly with distilled water until the filtrate is about 250 cc. Add sodium carbonate T.S. to the filtrate in small portions and with constant stirring, until a slight precipitate is formed which does not dissolve on stirring; then add a few drops of hydrochloric acid to dissolve the precipitate. Now add a solution of 5 Gm. of sodium acetate in 20 cc. of distilled water, heat to boiling, and boil for 1 minute. Collect the precipitate on a filter, discard the filtrate, dissolve the precipitate with 5 to 10 cc. of hydrochloric acid, and wash the filter with 50 cc. of an aqueous solution of hydrochloric acid (1 in 100). To the combined acid solution and washings in a glass-stoppered flask, add about 3 Gm. of potassium iodide. Stopper the flask, and allow the mixture to stand during 15 minutes; then add 50 cc. of distilled water, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.005585 Gm. of Fe.

Alcohol content—From 12 to 15 per cent, by volume, of C_2H_5OH.

Storage—Preserve Peptonized Iron and Manganese Solution in tight, light-resistant containers.

AVERAGE DOSE—**8 cc.** (approximately 2 fluidrachms).

One average metric dose contains about 0.14 Gm. of Peptonized Iron and 70 mg. of Soluble Manganese Citrate.

IRON, QUININE AND STRYCHNINE ELIXIR

Elixir Ferri, Quininæ et Strychninæ

Elix. Ferr. Quin. et Strych. Elixir I. Q. & S.

Ferric Citrochloride Tincture	**125 cc.**
Quinine Hydrochloride	**8 Gm.**
Strychnine Sulfate	**175 mg.**
Compound Orange Spirit	**10 cc.**
Alcohol	**240 cc.**
Glycerin	**300 cc.**
Distilled Water, a sufficient quantity, To make	**1000 cc.**

Dissolve the quinine hydrochloride in the alcohol, add the compound orange spirit, then the strychnine sulfate previously dissolved in 10 cc. of distilled water. Then add successively the glycerin, the ferric citrochloride tincture, and sufficient distilled water to make the product measure 1000 cc.; mix well, and filter, using 10 Gm. of purified talc, if necessary, to clarify the product.

Alcohol content—From 23 to 26 per cent, by volume, of C_2H_5OH.
Storage—Preserve Iron, Quinine and Strychnine Elixir in tight, light-resistant containers. *The Elixir should not be dispensed if markedly darkened in color.*

AVERAGE DOSE—4 cc. (approximately 1 fluidrachm).

One average metric dose contains 0.5 cc. of Ferric Citrochloride Tincture, 32 mg. of Quinine Hydrochloride, and 0.7 mg. of Strychnine Sulfate.

Iron, Quinine and Strychnine Phosphates Elixir

IRON, QUININE AND STRYCHNINE PHOSPHATES ELIXIR

Elixir Ferri, Quininæ et Strychninæ Phosphatum

Elix. Ferr. Quin. et Strych. Phos. Elixir I. Q. & S. Phosphates

Soluble Ferric Phosphate	**35 Gm.**
Quinine Phosphate	**5 Gm.**
Strychnine Phosphate	**250 mg.**
Orange Oil	**1 cc.**
Alcohol	**250 cc.**
Glycerin	**300 cc.**
Distilled Water, a sufficient quantity, To make	**1000 cc.**

Dissolve the soluble ferric phosphate in 250 cc. of distilled water by cold maceration, and add 75 cc. of glycerin. Dissolve the strychnine phosphate in the alcohol, and add the orange oil, the quinine phosphate, and the remainder of the glycerin. Shake until thoroughly mixed; then add the ferric phosphate solution and enough distilled water to make the product measure 1000 cc. Allow the mixture to stand during 24 hours, shaking it repeatedly until the quinine phosphate is dissolved. Filter, using 10 Gm. of purified talc, if necessary, to clarify the product.

Alcohol content—From 22 to 25 per cent, by volume, of C_2H_5OH.
Storage—Preserve Iron, Quinine and Strychnine Phosphates Elixir in tight, light-resistant containers. *The Elixir should not be dispensed if markedly darkened in color.*

AVERAGE DOSE—4 cc. (approximately 1 fluidrachm).

One average metric dose contains 0.14 Gm. of Soluble Ferric Phosphate, 20 mg. of Quinine Phosphate, and 1 mg. of Strychnine Phosphate.

REDUCED IRON
Ferrum Reductum

Ferr. Reduct. **Iron by Hydrogen**

Fe **At. wt. 55.85**

Reduced Iron is obtained by the action of hydrogen upon ferric oxide and contains not less than 90 per cent of Fe.

Description—Reduced Iron is an odorless, grayish black powder, all of which must pass through a No. 100 sieve. It is lusterless or has not more than a slight luster. When viewed under a microscope having a magnifying power of 100 diameters, Reduced Iron appears as an amorphous powder, free from particles having a crystalline structure. It is stable in dry air.

Identification—Heat about 1 Gm. of Reduced Iron in a porcelain crucible with a small Bunsen flame until it assumes a bluish black color without glowing, then quickly pour it from the crucible: the particles of iron will glow brightly as they fall through the air.

Insoluble in diluted sulfuric acid—Treat 1 Gm. of Reduced Iron with 20 cc. of diluted sulfuric acid, and when the reaction subsides, heat gently until no more gas is evolved. Filter, wash the residue with distilled water until the washings cease to react for sulfate, and dry to constant weight at 105°: the weight of the residue does not exceed 10 mg.

Reaction—Shake 1 Gm. of Reduced Iron with 5 cc. of distilled water, and filter: the filtrate does not change the color of litmus paper.

Sulfide—One Gm. of Reduced Iron mixed with 20 cc. of diluted sulfuric acid in a flask causes the evolution of hydrogen, which is nearly odorless and does not affect paper moistened with lead acetate T.S. within 2 minutes.

Arsenic—Transfer 0.10 Gm. of Reduced Iron, accurately weighed, to a Gutzeit bottle. Add bromine T.S. (about 10 cc.) in small divided portions until most of the Reduced Iron dissolves and a slight excess of bromine remains. Heat the mixture on a water bath for 15 minutes. Subject the solution to the test for *Arsenic*, page 689, reversing the order of the addition of the acid-stannous chloride T.S. and the potassium iodide T.S. This solution meets the requirements of the test for *Arsenic*, page 689.

Lead—Add slowly 10 cc. of nitrohydrochloric acid to 1 Gm. of Reduced Iron and evaporate to dryness on a water bath. Dissolve the residue in 4 cc. of hydrochloric acid and 20 cc. of distilled water and filter the solution into a 100-cc. volumetric flask. Rinse the filter several times with hot distilled water, combining the filtrates with the original filtrate. Cool to room temperature and dilute to 100 cc. with distilled water and mix thoroughly. A 10-cc. portion of this solution contains no more than 5 micrograms of lead (corresponding to not more than 50 parts per million) when treated according to the *Lead limit test*, page 729, using 6 cc. of ammonium citrate solution, 2 cc. of potassium cyanide solution and 2 cc. of hydroxylamine hydrochloride solution.

Assay—Weigh accurately from 0.17 to 0.20 Gm. of Reduced Iron and transfer to a 300-cc. Erlenmeyer flask. Add 50 cc. of diluted sulfuric acid and close the flask with a valve-stopper prepared as directed in the *Assay* under *Ferrous Gluconate*, page 225. Heat on a water bath until the iron is dissolved, cool the solution, dilute it with 50 cc. of freshly boiled and cooled distilled water, add 2 drops of orthophenanthroline T.S. and titrate with 0.1 *N* ceric sulfate until the red color is changed to weak blue. Each cc. of 0.1 *N* ceric sulfate is equivalent to 0.005585 Gm. of Fe.

Storage—Preserve Reduced Iron in well-closed containers.

AVERAGE DOSE—**0.5 Gm.** (approximately 7½ grains).

Iron, Reduced, Capsules

REDUCED IRON CAPSULES
Capsulæ Ferri Reducti

Cap. Ferr. Reduct.

Reduced Iron Capsules contain an amount of metallic iron (Fe) corresponding to not less than 86 per cent and not more than 102 per cent of the labeled amount of Fe.

Identification—Transfer the contents of a number of Reduced Iron Capsules, equivalent to about 1 Gm. of reduced iron, to a porcelain crucible and heat over a small Bunsen flame until the material assumes a bluish black color without glowing, then quickly pour it from the crucible: the particles of iron glow brightly as they fall through the air.

Assay—Weigh accurately the contents of a counted number of not less than 20 Reduced Iron Capsules. Transfer an accurately weighed portion of the contents, representing between 0.17 and 0.20 Gm. of iron to a 300-cc. Erlenmeyer flask and proceed as directed in the *Assay* under *Reduced Iron*, page 279, beginning with, "Add 50 cc. of diluted sulfuric acid and close the flask. . . ." Each cc. of 0.1 *N* ceric sulfate is equivalent to 0.005585 Gm. of Fe.

Storage—Preserve Reduced Iron Capsules in well-closed containers.

Sizes—Reduced Iron Capsules usually available contain the following amounts of reduced iron: **0.3, 0.5,** and **0.65 Gm.** (approximately 5, 7½, and 10 grains).

AVERAGE DOSE—**0.5 Gm.** (approximately 7½ grains) of Reduced Iron.

Iso-Alcoholic Elixir

ISO-ALCOHOLIC ELIXIR
Elixir Iso-Alcoholicum

Elix. Iso-Alc.	Iso-Elixir
Low-Alcoholic Elixir	**a certain volume**
High-Alcoholic Elixir	**a certain volume**

Mix the ingredients.

Low-Alcoholic Elixir

Compound Orange Spirit	**10 cc.**
Alcohol	**100 cc.**
Glycerin	**200 cc.**
Sucrose	**320 Gm.**
Distilled Water, a sufficient quantity,	
To make	**1000 cc.**

Mix the alcohol, glycerin, and 500 cc. of distilled water, add the compound orange spirit, agitate thoroughly from time to time, and let stand 24 hours. Filter this solvent mixture through a hard filter paper, returning, if necessary, the first portions of the filtrate until it passes through clear. Dissolve the sucrose in the filtrate by agitation or percolation, and add enough of the solvent mixture to make the product measure 1000 cc.

Alcohol content—From 8 to 10 per cent, by volume, of C_2H_5OH.
Storage—Preserve Low-Alcoholic Elixir in tight containers.

High-Alcoholic Elixir

Compound Orange Spirit	4 cc.
Saccharin	3 Gm.
Glycerin	200 cc.
Alcohol, a sufficient quantity,	
To make	1000 cc.

Dissolve the compound orange spirit and the saccharin in 700 cc. of alcohol, add the glycerin and sufficient alcohol to make the product measure 1000 cc., mix well and filter.

Alcohol content—From 73 to 78 per cent, by volume, of C_2H_5OH.
Storage—Preserve High-Alcoholic Elixir in tight containers.

Table for Adjustment of Iso-Alcoholic Elixir

Low-Alcoholic Elixir	*High-Alcoholic Elixir*	*Suitable as Vehicle for Preparations of the Following Alcohol Strengths*
Undiluted	None	0 to 10 per cent
4 volumes	1 volume	10 to 20 per cent
3 volumes	1 volume	20 to 30 per cent
2 volumes	1 volume	30 to 40 per cent
1 volume	1 volume	40 to 50 per cent
1 volume	2 volumes	50 to 60 per cent
1 volume	3 volumes	60 to 70 per cent
None	Undiluted	70 per cent or more

NOTE: Iso-Alcoholic Elixir is intended to serve as a general vehicle for various medicaments that require solvents of different alcohol strengths. When, therefore, Iso-Alcoholic Elixir is specified in a prescription, the proportion of its two ingredients is to be used that will produce a perfect solution.

The alcohol strength of the Iso-Alcoholic Elixir to be used with a

single liquid galenical in a prescription is approximately the same as that of the galenical.

When galenicals of different alcohol strengths are used in the same prescription, the Iso-Alcoholic Elixir to be used is to be of such alcohol strength as to secure the best solution possible under the circumstances. This will generally be found to be the average of the alcohol strengths of the several ingredients.

For non-extractive substances, the lowest alcohol strength of Iso-Alcoholic Elixir that will yield a perfect solution should be chosen.

Isopropyl Alcohol Rubbing Compound

ISOPROPYL ALCOHOL RUBBING COMPOUND

Alcohol Isopropylicum Fricamentum Compositum

Alcohol Isopropyl. Fricament. Comp. Isopropanol Rubbing Compound

Isopropyl Alcohol Rubbing Compound contains not less than 68 per cent and not more than 72 per cent of isopropyl alcohol by volume. Small quantities of perfume oils may be added if desired.

Description—Isopropyl Alcohol Rubbing Compound is a transparent, colorless, mobile, and volatile liquid having a slightly bitter taste and, in the absence of odorous constituents, a characteristic odor.

Identification—To 2 cc. of Isopropyl Alcohol Rubbing Compound contained in a test tube, add 2 cc. of distilled water and 1 cc. of mercuric sulfate T.S., and warm gently: a white precipitate or turbidity is produced.

Specific gravity—The specific gravity of Isopropyl Alcohol Rubbing Compound is not less than 0.8690 and not more than 0.8790 at 25°.

Free acid—Transfer 50 cc. of Isopropyl Alcohol Rubbing Compound into a suitable flask and add about 75 cc. of recently boiled and cooled distilled water. Titrate immediately with 0.02 *N* sodium hydroxide, using 3 drops of phenolphthalein T.S. as the indicator, to a pink color that persists for 30 seconds: not more than 1 cc. of 0.02 *N* sodium hydroxide is required for neutralization.

Non-volatile residue—Evaporate 50 cc. of Isopropyl Alcohol Rubbing Compound to dryness in a tared porcelain dish on a water bath and dry at 105° for 1 hour: the weight of the residue does not exceed 2 mg.

Assay—Transfer exactly 50 cc. of Isopropyl Alcohol Rubbing Compound into a 250-cc. distilling flask, note its temperature, and add 100 cc. of distilled water. Arrange the flask for distilling, distil, and collect 95 cc. of distillate in a 100-cc. volumetric flask. Adjust to the temperature at which the original test liquid was measured and add sufficient distilled water to bring it to the graduation mark. Mix well and determine the specific gravity of the distillate at 25°. The specific gravity is no greater than 0.9545 corresponding to 68 per cent and no less than 0.9502 corresponding to 72 per cent of isopropyl alcohol in the original sample.

Storage—Preserve Isopropyl Alcohol Rubbing Compound in tight containers.

JALAP
Jalapa
Jalap Root

Jalap is the dried tuberous root of *Exogonium purga* (Wenderoth) Bentham (Fam. *Convolvulaceæ*).

Jalap yields not less than 9 per cent of the total resins of Jalap.

Unground Jalap—Unground Jalap is fusiform, irregularly ovoid or pyriform, the larger roots often incised or cut into pieces; from 4 to 15 cm. in length and up to 10 cm. in diameter. Externally it is dusky brown to moderate yellowish brown, longitudinally wrinkled or furrowed, and with numerous lenticels; hard, compact, not fibrous; and internally weak brown to very pale brown, with a dark cambium line.

Histology—Jalap shows a cork of several rows of small, thin-walled cells; and a narrow cortex. The fibro-vascular bundles are small, bicollateral, numerous, and arranged in several concentric zones; each fibro-vascular bundle with several tracheæ, several small groups of sieve tissue, and an inconspicuous cambium, except in the outermost zone, where the cambium is conspicuous, with 6 to 10 rows of cells. The interfascicular cambium forms a complete circle. Parenchyma tissue is abundant, starch-bearing, and contains numerous large secretory cells with yellowish brown resinous contents scattered through it.

Powdered Jalap—Powdered Jalap is light yellowish brown; has a slight, but distinctive and smoky odor; and a somewhat sweet and acrid taste. The starch grains are numerous, simple or 2- to 3-compound, more or less swollen, up to 35 microns in diameter, ellipsoidal or ovoid, with concentric or eccentric lamellæ and radiating clefts. The calcium oxalate occurs in rosette aggregates from 10 to 35 microns in diameter. The tracheæ are short, wide, with simple or bordered pores. Fragments of secretory cells are also present.

Acid-insoluble ash—Jalap yields not more than 0.5 per cent of acid-insoluble ash, page 761.

Assay—Weigh accurately 10 Gm. of Jalap, in fine powder, and proceed as directed in the *Assay* under *Ipomea*, page 272. The weight obtained represents the yield of total resins from 2 Gm. of Jalap.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

COMPOUND JALAP POWDER
Pulvis Jalapæ Compositus
Pulv. Jalap. Comp.

Jalap, in very fine powder	**350 Gm.**
Potassium Bitartrate, in fine powder	**650 Gm.**
To make	**1000 Gm.**

Mix the ingredients thoroughly by trituration.

Description—Compound Jalap Powder occurs as a very pale to weak yellowish orange powder. It shows numerous, sharply angular, colorless fragments, mostly somewhat rectangular and with straight edges, varying from 30 to 300 microns in length,

slowly soluble in distilled water or in chloral hydrate T.S., and strongly birefringent (*fragments of crystals of potassium bitartrate*). It shows numerous starch grains, simple or 2- or 3-compound, and varying from 3 to 35 microns in diameter; occasional fragments of laticiferous cells or vessels having brown to yellowish orange granular contents, or of tracheæ with bordered pores (*jalap*).

Storage—Preserve Compound Jalap Powder in well-closed containers.

AVERAGE DOSE—**2 Gm.** (approximately 30 grains).

One average metric dose contains 0.7 Gm. of Jalap and 1.3 Gm. of Potassium Bitartrate.

Jalap Resin

JALAP RESIN

Resina Jalapæ

Res. Jalap.

Extract the resin from jalap, in fine powder, by percolation, using a mixture of 9 volumes of alcohol and 1 volume of water as the menstruum. Concentrate the percolate to about one-fourth of the weight of the drug taken, and pour it slowly, with constant stirring, into about 12 times as much hot water. Allow the precipitated resin to subside, decant the supernatant liquid, and wash the resin twice with hot water, using about one-third as much each time as was used for the first precipitation. Collect the resin, and dry it thoroughly.

Description—Jalap Resin occurs as masses or fragments, breaking with a resinous, glassy fracture; translucent at the edges, and orange to reddish brown in color; or as a yellowish gray to brown powder. It has a slight, peculiar odor, a somewhat acrid taste, and is permanent in air.

Solubility—Jalap Resin dissolves in alcohol. It is insoluble in carbon disulfide, benzene, and fixed or volatile oils.

Solubility in chloroform—Add 1 Gm. of the powdered Jalap Resin, dried to constant weight at 100° and accurately weighed, to 20 cc. of chloroform in a stoppered flask, shake the mixture occasionally during 1 hour, let stand overnight, again shake occasionally during 1 hour and filter. Wash the flask and residue on the filter with 3 successive 5-cc. portions of chloroform, evaporate the combined filtrate in a tared dish, and dry the residue to constant weight at 100°: the weight of the residue does not exceed 0.32 Gm.

Loss on drying—When dried to constant weight at 100°, Jalap Resin loses not more than 4 per cent of its weight.

Acid resins—One Gm. of Jalap Resin, when dissolved in 50 cc. of alcohol containing 1 cc. of phenolphthalein T.S., requires not more than 0.5 cc. of 0.5 *N* alcoholic potassium hydroxide to produce a pink color.

Guaiac—Shake 0.2 Gm. of Jalap Resin with 5 cc. of ether; filter, and evaporate the ether filtrate on filter paper: no blue color is produced by the application of 1 drop of ferric chloride T.S. to the filter paper.

Rosin—Triturate 1 Gm. of Jalap Resin wth 10 cc. of petroleum benzin and filter; add the filtrate to 10 cc. of fresh aqueous solution of cupric acetate (1 in 200), and shake well: the benzin layer does not become pink.

Rosin or other resins—Add 1 Gm. of powdered Jalap Resin to 20 cc. of ether in a stoppered flask, shake the mixture occasionally during 1 hour, and filter. Wash the flask and residue on the filter with 3 successive 5-cc. portions of ether, evapo-

rate the combined filtrates in a tared dish, and dry the residue to constant weight at 100°: the weight of the residue does not exceed 0.12 Gm.

Rosin, guaiac, or other resins—Jalap Resin is slowly but completely soluble in 5 times its weight of ammonia T.S., and the solution does not become gelatinous on standing. When this solution is acidified with hydrochloric acid, only a slight turbidity is produced.

Soluble impurities—When Jalap Resin is triturated with distilled water, the latter does not become colored, and none of the Resin dissolves.

Aloin—Add 0.5 Gm. of Jalap Resin to 5 cc. of ammonia T.S., and shake well: no red color is produced within 15 minutes and the mixture exhibits a light blue (not an olive-green) fluorescence in filtered ultra-violet light, using a Corex No. 986 filter or its equivalent.

Storage—Preserve Jalap Resin in well-closed containers.

AVERAGE DOSE—**0.125 Gm.** (approximately 2 grains).

Jellies

Ephedrine Sulfate Jelly, page 192
Methylrosaniline Chloride Jelly, page 343

Juniper

JUNIPER

Juniperus

Juniper-berries

Juniper is the dried ripe fruit of *Juniperus communis* Linné and its var. *depressa* Pursh (Fam. *Pinaceæ*).

Juniper yields not less than 0.5 cc. of juniper oil from each 100 Gm. of drug.

Unground Juniper—Unground Juniper is nearly globular, from 5 to 9 mm. in diameter; externally smooth, shining, purplish black to dusky red-purple, occasionally reddish brown or sometimes, usually in the var. *depressa*, covered with a blue-gray bloom, and with a 3-rayed furrow at the apex marking the cohesion of the 3 fleshy bracts; it has a soft flesh internally, moderate yellowish brown to dusky yellow and contains numerous large schizogenous cavities. The seeds are usually 3 in number, triangular ovate, hard, brown, and have large uneven oil glands on the surface.

Histology—The connate bracts show an epidermis of rounded polygonal cells with granular contents and form blunt papillæ at the sutures of the bracts; a hypodermis of 2 or 3 rows of collenchymatous cells; a fleshy portion composed of irregular, loose parenchyma cells, large oval canals and fibro-vascular bundles with areolated fibers; and an inner layer of small thick-walled cells, many containing crystals of calcium oxalate. The seed coat shows a ring of stone cells of 2 to 10 rows with very thick pitted walls, many enclosing prismatic crystals of calcium oxalate. The endosperm and embryo of the seed are rich in fixed oil and aleurone grains.

Powdered Juniper—Powdered Juniper is moderate brown to dark yellowish brown; has an aromatic odor, and a sweet, pleasant, terebinthinate, slightly bitter taste. It shows fragments composed of stone cells, the latter up to 145 microns in length; monoclinic prisms of calcium oxalate occurring either singly or within parenchyma or stone cells, from 5 to 30 microns in length, and occasionally larger; numerous fragments showing the polygonal cells of the bract epidermis, fragments of oil glands and resin masses, and of endosperm tissue.

Immature or discolored fruits—Juniper contains not more than 10 per cent of immature or discolored fruits of the plant.
Foreign organic matter—Juniper contains not more than 3 per cent of foreign organic matter, other than immature or discolored fruits, page 760.
Acid-insoluble ash—Juniper yields not more than 2 per cent of acid-insoluble ash, page 761.
Assay—Place about 200 Gm. of Juniper, coarsely comminuted or powdered and accurately weighed, into the flask of the apparatus used for volatile oil determinations and proceed with the assay as directed on page 764, Process A.

AVERAGE DOSE—**4 Gm.** (approximately 60 grains).

Juniper Oil

JUNIPER OIL
Oleum Juniperi

Ol. Junip.

Juniper Oil is the volatile oil distilled with steam from the dried ripe fruit of *Juniperus communis* Linné and its var. *depressa* Pursh (Fam. *Pinaceæ*).

Description—Juniper Oil is a colorless or yellowish liquid, having the characteristic odor and taste of juniper berries. A solution of recently distilled Juniper Oil in alcohol (1 in 4) is neutral or acid to moistened litmus paper.
Solubility—Juniper Oil dissolves in 4 volumes of alcohol with either cloudiness or turbidity, and when diluted to 10 volumes, shows no separation of oily globules after standing for 12 hours.
Specific gravity—The specific gravity of Juniper Oil is not less than 0.854 and not more than 0.879 at 25°.
Optical rotation—The optical rotation of Juniper Oil is not less than 0° and not more than −15° in a 100-mm. tube, at 25°, page 737.
Refractive index—The refractive index of Juniper Oil is not less than 1.4740 and not more than 1.4840 at 20°, page 745.
Heavy metals—Juniper Oil meets the requirements of the test for *heavy metals in volatile oils*, page 721.
Storage—Preserve Juniper Oil in well-filled, tight containers and avoid exposure to excessive heat.

Kamala

KAMALA
Kamala

Rottlera — Glandulæ Rottleræ

Kamala consists of the hairs obtained from the capsules of *Mallotus philippinensis* Müller Argoviensis (Fam. *Euphorbiaceæ*).

Kamala yields, when dried to constant weight at 100°, not less than 66 per cent of non-volatile ether-soluble extractive.

Description—Kamala occurs as a finely granular, moderate reddish brown powder, almost without odor or taste; containing numerous reddish brown to yellow glandular hairs with a very short 1-celled stalk (usually missing) and a nearly spheroidal,

multicellular head, from 40 to 100 microns in diameter, composed of from 20 to 50 ellipsoidal or somewhat spatulate cells, which are radiately arranged upon a small basal cell and immersed in the resinous secretion. Non-glandular hairs are few, peltate, consisting of 5 to 20 unicellular or uniseriate, thick-walled cells, pointed and frequently hooked at the ends. There are occasional cellular fragments of pericarp and irregular, angular fragments of sand or other inorganic impurities.

Acid-insoluble ash—Kamala yields not more than 6 per cent of acid-insoluble ash, page 761.

Assay—Extract 1 Gm. of Kamala, dried to constant weight at 100° and accurately weighed, with dehydrated ether in a continuous extraction apparatus for 8 hours. Evaporate the ether from the ether solution in a suitable tared container, and dry the residue to constant weight at 100°. The weight obtained represents the non-volatile ether-soluble extractive from 1 Gm. of Kamala.

AVERAGE DOSE—Human, **7.5 Gm.** (approximately 2 drachms).
Fowls, **0.5–1.0 Gm.** (approximately $7^1/_2$–15 grains).

Kaolin

KAOLIN
Kaolinum

Kaolin is a native hydrated aluminum silicate, powdered and freed from gritty particles by elutriation.

Description—Kaolin occurs as a soft, white or yellowish white powder, or as lumps. It has an earthy or clay-like taste and, when moistened with water, assumes a darker color and develops a marked clay-like odor.

Solubility—Kaolin is insoluble in water, in cold dilute acids, and in solutions of the alkali hydroxides.

Identification—Mix 1 Gm. of Kaolin with 10 cc. of distilled water and 5 cc. of sulfuric acid in a porcelain dish. Evaporate the mixture until the excess of water is removed, and further heat the residue until dense white fumes of sulfuric anhydride appear; then cool, add cautiously 20 cc. of distilled water, boil for a few minutes, and filter: there remains on the filter a gray residue (*impure silica*). The filtrate responds to the tests for *Aluminum*, page 722.

Loss on ignition—Kaolin loses not more than 15 per cent of its weight upon ignition at red heat.

Acid-soluble substances—Digest 1 Gm. of Kaolin with 20 cc. of diluted hydrochloric acid for 15 minutes, and filter: 10 cc. of the filtrate evaporated to dryness and ignited leaves not more than 10 mg. of residue.

Carbonate—Mix 1 Gm. of Kaolin with 10 cc. of distilled water and 5 cc. of sulfuric acid: no effervescence occurs.

Iron—Triturate 2 Gm. of Kaolin in a mortar with 10 cc. of distilled water: the mixture does not acquire more than a slight reddish tint on the addition of 0.5 Gm. of sodium salicylate.

Lead—To 1 Gm. of Kaolin contained in a centrifuge tube add 10 cc. of 5 per cent nitric acid and digest for 1 hour in a boiling water bath. Centrifuge until the solids are completely separated and pour the supernatant liquid into a 100-cc. volumetric flask. Add 5 cc. of 5 per cent nitric acid to the Kaolin, mix well, and digest for 15 minutes in a boiling water bath. Centrifuge and add the supernatant liquid to the previous extract in the volumetric flask. Dilute to 100 cc. with distilled water. A 50-cc. portion of this solution contains not more than 5 micrograms of lead (corresponding to not more than 10 parts per million) when tested according to the *Lead limit test*, page 729, using 3 cc. of ammonium citrate solution, 1 cc. of potassium cyanide solution, and 0.5 cc. of hydroxylamine hydrochloride solution.

Storage—Preserve Kaolin in well-closed containers.

Kaolin Cataplasm

KAOLIN CATAPLASM
Cataplasma Kaolini

Catapl. Kaolin.

Kaolin, in very fine powder and recently dried at 110°	565 Gm.
Boric Acid, in very fine powder	45 Gm.
Thymol	0.5 Gm.
Methyl Salicylate	2 cc.
Peppermint Oil	0.5 cc.
Glycerin, recently heated to 100°	387 Gm.
To make about	1000 Gm.

Mix the kaolin with the boric acid and thoroughly incorporate with the warm glycerin. Add the thymol, dissolved in the methyl salicylate and the peppermint oil, and make into a homogeneous mass.

Storage—Preserve Kaolin Cataplasm in tight containers.

Kino

KINO
Kino

Kino is the dried juice obtained from the trunk of *Pterocarpus Marsupium* Roxburgh (Fam. *Leguminosæ*).

Kino yields not less than 60 per cent of alcohol-soluble extractive and not less than 75 per cent of water-soluble extractive.

Unground Kino—Unground Kino occurs as small, brittle, angular fragments, usually less than 10 mm. in diameter, varying in color from reddish black to dusky brown. When masticated it colors the saliva pink.

Powdered Kino—Powdered Kino is dusky reddish brown to dark brown; it is inodorous, and has a very astringent taste. It occurs in angular fragments with glass-like conchoidal surfaces, the thinner pieces being translucent, and red to yellowish orange. When mounted in water the fragments become rounded and gradually disintegrate, leaving lighter-colored particles among which are rod-shaped bacteria and a few cellular fragments. When mounted in alcohol the color of the fragments deepens, the translucency increases, and the sharp angular outlines are preserved while solution is taking place.

Identification—An aqueous solution of Kino has a faintly acid reaction, produces a yellow-green precipitate with ferric chloride T.S. and a brown or orange color with an aqueous solution of an alkali.

Alcohol-soluble extractive—Weigh accurately 2 Gm. of Kino, in fine powder, and proceed as directed under *Gamboge*, page 232. Calculate the percentage of anhydrous extractive from the weight of the drug taken.

Water-soluble extractive—Proceed as directed under *Alcohol-soluble extractive*, using distilled water instead of alcohol.

Average dose—0.5 Gm. (approximately 7½ grains).

KINO TINCTURE
Tinctura Kino

Tr. Kino

Kino	**200 Gm.**
Alcohol,	
Glycerin, each, a sufficient quantity,	
To make	**1000 cc.**

Prepare the Tincture by Process M, page 758, using a mixture of 9 volumes of alcohol and 1 volume of glycerin as the solvent.

Alcohol content—From 70 to 76 per cent, by volume, of C_2H_5OH.
Storage—Preserve Kino Tincture in a cool, dark place, in small tightly stoppered, completely filled bottles.

AVERAGE DOSE—2 cc. (approximately 30 minims).

KOLA
Kola

Cola Kolanuts

Kola is the dried cotyledon of *Cola nitida* (Ventenat) Schott and Endlicher, or of other species of *Cola* (Fam. *Sterculiaceæ*).

Kola yields not less than 1 per cent of anhydrous caffeine, $C_8H_{10}N_4O_2$.

Unground Kola—Unground Kola occurs as irregularly plano-convex or somewhat globular cotyledons from 2.5 to 5 cm. in length; heavy, hard, and tough. The cotyledons are reddish black to light brown, smooth or somewhat wrinkled; the edges being slightly incurved and sharp.

Powdered Kola—Powdered Kola is light brown to moderate yellowish brown. It is odorless, and has a mildly astringent taste. It shows numerous starch grains, some of which show alteration, the normal grains being up to 45 microns in diameter; the smaller ellipsoidal or spherical, the larger ellipsoidal or irregularly oblong and occasionally with a protuberance on one side. Many of the larger grains show lamellæ and a circular hilum or a fissure through the center, and numerous parenchyma cells about 65 microns in diameter.

Foreign organic matter—Kola contains not more than 1 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Kola yields not more than 0.5 per cent of acid-insoluble ash, page 761.

Assay—Place 12 Gm. of Kola, in fine powder and accurately weighed, into a suitable container, add 120 cc. of chloroform, allow the mixture to stand about 5 minutes, and then add 6 cc. of ammonia water and 6 cc. of distilled water. Shake the mixture continuously for 1 hour or intermittently during 2 hours, and allow it to stand overnight. Again shake intermittently during 30 minutes and separate 100 cc. of the clear chloroform solution. Evaporate the chloroform, and treat the residue with 10 cc. of sulfuric acid (1 in 100) with the aid of gentle heat. Filter the cooled solution into a separator, and wash the dish and filter with successive small portions of

distilled water until no test for alkaloid is obtained with iodine T.S. in a portion (1 cc.) of the filtrate after acidifying strongly with diluted sulfuric acid. Make the combined filtrates alkaline with ammonia T.S., and again extract the alkaloid completely with successive portions of chloroform. Evaporate the combined chloroform solutions nearly to dryness, add about 1 cc. of neutralized alcohol, and continue evaporation to dryness. Dry the residue to constant weight at 80°. The weight obtained represents the yield of $C_8H_{10}N_4O_2$ from 10 Gm. of Kola.

AVERAGE DOSE—4 Gm. (approximately 60 grains).

Lactic Acid

LACTIC ACID
Acidum Lacticum

Acid. Lact.

$C_3H_6O_3$ $CH_3.CHOH.COOH$ Mol. wt. 90.08

Lactic Acid is a mixture of $HC_3H_5O_3$ and lactic anhydride equivalent to a total of not less than 85 per cent and not more than 90 per cent of $HC_3H_5O_3$.

Description—Lactic Acid is a colorless, or yellowish, nearly odorless, syrupy liquid. It absorbs water on exposure to moist air, and cannot be distilled under normal pressure without decomposition. It is acid to litmus paper.

Solubility—Lactic Acid is miscible with water, with alcohol, and with ether, but is insoluble in chloroform.

Specific gravity—The specific gravity of Lactic Acid is about 1.206 at 25°.

Identification—Lactic Acid responds to the tests for *Lactate*, page 725.

Residue on ignition—A 5-cc. portion of Lactic Acid yields not more than 6 mg. of residue on ignition, page 745.

Readily carbonizable substances—Carefully superimpose 5 cc. of Lactic Acid upon an equal volume of sulfuric acid in a test tube, and keep the temperature at 15°: no dark color develops at the zone of contact of the two liquids within 15 minutes.

Chloride—The addition of 2 drops of nitric acid and 1 cc. of silver nitrate T.S. to 10 cc. of an aqueous solution of Lactic Acid (1 in 100) produces no turbidity.

Citric, oxalic, phosphoric, or tartaric acid—Add 40 cc. of calcium hydroxide T.S. to 10 cc. of an aqueous solution of Lactic Acid (1 in 10), and boil for 2 minutes: no turbidity is produced.

Sulfate—The addition of 2 drops of hydrochloric acid and 1 cc. of barium chloride T.S. to 10 cc. of an aqueous solution of Lactic Acid (1 in 100) produces no turbidity.

Heavy metals—Dilute 1.7 cc. (2 Gm.) of Lactic Acid with 10 cc. of distilled water, and add 1 drop of phenolphthalein T.S., followed by ammonia T.S. until the solution is faintly pink. Add 2.5 cc. of diluted hydrochloric acid, and dilute to 25 cc. with distilled water: the heavy metals limit, page 721, for Lactic Acid is 10 parts per million.

Sugars—Add 5 drops of Lactic Acid to 10 cc. of hot alkaline cupric tartrate T.S.: no red precipitate is produced.

Assay—Add 50 cc. of 1 *N* sodium hydroxide to about 2.5 cc. of Lactic Acid, accurately weighed in a tared 250-cc. flask, and boil the mixture for 20 minutes. Titrate the excess of alkali in the hot solution with 1 *N* sulfuric acid, using phenolphthalein T.S. as the indicator. Perform a blank test with the same quantities of the same reagents and in the same manner, and make any necessary correction. Each cc. of 1 *N* sodium hydroxide is equivalent to 0.09008 Gm. of $HC_3H_5O_3$.

Storage—Preserve Lactic Acid in tight containers.

LARKSPUR
Delphinium
Larkspur Seed

Larkspur is the dried ripe seed of *Delphinium Ajacis* Linné (Fam. *Ranunculaceæ*).

Unground Larkspur—Unground Larkspur occurs as an irregularly tetrahedral seed, acute at one end, obtuse or rounded at the other, about 2 mm. in length, and nearly as wide. The surface is brownish black to dark yellowish brown, occasionally light brownish gray or yellowish gray, and has from 8 to 12 ridges transversely encircling the seed and forming wavy, continuous, vertical walls or ruffles, occasionally intersecting, and with narrow channels between. The seed coat is crustaceous. The endosperm is light gray, fleshy, and oily, and the small embryo is embedded within it.

Histology—Larkspur shows an epidermis of non-lignified cells with thick walls, some of the cells being radially elongated forming the ruffle-like projections; a layer of cells containing a brownish pigment; an inner seed coat composed of non-lignified cells with thick porous walls; and occasional cells near the micropyle containing a few starch grains. The endosperm is large and is composed of thick-walled parenchyma, the cells filled with fixed oil and aleurone grains.

Powdered Larkspur—Powdered Larkspur is brown to olive-gray, has a very faint odor, and a bitter, afterward biting and acrid taste. It shows numerous fragments of endosperm; aleurone grains up to 12 microns in length; fragments composed of elongated epidermal cells, the latter up to about 45 microns in diameter and 300 microns in length; and groups of elongated cells from the inner layer of the seed coat up to 10 microns in width, with characteristic beaded walls.

Foreign organic matter—Larkspur contains not more than 2 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Larkspur yields not more than 2 per cent of acid-insoluble ash, page 761.

LARKSPUR TINCTURE
Tinctura Delphinii
Tr. Delphin.

Larkspur, in moderately coarse powder	**100 Gm.**
Alcohol, a sufficient quantity,	
To make	**1000 cc.**

Prepare the Tincture by Process P, page 758. Use alcohol as the menstruum, macerate the drug during 24 hours, and percolate at a moderate rate.

Alcohol content—From 87 to 93 per cent, by volume, of C_2H_5OH.

Storage—Preserve Larkspur Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

FOR EXTERNAL USE AS A PARASITICIDE—Undiluted or diluted with an equal volume of water.

Larkspur Tincture, Acetic

ACETIC LARKSPUR TINCTURE
Tinctura Delphinii Acetica

Tr. Delphin. Acet.

NOTE: Acetic Larkspur Tincture may be dispensed when Larkspur Lotion is ordered.

Larkspur, in coarse powder	100 Gm.
Acetic Acid	50 cc.
Alcohol	100 cc.
Glycerin	50 cc.
Water, a sufficient quantity,	
To make	1000 cc.

Boil the powdered larkspur with the acetic acid, the glycerin, and 800 cc. of water for 10 minutes in a covered vessel; set it aside until cool, add the alcohol, and macerate overnight. Filter, and add enough water through the filter to make the product measure 1000 cc.

Alcohol content—From 8 to 10 per cent, by volume, of C_2H_5OH.
Storage—Preserve Acetic Larkspur Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

FOR EXTERNAL USE AS A PARASITICIDE—Undiluted.

Lead and Opium Lotion

LEAD AND OPIUM LOTION
Lotio Plumbi et Opii

Lot. Plumb. et Opii Lead and Opium Wash

Lead Acetate	18 Gm.
Opium Tincture	35 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the lead acetate in about 650 cc. of distilled water, add the opium tincture and sufficient distilled water to make the product measure 1000 cc.

NOTE: Shake Lead and Opium Lotion thoroughly before dispensing.

Alcohol content—Less than 1 per cent, by volume, of C_2H_5OH.
Storage—Preserve Lead and Opium Lotion in tight containers.

LEAD MONOXIDE
Plumbi Monoxidum

Plumb. Monoxid. Plumbi Oxidum Litharge

PbO Mol. Wt. 223.21

Lead Monoxide, when freshly ignited, contains not less than 97 per cent of PbO.

Description—Lead Monoxide occurs as a heavy, yellowish or reddish powder, or as minute scales, without odor or taste. On exposure to the air, it slowly absorbs moisture and carbon dioxide. When heated, Lead Monoxide becomes darker in color, but assumes its original color on cooling. It fuses at a red heat. When heated in contact with charcoal, it is reduced to metallic lead.

Solubility—Lead Monoxide is almost insoluble in water, to which, however, it imparts a faintly alkaline reaction. It is insoluble in alcohol. It is dissolved by acetic acid, by diluted nitric acid, and by warm solutions of the hydroxides of the fixed alkalies.

Identification—A solution of Lead Monoxide (1 in 10) in diluted nitric acid is colorless, and, when nearly neutralized by ammonia T.S., responds to the tests for *Lead*, page 725.

Loss on ignition—Lead Monoxide loses not more than 4 per cent of its weight on ignition.

Acetic acid-insoluble substances—Shake 5 Gm. of Lead Monoxide in a small flask with 5 cc. of distilled water, and add 20 cc. of acetic acid. Boil the mixture for a few minutes, filter, wash the insoluble residue thoroughly with diluted acetic acid, and dry at 110°: the weight of the residue does not exceed 0.1 Gm.

Alkalies and earths—Precipitate the lead from the filtrate and washings, obtained in the preceding tests, with hydrogen sulfide, and filter. To one-fifth of the filtrate, add 5 drops of sulfuric acid, evaporate to dryness and ignite: the weight of the residue does not exceed 5 mg.

Assay—Dissolve about 0.4 Gm. of freshly ignited Lead Monoxide, accurately weighed, in 2 cc. of glacial acetic acid and 25 cc. of recently boiled distilled water, in a 200-cc. volumetric flask, and mix the solution with 50 cc. of 0.1 *N* oxalic acid. Fill the flask to the 200-cc. mark with distilled water, mix well, filter through a dry filter paper into a dry flask, and reject the first 20 cc. of filtrate. Collect 100 cc. of the subsequent filtrate, acidify it with 20 cc. of diluted sulfuric acid, warm to about 80°, and titrate the oxalic acid with 0.1 *N* potassium permanganate. Each cc. of 0.1 *N* oxalic acid is equivalent to 0.01116 Gm. of PbO.

Storage—Preserve Lead Monoxide in tight containers.

LEAD OLEATE OINTMENT
Unguentum Plumbi Oleatis

Ung. Plumb. Oleat. Unguentum Diachylon

Lead Oleate Plaster	**500 Gm.**
Lavender Oil	**10 Gm.**
White Petrolatum	**490 Gm.**
To make about	**1000 Gm.**

Melt together the lead oleate plaster and the white petrolatum with gentle heat; then strain the mixture, allow it to cool but not congeal, add the lavender oil, and stir until it is cold.

Storage—Preserve Lead Oleate Ointment in tight containers and avoid prolonged exposure to temperatures above 40°.

Lead Oleate Plaster

LEAD OLEATE PLASTER
Emplastrum Plumbi Oleatis

Emp. Plumb. Oleat. Lead Plaster Diachylon Plaster

Lead Monoxide	1000 Gm.
Olive Oil	1000 Gm.
Lard	1000 Gm.

Water, a sufficient quantity.

Heat the olive oil and lard together until liquefied, in a bright copper or other suitable vessel of a capacity not less than 4 times the bulk of the ingredients. Sift the lead monoxide through a fine sieve upon the surface of the hot liquid, and mix thoroughly. Then gradually add 350 cc. of boiling water, and boil the mixture, constantly stirring with a wooden spatula and adding sufficient boiling water from time to time to replace that lost by evaporation, until the mass is homogeneous and a small portion removed and dipped into cold water is found to be pliable and tenacious. Then discontinue heating, and wash several times with warm water to remove the glycerin. Finally knead the mass until it is free from water, roll it into cylinders of suitable size, and wrap them in paper.

Storage—Preserve Lead Oleate Plaster in well-closed containers.

Lead Subacetate Cerate

LEAD SUBACETATE CERATE
Ceratum Plumbi Subacetatis

Cerat. Plumb. Subacet. Goulard's Cerate

Lead Subacetate Solution	200 Gm.
Wool Fat	200 Gm.
White Wax	200 Gm.
White Petrolatum	380 Gm.
Camphor	20 Gm.
To make	1000 Gm.

Melt the white wax and the white petrolatum in a dish on a water bath, remove the heat, and dissolve the camphor in the warm mixture. Add the wool fat, mix thoroughly, and then gradually incorporate the lead subacetate solution by continuous stirring.

Storage—Preserve Lead Subacetate Cerate in well-closed containers at a temperature below 40°.

LEAD SUBACETATE SOLUTION

Liquor Plumbi Subacetatis

Liq. Plumb. Subacet. Goulard's Extract

Lead Subacetate Solution is an aqueous solution containing, in each 100 cc., lead subacetate, approximately $Pb_2O(CH_3.COO)_2$, equivalent to not less than 22.5 Gm. of Pb.

Lead Acetate	220 Gm.
Lead Monoxide	140 Gm.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Triturate the lead monoxide to a smooth paste with 100 cc. of distilled water, and transfer the mixture to a bottle of about 1000-cc. capacity, using an additional 100 cc. of distilled water for rinsing. Dissolve the lead acetate in 700 cc. of distilled water, and add the solution to the lead oxide mixture. Shake the mixture vigorously for 5 minutes; then set it aside for 7 days, shaking frequently during this time. Filter, protecting the solution from undue contact with the air, and pass enough recently boiled distilled water through the filter to make the product measure 1000 cc.

This Solution may also be prepared as follows: Boil the mixture of lead acetate, lead monoxide, and water for 30 minutes in a suitable flask, adding small portions of distilled water as necessary to maintain the volume; then cool, and filter. The funnel during filtration should be covered to protect the solution from carbonation; pass sufficient recently boiled distilled water through the filter to make the product measure 1000 cc.

Description—Lead Subacetate Solution is a clear, colorless, odorless liquid, having a very sweet, astringent taste. On exposure to the air, it absorbs carbon dioxide, which causes the formation of a white precipitate. It is alkaline to litmus paper but not to phenolphthalein T.S.

Specific gravity—The specific gravity of Lead Subacetate Solution is about 1.25 at 25°.

Identification—

A: Lead Subacetate Solution responds to the tests for *Lead*, page 725, and for *Acetate*, page 722.

B: When 1 cc. of Lead Subacetate Solution is added to 5 cc. of mucilage of acacia (1 in 10), it produces a dense white precipitate (*difference from normal lead acetate*).

Alkalies and earths—Add 5 cc. of acetic acid to about 2 cc. of Lead Subacetate Solution, accurately weighed, and dilute with distilled water to 100 cc. Pass hydrogen sulfide through the mixture until the lead is completely precipitated, and filter through a dry filter, rejecting the first portion of the filtrate. To 50 cc. of the subsequent filtrate add a few drops of sulfuric acid; evaporate to dryness, and ignite to constant weight. The weight of the residue does not exceed 0.25 per cent of the weight of the Lead Subacetate Solution taken.

Copper or iron—Lead Subacetate Solution yields a white precipitate with potassium ferrocyanide T.S., but remains free from even a transient red or blue color.

Assay—Dilute 5 cc. of Lead Subacetate Solution, accurately measured, with sufficient recently boiled distilled water to make 100 cc. To 25 cc. of this dilution in a 200-cc. volumetric flask, add 50 cc. of 0.1 *N* oxalic acid. Agitate the mixture well, fill to the mark with distilled water, agitate, and filter through a dry filter into a dry flask. Reject the first 20 cc. of filtrate, acidify 100 cc. of the subsequent filtrate with 5 cc. of sulfuric acid, warm to about 80°, and titrate the excess oxalic acid with 0.1 *N* potassium permanganate. Each cc. of 0.1 *N* oxalic acid is equivalent to 0.01036 Gm. of Pb.

Storage—Preserve Lead Subacetate Solution in small, well-filled, tight containers.

FOR EXTERNAL USE—Dilute with 4 volumes of freshly boiled distilled water.

Lead Subacetate Solution, Diluted

DILUTED LEAD SUBACETATE SOLUTION

Liquor Plumbi Subacetatis Dilutus

Liq. Plumb. Subacet. Dil. Lead Water

Diluted Lead Subacetate Solution is an aqueous solution containing, in each 100 cc., lead subacetate, approximately $Pb_2O(CH_3.COO)_2$, equivalent to not less than 0.7 Gm. and not more than 0.8 Gm. of Pb.

Lead Subacetate Solution	**35 cc.**
Distilled Water, recently boiled, a sufficient quantity,	
To make	**1000 cc.**

Mix the lead subacetate solution with sufficient of the recently boiled distilled water to make the product measure 1000 cc.

Description—Diluted Lead Subacetate Solution is a colorless liquid, usually showing a slight turbidity; it has a sweet, astringent taste. It is alkaline to litmus paper.

Identification—

A: Diluted Lead Subacetate Solution responds to the tests for *Lead*, page 725, and for *Acetate*, page 722.

B: A white precipitate is formed when 5 cc. of Diluted Lead Subacetate Solution is mixed with 5 cc. of acacia mucilage (*difference from normal lead acetate*).

Copper or iron—Diluted Lead Subacetate Solution yields a white precipitate with potassium ferrocyanide T.S. but remains free from even a transient red or blue color.

Assay—Transfer 50 cc. of Diluted Lead Subacetate Solution, accurately measured, to a 200-cc. volumetric flask, and proceed as directed in the *Assay* under *Lead Subacetate Solution*, page 296, beginning with, "add 50 cc. of 0.1 *N* oxalic acid . . ." Each cc. of 0.1 *N* oxalic acid is equivalent to 0.01036 Gm. of Pb.

Storage—Preserve Diluted Lead Subacetate Solution in small, well-filled, tight containers.

FOR EXTERNAL USE—Undiluted.

LEPTANDRA
Leptandra
Culversroot

Leptandra consists of the dried rhizome and roots of *Veronicastrum virginicum* (Linné) Farwell (*Veronica virginica* Linné) (Fam. *Scrophulariaceæ*).

Unground Leptandra—Unground Leptandra rhizome is usually of horizontal growth, from 4 to 10 cm. in length and from 4 to 13 mm. in diameter, nearly cylindrical, somewhat branched, the branches readily separable from the main rhizome; it is externally weak brown to moderate yellowish brown, annulate from circular scars of bud-scales. The upper surface shows numerous circular stem-scars, and occasional short stem remnants and buds. Numerous coarse roots arise from the under and lateral portions. The fracture is very tough and woody, and shows a rather thin, pale brown to dusky brown and resinous bark internally; a yellowish white to light brown and porous wood about the same thickness as the bark; a more or less hollow and large pith, having a color the same as that of the bark. The roots are up to 10 cm. in length and from 0.5 to 2 mm. in diameter; the same color as the rhizome, and smooth or faintly longitudinally wrinkled. The fracture is short, showing a thick, dark-colored cortex and a small, light-colored central cylinder internally.

Powdered Leptandra—Powdered Leptandra is pale brown to light yellowish brown, having a characteristic odor, and a very bitter and acrid taste. The starch grains are numerous, located mostly in the parenchyma cells, the individual grains nearly spherical or more or less polygonal, and up to 9 microns in diameter. The tracheæ have spiral thickenings or simple or bordered pores. The wood fibers have thick lignified walls, with simple pores or with bordered pores resembling tracheids. Fragments of parenchyma are present containing a reddish black to yellowish orange resin, frequently closely coherent with the starch grains in the cells, thus preventing the separation of individual starch grains. When mounted in chloral hydrate T.S., many fragments show orange-pink to reddish orange cell contents and occasionally elongated cells with a yellow oily content.

Stem bases—Leptandra contains not more than 5 per cent of attached stem bases.

Foreign organic matter—Leptandra contains not more than 2 per cent of foreign organic matter, other than attached stem bases, page 760.

Acid-insoluble ash—Leptandra yields not more than 6 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—1 Gm. (approximately 15 grains).

Leptandra Extract

LEPTANDRA EXTRACT
Extractum Leptandræ

Ext. Leptand. Culversroot Extract Powdered Leptandra Extract

One Gm. of the Extract represents 4 Gm. of leptandra.

Prepare the Extract from leptandra, in moderately coarse powder, by percolation and evaporation. Use a mixture of 3 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 24 hours, and percolate at a moderate rate. Evaporate the percolate to dryness at a temperature not exceeding 70°. Reduce the residue to a fine powder, and mix it thoroughly, if necessary, with sufficient dry starch to make the Extract weigh one-fourth of the weight of the leptandra taken.

Storage—Preserve Leptandra Extract in tight, light-resistant containers, preferably at a temperature not above 30°.

AVERAGE DOSE—**0.25 Gm.** (approximately 4 grains).

Lime

LIME
Calx

Calcium Oxide Quicklime

CaO Mol. wt. 56.08

Lime, when freshly ignited to constant weight with a blast lamp, contains not less than 95 per cent of CaO.

Description—Lime occurs as hard, white or grayish white masses or granules, or a white powder. It is odorless.

Solubility—One Gm. of Lime dissolves in about 840 cc. of water at 25°, and in about 1740 cc. of boiling water. It is soluble in glycerin and in syrup, but is insoluble in alcohol.

Identification—

A: When lime is moistened with water, heat is generated and a white powder is obtained (calcium hydroxide or slaked lime). When this is mixed with about 3 or 4 times its weight of water, it forms a smooth magma (milk of lime) which is alkaline to litmus paper.

B: Slake 1 Gm. of Lime with 20 cc. of distilled water, and add acetic acid until the lime is dissolved: the resulting solution reponds to the tests for *Calcium*, page 723.

Loss on ignition—Ignite a portion of Lime to constant weight in a tared platinum crucible with a blast lamp: it loses not more than 10 per cent of its weight.

Insoluble substances—Slake 5 Gm. of Lime, then mix it with 100 cc. of distilled water, followed by hydrochloric acid, dropwise, with agitation, until solution takes place: the resulting solution after boiling and cooling must be acid and when filtered through a tared Gooch crucible yield not more than 50 mg. of insoluble matter.

Carbonate—Slake 1 Gm. of Lime, thoroughly mix it with 50 cc. of water, and decant the greater portion of the milky liquid: the addition of an excess of diluted hydrochloric acid to the residue does not cause more than a slight effervescence.

Alkalies or magnesium—Dissolve 0.5 Gm. of Lime in 30 cc. of distilled water and 15 cc. of diluted hydrochloric acid. Neutralize the solution with ammonia T.S., heat to boiling, and add ammonium oxalate T.S. to precipitate the calcium completely. Heat the mixture on a water bath for 1 hour, cool, dilute to 100 cc. with distilled water, mix well, and filter. To 50 cc. of the filtrate add 0.5 cc. of sulfuric acid, evaporate to dryness, and ignite to constant weight in a tared platinum crucible. The weight of the residue does not exceed 9 mg.

Assay—Ignite about 1 Gm. of Lime to constant weight with a blast lamp, weigh accurately, dissolve in 20 cc. of diluted hydrochloric acid, cool the solution, dilute with distilled water to 100 cc., and mix well. Transfer 20 cc. of this solution to a 200-cc. volumetric flask, add 100 cc. of 0.1 *N* oxalic acid, render it alkaline with ammonia T.S., shake the mixture well, and allow it to stand for 3 hours at from 60° to 70°, or overnight at room temperature. Cool the liquid, if necessary, fill the flask with distilled water to 200 cc., mix well, filter through a dry filter into a flask, reject the first 20 cc. of the filtrate, acidify 100 cc. of the subsequent filtrate with diluted sulfuric acid, then add 25 cc. more of the diluted sulfuric acid, warm the solution to about 70°, and titrate the excess oxalic acid with 0.1 *N* potassium permanganate. Each cc. of 0.1 *N* oxalic acid is equivalent to 0.002804 Gm. of CaO.

Storage—Preserve Lime in tight containers.

LIME LINIMENT
Linimentum Calcis

Lin. Calc. Carron Oil

Calcium Hydroxide Solution	**500 cc.**
Linseed Oil	**500 cc.**
To make	**1000 cc.**

Mix the ingredients by agitation.

Storage—Preserve Lime Liniment in tight containers.

SULFURATED LIME SOLUTION
Liquor Calcis Sulfuratæ

Liq. Calc. Sulfurat. Vleminckx' Solution Vleminckx' Lotion

Lime	**165 Gm.**
Sublimed Sulfur	**250 Gm.**
Water, a sufficient quantity,	
To make	**1000 cc.**

Slake the lime, mix it with the sulfur, and add the mixture gradually to 1750 cc. of boiling water. Boil this mixture, with frequent agitation, until it is reduced to 1000 cc., and maintain approximately this volume for 1 hour, while boiling, by the addition of water from time to time. Cool, filter, and pass sufficient water through the filter to make the product measure 1000 cc.

Description—Sulfurated Lime Solution is a clear, orange liquid, with a slight odor of hydrogen sulfide. It is alkaline to litmus paper.

Identification—

A: Add an excess of diluted hydrochloric acid to 5 cc. of Sulfurated Lime Solution: the color changes to a greenish yellow, a yellowish precipitate of sulfur appears, and hydrogen sulfide is evolved with effervescence.

B: Boil the liquid obtained in the foregoing test, filter, and add a slight excess of ammonia T.S., followed by a slight excess of acetic acid: the addition of 1 cc. of ammonium oxalate T.S. produces a white precipitate.

Storage—Preserve Sulfurated Lime Solution in completely filled, tight containers.

FOR EXTERNAL USE—Dilute with 9 volumes of water.

Liniments

Acetic Turpentine Liniment, page 542
Aconite and Chloroform Liniment, page 23
Ammonia Liniment, page 43
Belladonna Liniment, page 74
Calamine Liniment, page 100
Compound Soft Soap Liniment, page 467
Lime Liniment, page 299
Neocalamine Liniment, page 349
Solid Soap Liniment, page 468
Turpentine Liniment, page 542

Linseed

LINSEED

Linum

Flaxseed

Linseed is the dried ripe seed of *Linum usitatissimum* Linné (Fam. *Linaceæ*).

Linseed yields not less than 30 per cent of non-volatile, ether-soluble extractive, of which not more than 2 per cent is unsaponifiable matter.

Unground Linseed—Linseed is ovoid or oblong-lanceolate, obliquely pointed at one end, from 4 to 6 mm. in length; externally brown to dusky red; and is smooth and shiny. The raphe is a distinct, lighter-colored ridge along one edge and the hilum and micropyle are located in a slight depression just below the pointed end. Internally, Linseed is oily and light yellowish brown to weak yellow.

Histology—Linseed has a spermoderm consisting of an epidermis with a mucilaginous outer wall covered by a very thin, more or less broken sheath of cutin; 2 layers of parenchyma overlying a continuous layer of stone cells; a hyaline layer of narrow, elongated, colorless cells and a pigment layer whose cells have red to orange contents. The endosperm is composed of from 6 to 10 rows of cells, surrounding 2 large plano-convex cotyledons. The cells of the cotyledons and endosperm contain fixed oil and aleurone grains.

Powdered Linseed—Powdered Linseed is yellowish brown and has a slight odor and a mucilaginous, oily and distinctive taste. It consists chiefly of large oil globules and irregular fragments of endosperm, embryo, and seed coat. The seed coat is characterized by tabular pigment cells filled with reddish brown to yellowish brown, amorphous contents and by the somewhat radially elongated stone cells with orange to yellowish brown, porous walls and rather large lumina, and elongated, colorless cross cells. The aleurone grains vary from 3 to 20 microns in diameter.

Linseed meal—Linseed meal is light yellowish brown to weak yellow and contains numerous dark-colored fragments of the seed coat. The fragments of both the seed-coat and kernel are usually very coarse and contain the same cellular tissues as the powder.

Cottonseed meal—Linseed meal and Powdered Linseed do not show irregular epidermal cells with thick stratified yellowish walls and brown contents, twisted hairs or palisade cells, in excess of the tolerance on foreign seeds.

Cruciferous seed meals—Linseed meal and Powdered Linseed do not show the histological characteristics of cruciferous seeds in an amount in excess of the tolerance on foreign seeds.

Starch or starch-bearing seeds—Boil 50 cc. of distilled water with 1 Gm. of Powdered Linseed or Linseed meal, filter the cooled mixture, and add Iodine T.S. to the filtrate: not more than a faint blue color is produced.

Foreign seeds and foreign organic matter—Linseed contains not more than 2 per cent of other seeds or foreign organic matter, page 760.

Acid-insoluble ash—Linseed yields not more than 1 per cent of acid-insoluble ash, page 761.

Assay—Proceed as directed for the determination of *Non-volatile, Ether-soluble Extractive*, page 764, using 20 Gm. of ground or powdered Linseed. The non-volatile, ether-soluble extractive weighs not less than 6 Gm. Determine the unsaponifiable matter in 5 Gm. of this anhydrous extractive as directed on page 714: not more than 2 per cent of unsaponifiable matter remains.

LINSEED OIL
Oleum Lini

Ol. Lini Flaxseed Oil Raw Linseed Oil

Linseed Oil is the fixed oil obtained from the dried ripe seed of *Linum usitatissimum* Linné (Fam. *Linaceæ*).

Note: Linseed Oil that has been "boiled" or treated with a drier must not be used or dispensed.

Description—Linseed Oil is a yellow, oily liquid, having a characteristic odor and a bland taste. When exposed to air, it gradually thickens, darkens in color, and acquires a more pronounced odor and taste.

Solubility—Linseed Oil is slightly soluble in alcohol, but is miscible with ether, with chloroform, with petroleum benzin, with carbon disulfide, and with turpentine oil.

Specific gravity—The specific gravity of Linseed Oil is not less than 0.925 and not more than 0.935 at 25°.

Non-drying oils—Linseed Oil, when spread in a thin layer on a glass plate and allowed to stand in a warm place protected from dust, is gradually converted into a hard, transparent film.

Mineral or rosin oils—To 10 cc. of Linseed Oil add 3 Gm. of potassium hydroxide, 10 cc. of alcohol, and 10 cc. of distilled water, and heat the mixture on a water bath with frequent agitation until a clear solution results: the addition of 100 cc. of distilled water to this solution yields a clear liquid free from oily drops.

Rosin or rosin oils—Warm 10 cc. of Linseed Oil with an equal volume of acetic anhydride in a test tube until solution is effected. Allow the mixture to cool, then separate the lower anhydride layer, and filter it through a small filter moistened with acetic anhydride. Place 2 or 3 drops of the filtrate on a white porcelain surface, and add 1 drop of sulfuric acid: no purplish color is produced.

Unsaponifiable matter—Linseed Oil contains not more than 1.5 per cent of unsaponifiable matter, page 714.

Saponification value—The saponification value of Linseed Oil is not less than 187 and not more than 195, page 713.

Iodine value—The iodine value of Linseed Oil is not less than 170, page 713.

Acid value—The free fatty acids in 10 Gm. of Linseed Oil require for neutralization not more than 7.5 cc. of 0.1 *N* sodium hydroxide, page 712.

Storage—Preserve Linseed Oil in tight containers.

Liquid Petrolatum Emulsion with Phenolphthalein, page 384

Lithium Benzoate

LITHIUM BENZOATE

Lithii Benzoas

Lith. Benz.

$LiC_7H_5O_2$ Mol. wt. 128.05

Lithium Benzoate, when dried at 105° for 3 hours, contains not less than 99 per cent of $C_6H_5.COOLi$.

Description—Lithium Benzoate occurs as a white powder or as small crystalline scales. It is stable in the air, odorless, or with a faint odor, and has an alkaline, cooling, sweetish taste.

Solubility—One Gm. of Lithium Benzoate dissolves in about 3 cc. of water and in about 16 cc. of alcohol, at 25°. It is slightly more soluble in these solvents when they are hot.

Identification—

A: An aqueous solution of Lithium Benzoate (1 in 20) responds to the tests for *Lithium*, page 725, and for *Benzoate*, page 723.

B: When heated, Lithium Benzoate at first fuses; at higher temperatures it chars, emitting inflammable vapors having a benzoin-like odor, and finally leaves a residue of lithium carbonate and carbon. This residue is alkaline to litmus paper and effervesces with acids.

Loss on drying—When dried at 105° for 3 hours, Lithium Benzoate loses not more than 0.5 per cent of its weight.

Reaction—An aqueous solution of Lithium Benzoate (1 in 20), after a testing interval of 10 minutes, is alkaline to litmus paper but not to phenolphthalein T.S.

Carbonate—Add about 0.5 Gm. of Lithium Benzoate to 5 cc. of acetic acid: no effervescence is produced.

Other alkalies—Dissolve 0.6 Gm. of Lithium Benzoate in 25 cc. of distilled water, add 5 cc. of diluted hydrochloric acid, filter, and wash the precipitate with about 25 cc. of distilled water. Proceed as directed in the test for *Other alkalies* under *Lithium*

Citrate, page 306, beginning with, "Evaporate the combined filtrate and washings . . . ." The weight of the residue does not exceed 4 mg.

Coloring matter—A freshly prepared aqueous solution of Lithium Benzoate (1 in 20) is colorless.

Chlorinated compounds—Dissolve about 1 Gm. of Lithium Benzoate in 20 cc. of distilled water in a separator and add 10 cc. of diluted sulfuric acid; extract the precipitate of benzoic acid by shaking with 2 portions of 20 cc. each of ether, and evaporate the ether solution to dryness at a low temperature. Mix 0.5 Gm. of benzoic acid thus obtained and 0.7 Gm. of calcium carbonate with a little distilled water in a crucible, dry the mixture, and incinerate it at a low red heat. Dissolve the residue in 20 cc. of diluted nitric acid, filter, wash the filter and insoluble residue with 15 cc. of distilled water, and add to the filtrate 0.5 cc. of 0.1 *N* silver nitrate and enough distilled water to make exactly 50 cc. of mixture. Dissolve 0.7 Gm. of the same specimen of calcium carbonate in 20 cc. of diluted nitric acid, filter if necessary, add 0.5 cc. of 0.1 *N* silver nitrate and enough distilled water to make 50 cc. of liquid. Add to this mixture, from a burette, 0.02 *N* hydrochloric acid, dropwise, mixing well after each addition, until the turbidity matches that of the benzoic acid test mixture: not more than 0.6 cc. of 0.02 *N* hydrochloric acid is required in the control test.

Heavy metals—Dissolve 1 Gm. of Lithium Benzoate in 1 cc. of 0.1 *N* hydrochloric acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Lithium Benzoate is 20 parts per million.

Assay—Transfer about 1 Gm. of Lithium Benzoate, dried at 105° for 3 hours and accurately weighed, to a tall beaker or flask of about 300-cc. capacity, and add 75 cc. of ether and 5 drops of methyl orange T.S. Titrate the mixture with 0.5 *N* hydrochloric acid, mixing intimately the aqueous and ether layers by vigorous stirring, until a permanent orange color is produced in the aqueous layer. Each cc. of 0.5 *N* hydrochloric acid is equivalent to 0.06403 Gm. of C_6H_5COOLi.

Storage—Preserve Lithium Benzoate in well-closed containers.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

LITHIUM BROMIDE
Lithii Bromidum

Lith. Bromid.

LiBr Mol. wt. 86.86

Lithium Bromide, when dried at 165° for 3 hours, contains not less than 99 per cent of LiBr.

Description—Lithium Bromide occurs as a white, or pinkish white, granular powder, odorless, and with a sharp, slightly bitter taste. It is very deliquescent. Its solutions are neutral or alkaline to litmus paper.

Solubility—One Gm. of Lithium Bromide dissolves in about 0.6 cc. of water at 25° and in about 0.4 cc. of boiling water; it is freely soluble in alcohol and is soluble in ether.

Identification—An aqueous solution of Lithium Bromide (1 in 20) responds to the tests for *Lithium*, page 725, and for *Bromide*, page 723.

Loss on drying—When dried at 165° for 3 hours, Lithium Bromide loses not less than 10 and not more than 15 per cent of its weight.

Chloride—Dissolve about 0.1 Gm. of Lithium Bromide in 5 cc. of distilled water, and add an excess of silver nitrate T.S. and a few drops of nitric acid; filter, and wash the precipitate with distilled water; then digest it for 10 minutes with 5 cc. of ammonium carbonate T.S., and filter. The filtrate, diluted to 40 cc. and

strongly acidified with nitric acid, shows no more chloride than corresponds to 1.0 cc. of 0.02 *N* hydrochloric acid.

Iodide—Add a few drops of ferric chloride T.S. and 1 cc. of chloroform to 10 cc. of an aqueous solution of Lithium Bromide (1 in 20), and shake the mixture: the chloroform remains free from even a transient purplish color.

Bromate—Drop 1 cc. of diluted sulfuric acid on about 1 Gm. of powdered Lithium Bromide: no yellow color is produced immediately.

Sulfate—The addition of 1 cc. of barium chloride T.S. to 5 cc. of an aqueous solution of Lithium Bromide (1 in 100), acidified with 4 drops of hydrochloric acid, produces no turbidity immediately.

Other alkalies—Add 5 cc. of hydrochloric acid and 5 cc. of chlorine T.S. to 0.4 Gm. of Lithium Bromide contained in a flat-bottomed flask of 50-cc. capacity. Proceed as directed in the test for *Other alkalies* under *Lithium Citrate*, page 306: the weight of the residue does not exceed 2 mg.

Heavy metals—Dissolve 1 Gm. of Lithium Bromide in 1 cc. of diluted acetic acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Lithium Bromide is 10 parts per million.

Assay—Dissolve about 0.35 Gm. of Lithium Bromide, previously dried at 165° for 3 hours and weighed accurately in a stoppered weighing bottle, in about 50 cc. of distilled water. Add 50 cc. of 0.1 *N* silver nitrate, 5 cc. of nitric acid, and 2 cc. of ferric ammonium sulfate T.S. to the solution, and titrate the excess of silver nitrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.008686 Gm. of LiBr.

Storage—Preserve Lithium Bromide in tight containers.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Lithium Carbonate

LITHIUM CARBONATE

Lithii Carbonas

Li_2CO_3 **Lith. Carb.** Mol. wt. 73.89

Lithium Carbonate, when dried at 105° for 3 hours, contains not less than 99 per cent of Li_2CO_3.

Description—Lithium Carbonate occurs as a white, granular powder which is permanent in the air. It is odorless, and has an alkaline taste. Its saturated solutions are alkaline to litmus paper.

Solubility—One Gm. of Lithium Carbonate dissolves slowly in about 100 cc. of water at 25°. The resulting solution may not be entirely clear due to allowable traces of other carbonates or of other insoluble substances. It is almost insoluble in alcohol.

Identification—Lithium Carbonate responds to the tests for *Lithium*, page 725, and for *Carbonate*, page 723.

Loss on drying—When dried at 105° for 3 hours, Lithium Carbonate loses not more than 0.5 per cent of its weight.

Acetic acid-insoluble substances—Dissolve 1 Gm. of Lithium Carbonate in 40 cc. of diluted acetic acid, filter the solution through a quantitative filter paper, transferring the residue completely to the filter, wash the filter with five 10-cc. portions of hot water, and ignite gently until the carbon is consumed: not more than 1.5 mg. of residue remains.

Chloride—One-half Gm. of Lithium Carbonate shows no more chloride than corresponds to 0.5 cc. of 0.02 *N* hydrochloric acid, page 758.

Sulfate—One Gm. of Lithium Carbonate shows no more sulfate than corresponds to 2.5 cc. of 0.02 *N* sulfuric acid, the time limit for this turbidimetric test being 3 minutes, page 759.

Other alkalies—Add a slight excess of diluted hydrochloric acid to 0.2 Gm. of Lithium Carbonate contained in a flat-bottomed flask of 50-cc. capacity. Proceed as directed in the test for *Other alkalies* under *Lithium Citrate*, page 306: the weight of the residue does not exceed 2 mg.

Aluminum or iron—Dissolve 0.5 Gm. of Lithium Carbonate in 10 cc. of distilled water by adding hydrochloric acid, dropwise, with agitation; boil the solution and cool it. The addition of ammonia T.S. to 5 cc. of this solution until it has an alkaline reaction produces neither turbidity nor precipitation either before or after boiling.

Arsenic—A solution of 0.2 Gm. of Lithium Carbonate in 5 cc. of diluted hydrochloric acid, omitting treatment with sulfuric and sulfurous acids, meets the requirements of the test for *Arsenic*, page 689.

Calcium—Add a slight excess of diluted hydrochloric acid to 5 Gm. of Lithium Carbonate suspended in 50 cc. of distilled water. Boil the clear solution to expel carbon dioxide, add 5 cc. of ammonium oxalate T.S., make alkaline with ammonium hydroxide and let stand for 4 hours. Filter on a Gooch crucible and wash with warm water until the washings give no turbidity with calcium chloride solution. Place the crucible in a beaker, cover it with water, add 3 cc. of sulfuric acid, heat to 70° and titrate with 0.1 *N* potassium permanganate to a pale pink color which persists for 30 seconds. Not more than 3.75 cc. of 0.1 *N* permanganate is consumed.

Heavy metals—Dissolve 1 Gm. of Lithium Carbonate in 10 cc. of diluted hydrochloric acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Lithium Carbonate is 20 parts per million.

Assay—Dissolve about 1 Gm. of Lithium Carbonate, dried at 105° for 3 hours and accurately weighed, in 50 cc. of 1 *N* sulfuric acid, and titrate the residual sulfuric acid with 1 *N* sodium hydroxide, using methyl orange T.S. as the indicator. Each cc. of 1 *N* sulfuric acid is equivalent to 0.03695 Gm. of Li_2CO_3.

Storage—Preserve Lithium Carbonate in well-closed containers.

AVERAGE DOSE—**0.5 Gm.** (approximately $7^1/_2$ grains).

Lithium Citrate

LITHIUM CITRATE

Lithii Citras

Lith. Cit.

$Li_3C_6H_5O_7.4H_2O$ Mol. wt. 281.98

Lithium Citrate, when dried at 165° for 3 hours, contains not less than 99 per cent of $C_3H_4.OH.(COOLi)_3$.

Description—Lithium Citrate occurs as a white powder or as granules, and is deliquescent. It is odorless and has a cooling, faintly alkaline taste.

Solubility—One Gm. of Lithium Citrate dissolves in about 1.4 cc. of water at 25°; it is very slightly soluble in alcohol and insoluble in ether.

Identification—

A: An aqueous solution of Lithium Citrate (1 in 20) responds to the tests for *Lithium*, page 725, and for *Citrate*, page 724.

B: When heated, Lithium Citrate at first fuses; at higher temperatures it chars, emitting inflammable vapors having a pungent odor, and finally leaves a residue of lithium carbonate and carbon. This residue is alkaline to litmus paper and effervesces with acids.

Loss on drying—When dried at 165° for 3 hours, Lithium Citrate loses not less than 23 and not more than 26 per cent of its weight.

Free alkali—An aqueous solution of Lithium Citrate (1 in 20) is alkaline to litmus paper, but is not reddened by 1 drop of phenolphthalein T.S.

Carbonate—Add about 0.5 Gm. of Lithium Citrate to 5 cc. of acetic acid: no effervescence is produced.

Other alkalies—Treat the residue, obtained by igniting 0.4 Gm. of Lithium Citrate at a red heat, with about 5 cc. of diluted hydrochloric acid; filter, and wash the residue with about 25 cc. of distilled water. Evaporate the combined filtrate and washings on a water bath to a small volume in a beaker or dish; then transfer completely with the aid of a little distilled water into a flat-bottomed flask of about 50-cc. capacity, and evaporate almost to dryness on a water bath. Add 10 cc. of amyl alcohol, and cautiously heat the mixture until the lower aqueous layer has evaporated. The removal of the water from the amyl alcohol mixture is facilitated by passing a current of dry air through the hot solution. Then add 3 drops of hydrochloric acid, and boil the solution for 3 minutes. Collect any residue on a filter, wash it with amyl alcohol, and dry at 110° to constant weight: the weight of the residue does not exceed 4 mg.

Arsenic—Lithium Citrate meets the requirements of the test for *Arsenic*, page 689.

Heavy metals—Dissolve 1 Gm. of Lithium Citrate in 1 cc. of 0.1 *N* hydrochloric acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Lithium Citrate is 10 parts per million.

Assay—Heat about 1.2 Gm. of Lithium Citrate, dried at 165° for 3 hours and accurately weighed, in a porcelain crucible, heating at first very gently, then gradually raising the temperature to a dull red heat. The flame of the burner must not come in contact with the carbonized mass. Allow the carbonized mass to cool, moisten it with distilled water, ignite again, and repeat the moistening and igniting until a white residue is obtained. Then disintegrate the ignited mass and transfer it with the crucible to a beaker. Dissolve the residue in 50 cc. of 0.5 *N* sulfuric acid, and titrate the excess acid with 0.5 *N* sodium hydroxide, using methyl orange T.S. as the indicator. Each cc. of 0.5 *N* sulfuric acid is equivalent to 0.03499 Gm. of $C_2H_4.OH.(COOLi)_2$.

Storage—Preserve Lithium Citrate in tight containers.

AVERAGE DOSE—**0.5 Gm.** (approximately 7½ grains).

Lithium Salicylate

LITHIUM SALICYLATE

Lithii Salicylas

Lith. Salicyl.

$LiC_7H_5O_3$ Mol. wt. 144.05

Lithium Salicylate, when dried at 140° for 2 hours, contains not less than 99 per cent of $C_6H_4.OH.COOLi$.

Description—Lithium Salicylate occurs as a white or grayish white powder, and is deliquescent in moist air. It is odorless, or has a faint characteristic odor, and a sweetish taste. Its solutions are neutral or acid to litmus paper.

Solubility—Lithium Salicylate is very soluble in water and in alcohol.

Identification—

A: An aqueous solution of Lithium Salicylate (1 in 20) responds to the tests for *Lithium*, page 725, and for *Salicylate*, page 727.

B: When heated, Lithium Salicylate at first fuses; at higher temperatures it chars, emitting inflammable vapors having a phenol-like odor, and finally leaves a residue of lithium carbonate and carbon. This residue is alkaline to litmus paper and effervesces with acids.

Loss on drying—When dried at 140° for 2 hours, Lithium Salicylate loses not more than 5 per cent of its weight.

Carbonate—Add about 0.5 Gm. of Lithium Salicylate to 5 cc. of acetic acid: no effervescence is produced.

Other alkalies—Dissolve 0.7 Gm. of Lithium Salicylate in 25 cc. of distilled water, add 5 cc. of diluted hydrochloric acid, filter, and wash the precipitate with about 25 cc. of distilled water. Proceed as directed in the test for *Other alkalies* under *Lithium Citrate*, page 306: the weight of the residue does not exceed 5 mg.

Coloring matter—An aqueous solution of Lithium Salicylate (1 in 20), when freshly made, is colorless.

Arsenic—Lithium Salicylate meets the requirements of the test for *Arsenic*, page 689.

Heavy metals—Dissolve 1 Gm. of Lithium Salicylate in 1 cc. of 0.1 *N* hydrochloric acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Lithium Salicylate is 10 parts per million.

Assay—Transfer about 1.5 Gm. of Lithium Salicylate, dried at 140° for 2 hours and accurately weighed, to a tall beaker or flask of about 300-cc. capacity, and add 75 cc. of ether and 10 drops of bromophenol blue T.S. Titrate the mixture with 0.5 *N* hydrochloric acid, mixing intimately the aqueous and ether layers by vigorous stirring, until a permanent pale green color is produced in the aqueous layer. Transfer the contents of the titration beaker to a separator, and draw the aqueous layer into a clean flask. Wash the ether layer once with 5 cc. of distilled water, and draw the separated aqueous layer into the flask. Add 20 cc. of ether to the aqueous liquid in the flask, and complete the titration with 0.5 *N* hydrochloric acid to the production of a pale green color that persists on vigorous mixing of the two layers. Each cc. of 0.5 *N* hydrochloric acid is equivalent to 0.07203 Gm. of $C_6H_4.OH.COOLi$.

Storage—Preserve Lithium Salicylate in tight containers.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Lobelia

LOBELIA
Lobelia
Indian-tobacco

Lobelia consists of the dried leaves and tops of *Lobelia inflata* Linné (Fam. *Lobeliaceæ*).

Unground Lobelia—Unground Lobelia occurs as stems having alternate, sessile leaves, often narrowing into a short petiole usually broken. When entire, the blades are ovate or oblong, from 2 to 9 cm. in length, pale olive to dusky yellow-green and with scattered bristly hairs, obtusely dentate or irregularly serrate-denticulate, each tooth having a brownish, gland-like apex. The stems are cylindrical, winged, and irregularly furrowed, and show numerous spreading hairs. The flowers occur in long, loose racemes and have short pedicels. The calyx tubes are ovoid, with 5 subulate teeth; the corollas are tubular, from 3 to 4 mm. in length, 5-parted, the upper 2-lobed portion cleft nearly to the base; stamens with anthers united above into a curved tube enclose the bifid stigma. The capsules are ovoid or ellipsoidal from 5 to 8 mm. in length, wholly inferior and enclose numerous dark-colored, oblong, and coarsely reticulate seeds.

Powdered Lobelia—Powdered Lobelia is dusky yellow to weak greenish yellow. It has a slight and irritating odor, and a strongly acrid taste. It shows fragments of seed-coat composed of more or less polygonal cells with thick, yellowish walls; occasional non-glandular hairs, elongated-conical, up to 1.11 mm. in length; fragments of stem with tracheæ having annular or spiral thickenings or simple pores, and associated with narrow wood fibers, the walls of the latter being rather thin, more or less lignified and porous. Fragments of the epidermis of the leaf show elliptical stomata up to 35 microns in length, and usually with 3 or 4 neighbor-cells. The pollen grains are nearly spherical, and are from 20 to 30 microns in diameter.

Stems—Lobelia contains not more than 10 per cent of its stems.

Foreign organic matter—Lobelia contains not more than 4 per cent of foreign organic matter, other than stems, page 760.
Acid-insoluble ash—Lobelia yields not more than 5 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**0.1 Gm.** (approximately $1^1/_2$ grains).

Lobelia Fluidextract

LOBELIA FLUIDEXTRACT
Fluidextractum Lobeliæ

Fldext. Lobel.

Prepare the Fluidextract from lobelia, in moderately coarse powder by Process B, page 718. Use a mixture of 1 volume of acetic acid, 10 volumes of alcohol, and 9 volumes of water as Menstruum I, and diluted alcohol as Menstruum II; macerate the drug during 48 hours, and percolate at a moderate rate.

Alcohol content—From 36 to 42 per cent, by volume, of C_2H_5OH.
Storage—Preserve Lobelia Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**0.1 cc.** (approximately $1^1/_2$ minims).

Lobelia Tincture

LOBELIA TINCTURE
Tinctura Lobeliæ

Tr. Lobel. Tinctura Lobeliæ P.I.

Lobelia, in moderately coarse powder	**100 Gm.**
Acetic Acid	**5 cc.**
Diluted Alcohol, a sufficient quantity, To make	**1000 cc.**

Prepare the Tincture by Process P, page 758. Use 995 cc. of diluted alcohol and the acetic acid as the first menstruum, and complete the percolation with diluted alcohol; macerate the drug during 24 hours, and percolate at a moderate rate.

Alcohol content—From 44 to 47 per cent, by volume, of C_2H_5OH.
Storage—Preserve Lobelia Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**1 cc.** (approximately 15 minims).

Lotions

Black Lotion, page 88
Lead and Opium Lotion, page 292

Neocalamine Lotion, page 350
Phenolated Calamine Lotion, page 100
Phenolated Neocalamine Lotion, page 350
White Lotion, page 556
Yellow Lotion, page 559

LYCOPODIUM
Lycopodium

Lycopodium consists of the spores of *Lycopodium clavatum* Linné (Fam. *Lycopodiaceæ*).

Description—Lycopodium occurs as a light, yellow, very mobile powder composed of spores shaped somewhat like a 3-sided pyramid with a convex base, from 25 to 40 microns in diameter. The outer surface of the spore is reticulate, the reticulations being polygonal and formed by straight-sided delicate ridges which form a delicate fringe at the edges of the spore. When viewed with the rounded surface of the spore on the under side, a distinct triangular marking is seen, formed by the edges of the flat surfaces of the spore. Lycopodium is odorless and tasteless.

Identification—Lycopodium is not moistened by water but floats upon it; when boiled with water, it sinks. When Lycopodium is thrown into a flame, it burns with a quick flash.

Pine pollen—Lycopodium shows very few, if any, pollen grains consisting of a central convex generative cell separating 2 spherical cells or wings containing air, the pollen grains from 40 to 70 microns in diameter.

Starch or dextrin—When boiled with distilled water and cooled, Lycopodium does not give a bluish, purplish, or reddish color with iodine T.S.

Sulfur—When ignited, Lycopodium does not emit the odor of sulfur dioxide.

Acid-insoluble ash—Lycopodium yields not more than 0.75 per cent of acid-insoluble ash, page 761.

Magma, Bismuth, page 82

MAGNESIUM HYDROXIDE
Magnesii Hydroxidum

$Mg(OH)_2$ Mol. wt. 58.34

Magnesium Hydroxide contains not less than 95 per cent of $Mg(OH)_2$.

Description—Magnesium Hydroxide occurs as a bulky white powder.

Solubility—Magnesium Hydroxide dissolves in dilute acids. It is practically insoluble in water and in alcohol.

Identification—A solution of Magnesium Hydroxide (1 in 20) in diluted hydrochloric acid responds to the tests for *Magnesium*, page 726.

Loss on ignition—Transfer to a tared platinum crucible about 0.5 Gm. of Magnesium Hydroxide, weigh accurately, and ignite to constant weight: the loss in weight is not less than 30 per cent and not more than 33 per cent.

Soluble salts—Boil 2 Gm. of Magnesium Hydroxide with 100 cc. of distilled water

for 5 minutes in a covered beaker, then filter while hot. Titrate 50 cc. of the cooled filtrate with 0.1 *N* sulfuric acid using methyl red T.S. as the indicator: not more than 2 cc. of the acid is consumed. Evaporate 25 cc. of the filtrate to dryness, and dry at 120° for 3 hours; not more than 10 mg. of residue remains.

Carbonate—Boil a mixture of 0.1 Gm. of Magnesium Hydroxide with 5 cc. of distilled water, cool, and add 5 cc. of acetic acid: no effervescence is produced.

Arsenic—A solution of 0.2 Gm. of Magnesium Hydroxide in sufficient diluted hydrochloric acid to make 5 cc. meets the requirements of the test for *Arsenic*, page 689, omitting the treatment with sulfurous and sulfuric acids.

Calcium Oxide—Dissolve about 0.5 Gm. of Magnesium Hydroxide, accurately weighed, in a mixture of 3 cc. of sulfuric acid and 22 cc. of distilled water. Add 50 cc. of alcohol, and allow the mixture to stand overnight. If crystals of magnesium sulfate separate, warm the mixture to about 50° to dissolve them. Filter through a Gooch crucible containing an asbestos mat which has been previously washed with diluted sulfuric acid, distilled water, and alcohol, and ignited. Wash the crystals on the mat several times with a mixture of 3 volumes of alcohol and 1 volume of distilled water. Ignite the crucible and contents at a dull red heat, cool, and weigh. The weight of calcium sulfate thus obtained, multiplied by 0.4119, gives the equivalent of calcium oxide in the Magnesium Hydroxide taken for the test; this should not exceed 1 per cent.

Heavy metals—Dissolve 1 Gm. of Magnesium Hydroxide in 10 cc. of diluted hydrochloric acid and evaporate the solution to dryness on a water bath. Toward the end of the evaporation, stir the residue frequently and disintegrate it so that finally a dry powder is obtained, dissolve the residue in 20 cc. of distilled water, and filter. To the filtrate, which should be neutral to litmus paper, add 2 cc. of diluted acetic acid, and dilute to 25 cc. with distilled water: the heavy metals limit, page 721, for Magnesium Hydroxide is 40 parts per million.

Iron—Boil 50 mg. of Magnesium Hydroxide with 5 cc. of a mixture of 1 volume of nitric acid and 9 volumes of distilled water for 1 minute. Cool, dilute to 50 cc. with distilled water, add 5 cc. of ammonium thiocyanate T.S., mix well, and transfer to a Nessler tube. Treat in the same manner exactly 2 cc. of a solution of ferric ammonium sulfate, made by dissolving 86.5 mg. of ferric ammonium sulfate in 19 cc. of diluted sulfuric acid diluting it with distilled water to make 1000 cc., each cc. representing 0.01 mg. of Fe. The color of the test solution is not deeper than that of the mixture containing the standard iron solution. The comparison must be made within 5 minutes after the addition of the ammonium thiocyanate T.S.

Assay—Transfer about 0.5 Gm. of Magnesium Hydroxide, accurately weighed, to an Erlenmeyer flask, and dissolve it in 30 cc. of 1 *N* sulfuric acid, and determine the residual acid by titrating with 1 *N* sodium hydroxide using methyl orange T.S. as the indicator. From the volume of the 1 *N* sulfuric acid consumed, deduct the volume of 1 *N* sulfuric acid corresponding to the content of calcium oxide in the Magnesium Hydroxide taken for the assay. The difference is the volume of 1 *N* sulfuric acid equivalent to the Magnesium Hydroxide present. Each cc. of 1 *N* sulfuric acid is equivalent to 0.02917 Gm. of $Mg(OH)_2$ or to 0.02804 Gm. of CaO.

Storage—Preserve Magnesium Hydroxide in tight containers.

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains).

Magnesium Hydroxide Tablets

MAGNESIUM HYDROXIDE TABLETS

Tabellæ Magnesii Hydroxidi

"Milk of Magnesia Tablets"

Magnesium Hydroxide Tablets contain not less than 93 per cent and not more than 107 per cent of the labeled amount of $Mg(OH)_2$, the amount being expressed by weight.

Identification—Crush several Magnesium Hydroxide Tablets and dissolve 1 Gm. of the powder in 20 cc. of diluted hydrochloric acid. This solution responds to the tests for *Magnesium*, page 726.

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without appreciable loss, and transfer an accurately weighed portion of the powder, equivalent to about 0.5 Gm. of magnesium hydroxide, to an Erlenmeyer flask. Add 30 cc. of 1 *N* sulfuric acid and gently heat the mixture on a water bath for 30 minutes with occasional agitation. Cool and determine the residual acid by titrating with 1 *N* sodium hydroxide, using methyl orange T.S. as the indicator. Each cc. of 1 *N* sulfuric acid is equivalent to 0.02917 Gm. of $Mg(OH)_2$.

Storage—Preserve Magnesium Hydroxide Tablets in well-closed containers.

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains) of Magnesium Hydroxide.

Magnesium Phosphate, Tribasic

TRIBASIC MAGNESIUM PHOSPHATE

Magnesii Phosphas Tribasicus

Mag. Phos. Tribas.

$Mg_3(PO_4)_2.5H_2O$ Mol. wt. 353.00

Tribasic Magnesium Phosphate, when ignited to constant weight, contains not less than 98 per cent of $Mg_3(PO_4)_2$.

Description—Tribasic Magnesium Phosphate occurs as a white, odorless, and tasteless powder.

Solubility—Tribasic Magnesium Phosphate is readily soluble in diluted mineral acids but is almost insoluble in water.

Identification—

A: Ammonium molybdate T.S. added to a solution of Tribasic Magnesium Phosphate in diluted nitric acid produces a precipitate of greenish yellow ammonium phosphomolybdate which is soluble in ammonia T.S.

B: Dissolve 0.1 Gm. of Tribasic Magnesium Phosphate in 0.7 cc. of diluted acetic acid and 20 cc. of distilled water. Add 1 cc. of ferric chloride T.S., let stand 5 minutes, and filter. Five cc. of the filtrate responds to the test for *Magnesium*, page 726.

Loss on ignition—Weigh accurately about 1 Gm. of Tribasic Magnesium Phosphate and ignite it to constant weight: it loses not less than 20 per cent and not more than 27 per cent of its weight.

Acid-insoluble substances—If an insoluble residue remains in the test for *Carbonate* below, filter the solution, wash well with hot distilled water until the last washing is free from chloride, and ignite the residue: the weight of the residue does not exceed 4 mg.

Soluble salts—Digest 2 Gm. of Tribasic Magnesium Phosphate with 100 cc. of distilled water for 30 minutes on a water bath, cool, add sufficient distilled water to restore the original volume, mix well, and filter. Evaporate 50 cc. of the filtrate to dryness, and ignite gently to constant weight: the weight of the residue does not exceed 15 mg.

Carbonate—Mix 2 Gm. of Tribasic Magnesium Phosphate with 20 cc. of distilled water, and add hydrochloric acid, dropwise, to effect solution: no effervescence occurs when the acid is added.

Chloride—Dissolve 0.5 Gm. of Tribasic Magnesium Phosphate in 50 cc. of diluted nitric acid and add 1 cc. of silver nitrate T.S.: the turbidity, if any, is no greater than that produced by 1 cc. of 0.02 *N* hydrochloric acid, page 758.

Nitrate—Mix 0.2 Gm. of Tribasic Magnesium Phosphate with 5 cc. of distilled water, and add just sufficient hydrochloric acid to effect solution. Dilute with distilled

water to 10 cc., add 0.1 cc. of indigo carmine T.S., then add, with stirring, 10 cc. of sulfuric acid: the blue color persists for at least 5 minutes.

Sulfate—Dissolve 0.5 Gm. of Tribasic Magnesium Phosphate in the smallest possible amount of diluted hydrochloric acid, dilute to 48 cc. with distilled water, and add 2 cc. of barium chloride T.S.: the turbidity, if any, is no greater than that produced by 3 cc. of 0.02 *N* sulfuric acid, page 759.

Arsenic—A 5-cc. portion of a solution of Tribasic Magnesium Phosphate (1 in 25) in diluted nitric acid meets the requirements of the test for *Arsenic*, page 689.

Barium—Mix 2 Gm. of Tribasic Magnesium Phosphate with 40 cc. of distilled water, heat, add hydrochloric acid, dropwise, to effect solution, then add 1 cc. of acid in excess. Cool, dilute with distilled water to 50 cc., and filter. To 5 cc. of the filtrate add 1 cc. of potassium sulfate T.S.: no turbidity is produced within 15 minutes.

Calcium—Mix 0.5 Gm. of Tribasic Magnesium Phosphate with 15 cc. of distilled water, heat, and add sufficient hydrochloric acid in small portions to effect solution. Cool, add ammonia T.S. in small portions to produce a permanent slight precipitate, then add 2 cc. of acetic acid. Dilute with distilled water to 25 cc., and filter. To 10 cc. of the filtrate add 2 cc. of ammonium oxalate T.S.: not more than a slight turbidity is produced within 5 minutes.

Heavy metals—Dissolve 1 Gm. of Tribasic Magnesium Phosphate in 4.5 cc. of diluted hydrochloric acid, and dilute to 25 cc. with distilled water. The heavy metals limit, page 721, for Tribasic Magnesium Phosphate is 30 parts per million.

Dibasic salt and magnesium oxide—Ignite about 2.5 Gm. of Tribasic Magnesium Phosphate to constant weight. Weigh accurately about 2 Gm. of the ignited salt, and dissolve it by warming with 50 cc. of 1 *N* hydrochloric acid. Cool, add 1 or 2 drops of methyl orange T.S., and slowly titrate the excess of 1 *N* hydrochloric acid with 1 *N* sodium hydroxide to a yellow color, vigorously shaking the mixture during the titration. Not less than 14.8 cc. and not more than 15.4 cc. of 1 *N* hydrochloric acid is consumed for each Gm. of the ignited salt.

Assay—Proceed as directed under *Tribasic Calcium Phosphate*, page 112, using 0.2 Gm. of the ignited salt, accurately weighed. Each cc. of 1 *N* sodium hydroxide corresponds to 0.005716 Gm. of $Mg_3(PO_4)_2$.

Storage—Preserve Tribasic Magnesium Phosphate in well-closed containers.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Magnesium Phosphate, Tribasic, Tablets

TRIBASIC MAGNESIUM PHOSPHATE TABLETS

Tabellæ Magnesii Phosphatis Tribasici

Tab. Mag. Phos. Tribas.

Tribasic Magnesium Phosphate Tablets contain not less than 93 per cent and not more than 107 per cent of the labeled amount of $Mg_3(PO_4)_2.5H_2O$.

Identification—

A: Finely powder a number of Tribasic Magnesium Phosphate Tablets, equivalent to about 2 Gm. of tribasic magnesium phosphate, and ignite to destroy any carbonaceous matter. Dissolve about 0.1 Gm. of the ignited powder in diluted nitric acid, filter if necessary, warm the solution to about 60°, and add ammonium molybdate T.S.: a greenish yellow precipitate is produced.

B: Crush 1 of the Tablets and add a portion equivalent to 0.1 Gm. of tribasic magnesium phosphate to 20 cc. of distilled water and 0.7 cc. of diluted acetic acid. Mix well, add 1 cc. of ferric chloride T.S., and filter. A 5-cc. portion of the filtrate responds to the test for *Magnesium*, page 726.

Calcium—Mix 0.5 Gm. of the ignited powder obtained in the test for *Identification* with 15 cc. of distilled water, heat, and add hydrochloric acid in small portions until no more dissolves. Add ammonia T.S. in small portions until a permanent slight precipitate is produced, then 2 cc. of acetic acid, dilute with distilled water to 25 cc., and filter if necessary. To 10 cc. of the filtrate add 2 cc. of ammonium oxalate T.S.: not more than a slight turbidity is produced within 5 minutes.

Soluble salts—Digest 1 Gm. of the ignited powder with 50 cc. of distilled water on a water bath for 30 minutes. Cool, add sufficient distilled water to restore the original volume, mix well, filter, and wash with 10 cc. of distilled water. Evaporate the filtrate and washings to dryness, and ignite gently to constant weight: the weight of the residue does not exceed 15 mg.

Assay—Weigh a counted number of not less than 20 of the Tablets, and reduce them to a fine powder without appreciable loss. Weigh accurately a portion of the powder, equivalent to about 0.25 Gm. of tribasic magnesium phosphate, and carefully ignite it in a crucible at a low temperature, taking care to avoid any loss. Dissolve the residue by warming with 5 cc. of nitric acid and 10 cc. of distilled water, filter into a beaker, and thoroughly wash the crucible and filter with hot distilled water. To the combined filtrate and washings add ammonia T.S. until a slight precipitate is formed, then dissolve the precipitate by the addition of 1 cc. of nitric acid. Warm the solution to about 50°, add 80 cc. of ammonium molybdate T.S., and maintain the temperature of the mixture at about 50° for 30 minutes, stirring occasionally. Wash the precipitate once or twice by decantation with distilled water, using 30 cc. to 40 cc. each time. Transfer the precipitate to a filter, and wash with cold distilled water until the washings cease to give an acid reaction to litmus paper. Transfer the precipitate and filter to the precipitating vessel, add 30 cc. of 1 *N* sodium hydroxide, agitate until the precipitate is dissolved, then titrate the excess of alkali with 0.5 *N* sulfuric acid, using 3 drops of phenolphthalein T.S. as the indicator. Each cc. of 1 *N* sodium hydroxide is equivalent to 0.007674 Gm. of $Mg_3(PO_4)_2.5H_2O$.

Storage—Preserve Tribasic Magnesium Phosphate Tablets in well-closed containers.

Sizes—Tribasic Magnesium Phosphate Tablets usually available contain the following amounts of tribasic magnesium phosphate: **0.3** and **0.5 Gm.** (approximately 5 and 7½ grains).

AVERAGE DOSE—**1 Gm.** (approximately 15 grains) of Tribasic Magnesium Phosphate.

MAGNESIUM SULFATE AMPULS

Ampullæ Magnesii Sulfatis

Ampul. Mag. Sulf. Magnesium Sulfate Injection

Magnesium Sulfate Ampuls contain a sterile solution of magnesium sulfate in water for injection, and yield $MgSO_4$ equal to not less than 46 per cent and not more than 53 per cent of the labeled amount of $MgSO_4.7H_2O$.

Prepare the solution and fill the cleansed ampuls according to the requirements given on pages 687 to 689. Sterilize the filled ampuls by Process C, page 751, or by any other adequate and suitable method of sterilization, and test for sterility according to the method described on page 746. The Ampuls also conform to the other requirements under *Ampuls*, page 687.

Assay—Dilute an accurately measured volume of the ampul solution, containing about 0.25 Gm. of anhydrous magnesium sulfate in a beaker, with 100 cc. of an aqueous solution of hydrochloric acid (1 in 100). Add 20 cc. of ammonium phosphate T.S., and ammonia T.S., dropwise, with constant stirring, until a slight precipitate forms. Continue stirring until the crystalline precipitate is well formed and resume the addition of ammonia T.S., dropwise, with stirring, until there is no further precipitation. Then add 20 cc. of stronger ammonia T.S. and allow to stand overnight. Transfer the precipitate to a Gooch crucible, previously ignited and weighed, washing with dilute ammonia T.S. (1 in 4), until the washings are free from sulfate. Add a few crystals of ammonium nitrate to the crucible and dry at about 100°. Ignite carefully, starting with a very low heat and gradually increasing to a bright redness until constant weight is obtained. Each Gm. of the resulting magnesium pyrophosphate is equivalent to 1.082 Gm. of $MgSO_4$.

AVERAGE DOSE—**1 Gm.** of Magnesium Sulfate.

Malt Extract

MALT EXTRACT

Extractum Malti

Ext. Malt.

Malt Extract is a product obtained by extracting malt, the partially and artificially germinated grain of one or more varieties of *Hordeum vulgare* Linné (Fam. *Gramineæ*). The malt is infused with water at 60°, the expressed liquid concentrated at a temperature not exceeding 60°, preferably under reduced pressure. The extract may be mixed with 10 per cent, by weight, of glycerin. It contains dextrin, maltose, a small amount of glucose, and amylolytic enzymes.

Malt Extract is capable of converting not less than 5 times its weight of starch into water-soluble sugars.

Description—Malt Extract is a sweet, viscous, light brown, liquid extract having an agreeable, characteristic odor.

Solubility—Malt Extract partially dissolves in cold water, but readily dissolves in warm water. Its aqueous solution is not clear and deposits a voluminous, flocculent precipitate upon standing.

Specific gravity—The specific gravity of Malt Extract is not less than 1.350 and not more than 1.430 at 25°.

Assay—Determine the percentage of moisture in potato starch by drying about 0.5 Gm., accurately weighed, at 120°, for 4 hours. Thoroughly mix a quantity of the starch equivalent to 5 Gm. of dried starch, in a beaker, with 10 cc. of cold distilled water. Add 140 cc. of boiling distilled water, and heat on a water bath, with constant stirring, for 2 minutes or until a translucent, uniform paste is obtained. Cool to 40° in a suitable bath previously adjusted to this temperature. Add 20 cc. of a fresh solution of Malt Extract having a temperature of 40°, prepared by dissolving 5 Gm. of Malt Extract in sufficient distilled water to make 100 cc. of solution at 40°. Mix this well, and maintain the same temperature for exactly 30 minutes, stirring frequently. A thin, clear liquid is produced. Stir, and add at

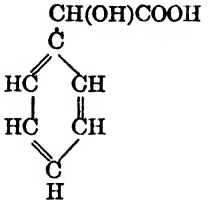
once 0.1 cc. of this liquid to a previously made mixture of 0.2 cc. of 0.1 *N* iodine and 60 cc. of distilled water: no blue or reddish color develops.

Storage—Preserve Malt Extract in tight containers which have been sterilized prior to filling.

AVERAGE DOSE—**15 Gm.** (approximately 4 drachms).

MANDELIC ACID
Acidum Mandelicum

Acid. Mandel. Racemic Mandelic Acid



$C_8H_8O_3$ Mol. wt. 152.14

Mandelic Acid, when dried over sulfuric acid for 4 hours, contains not less than 99 per cent of $HC_8H_7O_3$.

Description—Mandelic Acid occurs as white crystals or as a crystalline powder. It is odorless or has a slight, aromatic odor, and gradually darkens and decomposes on exposure to light. Its aqueous solutions are acid to litmus paper.

Solubility—One Gm. of Mandelic Acid dissolves in about 6.5 cc. of water at 25°. It is freely soluble in alcohol and in ether.

Melting point—Mandelic Acid melts between 118° and 120°, page 731.

Identification—

A: To 2 cc. of an aqueous solution of Mandelic Acid (1 in 20) add 3 cc. of potassium dichromate T.S. followed by 5 cc. of sulfuric acid: the odor of benzaldehyde becomes apparent.

B: Dissolve about 0.2 Gm. of Mandelic Acid in 2 cc. of distilled water, add 5 cc. of sulfuric acid, and agitate gently, then add 10 cc. more of sulfuric acid, and heat gently: a purple color develops and a faint odor of benzaldehyde becomes apparent.

Loss on drying—When dried over sulfuric acid for 4 hours, Mandelic Acid loses not more than 1 per cent of its weight.

Residue on Ignition—Mandelic Acid yields not more than 0.1 per cent of residue on ignition, page 745.

Chloride—Dissolve 1 Gm. of Mandelic Acid in 10 cc. of warm distilled water, and gradually add 0.5 Gm. of reagent sodium carbonate. Evaporate the solution to dryness in a crucible or dish, and incinerate the mass at a low red heat. Cool, break up the charred mass with a glass rod, and add 20 cc. of diluted nitric acid. Stir gently for 5 minutes, filter into a 50-cc. Nessler tube, wash the vessel and the filter, and dilute with distilled water to a volume of 50 cc. Add 1 cc. of silver nitrate T.S., and mix well: the turbidity produced is not greater than that produced in a control test to which 0.15 cc. of 0.02 *N* hydrochloric acid has been added.

Heavy metals—Dissolve 1 Gm. of Mandelic Acid in sufficient distilled water to make 25 cc.: the heavy metals limit, page 721, for Mandelic Acid is 20 parts per million.

Assay—Dry about 1 Gm. of Mandelic Acid in a desiccator over sulfuric acid for 4 hours, dissolve about 0.5 Gm. of the dried acid, accurately weighed, in 50 cc. of recently boiled and cooled distilled water, and titrate with 0.1 *N* sodium hydroxide,

using phenolphthalein T.S. as the indicator. Each cc. of 0.1 *N* sodium hydroxide is equivalent to 0.01521 Gm. of $HC_3H_7O_3$.

Storage—Preserve Mandelic Acid in well-closed, light-resistant containers.

AVERAGE DOSE—**3 Gm.** (approximately 45 grains).

Manganese Citrate, Soluble

SOLUBLE MANGANESE CITRATE

Mangani Citras Solubilis

Mangan. Cit. Sol. Manganese and Sodium Citrate

$Mn_3(C_6H_5O_7)_2$ Mol. wt. 542.99

Soluble Manganese Citrate is manganous citrate rendered soluble by means of sodium citrate, and contains not less than 48 per cent and not more than 52 per cent of $[C_3H_4.OH.(COO)_3]_2Mn_3$.

Description—Soluble Manganese Citrate occurs as a pale orange or pinkish white powder, as granules, or as translucent scales, and is permanent in the air. It is odorless, and has a slightly bitter, astringent taste. An aqueous solution of Soluble Manganese Citrate (1 in 20) is acid or alkaline to litmus paper.

Solubility—One Gm. of Soluble Manganese Citrate is slowly soluble in about 4 cc. of water at 25°; it is slightly more soluble in boiling water, and slightly soluble in alcohol.

Identification—An aqueous solution of Soluble Manganese Citrate (1 in 20) responds to the tests for *Manganese*, page 726, and for *Citrate*, page 724.

Readily carbonizable substances—The color of a solution produced by heating on a water bath for 15 minutes a mixture of 0.5 Gm. of Soluble Manganese Citrate and 5 cc. of sulfuric acid in a test tube previously rinsed with sulfuric acid is not deeper than matching fluid J, page 744.

Chloride—A 0.5-Gm. portion of Soluble Manganese Citrate shows no more chloride than corresponds to 0.1 cc. of 0.02 *N* hydrochloric acid, page 758.

Sulfate—A 0.5-Gm. portion of Soluble Manganese Citrate shows no more sulfate than corresponds to 1.0 cc. of 0.02 *N* sulfuric acid, page 759.

Arsenic—Soluble Manganese Citrate meets the requirements of the test for *Arsenic*, page 689.

Iron—Ten cc. of an aqueous solution of Soluble Manganese Citrate (1 in 100), when acidified with hydrochloric acid, is not more than slightly reddened by ammonium thiocyanate T.S.

Lead—To 1 Gm. of Soluble Manganese Citrate add 3 cc. of nitric acid (1 in 2) and 10 cc. of distilled water, and boil until the appearance of brown fumes. Add 10 cc. of distilled water and boil for 2 minutes. Cool and transfer to a 100-cc. volumetric flask with the aid of distilled water and add sufficient distilled water to make 100 cc. A 25-cc. aliquot of this solution shall contain no more than 5 micrograms of lead (corresponding to not more than 20 parts per million) when tested according to the *Lead limit test*, page 729, using 3 cc. of ammonium citrate solution, 1 cc. of potassium cyanide solution, and 0.5 cc. of hydroxylamine hydrochloride solution.

Assay—Dissolve about 0.5 Gm. of Soluble Manganese Citrate, accurately weighed, in 100 cc. of distilled water, add 50 cc. of hydrogen peroxide solution and 10 cc. of ammonia T.S., and boil the mixture for several minutes. Collect the precipi-

tate on a previously ignited and tared Gooch crucible, wash it thoroughly with hot distilled water, dry, and ignite to constant weight. Each Gm. of manganous-manganic oxide (Mn_3O_4) is equivalent to 2.373 Gm. of $[C_3H_4.OH.(COO)_2]_2Mn_2$.

Storage—Preserve Soluble Manganese Citrate in well-closed containers.

AVERAGE DOSE—**0.2 Gm.** (approximately 3 grains).

MANGANESE GLYCEROPHOSPHATE

Mangani Glycerophosphas

Mangan. Glycerophos.

$MnC_3H_5(OH)_2PO_4$ Mol. wt. 225.00

Manganese Glycerophosphate, when dried to constant weight at 110°, contains not less than 98 per cent of $MnC_3H_5(OH)_2PO_4$.

Description—Manganese Glycerophosphate occurs as a white or pinkish white powder. It is odorless, and nearly tasteless.

Solubility—One Gm. of Manganese Glycerophosphate dissolves in about 5 cc. of an aqueous solution of citric acid (1 in 4). It is slightly soluble in water and insoluble in alcohol.

Identification—

A: A solution of Manganese Glycerophosphate (1 in 20) in diluted hydrochloric acid responds to the tests for *Manganese*, page 726, and for *Glycerophosphate*, page 725.

B: When a mixture of 0.1 Gm. of Manganese Glycerophosphate and 0.5 Gm. of potassium bisulfate is heated, pungent vapors of acrolein are evolved.

Loss on drying—When dried to constant weight at 110°, Manganese Glycerophosphate loses not more than 12 per cent of its weight.

Chloride—Five-tenths Gm. of Manganese Glycerophosphate shows no more chloride than corresponds to 1 cc. of 0.02 *N* hydrochloric acid, page 758.

Phosphate—Prepare a standard solution containing 0.192 Gm. of potassium biphosphate in sufficient distilled water to make 100 cc. Dilute 5 cc. of the solution with 20 cc. of hydrochloric acid and sufficient distilled water to make 100 cc. To 10 cc. of the diluted standard solution add 10 cc. of cold ammonium molybdate T.S. To 10 cc. of a solution of Manganese Glycerophosphate (1 in 40) in diluted hydrochloric acid also add 10 cc. of cold ammonium molybdate T.S. Mix each suspension and allow to stand 10 minutes; agitate again, if necessary, before comparison. The turbidity of the Manganese Glycerophosphate suspension is not greater than that of the dilute standard solution suspension.

Sulfate—Five-tenths Gm. of Manganese Glycerophosphate shows no more sulfate than corresponds to 1 cc. of 0.02 *N* sulfuric acid, page 759.

Arsenic—Manganese Glycerophosphate, dissolved in diluted hydrochloric acid, meets the requirements of the test for *Arsenic*, page 689.

Lead—To 1 Gm. of Manganese Glycerophosphate add 3 cc. of dilute nitric acid (1 in 2) and 10 cc. of distilled water and boil until the appearance of brown fumes. Add 10 cc. of distilled water and boil for 2 minutes. Cool and transfer with the aid of distilled water to a 100-cc. volumetric flask and add sufficient distilled water to make 100 cc. A 25-cc. portion of this solution contains no more than 5 micrograms of lead (corresponding to 20 parts per million) when tested according to the *Lead limit test*, page 729, using 10 cc. of ammonium citrate solution, 1 cc. of potassium cyanide solution, and 0.5 cc. of hydroxylamine hydrochloride solution.

Assay—Dissolve about 1.0 Gm. of Manganese Glycerophosphate, dried to constant weight at 110° and accurately weighed, in 1.5 cc. of nitric acid and 5 cc. of warm

distilled water. Dilute to 125 cc., add 2.0 Gm. of dibasic ammonium phosphate, and heat to boiling; while maintaining the boiling, add methyl red T.S., and stronger reagent ammonia T.S. slowly, dropwise, with constant stirring until alkaline, and then 2.0 cc. in excess. Let stand 2 hours at room temperature. Filter through a tared Gooch crucible, and wash with dilute ammonia T.S. (1 in 100). Dry at 110°, ignite at a bright red heat, cool in a desiccator and weigh. Each Gm. of manganese pyrophosphate is equivalent to 1.586 Gm. of $MnC_3H_5(OH)_2PO_4$.

Storage—Preserve Manganese Glycerophosphate in well-closed containers.

AVERAGE DOSE—**0.2 Gm.** (approximately 3 grains).

Manganese Hypophosphite

MANGANESE HYPOPHOSPHITE

Mangani Hypophosphis

Mangan. Hypophos.

$Mn(H_2PO_2)_2.H_2O$ Mol. wt. 202.94

Manganese Hypophosphite, when dried for 2 hours over sulfuric acid, contains not less than 97 per cent of $Mn(H_2PO_2)_2.H_2O$.

Caution should be observed in compounding Manganese Hypophosphite with nitrates, chlorates, or other oxidizing agents as an explosion may occur if it is triturated or heated.

Description—Manganese Hypophosphite occurs as a pink, granular or crystalline powder, and is permanent in the air. It is odorless, and nearly tasteless.

Solubility—One Gm. of Manganese Hypophosphite dissolves in about 6.5 cc. of water at 25° or in about 6 cc. of boiling water. It is insoluble in alcohol.

Identification—An aqueous solution of Manganese Hypophosphite (1 in 20) responds to the tests for *Manganese*, page 726, and for *Hypophosphite*, page 725.

Loss on drying—When dried over sulfuric acid for 2 hours, Manganese Hypophosphite loses not more than 2 per cent of its weight.

Carbonate—Add about 0.5 Gm. of Manganese Hypophosphite to 5 cc. of acetic acid: no effervescence is produced.

Phosphate—Boil 0.25 Gm. of Manganese Hypophosphite with 10 cc. of sodium hydroxide T.S.: a white precipitate is formed which gradually acquires a brown color on exposure to air. The filtrate from this mixture, after being slightly acidified with hydrochloric acid, boiled for 1 minute, and then rendered alkaline with ammonia T.S., yields no precipitate upon the addition of 0.5 cc. of magnesia mixture T.S.

Sulfate—A 0.25-Gm. portion of Manganese Hypophosphite shows no more sulfate than corresponds to 0.5 cc. of 0.02 *N* sulfuric acid, page 758.

Calcium—Dissolve 0.5 Gm. of Manganese Hypophosphite in 10 cc. of hot distilled water, add 10 cc. of hydrogen peroxide solution and 10 cc. of sodium hydroxide T.S., and boil for 1 minute; then acidify slightly with acetic acid, and again warm. Now cool, filter, and add 1 cc. of ammonium oxalate T.S. to 10 cc. of the filtrate: no turbidity is produced within 1 minute.

Arsenic—Pour 5 cc. of an aqueous solution of Manganese Hypophosphite (1 in 30) into an evaporating dish containing 3 cc. of nitric acid diluted with about 10 cc. of distilled water, and evaporate to dryness on a water bath: the residue meets the requirements of the test for *Arsenic*, page 689.

Lead—To 1 Gm. of Manganese Hypophosphite add 3 cc. of dilute nitric acid (1 in 2) and 10 cc. of distilled water and boil until the appearance of brown fumes, then add 10 cc. of distilled water and boil for 2 minutes. Cool and transfer to a 100-cc.

volumetric flask with the aid of distilled water and add sufficient distilled water to make 100 cc. A 25-cc. portion of this solution contains no more than 5 micrograms of lead (corresponding to not more than 20 parts per million) when tested according to the *Lead limit test*, page 729, using 25 cc. of ammonium citrate solution, 1 cc. of potassium cyanide solution, and 0.5 cc. of hydroxylamine hydrochloride solution.

Assay—Accurately weigh about 0.12 Gm. of Manganese Hypophosphite, dried over sulfuric acid for 2 hours, and proceed as directed in the *Assay* under *Calcium Hypophosphite*, page 108. Each cc. of 0.1 *N* bromine is equivalent to 0.002537 Gm. of $Mn(H_2PO_2)_2.H_2O$.

Storage—Preserve Manganese Hypophosphite in well-closed containers.

AVERAGE DOSE—**0.2 Gm.** (approximately 3 grains).

Masses

Ferrous Carbonate Mass, page 221
Mercury Mass, page 339

Mastic

MASTIC
Mastiche
Mastich

Mastic is the concrete resinous exudation from *Pistacia Lentiscus* Linné (Fam. *Anacardiaceæ*).

Mastic yields not more than 3 per cent of ether-insoluble residue, and not more than 20 per cent of alcohol-insoluble residue.

Description—Mastic occurs as subglobular, lenticular, elongated or pear-shaped tears, about 3 mm. in diameter. It is moderate yellow to pale greenish yellow, transparent, and with a glass-like luster, the surface being sometimes slightly dusty. Mastic is brittle and becomes plastic when chewed. It has a slightly balsamic odor, and a mildly terebinthinate taste.

Acid value—The acid value of Mastic is not less than 50, using a sample of about 2 Gm., accurately weighed, and completing the test as directed on page 712.

Foreign organic matter—Mastic contains not more than 1 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Mastic yields not more than 0.25 per cent of acid-insoluble ash, page 761.

Assay for alcohol-insoluble residue—Place 2 Gm. of Mastic, in fine powder and accurately weighed, into a dry tared thimble, and extract it with alcohol in a continuous extraction apparatus for 3 hours or until completely extracted. Dry the insoluble residue in the thimble at 110° for 30 minutes, and weigh. The weight of the residue represents the yield of alcohol-insoluble residue from 2 Gm. of Mastic.

Assay for ether-insoluble residue—Place 2 Gm. of Mastic, in fine powder and accurately weighed, into a dry tared thimble, and extract it with absolute ether in a suitable continuous extraction apparatus for 3 hours or until completely extracted. Dry the insoluble residue in the thimble at 110° for 30 minutes, and weigh. The weight of the residue represents the yield of ether-insoluble residue from 2 Gm. of Mastic.

Matricaria

MATRICARIA
Matricaria

Hungarian Chamomile — German Chamomile

Matricaria is the dried flower-head of *Matricaria Chamomilla* Linné (Fam. *Compositæ*).

Unground Matricaria—The flower heads of Matricaria are composed of a few yellowish orange to pale yellow ray florets and numerous somewhat darker disk florets on conical, hollow, receptacles, the latter from 3 to 10 mm. in width. The disk florets are tubular, perfect, and without a pappus. The ray florets are from 10 to 20 and have a 3-toothed and 4-veined, usually reflexed pistillate corolla. The involucre is hemispherical, composed of from 20 to 30 imbricated, oblanceolate, and pubescent scales. The peduncles are weak brown to dusky greenish yellow, longitudinally furrowed, more or less twisted, and attain a length of 2.5 cm. The achenes are somewhat obovoid and faintly 3- to 5-ribbed, with no pappus or only a slight membranous crown.

Powdered Matricaria—Powdered Matricaria is moderate yellowish brown to light olive-brown. It has a pleasant, aromatic odor and an aromatic and bitter taste. It shows numerous spinose, spherical or triangulate pollen grains with 3 pores and up to 25 microns in diameter; fragments of corolla from ray florets with papillate epidermal cells; a few short glandular hairs; fragments of achene tissue with epidermal cells having scalariform markings or wavy longitudinal walls, and parenchyma containing rosette aggregates of calcium oxalate, the latter up to 10 microns in diameter; fragments of characteristic tissue of anthers composed of elongated cells with scalariform walls; fragments of stigmas, the upper end bearing characteristic papillæ; vascular bundles with tracheæ having spiral, annular, or reticulate markings; and fragments of the involucral scales bearing porous fibers, tracheæ, and elliptical stomata, the latter up to 30 microns in length.

Stems—Matricaria contains not more than 10 per cent of the stems of the plant.

Foreign organic matter—Matricaria contains not more than 2 per cent of foreign organic matter, other than stems, page 760.

Acid-insoluble ash—Matricaria yields not more than 4 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**15 Gm.** (approximately 4 drachms).

Menthol Ointment, Compound

COMPOUND MENTHOL OINTMENT
Unguentum Mentholis Compositum

Ung. Menthol. Comp.

Menthol	**100 Gm.**
Methyl Salicylate	**100 Gm.**
White Wax	**50 Gm.**
Hydrous Wool Fat	**750 Gm.**
To make	**1000 Gm.**

Melt the white wax with the hydrous wool fat on a water bath. Dissolve the menthol in the methyl salicylate, add it to the melted mixture, and stir until it congeals.

Storage—Preserve Compound Menthol Ointment in tight containers and avoid prolonged exposure to temperatures above 30°.

Menthol Spray, Compound

COMPOUND MENTHOL SPRAY

Nebula Mentholis Composita

Nebul. Menthol. Comp.

Menthol	10 Gm.
Camphor	10 Gm.
Methyl Salicylate	5 cc.
Eucalyptol	2 cc.
Light Liquid Petrolatum, a sufficient quantity,	
To make	1000 cc.

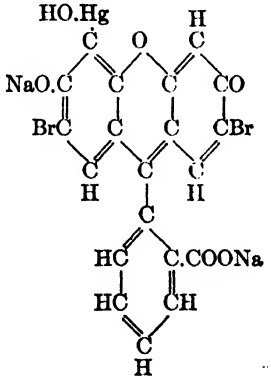
Agitate the menthol, camphor, eucalyptol, and methyl salicylate with 75 cc. of light liquid petrolatum until solution is effected. Then add sufficient light liquid petrolatum to make the product measure 1000 cc. Filter the solution, if necessary.

Storage—Preserve Compound Menthol Spray in tight containers.

Merbromin

MERBROMIN

Merbrominum



$C_{20}H_9O_6Br_2Na_2Hg$ Mol. wt. 750.70

Merbromin is the disodium salt of 2,7-dibromo-4-hydroxymercurifluorescein. When dried to constant weight at 110°, Merbromin contains not less than 24 per cent and not more than 26.7 per cent of Hg, and not less than 18 per cent and not more than 21.3 per cent of Br.

Description—Merbromin occurs as iridescent, green scales or granules. It is odorless, and is permanent in the air.

Solubility—Merbromin is freely soluble in water, practically insoluble in alcohol and in acetone, and insoluble in chloroform and in ether.

Identification—

A: An aqueous solution of Merbromin (1 in 2000) possesses a yellow-green fluorescence.

B: To 20 cc. of an aqueous solution of Merbromin (1 in 50) add about 3 cc. of diluted sulfuric acid: a reddish orange precipitate is produced. Upon filtration, the filtrate is nearly colorless or only slightly yellow. Retain the filtrate for the test for *Bromide ions* and for *Mercury ions*.

C: The residue remaining after the incineration of Merbromin responds to the tests for *Sodium*, page 727, *Bromide*, page 723, and *Carbonate*, page 723.

Loss on drying—When dried to constant weight at 110°, Merbromin, finely powdered, loses not more than 5 per cent of its weight.

Bromide ions—To 10 cc. of the filtrate, obtained in *Identification test B*, add a few drops of diluted nitric acid followed by silver nitrate T.S.: no turbidity is produced.

Mercury ions—To the remainder of the filtrate, obtained in *Identification test B*, add an equal volume of hydrogen sulfide T.S.: no precipitate nor darkening in color is produced.

Assay for bromine—Accurately weigh about 0.5 Gm. of Merbromin, previously ground to a fine powder, and dried to constant weight at 110°. Mix this in a crucible with about an equal weight of a flux, consisting of 1 part anhydrous sodium carbonate and 2 parts of light magnesium oxide. Add about 1 Gm. of reduced iron, mix and sprinkle more of the reduced iron lightly over the surface. Completely cover this mixture with the flux and slowly ignite over a flame (about 20 minutes to full heat). Continue the ignition for 10 minutes. Cool, and thoroughly extract the ignited mixture with hot distilled water and filter. Wash the filter with hot distilled water and combine the washings with the main portion of the filtrate. Acidify the filtrate with nitric acid and add silver nitrate T.S., 20 cc. or more, until precipitation is complete. Filter through a tared Gooch crucible and wash the precipitate with distilled water slightly acidified with nitric acid until the filtrate gives no test for silver. Finally, wash the precipitate with distilled water. Dry to constant weight at about 110° and weigh as silver bromide. Each Gm. of silver bromide is equivalent to 0.4256 Gm. of Br.

Assay for mercury—Accurately weigh about 0.3 Gm. of Merbromin, previously ground to a fine powder and dried to constant weight at 110°, and transfer to a 500-cc. beaker. Dissolve the Merbromin in 4 cc. of distilled water and cautiously add, with constant mixing, 10 cc. of sulfuric acid in small portions. Incline the beaker and add finely powdered potassium permanganate, in small portions, until an excess has been added, as indicated by the characteristic color of permanganate in the mixture. Allow this mixture to stand 30 minutes, shake at intervals, and add more permanganate until the color is permanent. Add 100 cc. of an aqueous solution of ammonium chloride (1 in 20), mix, and add finely powdered oxalic acid, in small portions, until the mixture becomes colorless. Filter through a small filter into a 400-cc. beaker, rinse the beaker and filter with distilled water until the filtrate measures 200 cc. Pass hydrogen sulfide into the filtrate for 20 minutes. Heat on a water bath until the precipitate settles when stirred. Again pass hydrogen sulfide into the mixture for 5 minutes. Filter the mixture immediately through a tared Gooch crucible and wash the precipitate with distilled water followed with 3 portions of alcohol, and then 4 portions of carbon tetrachloride or carbon disulfide, allow the liquid to run through the crucible with-

out suction, and finally wash with ether. Dry the precipitate at 100° for 1 hour and weigh as mercuric sulfide. Each Gm. of mercuric sulfide is equivalent to 0.8622 Gm. of Hg.

Storage—Preserve Merbromin in tight containers.

MERBROMIN SOLUTION

Liquor Merbromini

Liq. Merbrom.

Merbromin Solution contains, in each 100 cc., not less than 1.8 Gm. and not more than 2.2 Gm. of $C_{20}H_8O_6Br_2Na_2Hg$. The merbromin contains not less than 24 per cent and not more than 26.7 per cent of Hg, and not less than 18 per cent and not more than 21.3 per cent of Br.

Merbromin	**20 Gm.**
Water, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the merbromin in sufficient water to make the finished product measure 1000 cc.

Description—Merbromin Solution is a clear, red liquid with a yellow-green fluorescence.

Specific gravity—The specific gravity of Merbromin Solution is not less than 1.010 and not more than 1.015 at 25°.

Identification—

A: To 20 cc. of Merbromin Solution add about 3 cc. of diluted sulfuric acid: a reddish orange precipitate is produced. Upon filtration the filtrate is nearly colorless or only slightly yellow. Retain this filtrate for the tests for *Bromide ions* and for *Mercury ions*.

B: Place 25 cc. of Merbromin Solution in a crucible and evaporate to dryness on a water bath. The residue remaining after the incineration of this dried material responds to the tests for *Sodium*, page 727, *Bromide*, page 723, and for *Carbonate*, page 723.

Bromide ions—To 10 cc. of the filtrate, obtained in *Identification test A*, add a few drops of nitric acid followed by silver nitrate T.S.: no turbidity is produced.

Mercury ions—To the remainder of the filtrate, obtained in *Identification test A*, add an equal volume of hydrogen sulfide T.S.: no precipitate or darkening in color is produced.

Assay for merbromin—Accurately measure 10 cc. of Merbromin Solution into a tared container and evaporate to dryness on a water bath. Dry to constant weight at about 110°. The weight of the residue is not less than 0.18 Gm. and not more than 0.22 Gm.

Assay for mercury and for bromine—Evaporate a convenient volume of Merbromin Solution to dryness on a water bath. The merbromin so obtained meets the requirements for *Mercury* and for *Bromine* when assayed as directed under *Merbromin*, page 322.

Storage—Preserve Merbromin Solution in tight containers.

Merbromin Solution, Surgical

SURGICAL MERBROMIN SOLUTION

Liquor Merbromini Chirurgicalis

Liq. Merbrom. Chir.

Surgical Merbromin Solution contains, in each 100 cc., not less than 1.8 Gm. and not more than 2.2 Gm. of $C_{20}H_8O_6Br_2Na_2Hg$. The merbromin contains not less than 24 per cent and not more than 26.7 per cent of Hg, and not less than 18 per cent and not more than 21.3 per cent of Br.

Merbromin	20 Gm.
Water	350 cc.
Acetone	100 cc.
Neutralized Alcohol, a sufficient quantity,	
To make	1000 cc.

Dissolve the merbromin in the water. Add the acetone and sufficient neutralized alcohol, page 767, to make the product measure 1000 cc.

Description—Surgical Merbromin Solution is a clear, red liquid with a yellow-green fluorescence.

Specific gravity—The specific gravity of Surgical Merbromin Solution is not less than 0.9110 and not more than 0.9140 at 25°.

Identification—Surgical Merbromin Solution meets the tests for *Identification* under *Merbromin Solution*, page 323.

Distinction from Merbromin Solution—Distil 20 cc. of Surgical Merbromin Solution, collecting the first 10 cc. of distillate. Dilute 1 cc. of the distillate to 10 cc. with distilled water, add 2 cc. of sodium hydroxide T.S., mix, and add 3 cc. of iodine T.S.: a pale yellow precipitate is formed and the characteristic odor of iodoform is produced.

Bromide ions—Surgical Merbromin Solution meets the test for *Bromide ions* under *Merbromin Solution*, page 323.

Mercury ions—Surgical Merbromin Solution meets the test for *Mercury ions* under *Merbromin Solution*, page 323.

Assay for total solids—Proceed as directed in the *Assay for merbromin* under *Merbromin Solution*, page 323. The weight of the residue is not less than 0.18 Gm. and not more than 0.22 Gm.

Assay for mercury and for bromine—Evaporate a convenient volume of Surgical Merbromin Solution to dryness on a water bath. The merbromin so obtained meets the requirements for *Mercury* and for *Bromine* when assayed as directed under *Merbromin*, page 322.

Storage—Preserve Surgical Merbromin Solution in tight containers.

MERCURIC CYANIDE
Hydrargyri Cyanidum

$Hg(CN)_2$ Mol. wt. 252.65

Mercuric Cyanide, when dried to constant weight over sulfuric acid, contains not less than 99 per cent of $Hg(CN)_2$.

Caution: Because of the extremely poisonous nature of Mercuric Cyanide and of the gas evolved from it upon treatment with acids, all tests must be made in a hood, with a strong draft, and special care must be taken to avoid inhalation of fumes. Pipettes must not be used in measuring solutions of Mercuric Cyanide.

Description—Mercuric Cyanide occurs as colorless or white, odorless, prismatic crystals, or as a white, odorless powder. Its aqueous solutions are neutral to litmus paper, and it is affected by light.

Solubility—One Gm. of Mercuric Cyanide dissolves in about 13 cc. of water and in about 13 cc. of alcohol at 25°. One Gm. of Mercuric Cyanide dissolves in about 3 cc. of boiling water and in about 6 cc. of boiling alcohol. It is sparingly soluble in ether.

Identification—

A: When slowly heated in a dry test tube, Mercuric Cyanide decrepitates and decomposes into metallic mercury and inflammable cyanogen gas which burns with a purple flame. On further heating, the blackish residue is completely dissipated.

B: Gently heat a mixture of equal parts of Mercuric Cyanide and iodine in a dry test tube: at first a yellow sublimate is produced which later becomes red. Above this is a sublimate of colorless, needle-shaped crystals.

C: To 5 cc. of an aqueous solution of Mercuric Cyanide (1 in 20) cautiously add 2 cc. of diluted hydrochloric acid: the characteristic odor of hydrocyanic acid is evolved. *Caution!*

Loss on drying—When dried to constant weight over sulfuric acid, Mercuric Cyanide loses not more than 1 per cent of its weight.

Residue on ignition—When Mercuric Cyanide is strongly heated, it volatilizes, leaving not more than 0.1 per cent of residue on ignition, page 745.

Mercuric chloride—

A: To 10 cc. of an aqueous solution of Mercuric Cyanide (1 in 20), gradually add a few drops of potassium iodide T.S.: no red or reddish precipitate, soluble in excess of the reagent, is produced.

B: To 10 cc. of an aqueous solution of Mercuric Cyanide (1 in 20), add 1 cc. of diluted nitric acid and 1 cc. of silver nitrate, T.S.: no white precipitate or opalescence is produced.

Mercuric oxide—Dissolve 1 Gm. of Mercuric Cyanide in a solution of 2 Gm. of sodium chloride in 20 cc. of distilled water, and add 1 or 2 drops of phenolphthalein, T.S.: no red color is produced.

Oxycyanide—Mercuric Cyanide dissolves in ammonia T.S. without producing a white precipitate.

Assay—Dissolve 0.2 Gm. of Mercuric Cyanide, dried to constant weight over sulfuric acid and accurately weighed, in 50 cc. of distilled water and add 5 cc. of potassium iodide solution (1 in 5). Add 2 drops of methyl orange T.S., and titrate with 0.1 *N* hydrochloric acid. Each cc. of 0.1 *N* hydrochloric acid is equivalent to 0.01263 Gm. of $Hg(CN)_2$.

Storage—Preserve Mercuric Cyanide in tight, light-resistant containers.

Mercuric Iodide, Red

RED MERCURIC IODIDE
Hydrargyri Iodidum Rubrum

Hydrarg. Iodid. Rub. Mercuric Iodide

HgI_2 Mol. wt. 454.45

Red Mercuric Iodide, when dried at 105° for 3 hours, contains not less than 99 per cent of HgI_2.

Description—Red Mercuric Iodide occurs as a vivid red amorphous powder without odor. It is stable in air and nearly tasteless. It is affected by light.

Solubility—One Gm. of Red Mercuric Iodide dissolves in about 115 cc. of alcohol, in about 910 cc. of chloroform, in about 120 cc. of ether, at 25°; and in about 20 cc. of boiling alcohol. It is dissolved by solutions of the soluble iodides, mercuric chloride, sodium thiosulfate, and by hot solutions of the alkali chlorides, but is practically insoluble in water.

Identification—

A: Boil about 0.1 Gm. of Red Mercuric Iodide with 2 cc. of sodium hydroxide T.S., filter, and strongly acidify the filtrate with nitric acid: the liquid becomes colored because of the liberation of iodine; a blue color is formed upon the addition of a few drops of starch T.S.

B: When heated to about 150°, Red Mercuric Iodide becomes yellow, but again assumes a red color on cooling. At about 250° it fuses to a dark red liquid, which on cooling forms a yellow, crystalline mass. At about 350° it is volatilized.

C: Heat Red Mercuric Iodide with potassium hydroxide T.S., and add a little lactose: metallic mercury is precipitated.

Loss on drying—When dried at 105° for 3 hours, Red Mercuric Iodide loses not more than 2 per cent of its weight.

Residue on ignition—When Red Mercuric Iodide is strongly heated, it volatilizes, leaving not more than 0.2 per cent of residue on ignition, page 745.

Residue insoluble in potassium iodide solution—Not more than 4 mg. of insoluble residue remain on dissolving 2 Gm. of Red Mercuric Iodide in 100 cc. of distilled water containing 2 Gm. of potassium iodide.

Soluble mercury salts—Agitate thoroughly about 0.5 Gm. of Red Mercuric Iodide with 10 cc. of distilled water, and filter: the filtrate does not become more than slightly colored upon the addition of hydrogen sulfide T.S.

Assay—Dry about 1 Gm. of Red Mercuric Iodide for 3 hours at 105°, cool and weigh accurately. Transfer the sample to a 250-cc. glass-stoppered flask, add a cooled mixture of 30 cc. of hydrochloric acid in 20 cc. of distilled water and about 5 cc. of chloroform. Stopper and rotate the flask until the mercuric iodide dissolves. Titrate with 0.05 *M* potassium iodate, adding the solution rapidly while rotating the flask. When the iodine liberated in the first stage of the reaction has disappeared from the solution, stopper the flask, and shake vigorously for about 30 seconds. Then continue the titration slowly, shaking thoroughly after each addition of iodate solution, until the iodine color just disappears from the chloroform. Each cc. of 0.05 *M* potassium iodate is equivalent to 0.02272 Gm. of HgI_2.

Storage—Preserve Red Mercuric Iodide in tight, light-resistant containers.

AVERAGE DOSE—**4 mg.** (approximately $^1/_{16}$ grain).

Mercuric Iodide, Red, Tablets

RED MERCURIC IODIDE TABLETS
Tabellæ Hydrargyri Iodidi Rubri

Tab. Hydrarg. Iodid. Rub. Mercuric Iodide Tablets

Red Mercuric Iodide Tablets contain not less than 91 per cent and not more than 109 per cent of the labeled amount of HgI_2.

Identification—
A: Powder several of the Tablets, add a little lactose, and heat the mixture with potassium hydroxide T.S.: a dark gray color is produced.
B: Powder several of the Tablets and heat a portion of the powder, equivalent to about 10 mg. of red mercuric iodide, with alcohol. Filter the mixture, and evaporate the filtrate to dryness: the residue is soluble in potassium iodide T.S.
C: Powder several of the Tablets and boil a portion of the powder, equivalent to about 20 mg. of red mercuric iodide, with 10 cc. of sodium carbonate T.S. for 10 minutes. The filtrate, after acidification with sulfuric acid, responds to the test for *Iodide*, page 725

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without an appreciable loss, and transfer an accurately weighed portion, equivalent to about 0.13 Gm. of red mercuric iodide, to a glass-stoppered flask and continue as directed in the *Assay* under *Red Mercuric Iodide*, page 326, beginning with "add a cooled mixture of 30 cc. of hydrochloric acid . . .," but using 0.02 *M* potassium iodate instead of 0.05 *M* potassium iodate for the titration. Each cc. of 0.02 *M* potassium iodate is equivalent to 0.009089 Gm. of HgI_2.

Storage—Preserve Red Mercuric Iodide Tablets in tight, light-resistant containers.

Sizes—Red Mercuric Iodide Tablets usually available contain the following amounts of red mercuric iodide: **4, 8,** and **15 mg.** (approximately $^1/_{16}$, $^1/_8$, and $^1/_4$ grain).

AVERAGE DOSE—**4 mg.** (approximately $^1/_{16}$ grain) of Red Mercuric Iodide.

Mercuric Nitrate Ointment

MERCURIC NITRATE OINTMENT
Unguentum Hydrargyri Nitratis

Ung. Hydrarg. Nit. Citrine Ointment

Mercuric Nitrate Ointment contains an amount of mercuric nitrate corresponding to not less than 6.65 per cent and not more than 7.35 per cent of Hg.

Mercury	**70 Gm.**
Nitric Acid	**170 Gm.**
Lard, free from water	**760 Gm.**
To make	**1000 Gm.**

Warm the lard in a capacious porcelain dish until it has just melted, or to about 45°. Add 70 Gm. of the nitric acid all at once, and continue the heat until the characteristic reaction is complete. Hold an inverted glass funnel over the dish during the reaction. Withdraw the heat immediately after the rapid rise of froth which accompanies the end reaction, and cool the treated lard, stirring it until it assumes a bright citrine color. Dissolve the mercury in the remainder of the nitric acid, warming it if necessary to prevent crystallizing, and mix the solution with the previously prepared lard. Contact with metallic utensils or containers must be avoided.

Assay—Completely transfer about 1.5 Gm. of Mercuric Nitrate Ointment, accurately weighed, into a 250-cc. conical flask. Add 25 cc. of xylene and dissolve the fatty bases by gentle warming. Now add 10 cc. of glacial acetic acid followed by 2.5 Gm. of potassium iodide, previously dissolved in 10 cc. of warm distilled water, and use this solution to wash down any mercury compound adhering to the walls of the flask. Shake the flask with a swirling motion until the aqueous solution is clear and pale brown in color. Add 2 Gm. of reagent zinc filings. Adjust the flask to a reflux condenser and boil gently for 15 minutes. Wash down the condenser with 20 cc. of warm distilled water and again boil for 5 minutes. Remove the flame, allow the mixture to cool, and add 150 cc. of distilled water. Decant the xylene and aqueous solutions, then wash the amalgam by decantation with xylene and distilled water until the washings no longer give a test for iodide. Dissolve the amalgam in diluted nitric acid, cool, oxidize with potassium permanganate T.S., and decolorize this mixture with a few drops of hydrogen peroxide T.S. Now titrate the solution with 0.1 *N* ammonium thiocyanate, using ferric ammonium sulfate T.S. as the indicator. Each cc. of 0.1 *N* ammonium thiocyanate is equivalent to 0.01003 Gm. of Hg.

Storage—Preserve Mercuric Nitrate Ointment in tight containers and avoid prolonged exposure to temperatures above 30°.

Mercuric Oxide, Red

RED MERCURIC OXIDE
Hydrargyri Oxidum Rubrum

Hydrarg. Oxid. Rub. Red Precipitate

HgO Mol. wt. 216.61

Red Mercuric Oxide, when dried at 120° for 3 hours, contains not less than 99.5 per cent of HgO.

Description—Red Mercuric Oxide occurs as heavy, orange-red, crystalline scales, or as a crystalline powder, acquiring a yellow color when finely divided. It is odorless, and has a slightly metallic taste. It is affected by light.

Solubility—Red Mercuric Oxide is readily dissolved by diluted nitric or hydrochloric acid. It is almost insoluble in water and completely insoluble in alcohol.

Identification—

A: When heated to about 400°, Red Mercuric Oxide becomes very dusky red-purple, but assumes its original color on cooling.

B: A solution of Red Mercuric Oxide (1 in 40) in diluted hydrochloric acid or in diluted nitric acid is not more than slightly turbid and responds to the tests for *Mercuric Salts*, page 726.

Loss on drying—When dried at 120° for 3 hours, Red Mercuric Oxide loses not more than 1 per cent of its weight.

Residue on ignition—When Red Mercuric Oxide is strongly heated, it completely decomposes into oxygen and metallic mercury, and finally volatilizes, leaving not more than 0.2 per cent of residue on ignition, page 745.

Nitrate—Mix 1 Gm. of Red Mercuric Oxide with 5 cc. of distilled water, add 2 cc. of sulfuric acid, cool the mixture, and carefully pour upon it 2 cc. of ferrous sulfate T.S. so as to form separate layers: no brown zone develops at the line of contact.

Assay—Dissolve about 0.5 Gm. of Red Mercuric Oxide, dried at 120° for 3 hours and accurately weighed, in 10 cc. of distilled water and 5 cc. of nitric acid; further dilute the solution with 150 cc. of distilled water. Add 2 cc. of ferric ammonium sulfate T.S., and titrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* ammonium thiocyanate is equivalent to 0.01083 Gm. of HgO.

Storage—Preserve Red Mercuric Oxide in tight, light-resistant containers.

Mercuric Oxide, Red, Ointment

RED MERCURIC OXIDE OINTMENT

Unguentum Hydrargyri Oxidi Rubri

Ung. Hydrarg. Oxid. Rub.

Red Mercuric Oxide Ointment contains not less than 9.5 per cent and not more than 10.5 per cent of HgO.

Red Mercuric Oxide, in very fine powder	**100 Gm.**
Liquid Petrolatum	**50 Gm.**
Yellow Wax	**50 Gm.**
Wool Fat	**300 Gm.**
Petrolatum	**500 Gm.**
To make	**1000 Gm.**

Triturate the red mercuric oxide with the liquid petrolatum until the mixture is smooth and absolutely free from gritty particles; then incorporate the wool fat in divided portions, and finally incorporate this mixture thoroughly with the mixture of yellow wax and petrolatum, previously melted and cooled. Contact with metallic utensils and containers must be avoided.

Assay—Weigh accurately about 1.5 Gm. of Red Mercuric Oxide Ointment and completely transfer it with the aid of 25 cc. of xylene to a 250-cc. conical flask. Warm the mixture gently to dissolve the fatty bases, add 10 cc. of glacial acetic acid, 20 cc. of potassium iodide T.S., and mix thoroughly. Now add 2 Gm. of reagent zinc filings. Adjust the flask to a reflux condenser and boil gently for 15 minutes. Wash down the condenser with 20 cc. of warm distilled water and again boil for 5 minutes. Remove the flame, allow the mixture to cool, and add 150 cc. of distilled water. Decant the xylene and aqueous solutions, then wash the amalgam by decantation with xylene and distilled water until the washings no longer give a test for iodide. Dissolve the amalgam in diluted nitric acid, cool, oxidize with a small excess of potassium permanganate, then decolorize this mixture with a few drops of hydrogen peroxide T.S. Now titrate the solution with 0.1 *N* ammonium thiocyanate, using ferric ammonium sulfate T.S. as the indicator. Each cc. of 0.1 *N* ammonium thiocyanate is equivalent to 0.01083 Gm. of HgO.

Storage—Preserve Red Mercuric Oxide Ointment in tight containers and avoid prolonged exposure to temperatures above 30°.

Mercuric Salicylate

MERCURIC SALICYLATE

Hydrargyri Salicylas

Hydrarg. Salicyl.

$HgC_7H_4O_3$ Mol. wt. 336.71

Mercuric Salicylate contains not less than 54 per cent and not more than 59.5 per cent of Hg.

Description—Mercuric Salicylate occurs as a white, or slightly yellow or slightly pink, odorless powder. It is affected by light.

Solubility—Mercuric Salicylate is dissolved by solutions of the fixed alkali hydroxides, by solutions of the alkali carbonates, and by solutions of alkali halides. It is practically insoluble in water and in alcohol.

Identification—

A: Heat 1 Gm. of Mercuric Salicylate with 25 cc. of hydrochloric acid and cool the solution: salicylic acid separates. Filter the mixture, nearly neutralize the filtrate with ammonia T.S., and immerse copper foil in it: a coating of metallic mercury forms on the foil.

B: Mix 0.5 Gm. of Mercuric Salicylate with 10 cc. of distilled water, and add a few drops of ferric chloride T.S.: the mixture acquires a reddish purple color.

Residue on ignition—When ignited, Mercuric Salicylate leaves not more than 0.1 per cent of residue on ignition, page 745.

Alkali-insoluble substances—Add 4 cc. of 1 *N* sodium hydroxide to 0.2 Gm. of Mercuric Salicylate, and shake the mixture gently: the Mercuric Salicylate dissolves completely.

Foreign mercury compounds—No dark color results at once on shaking about 0.1 Gm. of Mercuric Salicylate with 5 cc. of hydrogen sulfide T.S.

Assay—Digest about 0.5 Gm. of Mercuric Salicylate, accurately weighed, with a mixture of 15 cc. of sulfuric acid and 15 cc. of nitric acid, contained in a Kjeldahl

flask in the mouth of which a small funnel is inserted, then heat upon a sand bath until colorless. Cool the solution, cautiously dilute with 150 cc. of distilled water, cool, add 2 cc. of ferric ammonium sulfate T.S., and titrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* ammonium thiocyanate is equivalent to 0.01003 Gm. of Hg.

Storage—Preserve Mercuric Salicylate in tight, light-resistant containers.

AVERAGE DOSE—Intramuscular, in oil, **0.1 Gm.** (approximately $1^1/_2$ grains).

MERCURIC SALICYLATE AMPULS

Ampullæ Hydrargyri Salicylatis

Ampul. Hydrarg. Salicyl. Mercuric Salicylate Injection

Mercuric Salicylate Ampuls contain a sterile suspension of mercuric salicylate in a suitable fixed oil, and yield an amount of Hg equivalent to not less than 52.5 per cent and not more than 61 per cent of the labeled amount of $HgC_7H_4O_3$. The contents of the Ampuls meet the requirements of the *Sterility Test for Liquids*, page 746.

Sterilize the filled ampuls preferably by Process E at a temperature not exceeding 65°. *See Sterilization Processes*, page 749. Mercuric Salicylate Ampuls also conform to the other requirements under *Ampuls*, page 687.

Identification—Transfer to a dry filter a sufficient volume of the suspension of mercuric salicylate in oil to yield about 1 Gm. of mercuric salicylate, wash it with petroleum benzin until the oil is removed, and allow the benzin to evaporate from the filter. The residue responds to *Identification tests A* and *B* under *Mercuric Salicylate*, page 330.

Assay—Shake thoroughly the contents of the cylinder obtained in the *Determination of the Volume of the Contents of Ampuls*, page 688, and at once transfer with a pipette, calibrated to contain an accurately measured volume of the suspension, equivalent to about 0.5 Gm. of mercuric salicylate, to a dry filter, washing out the pipette with a small quantity of petroleum benzin and adding the washings to the ampul suspension on the filter. Wash the suspension with petroleum benzin to remove all of the oil, and allow the petroleum benzin to evaporate from the filter. Place the filter and contents in a Kjeldahl flask, add 15 cc. of sulfuric acid, and follow in about 10 minutes with 15 cc. of nitric acid, adding the nitric acid slowly and while rotating the contents of the flask. Insert a small funnel in the neck of the flask, and heat on a sand bath until a colorless or practically colorless solution results. Cool the solution, cautiously dilute with 150 cc. of distilled water, cool, add 2 cc. of ferric ammonium sulfate T.S., and titrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* ammonium thiocyanate is equivalent to 0.01003 Gm. of Hg.

Storage—Preserve Mercuric Salicylate Ampuls preferably in single-dose hermetic containers, or in other suitable containers. See *Containers for Injections*, page 699. Protect the Ampuls from light.

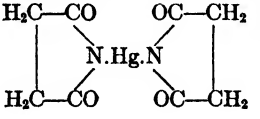
AVERAGE DOSE—Intramuscular, **0.1 Gm.** (approximately $1^1/_2$ grains) of Mercuric Salicylate.

Mercuric Succinimide

MERCURIC SUCCINIMIDE

Hydrargyri Succinimidum

Hydrarg. Succinim.



$C_8H_8N_2O_4Hg$ Mol. wt. 396.77

Mercuric Succinimide, when dried over sulfuric acid for 18 hours, contains not less than 49.5 per cent and not more than 51 per cent of Hg, corresponding to not less than 98 per cent of $C_8H_8N_2O_4Hg$.

Description—Mercuric Succinimide occurs as small, white crystals, or as a white powder. It is odorless and is stable in air, but darkens on exposure to light. An aqueous solution of Mercuric Succinimide (1 in 25) is neutral to litmus paper.

Solubility—One Gm. of Mercuric Succinimide dissolves in 20 cc. of water at 25°, and in about 5 cc. of boiling water. It is slightly soluble in alcohol and is insoluble in ether.

Identification—

A: The addition of sodium hydroxide T.S. to an aqueous solution of Mercuric Succinimide (1 in 25) produces a yellowish white precipitate which is reduced to metallic mercury when the mixture is heated.

B: Add potassium iodide T.S., dropwise, to a solution of Mercuric Succinimide (1 in 25): a yellow precipitate is produced which dissolves on the addition of an excess of the reagent.

C: Heated with about 5 times its weight of zinc dust, Mercuric Succinimide evolves pyrrole, which imparts a red color to a pine shaving moistened with hydrochloric acid and held in the vapor.

D: Disperse about 0.5 Gm. of finely powdered Mercuric Succinimide in 50 cc. of cold ether in a flask, and pass hydrogen sulfide through the mixture until it has a distinct odor of hydrogen sulfide: a black precipitate of mercuric sulfide is produced. Filter the mixture, evaporate the clear filtrate to dryness, and dry for 1 hour at 105°: the residue of succinimide melts between 123° and 125°, page 731.

Loss on drying—When dried over sulfuric acid for 18 hours, Mercuric Succinimide loses not more than 2 per cent of its weight.

Residue on ignition—When ignited, Mercuric Succinimide leaves not more than 0.1 per cent of residue on ignition, page 745.

Chloride—The addition of 5 drops of silver nitrate T.S. to 5 cc. of an aqueous solution of Mercuric Succinimide (1 in 25), previously acidified with 2 drops of diluted nitric acid, produces no opalescence.

Mercury salts—The addition of 5 drops of clear albumen T.S. to 5 cc. of an aqueous solution of Mercuric Succinimide (1 in 25) produces no turbidity.

Assay—Dry about 0.5 Gm. of Mercuric Succinimide over sulfuric acid for 18 hours, and weigh accurately. Dissolve it in 10 cc. of nitric acid, and dilute with 150 cc. of cold distilled water. Add 3 cc. of ferric ammonium sulfate T.S., and titrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* ammonium thiocyanate is equivalent to 0.01003 Gm. of Hg.

Storage—Preserve Mercuric Succinimide in tight, light-resistant containers.

AVERAGE DOSE—Intramuscular, **15 mg.** (approximately $^1/_4$ grain).

Mercuric Succinimide Ampuls

MERCURIC SUCCINIMIDE AMPULS

Ampullæ Hydrargyri Succinimidi

Ampul. Hydrarg. Succinim. · Mercuric Succinimide Injection

Mercuric Succinimide Ampuls contain a sterile solution of mercuric succinimide in water for injection, and yield an amount of Hg, equal to not less than 48 per cent and not more than 52 per cent of the labeled amount of $C_8H_8N_2O_4Hg$.

Prepare the solution and fill the cleansed ampuls according to the requirements given on pages 687 to 689. The Ampuls also conform to the other requirements under *Ampuls*, page 687.

Assay—Transfer to a suitable flask an accurately measured volume of the ampul solution, containing about 0.25 Gm. of mercuric succinimide. Add 10 cc. of nitric acid, 100 cc. of distilled water, and 2 cc. of ferric ammonium sulfate T.S., and titrate with 0.1 *N* ammonium thiocyanate. Each cc. of the 0.1 *N* ammonium thiocyanate is equivalent to 0.01003 Gm. of Hg.

AVERAGE DOSE—**15 mg.** of Mercuric Succinimide.

Mercurous Chloride, Mild, and Sodium Bicarbonate Tablets

MILD MERCUROUS CHLORIDE AND SODIUM BICARBONATE TABLETS

Tabellæ Hydrargyri Chloridi Mitis et Sodii Bicarbonatis

Tab. Hydrarg. Chlorid. Mit. et Sod. Bicarb. Calomel and Soda Tablets

Mild Mercurous Chloride and Sodium Bicarbonate Tablets contain not less than 92.5 per cent and not more than 107.5 per cent of the labeled amount of HgCl for tablets containing more than 15 mg., and not less than 90 per cent and not more than 110 per cent for tablets containing 15 mg. or less of HgCl.

Identification—
A: The Tablets conform to the tests for *Identification* under *Mild Mercurous Chloride Tablets*, page 335.
B: A filtered, cold aqueous solution of the Tablets responds to the tests for *Sodium*, page 727, and for *Bicarbonate*, page 723.

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without an appreciable loss, and mix an accurately weighed portion, equivalent to about 0.3 Gm. of mild mercurous chloride, with 50 cc. of distilled water; add diluted acetic acid until the mixture is slightly acid to litmus paper, and proceed as directed in the *Assay* under *Mild Mercurous Chloride Tablets*, page 335.

Storage—Preserve Mild Mercurous Chloride and Sodium Bicarbonate Tablets in tight, light-resistant containers.

Sizes—Mild Mercurous Chloride and Sodium Bicarbonate Tablets usually available contain the following amounts of mild mercurous chloride: **6, 15, 30, and 60 mg.** (approximately 1/10, 1/4, 1/2, and 1 grain).

AVERAGE DOSE—**60 mg.** (approximately 1 grain) of Mild Mercurous Chloride, in tablets usually containing a fraction of the average dose.

Mercurous Chloride, Mild, Ointment

MILD MERCUROUS CHLORIDE OINTMENT
Unguentum Hydrargyri Chloridi Mitis

Ung. Hydrarg. Chlorid. Mit. Calomel Ointment

Mild Mercurous Chloride Ointment contains not less than 28.5 per cent and not more than 31.5 per cent of HgCl.

Mild Mercurous Chloride	300 Gm.
Hydrous Wool Fat	350 Gm.
White Petrolatum	350 Gm.
To make	1000 Gm.

Mix the ingredients.

Assay—Weigh accurately about 1.0 Gm. of Mild Mercurous Chloride Ointment and completely transfer it with the aid of 25 cc. of xylene to a 250-cc. conical flask. Warm the mixture gently to dissolve the fatty bases, add 10 cc. of glacial acetic acid, 20 cc. of potassium iodide T.S., and mix thoroughly. Now add 2 Gm. of reagent zinc filings. Adjust the flask to a reflux condenser and boil gently for 15 minutes. Wash down the condenser with 20 cc. of warm distilled water and again boil for 5 minutes. Remove the flame, allow the mixture to cool, and add 150 cc. of distilled water. Decant the xylene and aqueous solutions, then wash the amalgam by decantation with xylene and distilled water until the aqueous washings no longer give a test for iodide. Dissolve the amalgam in diluted nitric acid, cool, oxidize with a small excess of potassium permanganate T.S., then decolorize this mixture with a few drops of hydrogen peroxide T.S. Now titrate the solution with 0.1 *N* ammonium thiocyanate, using ferric ammonium sulfate T.S. as the indicator. Each cc. of 0.1 *N* ammonium thiocyanate is equivalent to 0.01180 Gm. of HgCl.

Storage—Preserve Mild Mercurous Chloride Ointment in tight containers and avoid prolonged exposure to temperatures above 30°.

Mercurous Chloride, Mild, Pills, Compound

COMPOUND MILD MERCUROUS CHLORIDE PILLS

Pilulæ Hydrargyri Chloridi Mitis Compositæ

Pil. Hydrarg. Chlorid. Mit. Comp. Compound Cathartic Pills

Compound Colocynth Extract	**8 Gm.**
Mild Mercurous Chloride	**6 Gm.**
Jalap Resin, in fine powder	**2 Gm.**
Gamboge, in very fine powder	**1.5 Gm.**

Diluted Alcohol, a sufficient quantity,

To make 100 pills.

Prepare the pills according to the General Directions, page 739.

AVERAGE DOSE—2 pills.

One average metric dose contains 0.16 Gm. of Compound Colocynth Extract, 0.12 Gm. of Mild Mercurous Chloride, 40 mg. of Jalap Resin, and 30 mg. of Gamboge.

Mercurous Chloride, Mild, Tablets

MILD MERCUROUS CHLORIDE TABLETS

Tabellæ Hydrargyri Chloridi Mitis

Tab. Hydrarg. Chlorid. Mit. Calomel Tablets

Mild Mercurous Chloride Tablets contain not less than 92.5 per cent and not more than 107.5 per cent of the labeled amount of HgCl.

Identification—

A: The addition of a few drops of ammonia T.S., or a solution of an alkali hydroxide, to a portion of the powdered Tablets produces a grayish black color.

B: Powder several of the Tablets, and boil a portion of the powder, equivalent to about 20 mg. of mild mercurous chloride, in 2 cc. of sodium carbonate T.S.: a gray to black color is produced in the mixture. Filter the mixture, acidify it with nitric acid, and add silver nitrate T.S.: a white precipitate, soluble in ammonia T.S., is produced.

Mercuric chloride—Powder a number of the Tablets, equivalent to 0.2 Gm. of mild mercurous chloride, triturate the powder for several minutes with 30 cc. of distilled water, and filter. A mixture of 10 cc. of the clear filtrate and 1 cc. of albumin T.S. shows no more turbidity, within 5 minutes, than does a 10-cc. control portion of the filtrate without the albumin T.S.

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without an appreciable loss, mix an accurately weighed portion, equivalent to about 0.3 Gm. of mild mercurous chloride, with 50 cc. of distilled water, filter the mixture, and wash the insoluble residue on the filter with distilled water. Transfer the filter paper containing the residue to a glass-stoppered flask, add 35 cc. of 0.1 *N* iodine and 0.3 Gm. of potassium iodide dissolved in 10 cc. of distilled water, and 10 cc. of a saturated aqueous solution of sodium chloride. Stopper the flask, allow the mixture to stand, with occasional agitation, until complete solution of the mercurous chloride has taken place, and titrate the excess iodine with 0.1 *N* sodium thiosulfate, starch T.S. being used as the indicator. Each cc. of 0.1 *N* iodine is equivalent to 0.02361 Gm. of HgCl.

Storage—Preserve Mild Mercurous Chloride Tablets in tight, light-resistant containers.

Sizes—Mild Mercurous Chloride Tablets usually available contain the following amounts of mild mercurous chloride: **6, 15, 30, and 60 mg.** (approximately 1/10, 1/4, 1/2, and 1 grain).

AVERAGE DOSE—**60 mg.** (approximately 1 grain) of Mild Mercurous Chloride, in tablets usually containing a fraction of the average dose.

Mercurous Iodide, Yellow

YELLOW MERCUROUS IODIDE

Hydrargyri Iodidum Flavum

Hydrarg. Iodid. Flav. Mercurous Iodide

HgI Mol. wt. 327.53

Yellow Mercurous Iodide, when dried over sulfuric acid for 4 hours, contains not less than 99 per cent of HgI.

Description—Yellow Mercurous Iodide occurs as a strong yellowish orange, amorphous powder, without odor or taste. It decomposes upon exposure to light.

Solubility—Yellow Mercurous Iodide is practically insoluble in water, and is insoluble in alcohol and in ether.

Identification—

A: Yellow Mercurous Iodide is blackened by ammonia T.S. or by sodium hydroxide T.S.

B: Yellow Mercurous Iodide heated with sulfuric acid and a little manganese dioxide evolves iodine vapor.

C: Add 0.5 Gm. of Yellow Mercurous Iodide to 10 cc. of potassium iodide T.S.: mercuric iodide is formed, which dissolves, leaving a residue of mercury which coagulates into droplets after standing about 10 minutes.

Loss on drying—When dried over sulfuric acid for 4 hours, Yellow Mercurous Iodide loses not more than 2 per cent of its weight.

Residue on ignition—When Yellow Mercurous Iodide is strongly heated, it volatilizes, leaving not more than 0.1 per cent of residue on ignition, page 745.

Mercuric iodide—Place 0.5 Gm. of Yellow Mercurous Iodide in a 10-cc., glass-stoppered cylinder, add 10 cc. of alcohol, shake by inverting the cylinder 10 times, allow it to stand protected from light for 2 minutes, and again invert the cylinder 10 times. Filter at once, refilter if necessary until the filtrate is clear, and then to 5 cc. of the filtrate add an equal volume of hydrogen sulfide T.S.: the color of the mixture is not darker than that produced by the addition of 5 cc. of hydrogen sulfide T.S. to a mixture of 1 cc. of mercuric chloride solution (1 in 2000) and 4 cc. of alcohol.

Assay—Dry about 1 Gm. of Yellow Mercurous Iodide over sulfuric acid for 4 hours, weigh accurately, transfer to a glass-stoppered flask, and add 50 cc. of 0.1 *N* iodine followed by 5 Gm. of potassium iodide dissolved in 10 cc. of distilled water. Stopper the flask, and allow the mixture to stand with occasional agitation until complete solution has taken place, and then titrate the residual iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Each cc. of 0.1 *N* iodine is equivalent to 0.03275 Gm. of HgI.

Storage—Preserve Yellow Mercurous Iodide in tight, light-resistant containers.

AVERAGE DOSE—**10 mg.** (approximately 1/6 grain).

YELLOW MERCUROUS IODIDE TABLETS

Tabellæ Hydrargyri Iodidi Flavi

Tab. Hydrarg. Iodid. Flav. Mercurous Iodide Tablets

Yellow Mercurous Iodide Tablets contain not less than 91 per cent and not more than 109 per cent of the labeled amount of HgI.

Identification—

A: Powder several of the Tablets, and heat a portion of the powder, equivalent to about 0.15 Gm. of yellow mercurous iodide, with sulfuric acid and a little manganese dioxide: the vapor of iodine is evolved.

B: Heat a portion of the powdered Tablets with potassium hydroxide T.S.: a dark gray color is produced.

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without an appreciable loss, and transfer an accurately weighed portion, equivalent to about 0.1 Gm. of yellow mercurous iodide, to a glass-stoppered flask; add 20 cc. of distilled water, 50 cc. of hydrochloric acid, and 5 cc. of chloroform; cool to about 10° and titrate with 0.02 *M* potassium iodate. Each cc. of 0.02 *M* potassium iodate is equivalent to 0.008734 Gm. of HgI.

NOTE: This assay is applicable to these Tablets when not coated. Suitable modifications or another method may be necessary for assaying the Tablets when coated.

Storage—Preserve Yellow Mercurous Iodide Tablets in tight, light-resistant containers.

Sizes—Yellow Mercurous Iodide Tablets usually available contain the following amounts of yellow mercurous iodide: **8, 10, 15,** and **30 mg.** (approximately 1/8, 1/6, 1/4, and 1/2 grain).

AVERAGE DOSE—**10 mg.** (approximately 1/6 grain) of Yellow Mercurous Iodide.

MERCURY BICHLORIDE

Hydrargyri Bichloridum

Hydrarg. Bichlorid.

Corrosive Mercuric Chloride Corrosive Sublimate Mercuric Chloride

$HgCl_2$ Mol. wt. 271.52

Mercury Bichloride, when dried over sulfuric acid for 18 hours, contains not less than 99.5 per cent of $HgCl_2$.

Caution: Mercury Bichloride is extremely poisonous.

Description—Mercury Bichloride occurs as heavy, colorless, odorless crystals, as crystalline masses, or as a white powder. An aqueous solution of Mercury Bichloride (1 in 20) is acid to litmus paper, but becomes neutral upon the addition of sodium chloride.

Solubility—One Gm. of Mercury Bichloride dissolves in 13.5 cc. of water, in 3.8 cc. of alcohol, in about 12 cc. of glycerin, and in 25 cc. of ether, at 25°. One Gm. of Mercury Bichloride dissolves in 2.1 cc. of boiling water and in 1.6 cc. of boiling alcohol.

Identification—An aqueous solution of Mercury Bichloride (1 in 20) responds to the tests for *Mercuric Salts*, page 726, and for *Chloride*, page 724.

Loss on drying—When dried over sulfuric acid for 18 hours, Mercury Bichloride loses not more than 1 per cent of its weight.

Residue on ignition—When Mercury Bichloride is strongly heated, it volatilizes, leaving not more than 0.1 per cent of residue on ignition, page 745.

Ether-insoluble residue—Add 1 Gm. of Mercury Bichloride to 50 cc. of ether contained in a flask. Shake until no more dissolves, and then filter through a sintered glass crucible, which has been previously washed with ether, heated for 30 minutes at 50°, cooled, and weighed. Wash the crucible and contents with small portions of ether, using a total of 25 cc. Heat the crucible for 30 minutes at 50°, cool, and weigh: the weight of residue does not exceed 3 mg.

Assay—Dry about 0.5 Gm. of Mercury Bichloride over sulfuric acid for 18 hours, weigh accurately, and dissolve it in 300 cc. of warm distilled water, to which 1 cc. of hydrochloric acid has been added. Pass hydrogen sulfide through the solution until the precipitate of mercuric sulfide readily settles, leaving a clear, supernatant liquid. Collect the precipitate on counterpoised filters or in a tared Gooch crucible, wash it well with cold distilled water, and finally with 3 portions of about 10 cc. each of alcohol. Then close the tip of the funnel or of the Gooch crucible holder, add sufficient carbon tetrachloride to cover the precipitate, cover the funnel or crucible with a watch glass, and allow it to stand for about 30 minutes. Drain off the solvent, and wash the precipitate with further portions of carbon tetrachloride until, after evaporating about 1 cc. of the last filtrate, no visible residue remains. Remove the adhering carbon tetrachloride by washing the precipitate with several portions of 10 cc. each of alcohol, and, after drying in the air, transfer to an oven, and dry to constant weight at about 110°. The weight of mercuric sulfide, multiplied by 1.167, indicates its equivalent in $HgCl_2$.

Storage—Preserve Mercury Bichloride in tight containers.

Mercury Bichloride Tablets, Large Poison

MERCURY BICHLORIDE LARGE POISON TABLETS

Toxitabellæ Hydrargyri Bichloridi Magnæ

Toxitabel. Hydrarg. Bichlorid. Mag.

Large Corrosive Sublimate Tablets — Large Bichloride Tablets

Mercury Bichloride Large Poison Tablets contain an average of not less than 0.42 Gm. and not more than 0.52 Gm. of $HgCl_2$, with a sufficient quantity of a suitable excipient or diluent.

Mercury Bichloride Large Poison Tablets must be of a distinctive color, not white; they must be of an angular or irregular shape, not discoid. When sold in small quantities, the Tablets must be dispensed in glass containers of a distinctive, angular shape, having irregular or roughened sides or edges. On the exterior of each container must be placed a red printed label bearing the word "POISON" and a statement indicating the amount of mercury bichloride in each Tablet.

Assay—Proceed as directed under *Mercury Bichloride*, page 338, using for the assay one-tenth of a mixture prepared by uniformly powdering 10 Tablets. Prior to washing the sulfide with 3 portions of about 10 cc. each of alcohol, however, wash

it with distilled water until the last portion of filtrate is colorless and until a 5-cc. portion of the last washing, acidified with nitric acid, produces no turbidity on the addition of a few drops of silver nitrate T.S. The weight of the mercuric sulfide obtained, multiplied by 1.167, indicates its equivalent in $HgCl_2$.

NOTE: One Mercury Bichloride Large Poison Tablet added to 475 cc. (1 pint) of water makes approximately a 1 to 1000 solution.

Mercury Bichloride Tablets, Small Poison

MERCURY BICHLORIDE SMALL POISON TABLETS
Toxitabellæ Hydrargyri Bichloridi Parvæ

Toxitabel. Hydrarg. Bichlorid. Par.

Small Corrosive Sublimate Tablets — Small Bichloride Tablets

Mercury Bichloride Small Poison Tablets contain an average of not less than 0.11 Gm. and not more than 0.14 Gm. of $HgCl_2$, with a sufficient quantity of a suitable excipient or diluent.

Mercury Bichloride Small Poison Tablets must be of a distinctive color, not white; they must be of an angular or irregular shape, not discoid. When sold in small quantities, the Tablets must be dispensed in glass containers of a distinctive, angular shape, having irregular or roughened sides or edges. On the exterior of each container must be placed a red printed label bearing the word "POISON" and a statement indicating the amount of mercury bichloride in each Tablet.

Assay—Proceed as directed under *Mercury Bichloride*, page 338, using for the assay one-fifth of a mixture prepared by uniformly powdering 20 Tablets. Prior to washing the sulfide with 3 portions of about 10 cc. each of alcohol, however, wash it with distilled water until the last portion of the filtrate is colorless and until a 5-cc. portion of the last washing, acidified with nitric acid, produces no turbidity on the addition of a few drops of silver nitrate T.S. The weight of the mercuric sulfide obtained, multiplied by 1.167, indicates its equivalent in $HgCl_2$.

NOTE: One Mercury Bichloride Small Poison Tablet added to 120 cc. (4 fluid-ounces) of water makes approximately a 1 to 1000 solution.

Mercury Mass

MERCURY MASS
Massa Hydrargyri

Mass. Hydrarg. — Blue Mass — Blue Pill

Mercury Mass contains not less than 31 per cent and not more than 35 per cent of Hg.

Mercury	330 Gm.
Mercury Oleate	10 Gm.
Glycyrrhiza, in very fine powder	100 Gm.
Althea, in very fine powder	150 Gm.
Glycerin	90 Gm.
Honey	320 Gm.
To make	1000 Gm.

Triturate the mercury oleate in a mortar, gradually add the mercury, then a small amount of honey, and triturate the mixture until globules of mercury are no longer visible under a lens magnifying 10 diameters. Incorporate the remainder of the honey and the glycerin, gradually add the glycyrrhiza and althea, and continue the trituration until the mass is homogeneous.

Assay—Place about 0.5 Gm. of Mercury Mass, accurately weighed, in a Kjeldahl flask of about 300-cc. capacity. Add 10 cc. of sulfuric acid, and heat on a water bath for 10 minutes, gently agitating the mixture at frequent intervals to disintegrate the mass. Insert a small funnel in the neck of the flask, and slowly add 10 cc. of nitric acid. Heat the mixture with a Bunsen burner, at first gently, and then more strongly, until the solution is colorless or only slightly yellow, adding more nitric acid if necessary, and keeping the funnel in the neck of the flask during heating. Allow the solution to cool sufficiently, and carefully add through the funnel about 30 cc. of distilled water, rinsing the stem of the funnel with a few cc. of distilled water and allowing the rinsings to run into the flask. Then to the warm solution add potassium permanganate T.S. until a slight pink color persists. Cool the solution, discharge its color by the addition of just sufficient oxalic acid T.S., dilute with cold distilled water to about 100 cc., add 3 cc. of nitric acid and 2 cc. of ferric ammonium sulfate T.S., and titrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* ammonium thiocyanate is equivalent to 0.01003 Gm. of Hg.
Storage—Preserve Mercury Mass in tight containers.

AVERAGE DOSE—**0.2 Gm.** (approximately 3 grains).

Mercury with Chalk

MERCURY WITH CHALK
Hydrargyrum cum Creta
Hydrarg. c. Cret.

Mercury with Chalk contains not less than 36 per cent and not more than 40 per cent of Hg.

Mercury	380 Gm.
Honey	100 Gm.
Prepared Chalk	570 Gm.
Distilled Water, a sufficient quantity,	
To make	1000 Gm.

Weigh the mercury and honey successively into a strong bottle of 1000-cc. capacity, and add 20 cc. of distilled water. Stopper the bottle and shake it for about 30 minutes at a time until the aggregate time of shaking reaches 10 hours, or until the globules of mercury are no longer visible under a lens magnifying four diameters. The shaking may be more conveniently performed by mechanical means. Triturate the prepared chalk with distilled water in a mortar to a thick, creamy paste, add the contents of the bottle, washing out the last portions with a little distilled water, and again triturate the mixture until uniform. Finally dry the mixture, first between ample layers of bibulous paper, and afterward in a dish at ordinary temperature until it weighs 1000 Gm. Then reduce it to a uniform powder without trituration.

Description—Mercury with Chalk occurs as a light gray, rather damp powder, free from grittiness. It is odorless, has a slightly sweet taste, and is affected by light.

Identification—Digest 0.1 Gm. of Mercury with Chalk with 20 cc. of warm acetic acid: the chalk dissolves with effervescence, and a residue of finely divided mercury remains.

Mercurous oxide—Filter the mixture obtained in the *Identification* test: the filtrate becomes not more than slightly opalescent on the addition of a few drops of hydrochloric acid.

Mercuric oxide—Digest 0.1 Gm. of Mercury with Chalk with 20 cc. of diluted hydrochloric acid at 40° for 15 minutes, and filter: the filtrate is not rendered more than slightly brown by the addition of hydrogen sulfide T.S.

Assay—Dissolve about 1 Gm. of Mercury with Chalk, accurately weighed, in a mixture of 10 cc. of distilled water and 10 cc. of nitric acid, and heat on a water bath until red fumes cease to be evolved and the liquid becomes colorless. Then add 150 cc. of cold distilled water and 2 cc. of ferric ammonium sulfate T.S., and titrate the solution with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* ammonium thiocyanate is equivalent to 0.01003 Gm. of Hg.

Storage—Preserve Mercury with Chalk in tight, light-resistant containers.

AVERAGE DOSE—**0.25 Gm.** (approximately 4 grains).

METHENAMINE AMPULS

Ampullæ Methenaminæ

Ampul. Methenam. Hexamethylenamine Ampuls Methenamine Injection

Methenamine Ampuls contain a sterile solution of methenamine in water for injection, and yield $(CH_2)_6N_4$, equal to not less than 96 per cent and not more than 104 per cent of the labeled amount of $(CH_2)_6N_4$.

Prepare the solution and fill the cleansed ampuls according to the requirements given on pages 687 to 689. Sterilize the filled ampuls by heating to 100° for 30 minutes, or by any other adequate and suitable method of sterilization, and test for sterility according to the method described on page 746. The Ampuls also conform to the other requirements under *Ampuls*, page 687.

Assay—Transfer to a beaker an accurately measured volume of the ampul solution, diluted if necessary, and containing about 0.1 Gm. of methenamine; add 40 cc. of 0.1 *N* sulfuric acid, and heat on a water bath (adding a little distilled water from time to time, if necessary) until the odor of formaldehyde is no longer perceptible. Cool, and titrate the excess of acid with 0.1 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.003505 Gm. of $(CH_2)_6N_4$.

AVERAGE DOSE—**2 Gm.** of Methenamine.

Methenamine and Sodium Biphosphate Tablets

METHENAMINE AND SODIUM BIPHOSPHATE TABLETS

Tabellæ Methenaminæ et Sodii Biphosphatis

Tab. Methenam. et Sod. Biphos.

Tablets of Methenamine and Acid Sodium Phosphate

Methenamine and Sodium Biphosphate Tablets contain not less than 92.5 per cent and not more than 107.5 per cent of the labeled amounts of $(CH_2)_6N_4$ and of $NaH_2PO_4.H_2O$.

Identification—

A: Powder several of the Tablets, and heat an aqueous filtered solution of the powder, equivalent to methenamine 1 in 10, with diluted sulfuric acid: it decomposes with the liberation of formaldehyde, recognized by its odor or because it darkens paper moistened with silver ammonium nitrate T.S. On the subsequent addition of an excess of sodium hydroxide T.S., ammonia is liberated.

B: Add 1 cc. of alkaline mercuric potassium iodide T.S. to a filtered aqueous solution of the Tablets, equivalent to methenamine 1 in 20: a yellow precipitate develops, and after acidification with hydrochloric acid, the precipitate becomes soluble upon the addition of ammonia T.S.

C: A filtered aqueous solution of the Tablets, equivalent to sodium biphosphate 1 in 20, responds to the tests for *Sodium*, page 727, and for *Phosphate*, page 727.

Aluminum and calcium—A filtered aqueous solution of the Tablets, equivalent to sodium biphosphate 1 in 10, does not become turbid when rendered slightly alkaline to litmus paper with ammonia T.S.

Ammonium salts—Dissolve 0.5 Gm. of the powdered Tablets in 10 cc. of distilled water, add 5 cc. of sodium hydroxide T.S., and follow with 1 cc. of alkaline mercuric potassium iodide T.S.: the color produced in 15 seconds may be yellow, but not orange-yellow or darker.

Assay for methenamine—Weigh not less than 20 of the Tablets, reduce them to a fine powder without an appreciable loss, and transfer an accurately weighed portion, equivalent to about 0.25 Gm. of methenamine, to a 1-liter beaker. Add 200 cc. of

distilled water and 50 cc. of 1 *N* sulfuric acid, and boil the mixture gently until all of the formaldehyde has been driven off, adding distilled water, if necessary, to maintain approximately the original volume. Cool the liquid, add distilled water to make the liquid measure about 300 cc., transfer to an 800-cc. Kjeldahl flask, and add an excess of sodium hydroxide solution (1 in 2). Connect the flask to a distillation trap and condenser and distil the liberated ammonia into 25 cc. of 0.5 *N* sulfuric acid, taking care that the adapter dips beneath the surface of the acid. Titrate the excess acid with 0.5 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.5 *N* sulfuric acid is equivalent to 0.01752 Gm. of $(CH_2)_6N_4$.

Assay for sodium biphosphate—Transfer an accurately weighed portion of the finely powdered Tablets, equivalent to about 0.06 Gm. of sodium biphosphate, into a 500-cc. Kjeldahl flask. Add 25 cc. of nitric acid and 10 cc. of sulfuric acid and boil gently, adding additional nitric acid if necessary until all organic matter is destroyed. Cool, add 50 cc. of water, and boil vigorously until brown fumes cease to be evolved. Cool, transfer the contents of the Kjeldahl flask to a beaker, dilute to about 100 cc. with water and neutralize the solution with ammonia T.S. To the neutralized solution add 10 Gm. of ammonium nitrate, heat to a temperature of 35° or 40°, and add 75 cc. of ammonium molybdate T.S. with stirring, and continue to stir the mixture for 15 minutes at room temperature. Allow the mixture to stand for about 15 minutes and decant the supernatant liquid through a Gooch crucible. Wash the precipitate in the beaker by decantation with two 30-cc. portions of distilled water, stirring thoroughly and allowing to settle before passing the supernatant liquid through the Gooch crucible. Transfer the precipitate to the filter, wash with cold water until the washings are neutral to litmus paper, and place the crucible and contents in the beaker used for the precipitation. Dissolve the yellow precipitate in a measured excess of 0.5 *N* sodium hydroxide and titrate the excess with 0.5 *N* sulfuric acid, using phenolphthalein T.S. as indicator. Each cc. of 0.5 *N* sodium hydroxide is equivalent to 0.00300 Gm. of $NaH_2PO_4.H_2O$.

Storage—Preserve Methenamine and Sodium Biphosphate Tablets in tight containers.

Sizes—Methenamine and Sodium Biphosphate Tablets usually available contain the following amounts of methenamine and sodium biphosphate: of each, **0.3** and **0.5 Gm.** (approximately 5 and 7½ grains).

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains) each of Methenamine and Sodium Biphosphate.

Methylrosaniline Chloride Jelly

METHYLROSANILINE CHLORIDE JELLY

Gelatum Methylrosanilinæ Chloridi

Gentian Violet Jelly

Methylrosaniline Chloride	10	Gm.
Glycerin	150	Gm.
Exsiccated Sodium Phosphate	4.3	Gm.
Tragacanth	15	Gm.
Eugenol	0.3	cc.
Eucalyptol	0.3	cc.
Methyl parahydroxybenzoate	0.26	Gm.
Propyl parahydroxybenzoate	0.14	Gm.
Distilled Water, a sufficient quantity,		
To make	1000	Gm.

Dissolve the methylrosaniline chloride, exsiccated sodium phosphate, methyl parahydroxybenzoate and propyl parahydroxybenzoate in about 700 cc. of distilled water. Add the glycerin, tragacanth, eugenol, eucalyptol and sufficient distilled water to make 1000 Gm. Mix well, and keep in a clcsed container for 1 week with occasional mixing or agitation and then strain through light muslin.

Storage—Preserve Methylrosaniline Chloride Jelly in tight containers, preferably in collapsible dispensing tubes.

Methylrosaniline Chloride Solution

METHYLROSANILINE CHLORIDE SOLUTION

Liquor Methylrosanilini Chloridi

Liq. Methylrosanil. Chlorid.

Gentian Violet Solution — Crystal Violet Solution

Methylrosaniline Chloride	**10 Gm.**
Alcohol	**100 cc.**
Water, a sufficient quantity,	
To make	**1000 cc.**

Mix the alcohol and 800 cc. of water, and dissolve the methylrosaniline chloride by agitation in the mixture; add sufficient water to make the product measure 1000 cc.

Description—Methylrosaniline Chloride Solution is a purple liquid, with a slight odor of alcohol. A dilution of Methylrosaniline Chloride Solution in water (1 in 100) and viewed in 1 cm. of depth is deep purple in color.

Non-volatile residue—Evaporate 10 cc. of Methylrosaniline Chloride Solution on a water bath and dry to constant weight at 100°: the residue weighs not less than 85 mg. and not more than 0.115 Gm.

Alcohol content—From 8 to 10 per cent, by volume, of C_2H_5OH.

Storage—Preserve Methylrosaniline Chloride Solution in tight containers.

FOR EXTERNAL USE—Undiluted.

MEZEREUM

Mezereum

Mezereon

Mezereum is the dried bark of *Daphne Mezereum* Linné, of *Daphne Gnidium* Linné, or of *Daphne Laureola* Linné (Fam. *Thymeleaceæ*).

Unground Mezereum—Unground Mezereum occurs as flexible, tough, quilled pieces, or somewhat flattened strips, attaining a length of 90 cm., and from 0.3 to 1.0 mm. in thickness. The outer surface is dusky purple to olive-brown, smooth, with numerous lenticels giving a transversely striate appearance, and occasionally with numerous, circular, dark-colored apothecia. The corky layer is easily abraded, exposing a light yellowish brown to weak greenish yellow surface with more or less detached bast fibers. The inner surface is weak yellowish orange to pale yellow, satiny lustrous and finely striate. The fracture is tough and fibrous, showing a lamellated inner bark.

Histology—Mezereum shows a cork composed of from 20 to 30 rows of cells, the outer rows being compressed, and the inner more or less tabular and with nearly colorless walls; a hypodermis of 3 to 5 rows of collenchymatous cells containing chloroplastids or a greenish yellow resinous substance; and an inner bark consisting of sieve strands, loosely united bundles of bast fibers, and a few starch-bearing medullary rays 1 cell in width.

Powdered Mezereum—Powdered Mezereum is yellowish gray to light yellowish brown. It has a very slight odor and a taste at first slight, becoming gradually and increasingly pungent and acrid. Bast fibers are numerous, from 0.4 to 3.0 mm. in length and about 15 microns in width, frequently uneven or irregularly bent and considerably attenuated at the ends, the walls being from 1 to 5 microns in thickness, colorless, non-lignified, and free from pores. Fragments of cork and starch-bearing medullary rays are present; starch grains are relatively few, mostly spherical or elliptical and occasionally 2- to 4-compound, the individual grains from 3 to 15 microns in diameter.

Foreign organic matter—Mezereum contains not more than 2 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Mezereum yields not more than 2 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**0.6 Gm.** (approximately 10 grains).

Mild Mercurous Chloride and Sodium Bicarbonate Tablets, page 333
Mild Mercurous Chloride Ointment, page 334
Mild Mercurous Chloride Tablets, page 335

Mixtures

Carminative Mixture, page 126
Compound Opium and Glycyrrhiza Mixture, page 365

Copaiba Mixture, page 171
Expectorant Mixture, page 207
Rhubarb and Soda Mixture, page 441

Monobromated Camphor, page 114

Morphine and Atropine Sulfates Tablets

MORPHINE AND ATROPINE SULFATES TABLETS

Tabellæ Morphinæ et Atropinæ Sulfatum

Tab. Morph. et Atrop. Sulf.

Morphine and Atropine Sulfates Tablets contain not less than 91 per cent and not more than 109 per cent of the labeled amount of morphine sulfate, $(C_{17}H_{19}O_3N)_2.H_2SO_4.5H_2O$.

Identification—

A: Sulfuric acid containing 5 mg. of selenous acid in each cc. gives with the Tablets a blue color, changing to green and then to brown. (Codeine yields a green color, changing to blue and afterward to olive-brown.) Sulfuric acid containing 5 mg. of molybdic acid in each cc. gives a purple color, changing to yellow. Sulfuric acid containing in each cc. 1 drop of formaldehyde T.S. yields a reddish purple color.

B: With nitric acid, the Tablets produce an orange-red color, fading to yellow.

C: Barium chloride T.S. produces in a filtered aqueous solution of the Tablets a white precipitate, insoluble in hydrochloric acid.

D: Dissolve a sufficient number of the Tablets to represent 0.6 mg. of atropine sulfate, in 10 cc. of distilled water, and filter the solution. Instil 1 drop of this solution into a cat's eye: the pupil shows noticeable dilation within 2 hours.

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without an appreciable loss, transfer an accurately weighed portion, equivalent to about 0.13 Gm. of morphine sulfate, to a separator, add 5 cc. of distilled water, agitate the mixture gently, and then dissolve the mixture as completely as possible in 10 cc. of a 3 per cent aqueous solution of sodium hydroxide saturated with sodium chloride. Wash the solution with two 15-cc. portions of ether, discard the washings, add hydrochloric acid until the solution is neutral to litmus paper, and then add an additional 0.5 cc. of the acid. Add 5 cc. of alcohol, followed by 30 cc. of a mixture of 9 volumes of chloroform and 1 volume of alcohol. Carefully neutralize the solution with stronger ammonia T.S., and add an additional 5 drops of the ammonia. Extract the alkaloid completely with successive portions of the chloroform-alcohol solvent. Wash the combined extracts with 1 cc. of distilled water and extract the wash water twice with small portions of the chloroform-alcohol solvent. Filter the combined chloroform extracts into a small beaker, and evaporate the filtrate on a water bath, with the aid of a current of air, until the residue is nearly dry; dissolve the residue in 10 cc. of 0.05 *N* sulfuric acid, warming to aid solution, and titrate the excess acid with 0.02 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.05 *N* sulfuric acid is equivalent to 0.01897 Gm. of $(C_{17}H_{19}O_3N)_2.H_2SO_4.5H_2O$.

Storage—Preserve Morphine and Atropine Sulfates Tablets in tight containers.

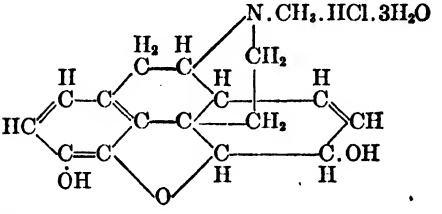
Sizes—Morphine and Atropine Sulfates Tablets usually available contain the following amounts of morphine sulfate: **8, 10, 15, and 30 mg.** (approximately $^1/_8$, $^1/_6$, $^1/_4$, and $^1/_2$ grain); and of atropine sulfate: **0.4 mg.** (approximately $^1/_{100}$ grain).

AVERAGE DOSE—Morphine Sulfate, **15 mg.** (approximately 1/4 grain).
Atropine Sulfate, **0.4 mg.** (approximately 1/150 grain).

MORPHINE HYDROCHLORIDE

Morphinæ Hydrochloridum

Morph. Hydrochlor.



$C_{17}H_{19}O_3N.HCl.3H_2O$ Mol. wt. 375.84

Description—Morphine Hydrochloride occurs as white, silky, glistening needles or cubical masses, or as a white, crystalline powder. It is odorless, has a bitter taste, and is permanent in the air but is affected by light.

Solubility—One Gm. of Morphine Hydrochloride dissolves in about 17.5 cc. of water and in about 52 cc. of alcohol at 25°; in about 0.5 cc. of boiling water and in about 46 cc. of alcohol at 60°. It is soluble in glycerin, but insoluble in chloroform and in ether.

Identification—

A: An aqueous solution of Morphine Hydrochloride responds to the tests for *Chloride*, page 724.

B: Place about 5 mg. of Morphine Hydrochloride on a watch glass, add 0.5 cc. of diluted sulfuric acid, and heat on a water bath for about 5 minutes. Cool and add 5 cc. of sulfuric acid, containing in each cc. 5 mg. of selenous acid: an intense blue color appears which slowly changes to green and finally to brown.

C: Morphine Hydrochloride with sulfuric acid, containing 5 mg. of molybdic acid in each cc., produces a purple color, changing to blue.

D: Sulfuric acid, containing in each cc. 1 drop of formaldehyde T.S., yields an intensely purple color with Morphine Hydrochloride.

E: With nitric acid Morphine Hydrochloride produces an orange-red color fading to yellow.

F: The addition of a few drops of freshly prepared ferric chloride T.S. to an aqueous solution of Morphine Hydrochloride (1 in 100) produces a blue color, which is destroyed by acids, by alcohol, or by heating.

G: Add potassium ferricyanide T.S., containing 1 drop of ferric chloride T.S. in each cc., to an aqueous solution of Morphine Hydrochloride (1 in 100): a deep blue color is produced at once (*difference from codeine*).

Loss on drying—When dried to constant weight at 105°, Morphine Hydrochloride loses not more than 15 per cent of its weight.

Residue on ignition—The residue on ignition from 0.5 Gm. of Morphine Hydrochloride is negligible, page 745.

Free acid—A solution of 0.5 Gm. of Morphine Hydrochloride in 15 cc. of distilled water requires not more than 0.5 cc. of 0.02 *N* sodium hydroxide for neutralization, using 1 drop of methyl red T.S. as the indicator.

Ammonium salts—Warm 0.2 Gm. of Morphine Hydrochloride with 5 cc. of sodium hydroxide T.S.: the odor of ammonia is not noticeable.

Apomorphine—Add 0.1 Gm. of sodium bicarbonate and 0.1 cc. of iodine T.S. to an aqueous solution of Morphine Hydrochloride (1 in 50): when shaken with an equal volume of ether, both layers remain free from even a transient green color.

Meconate—Add a few drops of ferric chloride T.S. to 5 cc. of an aqueous solution of Morphine Hydrochloride (1 in 30), previously mixed with 5 cc. of diluted hydrochloric acid: no red color is produced.

Foreign alkaloids—Dissolve 1 Gm. of Morphine Hydrochloride in 10 cc. of sodium hydroxide T.S. in a separator, and shake the solution with successive portions of 15 cc., 10 cc., and 10 cc. of chloroform, passing the chloroform solutions through a small filter previously moistened with chloroform. Shake the combined chloroform solutions with 5 cc. of distilled water, separate the chloroform, and evaporate it carefully to dryness on a water bath. Add to the residue thus obtained 10 cc. of 0.02 *N* sulfuric acid, heat gently until dissolved, cool, add 2 drops of methyl red T.S., and titrate the excess of sulfuric acid with 0.02 *N* sodium hydroxide: not less than 7.5 cc. of the latter is required.

Storage—Preserve Morphine Hydrochloride in tight, light-resistant containers.

AVERAGE DOSE—**8 mg.** (approximately $^1/_8$ grain).

Mucilage, Chondrus, page 144

Myrcia Oil

MYRCIA OIL
Oleum Myrciæ

Ol. Myrc. Bay Oil

Myrcia Oil is a volatile oil distilled from the leaves of *Pimenta racemosa* (Miller) J. W. Moore (Fam. *Myrtaceæ*).

Myrcia Oil yields not less than 50 per cent and not more than 65 per cent, by volume, of phenols.

Description—Myrcia Oil is a yellow or brownish yellow liquid with a pleasant, aromatic odor, and a pungent, spicy taste.

Solubility—Myrcia Oil yields solutions that are clear or but slightly turbid with equal volumes of alcohol or of glacial acetic acid.

Specific gravity—The specific gravity of Myrcia Oil is not less than 0.950 and not more than 0.990 at 25°.

Optical rotation—Myrcia Oil is lævorotatory, but the angle of rotation of the Oil in a 100-mm. tube does not exceed −3° at 25°, page 737.

Refractive index—The refractive index of Myrcia Oil is not less than 1.5070 and not more than 1.5160 at 20°, page 745.

Identification—

A: When Myrcia Oil is mixed with an equal volume of a concentrated solution of sodium hydroxide, a semi-solid mass forms.

B: Dissolve 2 drops of Myrcia Oil in 4 cc. of alcohol, and add 1 drop of ferric chloride T.S.: a light green color is produced. If the same test is made with 1 drop of dilute ferric chloride T.S., prepared by diluting the test solution with 4 volumes of distilled water, a yellow color is produced which soon disappears.

C: Shake 1 cc. of Myrcia Oil with 20 cc. of hot distilled water, and filter: the filtrate gives not more than a slight acid reaction with litmus paper, and on the addition of 1 drop of ferric chloride T.S., yields only a transient grayish green, not a blue or purple color.

Reaction—An alcohol solution of Myrcia Oil is acid to litmus paper.

Assay—Introduce exactly 10 cc. of Myrcia Oil into a cassia flask, add 75 cc. of potassium hydroxide T.S., stopper the flask tightly, shake the mixture thoroughly, and let it stand overnight. Then add sufficient potassium hydroxide T.S. to raise the lower limit of the oily layer within the graduated portion of the neck of the flask, and, after the alkaline solution has become clear, adjust it to the temperature at which it was measured, and note the volume of the residual oily liquid. This volume is not less than 3.5 cc. and not more than 5 cc., indicating the presence in Myrcia Oil of not less than 50 per cent and not more than 65 per cent, by volume, of phenols.

Storage—Preserve Myrcia Oil in tight, light-resistant containers.

Myrcia Spirit, Compound

COMPOUND MYRCIA SPIRIT

Spiritus Myrciæ Compositus

Sp. Myrc. Comp.

Myrcia Oil	8 cc.
Orange Oil	0.5 cc.
Pimenta Oil	0.5 cc.
Alcohol	610 cc.
Water, a sufficient quantity,	
To make	1000 cc.

Mix the oils with the alcohol and gradually add water until the product measures 1000 cc. Set the mixture aside in a well-closed container for 8 days, and then filter, using 10 Gm. of purified talc if necessary, to render the product clear.

Alcohol content—From 54 to 59 per cent, by volume, of C_2H_5OH.

Storage—Preserve Compound Myrcia Spirit in tight, light-resistant containers.

Neocalamine Liniment

NEOCALAMINE LINIMENT

Linimentum Neocalaminæ

Lin. Neocalam.

Prepared Neocalamine	150 Gm.
Olive Oil	500 cc.
Calcium Hydroxide Solution, a sufficient quantity,	
To make	1000 cc.

Mix the prepared neocalamine with the olive oil, and gradually add 450 cc. of the calcium hydroxide solution with constant agitation; then add sufficient of the calcium hydroxide solution to make 1000 cc. and mix well.

NOTE: Shake Neocalamine Liniment thoroughly before dispensing.

Storage—Preserve Neocalamine Liniment in tight containers.

Neocalamine Lotion

NEOCALAMINE LOTION

Lotio Neocalaminæ

Lot. Neocalam.

Prepared Neocalamine	150 Gm.
Bentonite Magma	400 cc.
Water, a sufficient quantity,	
To make	1000 cc.

Dilute the bentonite magma with an equal volume of water. Thoroughly mix the neocalamine with about one-tenth of the diluted bentonite magma, and gradually incorporate the remainder of the diluted magma added in divided portions. Finally add enough water to make 1000 cc., and shake well.

NOTE: Shake Neocalamine Lotion thoroughly before dispensing.

Storage—Preserve Neocalamine Lotion in tight containers.

Neocalamine Lotion, Phenolated

PHENOLATED NEOCALAMINE LOTION

Lotio Neocalaminæ Phenolata

Lot. Neocalam. Phenol. Compound Neocalamine Lotion

Liquefied Phenol	10 cc.
Neocalamine Lotion	990 cc.
To make	1000 cc.

Mix the ingredients.

NOTE: Shake Phenolated Neocalamine Lotion thoroughly before dispensing.

Storage—Preserve Phenolated Neocalamine Lotion in tight containers.

NEOCALAMINE OINTMENT

Unguentum Neocalaminæ

Ung. Neocalam.

Prepared Neocalamine	**150 Gm.**
Wool Fat	**125 Gm.**
Petrolatum	**375 Gm.**
Liquid Petrolatum	**100 cc.**
Water	**250 cc.**
To make	**1000 Gm.**

Mix the petrolatum and wool fat, and incorporate the water in small portions until completely emulsified, add the prepared neocalamine to the liquid petrolatum, and triturate thoroughly until well mixed. Finally, mix the cream and the paste until the product is smooth.

Storage—Preserve Neocalamine Ointment in tight containers and avoid prolonged exposure to temperatures above 30°.

PREPARED NEOCALAMINE

Neocalamina Præparata

Neocalam. Præp.

Prepared Neocalamine is zinc oxide admixed with ferric oxide, and contains, after ignition, not less than 92 per cent of ZnO.

Red Ferric Oxide	**30 Gm.**
Yellow Ferric Oxide	**40 Gm.**
Zinc Oxide	**930 Gm.**

Mix the ingredients.

Description—Prepared Neocalamine occurs as a fine powder, weak yellowish orange in color. It is odorless and almost tasteless.

Solubility—Prepared Neocalamine dissolves almost completely in mineral acids. It is insoluble in water and in alcohol.

Identification—Dissolve Prepared Neocalamine in diluted hydrochloric acid and filter the solution. The filtrate responds to the tests for *Zinc*, page **728**, and for *Ferric Salts*, page **725**.

Loss on ignition—Ignite 0.5 Gm. of Prepared Neocalamine: the loss on ignition does not exceed 5 mg.

Acid-insoluble substances—One Gm. of Prepared Neocalamine, when dissolved in 25 cc. of hydrochloric acid with the aid of heat, leaves not more than 20 mg. of residue.

Degree of fineness—Triturate Prepared Neocalamine to a smooth suspension with water and wash it through a standard 200 mesh sieve with water: no appreciable residue remains on the sieve.

Alkalies—Digest 1 Gm. of Prepared Neocalamine with 20 cc. of warm water, filter, and add 2 drops of phenolphthalein T.S.: if a red color is produced, not more than 0.2 cc. of 0.1 *N* sulfuric acid is required to discharge it.

Calcium—Dissolve 1 Gm. of Prepared Neocalamine in 25 cc. of diluted hydrochloric acid, filter, and add ammonia T.S. to the filtrate until the precipitate first formed is redissolved and only a red gelatinous precipitate remains; then add 5 cc. more of ammonia T.S. and filter. To 10 cc. of the filtrate add 2 cc. of ammonium oxalate T.S.: not more than a slight turbidity is produced.

Calcium or magnesium—To 10 cc. of the filtrate obtained in the preceding test add 2 cc. of sodium phosphate T.S.: not more than a slight turbidity is produced.

Arsenic—Dissolve 0.2 Gm. of Prepared Neocalamine in 5 cc. of diluted sulfuric acid: the solution meets the requirements of the test for *Arsenic*, page 689.

Lead—To 1 Gm. of Prepared Neocalamine add 15 cc. of distilled water, and stir well; then add 3 cc. of glacial acetic acid, warm on a water bath until dissolved, and filter. On the addition of 5 drops of potassium chromate T.S. to the filtrate no turbidity is produced.

Assay—Transfer into a beaker about 0.15 Gm., accurately weighed, of Prepared Neocalamine, previously ignited and cooled, and dissolve it as completely as possible in 3 cc. of hydrochloric acid. Neutralize the solution with ammonia T.S. using methyl orange T.S. as indicator, and add an excess until the white precipitate first formed is redissolved leaving a flocculent brown precipitate of ferric hydroxide. Filter, and wash with distilled water; neutralize the filtrate with diluted hydrochloric acid, and add about 3 cc. in excess. Dilute to 200 cc., heat to boiling, reserve 50 cc., and add 1 cc. of aqueous solution of ferrous ammonium sulfate (1 in 1000) and 4 drops of potassium ferricyanide solution (1 in 100) to the 150-cc. portion. Titrate the hot solution with 0.1 *N* potassium ferrocyanide, stirring vigorously, until the blue color of the solution disappears, and add 0.5 cc. in excess. Add 45 cc. of the reserve, and again titrate to the end point, and add 0.1 cc. in excess; finally add the last 5 cc. of reserve, and titrate to the final end-point. Each cc. of 0.1 *N* potassium ferrocyanide is equivalent to 0.004069 Gm. of ZnO.

Storage—Preserve Prepared Neocalamine in tight containers.

Nitric Acid

NITRIC ACID
Acidum Nitricum

HNO_3 Mol. wt. 63.02

Nitric Acid contains not less than 67 per cent and not more than 71 per cent of HNO_3.

Description—Nitric Acid is a fuming liquid, very caustic and having a characteristic, highly irritating odor. It boils at about 120°. Nitric Acid is acid to litmus paper even when highly diluted.

Specific gravity—The specific gravity of Nitric Acid is about 1.41 at 25°.

Identification—

A: Nitric Acid responds to the tests for *Nitrate*, page 726.

B: Nitric Acid acts upon copper, mercury, silver, and many other metals with the evolution of brownish fumes.

C: Nitric Acid stains woolen fabrics and animal tissues yellow.

Residue on ignition—Evaporate 30 cc. of Nitric Acid in a tared platinum or porcelain dish to dryness, add 2 drops of sulfuric acid, and ignite: the weight of the residue on ignition does not exceed 2 mg.

Arsenic—The residue remaining from the evaporation of 0.5 cc. of Nitric Acid to dryness on a water bath meets the requirements of the test for *Arsenic*, page 689.
Chloride—The addition of 1 cc. of silver nitrate T.S. to an aqueous solution of Nitric Acid (1 in 10), produces no opalescence.
Sulfate—The addition of 5 drops of barium chloride T.S. to 10 cc. of an aqueous solution of Nitric Acid (1 in 10), produces no turbidity.
Heavy metals—Evaporate 1.5 cc. (2 Gm.) of Nitric Acid to dryness on a water bath. Dissolve the residue in 2 cc. of diluted acetic acid, and add distilled water to make 25 cc.: the heavy metals limit, page 721, for Nitric Acid is 10 parts per million.
Assay—Weigh accurately about 2 cc. of Nitric Acid in a tared, glass-stoppered flask. Dilute with 25 cc. of distilled water, and titrate with 1 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 1 *N* sodium hydroxide is equivalent to 0.06302 Gm. of HNO_3.
Storage—Preserve Nitric Acid in tight containers.

NITROHYDROCHLORIC ACID
Acidum Nitrohydrochloricum

Acid. Nitrohydrochlor. Nitromuriatic Acid Aqua Regia

Nitrohydrochloric Acid is a concentrated aqueous solution containing hydrochloric acid, nitric acid, nitrosyl chloride, and chlorine.

Nitric Acid	**200 cc.**
Hydrochloric Acid	**800 cc.**
To make about	**1000 cc.**

Mix the acids in a suitable dish or loosely stoppered container. At room temperature a slight evolution of gas will continue for 15 hours or more. Gently warming the mixed acids will hasten the evolution of gas. When the reaction is complete, mix the contents gently to insure uniformity.

NOTE: Do not dispense Nitrohydrochloric Acid which does not immediately liberate iodine when 1 drop of the Acid is added to 1 cc. of an aqueous solution of potassium iodide (1 in 5).

Description—Nitrohydrochloric Acid is a yellow, fuming, and very corrosive liquid. It has a strong odor of chlorine and is acid to litmus paper, afterward bleaching it.
Identification—Nitrohydrochloric Acid readily dissolves gold leaf.
Non-volatile residue—Evaporate 10 cc. of Nitrohydrochloric Acid in a tared glass or porcelain dish on a water bath, and dry to constant weight at 105°: the weight of the residue does not exceed 3.5 mg.
Storage—Preserve Nitrohydrochloric Acid in tight containers and avoid excessive heat.

AVERAGE DOSE—**0.2 cc.** (approximately 3 minims).

Nitrohydrochloric Acid, Diluted

DILUTED NITROHYDROCHLORIC ACID

Acidum Nitrohydrochloricum Dilutum

Acid. Nitrohydrochlor. Dil. Diluted Nitromuriatic Acid

Nitrohydrochloric Acid	**220 cc.**
Distilled Water, a sufficient quantity,	
To make	**1000 cc.**

Mix the ingredients.

NOTE: Do not dispense Diluted Nitrohydrochloric Acid which does not immediately liberate iodine when 5 drops of the Diluted Acid is added to 1 cc. of an aqueous solution of potassium iodide (1 in 5).

Description—Diluted Nitrohydrochloric Acid is a colorless or pale yellow liquid. It has a faint odor of chlorine and is acid to litmus paper, afterward bleaching it.

Non-volatile residue—Evaporate 20 cc. of Diluted Nitrohydrochloric Acid in a tared glass or porcelain dish on a water bath, and dry to constant weight at 105°: the weight of the residue does not exceed 2 mg.

Storage—Preserve Diluted Nitrohydrochloric Acid in tight containers and avoid excessive heat.

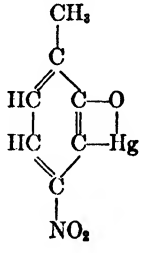
AVERAGE DOSE—1 cc. (approximately 15 minims).

Nitromersol

NITROMERSOL

Nitromersol

$C_7H_5O_3NHg$



Mol. wt. 351.73

Nitromersol is the anhydride of 4-nitro-3-hydroxy-mercuri-ortho-cresol. When dried to constant weight at 105°, Nitromersol yields not less than 56 per cent and not more than 57.4 per cent of Hg.

Description—Nitromersol occurs as brownish yellow to yellow granules or as a brownish yellow to yellow powder. It is odorless and tasteless.

Solubility—Nitromersol dissolves in solutions of alkalies and of ammonia by opening the anhydride ring and the formation of a salt. It is insoluble in water and is almost insoluble in alcohol, in acetone, and in ether.

Identification—

A: A solution of Nitromersol (1 in 1000) in dilute sodium hydroxide possesses a

reddish orange color. The addition of diluted hydrochloric acid to this solution causes the color to disappear and a yellowish, flocculent precipitate to form.

B: To 20 cc. of a solution of Nitromersol, made by dissolving 0.25 Gm. of Nitromersol in 2.5 cc. of sodium hydroxide T.S. and diluting to 20 cc., add about 3 cc. of diluted hydrochloric acid: a yellowish precipitate is produced. Upon filtration, the filtrate is nearly colorless or slightly yellow. Retain the filtrate for the test for *Mercury ions*. Dissolve the precipitate in 20 cc. of distilled water to which 2.5 cc. of sodium hydroxide T.S. has been added, add 0.5 Gm. of sodium hydrosulfite and heat to boiling. A heavy deposit of metallic mercury forms.

Loss on drying—When dried to constant weight at 105°, Nitromersol loses not more than 1 per cent of its weight.

Mercury ions—To the filtrate obtained in *Identification test B*, add an equal volume of hydrogen sulfide T.S.: no darkening in color is produced although a small amount of a flocculent, light-yellowish colored precipitate may form.

Residue on ignition—Nitromersol yields not more than 0.1 per cent of residue on ignition, page 745.

Alkali-insoluble substances—Add 7 cc. of sodium hydroxide T.S. to 1.0 Gm. of Nitromersol and then dilute to 20 cc. with distilled water. The resulting solution, upon standing in a glass-stoppered vessel for 24 hours in the dark, shows no more than a slight amount of insoluble material. Collect the insoluble residue, if any, in a tared Gooch crucible, wash the residue with warm distilled water, and dry to constant weight at 105°. The weight of the insoluble material does not exceed 0.1 per cent.

Uncombined nitrocresol—Shake 0.5 Gm. of Nitromersol with 50 cc. of benzene, filter, evaporate the filtrate to dryness in a tared dish, and dry the residue at 70° for 2 hours: the weight of the residue does not exceed 5 mg.

Assay for mercury—Accurately weigh about 0.2 Gm. of Nitromersol previously ground to a fine powder and dried to constant weight at 105°, and transfer to a 500-cc. Kjeldahl flask. Add 15 cc. of sulfuric acid, digest over a low flame for 15 to 20 minutes, cool and add, dropwise, enough hydrogen peroxide, 30 per cent, to decolorize the solution. Digest for 2 or 3 minutes adding more hydrogen peroxide, 30 per cent, if necessary to produce a colorless solution. Cool, dilute to about 100 cc., and add potassium permanganate T.S. until a permanent pink color persists on heating. Then add hydrogen peroxide T.S., dropwise, until the color is completely discharged. Cool, and add 5 cc. of nitric acid which has been diluted with 10 cc. of water. Add 5 cc. of ferric ammonium sulfate T.S. and titrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* ammonium thiocyanate is equivalent to 0.01003 Gm. of Hg.

Storage—Preserve Nitromersol in tight containers.

NITROMERSOL SOLUTION
Liquor Nitromersolis

Liq. Nitromersol.

Nitromersol Solution yields, from each 100 cc., not less than 0.100 Gm. and not more than 0.125 Gm. of Hg.

Nitromersol	**2 Gm.**
Sodium Hydroxide	**0.4 Gm.**
Monohydrated Sodium Carbonate	**4.25 Gm.**
Distilled Water, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the sodium hydroxide and the monohydrated sodium carbonate in 50 cc. of distilled water, add the nitromersol and stir until dissolved. Gradually add a sufficient quantity of distilled water to make 1000 cc.

Description—Nitromersol Solution is a clear, reddish orange solution. It is affected by light.

Specific gravity—The specific gravity of Nitromersol Solution is not less than 1.005 and not more than 1.010 at 25°.

Identification—

A: To 100 cc. of Nitromersol Solution add 3 cc. of diluted hydrochloric acid: a yellowish precipitate is produced. Filter and retain both the filtrate and the precipitate.

B: Add the precipitate from *Identification test A* to 20 cc. of distilled water and 2.5 cc. of sodium hydroxide T.S. Add 0.5 Gm. of sodium hydrosulfite and heat to boiling: a heavy deposit of metallic mercury is formed.

Mercuric ions—To the filtrate obtained in *Identification test A* add an equal volume of hydrogen sulfide T.S.: no darkening in color is produced, although a small amount of a flocculent, light-yellow precipitate may form.

Assay—Transfer 50 cc. of Nitromersol Solution, accurately measured, into a 500-cc. Kjeldahl flask, add a few glass beads and evaporate to about 5 cc. Continue as directed in the *Assay* under *Nitromersol*, page 355, beginning with, "Add 15 cc. of sulfuric acid . . . ." Each cc. of 0.1 *N* ammonium thiocyanate is equivalent to 0.01003 Gm. of Hg.

Storage—Preserve Nitromersol Solution in tight, light-resistant containers.

Caution: Dilutions of Nitromersol Solution should be prepared as needed as they tend to precipitate upon standing.

Nitromersol Tincture

NITROMERSOL TINCTURE
Tinctura Nitromersolis

Nitromersol Tincture yields, from each 100 cc., not less than 0.2500 Gm. and not more than 0.3160 Gm. of Hg.

Nitromersol	5 Gm.
Sodium Hydroxide	1 Gm.
Acetone	100 cc.
Alcohol	500 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the nitromersol in a mixture of the acetone, alcohol, and the sodium hydroxide dissolved in 50 cc. of distilled water and finally add a sufficient quantity of distilled water to make the product measure 1000 cc.

Description—Nitromersol Tincture is a clear, brilliant red liquid with the characteristic odor of acetone and of alcohol. It is affected by light.

Specific gravity—The specific gravity of Nitromersol Tincture is not less than 0.9050 and not more than 0.9150 at 25°.

Identification—Acidify 100 cc. of Nitromersol Tincture with diluted hydrochloric acid and evaporate to about 15 cc. After filtration, the resulting nitromersol meets all tests for *Identification* under *Nitromersol*, page 354.

Assay—Transfer 25 cc. of Nitromersol Tincture, accurately measured, into a 500-cc. Kjeldahl flask, add a few glass beads and evaporate to about 5 cc. Continue as directed in the *Assay* under *Nitromersol*, page 355, beginning with, "Add 15 cc. of sulfuric acid . . . ." Each cc. of 0.1 *N* ammonium thiocyanate is equivalent to 0.01003 Gm. of Hg.

Storage—Preserve Nitromersol Tincture in tight, light-resistant containers.

Nutgall

NUTGALL
Galla

Nutgall is the excrescence obtained from the young twigs of *Quercus infectoria* Oliver and other allied species of *Quercus* (Fam. *Fagaceæ*).

Unground Nutgall—Nutgall is nearly globular, from 0.8 to 2.5 cm. in diameter, and is tuberculated on the upper portion, the lower portion being smooth and contracted into a short stalk. The external color is moderate brown to weak olive. The fracture of Nutgall is short and horny, the internal color being light yellowish brown to weak orange. When broken, it exhibits a slightly radiate structure and a central cavity occasionally connected by a narrow, radial canal to the external surface, the cavity sometimes containing the remains of the insect. Most nutgalls are dense and sink in water.

Histology—Nutgall exhibits 3 distinct regions; a large outer layer consisting of thin-walled parenchyma cells, containing masses of tannin and occasionally rosettes and prisms of calcium oxalate; a middle layer of thick-walled stone cells; and an inner layer of thick-walled parenchyma cells containing starch grains.

Powdered Nutgall—Powdered Nutgall is weak yellow in color and has a slight odor and a strong and persistently astringent taste. It shows numerous simple and compound starch grains, the simple grains up to 30 microns in size and ellipsoidal, spheroidal or polygonal in shape; a few stone cells with branched pore canals and many with narrow cavities; occasional fragments of spiral and reticulate tracheæ; tannin masses that dissolve slowly in water mounts and monoclinic prisms and rosettes of calcium oxalate up to 40 microns in size.

Identification—An aqueous suspension of Nutgall (1 in 10,000) yields a bluish purple precipitate with a 5 per cent ferric sulfate solution; a gray to yellow-brown precipitate with 1 per cent ferric acetate T.S.; a yellowish orange color and a slight precipitate with a saturated solution of potassium dichromate plus a trace of acetic acid; and a yellowish orange color and a slight precipitate with 1 per cent sodium carbonate T.S.

Foreign organic matter—Nutgall contains not more than 1 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Nutgall yields not more than 2 per cent of acid-insoluble ash, page 761.

Nutgall Ointment

NUTGALL OINTMENT
Unguentum Gallæ

Ung. Gall.

Caution: During its manufacture and storage this Ointment must not come in contact with iron utensils or containers.

Nutgall, in very fine powder	200 Gm.
Wool Fat	50 Gm.
Yellow Wax	50 Gm.
Petrolatum	700 Gm.
To make	1000 Gm.

Melt the yellow wax in a suitable dish on a water bath, add the wool fat and the petrolatum, and continue heating until the mixture is liquefied. Stir the mixture until it congeals and then thoroughly incorporate the nutgall.

Storage—Preserve Nutgall Ointment in tight containers and avoid prolonged exposure to temperatures above 30°.

Nux Vomica

NUX VOMICA
Nux Vomica

Nux Vom. Strychni semen P.I.

Nux Vomica is the dried ripe seed of *Strychnos Nux-vomica* Linné (Fam. *Loganiaceæ*).

Nux Vomica contains not less than 1.15 per cent of strychnine.

Unground Nux Vomica—The seed is orbicular, nearly flat, occasionally somewhat bent, from 10 to 30 mm. in diameter, and from 3 to 6 mm. in thickness. Externally it is grayish, or from pale brown to pale olive and is covered with appressed hairs, giving it a silky luster. The hilum is indicated by a circular scar at the center of the seed and is connected with the micropyle by a radial raphe. The seed is very hard when dry. Beneath the thin and hairy seed coat is a large yellow to weak yellowish green endosperm, at one end of which is embedded a small embryo with two cordate 5- to 7-nerved cotyledons.

Histology—Transverse sections of the seed exhibit a thin spermoderm of collapsed cells from which project numerous appressed, twisted, thick-walled, lignified hairs with enlarged bases possessing walls with long, curved, narrow slits. Beneath the spermoderm occurs a broad endosperm of polygonal cells showing well-marked plasmodesmata, very thick walls of reserve cellulose, and lumina containing oily plasma and occasional aleurone grains.

Powdered Nux Vomica—The powder is pale brown to yellowish gray, and is inodorous, but possesses an intensely and persistently bitter taste. It consists chiefly of thick-walled endosperm cells containing globules of fixed oil and a few small aleurone grains up to 30 microns in diameter, fragments of strongly lignified, nonglandular hairs, the walls of which possess large, circular, or long, slit-like pores.

A few small, nearly spherical starch grains occur in the tissues of the adhering pulp.

Foreign organic matter—Nux Vomica contains not more than 1 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Nux Vomica yields not more than 1 per cent of acid-insoluble ash, page 761.

Assay—Place 15 Gm. of Nux Vomica, in coarse powder, in a flask or bottle, add 150 cc., measured at 25°, of a mixture of 3 volumes of ether and 1 volume of chloroform, tightly stopper the flask, shake the mixture, and allow it to stand for about 2 minutes. Then add 10 cc. of stronger ammonia T.S., stopper the flask tightly, shake frequently, but gently, during 1 hour, and allow the mixture to stand overnight at a temperature not over 25°. Again shake the flask gently for 15 minutes, and allow the liquids to separate at 25°. Then quickly transfer to a separator exactly 100 cc. of the liquid, representing 10 Gm. of Nux Vomica, rinse the measuring vessel with a little chloroform, and add the rinsings to the separator. Add about 40 cc. of approximately 1 *N* sulfuric acid to the separator, and shake the mixture gently for 5 minutes, then allow the liquids to separate, and draw off the acid into another separator. Repeat the extraction with successive portions of the acid, until the ether solution is completely extracted (see *Purification of the Alkaloids*, page 740).

To the combined acid solutions in the separator add a small piece of red litmus paper and 50 cc. of chloroform, and follow with sufficient ammonia T.S. to render the aqueous layer alkaline, and after gently shaking, add 2 or 3 cc. more of the ammonia T.S. Now shake the mixture thoroughly, but gently, for about 10 minutes, and allow the liquids to separate. Draw off the chloroform into a container, and repeat the extraction with additional portions of chloroform until all of the alkaloid is extracted. Extract the combined chloroform solutions with successive portions of approximately 1 *N* sulfuric acid until completely extracted. Then render the combined acid solutions alkaline with ammonia T.S., add 2 or 3 cc. more of the ammonia T.S., and completely extract the alkaloids with successive portions of chloroform.

Carefully evaporate the combined chloroform extracts to dryness on a water bath, dissolve the residue by warming with 15 cc. of approximately 3 per cent sulfuric acid, cool to 25°, and add 3 cc. of a mixture of equal parts of nitric acid and a 5 per cent solution of sodium nitrite in distilled water. Thoroughly stir this mixture, and allow it to stand for exactly 10 minutes at room temperature. At the expiration of this period, pour the red solution at once into a separator containing 50 cc. of chloroform and 15 cc. of sodium hydroxide solution (1 in 10), and rinse the flask with distilled water, adding the rinsings to the separator. Add sufficient sodium hydroxide solution (1 in 10), to the contents of the separator to render it distinctly alkaline to litmus paper, and then add a few cc. more of the sodium hydroxide solution. Shake the mixture gently for 10 minutes and allow the liquids to separate. Draw off the chloroform layer into another separator and repeat the extraction with additional portions of chloroform until the alkaloid is completely removed. Add 10 cc. of distilled water to the combined chloroform extract, shake the mixture gently, and add a small piece of red litmus paper. The litmus paper should indicate not more than a slight alkalinity. If the water, after shaking with the chloroform, is strongly alkaline, draw off the chloroform into another separator, and shake it with another 10 cc. of distilled water. Draw off the chloroform, passing it through a filter paper moistened with chloroform, into a container. Wash the filter paper with warm chloroform, and add these rinsings to the container. Now shake the combined aqueous extract with 5 cc. of chloroform and draw off this chloroform, passing it through the chloroform-moistened filter paper into the main chloroform solution.

Evaporate the combined chloroform extracts very carefully on a water bath nearly, but *not quite*, to dryness. Add to the moist residue 7 cc. of 0.1 *N* sulfuric acid, accurately measured, follow with 30 cc. of distilled water, and heat the mixture on a water bath until the alkaloid is dissolved and the odor of chloroform is dissipated. Cool to room temperature, and titrate the excess acid with 0.02 *N* sodium hydroxide, using 1 drop of methyl red T.S. as the indicator. Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.03344 Gm. of $C_{21}H_{22}O_2N_2$.

Nux Vomica Alkaloids Solution

NUX VOMICA ALKALOIDS SOLUTION

Liquor Nucis Vomicæ Alkaloidorum

Liq. Nuc. Vom. Alk. Nux Alkaloids Solution

Nux Vomica Alkaloids Solution contains, in each 100 cc., not less than 1.5 Gm. and not more than 1.7 Gm. of strychnine sulfate, $(C_{21}H_{22}N_2O_2)_2.H_2SO_4.5H_2O$, and not less than 1.5 Gm. and not more than 1.7 Gm. of brucine sulfate, $(C_{23}H_{26}N_2O_4)_2.H_2SO_4.7H_2O$.

Strychnine Sulfate	16 Gm.
Brucine Sulfate	16 Gm.
Glycerin	500 cc.
Resorcin Brown Solution	5 cc.
Distilled water, a sufficient quantity,	
To make	1000 cc.

Dissolve the alkaloidal salts in 475 cc. of distilled water and the glycerin, add the resorcin brown solution and sufficient distilled water to make the product measure 1000 cc. Filter, if necessary, until the product is clear.

Description—Nux Vomica Alkaloids Solution is a clear, yellowish orange solution with a very bitter taste. It is neutral or acid to litmus paper.

Identification—

A: An aqueous dilution (1 in 10) of Nux Vomica Alkaloids Solution responds to the tests for *Sulfate*, page 727.

B: Add a few drops of mercuric potassium iodide T.S. to an aqueous dilution (1 in 10) of Nux Vomica Alkaloids Solution: a copious yellowish precipitate is produced.

Assay for total alkaloidal salts—Transfer to a separator 10 cc. of Nux Vomica Alkaloids Solution, accurately measured; add 20 cc. of distilled water; make alkaline with ammonia T.S., and shake out the alkaloids with successive small portions of chloroform. Wash the combined chloroform solution by shaking with 10 cc. of distilled water; then filter the chloroform solution through a filter moistened with chloroform, and wash the filter with a small quantity of warm chloroform. Evaporate the filtrate nearly to dryness on a water bath. Dissolve the moist residue in 20 cc. of 0.1 *N* sulfuric acid, add 30 cc. of distilled water, and warm on a water bath until the odor of chloroform is no longer perceptible. Cool the solution, and titrate the excess acid with 0.1 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.04675 Gm. of equal quantities by weight of strychnine sulfate and brucine sulfate.

Assay for strychnine sulfate and brucine sulfate—Transfer to a separator 10 cc. of Nux Vomica Alkaloids Solution, accurately measured; add 20 cc. of distilled water; make alkaline with ammonia T.S., and shake out the alkaloids with successive small portions of chloroform. Carefully evaporate the combined chloroform solution to dryness on a water bath, dissolve the residue by warming with 15 cc. of sulfuric acid (3 in 100), cool and then add 3 cc. of a mixture of equal volumes of nitric acid and an aqueous solution of sodium nitrite (1 in 20). Stir well, and allow to stand at room temperature for 10 minutes closely timed. Immediately transfer the solution completely into a separator containing 50 cc. of chloroform. Add sufficient sodium hydroxide solution (1 in 10) until alkaline to litmus paper, and then add a few cc. more of the hydroxide solution. Shake the mixture gently

for 10 minutes and allow the liquids to separate. Draw off the chloroform layer into a separator and repeat the shaking out with additional portions of chloroform until the alkaloid is completely extracted. Wash the combined chloroform solution by shaking with 10-cc. portions of distilled water until the water is not more than faintly alkaline to litmus paper. Filter the chloroform solution through a filter moistened with chloroform. Shake the water washings with 5 cc. of chloroform and filter this chloroform into the main chloroform solution. Wash the filter paper and the stem of the funnel with a little warm chloroform, adding this also to the main chloroform solution. Evaporate the combined chloroform solution carefully on a water bath nearly, but *not quite*, to dryness. Add to the moist residue 10 cc. of 0.1 *N* sulfuric acid and 30 cc. of distilled water. Heat the mixture on a water bath until the alkaloid is dissolved and the odor of chloroform is no longer perceptible. Cool the solution, and titrate the excess acid with 0.1 *N* sodium hydroxide, using 1 drop of methyl red T.S. as the indicator. Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.04285 Gm. of $(C_{21}H_{22}N_2O_2)_2.H_2SO_4.5H_2O$. The difference, in cc., between the 0.1 *N* acid consumed in the assay for total alkaloids and that in the assay for strychnine sulfate multiplied by 0.05066 represents the weight of $(C_{21}H_{26}N_2O_4)_2.H_2SO_4.7H_2O$ in 10 cc. of Nux Vomica Alkaloids Solution.

Storage—Preserve Nux Vomica Alkaloids Solution in tight containers.

AVERAGE DOSE—Horses and Cattle, **2 to 4 cc.** (approximately $^1/_2$ to 1 fluidrachm).

Sheep and Swine, **0.5 to 1 cc.** (approximately 8 to 15 minims).

Based on the weight of the animal.

NUX VOMICA EXTRACT

Extractum Nucis Vomicæ

Ext. Nuc. Vom.

Powdered Nux Vomica Extract — Extractum Strychni P.I.

Nux Vomica Extract contains, in each 100 Gm., not less than 7 Gm. and not more than 7.75 Gm. of strychnine.

Extract the fat from nux vomica, in moderately coarse powder, by percolation with petroleum benzin until a few drops of the percolate leave no greasy stain when evaporated from a filter paper. Air-dry the defatted drug until the odor of benzin is no longer noticeable. Extract the dry defatted drug by Process B, page 740, using a mixture of 750 cc. of alcohol, 10 cc. of acetic acid, and 240 cc. of distilled water as Menstruum I, and a mixture of 3 volumes of alcohol and 1 volume of distilled water as Menstruum II. Macerate the drug during 24 hours, and then percolate it at a moderate rate until extraction is complete. Combine the reserve and weak percolates, and concentrate this liquid at a temperature not exceeding 100° to a volume of about 200 cc. Evaporate this pilular extract to dryness at a temperature

not exceeding 60°. Powder the product, assay, and adjust the extract by the addition of sufficient dry starch to contain in each 100 Gm. 7.4 Gm. of $C_{21}H_{22}O_2N_2$.

Assay—Place about 1.5 Gm. of Nux Vomica Extract, accurately weighed, in a dish, and digest it on a water bath with about 10 cc. of diluted alcohol, acidified with acetic acid, until the extract has liquefied. Transfer the solution to a separator containing 25 cc. of chloroform, and wash the dish with successive small portions of diluted alcohol, adding the rinsings to the separator. Dilute the alcohol liquid with an equal amount of distilled water, render it alkaline with ammonia T.S., and completely extract the alkaloids with successive portions of chloroform. Combine the chloroform solutions, and proceed as directed in the *Assay* under *Nux Vomica*, page 359, beginning with, "Add about 40 cc. of approximately 1 *N* sulfuric acid. . . ." Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.03344 Gm. of $C_{21}H_{22}O_2N_2$.

Storage—Preserve Nux Vomica Extract in tight, light-resistant containers, preferably at a temperature not above 30°.

AVERAGE DOSE—**15 mg.** (approximately 1/4 grain).

Nux Vomica Fluidextract

NUX VOMICA FLUIDEXTRACT

Fluidextractum Nucis Vomicæ

Fldext. Nuc. Vom.

Nux Vomica Fluidextract contains, in each 100 cc., not less than 1.05 Gm. and not more than 1.25 Gm. of strychnine.

Prepare the Fluidextract from nux vomica, in moderately coarse powder, by Process B, as modified for assayed fluidextracts, page 718. Use a mixture of 2 volumes of acetic acid, 3 volumes of water, and 15 volumes of alcohol as Menstruum I, and a mixture of 3 volumes of alcohol and 1 volume of water as Menstruum II; macerate the drug during 48 hours, and percolate at a moderate rate. Chill the percolate until the fat is separated, and filter while cold.

Adjust the concentrated fluid so as to contain, in each 100 cc., 1.15 Gm. of strychnine and 60 per cent, by volume, of C_2H_5OH.

Assay—Transfer 10 cc. of Nux Vomica Fluidextract, accurately measured, to a separator containing about 30 cc. of chloroform, add 5 cc. of water and 5 cc. of ammonia T.S., and shake well for 1 minute. Draw off the separated chloroform solution, and complete the extraction of the alkaloids from the alkaline liquid by shaking with successive portions of chloroform. Combine the chloroform solutions, and complete the *Assay* as directed under *Nux Vomica*, page 359, beginning with, "Add about 40 cc. of approximately 1 *N* sulfuric acid. . . ." Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.03344 Gm. of $C_{21}H_{22}O_2N_2$.

Alcohol content—From 57 to 63 per cent, by volume, of C_2H_5OH.

Storage—Preserve Nux Vomica Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**0.1 cc.** (approximately 1 1/2 minims).

NUX VOMICA TINCTURE

Tinctura Nucis Vomicæ

Tr. Nuc. Vom. Tinctura Strychni P.I.

Nux Vomica Tincture contains, in each 100 cc., not less than 0.105 Gm. and not more than 0.125 Gm. of strychnine.

Nux Vomica, in moderately coarse powder	**100 Gm.**
Alcohol,	
Hydrochloric Acid,	
Water, each, a sufficient quantity,	
To make about	**1000 cc.**

Prepare a tincture by Process P, as modified for assayed tinctures, page 758. Macerate the drug during 24 hours in a mixture of 7.5 cc. of hydrochloric acid, 150 cc. of alcohol, and 42.5 cc. of water, then percolate slowly, using a mixture of 3 volumes of alcohol and 1 volume of distilled water as the menstruum. Finally adjust the Tincture by the addition of sufficient of a mixture of 0.8 cc. of hydrochloric acid, 75 cc. of alcohol, and 24.2 cc. of water to make each 100 cc. contain 0.115 Gm. of strychnine. Keep the Tincture at a temperature of 5° for 30 minutes, and filter.

Assay—Measure accurately 100 cc. of Nux Vomica Tincture and evaporate it at a temperature not exceeding 100° to a volume of about 20 cc. Transfer the concentrated liquid to a separator containing about 30 cc. of chloroform, rinse the container with about 20 cc. of diluted alcohol, and add the rinsings to the separator. Then add 20 cc. of distilled water and 5 cc. of ammonia T.S., and shake the mixture thoroughly for 1 minute. Draw off the separated chloroform solution, and completely extract the alkaloids from the alkaline liquid by shaking it with successive portions of chloroform. Combine the chloroform solutions and proceed as directed in the *Assay* under *Nux Vomica*, page 359, beginning with the words, "Add about 40 cc. of approximately 1 *N* sulfuric acid. . . ." Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.03344 Gm. of $C_{21}H_{22}O_2N_2$.

Alcohol content—From 67 to 72 per cent, by volume, of C_2H_5OH.

Storage—Preserve Nux Vomica Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**1 cc.** (approximately 15 minims).

Oils

Aromatic Castor Oil, page 129
Bergamot Oil, page 81
Bitter Almond Oil, page 30
Bitter Orange Oil, page 367

Ointments

Oleoresins

OLEYL ALCOHOL

Alcohol Oleylicum

$C_{18}H_{36}O$ $[CH_3(CH_2)_7CH{=}CH(CH_2)_7CH_2OH]$ Mol. wt. 268.47

Oleyl Alcohol is a mixture of aliphatic alcohols consisting chiefly of $CH_3(CH_2)_7CH{=}CH(CH_2)_7CH_2OH$.

Description—Oleyl Alcohol is a pale yellow liquid. It has a faint, characteristic odor and a bland, mild taste. When strongly heated in air, Oleyl Alcohol is decomposed with the production of acrid vapors. The specific gravity of Oleyl Alcohol is about 0.850 at 25°.

Solubility—Oleyl Alcohol dissolves in alcohol and in ether, the solubility increasing with an increase in temperature. It is insoluble in water.

Melting point—Oleyl Alcohol melts between 13° and 19°, page 731.

Distillation range—Not less than 90 per cent of Oleyl Alcohol distils between 305° and 370° when tested by Method II under *Boiling or Distilling Temperatures*, page 692.

Acid value—The acid value of Oleyl Alcohol is not more than 2, page 712.

Iodine value—The iodine value of Oleyl Alcohol is not less than 74 and not more than 80, page 713.

Hydroxyl number—Proceed as directed under *Cetyl Alcohol*, page 134. The hydroxyl number of Oleyl Alcohol is not less than 210 and not more than 230.

Storage—Preserve Oleyl Alcohol in tight containers.

COMPOUND OPIUM AND GLYCYRRHIZA MIXTURE

Mistura Opii et Glycyrrhizæ Composita

Mist. Opii et Glycyrrh. Comp. Brown Mixture

Glycyrrhiza Fluidextract	120	cc.
Antimony and Potassium Tartrate	0.24	Gm.
Camphorated Opium Tincture	120	cc.
Ethyl Nitrite Spirit	30	cc.
Glycerin	120	cc.
Distilled Water, a sufficient quantity,		
To make	1000	cc.

Dilute the fluidextract with the glycerin and 500 cc. of distilled water, add the antimony and potassium tartrate dissolved in 12 cc. of hot distilled water, then add the other ingredients, and enough distilled water to make the product measure 1000 cc.

Alcohol content—From 9 to 11 per cent, by volume, of C_2H_5OH.
Storage—Preserve Compound Opium and Glycyrrhiza Mixture in tight containers.

AVERAGE DOSE—4 cc. (approximately 1 fluidrachm).

One average metric dose contains 0.96 mg. of Antimony and Potassium Tartrate. 0.48 cc. of Camphorated Opium Tincture, and 0.12 cc. of Ethyl Nitrite Spirit.

Opium Extract

OPIUM EXTRACT
Extractum Opii

Ext. Opii Powdered Opium Extract Extractum opii aquosum P.I.

Opium Extract contains, in each 100 Gm., not less than 19.5 Gm. and not more than 20.5 Gm. of anhydrous morphine.

One Gm. of the Extract represents about 2 Gm. of opium.

Prepare the Extract from opium, cut into small pieces, by maceration or percolation with hot water. Evaporate the liquid extract to dryness at a temperature not exceeding 100°. Reduce the residue to a fine powder and assay it. Mix it thoroughly, if necessary, with sufficient dry starch to make the Extract contain, in each 100 Gm., 20 Gm. of anhydrous morphine.

Assay—To 3 Gm. of Opium Extract, in a small tared flask, add about 30 cc. of warm distilled water and shake frequently until the soluble portion of the Extract is completely dissolved. Cool, and add 3 Gm. of freshly slaked lime, and shake frequently during 15 minutes; then add sufficient distilled water to make the mixture weigh 54 Gm., and mix thoroughly. Filter the mixture through a small (about 10 cm.), dry filter paper into a tared, stoppered flask of not more than 125-cc. capacity, keeping the funnel covered to prevent evaporation. To 34 Gm. of the filtrate, representing 2 Gm. of Opium Extract, add 2 cc. of alcohol and 15 cc. of ether; shake the mixture, and add 1 Gm. of ammonium chloride. Shake the flask vigorously at intervals during 10 minutes and then set it aside in a cool (5° to 10°) place overnight. Remove the stopper and brush any adhering crystals back into the flask. Decant the ether layer through a small filter paper, rinse the flask and contents with 10 cc. of ether, then with 5 cc. of ether, decanting through the filter; then wash the filter with a little more ether. When the filter has drained, pour the aqueous liquid through it and drain both flask and filter. Wash the flask and crystals and the filter and contents with small successive portions of a saturated aqueous solution of morphine, until the washings are colorless. Then add 1 cc. of distilled water to replace the morphinated water. Add 15 cc. of boiling reagent methanol to the flask to dissolve the adhering crystals, and pour the boiling solution through the filter, collecting the filtrate in a dry flask. Repeat the treatment with boiling reagent methanol from 8 to 10 times, using 5 to 7 cc. each time until all the morphine is dissolved and washed from the flask, and filter. Cool the methanol solution of morphine, add 25 cc. of 0.1 *N* sulfuric acid, dilute the solution with 75 cc. of distilled water, and boil it carefully or evaporate it on a water bath to a volume of about 50 cc. Cool the liquid and titrate the excess acid with 0.02 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.02853 Gm. of $C_{17}H_{19}O_3N$.

Storage—Preserve Opium Extract in tight, light-resistant containers, preferably at a temperature not above 30°.

AVERAGE DOSE—**30 mg.** (approximately 1/2 grain).

Orange, Bitter, Elixir

BITTER ORANGE ELIXIR
Elixir Aurantii Amari

Elix. Aurant. Amar. Elixir Curassao

Bitter Orange Oil	1 cc.
Bitter Orange Peel Tincture	20 cc.
Alcohol	300 cc.
Orange Flower Water	20 cc.
Syrup	400 cc.
Distilled Water, a sufficient quantity, To make	1000 cc.

Mix the bitter orange oil and the bitter orange peel tincture with the alcohol; add the syrup, the orange flower water, and then sufficient distilled water in several portions, shaking the mixture after each addition, to make the product measure 1000 cc.; let it stand 24 hours, and then filter, using 10 Gm. of purified talc, if necessary, to clarify the product.

Alcohol content—From 26 to 30 per cent, by volume, of C_2H_5OH.
Storage—Preserve Bitter Orange Elixir in tight containers.

Orange, Bitter, Oil

BITTER ORANGE OIL
Oleum Aurantii Amari

Ol. Aurant. Amar.

Bitter Orange Oil is a volatile oil obtained by expression from the fresh peel of the fruit of *Citrus Aurantium* Linné (Fam. *Rutaceæ*).

Description—Bitter Orange Oil is a pale yellow or yellowish brown liquid, with the characteristic, aromatic odor of the Seville orange, and an aromatic, somewhat bitter taste. It is affected by light and its alcohol solutions are neutral to litmus paper. *Bitter Orange Oil having a terebinthinate odor is not to be dispensed.*
Solubility—Bitter Orange Oil is miscible with about 4 volumes of alcohol, in all proportions with dehydrated alcohol, and with an equal volume of glacial acetic acid.
Specific gravity—The specific gravity of Bitter Orange Oil is not less than 0.845 and not more than 0.851 at 25°.
Optical rotation—The optical rotation of Bitter Orange Oil is not less than +88° and not more than +98° when determined in a 100-mm. tube at 25°, page 737,

Refractive index—The refractive index of Bitter Orange Oil is not less than 1.4725 and not more than 1.4755 at 20°, page 745.
Identification—Introduce 50 cc. of Bitter Orange Oil into a 100 cc., 3-bulb fractionating flask of approximately the following dimensions: the lower or main bulb 6 cm., with the smaller condensing bulbs 3.5 cm., 3.0 cm., and 2.5 cm. in diameter, respectively, and the distance from the bottom to the side arm, 20 cm. Distil Bitter Orange Oil at the rate of 2 cc. per minute until a distillate measuring 6 cc. has been collected: the angle of optical rotation of this distillate is not more than 2° lower or more than 4° higher than that of the original Bitter Orange Oil.
Washed citrus oils—Evaporate 5 Gm. of Bitter Orange Oil to constant weight at 100°: the weight of the residue is not less than 0.10 Gm.
Storage—Preserve Bitter Orange Oil in tight, light-resistant containers.

AVERAGE DOSE—**0.1 cc.** (approximately $1^1/_2$ minims).

Orange Flower Oil

ORANGE FLOWER OIL
Oleum Aurantii Floris

Ol. Aurant. Flor. Neroli Oil

Orange Flower Oil is a volatile oil distilled from the fresh flowers of *Citrus Aurantium* Linné (Fam. *Rutaceæ*).

Description—Orange Flower Oil is a pale yellow, slightly fluorescent liquid, which becomes reddish brown on exposure to light and air. It has a distinctive, fragrant odor, similar to that of orange blossoms, and an aromatic, at first sweet, then somewhat bitter, taste. Orange Flower Oil is affected by light and may become turbid or solid at low temperatures. It is neutral to litmus paper.
Solubility—Orange Flower Oil is miscible with an equal volume of alcohol and with about 2 volumes of 80 per cent alcohol, the solution becoming cloudy on the further addition of alcohol of the same percentage.
Specific gravity—The specific gravity of Orange Flower Oil is not less than 0.863 and not more than 0.880 at 25°.
Optical rotation—The optical rotation of Orange Flower Oil is not less than +1.5° and not more than +9.1° when determined in a 100-mm. tube at 25°, page 737.
Identification—An alcohol solution of Orange Flower Oil has a violet fluorescence.
Storage—Preserve Orange Flower Oil in tight, light-resistant containers.

Orris

ORRIS
Iris
Orris Root

Orris is the peeled and dried rhizome of *Iris florentina* Linné, *Iris germanica* Linné, or *Iris pallida* Lamarck (Fam. *Iridaceæ*).

Unground Orris—Unground Orris occurs in pieces of various forms and sizes, usually jointed and branched, from 5 to 10 cm. long and from 1.5 to 3 cm. wide, rounded or flattened, and with knotty enlargements. The under surface shows numerous root-scars, and the upper surface shows leaf-scars. Externally and internally it is yellowish white to weak yellowish orange. The fracture is hard, rough, and at times

mealy, showing a narrow cortex, a distinct endodermis, and a large stele with numerous vascular bundles, especially near the endodermis.

Histology—Orris shows a cortex of starch-bearing parenchyma cells with thickened, porous walls and intercellular spaces within which occur large prisms of calcium oxalate, which are also found in certain parenchyma cells with suberized walls; a distinct endodermis of collenchyma-like cells containing starch; and a large central cylinder of starch-bearing parenchyma with lepto-centric vascular bundles irregularly placed throughout, though more numerous near the endodermis.

Powdered Orris—Powdered Orris is yellowish white to weak yellow. It has a fragrant odor, resembling that of violet flowers, and a slightly aromatic, bitterish, somewhat irritating taste. It shows numerous fragments of starch-bearing parenchyma; the starch grains being ovoid or oval, truncate, some curved or with irregular protuberances, mostly single, from 20 to 50 microns in length, and with an X-shaped cleft in the large rounded end of the grain, 2 of the fissures extending to the small end of the grain. Tracheæ having spiral, annular, scalariform, or reticulate markings up to 25 microns in width; and calcium oxalate in prisms up to 500 microns in length and 30 microns in width are also present.

Foreign organic matter—Orris contains not more than 1 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Orris yields not more than 1 per cent of acid-insoluble ash, page 761.

OVARIAN RESIDUE
Residuum Ovarii

Resid. Ovar. Desiccated Ovarian Residue

Ovarian Residue is the dried, undefatted and powdered ovary without the corpus luteum from cattle, sheep, or swine.

Ovarian Residue is derived from sound, clean glands, freed from external connective tissue and external fat and, as far as practicable, from corpus luteum material. It is free from diluents or preservatives.

One part is obtained from approximately 6 parts by weight of fresh ovary without the corpus luteum. Dry in a vacuum, at a temperature not exceeding 60°.

Description—Ovarian Residue occurs as a yellow to brown powder having a characteristic odor.

Solubility—Ovarian Residue is only partially soluble in water.

Histology—Ovarian Residue is similar to Ovary except for the almost complete absence of the characteristic corpus luteum material.

Moisture—Ovarian Residue contains not more than 6 per cent of moisture, page 761.

Total ash—Ovarian Residue yields not more than 7 per cent of total ash, page 760.

Storage—Preserve Ovarian Residue in tight containers, and avoid excessive heat.

AVERAGE DOSE—To be determined by the prescriber.

Ovary

OVARY
Ovarium

Ovarium Siccum — Desiccated Ovarian Substance

Ovary is the dried, undefatted and powdered ovary of cattle, sheep, or swine.

Ovary is derived from sound, clean, and entire glands that are freed from external connective tissues and external fat. It is free from diluents or preservatives.

One part of Ovary is obtained from approximately 6 parts by weight of fresh glands. Dry in a vacuum, at a temperature not exceeding 60°.

Description—Ovary occurs as a yellow to brown powder having a characteristic odor.
Solubility—Ovary is only partially soluble in water.
Histology—Ovary shows more or less distorted, cubical or low columnar epithelial cells, with nuclei staining a deep blue and cytoplasm a pale purple or pink with Delafield's hematoxylin T.S.; rounded to irregular masses of primary oocytes surrounded by connective tissue elements, the former staining deep purple or pink and the latter pale pink with Delafield's hematoxylin T.S.; numerous fragments of dense connective tissue consisting chiefly of elongated, narrow collagen fibers which swell and take a yellow color and exhibit a fibrillar structure when examined in an aqueous solution containing 1 per cent of picric acid and 1 per cent of acetic acid; a few segments of non-medullated nerve fibers of cylindrical shape and of nearly uniform diameter, with elongated nuclei at intervals of 20 to 25 microns, and having distinct, slender neurofibrils when examined in silver nitrate T.S.; a few segments of large cylindrical blood vessels, appearing rounded and serrated at the severed ends; a few large, spherical cells containing lipoid substance, the latter colored black with osmic acid T.S.; a few primordial follicles containing a central ovum, staining pink and the nucleus blue with eosin and hematoxylin T.S.; numerous fibroblasts of irregular polygonal shape, occasionally slightly elongated, with ends forked and exhibiting distinct nuclei and fibrillæ when examined in neutral red T.S.; numerous lutein cells, large, polyhedral to oval, often in masses, and each containing a central nucleus, lutein granules, and fat globules.
Moisture—Ovary contains not more than 6 per cent of moisture, page 761.
Total ash—Ovary yields not more than 7 per cent of total ash, page 760.
Storage—Preserve Ovary in tight containers, and avoid excessive heat.

AVERAGE DOSE—To be determined by the prescriber.

Pamaquine Naphthoate

PAMAQUINE NAPHTHOATE
Pamaquinæ Naphthoas

Pamaquin. Naphth. — Aminoquin Naphthoate

$C_{62}H_{68}N_4O_7$ — Mol. wt. 703.8

Pamaquine naphthoate is the methylene-bis-β-hydroxynaphthoate of 6-methoxy-8-(1-methyl-4-diethylamino)butylaminoquinoline. It contains, when dried at 105° for 6 hours, not less than 43 per cent and not

more than 45 per cent of 6-methoxy-8-(1-methyl-4-diethylamino)butylaminoquinoline (pamaquine base) and not less than 53 per cent and not more than 57 per cent of methylene-bis-β-hydroxynaphthoic acid.

Description—Pamaquine Naphthoate occurs as a yellow to orange yellow, odorless powder. It is tasteless, or nearly so, and has a local anesthetic effect when placed on the tongue. It is affected by light.

Solubility—Pamaquine Naphthoate dissolves in alcohol and in acetone, but is insoluble in water.

Identification—

A: Dissolve 0.2 Gm. of Pamaquine Naphthoate in 5 cc. of acetone, and add 1 cc. of hydrochloric acid: a pale yellow precipitate is produced. Add 5 cc. of distilled water, filter, and to 1 cc. of the filtrate add a solution of 40 mg. of potassium iodate in 1 cc. of distilled water: an intense violet color is produced suddenly after an interval of about 2 minutes.

B: To 20 mg. of finely powdered Pamaquine Naphthoate add 2 cc. of sulfuric acid, stir well, and add 3 drops of formaldehyde solution: a green color is gradually produced.

C: Suspend 0.2 Gm. of Pamaquine Naphthoate in 5 cc. of sodium hydroxide T.S. in a separator, and extract with 20 cc. of ether. Evaporate the ether to dryness, take up the residue in 6 cc. of dilute acetic acid (1 in 10), add a hot solution of 50 mg. of chloranil in 3 cc. of glacial acetic acid, and heat: an intense blue color is produced.

Loss on drying—When dried at 105° for 6 hours, Pamaquine Naphthoate loses not more than 4 per cent of its weight.

Residue on ignition—Pamaquine Naphthoate yields not more than 1.0 per cent of residue on ignition, page 745.

Assay for methylene-bis-β-hydroxynaphthoic acid—Transfer about 1 Gm. of Pamaquine Naphthoate, previously dried at 105° for 6 hours and accurately weighed, to a 250-cc. beaker, and add 15 cc. of diluted hydrochloric acid. Stir well with a glass rod at 10-minute intervals for 1 hour, cover with a watch glass and let stand over night. Dilute with 100 cc. of distilled water, and filter through a tared filtering crucible. Wash the beaker and the crystals with distilled water until a 0.5-cc. portion of the last washings, when acidified with diluted nitric acid, does not become turbid upon the addition of silver nitrate T.S. Preserve the combined filtrate and washings. Dry the crystals to constant weight at 105°.

Assay for pamaquine base—Transfer the combined filtrate and washings from the *Assay for methylene-bis-β-hydroxynaphthoic acid* to a casserole, cool to 15°, add about 25 Gm. of crushed ice, and slowly titrate with 0.1 *M* sodium nitrite until a blue color is produced immediately when a glass rod dipped into the titrated solution is streaked on a smear of starch-iodide paste T.S. When the titration is complete, the end-point is reproducible after the mixture has been allowed to stand for 1 minute. Each cc. of 0.1 *M* sodium nitrite is equivalent to 0.03154 Gm. of pamaquine base ($C_{19}H_{29}N_3O$).

Storage—Preserve Pamaquine Naphthoate in tight, light-resistant containers.

AVERAGE DOSE—**20 mg.** (approximately 1/3 grain).

Papain

PAPAIN
Papain

Papain is the dried and purified latex of the fruit of *Carica Papaya* Linné (Fam. *Caricaceæ*).

Papain possesses a digestive activity not less than that of the Reference Papain.

Description—Papain occurs as light brownish gray to weak reddish brown granules or as a yellowish gray to weak yellow powder having a characteristic odor and taste.
Solubility—Papain is partially soluble in water, the solution being more or less opalescent or hazy. It is nearly insoluble in alcohol, in chloroform, and in ether.
Assay—Weigh 2 Gm. of dried beef powder into a suitable wide-mouthed bottle fitted with a rubber stopper. To the bottle add 0.1 Gm. of Papain, accurately weighed, and 50 cc. of water, and shake until thoroughly mixed. In a similar manner prepare another bottle containing 0.1 Gm. of Reference Papain, 2 Gm. of dried beef powder, and 50 cc. of water. Place the bottles in a water bath at 52° and maintain at that temperature for 2 hours, agitating the contents equally every 10 minutes by inverting once. At the end of the digestion period remove the bottles from the bath and pour the contents into measuring vessels similar to those described under *Pepsin* (page 379). Wash each tube with 50 cc. of water and allow the undigested residue to settle 2 hours. The volume of residue in the vessel corresponding to the Papain is not greater than that contained in the vessel corresponding to the Reference Papain (about 5 cc.).
Storage—Preserve Papain in tight containers and avoid excessive heat.

Paraffin

PARAFFIN
Paraffinum

Paraffin is a purified mixture of solid hydrocarbons obtained from petroleum.

Description—Paraffin occurs as a colorless or white, more or less translucent mass, showing a crystalline structure. It is without odor or taste, and is slightly greasy to the touch.
Solubility—Paraffin is freely soluble in chloroform, in ether, in benzene, in petroleum benzin, in carbon disulfide, in volatile oils and in most warm fixed oils. It is slightly soluble in dehydrated alcohol and insoluble in water and in alcohol.
Melting point—Paraffin melts between 47° and 65°, page 731.
Identification—
A: When strongly heated, Paraffin ignites with a luminous flame and deposits carbon.
B: Heat about 0.5 Gm. of Paraffin in a dry test tube with an equal weight of sulfur: the mixture evolves hydrogen sulfide and becomes black due to the liberation of carbon.
Readily carbonizable substances—Use a clean, dry, heat-resistant, glass-stoppered test tube, 140 mm. ±3 mm. in length and 14 ±1 mm. in diameter, with a capacity of 16 ±1.0 cc. when the stopper is inserted. Calibrate the test tube at the 5-cc. and 10-cc. liquid levels. Place in the test tube 5 cc. of Paraffin at a temperature just above the melting point and 5 cc. of sulfuric acid containing 94.5 per cent to 94.9 per cent H_2SO_4. Heat in a water bath at 70° for 10 minutes. After the test tube has been in the water bath for 5 minutes remove it quickly, hold with a finger over the stopper and give 3 vigorous, vertical shakes over an amplitude of about 5 inches. Shake quickly and at a rate corresponding to 5 shakes per second. Repeat every minute. Do not keep the test tube out of the bath longer than 3 seconds for each shaking period. At the end of 10 minutes from the time it was first placed in the bath, remove the test tube. The acid does not become darker than the standard color produced by mixing in a similar glass-stoppered test tube 3 cc. of ferric chloride C.S., page 783, 1.5 cc. of cobaltous chloride C.S., page 783, and 0.5 cc. of cupric sulfate C.S., page 783, this mixed fluid being overlaid with 5 cc. of liquid petrolatum. If the acid remains trapped in the paraffin, the color of the resulting emulsion does not become darker than a similar emulsion produced by shaking the mixed colorimetric solutions with liquid petrolatum.

Reaction—Shake melted Paraffin with an equal volume of hot alcohol: the separated alcohol is neutral to litmus paper.
Storage—Preserve Paraffin in tight containers and avoid exposure to temperatures above 40°.

CHLORINATED PARAFFIN
Paraffinum Chlorinatum

Paraff. Chlorinat. Chlorcosane

Chlorinated Paraffin is a liquid paraffin which has been treated with chlorine.

Description—Chlorinated Paraffin is a light yellow to light amber, clear, thick, oily liquid. It is odorless, and is stable in air.
Solubility—Chlorinated Paraffin is slightly soluble in alcohol. It is miscible with benzene, carbon tetrachloride, chloroform, and with ether but is immiscible with water.
Specific gravity—The specific gravity of Chlorinated Paraffin is not less than 1.00 and not more than 1.07 at 25°.
Identification—Boil 5 drops of Chlorinated Paraffin with 10 cc. of alcoholic potassium hydroxide T.S. under a reflux condenser for 30 minutes, cool, dilute with 10 cc. of distilled water, and acidify with diluted nitric acid: the liquid becomes turbid because of the separation of small, oily drops. Shake the mixture with an equal volume of ether, allow the liquids to separate, draw off the clear aqueous layer, and add to it a few cc. of silver nitrate T.S.: a white precipitate develops in the liquid which is soluble in ammonia T.S.
Residue on ignition—Chlorinated Paraffin yields not more than 0.1 per cent of residue on ignition, page 745.
Acids or alkalies—Shake about 5 Gm. of Chlorinated Paraffin with 25 cc. of warm distilled water for 5 minutes, and filter the mixture through a filter paper moistened with distilled water: the filtrate is neutral to litmus paper.
Free chlorine—Add a few drops each of potassium iodide T.S. and of starch T.S. to 5 cc. of the filtered solution obtained as described in the preceding paragraph: no blue color is produced in the mixture.
Chloride—Five cc. of the filtered solution obtained as described in the test for acids or alkalies shows no more chloride than corresponds to 0.05 cc. of 0.02 *N* hydrochloric acid.
Completeness of chlorination—Dissolve 10 Gm. of Chlorinated Paraffin in 10 cc. of carbon tetrachloride in a 50-cc. volumetric flask; dissolve in this solution 0.5 Gm. of powdered dichloramine-T, accurately weighed, and allow the mixture to stand at 40° protected from light for 4 hours. When the solution has cooled, dilute it with sufficient carbon tetrachloride to make it measure 50 cc. Transfer 10 cc. of this dilution to a glass-stoppered flask, add 10 cc. of glacial acetic acid and 5 cc. of potassium iodide T.S., and stopper the flask tightly. Allow to stand for 10 minutes, add 25 cc. of distilled water, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Make a blank test, using like quantities of the same dichloramine-T and other reagents, but omitting the Chlorinated Paraffin and using sufficient carbon tetrachloride to make the mixture measure 50 cc. The difference between the volume of 0.1 *N* sodium thiosulfate consumed in the blank test and that required for the original test does not exceed 0.6 cc.
Storage—Preserve Chlorinated Paraffin in tight containers.

Pastes

Bismuth Paste, page 83
Compound Acetylsalicylic Acid Paste, page 22
Mild Resorcinol Paste, page 439
Pectin Paste, page 376
Strong Resorcinol Paste, page 440
Thin Pectin Paste, page 376
Zinc Oxide Paste, page 564
Zinc Oxide Paste, Hard, page 564
Zinc Oxide Paste, Soft, page 565
Zinc Oxide Paste with Salicylic Acid, page 565

Pectin

PECTIN
Pectinum

Pectin is a purified carbohydrate product obtained from the dilute acid extract of the inner portion of the rind of citrus fruits or from apple pomace. It consists chiefly of partially methoxylated polygalacturonic acids.

Pectin yields not less than 7 per cent of methoxyl groups and not less than 78 per cent of galacturonic acid when calculated on a moisture and ash free basis.

NOTE: Commercial pectin for the production of jellied food products is standardized to the convenient "150 jelly grade" by addition of dextrose or other sugars and sometimes contains sodium citrate or other buffer salts. This monograph refers to the pure pectin to which no such additions have been made.

Description—Pectin occurs as a coarse or fine powder, yellowish white in color, almost odorless, and with a mucilaginous taste.

Solubility—Pectin is almost completely soluble in twenty parts of water at 25°, forming a viscous, opalescent, colloidal solution which flows readily and is acid to litmus paper. It is insoluble in alcohol or in diluted alcohol, and in other organic solvents. Pectin dissolves in water more readily if first moistened with alcohol, glycerin, or simple syrup, or if first mixed with 3 or more parts of sucrose.

Identification—

A: Heat 1 Gm. of Pectin with 9 cc. of water on a water bath until a solution is formed, replacing water lost by evaporation: it yields a stiff gel upon cooling.

B: An aqueous solution of Pectin (1 in 100) yields a translucent, gelatinous precipitate when treated with an equal volume of alcohol (*difference from most gums*).

C: To 10 cc. of an aqueous solution of Pectin (1 in 100) add 1 cc. of thorium nitrate T.S., stir, and allow to stand for 2 minutes: a stable precipitate or gel forms (*difference from gums*).

D: To 5 cc. of an aqueous solution of Pectin (1 in 100) add 1 cc. of a solution of potassium hydroxide (1 in 50) and allow to stand at room temperature for 15 minutes: a transparent gel or semi-gel forms (*difference from tragacanth*).

E: Acidify the gel from the preceding test with diluted hydrochloric acid and shake well: a voluminous, colorless, gelatinous precipitate forms, which upon boiling becomes white and flocculent (*pectic acid*).

F: Heat 50 cc. of an aqueous solution of Pectin (1 in 50) to 70°, add 5 cc. of solution of sodium hydroxide (1 in 5), allow to stand 10 minutes in a stoppered flask, acidify slightly with sulfuric acid, and distil until 5 cc. of distillate is collected. The entire distillate when tested as directed under *Whisky* responds to the test for *Methanol*, page 555.

Loss on drying—When dried at 105° for 2 hours, Pectin loses not more than 10 per cent of its weight.

Ash—Place a crucible containing the Pectin used for the test for *Loss on drying* in a muffle furnace and gradually raise the temperature to 500° and maintain the temperature at 500°–600° for 3 hours. Cool and weigh the residue. The ash from Pectin does not exceed 4 per cent.

Acid-insoluble ash—Pectin yields not more than 0.4 per cent of acid-insoluble ash, page 761.

Arsenic—Add 2 Gm. of Pectin to 10 cc. of nitric acid and 3 cc. of sulfuric acid in a Kjeldahl flask. Heat until dense white fumes are evolved. If the mixture turns brown, add more nitric acid and heat until colorless or light yellow; cool, add 10 cc. of distilled water and 0.5 Gm. of ammonium oxalate. Heat until dense white fumes are evolved. Cool and dilute to 25 cc. When tested for *Arsenic*, page 689, 5 cc. of this solution produces no more stain than that of a blank with 1.4 cc. of the standard arsenic solution, using the same quantities of the same reagents, diluted and otherwise treated as directed above.

Lead—Add 2 Gm. of Pectin to 20 cc. of nitric acid in a 250-cc. Erlenmeyer flask, mix well, and heat the contents carefully until the Pectin is dissolved. Continue the heating until the volume is reduced to about 7 cc. Cool rapidly to room temperature, transfer to a 100-cc. volumetric flask and dilute to 100 cc. with distilled water. A 50-cc. portion of this solution contains not more than 5 micrograms of lead (corresponding to not more than 5 parts per million) when tested according to the *Lead limit test*, page 729, using 15 cc. of ammonium citrate solution, 3 cc. of potassium cyanide solution, and 0.5 cc. of hydroxylamine hydrochloride solution. After the first dithizone extractions, wash the combined chloroform layers with 5 cc. of distilled water, discarding the water layer and continuing in the usual manner by extracting with 20 cc. of 1 per cent nitric acid.

Starch—Boil a 1 per cent aqueous solution of Pectin, cool, and add a few drops of iodine T.S.: not even a transient blue color is produced.

Sugars and organic acids—Place 1 Gm. of Pectin into a 500-cc. flask, moisten it with 3 to 5 cc. of alcohol, pour in rapidly 100 cc. of distilled water, shake well, and allow to stand until solution is complete. To this solution add 100 cc. of alcohol containing 0.3 cc. of hydrochloric acid, mix thoroughly, and filter rapidly. Measure 25 cc. of the filtrate into a tared dish, evaporate the liquid on a water bath and dry the residue in a vacuum oven at 50° for 2 hours: the weight of the residue does not exceed 20 mg.

Assay for methoxyl groups—Transfer exactly 5 Gm. of Pectin to a suitable beaker and stir for 10 minutes with a mixture of 5 cc. of hydrochloric acid and 100 cc. of 60 per cent alcohol. Transfer to a fritted glass filter tube (30 to 60 cc., Gooch or Buchner type, coarse) and wash with six 15-cc. portions of the hydrochloric acid-60 per cent alcohol mixture, followed by 60 per cent alcohol until the filtrate is free of chlorides. Finally wash with 20 cc. of alcohol and dry for 1 hour in an oven at 100°, cool and weigh. Transfer exactly one-tenth of the total net weight of the dried sample (representing 0.5 Gm. of the original unwashed sample) to a 250-cc. Erlenmeyer flask and moisten the sample with 2 cc. of alcohol. Add 100 cc. of recently boiled and cooled distilled water, stopper and swirl occasionally until the Pectin is completely dissolved. Add 5 drops of phenolphthalein T.S., titrate with 0.5 *N* sodium hydroxide and record the results as the *initial titre*. Add exactly 20 cc. of 0.5 *N* sodium hydroxide, stopper, shake vigorously and let stand for 15

minutes. Add exactly 20 cc. of 0.5 *N* hydrochloric acid and shake until the pink color disappears. After adding 3 drops of phenolphthalein T.S., titrate with 0.5 *N* sodium hydroxide to a faint pink color which persists after vigorous shaking: record this value as the *saponification titre*. Each cc. of 0.5 *N* sodium hydroxide used in the *saponification titre* is equivalent to 0.0155 Gm. of OCH_3 on an undried basis.

Assay for galacturonic acid—Each cc. of 0.5 *N* sodium hydroxide used in the total titration (the *initial titre* added to the *saponification titre*) is equivalent to 0.09707 Gm. of $C_5H_9O_5COOH$ on an undried basis.

Storage—Preserve Pectin in tight containers.

Pectin Paste

PECTIN PASTE
Pasta Pectini

Past. Pectin.

Pectin	**75 Gm.**
Glycerin	**180 Gm.**
Benzoic Acid	**2 Gm.**
Isotonic Three Chlorides Solution, a sufficient quantity, To make about	**1000 Gm.**

Dissolve the benzoic acid in 825 cc. of the isotonic three chlorides solution heated to 100°. Mix the pectin and glycerin in a large dry container until all of the particles of pectin are covered. Then, while stirring, add all of the hot isotonic three chlorides solution containing the benzoic acid, and continue the stirring until a homogeneous paste is formed.

Storage—Preserve Pectin Paste in tight containers and avoid excessive heat. It may deteriorate and after a few months show some liquefaction.

Pectin Paste, Thin

THIN PECTIN PASTE
Pasta Pectini Tenuis

Past. Pectin. Ten.

Pectin	**35 Gm.**
Glycerin	**70 Gm.**
Benzoic Acid	**2 Gm.**
Isotonic Three Chlorides Solution, a sufficient quantity, To make about	**1000 Gm.**

Dissolve the benzoic acid in 950 cc. of the isotonic three chlorides solution heated to 100°. Mix the pectin and glycerin in a large dry container until all the particles of pectin are coated. Then, while stirring, add all of the hot isotonic three chlorides solution containing the benzoic acid, and continue the stirring until a homogeneous paste is formed.

Storage—Preserve Thin Pectin Paste in tight containers and avoid excessive heat. It may deteriorate and after a few months show some liquefaction.

PELLETIERINE TANNATE
Pelletierinæ Tannas

Pellet. Tann.

Pelletierine Tannate is a mixture in varying proportions of the tannates of the several alkaloids obtained from pomegranate, *Punica Granatum* Linné (Fam. *Punicaceæ*). It contains an amount of the alkaloids equivalent to not less than 20 per cent as the hydrochloride.

Description—Pelletierine Tannate occurs as a light yellow, odorless, amorphous powder, having an astringent taste. It is affected by light. A saturated, aqueous solution of Pelletierine Tannate is acid to litmus paper.

Solubility—One Gm. of Pelletierine Tannate dissolves in about 250 cc. of water at 25° and is dissolved by warm dilute acids. It is soluble in alcohol, slightly soluble in ether, and insoluble in chloroform.

Identification—A saturated, aqueous solution of Pelletierine Tannate is colored blue-black by ferric chloride T.S.

Residue on ignition—The residue on ignition from 0.2 Gm. of Pelletierine Tannate is negligible, page 745.

Readily carbonizable substances—Stir about 1 mg. of the residue obtained in the *Assay* on a white, porcelain surface with 2 drops of sulfuric acid: the mixture develops no color other than a light yellow or a light brown.

Foreign alkaloids—Platinic chloride T.S. produces no precipitate in a cold solution of about 0.1 Gm. of Pelletierine Tannate in a mixture of 4 cc. of distilled water and 1 cc. of diluted hydrochloric acid.

Assay—To about 0.5 Gm. of Pelletierine Tannate, accurately weighed, add 10 cc. of sodium hydroxide T.S., and shake the mixture with 4 successive portions of 15, 10, 10, and 10 cc. of chloroform. Acidify the combined chloroform solutions with 0.1 cc. of hydrochloric acid, and evaporate to apparent dryness on a water bath. Dissolve the residue in 5 cc. of alcohol, again evaporate, and dry for 1 hour at 60°:

the weight of the residue is not less than 20 per cent of the weight of Pelletierine Tannate taken.

Storage—Preserve Pelletierine Tannate in tight, light-resistant containers.

AVERAGE DOSE—**0.25 Gm.** (approximately 4 grains).

Pentobarbital Elixir

PENTOBARBITAL ELIXIR

Elixir Pentobarbitali

Elix. Pentobarb.

Pentobarbital Elixir contains, in each 100 cc., not less than 0.33 Gm. and not more than 0.40 Gm. of $C_{11}H_{18}N_2O_3$.

Pentobarbital Sodium	4 Gm.
Sweet Orange Peel Tincture	30 cc.
Alcohol	125 cc.
Glycerin	450 cc.
Syrup	150 cc.
Diluted Hydrochloric Acid	6 cc.
Caramel	2 Gm.
Distilled Water, a sufficient quantity, To make	1000 cc.

Dissolve the pentobarbital sodium in 200 cc. of distilled water, then add the glycerin, alcohol, sweet orange peel tincture, caramel, and syrup. Mix thoroughly, and add the diluted hydrochloric acid and sufficient distilled water to make the product measure 1000 cc. Mix well and filter, if necessary, to obtain a clear elixir.

Assay—Transfer exactly 25 cc. of Pentobarbital Elixir to a separator, acidify with diluted hydrochloric acid, add 2 cc. excess, and saturate with sodium chloride. Add 30 cc. of chloroform and shake the mixture gently for about 30 seconds. Draw off the chloroform layer into a second separator, and completely extract the pentobarbital with successive 25-cc. portions of chloroform, combining the chloroform extracts in the second separator. Shake the combined chloroform extracts with 10 cc. of distilled water, and draw off the chloroform through a pledget of cotton into a tared beaker. Wash the aqueous layer with 10 cc. of chloroform, and draw this off through the cotton filter into the tared beaker. Evaporate the chloroform solution to dryness, and dry the residue to constant weight at 90°. The weight of the pentobarbital thus obtained is the weight of $C_{11}H_{18}N_2O_3$ in the portion of Elixir taken for the assay.

Alcohol content—From 12 to 15 per cent, by volume, of C_2H_5OH.

Storage—Preserve Pentobarbital Elixir in tight, light-resistant containers.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains 14.5 mg. of Pentobarbital.

PEPSIN
Pepsinum

Pepsin is a substance containing a proteolytic enzyme obtained from the glandular layer of the fresh stomach of the hog, *Sus scrofa* var. *domesticus* Gray (Fam. *Suidæ*).

Pepsin, when assayed as herein directed, digests not less than 3000 and not more than 3500 times its weight of egg albumen. A pepsin of higher digestive power may be reduced to the official standard by admixture with a pepsin of lower power or with lactose.

Description—Pepsin occurs as lustrous, transparent or translucent scales; as granular or spongy masses, ranging in color from weak yellow to light brown; or as a fine, white to weak yellow amorphous powder, free from offensive odor and having a slightly acid or salty taste. Pepsin is not more than slightly hygroscopic. Dry pepsin is not injured by heating to 100°. The activity of pepsin in solution is destroyed by alkalies or by temperatures exceeding 70°.

Solubility—Pepsin is freely soluble in water, the solution being more or less opalescent. It is nearly insoluble in alcohol, in chloroform, and in ether.

Identification—An aqueous solution of Pepsin (1 in 50) is acid to litmus paper. An aqueous solution of Pepsin yields precipitates with solutions of tannic acid or gallic acid and with solutions of the salts of many heavy metals. On heating a solution of Pepsin in acidified water to 100°, it becomes milky or yields a light, flocculent precipitate, and loses all proteolytic power.

Assay—Mix 35 cc. of 1 *N* hydrochloric acid with 385 cc. of distilled water. Dissolve 0.1 Gm. of Pepsin in 150 cc. of this dilute acid. Likewise dissolve 0.1 Gm. of Reference Pepsin, page 744, in another 150-cc. portion of the dilute acid. Immerse one or more hen eggs in boiling water during 15 minutes. Cool them rapidly to room temperature by immersion in cold water; remove the shell and pellicle and all of the yolk and at once rub the albumen through a clean dry, No. 40 sieve, rejecting the first portion that passes through the sieve. Place 10 Gm. of the succeeding well-mixed portion in each of 3 wide-mouth bottles of about 100-cc. capacity. Immediately add 35 cc. of the dilute acid at one time or in portions and, by suitable means, thoroughly disintegrate the particles of albumen. Place the bottles in a water bath at 52°. After the contents of the bottles have reached that temperature, add exactly 5 cc. of the acidified solution of Pepsin to one bottle, 4.30 cc. of the same solution and 0.70 cc. of the dilute acid to another bottle, and exactly 5 cc. of acidified solution of Reference Pepsin to the third bottle. At once stopper the bottles securely, invert them 3 times, and maintain them at a temperature of 52° for 2 hours and 30 minutes, agitating the contents equally every 10 minutes by inverting the bottles once. Remove the bottles from the bath, pour the contents into 100-cc. conically shaped measuring vessels, having diameters not exceeding 1 cm. at the bottom and complying in other respects with the water and sediment tube ASTM Standard Method, D96–35, graduated from 0 to 0.5 cc. in 0.05-cc. graduations; from 0.5 to 3 cc. in 0.1-cc. graduations; from 3 to 5 cc. in 0.5-cc. graduations; from 5 to 10 cc. in 1-cc. graduations; from 10 to 25 cc. in 5-cc. graduations; and with graduation marks at 50-, 75-, and 100-cc. points. Transfer the undigested egg albumen which adheres to the sides of the bottles to the respective measuring vessels with the aid of small portions of distilled water until 50 cc. has been used for each. Mix the contents of each measuring vessel and allow them to stand for 30 minutes. The volume of the undissolved albumen in the measuring vessel corresponding to 5.0 cc. of the solution of Pepsin being assayed does not exceed the volume of the undissolved albumen in the measuring vessel corresponding to 5.0 cc. of the Reference Pepsin solution, and

the volume of the undissolved albumen in the measuring vessel corresponding to 4.30 cc. of the solution of Pepsin being assayed is not less than the volume of the undissolved albumen in the measuring vessel corresponding to 5.0 cc. of the Reference Pepsin solution.

NOTE: Other measuring vessels than the one described in this monograph may be used if they are of such design and graduation as to measure the residue accurately.

Storage—Preserve Pepsin in tight containers and avoid excessive heat.

AVERAGE DOSE—**0.5 Gm.** (approximately $7^1/_2$ grains).

Pepsin and Rennin Elixir

PEPSIN AND RENNIN ELIXIR
Elixir Pepsini et Rennini

Elix. Pepsin. et Rennin. Pepsin Essence

Pepsin and Rennin Elixir possesses, in each 100 cc., a proteolytic activity equal to not less than 2.25 Gm. of Reference Pepsin.

Pepsin	45	Gm.
Rennin	18	Gm.
Glycerin	150	cc.
Alcohol	165	cc.
Sweet Orange Peel Tincture	50	cc.
Myristica Oil	0.1	cc.
Distilled Water, a sufficient quantity, To make	1000	cc.

Add the pepsin and the rennin to 500 cc. of cold distilled water, and allow the mixture to stand in a cool place until the pepsin is thoroughly softened; then stir very gently until the solids are dissolved, and add the glycerin. Dissolve the sweet orange peel tincture and myristica oil in the alcohol, and gradually add to the aqueous solution with gentle stirring. Then add sufficient distilled water to make the product measure 1000 cc., mix gently, and filter, if necessary, until the product is clear.

NOTE: Pepsin solutions are reduced in proteolytic activity by agitation and storage, particularly at or above normal room temperature. To insure the dispensing of this Elixir at standard strength, it is required that an excess of pepsin be used in preparing it.

Assay—Dilute 50 cc. of 1 *N* hydrochloric acid with 550 cc. of distilled water. To exactly 5.0 cc. of Pepsin and Rennin Elixir in a volumetric flask add sufficient of the dilute acid to make 200 cc. of the mixture. Dissolve 0.140 Gm. of Reference Pepsin, page 744, in 250 cc. of the dilute acid. Proceed as directed in the *Assay* under *Pepsin Elixir*, page 381, beginning with "Boil a sufficient number of eggs...."

Alcohol content—From 17 to 20 per cent, by volume, of C_2H_5OH.
Storage—Preserve Pepsin and Rennin Elixir in tight, light-resistant containers. Avoid excessive heat and undue agitation.

AVERAGE DOSE—**8 cc.** (approximately 2 fluidrachms).

One average metric dose contains not less than 0.18 Gm. of Pepsin and about 0.14 Gm. of Rennin.

Pepsin Elixir

PEPSIN ELIXIR

Elixir Pepsini

Elix. Pepsin.

Pepsin Elixir possesses, in each 100 cc., a proteolytic activity equal to not less than 1.75 Gm. of Reference Pepsin.

Pepsin	**35 Gm.**
Citric Acid	**12 Gm.**
Exsiccated Sodium Phosphate	**13 Gm.**
Distilled Water	**300 cc.**
Glycerin	**200 cc.**
Aromatic Elixir, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the citric acid and the exsiccated sodium phosphate in the cold distilled water, add the pepsin, and allow the mixture to stand in a cool place until the pepsin is thoroughly softened, and then stir very gently until dissolved. Add the glycerin and sufficient aromatic elixir to make the product measure 1000 cc.; mix gently, and filter, if necessary, until the product is clear.

NOTE: Pepsin solutions are reduced in proteolytic activity by agitation and storage, particularly at or above normal room temperature. To insure the dispensing of this Elixir at standard strength it is required that an excess of pepsin be used in preparing it.

Assay—Dilute 50 cc. of 1 *N* hydrochloric acid with 550 cc. of distilled water. To exactly 5.0 cc. of Pepsin Elixir in a volumetric flask add sufficient of this dilute acid to make 200 cc. of the dilution. Dissolve 0.110 Gm. of Reference Pepsin, page 744, in 250 cc. of the acid. Boil a sufficient number of eggs for 15 minutes to provide coagulated albumen for the assay. Then remove the shell, pellicle, and the yolk, and at once rub the albumen through a clean, dry, hair or brass, No. 40 sieve, rejecting the first portion that passes through the sieve and keeping the remainder in a stoppered container not longer than 1 day. Place a 10-Gm. portion of the granulated egg albumen in a porcelain mortar with 10 cc. of the dilute acid and rub until the albumen is completely suspended. With 20 cc. of the dilute acid, quantitatively transfer this suspension to a tube (the centrifuge tubes described under "Water and Sediment in Fatty Oils," page 714, or other suitable tubes) of about 125-cc. capacity. Repeat this procedure until a sufficient number of the tubes have been prepared. Place them in a water bath warmed to 52°.

To one tube add exactly 3 cc. and to another tube exactly 5 cc. of the acidified solution of Pepsin Elixir. Prepare 6 more tubes in a similar manner, adding exactly 3 cc., 4 cc., 5 cc., 6 cc., 7 cc., and 8 cc., respectively, of the acidified solution of Reference Pepsin; then to each of the 8 tubes add a sufficient amount of the dilute acid to bring the volume to 50 cc. At once stopper the tubes securely with smooth cork stoppers, invert them 3 times, making sure that the egg albumen in the tip of the tube is shaken out, and replace in the bath adjusted to maintain a temperature of 52°. Keep the tubes at this temperature for 2 hours and 30 minutes, agitating the contents equally every 10 minutes by inverting the tubes once, making sure that no particles of albumen adhere to the stopper or walls of the tube. Remove the tubes from the bath, stir the mixture well, and allow to stand 30 minutes. Keep the tubes in a perfectly vertical position during the sedimentation time. Compare the tubes containing the Pepsin Elixir and observe which tubes contain approximately the same amount of undigested egg albumen. Calculate the percentage of active pepsin in the Pepsin Elixir. If neither the 3-cc. nor the 5-cc. sample of the acidified solution of Pepsin Elixir produces an amount of undigested egg albumen which falls within the range of the set of standards, it is then necessary to use either less or more of the Pepsin Elixir, as the case may be, until the amount of albumen falls within the range of the standards.

Alcohol content—From 13 to 15 per cent, by volume, of C_2H_5OH.

Storage—Preserve Pepsin Elixir in tight, light-resistant containers. Avoid excessive heat and undue agitation.

AVERAGE DOSE—8 cc. (approximately 2 fluidrachms).

One average metric dose contains not less than 0.14 Gm. of Pepsin.

Pepsin Elixir, Compound

COMPOUND PEPSIN ELIXIR
Elixir Pepsini Compositum

Elix. Pepsin. Comp. Lactated Pepsin Elixir Compound Digestive Elixir

Compound Pepsin Elixir possesses, in each 100 cc., a proteolytic activity equal to not less than 1.75 Gm. of Reference Pepsin.

Pepsin	35 Gm.
Lactic Acid	1 cc.
Glycerin	250 cc.
Alcohol	200 cc.
Orange Oil	2 cc.
Cudbear Tincture	10 cc.
Distilled Water, a sufficient quantity, To make	1000 cc.

Add the pepsin to 500 cc. of cold distilled water containing the lactic acid, and allow the mixture to stand in a cool place until the pepsin is thoroughly softened; then stir very gently until dissolved and add the glycerin. Dissolve the orange oil and the cudbear tincture in the alcohol and gradually add this solution to the pepsin solution with gentle stirring. Then add sufficient distilled water to make the product measure 1000 cc., and filter, if necessary, until the product is clear.

NOTE: Pepsin solutions are reduced in proteolytic activity by agitation and storage, particularly at or above normal room temperature. To insure the dispensing of this Elixir at standard strength it is required that an excess of pepsin be used in preparing it.

Assay—Proceed as directed in the *Assay* under *Pepsin Elixir*, page 381.
Alcohol content—From 16 to 19 per cent, by volume, of C_2H_5OH.
Storage—Preserve Compound Pepsin Elixir in tight, light-resistant containers. Avoid excessive heat and undue agitation.

AVERAGE DOSE—**8 cc.** (approximately 2 fluidrachms).

One average metric dose contains not less than 0.14 Gm. of Pepsin.

Pepsin, Saccharated

SACCHARATED PEPSIN

Pepsinum Saccharatum

Pepsin. Sacch.

Pepsin, in fine powder	**100 Gm.**
Lactose, recently dried and in very fine powder	**900 Gm.**
To make	**1000 Gm.**

Triturate the pepsin with the lactose to a uniform, fine powder.

Storage—Preserve Saccharated Pepsin in tight containers.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

One average metric dose contains 0.1 Gm. of Pepsin.

Peptonized Iron, page 275
Peptonized Iron and Manganese Solution, page 276

Perfumed Spirit

PERFUMED SPIRIT

Spiritus Odoratus

Sp. Odorat. Cologne Water Aqua Coloniensis

Bergamot Oil	**15 cc.**
Lemon Oil	**4 cc.**
Rosemary Oil	**7 cc.**
Lavender Oil	**4 cc.**
Orange Flower Oil	**4 cc.**
Ethyl Acetate	**2 cc.**
Water	**120 cc.**
Alcohol	**840 cc.**
To make about	**1000 cc.**

Dissolve the oils and the ethyl acetate in the alcohol and add the water. Set the mixture aside in a tight container for 8 days, and then filter.

Alcohol content—From 74 to 81 per cent, by volume, of C_2H_5OH.
Storage—Preserve Perfumed Spirit in tight, light-resistant containers.

Petrolatum, Liquid, Emulsion with Phenolphthalein

LIQUID PETROLATUM EMULSION WITH PHENOLPHTHALEIN

Emulsum Petrolati Liquidi cum Phenolphthaleino

Emuls. Petrolat. Liq. c. Phenolphthal.

Heavy Liquid Petrolatum	500 cc.
Agar	10 Gm.
Acacia, in fine powder	40 Gm.
Phenolphthalein	4 Gm.
Alcohol	60 cc.
Vanillin	50 mg.
Saccharin	50 mg.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Place the agar in a suitable container, graduated to 350 cc., and boil it with about 400 cc. of distilled water for about 20 minutes, or until it has dissolved. Continue the heat, if necessary, until the solution measures 350 cc., allow it to cool to about 45°, stirring it frequently to prevent the formation of an agar film on the surface and adding additional distilled water, if necessary, to maintain the volume. Emulsify 160 cc. of the heavy liquid petrolatum with the acacia and 80 cc. of distilled water. Then add the remainder of the liquid petrolatum in portions, emulsifying each portion thoroughly and adding the agar solution in portions as required to maintain the proper consistence. Dissolve the vanillin, saccharin, and phenolphthalein in the alcohol, and gradually add the resulting solution to the emulsion.

NOTE: In the preparation of Liquid Petrolatum with Phenolphthalein Emulsion, the acacia may be partly or entirely replaced with chondrus, gelatin, tragacanth, or mixtures of these, provided the emulsion is similar in viscosity and appearance to the emulsion made by the formula given above. The use of a mechanical mixer or homogenizer greatly facilitates the making of this Emulsion. For other permissible modifications see *Emulsions*, page 708.

Alcohol content—From 5 to 6 per cent, by volume, of C_2H_5OH.
Storage—Preserve Liquid Petrolatum Emulsion with Phenolphthalein in tight, light-resistant containers, and avoid excessive heat.

AVERAGE DOSE—**15 cc.** (approximately 4 fluidrachms).

One average metric dose contains 7.5 cc. of Liquid Petrolatum and 60 mg. of Phenolphthalein.

Petroxolin, Solid

SOLID PETROXOLIN
Petroxolinum Spissum

Petrox. Spiss.	Petrolatum Saponatum Spissum	Solid Petrox
Yellow Wax		**350 Gm.**
Light Liquid Petrolatum		**200 Gm.**
Oleic Acid		**320 Gm.**
Lavender Oil		**30 cc.**
Alcohol		**50 cc.**
Strong Ammonia Solution		**60 cc.**
	To make about	**1000 Gm.**

Melt the yellow wax with the liquid petrolatum on a water bath, incorporate the oleic acid, and transfer the mixture at once to a warm mortar; when nearly congealed, add the alcohol and the strong ammonia solution which have been previously mixed and warmed, and stir continuously until cool. Finally, incorporate the lavender oil.

NOTE: Solid Petroxolin is an excellent base for ointments containing Peruvian balsam.

Storage—Preserve Solid Petroxolin in tight containers.

Phenol, Camphorated

CAMPHORATED PHENOL
Phenol Camphoratum

Phenol Camph.	Camphor-Phenol
Phenol	**300 Gm.**
Camphor	**600 Gm.**
Liquid Petrolatum, a sufficient quantity, To make	**1000 cc.**

Triturate the phenol and the camphor together until they liquefy, add sufficient liquid petrolatum to make the product measure 1000 cc., and mix it thoroughly.

Storage—Preserve Camphorated Phenol in tight containers.

PHENOL GLYCERITE

Glyceritum Phenolis

Glycer. Phenol. Carbolic Acid Glycerite

Phenol Glycerite contains, in each 100 cc., not less than 16.8 Gm. and not more than 20.6 Gm. of C_6H_6O.

Liquefied Phenol	200 cc.
Sodium Citrate	10 Gm.
Distilled Water	10 cc.
Glycerin	790 cc.
To make about	1000 cc.

Dissolve the sodium citrate in the hot distilled water, and incorporate this solution with the mixture of glycerin and liquefied phenol.

Description—Phenol Glycerite is a colorless or nearly colorless, viscous liquid having the characteristic odor of phenol and a sweetish taste.

Assay—Measure exactly 10 cc. of Phenol Glycerite in a 10-cc. volumetric flask and transfer into a 1000-cc. volumetric flask by washing with copious quantities of distilled water, finally bringing up to volume with distilled water. Transfer a portion equivalent to about 40 mg. of phenol to an iodine flask by means of a pipette and add 25 cc. of water and 30 cc. of 0.1 *N* bromine and proceed as directed in the *Assay* under *Phenolated Water*, page 387, beginning with "Add 5 cc. of hydrochloric acid. . . ." Each cc. of 0.1 *N* bromine is equivalent to 0.001569 Gm. of C_6H_6O.

Storage—Preserve Phenol Glycerite in tight containers.

Phenolated Calamine Lotion, page 100
Phenolated Iodine Solution, page 264
Phenolated Neocalamine Lotion, page 350

PHENOLATED OIL

Oleum Phenolatum

Oleum Carbolatum Phenol. Carbolized Oil

Phenol	50 Gm.
Olive Oil, a sufficient quantity,	
To make	1000 cc.

Melt the phenol with gentle heat, and mix it with enough olive oil to make the product measure 1000 cc.

Storage—Preserve Phenolated Oil in tight containers.

PHENOLATED WATER

Aqua Phenolata

Aq. Phenol. Carbolic Acid Water Solutio Phenoli P.I.

Phenolated Water contains, in each 100 cc., not less than 1.8 Gm. and not more than 2.3 Gm. of C_6H_6O.

Liquefied Phenol	22 cc.
Distilled Water	978 cc.
To make	1000 cc.

Mix the ingredients.

Description—Phenolated Water is a clear, colorless solution having the characteristic odor of phenol.

Assay—Transfer 2 cc. of Phenolated Water to an iodine flask and add 25 cc. of distilled water and 30 cc. of 0.1 *N* bromine. Add 5 cc. of hydrochloric acid and immediately insert the stopper. Shake the flask repeatedly during 30 minutes, allow it to stand for 15 minutes, remove the stopper just sufficiently to introduce quickly 5 cc. of an aqueous solution of potassium iodide (1 in 5), being careful that no bromine vapor escapes, and at once stopper the flask. Shake thoroughly, remove the stopper and rinse it and the neck of the flask with a little distilled water, so that the washings may flow into the flask. Add 1 cc. of chloroform, shake the mixture well, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Each cc. of 0.1 *N* bromine is equivalent to 0.001569 Gm. of C_6H_6O.

Storage—Preserve Phenolated Water in tight containers.

PHENOLPHTHALEIN TABLETS

Tabellæ Phenolphthaleini

Tab. Phenolphthal.

Phenolphthalein Tablets contain not less than 92.5 per cent and not more than 107.5 per cent of the labeled amount of $C_{20}H_{14}O_4$.

Identification—The Tablets produce a red liquid when mixed with alkali hydroxide solutions or with hot alkali carbonate solutions. The red liquid is decolorized by the addition of an excess of acid.

Assay—Weigh not less than 20 of the Tablets, and reduce them to a fine powder without an appreciable loss. Add 60 cc. of alcohol to an accurately weighed portion, equivalent to about 0.65 Gm. of phenolphthalein, and boil the mixture gently for 20 minutes, rotating the flask occasionally. Cool the mixture, transfer it carefully to a volumetric flask, add alcohol to the mark, and mix thoroughly. Filter the mixture, covering the funnel with a watch glass; transfer to a beaker, an accurately measured portion, equivalent to about 0.13 Gm. of phenolphthalein, and evaporate it to dryness on a water bath. Add 4 drops, or more if necessary, of an aqueous solution of potassium hydroxide (1 in 1), dilute the mixture with 5 cc. of distilled water, and agitate carefully until the phenolphthalein has been dissolved completely. Place the beaker in an ice and salt bath, and keep the solution at a temperature of from 0° to 5°. Add about 4.5 cc. of an iodine solution

(7 Gm. of iodine dissolved in 10 cc. of an aqueous saturated potassium iodide solution), dilute to 60 cc. with distilled water, and add sufficient of the potassium hydroxide solution to discharge the iodine color. Then add hydrochloric acid, dropwise, with constant stirring, until precipitation is complete. At this point the supernatant liquid must be deep brown in color, for a pale yellow color indicates that insufficient iodine solution has been used. Finally, add sufficient of the potassium hydroxide solution, dropwise, to dissolve the precipitate completely, though a little material may remain undissolved if fat is present. Repeat the process of precipitation and re-solution with hydrochloric acid and the potassium hydroxide solution several times, keeping the solution cold. Add 1 to 2 cc. of an aqueous solution of sodium sulfite (1.5 in 10) and, if necessary to remove fat, filter the mixture through a Gooch crucible, washing several times with cold distilled water. Acidify the solution with hydrochloric acid, add a few cc. in excess, and heat the mixture on a water bath for 30 minutes. Filter the mixture through a tared Gooch crucible, and wash the precipitate several times with cold distilled water and finally with a small amount of petroleum benzin. Dry the crucible and its contents to constant weight at 130° to 140°. The weight of the precipitate, multiplied by 0.3872, represents the weight of $C_{20}H_{14}O_4$ in the portion taken for the assay.

Storage—Preserve Phenolphthalein Tablets in tight containers.

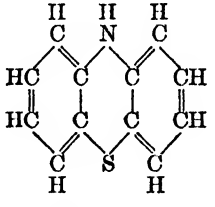
Sizes—Phenolphthalein Tablets usually available contain the following amounts of phenolphthalein: **60 mg.** and **0.12 Gm.** (approximately 1 and 2 grains).

AVERAGE DOSE—**60 mg.** (approximately 1 grain) of Phenolphthalein.

Phenothiazine

PHENOTHIAZINE
Phenothiazina

Phenothiaz. Thiodiphenylamine



$C_{12}H_9NS$ Mol. wt. 199.26

Description—Phenothiazine occurs as a pale greenish yellow to dark greenish gray powder, granules, or flakes. It is tasteless and has a slight characteristic odor. Phenothiazine is slowly oxidized when exposed to the air over a long period of time, the color becoming darkened.

Solubility—One Gm. of Phenothiazine dissolves in about 75 cc. of alcohol, in about 5 cc. of acetone, in about 20 cc. of chloroform, and in about 45 cc. of toluene at 25°. It is usually incompletely soluble in ether, and is insoluble in water.

Freezing point—The freezing point of Phenothiazine is not less than 179°, page 720.

Identification—

A: One drop of ferric chloride T.S. added to 10 cc. of an alcohol solution of Phenothiazine (1 in 2000) produces a green solution.

B: Add 1 cc. of hydrochloric acid to 100 cc. of water, heat to 80° and add 5 cc. of hydrogen peroxide T.S. Slowly add 20 cc. of an alcohol solution of Phenothiazine (1 in 100) to the well-stirred aqueous solution, maintaining the temperature at 80°: a deep red solution is produced, due to the oxidation of Phenothiazine.

Loss on drying—When dried over sulfuric acid for 3 hours, Phenothiazine loses not more than 1 per cent of its weight.

Residue on ignition—Phenothiazine yields not more than 0.2 per cent of residue on ignition, page 745.

Ether-insoluble substances—Completely extract an accurately weighed quantity of Phenothiazine in a Soxhlet extraction apparatus using absolute ether: the weight of the residue does not exceed 1.5 per cent.

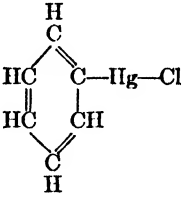
AVERAGE DOSE (based on the weight of the animal)—

Horses and Mules, **30 to 50 Gm.** (approximately 8 to 13 drachms)
Cattle, **50 to 80 Gm.** (approximately 13 to 20 drachms)
Calves, **24 to 40 Gm.** (approximately 6 to 10 drachms)
Swine, **4 to 30 Gm.** (approximately 1 to 8 drachms)
Sheep and Goats, **25 Gm.** (approximately 6¼ drachms)
Lambs (up to 60 lbs.), **15 Gm.** (approximately 4 drachms)
Chickens, **0.5 Gm.** (approximately 7½ grains)

Caution: Animals should be treated with Phenothiazine only upon the advice of a veterinarian.

PHENYLMERCURIC CHLORIDE
Phenylhydrargyri Chloridum

C_6H_5ClHg



Mol. wt. 313.17

Phenylmercuric Chloride contains not less than 63.5 per cent and not more than 64.5 per cent of Hg corresponding to not less than 99 per cent of C_6H_5ClHg.

Description—Phenylmercuric Chloride occurs as white, leafy crystals. It is affected by light.

Solubility—Phenylmercuric Chloride is practically insoluble in distilled water. It is slightly soluble in hot alcohol and in ether.

Melting point—Phenylmercuric Chloride melts between 250° and 252°, page 731.

Identification—

A: To 5 cc. of a warm saturated solution of Phenylmercuric Chloride in diluted nitric acid, add 1 cc. of silver nitrate T.S.: a white precipitate, soluble in excess ammonia T.S., is produced.

B: Add 5 cc. of ammonium sulfide T.S. to 5 cc. of a warm saturated solution of Phenylmercuric Chloride in diluted nitric acid and heat on a water bath: a black precipitate is produced.

Residue on ignition—Phenylmercuric Chloride yields not more than 0.1 per cent of residue on ignition, page 745.

Mercury ions—Neutralize with sodium hydroxide T.S., 5 cc. of a saturated solution of Phenylmercuric Chloride in diluted nitric acid, and add 5 cc. in excess: no yellow precipitate is produced (*mercuric ions*) and the solution does not darken (*mercurous ions*).

Assay—Transfer about 0.4 Gm. of Phenylmercuric Chloride, accurately weighed, into a 100-cc. flask and add 15 cc. of distilled water, 5 cc. of formic acid and 1 Gm. of zinc dust and reflux for 30 minutes. Cool, filter and wash the filter paper and the amalgam with distilled water until the washings are no longer acid to litmus paper. Dissolve the amalgam in 40 cc. of diluted nitric acid (1 in 2). Heat on a water bath for 3 minutes and add 0.5 Gm. of urea and enough potassium permanganate to produce a permanent pink color. Cool, decolorize the solution with hydrogen peroxide T.S. and titrate with 0.1 *N* ammonium thiocyanate, using 1 cc. of ferric ammonium sulfate T.S. as the indicator. Each cc. of 0.1 *N* ammonium thiocyanate is equivalent to 0.01003 Gm. of Hg.

Storage—Preserve Phenylmercuric Chloride in tight, light-resistant containers.

Phenylmercuric Nitrate

PHENYLMERCURIC NITRATE
Phenylhydrargyri Nitras

Phenylmercuric Nitrate is a mixture of phenylmercuric nitrate and phenylmercuric hydroxide containing not less than 62.75 per cent and not more than 63.5 per cent of Hg.

Description—Phenylmercuric Nitrate occurs as a white, crystalline powder. It is affected by light and its saturated aqueous solution is acid to litmus paper.

Solubility—Phenylmercuric Nitrate is very slightly soluble in distilled water. It is slightly soluble in alcohol and in glycerin. It is more soluble in the presence of either nitric acid or alkali hydroxides.

Melting point—Phenylmercuric Nitrate melts between 175° and 185°, page 731.

Identification—

A: Add 3 cc. of sulfuric acid to 0.1 Gm. of Phenylmercuric Nitrate: the mixture becomes yellow and the characteristic odor of nitrobenzene is evolved.

B: To 5 cc. of a saturated aqueous solution of Phenylmercuric Nitrate add 1 cc. of diluted hydrochloric acid: a white precipitate is produced.

C: To 5 cc. of a saturated aqueous solution of Phenylmercuric Nitrate add 5 cc. of ammonium sulfide T.S.: there is no reaction in the cold, but upon heating for 10 minutes in a boiling water bath, a black precipitate is produced.

Residue on ignition—Phenylmercuric Nitrate yields not more than 0.1 per cent of residue on ignition, page 745.

Mercury ions—To 5 cc. of a saturated aqueous solution of Phenylmercuric Nitrate, add 5 cc. of sodium hydroxide T.S.: no yellow precipitate is produced (*mercuric ions*) and the solution does not darken (*mercurous ions*).

Phenylmercuric ions—Transfer about 0.2 Gm. of Phenylmercuric Nitrate, accurately weighed, to an Erlenmeyer flask and dissolve in 90 cc. of distilled water and 10 cc. of nitric acid. Titrate the solution with 0.05 *N* ammonium thiocyanate using 2 cc. of ferric ammonium sulfate T.S. Each cc. of 0.05 *N* ammonium thiocyanate is equivalent to 0.01389 Gm. of phenylmercuric ion. Phenylmercuric Nitrate contains not less than 87.0 per cent and not more than 87.9 per cent of phenylmercuric ions.

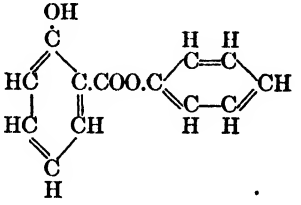
Assay—Transfer about 0.4 Gm. of Phenylmercuric Nitrate, accurately weighed, to a 100-cc. flask and continue as directed in the *Assay* under *Phenylmercuric Chloride*, page 390, beginning with, "and add 15 cc. of distilled water . . . ." Each cc. of 0.1 *N* ammonium thiocyanate is equivalent to 0.01003 Gm. of Hg.

Storage—Preserve Phenylmercuric Nitrate in tight, light-resistant containers.

PHENYL SALICYLATE

Phenylis Salicylas

Phenyl. Salicyl. Salol



$C_{13}H_{10}O_3$ Mol. wt. 214.21

Description—Phenyl Salicylate occurs as a white, crystalline powder, having a characteristic odor and taste.

Solubility—One Gm. of Phenyl Salicylate dissolves in about 6700 cc. of water and in 6 cc. of alcohol, at 25°. It is very soluble in chloroform, in ether, and in fixed and volatile oils.

Melting point—Phenyl Salicylate melts between 41° and 43°, page 731.

Identification—

A: Heat about 0.3 Gm. of Phenyl Salicylate with 3 cc. of sodium hydroxide T.S. for a few minutes, and acidify the solution with hydrochloric acid: salicylic acid separates and the odor of phenol is recognizable.

B: The addition of ferric chloride T.S., well diluted with water, to an alcohol solution of Phenyl Salicylate (1 in 20) produces a reddish purple color.

Loss on drying—When dried over sulfuric acid for 4 hours, Phenyl Salicylate loses not more than 1 per cent of its weight.

Residue on ignition—Phenyl Salicylate yields not more than 0.1 per cent of residue on ignition, page 745.

Free acid—Phenyl Salicylate does not redden moistened blue litmus paper.

Free phenol or salicylic acid—Shake 1 Gm. of Phenyl Salicylate with 50 cc. of distilled water, and filter the liquid: the addition of 1 drop of ferric chloride T.S. to 10 cc. of the filtrate produces no reddish purple color.

Chloride, sulfate—Ten-cc. portions of the filtrate prepared for the preceding test, when tested, respectively, with silver nitrate T.S. and barium chloride T.S., show no turbidity.

Storage—Preserve Phenyl Salicylate in tight containers at a temperature not above 35°.

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains).

PHENYL SALICYLATE TABLETS

Tabellæ Phenylis Salicylatis

Tab. Phenyl. Salicyl. Salol Tablets

Phenyl Salicylate Tablets contain not less than 91 per cent and not more than 109 per cent of the labeled amount of $C_{13}H_{10}O_3$.

Identification—
A: Powder several of the Tablets and heat a portion of the powder, equivalent to about 0.3 Gm. of phenyl salicylate, with 3 cc. of sodium hydroxide T.S. for a few minutes; cool, and then acidify the solution with hydrochloric acid: salicylic acid separates and the odor of phenol is recognizable.
B: Mix a portion of the powdered Tablets, equivalent to about 0.5 Gm. of phenyl salicylate, with 10 cc. of alcohol. Filter the mixture, and add dilute ferric chloride T.S.: a reddish purple color develops in the liquid.

Free phenol or salicylic acid—Powder several of the Tablets, shake a portion of the powder, equivalent to about 1 Gm. of phenyl salicylate, with 50 cc. of distilled water, and filter the liquid: the addition of 1 drop of ferric chloride T.S. to 10 cc. of the filtrate produces no reddish purple color.

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without an appreciable loss, and heat an accurately weighed portion, equivalent to about 0.3 Gm. of phenyl salicylate, with 30 cc. of sodium hydroxide T.S., for 45 minutes on a water bath. Transfer the mixture to a separator, acidify it with hydrochloric acid T.S., and completely extract the salicylic acid with successive portions of ether. Wash the combined ether solutions with 10 cc. of water; then evaporate the ether at a low temperature, allowing the last few cc. to evaporate spontaneously. Dissolve the residue in a few cc. of neutralized alcohol, add 15 cc. of distilled water, and titrate with 0.1 *N* sodium hydroxide, using phenolphthalein T.S. as the indicator. Each cc. of 0.1 *N* sodium hydroxide is equivalent to 0.02142 Gm. of $C_6H_4(OH)COOC_6H_5$.

Storage—Preserve Phenyl Salicylate Tablets in tight containers at a temperature not above 35°.

Sizes—Phenyl Salicylate Tablets usually available contain the following amounts of phenyl salicylate: 60 mg., 0.15, and 0.3 Gm. (approximately 1, 2½, and 5 grains).

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains) of Phenyl Salicylate.

Phosphoric Acid

PHOSPHORIC ACID
Acidum Phosphoricum

Acid. Phosph.

H_3PO_4 Mol. wt. 98.00

Phosphoric Acid contains not less than 85 per cent and not more than 88 per cent of H_3PO_4.

Description—Phosphoric Acid is a colorless, odorless liquid of a syrupy consistence. It is acid to litmus paper even when highly diluted.

Solubility—Phosphoric Acid is miscible with water and with alcohol.

Specific gravity—The specific gravity of Phosphoric Acid is about 1.71 at 25°.

Identification—Phosphoric Acid, carefully neutralized with sodium hydroxide T.S., using phenolphthalein T.S. as the indicator, responds to the tests for *Phosphate*, page 727.

Dilute Phosphoric Acid with 14 volumes of distilled water and apply the tests which follow for Nitrate, Phosphorous or hypophosphorous acid, Sulfate, and Arsenic.

Nitrate—Mix 5 cc. of the dilution with about 0.1 cc. of indigo carmine T.S., then add 5 cc. of sulfuric acid: the blue color is not discharged within 1 minute.

Phosphorous or hypophosphorous acid—Warm 5 cc. of the dilution gently, and add 2 cc. of silver nitrate T.S.: the mixture does not become brownish.

Sulfate—Mix 1 cc. of the dilution with 6 cc. of distilled water, and add 1 cc. of barium chloride T.S.: no precipitate is produced immediately.

Arsenic—A 2-cc. portion of the dilution meets the requirements of the test for arsenic, page 689.

Alkali phosphates—Transfer 1 cc. of Phosphoric Acid to a graduated cylinder, and add 6 cc. of ether and 2 cc. of alcohol: no turbidity is produced.

Heavy metals—Dilute 3 cc. (5 Gm.) of Phosphoric Acid with sufficient distilled water to make 50 cc. Mix 10 cc. of this dilution with 5.5 cc. of sodium hydroxide T.S., and add sufficient distilled water to make 25 cc.: the heavy metals limit, page 721, for Phosphoric Acid is 20 parts per million.

Assay—Weigh accurately about 1 Gm. of Phosphoric Acid in a tared, glass-stoppered flask. Then add about 25 cc. of distilled water, and dissolve 5 Gm. of sodium chloride in the solution. Titrate the solution with 1 *N* sodium hydroxide, using 2 drops of phenolphthalein T.S. as the indicator. Each cc. of 1 *N* sodium hydroxide is equivalent to 0.04900 Gm. of H_3PO_4.

Storage—Preserve Phosphoric Acid in tight containers.

Phosphoric Acid, Diluted

DILUTED PHOSPHORIC ACID

Acidum Phosphoricum Dilutum

Acid. Phosph. Dil.

Diluted Phosphoric Acid is an aqueous solution containing, in each 100 cc., not less than 9.5 Gm. and not more than 10.5 Gm. of H_3PO_4.

Diluted Phosphoric Acid may be prepared as follows:

Phosphoric Acid	**69 cc.**
Distilled Water, a sufficient quantity,	
To make	**1000 cc.**

Mix the ingredients.

Description—Diluted Phosphoric Acid is a clear, colorless, odorless liquid. It is acid to litmus paper.

Specific gravity—The specific gravity of Diluted Phosphoric Acid is about 1.057 at 25°.

Other tests—Diluted Phosphoric Acid, without further dilution, conforms to the tests for *Identification, Nitrate, Phosphorous or hypophosphorous acid, Sulfate,* and *Arsenic,* under *Phosphoric Acid,* page 392.

Alkali phosphates—Evaporate 20 cc. of Diluted Phosphoric Acid on a water bath to a weight of about 5 Gm. Cool, transfer 2 cc. to a graduated cylinder, and add 6 cc. of ether and 2 cc. of alcohol: no turbidity is produced.

Heavy metals—Dilute 9.5 cc. (10 Gm.) of Diluted Phosphoric Acid with about 10 cc. of distilled water, and add 6 cc. of sodium hydroxide T.S. and sufficient distilled water to make 25 cc.: the heavy metals limit, page 721, for Diluted Phosphoric Acid is 5 parts per million.

Assay—Accurately measure 10 cc. of Diluted Phosphoric Acid, add about 15 cc. of distilled water, and dissolve 5 Gm. of sodium chloride in the solution. Titrate the solution with 1 *N* sodium hydroxide, using 2 drops of phenolphthalein T.S. as the indicator. Each cc. of 1 *N* sodium hydroxide is equivalent to 0.04900 Gm. of H_3PO_4.

Storage—Preserve Diluted Phosphoric Acid in tight containers.

Pills

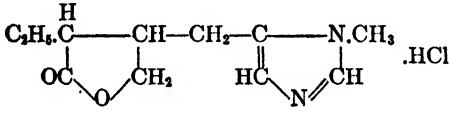
Aloe and Mastic Pills, page 32
Aloe Pills, page 32
Aloin, Belladonna, Cascara and Podophyllum Pills, page 33
Aloin, Strychnine and Belladonna Pills, page 33
Aloin, Strychnine, Belladonna and Cascara Pills, page 34
Aloin, Strychnine, Belladonna and Ipecac Pills, page 34
Asafetida Pills, page 68
Compound Colocynth and Jalap Pills, page 167
Compound Mild Mercurous Chloride Pills, page 335
Ferrous Carbonate Pills, page 222

ilocarpine Hydrochloride

PILOCARPINE HYDROCHLORIDE

Pilocarpinæ Hydrochloridum

Pilocarpin. Hydrochlor.



$C_{11}H_{16}O_2N_2.HCl$ Mol. wt. 244.72

Pilocarpine Hydrochloride is the hydrochloride of an alkaloid obtained from the dried leaflets of *Pilocarpus Jaborandi* Holmes, or of *Pilocarpus microphyllus* Stapf (Fam. *Rutaceæ*).

Description—Pilocarpine Hydrochloride occurs as colorless, translucent, odorless, faintly bitter crystals. It is hygroscopic and is affected by light. Its aqueous solutions are acid to litmus paper.

Solubility—One Gm. of Pilocarpine Hydrochloride dissolves in about 0.3 cc. of water, about 3 cc. of alcohol, or in about 366 cc. of chloroform at 25°; also in about 1.5 cc. of alcohol at 60°. It is insoluble in ether.

Melting point—Pilocarpine Hydrochloride, dried to constant weight at 105°, melts between 200° and 203°, page 731.

Identification—

A: An aqueous solution of Pilocarpine Hydrochloride (1 in 20) responds to the tests for *Chloride*, page 724.

B: Dissolve 10 to 20 mg. of Pilocarpine Hydrochloride in 2 cc. of distilled water in a test tube, add 2 cc. of faintly acid hydrogen peroxide T.S., and cover the mixture with about 1 cc. of benzene. Add 4 drops of a solution of potassium dichromate (1 in 300), and shake the mixture gently: the benzene layer acquires a purple color, while the aqueous layer remains yellow. (If more than 20 mg. of Pilocarpine Hydrochloride is used the benzene turns blue and the reaction is no longer characteristic.)

Loss on drying—When dried over sulfuric acid for 24 hours, Pilocarpine Hydrochloride loses not more than 3 per cent of its weight.

Residue on ignition—The residue on ignition from 0.1 Gm. of Pilocarpine Hydrochloride is negligible, page 745.

Readily carbonizable substances—The color of a solution produced by dissolving 0.25 Gm. of Pilocarpine Hydrochloride in 5 cc. of sulfuric acid is not deeper than matching fluid B, page 744.
Other alkaloids—The addition of ammonia T.S. or of potassium dichromate T.S. to 10 cc. of an aqueous solution of Pilocarpine Hydrochloride (1 in 100) produces no turbidity.
Storage—Preserve Pilocarpine Hydrochloride in tight, light-resistant containers.

AVERAGE DOSE—**5 mg.** (approximately $^1/_{12}$ grain).

Pimenta Oil

PIMENTA OIL
Oleum Pimentæ

Pimento Oil Allspice Oil

Pimenta Oil is a volatile oil distilled from the fruit of *Pimenta officinalis* Lindley (Fam. *Myrtaceæ*).

Pimenta Oil yields not less than 65 per cent, by volume, of phenols.

Description—Pimenta Oil is a colorless, yellow, or reddish yellow liquid, becoming darker with age, and with the characteristic odor and taste of allspice. It is affected by light.
Solubility—Pimenta Oil dissolves in alcohol.
Solubility in alcohol—Pimenta Oil dissolves in 2 volumes of 70 per cent alcohol.
Specific gravity—The specific gravity of Pimenta Oil is not less than 1.018 and not more than 1.048 at 25°.
Optical rotation—The optical rotation of Pimenta Oil is not less than 0° and not more than −4° when determined in a 100-mm. tube at 25°, page 737.
Refractive index—The refractive index of Pimenta Oil is not less than 1.5270 and not more than 1.5400 at 20°, page 745.
Assay—Introduce exactly 10 cc. of Pimenta Oil into a cassia flask, add 50 cc. of potassium hydroxide T.S., shake the mixture for 5 minutes, and then heat it on a water bath during 10 minutes. Cool, let stand overnight or until the liquids are clear, and add sufficient potassium hydroxide T.S. to raise the lower limit of the oily layer within the graduated portion of the neck of the flask; after the aqueous layer has become clear, note the volume of the residual oily liquid: this volume does not exceed 3.5 cc., indicating the presence of not less than 65 per cent, by volume, of phenols.
Storage—Preserve Pimenta Oil in tight, light-resistant containers.

AVERAGE DOSE—**0.1 cc.** (approximately $1^1/_2$ minims).

Pine Needle Oil

DWARF PINE NEEDLE OIL
Oleum Pini Pumilionis

Ol. Pin. Pumil. Pine Needle Oil

Dwarf Pine Needle Oil is the volatile oil distilled with steam from the fresh leaves of *Pinus Mugo* Turra (*Pinus Pumilio* Haenke) (Fam. *Pinaceæ*). It contains not less than 3 per cent and not more than 10 per cent of esters calculated as bornyl acetate, $C_{10}H_{17}.C_2H_3O_2$.

Description—Dwarf Pine Needle Oil is a colorless or yellowish liquid, having a pleasant, aromatic odor, and a bitter, pungent taste.
Solubility—Dwarf Pine Needle Oil dissolves in from 4.5 to 10 volumes of 90 per cent alcohol, often with turbidity.
Specific gravity—The specific gravity of Dwarf Pine Needle Oil is not less than 0.853 and not more than 0.871 at 25°.
Optical rotation—The optical rotation of Dwarf Pine Needle Oil is not less than −5° and not more than −15.5° in a 100-mm. tube at 25°, page 737.
Refractive index—The refractive index of Dwarf Pine Needle Oil is not less than 1.4750 and not more than 1.4800 at 20°, page 745.
Distillation limits—Less than 10 per cent of Dwarf Pine Needle Oil distils below 165°, page 691.
Assay—Place 10 cc. of Dwarf Pine Needle Oil in a tared, 125-cc. Erlenmeyer flask, and weigh it accurately. Add 25 cc. of 0.5 *N* alcoholic potassium hydroxide, connect the flask with a reflux condenser, and boil the mixture on a water bath for exactly 1 hour. Allow the mixture to cool, and titrate the excess of alkali with 0.5 *N* sulfuric acid, using 10 drops of phenolphthalein T.S. as the indicator. The number of cc. of 0.5 *N* alcoholic potassium hydroxide consumed in the saponification, multiplied by 0.09814, indicates the number of Gm. of esters, calculated as $C_{10}H_{17}.C_2H_3O_2$, in the amount of Oil taken for the assay.
Storage—Preserve Dwarf Pine Needle Oil in tight containers.

Pine Oil

PINE OIL
Oleum Pini
Ol. Pin.

Pine Oil is a volatile oil composed chiefly of tertiary and secondary terpene alcohols obtained by extraction and fractionation or by steam distillation of the wood of *Pinus palustris* Miller and other species of *Pinus* (Fam. *Pinaceæ*).

Description—Pine Oil is a colorless to light amber liquid having a characteristic pinaceous odor.
Solubility—Pine Oil is miscible with alcohol in all proportions.
Specific gravity—The specific gravity of Pine Oil is not less than 0.925 and not more than 0.937 at 25°.
Refractive index—The refractive index of Pine Oil is not less than 1.4810 and not more than 1.4840 at 20°, page 745.
Distillation range—Place 100 cc. of Pine Oil into a standard 100-cc. Engler distillation flask, having the side-tube 8 cm. above the top of the bulb and distil the oil at the rate of 2 drops per second: not less than 95 per cent of the oil distils between 200° and 225°, the temperature being read on a thermometer so placed that its bulb is opposite the side tube of the flask, and the top of the mercury column within the neck of the flask.
Unpolymerized residue—Place 20 cc. of 38 *N* sulfuric acid (100.92 per cent ± 0.15 per cent) in a dry graduated narrow neck Babcock flask, stopper and place in ice water to cool. Add 5 cc. of Pine Oil slowly from a pipette, a little at a time, while shaking after each addition. The Pine Oil should be added dropwise with sufficiently vigorous shaking after each addition to mix the Pine Oil thoroughly with the acid. Continue shaking after all the Pine Oil has been added, keeping the temperature down to 60° to 65° by immersion in ice water until the mixture no longer warms on shaking. Agitate thoroughly and place in a water bath at 60° to 65° for at least 10 minutes, mixing the contents of the flask thoroughly by shaking

vigorously 6 times for 30 seconds each time during the period. Do not stopper the flask after the Pine Oil has been added. Cool to room temperature, fill the flask with sulfuric acid (sp. gr. 1.84) until the unpolymerized oil rises into the graduated neck of the flask and centrifuge 4 to 5 minutes at not less than 1200 revolutions per minute, or for 15 minutes at not less than 900 revolutions per minute, or allow the flask to stand lightly stoppered for 12 hours. Read the volume of unpolymerized material. It should not exceed 0.125 cc.

Storage—Preserve Pine Oil in tight containers.

PINE OIL EMULSION CONCENTRATE

Emulsum Olei Pini Concentratum

Emuls. Ol. Pin. Conc.

Pine Oil Emulsion Concentrate is a concentrate prepared from pine oil and water using soap, sulfonated oil, or other suitable emulsifying agent.

Pine Oil Emulsion Concentrate contains not less than 65 per cent, by volume, of pine oil and not more than 10 per cent of water.

Description—Pine Oil Emulsion Concentrate is a clear, colorless or pale yellow liquid having the odor of pine oil.

Assay for pine oil—Place 5 cc. of Pine Oil Emulsion Concentrate in a 250-cc. flask of the apparatus for the determination of volatile oils lighter than water, page 765. Add 1.5 cc. of hydrochloric acid (1 in 2) and 100 cc. of distilled water and connect the trap and boil the contents of the flask for 2 hours or until all of the pine oil has completely separated and no longer collects in the graduated tube of the apparatus. Read the volume of the volatile oil in the tube. It is not less than 3.25 cc.

Water—Place 20 cc. of the Pine Oil Emulsion Concentrate in the flask of the apparatus for the determination of moisture by the toluene distillation method, add 100 cc. of toluene, and proceed as directed on page 761. The volume of water in the trap does not exceed 2 cc.

Emulsifying property—Place 10 cc. of Pine Oil Emulsion Concentrate in a 250-cc. glass-stoppered Erlenmeyer flask and add 190 cc. of distilled water at 20°. A stable emulsion results which, after 24 hours, shows no sign of separation (oil float, unsaponified or clear free oil).

Storage—Preserve Pine Oil Emulsion Concentrate in tight containers.

PINE TAR SYRUP

Syrupus Picis Pini

Syr. Pic. Pin.	Syrupus Picis Liquidæ	Tar Syrup
Rectified Tar Oil		**1 cc.**
Sucrose		**850 Gm.**
Distilled Water, a sufficient quantity,		
To make		**1000 cc.**

Mix the oil with 450 cc. of distilled water, and agitate the mixture frequently during 15 minutes. Then set it aside for 24 hours, shaking it occasionally during that time. Filter, dissolve the sucrose in the clear filtrate without heating, and add sufficient distilled water to make the product measure 1000 cc. Mix thoroughly and strain.

Storage—Preserve Pine Tar Syrup in tight containers, preferably at a temperature not above 25°.

AVERAGE DOSE—**10 cc.** (approximately $2^1/_2$ fluidrachms).

Pituitary, Anterior

ANTERIOR PITUITARY
Pituitarium Anterius

Pituitar. Anter.

Pituitary Anterior Lobe Pituitary Body Anterior Lobe

Desiccated Pituitary Anterior Lobe

Anterior Pituitary is the dried, partially defatted, and powdered anterior lobe of the pituitary gland of cattle, sheep, or swine.

Anterior Pituitary is derived from sound, clean, and entire glands that are freed from external tissues. It is free from diluents and preservatives.

One part of Anterior Pituitary is obtained from approximately 5 parts by weight of fresh anterior lobe of the pituitary gland, and when the fresh material is dried by heat, it is to be dried in a vacuum at a temperature not exceeding 60°.

Description—Anterior Pituitary occurs as a gray or yellowish gray amorphous powder of characteristic odor and salty taste. No disagreeable odor suggestive of partial putrefaction is present.

Solubility—Anterior Pituitary is only partially soluble in water.

Histology—Anterior Pituitary contains numerous polyhedral chromophile cells with coarse cytoplasmic granules and round nuclei exhibiting a red color in acid fuchsin T.S.; numerous cubical cells separated by colloidal material and containing fine cytoplasmic granules and with nuclei along their walls; numerous masses of polyhedral cells surrounded by connective tissue; a few segments of blood vessels; a few scattered nerve fibers frequently attached to blood vessels, the axis cylinder of the nerve fibers staining a delicate purple with eosin and hematoxylin T.S.; and a few rounded cells staining black with osmic acid T.S.

Moisture—Anterior Pituitary contains not more than 6 per cent of moisture, page 761.

Total ash—Anterior Pituitary yields not more than 7 per cent of total ash, page 760.

Fat—Anterior Pituitary yields not more than 5 per cent of fat when extracted with petroleum benzin, page 763.
Storage—Preserve Anterior Pituitary in tight containers, and avoid excessive heat.

AVERAGE DOSE—To be determined by the prescriber.

WHOLE PITUITARY
Pituitarium Totum

Pituitar. Tot.

Pituitary Gland Desiccated Pituitary Substance Pituitary Body

Whole Pituitary is the dried, partially defatted, and powdered pituitary gland of cattle, sheep, or swine.

Whole Pituitary is derived from sound, clean, and entire glands that are freed from external tissues. It is free from diluents or preservatives.

One part of Whole Pituitary is obtained from approximately 5 parts by weight of fresh pituitary gland, and when the fresh material is dried by heat, it is to be dried in vacuum at a temperature not exceeding 60°.

Description—Whole Pituitary occurs as a gray or yellowish gray amorphous powder of characteristic odor and salty taste. No disagreeable odor suggestive of partial putrefaction is present.
Histology—Whole Pituitary contains numerous yellow masses of polyhedral cells surrounded by connective tissue, the latter staining blue with a mixture of Mallory's stain and phosphotungstic acid T.S.; numerous large, polyhedral, chromophile cells with central rounded nuclei and coarse cytoplasmic granules staining red with acid fuchsin T.S., and blue with Heidenhain's hematoxylin T.S., the nuclei staining blue and the cytoplasm red-purple with eosin and methylene blue T.S.; numerous cubical to low columnar chromophobe cells with or without fine cytoplasmic granules whose nuclei stain light blue and cytoplasm pale blue with eosin and methylene blue T.S.; both chromophile and chromophobe cells frequently having minute fat droplets which stain brown to black with osmic acid T.S.; a few cells containing a colloidal substance and appearing greenish in water mounts; a few segments of blood vessels with scalloped inner margins when mounted in silver nitrate T.S.; numerous neuroglia cells with spherical nuclei and exhibiting long, slender, branching processes; numerous elongated somewhat ovoid multipolar cells with few bluish black processes when viewed in phosphotungstic acid T.S. and Heidenhain's hematoxylin T.S.; a few small, faintly basophilic, polyhedral cells from the pars intermedia showing pale blue nuclei and a pink, granular cytoplasm when stained with eosin and hematoxylin T.S.; a few amyloid bodies staining purple with iodine water; a number of angular hyaline fragments; fragments of nerve fibers with or without a bulbous end, the axis cylinders of which are colored mauve with eosin and hematoxylin T.S.; a few cells staining black with osmic acid T.S., and a number of spindle-shaped bipolar nerve cells.
Moisture—Whole Pituitary contains not more than 6 per cent of moisture, page 761.

Total ash—Whole Pituitary yields not more than 7 per cent of total ash, page 760.
Fat—Whole Pituitary yields not more than 5 per cent of fat when extracted with petroleum benzin, page 763.
Storage—Preserve Whole Pituitary in tight containers, and avoid excessive heat.

AVERAGE DOSE—To be determined by the prescriber.

Plantago Seed

PLANTAGO SEED

Plantaginis Semen

Plantag. Sem. **Psyllium Seed** Plantain Seed

Plantago Seed is the cleaned, dried, ripe seed of *Plantago Psyllium* Linné, or of *Plantago indica* Linné (*Plantago arenaria* Waldstein et Kitaibel), known in commerce as Spanish or French Psyllium Seed; or of *Plantago ovata* Forskal, known in commerce as Blond Psyllium or Indian Plantago Seed (Fam. *Plantaginaceæ*).

Unground Plantago Seed—The seed of *P. Psyllium* is ovate to ovate-elongate, concavo-convex; mostly from 1.3 to 2.7 mm. in length, rarely up to 3 mm., and from 0.6 to 1.1 mm. in width. It is light brown to moderate brown, darker along the margin, and very glossy; the convex dorsal surface exhibiting a lighter-colored longitudinal area extending nearly the length of the seed and representing the embryo lying beneath the seed coat, and a transverse groove nearer the broader end. The concave ventral surface has a deep cavity, in the center of the base of which is an oval yellowish white hilum.

The seed of *P. indica* is ovate-oblong to elliptical, concavo-convex; from 1.6 to 3.0 mm. in length and from 1.0 to 1.5 mm. in width. Externally it is dark reddish brown to moderate yellowish brown, occasionally somewhat glossy, often dull, rough, and reticulate; the convex dorsal surface having a longitudinal lighter-colored area extending lengthwise along the center and beneath the seed coat, and a median transverse groove, dent, or fissure. The ventral surface has a deep concavity, the edges somewhat flattened and frequently forming a sharp indented angle with the base of the cavity, the latter showing a light-colored oval hilum.

The seed of *P. ovata* is broadly elliptical to ovate, boat-shaped; from 2 to 3.5 mm. in length and from 1 to 1.5 mm. in width. It is pale brown to moderate brown with a dull surface; the convex surface having a small, elongated, glossy brown spot. The concave surface has a deep cavity in the center of the base of which occurs a hilum covered with a thin membrane.

Histology—Plantago Seed is reniform in median transverse sections and shows a seed-coat with a colorless epidermis of mucilaginous cells whose radial and outer walls break down to form layers of mucilage when brought into contact with water, and a reddish brown to yellow pigment layer in the seeds of *P. indica* and *P. Psyllium;* a broad endosperm with thick-walled outer palisade cells, and irregular inner endosperm cells; and an embryo at the center. The endosperm and embryo cells contain fixed oil and aleurone grains, the latter being rounded, oval, pyriform, or irregular shaped, from 2 to 8 microns in diameter.

Test for quality—Place 1 Gm. of Plantago Seed in a 25-cc. graduated cylinder, add water to the 20-cc. mark, and shake the cylinder at intervals during 24 hours; allow the seed to settle for 12 hours and note the total volume occupied by the swollen seeds: the seeds of *Plantago Psyllium* occupy a volume of not less than 14 cc., those of *Plantago ovata* not less than 10 cc., and those of *Plantago indica* not less than 8 cc.

Foreign organic matter—Plantago Seed contains not more than 0.5 per cent of foreign organic matter, page 760.
Total ash—Plantago Seed yields not more than 4 per cent of total ash, page 760.
Acid-insoluble ash—Plantago Seed yields not more than 1 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**7.5 Gm.** (approximately 2 drachms).

Plasters

Belladonna Plaster, page 75
Lead Oleate Plaster, page 294

Podophyllum

PODOPHYLLUM
Podophyllum

Podoph. Mandrake May Apple

Podophyllum consists of the dried rhizome and roots of *Podophyllum peltatum* Linné (Fam. *Berberidaceæ*).

Podophyllum yields not less than 5 per cent of podophyllum resin.

Unground Podophyllum—Unground Podophyllum consists of a nearly cylindrical rhizome, jointed, compressed on the upper and lower surfaces, and sometimes branched. It occurs in pieces usually less than 20 cm. in length, the internodes being from 2 to 9 mm. in diameter and having some of the nodes thickened. The rhizome is dusky red to light yellowish brown; longitudinally wrinkled or nearly smooth, with irregular, somewhat V-shaped scars of scale leaves; some of the nodes are annulate, the upper portion having large, circular, depressed stem-scars and buds or stem-bases. On the lower portion there are numerous root-scars or roots from 2 to 7 cm. in length and about 2 mm. in thickness. The fracture is short and weak yellowish orange to pale yellow.

Histology—The rhizome shows an outer portion consisting of 1 or 2 layers of brown to olive-brown suberized cells; a cortex about 20 cells in width; a circle of from 16 to 34 vascular bundles, separated by rather wide medullary rays and each containing a few lignified tracheæ, a more or less distinct cambium and a rather large phloem. The pith is large, the parenchyma cells of the cortex and pith being more or less rounded and containing starch grains. Sections made through the nodes show calcium oxalate rosettes in certain of the parenchyma cells. The root shows an epidermal layer of brownish suberized cells and a single row of hypodermal cells; a broad cortex consisting of thin-walled isodiametric cells; a distinct endodermis with uniformly thickened, tangentially elongated cells, and a 4- to 7-rayed vascular bundle.

Powdered Podophyllum—Powdered Podophyllum is pale brown to weak yellow. It has a slight odor and a disagreeably bitter and acrid taste. Starch grains are numerous, spheroidal or polygonal, from 3 to 20 microns in diameter, simple or 2- to 6-compound; calcium oxalate rosette aggregates are few, from 30 to 80 microns in diameter; tracheæ with simple pores or reticulate thickenings are present, and fragments of starch-bearing parenchyma and reddish brown to yellow cork cells.

Indian Podophyllum—Macerate 0.5 Gm. of powdered podophyllum for 10 minutes in 10 cc. of alcohol, filter and add to the filtrate a few drops of strong copper acetate solution; a green color, but no brownish precipitate, is produced.

Foreign organic matter—Podophyllum contains not more than 2 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Podophyllum yields not more than 2 per cent of acid-insoluble ash, page 761.

Assay—Place 10 Gm. of Podophyllum, in fine powder, into a 125-cc. Erlenmeyer flask, add 35 cc. of alcohol, and reflux on a water bath for 3 hours. Transfer the mixture to a small percolator, and percolate slowly with warm alcohol until the percolate measures 95 cc. Cool, add sufficient alcohol to the percolate to make it measure exactly 100 cc., and mix thoroughly.

Transfer 10 cc. of this percolate to a separator, and add 10 cc. of chloroform and 10 cc. of 0.6 per cent hydrochloric acid. Shake the mixture, allow it to separate, draw off the alcohol-chloroform layer into a second separator, and then wash the acid layer 3 times with successive 15-cc. portions of an alcohol-chloroform mixture prepared from 1 volume of alcohol and 2 volumes of chloroform, adding the washings to the second separator. Add 10 cc. of 0.6 per cent hydrochloric acid to the combined extract and washings, again shake the mixture, allow it to separate, and draw off the alcohol-chloroform layer into a tared vessel. Wash the acid layer 3 times with 15-cc. portions of the alcohol-chloroform mixture, adding the washings to the tared vessel. Evaporate the combined extractions on a water bath to apparent dryness, add 1 cc. of dehydrated alcohol, again evaporate to dryness and dry to constant weight at 80°. The weight of this residue is the weight of resin in 1 Gm. of the Podophyllum taken.

Podophyllum Resin

PODOPHYLLUM RESIN
Resina Podophylli

Res. Podoph.	Podophyllin
Podophyllum, in fine powder	**1000 Gm.**
Hydrochloric Acid	**10 cc.**
Alcohol,	
Water, each, a sufficient quantity.	

Extract the drug by slow percolation until it is exhausted of its resin, using alcohol as the menstruum. Concentrate the percolate by evaporation until the residue has the consistence of a thin syrup, and pour this, with constant stirring, into 1000 cc. of water containing the hydrochloric acid and previously cooled to a temperature below 10°. Allow the precipitate to settle, decant the clear liquid, and wash the precipitate with two 1000-cc. portions of cold water. Dry the resin and powder it.

Description—Podophyllum Resin occurs as an amorphous powder, varying in color from light brown to greenish yellow, turning darker when subjected to a temperature exceeding 25° or when exposed to light. It has a slight, peculiar, faintly bitter taste. *It is very irritating to the eye, and to mucous membranes in general.*

Solubility—Podophyllum Resin dissolves in alcohol with only a slight opalescence. It is only partially soluble in ether and in chloroform.

Identification—

A: Podophyllum Resin is soluble in potassium or sodium hydroxide T.S., forming a yellow liquid, which gradually becomes darker on standing, and from which the resin is reprecipitated by acids.

B: A hot, aqueous solution of Podophyllum Resin deposits most of its contents on cooling, and if the cooled liquid is filtered, the filtrate has a bitter taste, and turns brown upon the addition of a few drops of ferric chloride T.S.

Residue on ignition—Podophyllum Resin yields not more than 1.5 per cent of residue on ignition, page 745.

Reaction—An alcohol solution of Podophyllum Resin is acid to litmus paper.

Difference from resin of podophyllum emodi—Add 0.4 Gm. of Podophyllum Resin to 3 cc. of 60 per cent alcohol, follow with 0.5 cc. of potassium hydroxide T.S., and shake the mixture gently: it does not gelatinize.

Storage—Preserve Podophyllum Resin in tight, light-resistant containers, and avoid excessive heat.

AVERAGE DOSE—**10 mg.** (approximately $^1/_6$ grain).

POPLAR BUD

Populi Gemma

Popul. Gem.

Poplar Bud is the air-dried, closed, winter leaf bud of *Populus candicans* Aiton, known in commerce as Balm of Gilead Buds, or of *Populus Tacamahacca* Miller (*Populus balsamifera* Linné), known in commerce as Balsam Poplar Buds (Fam. *Salicaceæ*).

Poplar Bud yields not less than 40 per cent of anhydrous alcohol-soluble extractive.

Unground Poplar Bud—Unground Poplar Bud is conical or pyramidal, pointed, up to 25 mm. in length and 15 mm. in thickness; externally it is weak reddish brown to moderate brown, glossy and glutinous when fresh; consisting of a few small immature leaves at the center toward the base, enclosed by about 15 oblong, pointed, concave, closely imbricated scales agglutinated with a thick oleoresin containing numerous microscopic crystals of salicin which display colors with polarized light. The odor is pleasant and balsamic; and the taste, aromatic and bitter. The flower buds are thin, and contain but 4 or 5 scales and small immature flowers.

Histology—The epidermal cells of bud-scales are polygonal, with heavily cutinized outer walls. The hairs are non-glandular, unicellular, and conical, up to 450 microns in length and 15 microns in thickness, abundant on the outer surface (*P. balsamifera*) or along the margin (*P. candicans*). Parenchyma cells of the mesophyll contain reddish brown to yellowish orange oleoresinous contents and occasionally a rosette aggregate of calcium oxalate up to 20 microns in diameter. The stone cells are numerous in the mesophyll, up to 25 microns in diameter, single or in groups (up to 20 cells in transverse sections of *P. candicans* and up to 80 cells in transverse sections of *P. balsamifera*).

Flower buds—Poplar Bud contains not more than 10 per cent of flower buds of the plants yielding Poplar Bud.

Foreign organic matter—Poplar Bud contains not more than 2 per cent of foreign organic matter, other than flower buds, page 760.

Acid-insoluble ash—Poplar Bud yields not more than 1 per cent of acid-insoluble ash, page 761.

Assay—Weigh accurately 2 Gm. of Poplar Bud, in coarse powder, and proceed as directed for *Alcohol-soluble extractive* under *Gamboge*, page 232. The weight obtained represents the yield of extractive from 1 Gm. of the sample taken.

AVERAGE DOSE—**4 Gm.** (approximately 60 grains).

Potash, Sulfurated

SULFURATED POTASH

Potassa Sulfurata

Pot. Sulfurat.

Sulfurated Potash is a mixture composed chiefly of potassium polysulfides and potassium thiosulfate. It contains not less than 12.8 per cent of sulfur in combination as sulfide.

Description—Sulfurated Potash occurs in irregular pieces, liver-brown, when freshly made, changing to a greenish yellow. It has an odor of hydrogen sulfide and a bitter, acrid, and alkaline taste. It decomposes upon exposure to air.

Solubility—One Gm. of Sulfurated Potash dissolves in about 2 cc. of water, usually leaving a slight residue. Alcohol dissolves only the sulfides.

Identification—

A: An aqueous solution of Sulfurated Potash (1 in 10) is light brown in color and is alkaline to litmus paper.

B: To a portion of the solution from *Identification test A* add an excess of acetic acid: hydrogen sulfide is evolved and sulfur is precipitated.

C: Filter the mixture from *Identification test B* and add to the filtrate an excess of sodium bitartrate T.S.: an abundant, white, crystalline precipitate is formed within 15 minutes.

Minimum of sulfides—Dissolve about 1 Gm. of Sulfurated Potash, accurately weighed, in 10 cc. of distilled water contained in a stoppered flask. Dissolve an equal weight of crystallized cupric sulfate, accurately weighed, in 15 cc. of distilled water. Add the cupric sulfate solution to the Sulfurated Potash solution, stopper the flask, shake for a few minutes, and filter. Acidify the filtrate with acetic acid, refilter if necessary, and add an equal volume of hydrogen sulfide T.S.: no black precipitate is produced.

Storage—Preserve Sulfurated Potash in tight containers which hold not more than 120 Gm. of the product.

Potassium Bitartrate

POTASSIUM BITARTRATE

Potassii Bitartras

Pot. Bitart. Cream of Tartar Acid Potassium Tartrate

$KHC_4H_4O_6$ Mol. wt. 188.18

Potassium Bitartrate, when dried at 105° for 3 hours, contains not less than 99.5 per cent of KOOC.CHOH.CHOH.COOH.

Description—Potassium Bitartrate occurs as colorless or slightly opaque crystals, or as a white, crystalline powder, having a pleasant, acid taste. A saturated aqueous solution of Potassium Bitartrate is acid to litmus paper.

Solubility—One Gm. of Potassium Bitartrate dissolves in 165 cc. of water and in 8820 cc. of alcohol, at 25°. One Gm. dissolves in 16 cc. of boiling water.

Identification—

A: When Potassium Bitartrate is sufficiently heated, it chars and emits inflammable vapors, having an odor resembling that of burning sugar. At a

higher temperature and with free access of air, the carbon of the black residue is consumed, and there remains a white, fused mass of potassium carbonate, which imparts a reddish purple color to a non-luminous flame in which it is held.

B: A saturated aqueous solution of Potassium Bitartrate yields a yellowish orange precipitate with sodium cobaltic nitrite T.S.

C: Neutralize a saturated aqueous solution of Potassium Bitartrate with sodium hydroxide T.S. in a test tube, add silver nitrate T.S., then just sufficient ammonia T.S. to dissolve the white precipitate, and boil the solution: silver is deposited on the inner surface of the test tube, forming a mirror.

Insoluble matter—Agitate 0.5 Gm. of Potassium Bitartrate with 3 cc. of ammonia T.S.: no undissolved residue remains.

Ammonia—The odor of ammonia is not evolved on heating 0.5 Gm. of Potassium Bitartrate with 5 cc. of sodium hydroxide T.S.

Heavy metals—Mix 2 Gm. of Potassium Bitartrate with 15 cc. of distilled water, and add ammonia T.S., dropwise, until solution is complete. Add 1 drop of phenolphthalein T.S., and discharge the pink color by the addition of just sufficient diluted acetic acid, added dropwise. Now add 2 cc. additional diluted acetic acid, and dilute to 25 cc. with distilled water: the heavy metals limit, page 721, for Potassium Bitartrate is 10 parts per million.

Assay—Dry about 6 Gm. of Potassium Bitartrate at 105° for 3 hours, weigh accurately, dissolve it in 100 cc. of boiling distilled water, and titrate with 1 *N* sodium hydroxide, using phenolphthalein T.S. as the indicator. Each cc. of 1 *N* sodium hydroxide is equivalent to 0.1882 Gm. of $KOOC.CHOH.CHOH.COOH$. Each Gm. of Potassium Bitartrate consumes not less than 5.28 cc. and not more than 5.35 cc. of 1 *N* sodium hydroxide.

Storage—Preserve Potassium Bitartrate in tight containers.

AVERAGE DOSE—**2 Gm.** (approximately 30 grains).

POTASSIUM BROMIDE ELIXIR

Elixir Potassii Bromidi

Elix. Pot. Bromid.

Potassium Bromide Elixir contains, in each 100 cc., not less than 16.5 Gm. and not more than 18.5 Gm. of KBr.

Potassium Bromide	**175 Gm.**
Syrup	**200 cc.**
Distilled Water	**460 cc.**
Aromatic Elixir, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the potassium bromide in the distilled water, add the syrup and sufficient aromatic elixir to make the product measure 1000 cc.; mix well, and filter, if necessary, until the product is clear.

Assay—Dilute exactly 5 cc. of Potassium Bromide Elixir with distilled water to 100 cc. To 25 cc. of the dilution add slowly and with agitation 50 cc. of 0.1 *N*

silver nitrate, 2 cc. of nitric acid, and 2 cc. of ferric ammonium sulfate T.S. Titrate the excess silver nitrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.01190 Gm. of KBr.

Alcohol content—From 5 to 7 per cent, by volume, of C_2H_5OH.

Storage—Preserve Potassium Bromide Elixir in tight containers.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains 0.7 Gm. of Potassium Bromide.

Potassium Chlorate

POTASSIUM CHLORATE

Potassii Chloras

Pot. Chloras

$KClO_3$ Mol. wt. 122.55

Potassium Chlorate contains not less than 99 per cent of $KClO_3$.

Great caution should be observed in handling this salt, as dangerous explosions are liable to occur when it is heated or subjected to concussion or to trituration with organic substances, such as cork, tannic acid, dust, sucrose, etc., or with charcoal, sulfur, sulfides, hypophosphites, reduced iron, or other easily oxidizable substances.

Description—Potassium Chlorate occurs as colorless, odorless, lustrous, monoclinic prisms or plates, or as a white, granular powder. It is stable in the air. An aqueous solution of Potassium Chlorate (1 in 20) is neutral to litmus paper.

Solubility—One Gm. of Potassium Chlorate dissolves in about 16.5 cc. of water at 25°, and in about 1.8 cc. of boiling water. It is soluble in glycerin, but is almost insoluble in alcohol.

Identification—

A: When heated to about 400°, Potassium Chlorate gives off oxygen and finally leaves a residue of potassium chloride, which is readily soluble in water and which responds to the tests for *Potassium*, page 727, and for *Chloride*, page 724.

B: Add about 0.2 Gm. of Potassium Chlorate to 1 cc. of hydrochloric acid: the liquid becomes deep greenish yellow in color, and chlorine and oxides of chlorine are evolved.

Heavy metals—Dissolve 1 Gm. of Potassium Chlorate in 1 cc. of diluted acetic acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Potassium Chlorate is 20 parts per million.

Assay—Transfer about 0.3 Gm. of Potassium Chlorate, accurately weighed, into a 100-cc. volumetric flask and dissolve in a few cc. of water. Add 1 Gm. of sodium nitrite, 5 cc. of nitric acid, and 40 cc. of 0.1 *N* silver nitrate, dilute to volume with distilled water and mix well. Filter through a dry filter, rejecting the first 20 cc., and transfer 50 cc. of the subsequent filtrate into a suitable flask, add 2 cc. of ferric ammonium sulfate T.S., and titrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.01226 Gm. of $KClO_3$.

Storage—Preserve Potassium Chlorate in well-closed containers.

POTASSIUM CHLORATE GARGLE WITH IRON

Gargarisma Potassii Chloratis cum Ferro

Gargar. Pot. Chlorat. c. Ferr. Golden Gargle

Ferric Chloride Tincture	120 cc.
Potassium Chlorate	45 Gm.
Glycerin	240 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the potassium chlorate in a mixture of the glycerin and 600 cc. of distilled water. Add the ferric chloride tincture and sufficient distilled water to make the product measure 1000 cc.

Alcohol content—From 7 to 8 per cent, by volume, of C_2H_5OH.
Storage—Preserve Potassium Chlorate Gargle with Iron in tight containers.

POTASSIUM CHLORATE TABLETS

Tabellæ Potassii Chloratis

Tab. Pot. Chlorat.

Potassium Chlorate Tablets contain not less than 94 per cent and not more than 106 per cent of the labeled amount of $KClO_3$.

Identification—
A: When heated to about 400°, the Tablets give off oxygen and finally leave a residue which responds to the tests for *Potassium*, page 727, and for *Chloride*, page 724.
B: Powder several of the Tablets, and add 1 cc. of hydrochloric acid to a portion of the powder, equivalent to about 0.2 Gm. of potassium chlorate: the mixture produces a deep greenish yellow color, and chlorine and oxides of chlorine are evolved.

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without appreciable loss, and transfer an accurately weighed portion, equivalent to about 0.3 Gm. of potassium chlorate, into a 100-cc. volumetric flask, and proceed as directed in the *Assay* under *Potassium Chlorate*, page 406, beginning with "and dissolve in a few cc. of water. . . ." Each cc. of 0.1 *N* silver nitrate is equivalent to 0.01226 Gm. of $KClO_3$.
Storage—Preserve Potassium Chlorate Tablets in well-closed containers.

Sizes—Potassium Chlorate Tablets usually available contain the following amount of potassium chlorate: **0.3 Gm.** (approximately 5 grains).

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains) of Potassium Chlorate.

Potassium Citrate Solution

POTASSIUM CITRATE SOLUTION

Liquor Potassii Citratis

Liq. Pot. Cit.

Potassium Citrate Solution is an aqueous solution containing, in each 100 cc., not less than 8 Gm. of $C_3H_4.OH.(COOK)_3$, with small amounts of free citric and carbonic acids.

Potassium Bicarbonate	**80 Gm.**
Citric Acid	**60 Gm.**
Distilled Water, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the potassium bicarbonate and the citric acid, each in 400 cc. of distilled water. Filter the solutions separately, and wash the filters with enough distilled water to obtain, in each case, 500 cc. Mix the 2 solutions; when effervescence has ceased, transfer to a bottle and stopper tightly.

NOTE: This preparation must not be dispensed unless it has been recently prepared.

Description—Potassium Citrate Solution is a clear, colorless, odorless liquid, with a slightly acid, salty taste. It is acid to litmus paper.

Identification—Potassium Citrate Solution responds to the tests for *Potassium*, page 727, and for *Citrate*, page 724.

Tartrate—Evaporate 10 cc. of Potassium Citrate Solution to 1 cc., and add 1 cc. of acetic acid: no precipitate is produced.

Arsenic—Potassium Citrate Solution meets the requirements of the test for *Arsenic*, page 689.

Heavy metals—To 10 cc. of Potassium Citrate Solution add 1 cc. of 0.1 *N* hydrochloric acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Potassium Citrate Solution is 10 parts per million.

Assay—Evaporate 5 cc. of Potassium Citrate Solution, accurately measured, to dryness in a platinum crucible. Heat the residue, at first very gently, then gradually raise the temperature until the salt is thoroughly carbonized. The final temperature must not exceed a dull red heat, and the flame of the burner must not come in contact with the carbonized mass. After allowing the carbonized mass to cool, moisten with distilled water, ignite again, and repeat the moistening and igniting procedure until a white residue is obtained. Disintegrate the fused residue in the crucible with the aid of a stout glass rod, and transfer the crucible with its

contents to a beaker. Add 50 cc. of distilled water, and titrate with 0.1 *N* sulfuric acid, using methyl orange T.S. as the indicator. Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.01021 Gm. of $C_3H_4.OH.(COOK)_3$.

Storage—Dispense Potassium Citrate Solution in tight containers.

AVERAGE DOSE—**15 cc.** (approximately 4 fluidrachms).

One average metric dose contains about 1.2 Gm. of Potassium Citrate.

POTASSIUM GUAIACOLSULFONATE

Potassii Guaiacolsulfonas

Pot. Guaiacolsulf.

$C_7H_7O_5SK$ Mol. wt. 242.28

Potassium Guaiacolsulfonate, when dried over sulfuric acid for 24 hours, contains not less than 95 per cent of $C_6H_3.OH.OCH_3.SO_3.K$.

Description—Potassium Guaiacolsulfonate occurs as white crystals, or as a white, crystalline powder. It has a slightly aromatic odor, and a slightly bitter taste. Its aqueous solutions are neutral or alkaline to litmus paper and it is affected by light.

Solubility—One Gm. of Potassium Guaiacolsulfonate dissolves in about 7.5 cc. of water at 25°. It is insoluble in alcohol and in ether.

Identification—

A: Ten cc. of an aqueous solution of Potassium Guaiacolsulfonate (1 in 100) is colored violet-blue upon the addition of 2 drops of ferric chloride T.S.

B: Ignite a portion of Potassium Guaiacolsulfonate: the ash imparts a violet color to a non-luminous flame.

Loss on drying—When dried over sulfuric acid for 24 hours, Potassium Guaiacolsulfonate loses not more than 2 per cent of its weight.

Sulfate—The addition of 5 drops of barium chloride T.S. to 10 cc. of an aqueous solution of Potassium Guaiacolsulfonate (1 in 20), acidified with 3 drops of hydrochloric acid, produces no turbidity in 1 minute.

Heavy metals—Dissolve 1 Gm. of Potassium Guaiacolsulfonate in 1 cc. of diluted acetic acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Potassium Guaiacolsulfonate is 20 parts per million.

Assay—Transfer about 0.5 Gm. of Potassium Guaiacolsulfonate, previously dried over sulfuric acid and accurately weighed, to a 400-cc. beaker and dissolve in 15 cc. of distilled water. Cautiously add 20 cc. of nitric acid, cover with a watch glass and heat on a water bath for at least 1 hour. Cautiously add 0.5 Gm. potassium carbonate and evaporate to dryness on a water bath. Finally heat with a burner for a few seconds to remove any nitric acid that may remain. Dissolve the residue in 200 cc. of distilled water, add 2 cc. of diluted hydrochloric acid, heat to boiling, and add slowly 10 cc. of barium chloride T.S. Heat on a water bath for 1 hour and allow to stand overnight. Collect the precipitate on an asbestos mat in a tared Gooch crucible, wash thoroughly, ignite gently and weigh. The weight of the precipitate multiplied by 1.038 represents the weight of $C_6H_3.OH.OCH_3.SO_3K$ in the sample taken.

Storage—Preserve Potassium Guaiacolsulfonate in well-closed, light-resistant containers.

AVERAGE DOSE—**0.5 Gm.** (approximately $7\frac{1}{2}$ grains).

Potassium Guaiacolsulfonate Syrup

POTASSIUM GUAIACOLSULFONATE SYRUP

Syrupus Potassii Guaiacolsulfonatis

Syr. Pot. Guaiacolsulf.

Potassium Guaiacolsulfonate	75 Gm.
Distilled Water	100 cc.
Aromatic Eriodictyon Syrup, a sufficient quantity, To make	1000 cc.

Mix the potassium guaiacolsulfonate with the water, add the syrup, and shake the mixture until the salt is dissolved; then filter through cotton, passing enough of the aromatic eriodictyon syrup through the filter to make the product measure 1000 cc. Mix well.

Alcohol content—From 5 to 7 per cent, by volume, of C_2H_5OH.
Storage—Preserve Potassium Guaiacolsulfonate Syrup in tight containers, and avoid excessive heat.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains 0.3 Gm. of Potassium Guaiacolsulfonate.

Potassium Hydroxide Solution

POTASSIUM HYDROXIDE SOLUTION

Liquor Potassii Hydroxidi

Liq. Pot. Hydrox.

Potassium Hydroxide Solution contains, in each 100 cc., not less than 4.5 Gm. and not more than 5.5 Gm. of total alkali, calculated as KOH, of which not more than 0.35 Gm. is K_2CO_3.

Potassium Hydroxide	60 Gm.
Distilled Water, a sufficient quantity, To make	1000 cc.

Dissolve the potassium hydroxide in sufficient distilled water to make the product measure 1000 cc.

NOTE: The amount (60 Gm.) of potassium hydroxide is based on a strength of 85 per cent of total alkali. Potassium hydroxide of a greater strength may be used in proportionately smaller quantity.

Description—Potassium Hydroxide Solution is a clear, colorless, odorless, strongly caustic liquid. When exposed to the air, it readily absorbs carbon dioxide, and it is alkaline to litmus paper.
Specific gravity—The specific gravity of Potassium Hydroxide Solution is about 1.046 at 25°.

Identification—Potassium Hydroxide Solution responds to the tests for *Potassium*, page 727.

Arsenic—Potassium Hydroxide Solution meets the requirements of the test for *Arsenic*, page 689.

Assay—Titrate 25 cc. of Potassium Hydroxide Solution, accurately measured, with 1 *N* sulfuric acid, using phenolphthalein T.S. as the indicator. At the discharge of the pink color of the indicator, note the volume of the 1 *N* solution used, add 3 drops of methyl orange T.S., and continue the titration to the production of a permanent pink color. The number of cc. of 1 *N* sulfuric acid, obtained by subtracting the number of cc. consumed in the second titration from the number of cc. consumed in the first titration, corresponds to the amount of KOH present. Double the number of cc. of acid consumed in the second titration corresponds to the amount of K_2CO_3 present. Each cc. of 1 *N* sulfuric acid is equivalent to 0.05610 Gm. of KOH or to 0.06910 Gm. of K_2CO_3.

Storage—Preserve Potassium Hydroxide Solution in well-filled bottles of hard glass, with tight rubber stoppers, or glass stoppers well coated with petrolatum.

AVERAGE DOSE—**1 cc.** (approximately 15 minims).

Caution: Potassium Hydroxide Solution should be freely diluted with water before being taken into the mouth.

POTASSIUM HYPOPHOSPHITE

Potassii Hypophosphis

Pot. Hypophos.

KH_2PO_2 Mol. wt. 104.09

Potassium Hypophosphite, when dried to constant weight over sulfuric acid, contains not less than 98 per cent of KH_2PO_2.

Caution should be observed in compounding Potassium Hypophosphite with other substances, as an explosion may occur if it is triturated or heated with nitrates, chlorates, or other oxidizing agents.

Description—Potassium Hypophosphite occurs as white, opaque, hexagonal plates, as crystalline masses, or as a granular powder, and is very deliquescent. It is odorless, and has a pungent, salty taste. An aqueous solution of Potassium Hypophosphite (1 in 20) is neutral or alkaline to litmus paper.

Solubility—One Gm. of Potassium Hypophosphite dissolves in about 0.6 cc. of water and in about 9 cc. of alcohol at 25°. It is more soluble in boiling water or boiling alcohol.

Identification—An aqueous solution of Potassium Hypophosphite (1 in 20) responds to the tests for *Potassium*, page 727, and for *Hypophosphite*, page 725.

Loss on drying—When dried to constant weight over sulfuric acid, Potassium Hypophosphite loses not more than 5 per cent of its weight.

Free alkali—A solution of 1 Gm. of Potassium Hypophosphite in about 10 cc. of distilled water requires not more than 1.5 cc. of 0.1 *N* hydrochloric acid for neutralization, using methyl orange T.S. as the indicator.

Phosphate—The addition of 0.5 cc. of magnesia mixture T.S. to 10 cc. of an aqueous solution of Potassium Hypophosphite (1 in 20) made slightly alkaline with ammonia T.S. produces no turbidity in 1 minute.

Arsenic—Measure 5 cc. of an aqueous solution of Potassium Hypophosphite (1 in 25) into a beaker containing 3 cc. of nitric acid diluted with about 10 cc. of dis-

tilled water, and evaporate the mixture to dryness on a water bath: the residue meets the requirement of the test for *Arsenic*, page 689.

Calcium—The addition of 0.5 cc. of ammonium oxalate T.S. to 10 cc. of an aqueous solution of Potassium Hypophosphite (1 in 20), made slightly alkaline with ammonia T.S. produces no turbidity in 1 minute.

Heavy metals—Dissolve 2 Gm. of Potassium Hypophosphite in enough distilled water to make 40 cc. of solution. To 10 cc. of this solution add standard lead solution equivalent to 0.020 mg. of lead, dilute to 30 cc. with distilled water, and add 1 cc. of diluted acetic acid (A). To the remaining 30 cc. add 1 cc. of diluted acetic acid (B). To each solution add 10 cc. of hydrogen sulfide T.S. (B) is not darker than (A): the heavy metals limit of Potassium Hypophosphite is 20 parts per million.

Assay—Proceed as directed in the *Assay* under *Calcium Hypophosphite*, page 108. Each cc. of 0.1 *N* bromine is equivalent to 0.002602 Gm. of KH_2PO_2.

Storage—Preserve Potassium Hypophosphite in tight containers.

AVERAGE DOSE—**0.5 Gm.** (approximately $7^1/_2$ grains).

Potassium Iodide Solution

POTASSIUM IODIDE SOLUTION

Liquor Potassii Iodidi

Liq. Pot. Iodid. Saturated Potassium Iodide Solution

Potassium Iodide Solution contains, in each 100 cc., not less than 97 Gm. and not more than 103 Gm. of KI.

Potassium Iodide	**1000 Gm.**
Distilled Water, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the salt in 680 cc. of hot distilled water; cool to about 25°, and add sufficient distilled water to make 1000 cc.; filter, if necessary.

NOTE: If Potassium Iodide Solution is not to be used extemporaneously, 0.5 Gm. of sodium thiosulfate should be added.

Description—Potassium Iodide Solution is a clear, colorless, and odorless liquid, with a characteristic, strongly salty taste. It is neutral or alkaline to litmus paper.

Specific gravity—The specific gravity of Potassium Iodide Solution is about 1.700 at 25°.

Identification—Potassium Iodide Solution responds to the tests for *Potassium*, page 727, and for *Iodide*, page 725.

Other tests—Separate portions of Potassium Iodide Solution, in the same quantities and dilutions as specified for potassium iodide, meet the requirements of the tests for identity and purity under *Potassium Iodide* in the U. S. Pharmacopœia XIII.

Assay—Dilute 5 cc. of Potassium Iodide Solution, accurately measured, to 100 cc., with distilled water. To 10 cc. of this dilution in a glass-stoppered flask, add 15 cc. of distilled water, 25 cc. of hydrochloric acid, and 5 cc. of chloroform. Chill to about 10°, and titrate with 0.05 *M* potassium iodate. Each cc. of 0.05 *M* potassium iodate is equivalent to 0.01660 Gm. of KI.

Storage—Preserve Potassium Iodide Solution in tight, light-resistant containers.

AVERAGE DOSE—**0.3 cc.** (approximately 5 minims).

One average metric dose contains 0.3 Gm. of Potassium Iodide.

POTASSIUM IODIDE TABLETS

Tabellæ Potassii Iodidi

Tab. Pot. Iodid.

Potassium Iodide Tablets contain not less than 94 per cent and not more than 106 per cent of the labeled amount of KI for tablets of 0.3 Gm. or more, and not less than 92.5 per cent and not more than 107.5 per cent for tablets of less than 0.3 Gm.

Identification—A filtered aqueous solution of the powdered Tablets responds to the tests for *Potassium*, page 727, and for *Iodide*, page 725.

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without an appreciable loss, and transfer a portion, equivalent to about 0.1 Gm. of potassium iodide, to a glass-stoppered flask, add 20 cc. of distilled water, 50 cc. of hydrochloric acid, and 5 cc. of chloroform; cool to about 10°, and titrate with 0.02 *M* potassium iodate. Each cc. of 0.02 *M* potassium iodate is equivalent to 0.006641 Gm. of KI.

Storage—Preserve Potassium Iodide Tablets in tight containers.

Sizes—Potassium Iodide Tablets usually available contain the following amounts of potassium iodide: **0.12** and **0.3 Gm.** (approximately 2 and 5 grains).

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains) of Potassium Iodide.

POTASSIUM NITRATE

Potassii Nitras

Pot. Nitras Saltpeter

KNO_3 Mol. wt. 101.10

Potassium Nitrate, when dried at 110° for 4 hours, contains not less than 99 per cent of KNO_3.

Description—Potassium Nitrate occurs as colorless, transparent prisms, or as a white, crystalline powder. It is odorless, has a salty taste, and produces a cooling sensation in the mouth. It is slightly hygroscopic in moist air. An aqueous solution of Potassium Nitrate (1 in 10) is neutral to litmus paper.

Solubility—One Gm. of Potassium Nitrate dissolves in 3 cc. of water, and in about 620 cc. of alcohol, at 25°. One Gm. dissolves in 0.5 cc. of boiling water.

Identification—An aqueous solution of Potassium Nitrate (1 in 10) responds to the tests for *Potassium*, page 727, and for *Nitrate*, page 726.

Loss on drying—When dried at 110° for 4 hours, Potassium Nitrate loses not more than 1 per cent of its weight.

Chlorate—Sprinkle about 0.1 Gm. of dry Potassium Nitrate upon 1 cc. of sulfuric acid: the mixture does not become yellow.

Chloride—One-half Gm. of Potassium Nitrate shows no more chloride than corresponds to 0.4 cc. of 0.02 *N* hydrochloric acid, page 758.

Heavy metals—Dissolve 1 Gm. of Potassium Nitrate in 15 cc. of distilled water, and add 2 cc. of diluted acetic acid and distilled water to make 25 cc.: the heavy metals limit, page 721, for Potassium Nitrate is 20 parts per million.

Assay—Weigh accurately about 0.4 Gm. of Potassium Nitrate previously dried at 110° for 4 hours, dissolve in 10 cc. of hydrochloric acid in a small porcelain dish, and evaporate the solution to dryness on a water bath. Dissolve the residue in 10 cc. of hydrochloric acid, and again evaporate to dryness on a water bath, continuing the heat until the residue, when redissolved in distilled water, is neutral to litmus paper. Transfer the residue with the aid of 25 cc. of distilled water to a 200-cc. volumetric flask. Add 50 cc. of 0.1 *N* silver nitrate to the solution, then 5 cc. of nitric acid, and sufficient distilled water to make the mixture measure 200 cc. Mix well, filter through a dry filter into a dry flask, and reject the first 20 cc. of filtrate. To exactly 100 cc. of the subsequent filtrate add 2 cc. of ferric ammonium sulfate T.S., and titrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.01011 Gm. of KNO_3.

Storage—Preserve Potassium Nitrate in tight containers.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Potassium Permanganate Tablets

POTASSIUM PERMANGANATE TABLETS

Tabellæ Potassii Permanganatis

Tab. Pot. Permang.

Potassium Permanganate Tablets contain not less than 94 per cent and not more than 106 per cent of the labeled amount of $KMnO_4$ for tablets of 0.3 Gm. or more, and not less than 92.5 per cent and not more than 107.5 per cent for tablets of less than 0.3 Gm.

Identification—An aqueous solution of the Tablets has a deep violet-red color when concentrated, and a pink color when highly diluted, and responds to the tests for *Permanganate*, page 726.

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without an appreciable loss, and dissolve an accurately weighed portion, equivalent to about 0.1 Gm. of potassium permanganate, in 25 cc. of distilled water. Add 1 cc. of sulfuric acid and 50 cc. of 0.1 *N* oxalic acid, warm the solution to about 80°, and titrate the excess oxalic acid with 0.1 *N* potassium permanganate. Each cc. of 0.1 *N* oxalic acid is equivalent to 0.003161 Gm. of $KMnO_4$.

Storage—Preserve Potassium Permanganate Tablets in tight containers.

Sizes—Potassium Permanganate Tablets usually available contain the following amounts of potassium permanganate: **60 mg., 0.12, 0.2,** and **0.3 Gm.** (approximately 1, 2, 3, and 5 grains).

AVERAGE DOSE—**60 mg.** (approximately 1 grain) of Potassium Permanganate.

Potassium Thiocyanate

POTASSIUM THIOCYANATE

Potassii Thiocyanas

Pot. Thiocyan. Potassium Sulfocyanate Potassium Rhodanate

KSCN Mol. wt. 97.17

Potassium Thiocyanate, when dried to constant weight at 105°, contains not less than 99 per cent of KSCN.

Description—Potassium Thiocyanate occurs as colorless, transparent prismatic crystals that are hygroscopic. It is odorless, and has a cooling, salty taste. It is affected by light. An aqueous solution of Potassium Thiocyanate (1 in 10) is neutral to litmus paper.

Solubility—One Gm. of Potassium Thiocyanate dissolves in about 0.5 cc. of water and in about 12 cc. of alcohol, at 25°. It dissolves in about 0.2 cc. of boiling water and in about 8 cc. of boiling alcohol.

Identification—An aqueous solution of Potassium Thiocyanate (1 in 10) responds to the tests for *Potassium*, page 727, and for *Thiocyanate*, page 728.

Loss on drying—When dried to constant weight at 105°, Potassium Thiocyanate loses not more than 5 per cent of its weight.

Chloride—To a solution of 4 Gm. of cupric sulfate (free from chloride) in 20 cc. of distilled water, add 30 cc. of sulfurous acid T.S. and 1 Gm. of Potassium Thiocyanate dissolved in 10 cc. of distilled water. Boil about 1 minute, cool quickly, and filter. Add 10 cc. of sulfurous acid T.S. to the filtrate. If additional precipitation takes place, filter and add more sulfurous acid T.S. to the filtrate. To the clear filtrate add 5 cc. of nitric acid and 1 cc. of 0.1 *N* silver nitrate solution. The turbidity is not greater than is produced in the same volume of distilled water containing 1.5 cc. of 0.02 *N* hydrochloric acid, the quantity of sulfurous acid T.S. used in the test, enough cupric sulfate to match the color of the solution tested, and the quantities of nitric acid and silver nitrate used in the test.

Cyanide—Dissolve 1 Gm. of Potassium Thiocyanate in 10 cc. of distilled water, add 1 cc. of sodium hydroxide T.S., 5 drops of ferrous sulfate T.S., and 1 drop of ferric chloride T.S. Warm gently for 1 minute, acidify with diluted sulfuric acid, filter through white filter paper, and wash well with distilled water: no green or blue color appears on the paper.

Sulfate—Two Gm. of Potassium Thiocyanate shows no more sulfate than corresponds to 0.5 cc. of 0.02 *N* sulfuric acid, page 759.

Ammonium salts—Ammonia is not evolved when 0.5 Gm. of Potassium Thiocyanate is heated with 5 cc. of sodium hydroxide T.S. for 1 minute.

Arsenic—Potassium Thiocyanate meets the requirements of the test for *Arsenic* when tested as directed under *Sodium Thiocyanate*, page 493.

Heavy metals—Dissolve 1 Gm. of Potassium Thiocyanate in 1 cc. of diluted acetic acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Potassium Thiocyanate is 20 parts per million.

Assay—Dissolve about 0.2 Gm. of Potassium Thiocyanate, dried to constant weight at 110° and accurately weighed, in 100 cc. of distilled water, and add 40 cc. of 0.1 *N* silver nitrate. Add 2 cc. of ferric ammonium sulfate T.S. and 2 cc. of nitric acid, and titrate the excess silver nitrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.009717 Gm. of KSCN.

Storage—Preserve Potassium Thiocyanate in tight, light-resistant containers.

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains).

Powders

Aromatic Chalk Powder, page 134
Aromatic Powder, page 62
Compound Acetanilid Powder, page 15
Compound Chalk Powder, page 135
Compound Jalap Powder, page 283
Compound Rhubarb Powder, page 443
Compound Senna Powder, page 457
Compound Zinc Sulfate Powder, page 567
Ipecac and Opium Powder, page 269
Sodium Bicarbonate and Calcium Carbonate Powder, page 472
Sodium Bicarbonate and Magnesium Oxide Powder, page 474

Prepared Ergot, page 196
Prepared Neocalamine, page 351
Prepared Suet, page 515

Procaine Hydrochloride Ampuls

PROCAINE HYDROCHLORIDE AMPULS

Ampullæ Procainæ Hydrochloridi

Ampul. Procain Hydrochlor. Procaine Hydrochloride Injection

Procaine Hydrochloride Ampuls contain a sterile solution of procaine hydrochloride in water for injection or other suitable solvent, and yield not less than 95 per cent and not more than 105 per cent of the labeled amount of $C_{13}H_{20}O_2N_2.HCl$.

Prepare the solution and fill the cleansed ampuls according to the requirements given on pages 687 to 689. Sterilize the filled ampuls by Process D, page 752, or by any other adequate and suitable method of sterilization, and test for sterility according to the method described on page 746. The Ampuls also conform to the other requirements under *Ampuls*, page 687.

Assay—Transfer to a separator an accurately measured volume of the ampul solution, containing about 0.2 Gm. of procaine hydrochloride; add 5 cc. of ammonia T.S., and extract the procaine by shaking with successive portions of chloroform. Filter the successive chloroform extracts, wash the filter with chloroform, and evaporate the chloroform from the filtrate in a current of warm air. Dissolve the oily residue in 10 cc. of neutralized alcohol, add 10 cc. of 0.1 *N* sulfuric acid, and titrate the excess acid with 0.02 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.02728 Gm. of $C_{13}H_{20}O_2N_2.HCl$.

AVERAGE DOSE—**20 mg.** of Procaine Hydrochloride.

Procaine Hydrochloride Solution

PROCAINE HYDROCHLORIDE SOLUTION

Liquor Procainæ Hydrochloridi

Liq. Procain. Hydrochlor.

Procaine Hydrochloride Solution contains, in each 100 cc., not less than 1.9 Gm. and not more than 2.1 Gm. of $C_{13}H_{20}O_2N_2.HCl$.

Procaine Hydrochloride	20 Gm.
Isotonic Sodium Chloride Solution, a sufficient quantity,	
To make	1000 cc.

Dissolve the procaine hydrochloride in the isotonic sodium chloride solution, and boil the solution for 10 minutes under aseptic conditions. Then cool, and add sufficient sterilized distilled water to make the product measure 1000 cc.

NOTE: It is customary to add about 0.01 cc. of epinephrine hydrochloride solution to each cc. of Procaine Hydrochloride Solution just before its use parenterally.

Description—Procaine Hydrochloride Solution is a clear, colorless, almost odorless liquid, with a slightly salty taste.

Identification—

A: Separate portions of Procaine Hydrochloride Solution show marked precipitation with iodine T.S., mercuric potassium iodide T.S., and picric acid T.S.; with silver nitrate T.S., a precipitate is obtained which, when separated by filtration, is soluble in an excess of ammonia T.S.

B: To 5 cc. of Procaine Hydrochloride Solution add 2 drops each of hydrochloric acid and sodium nitrite solution (1 in 10); then add 0.2 Gm. of beta-naphthol in a mixture of 3 cc. of sodium hydroxide T.S. and 7 cc. of water: a red precipitate is produced (*difference from phenacaine*).

• C: To 2 cc. of Procaine Hydrochloride Solution add 2 cc. of a solution of chlorinated lime (1 in 20): an orange precipitate is produced at once (*difference from cocaine and many other alkaloids*).

D: To 5 cc. of Procaine Hydrochloride Solution add 3 drops of diluted sulfuric acid and 5 drops of potassium permanganate T.S.: the purplish color is immediately discharged (*difference from cocaine hydrochloride*).

Assay—Transfer to a separator, 10 cc. of Procaine Hydrochloride Solution, accurately measured; add 5 cc. of ammonia T.S., and completely extract the procaine by shaking with successive portions of chloroform. Filter the successive chloroform extracts, wash the filter with chloroform, and evaporate the chloroform from the filtrate in a current of warm air. Dissolve the oily residue in 10 cc. of neutralized alcohol, add 10 cc. of 0.1 *N* sulfuric acid, and titrate the excess acid with 0.02 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.02728 Gm. of $C_{13}H_{20}O_2N_2.HCl$.

Storage—Preserve Procaine Hydrochloride Solution aseptically in containers complying with the requirements for ampul glass.

AVERAGE PARENTERAL DOSE—1 cc.

PROCAINE HYDROCHLORIDE TABLETS

Tabellæ Procainæ Hydrochloridi

Tab. Procain. Hydrochlor.

Procaine Hydrochloride Tablets contain not less than 92.5 per cent and not more than 107.5 per cent of the labeled amount of $C_{13}H_{20}O_2N_2.HCl$.

Identification—

A: A filtered aqueous solution of the Tablets, equivalent to procaine hydrochloride 1 in 100, yields precipitates with gold chloride T.S., with iodine T.S., with mercuric potassium iodide T.S., and with trinitrophenol T.S.

B: Silver nitrate T.S. produces in a filtered aqueous solution of the Tablets, equivalent to procaine hydrochloride 1 in 20, a white precipitate insoluble in nitric acid but soluble in ammonia T.S.

C: Dissolve a number of the Tablets equivalent to 0.1 Gm. of procaine hydrochloride, in 5 cc. of distilled water; add 2 drops each of hydrochloric acid and sodium nitrite solution (1 in 10); then add a solution of 0.2 Gm. of betanaphthol in a mixture of 3 cc. of sodium hydroxide T.S. and 7 cc. of distilled water: a red precipitate is produced.

D: Dissolve a number of the Tablets, equivalent to 0.1 Gm. of procaine hydrochloride, in 5 cc. of distilled water; add 3 drops of diluted sulfuric acid, followed by 5 drops of potassium permanganate T.S.: the purplish color of the latter is immediately discharged (*difference from cocaine hydrochloride*).

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without an appreciable loss, and dissolve an accurately weighed portion, equivalent to about 0.2 Gm. of procaine hydrochloride, in 25 cc. of distilled water in a separator. Proceed as directed in the *Assay* under *Procaine Hydrochloride Solution*, page 417, beginning with, "add 5 cc. of ammonia T.S. . . ."

Storage—Preserve Procaine Hydrochloride Tablets in tight, light-resistant containers.

Sizes—Procaine Hydrochloride Tablets usually available contain the following amounts of procaine hydrochloride: **20, 50,** and **75 mg.,** and **0.15 Gm.** (approximately 1/3, 3/4, 1 1/4, and 2 1/2 grains).

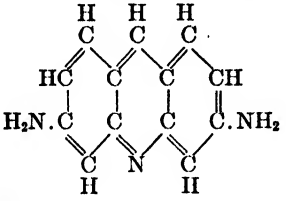
AVERAGE DOSE—**50 mg.** (approximately 3/4 grain) of Procaine Hydrochloride.

Proflavine Dihydrochloride

PROFLAVINE DIHYDROCHLORIDE

Proflavinæ Dihydrochloridum

Proflav. Dihydrochlor.



$.2HCl.2H_2O$

$C_{13}H_{11}N_3.2HCl.2H_2O$ Mol. wt. 318.20

Proflavine Dihydrochloride contains not less than 72.0 per cent and not more than 74.5 per cent of $C_{13}H_{11}N_3$ calculated on a moisture-free basis, the moisture being determined on a separate portion by drying to constant weight over sulfuric acid.

Description—Proflavine Dihydrochloride occurs as orange-red to brown-red, odorless crystals. It is affected by light.

Solubility—One Gm. of Proflavine Dihydrochloride dissolves in about 10 cc. of water at 25°, but on standing for several hours a precipitate forms. It is very slightly soluble in ether, in chloroform, and in liquid petrolatum.

Identification—

A: To 5 cc. of an aqueous solution of Proflavine Dihydrochloride (1 in 1000) add a few drops of sodium hydroxide T.S.: a yellow precipitate is produced.

B: To 5 cc. of an aqueous solution of Proflavine Dihydrochloride (1 in 1000) add a few drops of silver nitrate T.S.: a curdy, white precipitate is produced.

Loss on drying—When dried to constant weight over sulfuric acid, Proflavine Dihydrochloride loses not more than 13 per cent of its weight.

Residue on ignition—Proflavine Dihydrochloride yields not more than 0.25 per cent of residue on ignition, page 745.

Hydrogen-ion concentration—The hydrogen-ion concentration of an aqueous solution of Proflavine Dihydrochloride (1 in 1000), expressed as *p*H, is not less than 2.5 and not more than 3 at 25°.

Clarity of solution—Dissolve 0.2 Gm. of Proflavine Dihydrochloride in 100 cc. of distilled water: a clear solution is obtained which remains clear and free from sediment upon standing for 24 hours in the dark.

Assay for proflavine—Dissolve about 2 Gm. of Proflavine Dihydrochloride, accurately weighed, in 750 cc. of distilled water. Add 0.1 *N* hydrochloric acid to the solution until it is faintly acid to congo red paper, followed by 5 Gm. of sodium acetate. Add 50 cc. of 0.1 *M* potassium ferricyanide, stirring during the addition, and allow the mixture to stand for 10 minutes. Filter the precipitate through a filter paper in a Buchner funnel and wash the precipitating vessel and filter with three 50-cc. portions of distilled water. To the combined filtrate and washings add, separately, 10 cc. of hydrochloric acid, 10 Gm. of sodium chloride, 1 Gm. of potassium iodide, and 3 Gm. of zinc sulfate dissolved in 10 cc. of distilled water, stirring after each addition. Allow to stand for 3 minutes, then titrate the liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. When the titration is nearly complete, allow the mixture to stand for 3 minutes, then complete the titration. Perform a blank test with the same quantities of the same reagents, and in the same manner, and calculate the volume of 0.1 *M* potassium ferricyanide consumed by the Proflavine Dihydrochloride. Each cc. of 0.1 *M* potassium ferricyanide is equivalent to 0.06277 Gm. of $C_{13}H_{11}N_3$.

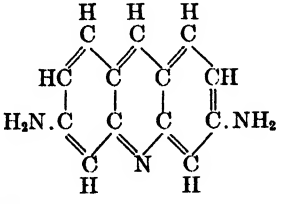
Storage—Preserve Proflavine Dihydrochloride in tight, light-resistant containers.

Caution: Proflavine Dihydrochloride Solutions should be dispensed in light-resistant containers and should be discarded when they become turbid.

PROFLAVINE SULFATE

Proflavinæ Sulfas

Proflav. Sulf.



$.H_2SO_4.H_2O$

$C_{13}H_{11}N_3.H_2SO_4.H_2O$ Mol. wt. 325.33

Proflavine Sulfate contains not less than 66.0 per cent and not more than 68.5 per cent of $C_{13}H_{11}N_3$, calculated on a moisture-free basis, the moisture being determined on a separate portion by drying to constant weight at 105°.

Description—Proflavine Sulfate occurs as a reddish brown, odorless, crystalline powder. It is affected by light.

Solubility—One Gm. of Proflavine Sulfate dissolves in about 300 cc. of water at 25°. It is slightly soluble in alcohol, but nearly insoluble in ether, in chloroform and in liquid petrolatum.

Identification—

A: To 5 cc. of an aqueous solution of Proflavine Sulfate (1 in 300) add a few drops of sodium hydroxide T.S.: a yellow precipitate is produced.

B: To 5 cc. of an aqueous solution of Proflavine Sulfate (1 in 1000) add a few drops of diluted hydrochloric acid and 2 drops of sodium nitrite solution (1 in 10): a deep violet color is produced which rapidly becomes deep red, changing to brownish red.

C: Filter the solution obtained in *Identification test A*, and add 2 cc. of diluted nitric acid to the filtrate. The filtrate responds to the test for *Sulfate*, page 727.

Loss on drying—When dried to constant weight at 105°, Proflavine Sulfate loses not more than 6 per cent of its weight.

Residue on ignition—Proflavine Sulfate yields not more than 1 per cent of residue on ignition, page 745.

Hydrogen-ion concentration—The hydrogen-ion concentration of an aqueous solution of Proflavine Sulfate (1 in 1000), expressed as *p*H, is not less than 2.5 and not more than 3 at 25°.

Clarity of solution—Dissolve 0.2 Gm. of Proflavine Sulfate in 100 cc. of distilled water: a clear solution is obtained which remains clear and free from sediment upon standing for 24 hours in the dark.

Assay for proflavine—Proceed as directed in the *Assay for proflavine*, under *Proflavine Dihydrochloride*, page 419.

Storage—Preserve Proflavine Sulfate in tight, light-resistant containers.

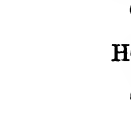
Caution: Proflavine Sulfate Solutions should be dispensed in light-resistant containers and should be discarded when they become turbid.

Propylene Glycol

PROPYLENE GLYCOL

Glycol Propylenum

Glycol Propyl.



$C_3H_8O_2$ Mol. wt. 76.09

Propylene Glycol contains not less than 97.5 per cent by weight of $C_3H_8O_2$.

Description—Propylene Glycol is a clear, colorless, viscous liquid having a slightly acrid taste. It is practically odorless. It absorbs moisture when exposed to moist air.

Solubility—Propylene Glycol is miscible with water, with acetone, and with chloroform in all proportions. It is soluble in ether and will dissolve many essential oils, but is immiscible with fixed oils.

Specific gravity—The specific gravity of Propylene Glycol is not less than 1.035 and not more than 1.037 at 25°.

Distillation range—Propylene Glycol distils completely between 185° and 195° when determined by Method II for *Boiling or Distilling Temperatures*, page 692.

Identification—

A: Heat 0.5 Gm. of Propylene Glycol and 3.6 Gm. of triphenylchloromethane together with 5 cc. of pyridine under a reflux for 1 hour on a water bath. Cool, dissolve the mixture in 100 cc. of warm acetone and stir well with 0.1 Gm. of activated carbon. Filter, evaporate the filtrate to about 50 cc. and allow to stand overnight in the refrigerator. Filter off the crystals and let dry in a current of air. The crystals, when reduced to a fine powder, melt at about 176°.

B: To 0.5 Gm. of potassium bisulfate in a test tube, add 1 cc. of Propylene Glycol and heat gently: a fruity odor is evolved and no sharp, acrid odor of acrolein is present when heated to dryness.

Residue on ignition—Weigh 50 Gm. of Propylene Glycol in a tared platinum dish and heat until the vapor continues to burn after the withdrawal of the flame. Allow the combustion to continue until it dies out. Carefully protect from drafts, especially during the latter part of the combustion. Ignite gently, cool, and weigh: the weight of the residue on ignition does not exceed 3.5 mg.

Acidity—Add 1 cc. of phenolphthalein T.S. to 50 cc. of distilled water, then add 0.1 *N* sodium hydroxide until the solution remains pink for 30 seconds. Now add 10 cc. of Propylene Glycol, accurately measured, and titrate with 0.1 *N* sodium hydroxide until the original pink color returns and remains for 30 seconds: not more than 0.2 cc. of 0.1 *N* sodium hydroxide is required.

Chloride—To 10 cc. of a solution of Propylene Glycol (1 in 10) and 1 cc. of diluted nitric acid add 0.5 cc. of silver nitrate T.S. Any turbidity is not greater than that produced by 1.0 cc. of 0.02 *N* hydrochloric acid when treated with the same quantities of diluted nitric acid and silver nitrate T.S. in the same total volume.

Sulfate—The addition of 5 drops of barium chloride T.S. to 20 cc. of an aqueous solution of Propylene Glycol (1 in 4), acidified with 5 drops of hydrochloric acid, produces no turbidity immediately.

Heavy metals—Mix 5 cc. of Propylene Glycol with 2 cc. of 0.1 *N* hydrochloric acid and dilute to 25 cc. with distilled water. The heavy metals limit, page 721, of Propylene Glycol, determined on this solution, is 5 parts per million.

Arsenic—A 10-cc. portion of an aqueous solution of Propylene Glycol (1 in 10) meets the requirements of the test for *Arsenic*, page 689.

Assay—Weigh accurately, by means of a weighing pipette, about 0.3 Gm. of Propylene Glycol, transfer into a 100-cc. volumetric flask, and add sufficient distilled water to make 100 cc. Transfer exactly 10 cc. of the resulting solution into a 125-cc. Erlenmeyer flask, add 5 cc. of 0.1 *M* periodic acid, swirl, and permit to stand for 15 minutes. Add 10 cc. of a saturated solution of sodium bicarbonate, followed by 15 cc. of 0.1 *N* sodium arsenite and 1 cc. of 5 per cent potassium iodide solution. Add sufficient sodium bicarbonate so that at the end point there will be several grams of solid sodium bicarbonate remaining undissolved, and titrate with 0.1 *N* iodine, using a 10-cc. microburette. Titrate until the appearance of a faint yellow color. Perform a blank using the same quantities of reagents, omitting the Propylene Glycol. Subtract the number of cc. of 0.1 *N* iodine required for the blank from the number of cc. required for the sample. Each cc. of 0.1 *N* iodine is equivalent to 0.003805 Gm. of $C_3H_8O_2$.

Storage—Preserve Propylene Glycol in tight containers.

PUMICE
Pumex

Pumice is a substance of volcanic origin, consisting chiefly of complex silicates of aluminum, potassium, and sodium.

Description—Pumice occurs as very light, hard, rough, porous grayish masses, or as a gritty, grayish powder. It is odorless and tasteless, and is permanent in the air.
Solubility—Pumice is insoluble in water and is not attacked by acids.
Powdered Pumice—Powdered Pumice meets the following requirements:

"Pumice Flour" or "Superfine Pumice": not less than 97 per cent of pumice flour or superfine pumice passes through a No. 200 standard mesh sieve.

"Fine Pumice": not less than 95 per cent of fine pumice passes through a No. 150 standard mesh sieve, and not more than 75 per cent passes through a No. 200 standard mesh sieve.

"Coarse Pumice": not less than 95 per cent of coarse pumice passes through a No. 60 standard mesh sieve and not more than 5 per cent passes through a No. 200 standard mesh sieve.

Soluble substances—Boil 10 Gm. of Pumice with 50 cc. of distilled water for 30 minutes, adding distilled water from time to time to maintain approximately the original volume, and then filter; the filtrate is neutral to litmus paper, and one-half of this filtrate, when evaporated and the residue dried to constant weight at 105°, yields not more than 10 mg. of residue.
Acid-soluble residue—Boil 1 Gm. of Pumice with 25 cc. of diluted hydrochloric acid for 30 minutes, adding distilled water from time to time to maintain approximately the original volume, and then filter the liquid. Add 5 drops of sulfuric acid to the filtrate, evaporate to dryness, ignite, and weigh the residue: not more than 60 mg. of residue is obtained.
Iron—The remaining half of the filtrate from the test for *Soluble substances*, after being slightly acidified with hydrochloric acid, does not yield a blue color with potassium ferrocyanide T.S.
Storage—Preserve Pumice in well-closed containers.

Purified Animal Charcoal, page 135

Pyrethrum

PYRETHRUM
Pyrethrum

Pyrethrum Flowers, Insect Flowers

Pyrethrum is the dried flower-head of *Chrysanthemum cinerariæfolium* (Trev.) Bocc., *Chrysanthemum coccineum* Willdenow (*Chrysanthemum roseum* Web. et Mohr) or of *Chrysanthemum Marschallii* Aschers (Fam. *Compositæ*).

Pyrethrum yields not less than 0.5 per cent of total pyrethrins (Pyrethrin I and Pyrethrin II).

Unground Pyrethrum—The flower-heads of Pyrethrum are hemispherical or subglobose and somewhat flattened, up to 20 mm. in diameter, and are composed of 30 or more yellowish white, straw-colored, weak yellowish orange, reddish or reddish purple ray florets and many yellowish orange to yellow disk florets on broadly conical or rounded receptacles. The ray florets are pistillate, possessing a strap-like corolla from 1 to 2 cm. in length and terminating in 3 short obtuse or rounded teeth. The disk florets are up to about 7 mm. in length, are perfect and have 5-toothed tubular corollas borne on the achenes, the latter being 5- to 10-ribbed and provided with a short-toothed crown or pappus. The involucre is made up of 2 or 3 rows of bracts, the outer bracts being lanceolate and distinctly keeled, somewhat hairy on the outer surface and smooth, shiny and weak yellowish orange on the inner surface. The inner bracts are spatulate, longer than the outer ones and have

a white, dark red or reddish brown membranous margin. Stems are usually wanting, but if present are cylindrical, grayish or yellowish green, pubescent and show 9 to 12 prominent ribs.

Powdered Pyrethrum—Powdered Pyrethrum is weak yellowish orange to moderate yellow in color. It has a characteristic odor and is somewhat sternutatory. The taste is at first acrid and bitter, followed by a numbing sensation on the tongue and lips. The powder shows numerous T-shaped, non-glandular hairs from the involucral bracts, the hairs usually broken but when entire consisting of a 2-celled stalk and a curved or twisted horizontal end cell, the latter tapering to a point at either end; numerous spherical, spinose pollen grains up to about 30 microns in diameter and fragments of the outer epidermis of the involucral scales with polygonal or wavy-walled epidermal cells and broadly elliptical stomata, the latter with 3 to 4 neighboring cells. These fragments also show the T-shaped, non-glandular hairs as well as sessile glandular hairs with 2- to 8-celled glandular heads. Fragments of achene and pistil tissue are numerous and show club-shaped sessile, glandular hairs, brownish resin canals, and in *Chrysanthemum cinerariæfolium*, small prisms of calcium oxalate. Fragments of achene tissues also show cells of the pericarp with thin, nearly colorless walls, rectangular cells of the seed-coat with thick, porous and strongly lignified walls and elongated resin secretion cells having a brownish amorphous content. Portions of the corolla show outer epidermal cells with a striated cuticle, occasional stomata, the latter surrounded by 4 to 5 neighboring cells, and an inner epidermis with cells having the form of striated papillæ and appearing polygonal in surface view. Fragments of the teeth of the tubular florets show rows of longitudinally elongated cells, many of which contain a rosette aggregate of calcium oxalate. Fragments of vascular tissues from the scales and stem portions showing lignified, sclerenchymatous cells and fibers are also present.

Powdered Daisy Flowers—Powdered Pyrethrum shows no fragments of dark red amorphous material from secretion cells. The powder also contains no achene tissue showing tightly arranged, thick-walled, narrow, palisade cells.

Stems—Pyrethrum contains not more than 5 per cent of the stems of the plant.

Foreign organic matter—Pyrethrum contains not more than 2 per cent of foreign organic matter, other than stems, page 760.

Acid-insoluble ash—Pyrethrum yields not more than 2 per cent of acid-insoluble ash, page 761.

Assay—Extract about 15 Gm. of Pyrethrum in fine powder, accurately weighed, in a Soxhlet or other continuous extraction apparatus for 7 hours with petroleum benzin. Evaporate the petroleum benzin on a water bath, heating no longer than is necessary to remove the solvent. Do not pass a current of air through the flask during evaporation. Add 20 cc. of 0.5 *N* alcoholic sodium hydroxide to the flask containing the extract; connect it to a reflux condenser and boil gently for 1 hour to 1 hour and 30 minutes. Transfer the contents of the flask to a 600 cc. beaker and add sufficient water to bring the volume to 200 cc. Add a few glass beads and boil gently until the volume is about 150 cc. Transfer to a 250-cc. volumetric flask and add 1 Gm. of purified siliceous earth and 10 cc. of barium chloride solution (1 in 10). Do not shake before diluting to volume. Add sufficient water to make the volume 250 cc., mix thoroughly, and filter, collecting exactly 200 cc. of the filtrate. Neutralize the filtrate with dilute sulfuric acid (1 in 5) using 1 drop of phenolphthalein T.S. as the indicator, and add 1 cc. of the acid in excess. (If it is necessary to have the solution stand overnight at this point, it should be kept in the alkaline condition.) Filter through a 7 cm. filter paper that has been coated lightly with a suspension of purified siliceous earth in water, on a Büchner funnel and wash several times with water. Transfer the filtrate and washings to a 500-cc. separatory funnel and extract with two 50-cc. portions of petroleum benzin. Wash the combined petroleum extracts with two or three 10-cc. portions of water, retaining the washings. Filter the petroleum benzin extract through cotton into a 250-cc. separatory funnel, washing the cotton with 5 cc. of petroleum benzin. Combine the aqueous washings with the acid-aqueous solution and retain for the assay of Pyrethrin II. Extract the combined petroleum benzin solutions with 5 cc. of 0.1 *N* sodium hydroxide, shaking vigorously. Draw off the aqueous layer into a 100-cc. beaker; wash the petroleum benzin with 5 cc. of water or with an additional

5-cc. portion of 0.1 *N* sodium hydroxide and add this to the beaker. Add 10 cc. of mercuric sulfate T.S. and allow to stand for 1 hour at 25° ±2°. Add 20 cc. of alcohol and 3 cc. of a saturated solution of sodium chloride. Warm to 60° and filter through a small filter paper, transferring all of the precipitate to the filter paper, and wash with two 10-cc. portions of hot alcohol. Wash with two 10-cc. portions of hot chloroform and transfer the filter paper and contents to a 250-cc. glass-stoppered Erlenmeyer flask. Add 30 cc. of hydrochloric acid and 20 cc. of water to the flask and allow to cool. Add 6 cc. of chloroform or carbon tetrachloride and 1 cc. of iodine monochloride T.S. and titrate with 0.01 *M* potassium iodate, shaking vigorously after each addition, until there is no iodine color in the chloroform (or carbon tetrachloride) layer. Each cc. of 0.01 *M* potassium iodate is equivalent to 0.0057 Gm. of Pyrethrin I.

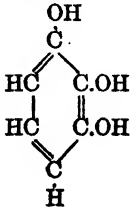
If necessary, filter the aqueous residue from the petroleum benzin extraction above through a Gooch crucible and concentrate the filtrate to about 50 cc. Transfer to a separatory funnel and neutralize with sodium bicarbonate. Extract twice with chloroform, washing the chloroform extract with about 15-cc. portions of water in each of 2 separatory funnels. Combine the aqueous solution and washings, acidify strongly with hydrochloric acid (about 8 cc.), saturate with sodium chloride adding cautiously at first to prevent excessive ebullition of carbon dioxide and extract with 50 cc. of ethyl ether. Draw off the aqueous layer into a second separatory funnel and extract with 50 cc. of ether. Continue this extraction and drawing off of the aqueous layer using 35 cc. of ether for the third and fourth extractions. Wash the 4 ether extracts successively with 10-cc. portions of water, and repeat with a second successive washing with another 10-cc. portion of water. Combine the ether extracts, draw off any water that separates and filter through cotton into a 500-cc. Erlenmeyer flask. Evaporate the ether on a water bath and dry the residue for 10 minutes at 100°. Add 2 cc. of neutralized alcohol and 20 cc. of water and heat to dissolve the residue. Cool, filter through a Gooch crucible and add 1 or 2 drops of phenolphthalein T.S. and titrate with 0.02 *N* sodium hydroxide. Each cc. of 0.02 *N* sodium hydroxide is equivalent to 0.00374 Gm. of Pyrethrin II.

Pyrogallol

PYROGALLOL

Pyrogallol

Pyrogallic Acid



$C_6H_6O_3$ Mol. wt. 126.11

Description—Pyrogallol occurs as light, white, or nearly white odorless leaflets or fine needles. It acquires a grayish tint on exposure to air and light. An aqueous solution of Pyrogallol when exposed to air acquires a brown color and an acid reaction owing to oxidation by the air. The absorption of oxygen and change of color take place very rapidly after the solution is rendered alkaline with an alkali hydroxide.

Solubility—One Gm. of Pyrogallol dissolves in about 2 cc. of water, in about 1.5 cc. of alcohol, and in about 2 cc. of ether, at 25°. It is very soluble in boiling water and in boiling alcohol.

Melting point—Pyrogallol melts between 130° and 133°, page 731.

Identification—

A: An aqueous solution of Pyrogallol (1 in 10) reduces solutions of the salts of silver, gold, and mercury even in the cold.

B: One cc. of freshly prepared aqueous solution of Pyrogallol (1 in 20) is colored brownish red by a few drops of ferric chloride T.S. Freshly prepared ferrous sulfate T.S. produces a blue color in an aqueous solution of Pyrogallol.

Residue on ignition—Pyrogallol yields not more than 0.1 per cent of residue on ignition, page 745.

Free acid—A freshly prepared solution of Pyrogallol (1 in 20) in recently boiled, distilled water is colorless or at most slightly yellow, and is neutral or acid to litmus paper.

Storage—Preserve Pyrogallol in tight, light-resistant containers.

QUASSIA

Quassia

Bitter Wood

Quassia is the heart-wood of *Picrasma excelsa* (Swartz) Planchon, known in commerce as Jamaica Quassia, or of *Quassia amara* Linné, known in commerce as Surinam Quassia (Fam. *Simarubaceæ*).

Unground Jamaica Quassia—Unground Jamaica Quassia usually occurs as chips, raspings, or shavings, and occasionally in billets. It is pale yellow to moderate yellow with a few yellowish gray pieces, some being somewhat coarsely grained. The fracture is tough and fibrous.

Histology—Jamaica Quassia shows large tracheæ, occasionally with colored contents, usually from 2 to 6 in a group and surrounded by numerous wood fibers; lignified medullary rays, mostly 1 to 5 cells wide and from 10 to 20 rows deep, and lignified parenchyma cells in interrupted tangential bands containing calcium oxalate prisms or starch grains.

Unground Surinam Quassia—Unground Surinam Quassia resembles Jamaica Quassia except that the billets are usually thinner, the tracheæ single or in pairs and smaller, the medullary rays usually 1 to 2 cells wide, and from 10 to 30 rows deep, and the calcium oxalate crystals few or entirely absent.

Powdered Quassia—Powdered Quassia is weak yellow; has a slight odor and a very bitter taste. It contains fragments of tracheæ, the walls marked by numerous small bordered pores; wood fibers with thin walls and oblique pores; medullary ray and parenchyma cells with numerous pores; calcium oxalate in 4- to 6-sided prisms, from 6 to 30 microns in length, sometimes in crystal fibers; and a few starch grains, spherical or ellipsoidal, and from 5 to 15 microns in diameter.

Foreign organic matter—Quassia contains not more than 1 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Quassia yields not more than 0.5 per cent of acid-insoluble ash, page 761.

Average dose—0.5 Gm. (approximately 7½ grains).

Quillaja

QUILLAJA
Quillaja

Soaptree-bark Soapbark

Quillaja is the dried inner bark of *Quillaja Saponaria* Molina (Fam. *Rosaceæ*).

Unground Quillaja—Unground Quillaja occurs as flat pieces of variable length, from 3 to 10 mm. in thickness, or in small chips. The outer surface is weak reddish brown to weak yellowish orange, sometimes showing a very few small patches of cork attached, otherwise being nearly smooth. The inner surface is weak yellowish orange to yellowish white, nearly smooth, with occasional circular depressions and conical projections or transverse channels. The fracture is uneven and strongly fibrous, the laminæ being oblique to each other.

Powdered Quillaja—Powdered Quillaja is very pale orange, has a slight odor, a very acrid taste, and is very sternutatory. It contains calcium oxalate in elongated prisms either isolated or in crystal fibers, the prisms from 35 to 200 microns in length; numerous fragments composed of long, more or less irregular fibers with thick, strongly lignified walls, the fibers often associated with medullary rays, the latter about four cells wide; stone cells with simple oblique pores; nearly spheroidal starch grains up to 10 microns in diameter; and occasional fragments composed of cork cells with colored walls.

Outer bark—Quillaja contains not more than 5 per cent of adhering outer bark.

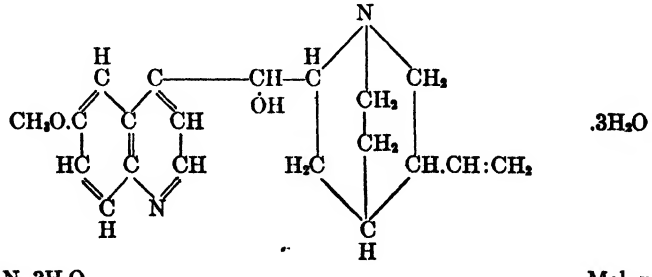
Foreign organic matter—Quillaja contains not more than 1 per cent of foreign organic matter, other than adhering outer bark, page 760.

Acid-insoluble ash—Quillaja yields not more than 2 per cent of acid-insoluble ash, page 761.

Quinine

QUININE
Quinina

Quin.



$C_{20}H_{24}O_2N_2.3H_2O$ Mol. wt. 378.46

Quinine is an alkaloid usually obtained from cinchona.

Description—Quinine occurs as a white, microcrystalline powder. It is odorless, and has a bitter taste, which is intense and persistent. It is efflorescent in dry air and is

affected by light. An alcohol solution of Quinine (1 in 10) is alkaline to litmus paper.

Solubility—One Gm. of Quinine dissolves in about 1560 cc. of water, in about 1 cc. of alcohol, in about 1 cc. of chloroform, and in about 1890 cc. of dilute ammonia solution, at 25°. It is soluble in ether and 1 Gm. is soluble in about 800 cc. of boiling water.

Optical rotation—An alcohol solution of Quinine (1 in 10) is lævorotatory.

Identification—

A: A solution of Quinine in diluted sulfuric acid shows a blue fluorescence.

B: Add 2 or 3 drops of bromine T.S. to 5 cc. of a saturated, aqueous solution of Quinine, and follow with 1 cc. of ammonia T.S.: the liquid acquires a green color due to the formation of thallcoquin.

Loss on drying—When dried to constant weight at 105°, Quinine loses not more than 15 per cent of its weight.

Residue on ignition—Quinine yields not more than 0.1 per cent of residue on ignition, page 745.

Ammonium salts—Heat 0.2 Gm. of Quinine with 2 cc. of sodium hydroxide T.S. on a water bath: the mixture does not evolve the odor of ammonia.

Other cinchona alkaloids—Dry Quinine to constant weight at 105°, dissolve 1.5 Gm. of the dried Quinine in 25 cc. of alcohol, dilute the solution with 50 cc. of hot distilled water, add 1 *N* sulfuric acid (about 5 cc.) until the solution is acid, using 2 drops of methyl red T.S. as the indicator, and neutralize the excess of acid with 1 *N* sodium hydroxide. Evaporate the liquid to dryness on a water bath, powder the residue, agitate it in a test tube with 20 cc. of distilled water at 65° for 30 minutes. Allow the mixture to cool to 15°, macerate it at this temperature for 2 hours with occasional shaking, and then filter it through a filter paper (8 to 10 cm.). Transfer 5 cc. of this filtrate, at a temperature of 15°, to a test tube and mix it gently (without shaking) with 6 cc. of ammonia T.S. (which must contain not less than 10 per cent and not more than 10.2 per cent of NH_3, have a temperature of 15°, and be added at once): a clear liquid is produced.

Storage—Preserve Quinine in tight, light-resistant containers.

AVERAGE DOSE—1 Gm. (approximately 15 grains).

QUININE AND UREA HYDROCHLORIDE

Quininæ et Ureæ Hydrochloridum

Quin. et Urea. Hydrochlor.

$C_{20}H_{24}N_2O_2.HCl.CO(NH_2)_2.HCl.5H_2O$ Mol. wt. 547.48

Quinine and Urea Hydrochloride is a double salt of quinine and urea hydrochlorides. It contains not less than 58 per cent and not more than 65 per cent of anhydrous quinine ($C_{20}H_{24}N_2O_2$).

Description—Quinine and Urea Hydrochloride occurs as colorless, translucent prisms, white granules, or as a white powder. It is odorless, has a very bitter taste, and is affected by light. An aqueous solution of Quinine and Urea Hydrochloride (1 in 20) is acid to litmus paper.

Solubility—One Gm. of Quinine and Urea Hydrochloride dissolves in 1 cc. of water and in 3 cc. of alcohol, at 25°.

Identification—

A: A solution of Quinine and Urea Hydrochloride in diluted sulfuric acid (1 in 1000) shows a blue fluorescence.

B: Add 2 or 3 drops of bromine T.S. to 5 cc. of an aqueous solution of Quinine and Urea Hydrochloride (1 in 1000), and follow with 1 cc. of ammonia T.S.: the liquid acquires a greenish color due to the formation of thalleoquin.

C: Add 2 cc. of colorless nitric acid to a cold solution of about 1 Gm. of Quinine and Urea Hydrochloride in 2 cc. of distilled water, and cool the mixture at once to the temperature of melting ice: crystalline leaflets of urea nitrate are formed on standing. Collect the crystals in a funnel upon glass wool, wash them with about 5 cc. of a cold mixture of equal volumes of nitric acid and distilled water, and after draining dissolve the crystals in a few cc. of distilled water: the addition of a few drops of mercuric nitrate T.S. to the urea nitrate solution, followed by sodium hydroxide T.S. until the solution is nearly neutralized, produces a white precipitate.

D: Quinine and Urea Hydrochloride responds to the tests for *Chloride*, page 724.

Residue on ignition—Quinine and Urea Hydrochloride yields not more than 0.15 per cent of residue on ignition, page 745.

Readily carbonizable substances—Dissolve 0.2 Gm. of Quinine and Urea Hydrochloride in 5 cc. of sulfuric acid: the solution has no more color than matching fluid M, page 744.

Ammonium compounds—Warm 10 cc. of an aqueous solution of Quinine and Urea Hydrochloride (1 in 20) with 5 cc. of sodium hydroxide T.S. to 50°: the mixture does not at once evolve the odor of ammonia.

Other cinchona alkaloids—Dissolve about 3 Gm. of Quinine and Urea Hydrochloride in 30 cc. of distilled water in a separator, add 10 cc. of ammonia T.S., extract the mixture successively with 30 and 20 cc. of chloroform, and evaporate the combined chloroform solutions to dryness on a water bath. Dissolve 1.5 Gm. of the residue in 25 cc. of alcohol, dilute the solution with 50 cc. of hot distilled water, add 1 *N* sulfuric acid (about 5 cc.) until the solution is acid, using 2 drops of methyl red T.S. as the indicator, and neutralize the excess of acid with 1 *N* sodium hydroxide. Evaporate the liquid to dryness on a water bath, powder the residue, mix it in a test tube with 20 cc. of distilled water, and agitate the mixture at 65° for 30 minutes. Cool the mixture to 15°, and allow it to stand at this temperature for 2 hours with occasional shaking, then filter it through a filter paper (8 to 10 cm.). Transfer 5 cc. of this filtrate, at a temperature of 15°, to a test tube, and mix it gently, without shaking, with 6 cc. of ammonia T.S.: a clear liquid is produced. The ammonia T.S. must contain not less than 10 per cent and not more than 10.2 per cent of NH_3, have a temperature of 15°, and be added at once.

Assay—Dissolve about 0.5 Gm. of Quinine and Urea Hydrochloride, accurately weighed, in 5 cc. of distilled water in a separator, add 3 cc. of ammonia T.S., and shake the mixture with successive portions of 10, 5, and 5 cc., respectively, of chloroform or sufficient to extract the quinine completely. Evaporate the combined chloroform solutions on a water bath, dissolve the residue in 10 cc. of ether, evaporate the solution to dryness in a tared dish, and dry the residue, consisting of $C_{20}H_{24}N_2O_2$, to constant weight at 105°.

Storage—Preserve Quinine and Urea Hydrochloride in tight, light-resistant containers.

Quinine and Urea Hydrochloride Ampuls

QUININE AND UREA HYDROCHLORIDE AMPULS

Ampullæ Quininæ et Ureæ Hydrochloridi

Ampul. Quin. et Urea. Hydrochlor. Quinine and Urea Hydrochloride Injection

Quinine and Urea Hydrochloride Ampuls contain a sterile solution of quinine and urea hydrochloride in water for injection, and yield $C_{20}H_{24}O_2N_2$, equal to not less than 56 per cent and not more than 65 per cent of the labeled amount of $C_{20}H_{24}O_2N_2.HCl.CO(NH_2)_2.HCl.5H_2O$.

Prepare the solution and fill the cleansed ampuls according to the requirements given on pages 687 to 689. Sterilize the filled ampuls by Process E, page 753, or by any other adequate and suitable method of sterilization, at a temperature not exceeding 65°, and test for sterility according to the method described on page 746. The Ampuls also conform to the other requirements under *Ampuls*, page 687.

Assay—Proceed as directed in the *Assay* under *Quinine Dihydrochloride Ampuls*, page 429.

AVERAGE DOSE—**0.5 Gm.** of Quinine and Urea Hydrochloride.

QUININE DIHYDROCHLORIDE AMPULS

Ampullæ Quininæ Dihydrochloridi

Ampul. Quin. Dihydrochlor. Quinine Dihydrochloride Injection

Quinine Dihydrochloride Ampuls contain a sterile solution of quinine dihydrochloride in water for injection, and yield $C_{20}H_{24}O_2N_2$, equal to not less than 78 per cent and not more than 84 per cent of the labeled amount of $C_{20}H_{24}O_2N_2.2HCl$.

Prepare the solution and fill the cleansed ampuls according to the requirements given on pages 687 to 689. Sterilize the filled ampuls by heating to 100° for 30 minutes, or by any other adequate and suitable method of sterilization, and test for sterility according to the method described on page 746. The Ampuls also conform to the other requirements under *Ampuls*, page 687.

Assay—Transfer to a separator an accurately measured volume of the ampul solution, diluted with distilled water, if necessary, and containing about 0.5 Gm. of the quinine salt. Add a slight excess of ammonia T.S., and extract the alkaloid completely with successive portions of chloroform. Evaporate the combined chloroform solution in a tared beaker, dissolve the residue in 10 cc. of ether, evaporate to dryness, dry to constant weight at 105°, and weigh as $C_{20}H_{24}O_2N_2$.

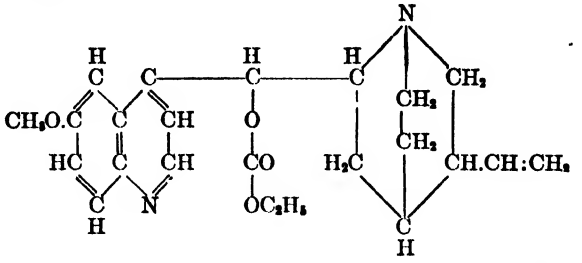
AVERAGE DOSE—**0.5 Gm.** of Quinine Dihydrochloride.

Quinine Ethylcarbonate

QUININE ETHYLCARBONATE

Quininæ Æthylcarbonas

Quin. Æthylcarb. **Euquinine**



$C_{22}H_{28}N_2O_4$ Mol. wt. 396.47

The ethylcarbonate of an alkaloid usually obtained from cinchona.

Description—Quinine Ethylcarbonate occurs as white, fine, soft needles, usually matted together in fleecy masses. It is odorless and practically tasteless, but when masticated it slowly develops a slightly bitter taste. It darkens on exposure to light. A saturated, aqueous solution of Quinine Ethylcarbonate is alkaline to litmus paper.

Solubility—One Gm. of Quinine Ethylcarbonate dissolves in 3 cc. of alcohol, in about 1 cc. of chloroform, and in 10 cc. of ether, at 25°. It is readily soluble in dilute acids but is only slightly soluble in water.

Melting point—Quinine Ethylcarbonate melts between 89° and 91°, page 731.

Identification—

A: A solution of Quinine Ethylcarbonate in diluted sulfuric acid exhibits a blue fluorescence.

B: To 5 cc. of an aqueous solution of Quinine Ethylcarbonate (1 in 1000), made with the aid of a slight excess of diluted sulfuric acid, add 2 or 3 drops of bromine T.S., and follow with 1 cc. of ammonia T.S.: the liquid acquires a green color due to the formation of thalleoquin.

C: To about 0.2 Gm. of Quinine Ethylcarbonate add 2 cc. of sodium hydroxide T.S. and 5 cc. of iodine T.S., and gently warm the mixture: the odor of iodoform is evolved.

D: Digest about 1 Gm. of Quinine Ethylcarbonate with 10 cc. of a solution of potassium hydroxide in dehydrated alcohol (1 in 20): a white precipitate which effervesces with acids gradually appears in the mixture.

Loss on drying—When dried over sulfuric acid for 18 hours, Quinine Ethylcarbonate loses not more than 2 per cent of its weight.

Residue on ignition—Quinine Ethylcarbonate yields not more than 0.2 per cent of residue on ignition, page 745.

Chloride—Dissolve 0.3 Gm. of Quinine Ethylcarbonate in 10 cc. of diluted nitric acid and 20 cc. of distilled water: a 10-cc. portion of this solution is not rendered turbid at once by the addition of a few drops of silver nitrate T.S.

Sulfate—A 10-cc. portion of the solution of Quinine Ethylcarbonate prepared for use in the test for *Chloride* does not become turbid at once upon the addition of a few drops of barium chloride T.S.

Storage—Preserve Quinine Ethylcarbonate in tight, light-resistant containers.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

QUININE HYDROBROMIDE

Quininæ Hydrobromidum

Quin. Hydrobrom.

$C_{20}H_{24}O_2N_2.HBr.H_2O$ Mol. wt. 423.35

Description—Quinine Hydrobromide occurs as small, white needles or scale-like crystals. It is odorless, has a very bitter taste, effloresces on exposure to the air, and is affected by light. An aqueous solution of Quinine Hydrobromide (1 in 50) is neutral or alkaline to litmus paper.

Solubility—One Gm. of Quinine Hydrobromide dissolves in about 40 cc. of water, in about 1 cc. of alcohol, in about 7 cc. of glycerin, in about 1 cc. of chloroform, and in about 25 cc. of ether, at 25°. One Gm. is soluble in about 3.2 cc. of water at 80°.

Identification—

A: An aqueous solution of Quinine Hydrobromide (1 in 50) becomes fluorescent when mixed with diluted sulfuric acid.

B: Precipitate the quinine with sodium hydroxide T.S. from an aqueous solution of Quinine Hydrobromide (1 in 50) and filter: the filtrate responds to the tests for *Bromide*, page 723.

C: Add to 5 cc. of an aqueous solution of Quinine Hydrobromide (1 in 1000) 3 drops of bromine T.S. and then 1 cc. of ammonia T.S.: the liquid acquires a green color due to the formation of thalleoquin.

Loss on drying—When dried to constant weight at 105°, Quinine Hydrobromide loses not more than 5 per cent of its weight.

Residue on ignition—Quinine Hydrobromide yields not more than 0.05 per cent of residue on ignition, page 745.

Readily carbonizable substances—The color of a solution produced by dissolving 0.25 Gm. of Quinine Hydrobromide in 5 cc. of sulfuric acid is not deeper than matching fluid M, page 744.

Sulfate—One Gm. of Quinine Hydrobromide shows no more sulfate than corresponds to 0.5 cc. of 0.02 *N* sulfuric acid, page 759.

Barium—The addition of 5 drops of diluted sulfuric acid to 10 cc. of a hot aqueous solution of Quinine Hydrobromide (1 in 20) produces no turbidity.

Inorganic salts—One Gm. of Quinine Hydrobromide dissolves completely in 7 cc. of a mixture of 2 volumes of chloroform and 1 volume of dehydrated alcohol.

Other cinchona alkaloids—Dissolve about 3 Gm. of Quinine Hydrobromide in 80 cc. of warm distilled water in a separator, and proceed as directed in the test for *Other cinchona alkaloids* under *Quinine and Urea Hydrochloride*, page 428, beginning with "add 10 cc. of ammonia T.S. . . ."

Storage—Preserve Quinine Hydrobromide in tight, light-resistant containers.

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains).

QUININE PHOSPHATE

Quininæ Phosphas

Quin. Phos.

$(C_{20}H_{24}O_2N_2)_3.2H_3PO_4.5H_2O$ Mol. wt. 1259.31

Quinine Phosphate yields not less than 74 per cent and not more than 78 per cent of $C_{20}H_{24}O_2N_2$.

Description—Quinine Phosphate occurs as small, white crystals, or as a white crystalline powder. It is odorless and has a bitter taste. It is affected by light. A saturated aqueous solution of Quinine Phosphate is acid to litmus paper.

Solubility—One Gm. of Quinine Phosphate dissolves in about 600 cc. of water and in about 60 cc. of boiling alcohol.

Identification—

A: A solution of Quinine Phosphate in diluted sulfuric acid (1 in 100) shows a blue fluorescence.

B: Add 3 drops of bromine T.S. to 5 cc. of a solution of Quinine Phosphate in diluted sulfuric acid (1 in 1000), and then add 1 cc. of ammonia T.S.: the liquid acquires a green color due to the formation of thalleoquin.

C: Dissolve about 0.5 Gm. of Quinine Phosphate in 10 cc. of distilled water with the aid of diluted nitric acid; then add an excess of sodium hydroxide T.S., filter, and neutralize the filtrate with nitric acid. This solution responds to the tests for *Phosphate*, page 727.

Readily carbonizable substances—The color of a solution produced by dissolving 0.25 Gm. of Quinine Phosphate in 5 cc. of sulfuric acid is not deeper than matching fluid N, page 744.

Chloride—Dissolve 0.6 Gm. of Quinine Phosphate in 10 cc. of distilled water and 5 cc. of diluted nitric acid, and add 1 cc. of silver nitrate T.S. If a turbidity is produced, it is not greater than that produced by 0.2 cc. of 0.02 *N* hydrochloric acid in a solution made with the same volumes of the reagents and 0.1 Gm. of the Quinine Phosphate.

Sulfate—A solution of 0.5 Gm. of Quinine Phosphate in 20 cc. of distilled water and 1 cc. of hydrochloric acid shows no more sulfate than corresponds to 0.5 cc. of 0.02 *N* sulfuric acid, page 759.

Other cinchona alkaloids—Dissolve 2.5 Gm. of Quinine Phosphate in a mixture of 25 cc. of distilled water and 25 cc. of diluted hydrochloric acid, add a slight excess of ammonia T.S., and proceed as directed in the test for *Other cinchona alkaloids* under *Quinine and Urea Hydrochloride*, page 428.

Assay—Dissolve about 0.5 Gm. of Quinine Phosphate, accurately weighed, in 15 cc. of distilled water, with the aid of hydrochloric acid, in a separator; add a slight excess of ammonia T.S., and completely extract the quinine with successive portions of chloroform. Wash the combined chloroform solutions twice with 5 cc. of distilled water, reject the washings, filter the solution through paper moistened with chloroform, and rinse the stem of the separator and the filter with a little chloroform. Evaporate the chloroform solution on a water bath to a few cc., add 10 cc. of alcohol, evaporate to dryness, dry at 105°, and weigh as $C_{20}H_{24}O_2N_2$.

Storage—Preserve Quinine Phosphate in tight, light-resistant containers.

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains).

Quinine Salicylate

QUININE SALICYLATE

Quininæ Salicylas

Quin. Salicyl.

$C_{20}H_{24}O_2N_2.C_6H_4.OH.COOH.H_2O$ Mol. wt. 480.55

Description—Quinine Salicylate occurs as white needles or powder. It is odorless, and has a bitter taste. It often assumes a pink color upon aging and is affected by light. A saturated aqueous solution of Quinine Salicylate is alkaline to litmus paper.

Solubility—One Gm. of Quinine Salicylate dissolves in about 15 cc. of alcohol, in about 13 cc. of glycerin, in about 25 cc. of chloroform, and in about 160 cc. of ether, at 25°. It is slightly soluble in water.

Identification—
A: A saturated aqueous solution of Quinine Salicylate responds to the tests for *Salicylate*, page 727.
B: Add to a saturated aqueous solution of Quinine Salicylate 3 drops of bromine T.S. and then 1 cc. of ammonia T.S.: the liquid acquires a green color due to the formation of thalleoquin.

Readily carbonizable substances—The color of a solution produced by dissolving 0.25 Gm. of Quinine Salicylate in 5 cc. of sulfuric acid is not deeper than matching fluid M, page 744.

Loss on drying—When dried to constant weight at 105°, Quinine Salicylate loses not more than 5 per cent of its weight.

Residue on ignition—Quinine Salicylate yields not more than 0.05 per cent of residue on ignition, page 745.

Chloride—Add 0.2 Gm. of Quinine Salicylate to 10 cc. of water containing an excess of nitric acid and filter: the filtrate shows no more chloride than corresponds to 0.2 cc. of 0.02 *N* hydrochloric acid, page 758.

Sulfate—Ten cc. of an aqueous solution of Quinine Salicylate prepared as directed in the preceding test, but using hydrochloric acid for the precipitation of the salicylic acid, shows no more sulfate than corresponds to 0.2 cc. of 0.02 *N* sulfuric acid, page 759.

Other cinchona alkaloids—Mix about 2.5 Gm. of Quinine Salicylate with 60 cc. of distilled water in a separator, and proceed as directed in the test for *Other cinchona alkaloids* under *Quinine and Urea Hydrochloride*, page 428.

Storage—Preserve Quinine Salicylate in tight, light-resistant containers.

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains).

QUININE SULFATE CAPSULES

Capsulæ Quininæ Sulfatis

Cap. Quin. Sulf.

Quinine Sulfate Capsules contain not less than 94 per cent and not more than 106 per cent of the labeled amount of $(C_{20}H_{24}N_2O_2)_2.H_2SO_4.2H_2O$.

Identification—
A: Dissolve the residue obtained in the assay by warming with 1 cc. of diluted sulfuric acid and 5 cc. of distilled water, and dilute with distilled water to make a volume of 10 cc.: the resulting solution exhibits a blue fluorescence and is lævorotatory.
B: Shake the contents of a sufficient number of capsules equivalent to about 0.2 Gm. of quinine sulfate in warm water, acidified with a few drops of hydrochloric acid, and filter. The addition of barium chloride T.S. to the clear filtrate produces a white precipitate insoluble in hydrochloric acid.

Assay—Transfer, as completely as possible, the contents of 20 Quinine Sulfate Capsules to a 250-cc. volumetric flask. Add 50 cc. of distilled water and 5 cc. of diluted sulfuric acid, agitate well, and allow to stand for 1 hour. Add distilled water to make the mixture measure 250 cc., mix well, and filter through an asbestos pad in a Gooch crucible or through a sintered glass crucible. Transfer to a separator, an accurately measured volume of the clear solution, equivalent to about 0.4 Gm. of quinine sulfate, render it distinctly alkaline with ammonia T.S., and extract the alkaloid with successive portions of chloroform, using 25 cc., 10 cc., 10 cc., and 10 cc., or more if necessary, until the alkaloid is completely extracted. Wash the combined chloroform extract with 5 cc. of distilled water, then

filter the extract through a filter moistened with chloroform, and wash the separator and the filter with several 5-cc. portions of chloroform. Evaporate the combined chloroform extract in a tared vessel on a water bath with the aid of a current of air to about 2 cc., and add 10 cc. of alcohol, evaporate to dryness, and dry at 105°, to constant weight. The weight of quinine so obtained, multiplied by 1.207, represents the equivalent of $(C_{20}H_{24}N_2O_2)_2.H_2SO_4.2H_2O$.

Storage—Preserve Quinine Sulfate Capsules in tight containers.

Sizes—Quinine Sulfate Capsules usually available contain the following amounts of quinine sulfate: **60 mg.**, and **0.12, 0.2, 0.25,** and **0.3 Gm.** (approximately 1, 2, 3, 4, and 5 grains).

AVERAGE DOSE—**0.6 Gm.** (approximately 10 grains) of Quinine Sulfate.

Raspberry Juice

RASPBERRY JUICE
Succus Rubi Idæi

Suc. Rub. Id.

Raspberry Juice is the liquid expressed from the fresh ripe fruit of varieties of *Rubus idæus* Linné or of *Rubus strigosus* Michaux (Fam. *Rosaceæ*).

Raspberry Juice contains not less than 1.5 per cent of citric acid, $C_6H_8O_7.H_2O$. It may be prepared as follows:

Express the juice from washed, well-drained, fresh, ripe red raspberries; dissolve 0.1 per cent of benzoic acid in the expressed juice and allow it to stand at room temperature (possibly for several days) until a small portion of the filtered juice produces a clear solution when mixed with one-half of its volume of alcohol; this solution does not become cloudy within 30 minutes. Strain the juice from the mixture or filter it, if necessary.

Description—Raspberry Juice is a clear liquid with an aromatic, characteristic odor and a characteristic, sour taste. The color of the freshly prepared Juice is red to reddish orange. It is affected by light.

Specific gravity—The specific gravity of Raspberry Juice is not less than 1.025 and not more than 1.045 at 25°.

Refractive index—The refractive index of Raspberry Juice is not less than 1.3445 at 25°, page 745.

Identification—Add 2 cc. of 0.5 *N* sodium hydroxide to 2 cc. of Raspberry Juice: the color of the mixture becomes olive-brown to yellow-green.

Residue on ignition—Ignite the residue from 10 cc. of Raspberry Juice: the weight of the residue is not less than 25 mg. and not more than 45 mg.

Hydrogen-ion concentration—The hydrogen-ion concentration expressed as *p*H is not less than 2.75 and not more than 3.75 at 25°.

Total solids—Evenly spread 5 cc. of Raspberry Juice over the bottom of a tared half petri dish and place on an actively boiling water bath for 1 hour. Place in a vacuum desiccator, evacuate, allow to stand 16 hours, and weigh: the weight of the residue is not less than 0.25 Gm.

Reducing sugars—Add lead acetate T.S. to 5 cc. of Raspberry Juice until the mix-

ture, when filtered, gives no further precipitation with the lead acetate solution. Filter the mixture, and add 5 cc. of an aqueous solution of potassium oxalate (1 in 10) to remove the excess lead acetate by precipitation. Again filter the mixture and add 5 cc. of alkaline cupric tartrate T.S. to 5 cc. of the clear filtrate: upon warming a red precipitate is produced.

Volatile acids—Distil 25 cc. of Raspberry Juice with steam to obtain 100 cc. of distillate: not more than 2.5 cc. of 0.1 *N* sodium hydroxide T.S. is required for neutralization with phenolphthalein T.S. as the indicator.

Absence of coal-tar dyes—Add 0.4 Gm. of yellow mercuric oxide to 10 cc. of Raspberry Juice; shake the mixture violently for at least 1 minute; after settling, filter through double filter paper until clear: the filtrate is nearly colorless to pale brown.

Arsenic—To 50 cc. of Raspberry Juice in a Kjeldahl flask add 10 cc. of nitric acid and 5 cc. of sulfuric acid; heat the mixture until the volume is reduced to about 10 cc. and the color becomes brownish or black; add a further small portion of nitric acid and continue the heating, adding small portions of nitric acid as often as browning recurs, until the organic matter is destroyed and dense, white fumes are liberated; then dilute the solution with about 10 cc. of water and add 0.5 Gm. of ammonium oxalate. Continue the heating until dense, white fumes are again evolved and the solution is colorless to weak yellow in color. Cool the mixture, dilute cautiously with distilled water to a volume of 50 cc., and using 5 cc. of the dilution apply the test for *Arsenic*, page 689. The stain produced by the 5 cc. of the solution does not exceed the stain produced by 0.002 mg. of arsenic trioxide.

Assay—Evaporate 10 cc. of Raspberry Juice to dryness on a water bath and continue to heat for 15 minutes at water bath temperature. Dissolve the residue in 10 cc. of water and repeat the process of evaporation and heating. Redissolve the residue in 10 cc. of water, add 1 Gm. of magnesium oxide, heat the mixture for 5 minutes on a water bath, filter and wash. To the filtrate in a beaker add 50 cc. of water, 20 cc. of sodium phosphate T.S., and 20 cc. of ammonia T.S. Allow to stand for 3 hours or overnight. Filter, and wash the precipitate with several 10-cc. portions of distilled water. Ignite the paper and residue and heat to constant weight. Each Gm. of residue is equivalent to 1.258 Gm. of $C_6H_9O_7.H_2O$.

Storage—Preserve Raspberry Juice in tight, light-resistant containers, and avoid excessive heat.

RASPBERRY SYRUP

Syrupus Rubi Idæi

Syr. Rub. Id.

Raspberry Juice	475 cc.
Sucrose	800 Gm.
Alcohol	20 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the sucrose in the raspberry juice by heating on a water bath, cool, and remove the scum. Add the alcohol and sufficient distilled water to make 1000 cc. of the syrup. Mix well.

Alcohol content—From 1 to 2 per cent, by volume, of C_2H_5OH.

Storage—Preserve Raspberry Syrup in tight, light-resistant containers and avoid excessive heat.

Rectified Birch Tar Oil, page 81
Rectified Tar Oil, page 527
Rectified Turpentine Oil, page 544
Red Aromatic Elixir, page 62
Red Ferric Oxide, page 217
Red Mercuric Iodide, page 326
Red Mercuric Iodide Tablets, page 327
Red Mercuric Oxide, page 328
Red Mercuric Oxide Ointment, page 329
Reduced Iron, page 279

Rennin

RENNIN
Renninum

The partially purified milk-curdling enzyme obtained from the glandular layer of the stomach of the calf, *Bos taurus* Linné (Fam. *Bovidæ*).

Rennin possesses a coagulating activity of not less than 90 per cent and not more than 110 per cent of the Reference Rennin, page 744. Rennin of a higher coagulating power may be brought to the requisite strength by admixture with lactose or sodium chloride or both.

Description—Rennin occurs as a yellowish white powder, or as yellow grains or scales, having a characteristic and slightly salty taste, and a peculiar, not unpleasant odor. It is slightly hygroscopic.

Solubility—Rennin is partially soluble in water and in diluted alcohol.

Tests for purity—When mounted in water or diluted alcohol and examined microscopically, it shows no cellular structure, and no blue coloration is produced on the addition of iodine T.S.

Assay—Mix 0.1 Gm. of Rennin with 50 cc. of distilled water by gentle stirring, and allow the mixture to stand exactly 15 minutes. Mix 0.1 Gm. of Reference Rennin, page 744, with 50 cc. of distilled water by gentle stirring, and allow the mixture to stand for exactly 15 minutes.

Place 50 cc. of well-mixed cow's milk in each of 2 glass vessels about 12 cm. high and 4.5 cm. in diameter. Warm the milk rapidly to a temperature of 43°, and maintain it on a water bath at this temperature. Add 1 cc. of the rennin solution to the milk in one vessel, and 1 cc. of the Reference Rennin solution to the milk in the other vessel, noting the time when each solution is added. Stir each milk mixture slowly for 10 seconds immediately after the solution is added. Note the time which elapses until the milk thickens, as shown by a distinctly convex surface when the vessel is tipped to an angle of about 45°.

The rennin solution coagulates in not less than 90 per cent and not more than 110 per cent of the time required by the Reference Rennin solution.

NOTE: Milk varies in its coagulability. Different lots of milk, or the same distributor's milk obtained on successive days, may be found to vary in coagulation time with the Reference Rennin.

Storage—Preserve Rennin in tight containers, and avoid excessive heat.

Residue, Ovarian, page 369

Resins

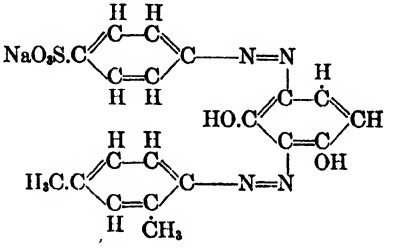
Ipomea Resin, page 272
Jalap Resin, page 284
Podophyllum Resin, page 402

Resorcin Brown

RESORCIN BROWN

Resorcinol Fuscum

Resorc. Fuscum **D & C Brown No. 1**



$C_{20}H_{17}N_4O_5SNa$ Mol. wt. 448.43

Resorcin Brown is the monosodium salt of 4-*p*-sulfophenylazo-2-(2,4-xylylazo)-1,3-resorcinol.

Description—Resorcin Brown occurs as a strong brown to deep brown powder. It is affected by light.

Solubility—One Gm. of Resorcin Brown dissolves in about 15 cc. of water at 25°; it is also soluble in glycerin, in methyl and ethyl alcohol, and is sparingly soluble in ether, and in acetone.

Color—The color of an aqueous solution of the dye is reddish brown to yellowish orange. A brownish precipitate is formed in an aqueous solution on the addition of hydrochloric or sulfuric acids; sodium hydroxide T.S. reddens and intensifies the color.

Stability (Fastness)—The stability of an aqueous solution of Resorcin Brown is fair to light, good to acids, very good to alkalies, fair to oxidizing agents and very poor to reducing agents.

Standard—Resorcin Brown complies with the specifications for D & C Brown No. 1 as listed in Coal-Tar Color Regulations promulgated under the authority of the Food, Drug, and Cosmetic Act.

Storage—Preserve Resorcin Brown in tight, light-resistant containers.

Resorcin Brown Solution

RESORCIN BROWN SOLUTION

Liquor Resorcinolis Fusci

Liq. Resorcin. Fusci

Resorcin Brown	**5 Gm.**
Distilled Water, a sufficient quantity,	
To make	**1000 cc**

Dissolve the Resorcin Brown in sufficient distilled water to make the product measure 1000 cc.

Description—Resorcin Brown Solution is an odorless, clear, reddish brown liquid.
Identification—Dry 20 cc. of Resorcin Brown Solution to constant weight at 100°: the weight of the residue is not less than 90 mg. and not more than 0.11 Gm. The residue meets the requirements under *Resorcin Brown*, page 437.
Storage—Preserve Resorcin Brown Solution in tight containers.

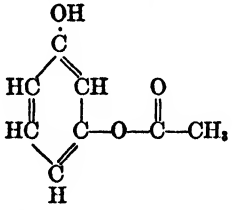
Resorcinol Monoacetate

RESORCINOL MONOACETATE

Resorcinolis Monoacetas

Resorcin Acetate

$C_8H_8O_3$



Mol. wt. 152.14

Description—Resorcinol Monoacetate is a viscous, pale yellow or amber liquid with a faint characteristic odor and a burning taste. It boils at about 283° with decomposition. A saturated aqueous solution of Resorcinol Monoacetate is acid to litmus paper.
Solubility—Resorcinol Monoacetate dissolves in alcohol and in most organic solvents. It is sparingly soluble in water.
Specific gravity—The specific gravity of Resorcinol Monoacetate is not less than 1.203 and not more than 1.207 at 25°.
Identification—
A: Fuse 3 drops of Resorcinol Monoacetate with about 0.3 Gm. of phthalic anhydride and about 50 mg. of zinc chloride: a small portion of the fused mixture when dissolved in 10 cc. of sodium hydroxide T.S. produces an intense blue fluorescence typical of fluorescein.
B: Dissolve 0.5 cc. of Resorcinol Monoacetate in 3 cc. of alcohol, add 3 drops of sulfuric acid and boil: ethyl acetate, recognized by its odor, is evolved.
Free acid—A solution of 10 cc. of Resorcinol Monoacetate in 20 cc. of benzene, when shaken with 100 cc. of distilled water, requires not more than 0.5 cc. of 0.1 *N* sodium hydroxide for neutralization, using methyl orange T.S. as the indicator.
Loss on drying—When dried on a water bath for 1 hour, Resorcinol Monoacetate loses not more than 2.5 per cent of its weight.
Residue on ignition—Resorcinol Monoacetate yields not more than 0.1 per cent of residue on ignition, page 745.
Storage—Preserve Resorcinol Monoacetate in tight, light-resistant containers.

COMPOUND RESORCINOL OINTMENT

Unguentum Resorcinolis Compositum

Ung. Resorcin. Comp.

Resorcinol	60 Gm.
Zinc Oxide	60 Gm.
Bismuth Subnitrate	60 Gm.
Rectified Birch Tar Oil	60 Gm.
Yellow Wax	100 Gm.
Petrolatum	250 Gm.
Wool Fat	280 Gm.
Glycerin	130 Gm.
To make	1000 Gm.

Melt the yellow wax and wool fat in a dish on a water bath. Triturate the zinc oxide and bismuth subnitrate with the petrolatum until smooth, and add it to the melted mixture. Dissolve the resorcinol in the glycerin; incorporate the solution with the warm mixture just prepared; then add the rectified birch tar oil, and stir the Ointment until it congeals.

Storage—Preserve Compound Resorcinol Ointment in tight containers and avoid prolonged exposure to temperatures above 30°.

MILD RESORCINOL PASTE

Pasta Resorcinolis Mitis

Past. Resorcin. Mit. Lassar's Mild Resorcinol Paste

Mild Resorcinol Paste contains, in each 100 Gm., not less than 9.5 Gm. and not more than 10.5 Gm. of $C_6H_4(OH)_2$, and not less than 24 Gm. and not more than 26 Gm. of ZnO.

Resorcinol	100 Gm.
Zinc Oxide	250 Gm.
Starch	250 Gm.
Light Liquid Petrolatum	400 Gm.
To make	1000 Gm.

Thoroughly triturate the zinc oxide with sufficient of the liquid petrolatum to make a thin, smooth paste. Reduce the resorcinol to a very fine powder, mix it with the starch, add the mixture to the zinc oxide paste, and triturate until a uniformly smooth product is obtained. Then gradually incorporate the remainder of the liquid petrolatum.

Assays for resorcinol and zinc oxide—Proceed as directed in the *Assays* under *Strong Resorcinol Paste*, page 440.
Storage—Preserve Mild Resorcinol Paste in well-closed containers.

Resorcinol Paste, Strong

STRONG RESORCINOL PASTE
Pasta Resorcinolis Fortis

Past. Resorcin. Fort. Lassar's Stronger Resorcinol Paste

Strong Resorcinol Paste contains, in each 100 Gm., not less than 19 Gm. and not more than 21 Gm. of $C_6H_4(OH)_2$, and not less than 19 Gm. and not more than 21 Gm. of ZnO.

Resorcinol	200 Gm.
Zinc Oxide	200 Gm.
Starch	200 Gm.
Light Liquid Petrolatum	400 Gm.
To make	1000 Gm.

Thoroughly triturate the zinc oxide with sufficient of the liquid petrolatum to make a thin, smooth paste. Reduce the resorcinol to a very fine powder, mix it with the starch, add the mixture to the zinc oxide paste, and triturate until a uniformly smooth product is obtained. Then gradually incorporate the remainder of the liquid petrolatum.

Assay for resorcinol—Place 1 Gm. of the Paste, accurately weighed, in a 250-cc. flask, add 40 cc. of hot water, stopper the flask tightly, and shake it vigorously. Decant the supernatant liquid onto a moistened filter and collect the filtrate in a 100-cc. volumetric flask. Repeat the shaking-out process with two 15-cc. portions of hot water, decanting after each extraction. Finally, rinse the contents of the flask onto the filter, and wash with sufficient hot water to make 100 cc. of filtrate. Carefully preserve the filter and its contents for the determination of zinc oxide as directed below under *Assay for zinc oxide*. Transfer 40 cc. of the filtrate, representing 0.4 Gm. of the Paste, to a 500-cc. glass-stoppered iodine flask, add 50 cc. of 0.1 *N* bromine, dilute with 50 cc. of distilled water, add 5 cc. of hydrochloric acid, and at once stopper the flask. Shake the mixture, allow it to stand for 1 minute, dilute it with 20 cc. of distilled water, add 5 cc. of potassium iodide T.S., allow it to stand for 5 minutes, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Each cc. of 0.1 *N* bromine is equivalent to 0.001835 Gm. of $C_6H_4(OH)_2$.

Assay for zinc oxide—Dry and ignite the filter used in the preceding assay, together with its contents, until free of organic matter. Digest the residue, after ignition, with 25 cc. of 1 *N* sulfuric acid until solution is complete. Then titrate the excess sulfuric acid with 1 *N* sodium hydroxide, using methyl orange T.S. as the indicator. Each cc. of 1 *N* sulfuric acid is equivalent to 0.04069 Gm. of ZnO.
Storage—Preserve Strong Resorcinol Paste in well-closed containers.

RHUBARB AND SODA MIXTURE

Mistura Rhei et Sodæ

Mist. Rhei et Sod.

Rhubarb Fluidextract	15 cc.
Ipecac Fluidextract	3 cc.
Sodium Bicarbonate	35 Gm.
Peppermint Spirit	35 cc.
Glycerin	200 cc.
Distilled Water, a sufficient quantity, To make	1000 cc.

Dissolve the sodium bicarbonate in about 500 cc. of the distilled water; add the fluidextracts, the glycerin, the peppermint spirit, and sufficient distilled water to make the product measure 1000 cc.; mix it thoroughly.

Alcohol content—From 2 to 4 per cent, by volume, of C_2H_5OH.
Storage—Preserve Rhubarb and Soda Mixture in tight containers.

AVERAGE DOSE—4 cc. (approximately 1 fluidrachm).

One average metric dose contains 0.06 cc. of Rhubarb Fluidextract, 0.012 cc. of Ipecac Fluidextract, 0.14 Gm. of Sodium Bicarbonate, and 0.14 cc. of Peppermint Spirit.

ALKALINE RHUBARB ELIXIR

Elixir Rhei Alkalinum

Elix. Rhei Alk. Neutralizing Cordial

Rhubarb Fluidextract	16 cc.
Hydrastis Fluidextract	8 cc.
Potassium Carbonate	16 Gm.
Cinnamon Tincture	64 cc.
Peppermint Spirit	8 cc.
Syrup	250 cc.
Diluted Alcohol, a sufficient quantity, To make	1000 cc.

Dissolve the potassium carbonate in the syrup; add the solution to a mixture of the fluidextracts, the tincture, the spirit, and 625 cc. of diluted alcohol. Mix well, add sufficient diluted alcohol to make the product measure 1000 cc., and filter, if necessary, until the product is clear.

Alcohol content—From 34 to 38 per cent, by volume, of C_2H_5OH.
Storage—Preserve Alkaline Rhubarb Elixir in tight containers.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains 0.064 cc. of Rhubarb Fluidextract, 0.032 cc. of Hydrastis Fluidextract and 64 mg. of Potassium Carbonate.

Rhubarb Extract

RHUBARB EXTRACT
Extractum Rhei

Ext. Rhei Powdered Rhubarb Extract

Each Gm. of Rhubarb Extract represents 2 Gm. of rhubarb.

Prepare an extract by percolating 1000 Gm. of rhubarb, in moderately coarse powder, using a mixture of 4 volumes of alcohol and 1 volume of water as the menstruum. Macerate the moistened drug during 48 hours, and then percolate it at a moderate rate. Evaporate the percolate to dryness at a temperature not exceeding 70°. Powder the residue, and add sufficient starch, dried at 100°, to make the product weigh 500 Gm. Mix thoroughly and pass the Extract through a fine sieve.

Storage—Preserve Rhubarb Extract in tight, light-resistant containers, preferably at a temperature not above 30°.

AVERAGE DOSE—**0.5 Gm.** (approximately $7\frac{1}{2}$ grains).

Rhubarb Fluidextract

RHUBARB FLUIDEXTRACT
Fluidextractum Rhei

Fldext. Rhei

Prepare the Fluidextract from rhubarb, in moderately coarse powder, by Process A, page 718. Use a mixture of 4 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 12 hours, and percolate rapidly.

Alcohol content—From 55 to 63 per cent, by volume, of C_2H_5OH.
Storage—Preserve Rhubarb Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**1 cc.** (approximately 15 minims).

COMPOUND RHUBARB POWDER

Pulvis Rhei Compositus

Pulv. Rhei Comp. Gregory's Powder

Rhubarb, in very fine powder	**250 Gm.**
Magnesium Oxide	**650 Gm.**
Ginger, in very fine powder	**100 Gm**
To make	**1000 Gm.**

Triturate the rhubarb and ginger together; gradually add the magnesium oxide, continuing the trituration lightly until the ingredients are thoroughly mixed.

Description—Compound Rhubarb Powder occurs as a weak orange-pink powder, becoming darker on exposure to moisture. It contains magnesium oxide in fine particles. It shows numerous ellipsoidal or ovoid starch grains, often with a prominent beak and up to 60 microns long (*ginger*); and simple and spheroidal starch grains compound and polygonal, with a central cleft, and up to 25 microns in diameter (*rhubarb*). The calcium oxalate crystals are in rosette aggregates up to 150 microns in diameter in the brown to yellowish brown parenchyma fragments of rhubarb. When mounted in chloral hydrate T.S. the powder shows strong effervescence, and when mounted in strong alkalies it shows fragments of tissue which are purplish red to reddish orange.

Storage—Preserve Compound Rhubarb Powder in tight containers.

AVERAGE DOSE—**2 Gm.** (approximately 30 grains).

One average metric dose contains 0.5 Gm. of Rhubarb, 1.3 Gm. of Magnesium Oxide, and 0.2 Gm. of Ginger.

RHUBARB SYRUP

Syrupus Rhei

Syr. Rhei

Rhubarb Fluidextract	**100 cc.**
Cinnamon Spirit	**4 cc.**
Potassium Carbonate	**10 Gm.**
Distilled Water	**50 cc.**
Syrup, a sufficient quantity,	
To make	**1000 cc.**

Mix the cinnamon spirit with the fluidextract, add the potassium carbonate, previously dissolved in the water, and add to this mixture enough syrup to make the product measure 1000 cc. Mix well.

Alcohol content—From 5 to 7 per cent, by volume, of C_2H_5OH.
Storage—Preserve Rhubarb Syrup in tight containers, and avoid excessive heat.

AVERAGE DOSE—10 cc. (approximately $2^1/_2$ fluidrachms).

One average metric dose contains 1 cc. of Rhubarb Fluidextract.

Rhubarb Tincture

RHUBARB TINCTURE
Tinctura Rhei

Tr. Rhei

Rhubarb, in moderately coarse powder	200 Gm.
Cardamom Seed, in moderately coarse powder	30 Gm.
Glycerin	100 cc.
Alcohol,	
Diluted Alcohol,	
Water, each, a sufficient quantity,	
To make	1000 cc.

Prepare the Tincture by Process P, page 758. Use a mixture of the glycerin, 500 cc. of alcohol, and 400 cc. of water as the first menstruum, and complete the percolation with diluted alcohol; macerate the mixed drugs during 12 hours, and percolate rapidly.

Alcohol content—From 43 to 46 per cent, by volume, of C_2H_5OH.
Storage—Preserve Rhubarb Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—4 cc. (approximately 1 fluidrachm).

Rhubarb Tincture, Sweet

SWEET RHUBARB TINCTURE
Tinctura Rhei Dulcis

Tr. Rhei Dulc.

Rhubarb, in moderately coarse powder	100 Gm.
Glycyrrhiza, in moderately coarse powder	40 Gm.
Anise, in coarse powder	40 Gm.
Cardamom Seed, in coarse powder	10 Gm.
Glycerin	100 cc.
Alcohol,	
Diluted Alcohol,	
Water, each, a sufficient quantity,	
To make	1000 cc.

Prepare the Tincture by Process P, page 758. Use a mixture of 100 cc. of glycerin, 500 cc. of alcohol, and 400 cc. of water as the first menstruum, and complete the percolation with diluted alcohol; macerate the mixed drugs during 12 hours, and percolate rapidly.

Alcohol content—From 42 to 46 per cent, by volume, of C_2H_5OH.
Storage—Preserve Sweet Rhubarb Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—4 cc. (approximately 1 fluidrachm).

Rose

ROSE
Rosa

Red Rose Petals French Rose Rosa Gallica

Rose consists of the dried petals of *Rosa gallica* Linné (Fam. *Rosaceæ*), collected just before the expansion of the flowers.

Unground Rose—Unground Rose occurs as petals either separate or imbricated in small cones, broadly ovate, with a rounded and deeply notched summit, an entire and a somewhat recurved margin, and an obtuse base. Externally it is dark purplish red to weak red except for the yellowish brown to yellowish orange claw. The texture is velvety, and when dry, is brittle. The odor is agreeable and the taste astringent.
Foreign organic matter—Rose contains not more than 1 per cent of foreign organic matter, page 760.
Acid-insoluble ash—Rose yields not more than 1 per cent of acid-insoluble ash, page 761.
Storage—Preserve Rose in tight, light-resistant containers.

Rosin

ROSIN
Resina
Colophony

Rosin is a solid resin obtained from *Pinus palustris* Miller, and from other species of *Pinus* (Fam. *Pinaceæ*).

Description—Rosin occurs as sharply angular, translucent, amber-colored fragments, frequently covered with a yellow dust. The fracture is brittle at ordinary temperatures, shiny and shallow-conchoidal. The odor and taste are slightly terebinthinate. Rosin is easily fusible and burns with a dense, yellowish smoke. An alcohol solution of Rosin is acid to litmus paper.
Solubility—Rosin dissolves in alcohol, in ether, in benzene, in glacial acetic acid, and in fixed or volatile oils. It is also soluble in dilute solutions of the fixed alkali hydroxides.
Specific gravity—The specific gravity of Rosin is not less than 1.07 and not more than 1.09 at 25°.

Residue on ignition—Rosin yields not more than 0.1 per cent of residue on ignition, page 745.
Acid value—The acid value of Rosin is not less than 150, page 712, using about 1 Gm. of Rosin, accurately weighed.
Storage—Preserve Rosin in well-closed containers.

Rosin Cerate

ROSIN CERATE
Ceratum Resinæ

Cerat. Res.

Rosin	**350 Gm.**
Yellow Wax	**150 Gm.**
Lard	**500 Gm.**
To make	**1000 Gm.**

Melt the rosin, add the yellow wax and lard, and heat the mixture until it is liquefied, then strain the liquid through muslin, and stir it occasionally until it congeals.

Storage—Preserve Rosin Cerate in well-closed containers.

Rosin Cerate, Compound

COMPOUND ROSIN CERATE
Ceratum Resinæ Compositum

Cerat. Res. Comp. — Deshler's Salve

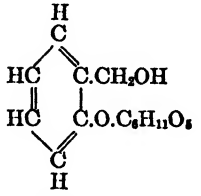
Rosin	**230 Gm.**
Yellow Wax	**220 Gm.**
Prepared Suet	**300 Gm.**
Turpentine	**120 Gm.**
Linseed Oil	**130 Gm.**
To make	**1000 Gm.**

Melt the rosin, yellow wax, and prepared suet; add the linseed oil and turpentine, and continue the heat, if necessary, until the mixture is liquefied. Strain it through coarse muslin, and then stir until it begins to congeal.

Storage—Preserve Compound Rosin Cerate in well-closed containers at a temperature below 40°.

Saccharated Ferrous Carbonate, page 223
Saccharated Pepsin, page 383

SALICIN
Salicinum



$C_{13}H_{18}O_7$ Mol. wt. 286.27

Description—Salicin occurs as colorless, silky, shining needles or prisms, or as a white crystalline powder. It is odorless, and has a very bitter taste. An aqueous solution of Salicin (1 in 30) is neutral to litmus paper.

Solubility—One Gm. of Salicin dissolves in about 25 cc. of water and in about 90 cc. of alcohol, at 25°. One Gm. dissolves in about 3.3 cc. of water at 80°, or in about 30 cc. of alcohol at 60°. It is insoluble in chloroform and in ether.

Melting point—Salicin melts between 199° and 202°, page 731.

Optical rotation—The specific rotation, $[\alpha]_D^{25}$, of Salicin, previously dried to constant weight over sulfuric acid, and determined in a solution containing 3 Gm. of Salicin in sufficient water to make 100 cc., is not less than −62° and not more than −67°, page 737.

Identification—

A: Heat a small portion of Salicin in a test tube until it turns brown, add a few cc. of distilled water and 1 drop of ferric chloride T.S.: a red-purple color is produced.

B: With sulfuric acid, Salicin produces a red color which disappears on the addition of distilled water.

C: Heat gently about 0.1 Gm. of Salicin with about 0.2 Gm. of potassium dichromate and 2 cc. of diluted sulfuric acid: the fragrant odor of salicylic aldehyde is developed.

Loss on drying—When dried over sulfuric acid for 4 hours, Salicin loses not more than 2 per cent of its weight.

Residue on ignition—Salicin yields not more than 0.05 per cent of residue on ignition, page 745.

Alkaloids—Ten cc. of an aqueous solution of Salicin (1 in 50) yields no precipitate on the addition of 1 cc. of tannic acid T.S., picric acid T.S., or mercuric potassium iodide T.S.

Salicylic acid—Ten cc. of an aqueous solution of Salicin (1 in 50) is not colored purplish by 1 drop of ferric chloride T.S.

Heavy metals—Dissolve 0.5 Gm. of Salicin in 1 cc. of diluted acetic acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Salicin does not exceed 30 parts per million.

Storage—Preserve Salicin in tight containers.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Salicylic Collodion, page 165

Salvia

SALVIA

Salvia

Garden-sage

Salvia is the dried leaf of *Salvia officinalis* Linné (Fam. *Labiatæ*).

Salvia yields not less than 1.25 cc. of volatile oil from each 100 Gm. of drug.

Unground Salvia—Unground Salvia occurs as oblong-lanceolate or ovate leaves, 2 to 10 cm. long and 1 to 3 cm. broad, having an acute or obtuse apex, and a rounded to cuneate base, frequently lobed. The margin is crenulate; the upper surface with depressed midrib is light olive-gray to weak yellow-green and densely pubescent especially in younger leaves. The lower surface is paler, densely pubescent, having midrib and larger veins raised. The venation is pinnate-reticulate; and the texture velvety. The petiole is from 1.0 to 4.5 cm. in length, pubescent, and grooved on the upper surface.

Histology—In transverse section, Salvia shows an upper epidermis, undulate in outline and composed of large, thick-walled, cutinized cells having slightly wavy, polygonal, beaded walls in surface view. Beneath the upper epidermis are 1 to 2 layers of palisade parenchyma followed by about 4 layers of spongy parenchyma containing chloroplastids and resin. The lower epidermis is undulate in outline and is made up of small, thin-walled cells having a very wavy cuticle and a wavy outline in surface view. Adjacent to the stomata are 2 crescent-shaped neighboring cells, usually unequal in size, whose long axes run perpendicular to the stomal opening. Both epidermises are profusely covered with hairs mostly of the non-glandular type, though several types of glandular hairs also occur. The midrib shows 1 to 5 layers of collenchyma beneath each epidermis and a concavo-convex group of open collateral bundles separated by medullary rays usually 1 cell, and rarely 2 cells in width.

Powdered Salvia—Powdered Salvia is dusky greenish yellow to light olive, has a strongly aromatic odor and an aromatic, bitter taste. It shows numerous non-glandular hairs, uniseriate, 1- to 5-celled, usually curved or bent, the end cell attenuate and the lumen of the basal cell usually narrower than that of the other cells; glandular hairs of three types, those having a 2- to 4-celled stalk and a 1- to 2-celled head, those having a 1-celled stalk and a 1- to 2-celled head, and a third having an 8-celled glandular head; numerous fragments of chlorenchyma, and of epidermis, occasionally bearing stomata.

Other Salvia species—Unground Salvia contains no leaves that are broader or darker green than specified in this monograph, or with a cordate base.

Powdered Salvia does not contain stellate hairs (*Phlomis species*) or an abundance of reticulate tracheæ and crystal-bearing cells (*Sage stems*).

Stems—Salvia contains not more than 10 per cent of the stems of the plant.

Foreign organic matter—Salvia contains not more than 2 per cent of foreign organic matter, other than stems, page 760.

Crude fiber—Salvia yields not more than 25 per cent of crude fiber, page 762.

Total ash—Salvia yields not more than 10 per cent of total ash, page 760.

Acid-insoluble ash—Salvia yields not more than 1 per cent of acid-insoluble ash, page 761.

Assay—Place about 150 Gm. of Salvia, coarsely comminuted or powdered and accurately weighed, into the flask of the apparatus used for volatile oil determinations, and proceed with the assay as directed on page 764, Process A.

AVERAGE DOSE—**4 Gm.** (approximately 60 grains).

SANGUINARIA
Sanguinaria

Sanguin. **Bloodroot**

Sanguinaria is the dried rhizome of *Sanguinaria canadensis* Linné (Fam. *Papaveraceæ*).

Unground Sanguinaria—Unground Sanguinaria occurs in horizontal growth, occasionally branching, often flexuous, more or less cylindrical, somewhat flattened, from 2 to 7 cm. in length, and from 5 to 15 mm. in diameter. Externally it is brown, slightly annulate, with a few stem-scars on the upper surface and numerous root-scars or occasional filiform roots on the lower surface. The fracture is short, somewhat waxy, most of the rhizomes showing a dusky red to moderate orange internal color and yellowish fibro-vascular bundles.

Histology—Sanguinaria shows an epidermis of thin-walled cells; a cortex of from 10 to 15 rows of thin-walled parenchyma cells; a zone of cambium, most of which is interfascicular; a narrow zone of small, collateral fibro-vascular bundles, and a very large pith. The parenchyma cells of the cortex, medullary rays and pith, contain numerous starch grains and occasionally a small amount of fixed oil. Latex cells containing a reddish brown or orange secretion either isolated or connected into irregular chains are distributed throughout the cortex and pith. Sections treated with glycerin for 24 hours show spheroidal aggregates of crystals in the secretion cells.

Powdered Sanguinaria—Powdered Sanguinaria is light brown to dark orange; has a slight odor, a bitter and persistently acrid taste, and is sternutatory. It contains numerous starch grains up to 20 microns in diameter, mostly simple, seldom 2- to 3-compound, the individual grains nearly spherical or ovoid, sometimes more or less plano-convex, and polarizing light; numerous fragments of parenchyma bearing short latex cells with reddish orange to orange, resinous masses, and a few tracheal fragments, with numerous slit-like pores.

Roots—Sanguinaria contains not more than 5 per cent of the roots of the plant.

Foreign organic matter—Sanguinaria contains not more than 2 per cent of foreign organic matter, other than roots, page 760.

Acid-insoluble ash—Sanguinaria yields not more than 2 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**0.125 Gm.** (approximately 2 grains).

SANTAL OIL
Oleum Santali

Ol. Santal. **Sandalwood Oil**

Santal Oil is the volatile oil distilled with steam from the dried heartwood of *Santalum album* Linné (Fam. *Santalaceæ*).

Santal Oil yields not less than 90 per cent of alcohols calculated as santalol ($C_{15}H_{23}OH$).

Description—Santal Oil is a pale yellow, somewhat viscid, oily liquid having the characteristic odor and taste of sandalwood. It is affected by light.

Solubility—Santal Oil is soluble in 5 volumes of 70 per cent alcohol by volume.
Specific gravity—The specific gravity of Santal Oil is not less than 0.965 and not more than 0.980 at 25°.
Optical rotation—The optical rotation of Santal Oil is not less than −15° and not more than −20° when determined in a 100-mm. tube at 25°, page 737.
Refractive index—The refractive index of Santal Oil is not less than 1.500 and not more than 1.510 at 20°, page 745.
Reaction—A solution of the recently distilled oil in 70 per cent alcohol (1 in 5) is acid to moistened blue litmus paper.
Assay for alcohols—Place 10 cc. of Santal Oil in an acetylization flask of 100-cc. capacity, and add 10 cc. of acetic anhydride and 1 Gm. of freshly fused sodium acetate. Boil the mixture gently for exactly 1 hour, cool, disconnect the flask from the condenser, transfer the mixture to a small separator, rinsing the acetylization flask with 3 successive 5-cc. portions of warm distilled water, and add the rinsings to the separator. When the liquids have completely separated, reject the aqueous layer, and wash the remaining oil with successive portions of sodium carbonate T.S., diluted with an equal volume of distilled water, until the last washing is alkaline to 2 drops of phenolphthalein T.S. Dry the resulting oil with anhydrous sodium sulfate (prepared by drying sodium sulfate to constant weight at 110° and powdering), and filter it. Transfer 5 cc. of the dry acetylized oil to a tared, 100-cc. Erlenmeyer flask, weigh accurately, add 50 cc. of 0.5 *N* alcoholic potassium hydroxide, connect the flask with a reflux condenser, and boil the mixture on a water bath for exactly 1 hour. Allow the mixture to cool, disconnect the flask from the condenser, and titrate the excess of alkali with 0.5 *N* sulfuric acid, using 10 drops of phenolphthalein T.S. as the indicator. Calculate the per cent of santalol by the following formula:
Per cent of alcohols (calculated as santalol) in the Oil tested =

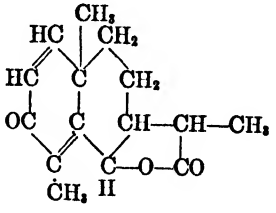
$$\frac{A \times 11.017}{B - (A \times 0.021)}$$

A is the result obtained by subtracting the number of cc. of 0.5 *N* sulfuric acid required in the above titration from the number of cc. of 0.5 *N* alcoholic potassium hydroxide originally taken, and *B* is the weight of the acetylized oil taken.
Storage—Preserve Santal Oil in tight, light-resistant containers.

AVERAGE DOSE—**0.5 cc.** (approximately 8 minims).

Santonin

SANTONIN
Santoninum



$C_{15}H_{18}O_3$

Mol. wt. 246.29

Description—Santonin occurs as colorless crystals, usually tabular, or as a white, crystalline powder. Santonin is odorless, and nearly tasteless at first, but afterward develops a bitter taste. It is stable in the air, but rapidly becomes yellow on exposure to light. An alcohol solution of Santonin (1 in 50) is neutral to litmus paper.

Solubility—One Gm. of Santonin dissolves in about 45 cc. of alcohol, and in about 2 cc. of chloroform, at 25°. One Gm. dissolves in about 6.5 cc. of boiling alcohol. It is almost insoluble in cold water, and only slightly soluble in boiling water.
Melting point—Santonin melts between 170° and 173°, page 731.
Optical rotation—The specific rotation, $[\alpha]_D^{25}$°, of Santonin determined in a solution containing 2 Gm. of Santonin in sufficient alcohol to make 100 cc. is not less than −170° and not more than −175°, page 737.
Identification—
A: Heat about 0.2 Gm. of Santonin with 2 cc. of alcoholic potassium hydroxide T.S.: a red color is produced.
B: Shake about 10 mg. of Santonin with a cool mixture of 1 cc. each of sulfuric acid and distilled water, heat the solution to 100°, and add 1 drop of diluted ferric chloride solution (1 volume of ferric chloride T.S. to 10 volumes of distilled water): a violet color is produced.
Residue on ignition—Santonin yields not more than 0.1 per cent of residue on ignition, page 745.
Alkaloids—Boil 0.5 Gm. of Santonin with 20 cc. of distilled water and 2 cc. of diluted sulfuric acid, cool, and filter the mixture: the addition of 3 drops of mercuric potassium iodide T.S. or of iodine T.S. to 10 cc. of the filtrate, mixed with 10 cc. of distilled water, produces no cloudiness even after standing for 3 hours.
Storage—Preserve Santonin in tight, light-resistant containers.

AVERAGE DOSE—**60 mg.** (approximately 1 grain).

SANTONIN AND MILD MERCUROUS CHLORIDE TABLETS

Tabellæ Santonini et Hydrargyri Chloridi Mitis

Santonin and Calomel Tablets

Santonin and Mild Mercurous Chloride Tablets contain not less than 92.5 per cent and not more than 107.5 per cent of the labeled amount of $C_{15}H_{18}O_3$ and of HgCl.

Identification—
A: Crush several of the Tablets and extract with two 25-cc. portions of chloroform. Evaporate the chloroform to dryness: the residue responds to the tests for *Identification* under *Santonin*, page 451.
B: Place the portion of the Tablets which is insoluble in chloroform in *Identification test A* in a dry glass test tube and heat with an equal weight of anhydrous sodium carbonate: metallic mercury condenses on the walls of the tube.
Assay for santonin—Weigh not less than 20 of the Tablets, reduce them to a fine powder without appreciable loss, and transfer a portion of the powder equivalent to about 0.3 Gm. of santonin to a 250-cc. beaker. Add 75 cc. of chloroform, cover with a watch glass, and heat on a water bath for 30 minutes. Filter through a small, quantitative filter, transfer the insoluble residue to the filter with two 10-cc. portions of chloroform and wash the residue with an additional 20 cc. of chloroform in 5-cc. portions. Collect all of the chloroform extract and washings in a tared beaker, evaporate to dryness on a water bath, dry for 1 hour at 105°, and weigh as $C_{15}H_{18}O_3$.
Assay for mild mercurous chloride—Weigh not less than 20 of the Tablets, reduce them to a fine powder without appreciable loss and take a portion equivalent to about 0.3 Gm. of mild mercurous chloride. Extract this portion with warm chloroform until a 1-cc. portion of the chloroform extract leaves no residue upon evapora-

tion. Mix the chloroform-insoluble residue with 50 cc. of distilled water, filter the mixture, and wash the insoluble residue on the filter with distilled water. Continue as directed in the *Assay* under *Mild Mercurous Chloride Tablets*, page 335, beginning with "Transfer the filter paper containing the residue to a glass-stoppered flask. . . ." Each cc. of 0.1 *N* iodine is equivalent to 0.02361 Gm. of HgCl.

Storage—Preserve Santonin and Mild Mercurous Chloride Tablets in tight, light-resistant containers.

Sizes—Santonin and Mild Mercurous Chloride Tablets usually available contain the following amounts of santonin and mild mercurous chloride: of each, **15, 30,** and **60 mg.** (approximately 1/4, 1/2, and 1 grain).

AVERAGE DOSE—**60 mg.** (approximately 1 grain) of Santonin; **0.12 Gm.** (approximately 2 grains) of Mild Mercurous Chloride.

Santonin Tablets

SANTONIN TABLETS
Tabellæ Santonini

Santonin Tablets contain not less than 92.5 per cent and not more than 107.5 per cent of the labeled amount of $C_{15}H_{18}O_3$.

Identification—Crush several of the Tablets and extract with two 25-cc. portions of chloroform. Evaporate the chloroform to dryness: the residue responds to the tests for *Identification* and *Melting point*, under *Santonin*, page 451.

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without appreciable loss, and proceed as directed in the *Assay for santonin* under *Santonin and Mild Mercurous Chloride Tablets*, page 451.

Storage—Preserve Santonin Tablets in tight, light-resistant containers.

Sizes—Santonin Tablets usually available contain the following amounts of santonin: **30** and **60 mg.** (approximately 1/2 and 1 grain).

AVERAGE DOSE—**60 mg.** (approximately 1 grain) of Santonin.

Sassafras

SASSAFRAS
Sassafras

Sassaf.

Sassafras is the dried bark of the root of *Sassafras albidum* (Nuttall) Nees (Fam. *Lauraceæ*).

Sassafras yields not less than 4 cc. of sassafras oil from each 100 Gm. of drug.

Unground Sassafras—Unground Sassafras occurs as irregular, transversely curved, or quilled pieces up to 15 cm. in length and from 1 to 4 mm. in thickness. The outer surface is weak reddish brown to light yellowish brown, nearly smooth and marked with more or less irregular ridges. The inner surface is light brown to moderate brown, and obscurely short-striate. The fracture is short with a light brown to pale orange inner bark and a thin darker-colored corky layer.

Powdered Sassafras—Powdered Sassafras is yellowish brown. It has an aromatic odor and a slightly mucilaginous, astringent, aromatic, and somewhat pungent

taste. Starch grains are numerous, either simple or 2- to 4-compound, the individual grains being more or less spherical or polygonal and frequently with a distinct cleft, and from 3 to 20 microns in diameter, some of the swollen or altered grains attaining a diameter of 30 microns. The bast fibers are characteristic, spindle-shaped, occasionally very irregular in outline, with sharply pointed ends, from 150 to 400 microns in length, about 25 microns in diameter, and with very thick, strongly lignified walls, the lumina being frequently nearly obliterated. The parenchyma cells contain either starch grains or irregular orange-colored masses of tannin, which stain black upon the addition of ferric chloride T.S. Fragments of wood are few, with large thin-walled tracheæ marked by simple pores and associated with rather thin-walled wood fibers.

Foreign organic matter—Sassafras contains not more than 4 per cent of adhering wood, outer corky tissues, or other foreign organic matter, page 760.

Acid-insoluble ash—Sassafras yields not more than 5 per cent of acid-insoluble ash, page 761.

Assay—Place about 50 Gm. of Sassafras, coarsely comminuted or powdered and accurately weighed, into the flask of the apparatus used for volatile oil determinations, and proceed with the assay as directed for Process A, page 764.

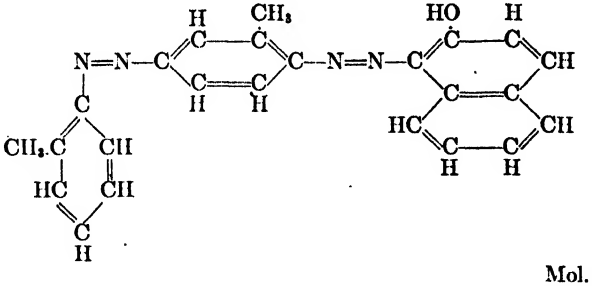
AVERAGE DOSE—**10 Gm.** (approximately $2^1/_2$ drachms).

Scarlet Red

SCARLET RED

Rubrum Scarlatinum

Rub. Scar. Scarlet Red, Medicinal Biebrich Scarlet Red



$C_{24}H_{20}ON_4$ Mol. wt. 380.43

Scarlet Red is an azo dye, *o*-tolyl azo-*o*-tolyl azo-β-naphthol.

Description—Scarlet Red occurs as a dark brown, odorless powder.

Solubility—One Gm. of Scarlet Red dissolves in about 15 cc. of chloroform. It dissolves in oils, in fats, or in phenol, and in warm petrolatum or paraffin. Scarlet Red is slightly soluble in alcohol, in acetone, or in benzene, but is almost insoluble in water.

Identification—

A: Sprinkle about 1 mg. of Scarlet Red on 1 cc. of sulfuric acid: it dissolves in the acid with a bluish green color. When this solution is diluted cautiously with distilled water the color changes first to blue, then to purple, red, and finally to orange.

B: Add 3 cc. of alcohol and a few drops of hydrochloric acid to about 10 mg. of Scarlet Red and boil the mixture: it assumes a deep scarlet-red color. Add to this solution about 5 cc. of diluted hydrochloric acid and about 0.5 Gm. of zinc dust, and heat the mixture: the red color is discharged.

Residue on ignition—Scarlet Red yields not more than 1 per cent of residue on ignition, page 745.

Water-soluble substances—Shake 1 Gm. of Scarlet Red with 100 cc. of distilled water frequently during 1 hour, and filter the mixture. Evaporate 50 cc. of the filtrate to dryness on a water bath, and dry the residue to constant weight at 105°: the weight of the residue does not exceed 5 mg.

Storage—Preserve Scarlet Red in well-closed containers.

Scarlet Red Ointment

SCARLET RED OINTMENT

Unguentum Rubri Scarlatini

Ung. Rub. Scar.

Scarlet Red	**50 Gm.**
Olive Oil	**50 Gm.**
Wool Fat	**400 Gm.**
Petrolatum	**500 Gm.**
To make	**1000 Gm.**

Triturate the scarlet red with the olive oil in a glass mortar until perfectly smooth, incorporate the wool fat and the petrolatum, and mix thoroughly.

Storage—Preserve Scarlet Red Ointment in tight containers and avoid prolonged exposure to temperatures above 30°.

Scopolamine Hydrobromide Tablets

SCOPOLAMINE HYDROBROMIDE TABLETS

Tabellæ Scopolaminæ Hydrobromidi

Tab. Scopol. Hydrobrom. Hyoscine Hydrobromide Tablets

Scopolamine Hydrobromide Tablets contain not less than 91 per cent and not more than 109 per cent of the labeled amount of $C_{17}H_{21}NO_4.HBr.3H_2O$ for tablets containing 1.2 mg. or more, and not less than 88 per cent and not more than 112 per cent for tablets containing less than 1.2 mg. of $C_{17}H_{21}NO_4.HBr.3H_2O$.

Identification—

A: Add a few drops of chlorine T.S. to 1 cc. of a filtered aqueous solution of the Tablets, equivalent to scopolamine hydrobromide 1 in 400, and shake the mixture with 1 cc. of chloroform: the latter assumes a yellowish color.

B: Silver nitrate produces in a filtered aqueous solution of the Tablets, equivalent to scopolamine hydrobromide 1 in 300, a white precipitate, insoluble in nitric acid but soluble in ammonia T.S.

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without an appreciable loss, and dissolve an accurately weighed portion, equivalent to at least 60 mg. of scopolamine hydrobromide, in a sufficient quantity of distilled water to make a clear solution. Render the solution distinctly alkaline with ammonia T.S., and extract the scopolamine with small successive portions of chloroform. Combine the chloroform extracts, and for each 50 cc. of chloroform extract add 10 cc. of dehydrated alcohol, and evaporate the mixture to dryness on a water bath, with the aid of a current of dry air. Dissolve the residue in a few cc. of neutralized alcohol, add 10 cc. of 0.05 *N* sulfuric acid, and titrate the excess acid with 0.02 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.05 *N* sulfuric acid is equivalent to 0.02192 Gm. of $C_{17}H_{21}NO_4.HBr.3H_2O$.

Storage—Preserve Scopolamine Hydrobromide Tablets in tight, light-resistant containers.

Sizes—Scopolamine Hydrobromide Tablets usually available contain the following amounts of scopolamine hydrobromide: **0.3, 0.4, 0.6,** and **1.2 mg.** (approximately $^1/_{200}$, $^1/_{150}$, $^1/_{100}$, and $^1/_{50}$ grain).

AVERAGE DOSE—**0.6 mg.** (approximately $^1/_{100}$ grain) of Scopolamine Hydrobromide.

SENEGA

Senega

Seneca-snakeroot

Senega is the dried root of *Polygala Senega* Linné (Fam. *Polygalaceæ*).

Unground Senega—Unground Senega is slenderly conical, with an enlarged crown; from 3 to 15 cm. in length and from 2 to 10 mm. in thickness; tortuous, somewhat branched, and bears a few rootlets. The crown is knotty with numerous buds and short stem bases. Externally it is weak brown to weak yellowish orange, the crown being somewhat darker and sometimes tinged with red. It is longitudinally wrinkled, frequently showing a distinct ridge or keel. The fracture is short, showing pale yellowish orange to yellowish white wood.

Histology—Senega shows an outer layer of several rows of tangentially elongated, brown to orange colored cells; isodiametric cortical cells, occasionally tangentially elongated; and an inner bark of small groups of sieve tissue associated with parenchyma and alternating with medullary rays 1 to 3 cells wide. The parenchyma of the cortex, phloem and medullary rays has amorphous contents which form oily drops upon the addition of potassium hydroxide T.S. or of chloral hydrate T.S. The wood is usually eccentrically developed, varying in outline in transverse section from circular or elliptical to reniform or irregularly fan-shaped, or even separated by broad parenchyma rays into 2 or more masses. The inner bark adjacent to the radially longer wood-wedges is thickened proportionally to their increased length, and the cortex opposite the radially short or absent wood-wedges is also thickened proportionally to their shortness or absence.

Powdered Senega—Powdered Senega is pale brown to weak yellow. It has an odor suggesting methyl salicylate, a sweetish, afterward strongly acrid taste, and is somewhat sternutatory. It consists of scattered fragments of cork-like cells; fragments of parenchyma and sieve tissue; fragments of tracheæ and short, pointed tracheids with numerous simple, bordered pores, and associated with lignified medullary ray cells with simple pores.

Stem bases—Senega contains not more than 5 per cent of attached stem bases.

Foreign organic matter—Senega contains not more than 2 per cent of foreign organic matter, other than attached stem bases, page 760.
Acid-insoluble ash—Senega yields not more than 2 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—1 Gm. (approximately 15 grains).

Senega Fluidextract

SENEGA FLUIDEXTRACT
Fluidextractum Senegæ

Fldext. Seneg. Fluidextract of Seneca-snakeroot

Prepare the Fluidextract from senega, in moderately coarse powder, by Process A, page 718. Use a mixture of 2 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 48 hours, and percolate at a moderate rate. Before adjusting to the final volume of the Fluidextract, cautiously add ammonia water until the product is alkaline to litmus paper and has a slight odor of ammonia.

Alcohol content—From 43 to 50 per cent, by volume, of C_2H_5OH.
Storage—Preserve Senega Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—1 cc. (approximately 15 minims).

Senega Syrup

SENEGA SYRUP
Syrupus Senegæ

Syr. Seneg.

Senega Fluidextract	200 cc.
Diluted Ammonia Solution	10 cc.
Syrup, a sufficient quantity,	
To make	1000 cc.

Mix the diluted ammonia solution with the fluidextract, add the syrup, and mix well.

Alcohol content—From 8 to 10 per cent, by volume, of C_2H_5OH.
Storage—Preserve Senega Syrup in tight containers, and avoid excessive heat.

AVERAGE DOSE—4 cc. (approximately 1 fluidrachm).

One average metric dose contains 0.8 cc. of Senega Fluidextract.

COMPOUND SENNA POWDER
Pulvis Sennæ Compositus

Pulv. Sen. Comp. Compound Licorice Powder

Senna, in very fine powder	**180 Gm.**
Glycyrrhiza, in very fine powder	**236 Gm.**
Washed Sulfur	**80 Gm.**
Fennel Oil	**4 Gm.**
Sucrose, finely powdered	**500 Gm.**
To make	**1000 Gm.**

Mix the fennel oil thoroughly with about one-half of the sucrose, then add the remainder of the sucrose and the other ingredients, and mix thoroughly. Finally pass the powder through a No. 80 sieve, pulverize the residue if any should be left on the sieve, add it to the sifted powder, and mix thoroughly.

NOTE: Three per cent of the sucrose in the above formula may be replaced by powdered starch. The powder should not be dispensed if it becomes hard and compact.

Description—Compound Senna Powder occurs as a weak yellow or dusky yellow powder with a fennel-like odor. The elements of identification are washed sulfur fragments and the tissue elements of senna and glycyrrhiza as described in the monographs for these powders in the U. S. Pharmacopœia. A few corn starch grains are permissible.

Identification—Place 0.1 Gm. of Compound Senna Powder in a test tube, moisten it with 2 cc. of alcohol, add 10 cc. of water, boil the mixture, cool, and filter. The filtrate is greenish yellow which changes to yellowish orange or yellow upon the addition of 1 drop of potassium hydroxide T.S.

Sulfide—Compound Senna Powder is free from the odor of hydrogen sulfide.

Storage—Preserve Compound Senna Powder in tight containers.

AVERAGE DOSE—**4 Gm.** (approximately 1 drachm).

One average metric dose contains 0.72 Gm. of Senna, 0.94 Gm. of Glycyrrhiza, 0.32 Gm. of Washed Sulfur, and 0.016 cc. of Fennel Oil.

SERENOA
Serenoa

Seren. Saw Palmetto Berries **Sabal**

Serenoa is the partially dried, ripe fruit of *Serenoa repens* (Bartram) Small (Fam. *Palmæ*).

Unground Serenoa—Unground Serenoa is ellipsoidal, ovoid or somewhat globular, occasionally compressed, from 1.5 to 3.5 cm. in length and from 1 to 2 cm. in

diameter; very dusky red to brownish black externally, smooth and somewhat oily, with a few large, more or less angular depressions due to the contraction of the sarcocarp, marked by the scar of the style at the apex, and with either a short stalk or a stem-scar at the base. The epicarp and the outer portion of the sarcocarp together form a thin coriaceous shell enclosing the inner part of the sarcocarp and the hard thin endocarp, which is reddish brown to yellowish brown and somewhat fibrous, as is also the inner layer of the sarcocarp. The inner surface of the endocarp is smooth, enclosing a hard, ellipsoidal or ovoid, somewhat flattened, reddish brown to pale brown seed having a raphal scar extending the length of the seed and a micropyle located toward or near one end of the back of the seed.

Powdered Serenoa—Powdered Serenoa is weak brown to moderate brown. It has a pronounced, aromatic odor and a sweetish, aromatic, slightly acrid taste. It shows fragments of inner epicarp and mesocarp containing a reddish brown to yellowish orange amorphous substance; numerous yellowish white fragments of endosperm, the cell walls considerably, and occasionally irregularly, thickened, usually with large pores; oval, polygonal or elongated stone cells, up to 180 microns in length, with walls up to 35 microns thick, showing numerous simple and branching pores, and polarizing light with a distinct cross; numerous yellowish oil globules; occasional fragments of sclerenchyma fibers with thickened walls and narrow lumina; and a few spiral tracheæ.

Immature fruits—Serenoa contains not more than 10 per cent of immature fruits which are not well filled, and whose surfaces are not creased or wrinkled.

Moisture—Serenoa contains not more than 15 per cent of moisture, page 761.

Foreign organic matter—Serenoa contains not more than 1 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Serenoa yields not more than 2 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—1 Gm. (approximately 15 grains).

Serenoa and Sandalwood Elixir, Compound

COMPOUND SERENOA AND SANDALWOOD ELIXIR

Elixir Serenoæ et Santali Compositum

Elix. Seren. et Santal. Comp.

Compound Elixir of Saw Palmetto and Santal — Sabal-Santal Elixir

Serenoa Fluidextract	250 cc.
Zea Fluidextract	250 cc.
Santal Oil	2 cc.
Compound Orange Spirit	5 cc.
Glycerin	150 cc.
Alcohol	175 cc.
Distilled Water, a sufficient quantity, To make	1000 cc.

Mix the santal oil and the compound orange spirit with the alcohol, add the serenoa fluidextract, the zea fluidextract, the glycerin, and sufficient distilled water to make the product measure 1000 cc.; mix well, allow the mixture to stand 24 hours, and filter, if necessary, until the product is clear.

Alcohol content—From 38 to 42 per cent, by volume, of C_2H_5OH.
Storage—Preserve Compound Serenoa and Sandalwood Elixir in tight containers.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains 1 cc. each of Serenoa Fluidextract and Zea Fluidextract.

SERENOA FLUIDEXTRACT
Fluidextractum Serenoæ

Fldext. Seren. Saw Palmetto Berries Fluidextract

Prepare the Fluidextract from serenoa, in moderately coarse powder, by Process A, page 718. Use a mixture of 4 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 48 hours, and percolate at a moderate rate.

Alcohol content—From 61 to 68 per cent, by volume, of C_2H_5OH.
Storage—Preserve Serenoa Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**1 cc.** (approximately 15 minims).

SERPENTARIA
Serpentaria

Serpentaria consists of the dried rhizome and roots of *Aristolochia Serpentaria* Linné, known in commerce as Virginia Snakeroot, or of *Aristolochia reticulata* Nuttall, known in commerce as Texas Snakeroot (Fam. *Aristolochiaceæ*).

Unground Serpentaria—Unground Serpentaria shows an oblique, subcylindrical, more or less curved rhizome, from 10 to 40 mm. in length and from 1 to 4 mm. in diameter; externally weak reddish brown, the upper portion slightly annulated with short stem-bases and the lower and lateral portions with numerous long, thin, nearly straight, moderate brown to light yellowish brown roots. The fracture is short, and shows a weak yellowish orange to weak yellow color internally.
Histology—The rhizome has an outer layer of epidermal cells; a cortex of from 10 to 15 rows of parenchyma; an inner bark sometimes showing strongly lignified bast fibers, either single or distributed in a more or less interrupted circle; a xylem of broad wood-wedges separated by medullary rays, the latter about 8 cells wide, and with walls strongly lignified and with numerous simple pores; and an eccentric pith with polygonal cells having lignified and porous walls. The cells of the cortex, medullary rays, and pith contain starch.

The stem shows an interrupted circle of from 6 to 10 fibro-vascular bundles, a bark with a prominent pericyclic ring of strongly lignified cells, and a few non-glandular hairs.

The root shows an epidermal layer; a broad zone of cortical parenchyma having thickened walls and containing numerous starch grains; an endodermis having irregularly thickened radial walls; and a thin-walled pericycle surrounding a tetrarch radial fibro-vascular bundle.

Powdered Serpentaria—Powdered Serpentaria is pale brown to dusky yellow. It has a camphoraceous or terebinthinate odor, and a bitter, aromatic taste. It contains numerous starch grains, simple and 2- to 4-compound, the individual grains more or less spherical or plano-convex, frequently with a central cleft and from 3 to 18 microns in diameter; numerous lignified elements consisting of tracheæ, fibers, medullary ray cells, and pith cells; and occasionally a few non-glandular hairs from the stem.

Overground stems—Serpentaria contains not more than 10 per cent of its overground stems.

Foreign organic matter—Serpentaria contains not more than 2 per cent of foreign organic matter, other than stems, page 760.

Acid-insoluble ash—Serpentaria yields not more than 10 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Serum, Antimeningococcic

ANTIMENINGOCOCCIC SERUM

Serum Antimeningococcicum

Serum Antimeningococ.

Antimeningococcus Serum Meningococcus Serum Meningitis Serum

Antimeningococcic Serum is obtained from the blood of an animal immunized with cultures of the several types of meningococci (*Neisseria intracellularis*) which prevail in the United States. Antimeningococcic Serum complies with the requirements of the National Institute of Health of the United States Public Health Service.

Description—Antimeningococcic Serum is a yellowish, clear, or slightly turbid liquid having a faint odor of serum or having an odor due to the presence of a preservative; it may have a slight, granular deposit.

Regulations—Antimeningococcic Serum must come from healthy animals and must be sterile and free from harmful substances detectable by animal inoculation. It must not contain an excessive proportion of preservative (not more than 0.35 per cent of phenol or cresol if either of these is used).

The outside label must bear the name *Antimeningococcic Serum*, the manufacturer's lot number of the Serum, the name, address, and license number of the manufacturer, the genus of animal employed when other than the horse, and the date beyond which the Serum may not be expected to retain the potency prescribed by governmental authority.

Storage—Preserve Antimeningococcic Serum at a temperature between 2° and 10°, preferably at the lower limit. It must be dispensed in the unopened glass container in which it was placed by the manufacturer.

AVERAGE DOSE—Parenteral, therapeutic, **20 cc.**

ANTIPNEUMOCOCCIC SERUM—TYPE SPECIFIC

Serum Antipneumococcicum

Serum Antipneumococ. Antipneumococcus Serum Pneumonia Serum

Antipneumococcic Serum is obtained from the blood of an animal which has been immunized with cultures of a pneumococcus (*Diplococcus pneumoniæ*) of one of the types for which a serum has been prepared and which has been standardized or has been released by the National Institute of Health of the United States Public Health Service, and complies with the requirements of that agency of the Government.

Description—Antipneumococcic Serum is a yellowish, clear, opalescent, or slightly turbid liquid, having a faint odor of serum or having an odor due to the presence of a preservative; it may have a slight, granular deposit.

Regulations—Antipneumococcic Serum must come from healthy animals, and must be sterile and free from harmful substances detectable by animal inoculation. It must not contain an excessive proportion of preservative (not more than 0.5 per cent of phenol or 0.4 per cent of cresol if either of these is used). The potency of Antipneumococcic Serum shall be expressed in units of protective antibody, and the unit shall be that established by the National Institute of Health of the United States Public Health Service.

The outside label must bear the name *Antipneumococcic Serum*, the specific type or types of pneumococcus represented, the minimum number of units in the package, the genus of animal employed, the manufacturer's lot number of the Serum, the name, address, and license number of the manufacturer, and the date beyond which the Serum may not be expected to retain the potency prescribed by governmental authority.

Storage—Preserve Antipneumococcic Serum at a temperature between 2° and 10°, preferably at the lower limit. It must be dispensed in the unopened glass container in which it was placed by the manufacturer.

AVERAGE DOSE—Parenteral, therapeutic, from 20,000 to 100,000 units.

Caution: Type XIV Antipneumococcic Serum produced by immunization of the horse should not be administered to persons of blood group "A."

HUMAN MEASLES IMMUNE SERUM

Serum Immune Morbillosi Humanum

Ser. Immun. Morbill. Human. Measles Convalescent Serum

Human Measles Immune Serum is sterile serum obtained from the blood of a healthy human (*Homo sapiens*) who has survived an attack of measles. Human Measles Immune Serum complies with the requirements of the National Institute of Health of the United States Public Health Service.

Description—Human Measles Immune Serum is a transparent or slightly opalescent liquid, of a faint brownish, yellowish, or greenish color, nearly odorless or having an odor due to the presence of a preservative; it may have a slight, granular deposit.

Regulations—Human Measles Immune Serum must be free from harmful substances detectable by animal inoculation, and must not contain an excessive proportion of preservative (not more than 0.5 per cent of phenol or 0.4 per cent of cresol, if either of these is used).

The outside label must bear the name *Human Measles Immune Serum*, the manufacturer's lot number of the Serum, the name, address, and license number of the manufacturer, and the date beyond which the Serum may not be expected to retain the potency prescribed by governmental authority.

Storage—Preserve Human Measles Immune Serum at a temperature between 2° and 10°, preferably at the lower limit. It must be dispensed in the unopened glass container in which it was placed by the manufacturer.

AVERAGE DOSE—Parenteral, therapeutic, **20 cc.**; prophylactic, **10 cc.**

Serum, Human Scarlet Fever Immune

HUMAN SCARLET FEVER IMMUNE SERUM

Serum Immune Scarlatinæ Humanum

Ser. Immun. Scarlat. Human. Scarlet Fever Convalescent Serum

Human Scarlet Fever Immune Serum is a sterile serum obtained from the blood of a healthy human (*Homo sapiens*) who has survived an attack of scarlet fever. Human Scarlet Fever Immune Serum complies with the requirements of the National Institute of Health of the United States Public Health Service.

Description—Human Scarlet Fever Immune Serum is a transparent or slightly opalescent liquid of a faint brownish, yellowish, or greenish color, nearly odorless or having an odor due to the presence of a preservative; it may have a slight, granular deposit.

Regulations—Human Scarlet Fever Immune Serum must be free from harmful substances detectable by animal inoculation, and must not contain an excessive proportion of preservative (not more than 0.5 per cent of phenol or 0.4 per cent of cresol, if either of these is used).

The outside label must bear the name *Human Scarlet Fever Immune Serum*, the manufacturer's lot number of the Serum, the name, address, and license number of the manufacturer, and the date beyond which the Serum may not be expected to retain the potency prescribed by governmental authority.

Storage—Preserve Human Scarlet Fever Immune Serum at a temperature between 2° and 10°, preferably at the lower limit. It must be dispensed in the unopened glass container in which it was placed by the manufacturer.

AVERAGE DOSE—Parenteral, therapeutic, **20 cc.**; prophylactic, **10 cc.**

SHERRY WINE
Vinum Xericum

Sherry Wine is an alcoholic liquid obtained by fermenting the juice of sound, ripe grapes, fortifying with brandy, and containing, at 15.56°, not less than 17 per cent and not more than 24 per cent, by volume, of C_2H_5OH.

Description—Sherry Wine is a pale yellowish brown or amber-colored liquid, having a characteristic aromatic odor and taste.

Specific gravity—The specific gravity of Sherry Wine is not less than 0.985 and not more than 1.030 at 15.56°.

Free acid—Transfer 10 cc. of Sherry Wine, accurately measured, into a flask containing about 100 cc. of boiling water, and titrate immediately with 0.1 *N* sodium hydroxide, using 1 cc. of phenolphthalein T.S. as indicator. Not less than 4 cc. and not more than 8 cc. of 0.1 *N* sodium hydroxide is required for neutralization.

Total solids, glycerin, and sugar—Evaporate 25 cc. of Sherry Wine in a tared dish on a water bath and dry the residue to constant weight at 100°: the weight of the residue does not exceed 1.75 Gm. Retain the residue for the determination of *Ash*.

Ash—Ignite the residue from the test for *Total solids, glycerin, and sugar* until a white ash is obtained, cool, moisten with ammonium carbonate T.S., and again carefully ignite to constant weight: the weight of the ash does not exceed 125 mg.

Volatile acids—Transfer 50 cc. of Sherry Wine, accurately measured, into a 250-cc. round bottom flask and distil by means of a current of steam introduced through a tube reaching to the bottom of the flask, and the application of gentle heat to the distillation flask to keep the volume of the liquid constant. Collect 200 cc. of distillate and titrate with 0.1 *N* sodium hydroxide, using phenolphthalein T.S. as indicator. Each cc. of 0.1 *N* sodium hydroxide is equivalent to 0.006005 Gm. of $HC_2H_3O_2$. Sherry Wine contains in each 100 cc. not more than 0.14 Gm. of acids calculated as acetic acid.

Sulfate—To 50 cc. of Sherry Wine add about 2 cc. of hydrochloric acid, heat to boiling, and add a slight excess of barium chloride T.S. Allow to stand about 1 hour, filter, wash the precipitate until free of chlorides, and ignite the barium sulfate to constant weight. The weight of the barium sulfate does not exceed 34 mg.

Total Sulfur dioxide—Transfer 100 cc. of Sherry Wine, accurately measured, into an 800-cc. Kjeldahl flask containing 200 cc. of water, and add 10 cc. of a solution of sodium bicarbonate (1 in 10) followed in from 1 to 5 minutes by 20 cc. of hydrochloric acid. Connect this flask by means of a Kjeldahl connecting bulb with a condenser, the delivery tube of which dips beneath the surface of about 50 cc. of bromine T.S. contained in an Erlenmeyer flask. Distil until about one-half of the contents of the Kjeldahl flask has distilled over. After the distillation is complete, transfer the contents of the receiving flask to a beaker, boil until the excess bromine is completely removed, add 5 cc. of hydrochloric acid followed, with constant stirring, by an excess of barium chloride T.S. added gradually. Heat the mixture for 1 hour on a water bath, collect the precipitate of barium sulfate on a filter, wash it until free from chloride, dry, ignite, and weigh. The weight of the barium sulfate thus obtained does not exceed 127.5 mg. equivalent to 350 parts per million of total sulfur dioxide in Sherry Wine.

Uncombined sulfur dioxide—Transfer 100 cc. of Sherry Wine, accurately measured, into an 800-cc. Kjeldahl flask containing 200 cc. of water and add 10 cc. of a solution of sodium bicarbonate (1 in 10). Proceed as directed in the determination of *Total sulfur dioxide*, beginning with the words, "Connect the flask by means of a Kjeldahl connecting bulb. . . ." The weight of the barium sulfate obtained does not exceed 25.5 mg. equivalent to 70 parts per million of uncombined sulfur dioxide in Sherry Wine.

Storage—Preserve Sherry Wine in tight containers.

Silver Chloride, Colloidal

COLLOIDAL SILVER CHLORIDE

Argenti Chloridum Colloidale

Arg. Chlorid. Colloid.

Colloidal Silver Chloride is silver chloride rendered colloidal by the presence of sucrose or other suitable colloid stabilizing agent. It contains not less than 9 per cent and not more than 11 per cent of AgCl.

Description—Colloidal Silver Chloride occurs as a white, granular powder which is slightly hygroscopic. It is odorless and has a sweet, metallic taste. It is affected by light.

Solubility—Colloidal Silver Chloride is freely soluble in distilled water, forming an opalescent suspension which is bluish white in reflected light and reddish in transmitted light.

Identification—

A: To 25 cc. of an aqueous solution of Colloidal Silver Chloride (1 in 50) add 0.6 Gm. of potassium iodide dissolved in 3 cc. of distilled water: a yellow color is produced.

B: To 25 cc. of an aqueous solution of Colloidal Silver Chloride (1 in 5) add 8 cc. of strong ammonia solution: a clear, colorless solution is produced.

C: To 10 cc. of an aqueous solution of Colloidal Silver Chloride (1 in 20) add 15 cc. of sodium thiosulfate T.S.: a clear, colorless solution is produced.

Silver ion—To 2 cc. of fresh, undiluted egg white, add 1 cc. of an aqueous solution of Colloidal Silver Chloride (1 in 10). Shake the mixture and allow to stand for 15 minutes; then dilute with 15 cc. of distilled water: no precipitate is produced.

Assay—Dissolve about 0.5 Gm. of Colloidal Silver Chloride, accurately weighed, in 25 cc. of distilled water and add 8 cc. of strong ammonia solution. Add sufficient nitric acid to render the solution acid to litmus paper and add 5 cc. in excess. Boil the solution gently for 5 minutes and allow to cool in the dark until the supernatant liquid has become clear. Transfer the precipitate completely to a tared filtering crucible and wash it thoroughly with distilled water, dry to constant weight at 105°, and weigh as AgCl.

Storage—Preserve Colloidal Silver Chloride in tight, light-resistant containers.

Silver Iodide, Colloidal

COLLOIDAL SILVER IODIDE

Argenti Iodidum Colloidale

Arg. Iodid. Colloid.

Colloidal Silver Iodide is silver iodide rendered colloidally stable by the presence of gelatin. It contains not less than 18 per cent and not more than 22 per cent of AgI.

Caution: Solutions of Colloidal Silver Iodide should be freshly prepared and should be dispensed in amber-colored bottles.

Description—Colloidal Silver Iodide occurs as a weak yellow to pale yellow granular solid with a faint odor. It is affected by light.

Solubility—Colloidal Silver Iodide is freely soluble in distilled water, forming a milky opalescent colloidal suspension. It is slowly soluble in glycerin and insoluble in fixed oils.

Identification—

A: Add 2 cc. of sodium hydroxide T.S. to 5 cc. of an aqueous solution of Colloidal Silver Iodide (1 in 100): upon boiling, the solution darkens, but no precipitation occurs after standing for 10 minutes.

B: To 5 cc. of an aqueous solution of Colloidal Silver Iodide (1 in 100) add 1 cc. of diluted hydrochloric acid: the solution becomes opaque without further separation of a precipitate. Upon boiling for 1 minute, silver iodide gradually precipitates.

Silver chloride and silver bromide—An aqueous solution of Colloidal Silver Iodide (1 in 100) is not discolored by sunlight in 1 hour.

Non-filterable residue—Transfer about 1 Gm. of Colloidal Silver Iodide, accurately weighed, to a beaker containing 100 cc. of distilled water, stir well, and let stand 15 minutes. Filter through a tared Gooch crucible prepared with a moderately thick asbestos pad. Wash with three 10-cc. portions of distilled water, dry to constant weight at 105°, and weigh. The non-filterable residue is not greater than 1 per cent of the weight of Colloidal Silver Iodide taken.

Assay—Transfer about 1 Gm. of Colloidal Silver Iodide, accurately weighed, to a 300-cc. wide-mouth Erlenmeyer flask containing about 100 cc. of distilled water and boil gently until a dispersion is effected. Remove the flask from the flame and carefully add 5 cc. of hydrochloric acid and heat to boiling. Transfer the flask to a water bath and continue the heating for 30 minutes or until the precipitation is complete. Filter while hot through a tared Gooch crucible prepared with a moderately thick asbestos pad. Wash thoroughly with hot 3 per cent hydrochloric acid, and dry at 105° to constant weight. The weight of the precipitate so obtained represents the weight of AgI in the sample taken.

Storage—Preserve Colloidal Silver Iodide in tight, light-resistant containers.

Silver Nitrate Solution, Ammoniacal

AMMONIACAL SILVER NITRATE SOLUTION
Liquor Argenti Nitratis Ammoniacalis

Liq. Arg. Nitrat. Ammon. · Ammoniacal Silver Nitrate, Howe

Ammoniacal Silver Nitrate Solution is an aqueous solution of silver diammino nitrate, containing in each 100 Gm. the equivalent of not less than 28.5 Gm. and not more than 30.5 Gm. of Ag, and not less than 9.0 Gm. and not more than 9.7 Gm. of NH_3.

Silver Nitrate	**704 Gm.**
Distilled Water	**245 cc.**
Strong Ammonia Solution, about	**680 cc.**
To make about	**1000 cc.**

Powder the silver nitrate in a glass mortar and dissolve it in the distilled water, warming if necessary. Cool to room temperature and add strong ammonia solution from a burette until all but the last trace of black precipitate is dissolved. Filter this last trace of precipitate from the solution.

Description—Ammoniacal Silver Nitrate Solution is a clear, colorless, almost odorless liquid. It is alkaline to litmus paper and it is affected by light.

Specific gravity—The specific gravity of Ammoniacal Silver Nitrate Solution is about 1.48 at 25°.

Identification—

A: An aqueous solution of Ammoniacal Silver Nitrate Solution (1 in 10) responds to the tests for *Silver*, page 727, and for *Nitrate*, page 726.

B: To 5 cc. of Ammoniacal Silver Nitrate Solution add a few drops of formaldehyde solution (1 in 10): a black precipitate is immediately formed (*distinction from solution of silver and ammonium nitrate*).

C: To 5 cc. of an aqueous solution of Ammoniacal Silver Nitrate Solution (1 in 10) add 2 cc. of diluted hydrochloric acid, filter, add 5 cc. of sodium hydroxide T.S. and boil: the vapors turn red litmus paper blue.

Copper—Ammoniacal Silver Nitrate Solution remains free from even a transient blue color.

Potassium and sodium—To 1 cc. of Ammoniacal Silver Nitrate Solution add 3 cc. of diluted hydrochloric acid, and filter: the clear filtrate tested in a flame on a platinum wire yields no more than traces of sodium or potassium (*distinction from Tollens' Reagent*).

Assay for silver—Accurately weigh about 1 cc. of Ammoniacal Silver Nitrate Solution in a stoppered flask. Add 50 cc. of distilled water, 10 cc. of diluted nitric acid, and 3 cc. of ferric ammonium sulfate T.S. Titrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* ammonium thiocyanate is equivalent to 0.01079 Gm. of Ag.

Assay for ammonia—Accurately weigh about 1 cc. of Ammoniacal Silver Nitrate Solution in a weighing bottle, transfer the sample to a Kjeldahl distillation flask with 50 cc. of distilled water, and add sufficient of the water to make a volume of 200 cc.; add 10 cc. of sodium sulfide T.S. and 20 cc. of an aqueous solution of sodium hydroxide (4 in 10). Connect the flask to a condenser, the lower outlet tube of which dips beneath the surface of 50 cc. of 0.5 *N* sulfuric acid contained in a receiving flask. Distil the mixture until about 100 cc. of distillate has been collected, and titrate the excess acid with 0.5 *N* sodium hydroxide using methyl red T.S. as the indicator. Each cc. of 0.5 *N* sulfuric acid is equivalent to 0.008516 Gm. of NH_3.

The ratio between the percentage of ammonia and the percentage of silver closely approximates 1 to 3.18.

Storage—Preserve Ammoniacal Silver Nitrate Solution in small glass-stoppered, light-resistant containers, or in light-resistant ampuls.

FOR ORAL USE—Mix Ammoniacal Silver Nitrate Solution with a reducing agent, such as formaldehyde (1 in 10) or eugenol, to deposit the metallic silver in the infected area in a state of fine subdivision.

Silver, Strong Protein

STRONG PROTEIN SILVER
Argentum Proteinicum Forte

Arg. Prot. Fort. Strong Silver Protein Strong Protargin

Strong Protein Silver contains not less than 7.5 per cent and not more than 8.5 per cent of Ag.

Caution: Strong Protein Silver Solutions should be freshly prepared and should be dispensed in amber-colored bottles.

Description—Strong Protein Silver occurs as a pale yellowish orange to brownish black, odorless powder. It is usually somewhat hygroscopic and is affected by light.

Solubility—Strong Protein Silver is freely soluble in water, but almost insoluble in alcohol, in chloroform, and in ether.

Identification—

A: Heat about 0.2 Gm. of Strong Protein Silver in a porcelain crucible until all carbonaceous matter is burned off, warm the residue with 1 cc. of nitric acid, dilute with 10 cc. of distilled water, and add a few drops of hydrochloric acid: a white precipitate is produced which dissolves in ammonia T.S.

B: The addition of 2 cc. of an aqueous solution of sodium chloride (1 in 100) to 10 cc. of an aqueous solution of Strong Protein Silver (1 in 100) produces no turbidity.

C: Ferric chloride T.S. added to an aqueous solution of Strong Protein Silver (1 in 100) discharges the dark color, and a precipitate is gradually produced.

D: To 10 cc. of an aqueous solution of Strong Protein Silver (1 in 50) add a few drops of mercuric chloride T.S.: a white precipitate is formed, and the supernatant liquid becomes colorless or nearly so.

Distinction from mild protein silver—Dissolve 1 Gm. of Strong Protein Silver in 10 cc. of distilled water. Add, all at once, 7 Gm. of reagent ammonium sulfate, and stir occasionally for 30 minutes. Filter through quantitative filter paper into a 50-cc. Nessler tube, returning the first portions of the filtrate to the filter, if necessary, to secure a clear filtrate, and allow the filter and precipitate to drain. Add to the clear filtrate 25 cc. of an aqueous solution of acacia (1 in 100). In a second 50-cc. Nessler tube dissolve 7 Gm. of reagent ammonium sulfate in 10 cc. of distilled water, and add to this solution 25 cc. of the solution of acacia and 1.6 cc. of 0.01 *N* silver nitrate. To each tube add 2 cc. of nitric acid, 2 cc. of diluted hydrochloric acid, and enough of the acacia solution to make the volume of each solution measure 50 cc. Mix the contents of each tube thoroughly, and allow to stand for 5 minutes: the turbidity of the mixture containing the Strong Protein Silver is greater than that to which no Strong Protein Silver has been added.

Assay—Ignite about 2 Gm. of Strong Protein Silver, accurately weighed, in a porcelain crucible until all of the carbon is burned off. Transfer to a beaker as much of the residue as possible, add to the crucible 5 cc. of nitric acid, warm to dissolve any adhering silver, and transfer the solution to the beaker with the aid of a little distilled water. Cover the beaker, and heat on a water bath until all of the metallic silver is dissolved, adding a little more nitric acid, if necessary. Filter into an Erlenmeyer flask, wash the insoluble residue thoroughly with distilled water, cool, and dilute with distilled water, if necessary, to about 75 cc. Add 2 cc. of ferric ammonium sulfate T.S., and titrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* ammonium thiocyanate is equivalent to 0.01079 Gm. of Ag.

Storage—Preserve Strong Protein Silver in tight, light-resistant containers.

Soap Liniment, Soft, Compound

COMPOUND SOFT SOAP LINIMENT

Linimentum Saponis Mollis Compositum

Lin. Sapon. Moll. Comp. Compound Green Soap Tincture

Soft Soap	**150 Gm.**
Juniper Tar	**20 cc.**
Alcohol, a sufficient quantity,	
To make	**1000 cc.**

Soften the soap by warming it in a dish on a water bath; remove it from the heat, mix it with 750 cc. of alcohol, and when it has dissolved, add the juniper tar. Then filter the liquid, and wash the filter with sufficient alcohol to make the product measure 1000 cc. Mix well.

Alcohol content—From 74 to 80 per cent, by volume, of C_2H_5OH.
Storage—Preserve Compound Soft Soap Liniment in tight containers.

Soap Liniment, Solid

SOLID SOAP LINIMENT
Linimentum Saponis Spissum

Lin. Sapon. Spiss. Camphorated Soap Liniment Solid Opodeldoc

Monohydrated Sodium Carbonate	10 Gm.
Stearic Acid	50 Gm.
Camphor, in coarse powder	25 Gm.
Water	100 cc.
Thyme Oil	3 cc.
Rosemary Oil	6 cc.
Diluted Ammonia Solution	50 cc.
Alcohol, a sufficient quantity, To make	1000 cc.

Dissolve the monohydrated sodium carbonate in the water with the aid of heat, add 200 cc. of alcohol and the stearic acid, and heat the mixture until effervescence has ceased and solution results. Add the oils and camphor, dissolved in 500 cc. of alcohol, then the diluted ammonia solution and sufficient alcohol to make the product measure 1000 cc. Mix well, and filter the liniment while warm. Pour the filtered liquid into dry, wide-mouthed jars; stopper, and set aside to cool.

Alcohol content—From 68 to 76 per cent, by volume, of C_2H_5OH.
Storage—Preserve Solid Soap Liniment in tight containers.

Soda and Mint Solution

SODA AND MINT SOLUTION
Liquor Sodæ et Menthæ

Liq. Sod. et Menth. Mistura Sodæ et Menthæ Soda Mint

Sodium Bicarbonate	50 Gm.
Aromatic Ammonia Spirit	20 cc.
Spearmint Water, a sufficient quantity, To make	1000 cc.

Dissolve the sodium bicarbonate in 950 cc. of spearmint water, add the aromatic ammonia spirit, and shake the mixture intermittently during 30 minutes; then filter the mixture, using 10 Gm. of purified talc to clarify it if necessary, and add sufficient spearmint water through the filter to make the product measure 1000 cc.

NOTE: When preferred, peppermint water may be used in place of spearmint water.

Description—Soda and Mint Solution is a colorless, transparent solution, with an aromatic mint-like odor and an alkaline mint-like taste. Soda and Mint Solution is alkaline to phenolphthalein T.S.

Identification—

A: Add to 3 cc. of Soda and Mint Solution a few drops of hydrochloric acid: effervescence is produced immediately.

B: Heat 5 cc. of Soda and Mint Solution in a test tube with 3 cc. of sodium hydroxide T.S.: a piece of moistened red litmus paper placed inside the mouth of the tube, but not in contact with the side, will turn blue.

C: A non-luminous flame is colored yellowish orange when a clean platinum wire is dipped into Soda and Mint Solution and held in the flame.

Alcohol content—Not more than 2 per cent, by volume, of C_2H_5OH.

Storage—Preserve Soda and Mint Solution in tight containers.

AVERAGE DOSE—8 cc. (approximately 2 fluidrachms).

One average metric dose contains 0.4 Gm. of Sodium Bicarbonate and 0.16 cc. of Aromatic Ammonia Spirit.

SODIUM ACETATE

Sodii Acetas

$CH_3.COONa.3H_2O$ **Sod. Acet.** **Mol. wt. 136.09**

Sodium Acetate, when rendered anhydrous by drying at 120°, contains not less than 99 per cent of $CH_3.COONa$.

Description—Sodium Acetate occurs as colorless, transparent crystals or a granular crystalline powder. It is odorless, or has a faint, acetous odor. It is efflorescent in warm, dry air.

Solubility—One Gm. of Sodium Acetate dissolves in about 0.8 cc. of water and in about 19 cc. of alcohol, at 25°.

Identification—

A: An aqueous solution of Sodium Acetate responds to the tests for *Sodium*, page 727, and for *Acetate*, page 722.

B: Upon ignition, Sodium Acetate yields an alkaline residue which effervesces with acids.

Loss on drying—When dried to constant weight at 120°, Sodium Acetate loses not less than 36 per cent and not more than 41 per cent of its weight.

Free alkali—A solution of 2 Gm. of Sodium Acetate in 20 cc. of distilled water requires not more than 0.1 cc. of 0.1 *N* sulfuric acid for neutralization using 3 drops of phenolphthalein T.S. as the indicator.

Arsenic—An aqueous solution of Sodium Acetate meets the requirements of the test for *Arsenic*, page 689.

Heavy metals—Dissolve 1 Gm. of Sodium Acetate in 1 cc. of 1 *N* hydrochloric

acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Sodium Acetate is 10 parts per million.

Potassium compounds—Mix a few drops of sodium bitartrate T.S. with about 5 cc. of a clear, saturated, aqueous solution of Sodium Acetate: no turbidity is produced.

Assay—Weigh accurately in a tared platinum or porcelain crucible about 0.3 Gm. of Sodium Acetate, previously dried to constant weight at 120°. Heat at first very gently, then gradually raise the temperature until the salt is thoroughly carbonized and proceed as directed in the *Assay* under *Potassium Citrate Solution*, page 408, beginning with "The final temperature must not exceed. . ." Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.008204 Gm. of $CH_3.COONa$.

Storage—Preserve Sodium Acetate in tight containers.

AVERAGE DOSE—**1.5 Gm.** (approximately 22 grains).

Sodium Alginate

SODIUM ALGINATE

Sodii Alginas

Algin

Sodium Alginate is the purified carbohydrate product extracted from giant brown seaweeds by the use of dilute alkali. It consists chiefly of the sodium salt of alginic acid, a polyuronic acid composed of beta *d*-mannuronic acid residues linked so that the carboxyl group of each unit is free while the aldehyde group is shielded by a glycosidic linkage.

Description—Sodium Alginate occurs as a nearly odorless and tasteless, coarse or fine powder, yellowish white in color.

Solubility—Sodium Alginate dissolves in water, forming a viscous, colloidal solution. It is insoluble in alcohol and in hydro-alcoholic solutions in which the alcohol content is greater than about 30 per cent by weight. It is insoluble in chloroform, in ether, and in acids when the *p*H of the resulting solution becomes lower than about 3.

Identification—

A: To 5 cc. of an aqueous solution of Sodium Alginate (1 in 100) add 1 cc. of calcium chloride T.S.: a voluminous gelatinous precipitate is produced immediately.

B: To 10 cc. of an aqueous solution of Sodium Alginate (1 in 100) add 1 cc. of diluted sulfuric acid: a heavy gelatinous precipitate is produced.

Loss on drying—When dried to constant weight at 105°, Sodium Alginate loses not more than 15 per cent of its weight.

Ash—Sodium Alginate yields not less than 18 per cent and not more than 24 per cent of ash, page 760, taking care to heat at a temperature not exceeding a dull red heat.

Insoluble matter—Dissolve 0.5 Gm. of Sodium Alginate in 200 cc. of boiling distilled water in a covered beaker and heat on a water bath for 1 hour with frequent stirring. Without cooling, filter the solution through a tared Gooch crucible with an asbestos mat. Wash the filter thoroughly with hot distilled water, dry at 105°, cool and weigh. The weight of insoluble matter does not exceed 1 mg.

Arsenic—Add 5 Gm. of Sodium Alginate to 10 cc. of reagent nitric acid and 3 cc. of reagent sulfuric acid in a Kjeldahl flask. Heat until dense white fumes are evolved. If the mixture turns brown add more nitric acid and again heat until the solution becomes colorless or a very weak yellow; cool, add 10 cc. of distilled water and 0.5 Gm. of ammonium oxalate. Heat until dense white fumes are evolved, then cool and dilute to exactly 25 cc. A 5-cc. portion of this solution meets the requirements for *Arsenic*, page 689.

Heavy metals—Carefully ash 1 Gm. of Sodium Alginate avoiding a temperature above a dull red heat. Cool, add 2 cc. of hydrochloric acid and 0.5 cc. of nitric acid and evaporate to dryness on a water bath. Add to the residue 1 cc. of 1 *N* hydrochloric acid and 15 cc. of distilled water and warm gently. Filter and wash the filter paper with sufficient distilled water to give a final volume of 50 cc. To 25 cc. of this solution, add 10 cc. of hydrogen sulfide T.S. The heavy metals limit, page 721, for Sodium Alginate is not more than 20 parts per million.

Starch—To 5 cc. of an aqueous solution of Sodium Alginate (1 in 1000) add 1 drop of iodine T.S.: not even a transient blue color is produced.

Gelatin—To 5 cc. of an aqueous solution of Sodium Alginate, add 1 cc. of an aqueous solution of ammonium molybdate (1 in 20): no precipitate is produced within 5 minutes.

Storage—Preserve Sodium Alginate in tight containers.

Sodium Arsenate, Exsiccated

EXSICCATED SODIUM ARSENATE

Sodii Arsenas Exsiccatus

Sod. Arsen. Exsic. Dried Sodium Arsenate

Na_2HAsO_4 Mol. wt. 185.91

Exsiccated Sodium Arsenate, when dried to constant weight at 150°, contains not less than 98 per cent of Na_2HAsO_4.

Caution: Exsiccated Sodium Arsenate is very poisonous.

Description—Exsiccated Sodium Arsenate occurs as an odorless, amorphous, white powder. Its aqueous solutions are alkaline to litmus paper and it is slightly hygroscopic.

Solubility—One Gm. of Exsiccated Sodium Arsenate dissolves in about 3.5 cc. of water at 25°, and in about 1.5 cc. of boiling water. It is slightly soluble in alcohol at 25°, and is nearly insoluble in boiling alcohol.

Identification—An aqueous solution of Exsiccated Sodium Arsenate (1 in 20) responds to the tests for *Sodium*, page 727, and for *Arsenate*, page 722.

Loss on drying—When dried to constant weight at 150°, Exsiccated Sodium Arsenate loses not more than 3 per cent of its weight.

Nitrate—Dissolve about 0.2 Gm. of Exsiccated Sodium Arsenate in 5 cc. of distilled water, add 2 cc. of ferrous sulfate T.S., and carefully overlay the solution upon 2 cc. of sulfuric acid: no brown color develops at the zone of contact.

Limit of arsenite—Dissolve 1 Gm. of Exsiccated Sodium Arsenate, accurately weighed, in 30 cc. of distilled water, render the solution slightly acid to litmus paper by the cautious addition of diluted sulfuric acid; add 20 cc. of a saturated solution of sodium bicarbonate, and titrate the liquid with 0.1 *N* iodine, using starch T.S. as the indicator: not more than 1 cc. of 0.1 *N* iodine is required.

Lead, copper, or iron—Add 1 cc. of sodium sulfide T.S. to 5 cc. of an aqueous solution of Exsiccated Sodium Arsenate (1 in 100): no dark coloration appears.

Assay—Dissolve about 0.3 Gm. of Exsiccated Sodium Arsenate, dried to constant weight at 150° and accurately weighed, in 25 cc. of distilled water in a glass-stoppered flask; heat the solution to 80°, and add 10 cc. of hydrochloric acid and 3 Gm. of potassium iodide. Allow the mixture to stand in the stoppered flask for 15 minutes at 80°, then cool, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Conduct a blank test, and deduct the amount of 0.1 *N* sodium thiosulfate consumed in the blank. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.009296 Gm. of Na_2HAsO_4.

Storage—Preserve Exsiccated Sodium Arsenate in tight containers.

AVERAGE DOSE—**3 mg.** (approximately $^1/_{20}$ grain).

Sodium Arsenate Solution

SODIUM ARSENATE SOLUTION
Liquor Sodii Arsenatis

Liq. Sod. Arsen.

Sodium Arsenate Solution contains, in each 100 cc., not less than 0.95 Gm. and not more than 1.05 Gm. of Na_2HAsO_4.

Exsiccated Sodium Arsenate, previously dried to constant weight at 150°	10 Gm.
Distilled Water, a sufficient quantity, To make	1000 cc.

Dissolve the exsiccated sodium arsenate in sufficient distilled water to make the product measure 1000 cc.

Description—Sodium Arsenate Solution is a clear, colorless, odorless liquid. Sodium Arsenate Solution is alkaline to litmus paper.

Identification—Evaporate 100 cc. of Sodium Arsenate Solution to 10 cc. This concentrated solution yields a white precipitate with barium chloride T.S.; a brown precipitate with silver nitrate T.S.; and when previously acidified with hydrochloric acid, a yellow precipitate with hydrogen sulfide T.S.

Assay—Place 25 cc. of Sodium Arsenate Solution, accurately measured, in a glass-stoppered flask; heat to 80°, and add 10 cc. of hydrochloric acid and 3 Gm. of potassium iodide. Stopper the flask and allow the mixture to stand at 80° for 15 minutes; then cool, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Perform a blank, using 25 cc. of distilled water and the same reagents under the same conditions as in the assay. From the number of cc. of 0.1 *N* sodium thiosulfate consumed in the assay, deduct the number consumed in the blank. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.009296 Gm. of Na_2HAsO_4.

Storage—Preserve Sodium Arsenate Solution in tight containers.

AVERAGE DOSE—**0.2 cc.** (approximately 3 minims).

One average metric dose contains about 2 mg. of Exsiccated Sodium Arsenate.

Sodium Bicarbonate and Calcium Carbonate Powder

SODIUM BICARBONATE AND CALCIUM CARBONATE POWDER
Pulvis Sodii Bicarbonatis et Calcii Carbonatis

Pulv. Sod. Bicarb. et Calc. Carb. Sippy Powder No. 1

Sodium Bicarbonate and Calcium Carbonate Powder contains not less than 92.5 per cent and not more than 107.5 per cent of the labeled amount of $NaHCO_3$ and of $CaCO_3$. The following formula may be used:

Precipitated Calcium Carbonate	**230 Gm.**
Sodium Bicarbonate	**770 Gm.**
To make	**1000 Gm.**

Mix the ingredients.

Identification—Sodium Bicarbonate and Calcium Carbonate Powder responds to the tests for *Sodium*, page 727, for *Calcium*, page 723, and for *Carbonate*, page 723.

Assay for calcium carbonate—Weigh accurately a sufficient quantity of Sodium Bicarbonate and Calcium Carbonate Powder to represent 0.3 Gm. of calcium carbonate and dissolve it in a mixture of 20 cc. of diluted hydrochloric acid and 20 cc. of distilled water. Continue the assay as under *Calcium Bromide*, page 104. Each cc. of 0.1 *N* potassium permanganate is equivalent to 0.005005 Gm. of $CaCO_3$.

Assay for sodium bicarbonate—Weigh accurately a sufficient quantity of Sodium Bicarbonate and Calcium Carbonate Powder to represent about 3 Gm. of sodium bicarbonate and dissolve it in 75 cc. of 1 *N* hydrochloric acid. Boil gently to remove the carbon dioxide. Add 75 cc. of distilled water, cool and titrate with 1 *N* sodium hydroxide using phenolphthalein T.S. as the indicator. From the volume of 1 *N* hydrochloric acid consumed, deduct the volume of 1 *N* hydrochloric acid corresponding to the previously determined content of calcium carbonate in the weight of Sodium Bicarbonate and Calcium Carbonate Powder taken for the assay. (Each cc. of 1 *N* hydrochloric acid is equivalent to 0.05005 Gm. of calcium carbonate.) The difference is the volume of 1 *N* hydrochloric acid equivalent to the sodium bicarbonate present. Each cc. of 1 *N* hydrochloric acid is equivalent to 0.08402 Gm. of $NaHCO_3$.

Storage—Preserve Sodium Bicarbonate and Calcium Carbonate Powder in well-closed containers.

AVERAGE DOSE—**2.6 Gm.** (approximately 40 grains).

Sodium Bicarbonate and Calcium Carbonate Tablets

SODIUM BICARBONATE AND CALCIUM CARBONATE TABLETS

Tabellæ Sodii Bicarbonatis et Calcii Carbonatis

Tab. Sod. Bicarb. et Calc. Carb. Sippy Powder Tablets No. 1

Sodium Bicarbonate and Calcium Carbonate Tablets contain not less than 92.5 per cent and not more than 107.5 per cent of the labeled amount of $NaHCO_3$ and of $CaCO_3$.

Identification—Crush several Sodium Bicarbonate and Calcium Carbonate Tablets. The resulting powder responds to the tests for *Sodium*, page 727, for *Calcium*, page 723, and for *Carbonate*, page 723.

Assay for calcium carbonate—Weigh not less than 20 of the Tablets, reduce them to a fine powder without appreciable loss, and assay an accurately weighed portion equivalent to about 0.3 Gm. of calcium carbonate and proceed as directed in the *Assay for calcium carbonate* under *Sodium Bicarbonate and Calcium Carbonate Powder*, page 473.

Assay for sodium bicarbonate—From the crushed Tablets prepared for the *Assay for calcium carbonate*, take an accurately weighed portion equivalent to about 3 Gm. of sodium bicarbonate and proceed as directed in the *Assay for sodium bicarbonate* under *Sodium Bicarbonate and Calcium Carbonate Powder*, page 473.

Storage—Preserve Sodium Bicarbonate and Calcium Carbonate Tablets in well-closed containers.

Sizes—Sodium Bicarbonate and Calcium Carbonate Tablets usually available contain 2 Gm. (approximately 30 grains) of sodium bicarbonate and 0.6 Gm. (approximately 10 grains) of calcium carbonate.

AVERAGE DOSE—**2.6 Gm.** (approximately 40 grains) of Sodium Bicarbonate and Calcium Carbonate Powder.

Sodium Bicarbonate and Magnesium Oxide Powder

SODIUM BICARBONATE AND MAGNESIUM OXIDE POWDER

Pulvis Sodii Bicarbonatis et Magnesii Oxidi

Pulv. Sod. Bicarb. et Mag. Oxid. Sippy Powder No. 2

Sodium Bicarbonate and Magnesium Oxide Powder contains not less than 92.5 per cent and not more than 107.5 per cent of the labeled amount of $NaHCO_3$, and not less than 90 per cent and not more than 110 per cent of the labeled amount of MgO. The following formula may be used:

Magnesium Oxide	**500 Gm.**
Sodium Bicarbonate	**500 Gm.**
To make	**1000 Gm.**

Mix the ingredients.

Identification—Sodium Bicarbonate and Magnesium Oxide Powder responds to the tests for *Sodium*, page 727, for *Magnesium*, page 726, and for *Carbonate*, page 723.

Assay for magnesium oxide—Weigh accurately a sufficient quantity of Sodium Bicarbonate and Magnesium Oxide Powder to represent about 0.1 Gm. of magnesium oxide and dissolve it in 25 cc. of diluted hydrochloric acid, and add 5 cc. of hydrochloric acid and 3 drops of methyl red T.S. Dilute to about 100 cc. with distilled water and add 40 cc. of dibasic ammonium phosphate T.S. Add a strong solution of ammonia, with constant stirring, until the solution is neutral. Continue to stir until the precipitate is well formed, then add an additional 5 cc. of strong ammonia solution, stir and allow the mixture to stand overnight. Filter and wash the precipitate with a 1 per cent ammonia solution. Dissolve the precipitate on the filter by washing with 3 per cent hydrochloric acid. Dilute the filtrate to about 100 cc. Add 3 drops of methyl red T.S. and 4 cc. of dibasic ammonium phosphate T.S. and again precipitate the magnesium by adding the strong ammonia solution as before. Allow the precipitate to stand for 4 hours, filter through a quantitative filter paper and ignite to constant weight in a tared platinum crucible at about 1000° after first heating to about 500° until the charring is complete. Each Gm of magnesium pyrophosphate is equivalent to 0.3623 Gm. of MgO.

Assay for sodium bicarbonate—Weigh accurately a quantity of Sodium Bicarbonate and Magnesium Oxide Powder equivalent to about 3 Gm. of sodium bicarbonate and dissolve it in 75 cc. of 1 *N* hydrochloric acid. Boil gently to remove the carbon dioxide. Add 75 cc. of distilled water, cool and titrate with 1 *N* sodium hydroxide, using phenolphthalein T.S. as the indicator. From the volume of 1 *N* hydrochloric acid consumed, deduct the volume of 1 *N* hydrochloric acid corresponding to the previously determined content of magnesium oxide in the weight of Sodium Bicarbonate and Magnesium Oxide Powder taken for the assay. (Each cc. of 1 *N* hydrochloric acid is equivalent to 0.02016 Gm. of magnesium oxide.)

The difference is the volume of 1 *N* hydrochloric acid equivalent to the sodium bicarbonate present. Each cc. of 1 *N* hydrochloric acid is equivalent to 0.08402 Gm. of $NaHCO_3$.

Storage—Preserve Sodium Bicarbonate and Magnesium Oxide Powder in well-closed containers.

AVERAGE DOSE—**1.3 Gm.** (approximately 20 grains).

Sodium Bicarbonate and Magnesium Oxide Tablets

SODIUM BICARBONATE AND MAGNESIUM OXIDE TABLETS

Tabellæ Sodii Bicarbonatis et Magnesii Oxidi

Tab. Sod. Bicarb. et Mag. Oxid. Sippy Powder Tablets No. 2

Sodium Bicarbonate and Magnesium Oxide Tablets contain not less than 92.5 per cent and not more than 107.5 per cent of the labeled amount of $NaHCO_3$ and not less than 90 per cent and not more than 110 per cent of the labeled amount of MgO.

Identification—Crush several Sodium Bicarbonate and Magnesium Oxide Tablets. The resulting powder responds to the tests for *Sodium*, page 727, for *Magnesium*, page 726, and for *Carbonate*, page 723.

Assay for magnesium oxide—Weigh not less than 20 of the Tablets, reduce them to a fine powder without appreciable loss. Take an accurately weighed portion equivalent to about 0.1 Gm. of magnesium oxide and proceed as directed in the *Assay for magnesium oxide* under *Sodium Bicarbonate and Magnesium Oxide Powder*, page 474.

Assay for sodium bicarbonate—From the crushed Tablets prepared for the *Assay for magnesium oxide*, take an accurately weighed portion equivalent to about 3 Gm. of sodium bicarbonate and proceed as directed in the *Assay for sodium bicarbonate* under *Sodium Bicarbonate and Magnesium Oxide Powder*, page 474.

Storage—Preserve Sodium Bicarbonate and Magnesium Oxide Tablets in well-closed containers.

Sizes—Sodium Bicarbonate and Magnesium Oxide Tablets usually available contain **0.6 Gm.** (approximately 10 grains) of sodium bicarbonate and **0.6 Gm.** (approximately 10 grains) of magnesium oxide.

AVERAGE DOSE—**1.3 Gm.** (approximately 20 grains) of Sodium Bicarbonate and Magnesium Oxide Powder.

Sodium Bicarbonate Tablets

SODIUM BICARBONATE TABLETS

Tabellæ Sodii Bicarbonatis

Tab. Sod. Bicarb.

Sodium Bicarbonate Tablets contain not less than 92.5 per cent and not more than 107.5 per cent of the labeled amount of $NaHCO_3$.

Identification—An aqueous solution of the Tablets responds to the tests for *Sodium*, page 727, and for *Bicarbonate*, page 723.

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without an appreciable loss, mix an accurately weighed portion, equivalent to about 2 Gm. of sodium bicarbonate, with 25 cc. of distilled water, and titrate with 1 *N* sulfuric acid, using methyl orange T.S. as the indicator. Each cc. of 1 *N* sulfuric acid is equivalent to 0.08402 Gm. of $NaHCO_3$.
Storage—Preserve Sodium Bicarbonate Tablets in tight containers.
Sizes—Sodium Bicarbonate Tablets usually available contain the following amounts of sodium bicarbonate: **0.3** and **0.6 Gm.** (approximately 5 and 10 grains).

AVERAGE DOSE—**1 Gm.** (approximately 15 grains) of Sodium Bicarbonate.

Sodium Borate Solution, Compound

COMPOUND SODIUM BORATE SOLUTION

Liquor Sodii Boratis Compositus

Liq. Sod. Bor. Comp. Dobell's Solution

Compound Sodium Borate Solution contains, in each 100 cc., not less than 0.25 Gm. and not more than 0.31 Gm. of C_6H_6O.

Sodium Borate	**15 Gm.**
Sodium Bicarbonate	**15 Gm.**
Liquefied Phenol	**3 cc.**
Glycerin	**35 cc.**
Distilled Water, a sufficient quantity, To make	**1000 cc.**

Dissolve the sodium borate and sodium bicarbonate in about 500 cc. of the water; add the glycerin and liquefied phenol, and allow the mixture to stand 30 minutes, or until the effervescence has ceased; then add sufficient water to make the product measure 1000 cc., and filter.

Description—Compound Sodium Borate Solution is a clear, colorless, or yellowish liquid, with a phenol odor. It is alkaline to phenolphthalein T.S.
Identification—
A: Add a few drops of hydrochloric acid to 3 cc. of Compound Sodium Borate Solution: effervescence is produced immediately.
B: Compound Sodium Borate Solution turns turmeric paper red; if this paper is dried and then moistened with ammonia T.S., it is changed to a dark bluish color.
Assay—Transfer 20 cc. of Compound Sodium Borate Solution to an iodine flask and proceed as directed in the *Assay* under *Phenolated Water*, page 387. Each cc. of 0.1 *N* bromine is equivalent to 0.001569 Gm. of C_6H_6O.
Storage—Preserve Compound Sodium Borate Solution in tight containers.

FOR USE ON MUCOUS MEMBRANES—Undiluted; or for the dental spray bottle, diluted with 5 volumes of water.

SODIUM BROMIDE ELIXIR

Elixir Sodii Bromidi

Elix. Sod. Bromid.

Sodium Bromide Elixir contains, in each 100 cc., not less than 16.5 Gm. and not more than 18.5 Gm. of NaBr.

Sodium Bromide	**175 Gm.**
Syrup	**200 cc.**
Distilled Water	**460 cc.**
Aromatic Elixir, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the sodium bromide in the distilled water, add the syrup and sufficient aromatic elixir to make the product measure 1000 cc.; mix well, and filter, if necessary, until the product is clear.

Assay—Dilute exactly 5 cc. of Sodium Bromide Elixir with distilled water to 100 cc. To 25 cc. of the dilution add slowly and with agitation, 50 cc. of 0.1 *N* silver nitrate, 2 cc. of nitric acid, and 2 cc. of ferric ammonium sulfate T.S. Titrate the excess silver nitrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.01029 Gm. of NaBr.

Alcohol content—From 5 to 7 per cent, by volume, of C_2H_5OH.

Storage—Preserve Sodium Bromide Elixir in tight containers.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains 0.7 Gm. of Sodium Bromide.

SODIUM BROMIDE TABLETS

Tabellæ Sodii Bromidi

Tab. Sod. Bromid.

Sodium Bromide Tablets contain not less than 92.5 per cent and not more than 107.5 per cent of the labeled amount of NaBr.

Identification—A filtered aqueous solution of the Tablets responds to the tests for *Sodium*, page 727, and for *Bromide*, page 723.

Chloride—Dissolve 1 Gm. of the powdered Tablets in 50 cc. of distilled water. Dilute 10 cc. of this solution with 30 cc. of distilled water, add 35 cc. of ammonium carbonate T.S., then add, slowly with agitation, 45 cc. of solution of silver nitrate (1 in 20). Allow the mixture to stand 10 minutes and filter. To 30 cc. of the filtrate add carefully 5 cc. of nitric acid, and dilute with distilled water to 50 cc. The turbidity produced is not greater than that produced in a control test made by adding 1.3 cc. of 0.02 *N* hydrochloric acid to 5 cc. of the same solution of the sample and treating this mixture in the same manner as in the test.

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without an appreciable loss, and dissolve an accurately weighed portion, equivalent to

about 0.3 Gm. of sodium bromide, in 25 cc. of distilled water. Add 50 cc. of 0.1 *N* silver nitrate and 2 cc. of nitric acid, and agitate the mixture until the precipitate is coagulated. Then add 2 cc. of ferric ammonium sulfate T.S., and titrate the excess of silver nitrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.01029 Gm. of NaBr.

Storage—Preserve Sodium Bromide Tablets in tight containers.

Sizes—Sodium Bromide Tablets usually available contain the following amounts of sodium bromide: 0.3 and 0.6 Gm. (approximately 5 and 10 grains).

AVERAGE DOSE—1 Gm. (approximately 15 grains) of Sodium Bromide.

Sodium Cacodylate

SODIUM CACODYLATE

Sodii Cacodylas

Sod. Cacodyl.

$Na(CH_3)_2AsO_2.3H_2O$ Mol. wt. 214.02

Sodium Cacodylate contains not less than 72 per cent and not more than 75 per cent of $Na(CH_3)_2AsO_2$, the remainder consisting chiefly of water.

Description—Sodium Cacodylate occurs as white crystals, or as a white, granular powder. It is odorless or has a slight odor, and is deliquescent. It liquefies in its water of hydration at about 60°.

Solubility—One Gm. of Sodium Cacodylate dissolves in about 0.5 cc. of water and in about 2.5 cc. of alcohol, at 25°.

Identification—

A: Sodium Cacodylate burns with a bluish flame, emitting a garlic-like odor, and to a non-luminous flame it imparts a yellowish orange color.

B: A mixture of a few drops of an aqueous solution of Sodium Cacodylate (1 in 100) with 2 cc. of hypophosphorous acid T.S., allowed to stand in a stoppered tube, develops the odor of cacodyl within 1 hour.

Monomethylarsenate—No turbidity is produced in 10 cc. of an aqueous solution of Sodium Cacodylate (1 in 20) by the addition of 1 cc. of calcium chloride T.S., either when cold or on heating.

Arsenate or phosphate—Add 2 cc. of magnesia mixture T.S. to 5 cc. of an aqueous solution of Sodium Cacodylate (1 in 20): the mixture develops no turbidity within 1 hour.

Chloride—One Gm. of Sodium Cacodylate shows no more chloride than corresponds to 0.3 cc. of 0.02 *N* hydrochloric acid, page 758.

Sulfate—The addition of 5 drops of barium chloride T.S. to 10 cc. of an aqueous solution of Sodium Cacodylate (1 in 50), acidified with 2 drops of hydrochloric acid, produces no turbidity within 30 seconds.

Free alkali or acid—A solution of 2 Gm. of Sodium Cacodylate in 50 cc. of recently boiled distilled water requires not more than 0.5 cc. of 0.1 *N* hydrochloric acid or 0.5 cc. of 0.1 *N* sodium hydroxide to render it neutral, using 2 drops of phenolphthalein T.S. as the indicator.

Assay—Place about 0.2 Gm. of Sodium Cacodylate, accurately weighed, in a 500-cc. Kjeldahl flask, and add 10 Gm. of potassium sulfate, 0.3 Gm. of starch, and 20 cc. of sulfuric acid. Digest over a low flame until frothing has ceased and the solution is colorless, then cool, and dilute the solution cautiously with 75 cc. of distilled water. Transfer the solution to a 500-cc. Erlenmeyer flask, rinsing the Kjeldahl

flask with 50 cc. of distilled water added in small portions. Slowly add a cold aqueous solution of sodium hydroxide (1 in 2) until the mixture is alkaline to litmus paper, then add diluted sulfuric acid until the reaction is acid to litmus paper. Again cool the solution, add 2 Gm. of sodium bicarbonate, stir until dissolved, add a few drops of starch T.S., and immediately titrate with 0.1 *N* iodine. Each cc. of 0.1 *N* iodine is equivalent to 0.007999 Gm. of $Na(CH_3)_2AsO_2$.

Storage—Preserve Sodium Cacodylate in tight containers.

AVERAGE DOSE—**60 mg.** (approximately 1 grain).

Sodium Cacodylate Ampuls

SODIUM CACODYLATE AMPULS

Ampullæ Sodii Cacodylatis

Ampul. Sod. Cacodyl. Sodium Cacodylate Injection

Sodium Cacodylate Ampuls contain a sterile solution of sodium cacodylate in water for injection, and yield $Na(CH_3)_2AsO_2$, equal to not less than 71 per cent and not more than 77 per cent of the labeled amount of $Na(CH_3)_2AsO_2.3H_2O$.

Prepare the solution and fill the cleansed ampuls according to the requirements given on pages 687 to 689. Sterilize the filled ampuls by Process C at 15 pounds pressure for 20 minutes, page 751, or by any other adequate and suitable method of sterilization, and test for sterility according to the method described on page 746. The Ampuls also conform to the other requirements under *Ampuls*, page 687.

Assay—Transfer to a 500-cc. Kjeldahl flask an accurately measured volume of the ampul solution diluted, if necessary, and containing about 0.2 Gm. of sodium cacodylate and proceed as directed in the *Assay* under *Sodium Cacodylate*, page 478, beginning with "and add 10 Gm. of potassium sulfate. . . ." Each cc. of 0.1 *N* iodine is equivalent to 0.007999 Gm. of $Na(CH_3)_2AsO_2$.

AVERAGE DOSE—**0.3 Gm.** of Sodium Cacodylate.

Sodium Chloride and Dextrose Tablets

SODIUM CHLORIDE AND DEXTROSE TABLETS

Tabellæ Sodii Chloridi et Dextrosi

Tab. Sod. Chlorid. et Dextros.

Sodium Chloride and Dextrose Tablets contain not less than 92.5 per cent and not more than 107.5 per cent of the labeled amounts of NaCl and of $C_6H_{12}O_6.H_2O$.

Identification—

A: A filtered aqueous extract of the Tablets responds to the tests for *Sodium*, page 727, and for *Chloride*, page 724.

B: Add a few drops of the filtered aqueous extract of the Tablets to 5 cc. of hot alkaline cupric tartrate T.S.: A copious red precipitate of cuprous oxide is produced.

Iodide or bromide—Proceed as directed under *Sodium Chloride Tablets*, page 480.

Barium—Proceed as directed under *Sodium Chloride Tablets*, page 480.

Calcium and magnesium—Proceed as directed under *Sodium Chloride Tablets*, page 480.

Assay for dextrose—Dissolve not less than 20 of the Tablets, containing from 2 to 5 Gm. of dextrose, in about 75 cc. of distilled water in a 100-cc. volumetric flask, add several drops of ammonia T.S., dilute to volume, and mix well. After 30 minutes, filter through a dry filter and determine the angular rotation in a 200-mm. tube at 25°, retaining the excess of the solution for the *Assay for sodium chloride*. The observed rotation in degrees, multiplied by 1.0425, represents the weight of $C_6H_{12}O_6.H_2O$, in the sample taken.

Assay for sodium chloride—Dilute to 100 cc. with distilled water, exactly 20 cc. of the solution used for the *Assay for dextrose*. Transfer an accurately measured portion, equivalent to about 0.25 Gm. of sodium chloride, to a glass-stoppered flask, and add sufficient distilled water to make about 50 cc. Proceed as directed in the *Assay* under *Sodium Chloride Tablets*, page 481, beginning with "add 50 cc. of 0.1 *N* silver nitrate. . . ."

Storage—Preserve Sodium Chloride and Dextrose Tablets in well-closed containers.

Sizes—Sodium Chloride and Dextrose Tablets usually available contain the following amounts of sodium chloride and dextrose, of each: **0.2** and **0.45 Gm.** (approximately 3 and 7 grains).

Sodium Chloride Tablets

SODIUM CHLORIDE TABLETS

Tabellæ Sodii Chloridi

Tab. Sod. Chlorid.

Sodium Chloride Tablets contain not less than 92.5 per cent and not more than 105 per cent of the labeled amount of NaCl.

Identification—A filtered aqueous extract of the Tablets responds to the tests for *Sodium*, page 727, and for *Chloride*, page 724.

Iodide or bromide—Reduce not less than 20 of the Tablets to a fine powder. Digest 2 Gm. of the powder for 3 hours with 25 cc. of warm alcohol, cool the mixture, and remove the undissolved material by filtration. Evaporate the filtrate to dryness, dissolve the residue in 5 cc. of distilled water, filter, if necessary, and add 1 cc. of chloroform. Cautiously introduce, dropwise, with constant agitation, chlorine T.S. which has been diluted with twice its volume of distilled water: the chloroform does not acquire a violet, yellow or orange color.

Barium—Digest 4 Gm. of the powdered Tablets with 20 cc. of distilled water, filter, and divide the solution into 2 equal portions. To 1 portion add 2 cc. of diluted sulfuric acid and to the other, 2 cc. of distilled water: after standing for 2 hours the solutions are equally clear.

Calcium and magnesium—Digest 1 Gm. of the powdered Tablets with 50 cc. of distilled water, and filter. Mix 4 cc. of ammonia T.S. with the filtrate, and divide the mixture into 2 equal portions. Treat 1 portion with 1 cc. of ammonium oxa-

late T.S. and the other portion with 1 cc. of sodium phosphate T.S.: neither mixture becomes turbid within 5 minutes.

Assay—Dissolve not less than 20 of the Tablets in about 100 cc. of distilled water, filter into a 500-cc. volumetric flask and wash the original container and filter with 100 cc. of distilled water in divided portions, adding the washings to the original filtrate. Add sufficient distilled water to make 500 cc. Accurately measure a volume of solution which contains about 0.25 Gm. of sodium chloride and transfer to a glass-stoppered flask and add sufficient distilled water to make about 50 cc. Add 50 cc. of 0.1 *N* silver nitrate, 3 cc. of nitric acid, 3 cc. of nitrobenzene, and 2 cc. of ferric ammonium sulfate T.S. Shake well and titrate the excess silver nitrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.005845 Gm. of NaCl.

Storage—Preserve Sodium Chloride Tablets in well-closed containers.

Sizes—Sodium Chloride Tablets usually available contain the following amounts of sodium chloride: **0.3, 0.5, 0.6,** and **1 Gm.** (approximately 5, 7½, 10, and 15 grains).

SODIUM CITRATE SOLUTION

Liquor Sodii Citratis

Liq. Sod. Cit. Mistura Sodii Citratis Potio Riverii

Sodium Citrate Solution contains, in each 100 cc., not less than 2.5 Gm. and not more than 3 Gm. of $Na_3C_6H_5O_7.2H_2O$.

Citric Acid	**20 Gm.**
Sodium Bicarbonate	**25 Gm.**
Distilled Water, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the citric acid in the distilled water contained in a strong bottle of about 1250-cc. capacity; add the sodium bicarbonate; dissolve it by gentle agitation, and immediately stopper the bottle securely.

NOTE: This preparation should not be dispensed unless it has been recently prepared.

Description—Sodium Citrate Solution is a slightly effervescent, clear, colorless, odorless liquid, with a pleasantly acid and salty taste. It is acid to litmus paper.

Identification—

A: When a clean platinum wire is moistened with Sodium Citrate Solution and held in a non-luminous flame, it imparts a yellowish orange color.

B: Neutralize 10 cc. of Sodium Citrate Solution carefully with ammonia T.S., add an equal volume of calcium chloride T.S., and boil the mixture: a white precipitate is produced.

Assay—Evaporate 10 cc. of Sodium Citrate Solution, accurately measured, to dryness in a platinum crucible and proceed as directed in the *Assay* under *Potassium*

Citrate Solution, page 408. Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.009804 Gm. of $Na_3C_6H_5O_7.2H_2O$.

Storage—Preserve Sodium Citrate Solution in tight containers.

AVERAGE DOSE—15 cc. (approximately 4 fluidrachms).

One average metric dose contains about 0.4 Gm. of Sodium Citrate.

Sodium Glycerophosphate

SODIUM GLYCEROPHOSPHATE

Sodii Glycerophosphas

Sod. Glycerophos.

$Na_2C_3H_5(OH)_2PO_4$ Mol. wt. 216.06

Sodium Glycerophosphate contains not less than 68 per cent and not more than 74 per cent of $Na_2C_3H_5(OH)_2PO_4$.

Description—Sodium Glycerophosphate occurs as white, monoclinic plates or scales, or as a white powder. It is odorless, and has a salty taste.

Solubility—One Gm. of Sodium Glycerophosphate dissolves in about 1.5 cc. of water at 25°. It is very soluble in hot water, but nearly insoluble in alcohol.

Identification—

A: An aqueous solution of Sodium Glycerophosphate (1 in 20) responds to the tests for *Sodium*, page 727, and for *Glycerophosphate*, page 725.

B: When strongly heated, Sodium Glycerophosphate is decomposed, evolving inflammable vapors.

Reaction—An aqueous solution of Sodium Glycerophosphate (1 in 20) is alkaline to litmus paper and to phenolphthalein T.S.

Free alkali—A solution of 1 Gm. of Sodium Glycerophosphate in 10 cc. of distilled water requires not more than 1.5 cc. of 0.1 *N* sulfuric acid for neutralization using 3 drops of phenolphthalein T.S. as the indicator.

Alcohol-soluble impurities—Triturate 1 Gm. of Sodium Glycerophosphate with 20 cc. of dehydrated alcohol, filter the mixture, evaporate the filtrate on a water bath, and dry the residue for 1 hour at a temperature not exceeding 70°: the weight of the residue does not exceed 10 mg.

Phosphate—Prepare a standard solution containing 0.192 Gm. of potassium biphosphate in sufficient distilled water to make 100 cc. Dilute 2 cc. of this solution with sufficient distilled water to make 100 cc. To 10 cc. of this diluted standard solution add 10 cc. of cold ammonium molybdate T.S., and to 10 cc. of a solution of sodium glycerophosphate (1 in 10) in distilled water add 10 cc. of cold ammonium molybdate T.S. Mix each suspension and allow them to stand 10 minutes; agitate again, if necessary, before comparison. The turbidity of the sodium glycerophosphate suspension is not greater than that of the diluted standard solution suspension.

Arsenic—Sodium Glycerophosphate meets the requirements of the test for *Arsenic*, page 689.

Heavy metals—Dissolve 1 Gm. of Sodium Glycerophosphate in 3 cc. of diluted acetic acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Sodium Glycerophosphate is 20 parts per million.

Assay—Dissolve about 3 Gm. of Sodium Glycerophosphate, accurately weighed, in 30 cc. of distilled water, and titrate with 0.5 *N* hydrochloric acid, using methyl

orange T.S. as the indicator. Each cc. of 0.5 *N* hydrochloric acid is equivalent to 0.1080 Gm. of $Na_2C_3H_5(OH)_2PO_4$.

Storage—Preserve Sodium Glycerophosphate in tight containers.

AVERAGE DOSE—**0.25 Gm.** (approximately 4 grains).

DILUTED SODIUM HYPOCHLORITE SOLUTION

Liquor Sodii Hypochloritis Dilutus

Liq. Sod. Hypochlor. Dil.

Modified Dakin's Solution Liquor Sodæ Chlorinatæ Chirurgicalis

Diluted Sodium Hypochlorite Solution is an aqueous solution of chlorine compounds of sodium containing, in each 100 cc., not less than 0.45 Gm. and not more than 0.50 Gm. of NaOCl, equivalent to not less than 0.43 Gm. and not more than 0.48 Gm. of available Cl.

Diluted Sodium Hypochlorite Solution may be prepared as follows:

Sodium Hypochlorite Solution . . . . . **1000 cc.**
Sodium Bicarbonate,
Distilled Water, of each, a sufficient quantity.

Dilute sodium hypochlorite solution with 5000 cc. of distilled water and add 40 cc. of a 5 per cent solution of sodium bicarbonate in cold distilled water, and mix well. Remove about 20 cc. of the mixture, add to it about 20 mg. of powdered phenolphthalein, and shake it gently for 2 minutes. If a red color appears, add more of the sodium bicarbonate solution, and test with powdered phenolphthalein as just described, repeating the procedure as often as necessary until no red color is produced. Assay the liquid and dilute it with sufficient distilled water to make the final solution contain, in each 100 cc., 0.48 Gm. of NaOCl.

Description—Diluted Sodium Hypochlorite Solution is a colorless or light yellow liquid having a slight odor suggesting chlorine.

Specific gravity—The specific gravity of Diluted Sodium Hypochlorite Solution is not more than 1.025 at 25°.

Total solids—Add 5 drops of sulfuric acid to 10 cc. of Diluted Sodium Hypochlorite Solution, evaporate to dryness on a water bath, and ignite the residue gently to constant weight: the weight of the residue does not exceed 0.300 Gm.

Free alkali—Add about 20 mg. of powdered phenolphthalein to 20 cc. of Diluted Sodium Hypochlorite Solution: no red color is produced in the mixture when agitated.

Assay—Measure accurately 15 cc. of Diluted Sodium Hypochlorite Solution and dilute it with 25 cc. of distilled water. Add 2 Gm. of potassium iodide and 10 cc. of acetic acid, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate,

using starch T.S. as the indicator. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.003723 Gm. of NaOCl.

Storage—Preserve Diluted Sodium Hypochlorite Solution in tight, light-resistant containers, and avoid excessive heat.

Sodium Hypophosphite

SODIUM HYPOPHOSPHITE

Sodii Hypophosphis

Sod. Hypophos.

$NaH_2PO_2.H_2O$ Mol. wt. 106.01

Sodium Hypophosphite, when dried over sulfuric acid for 2 hours, contains not less than 98 per cent of $NaH_2PO_2.H_2O$.

Caution should be observed in compounding Sodium Hypophosphite with other substances, as an explosion may occur if it is triturated or heated with nitrates, chlorates, or other oxidizing agents.

Description—Sodium Hypophosphite occurs as small, colorless, transparent, rectangular plates of a pearly luster, or as a white, granular powder. It is deliquescent on exposure to moist air, is odorless, and has a salty taste. An aqueous solution of Sodium Hypophosphite (1 in 20) is neutral or alkaline to litmus paper.

Solubility—One Gm. of Sodium Hypophosphite dissolves in about 1 cc. of water at 25° and in about 0.2 cc. of boiling water. It is soluble in alcohol, slightly soluble in dehydrated alcohol, and freely soluble in glycerin, at 25°, and in boiling alcohol.

Identification—An aqueous solution of Sodium Hypophosphite (1 in 20) responds to the tests for *Sodium*, page 727, and for *Hypophosphite*, page 725.

Loss on drying—When dried over sulfuric acid for 2 hours, Sodium Hypophosphite loses not more than 3 per cent of its weight.

Free alkali—A solution of 1 Gm. of Sodium Hypophosphite in 10 cc. of distilled water requires not more than 1.5 cc. of 0.1 *N* hydrochloric acid for neutralization using methyl orange T.S. as the indicator.

Phosphate—Add 0.5 cc. of magnesia mixture T.S. to 10 cc. of an aqueous solution of Sodium Hypophosphite (1 in 20) which has been made alkaline with ammonia T.S.: no precipitate or turbidity is produced within 1 minute.

Arsenic—Measure 5 cc. of an aqueous solution of Sodium Hypophosphite (1 in 25) into a beaker containing 3 cc. of nitric acid diluted with about 10 cc. of distilled water, and evaporate the mixture to dryness on a water bath: the residue meets the requirements of the test for *Arsenic*, page 689.

Calcium—To 10 cc. of an aqueous solution of Sodium Hypophosphite (1 in 20) add 0.5 cc. of ammonium oxalate T.S. and a few drops of ammonia T.S.: the mixture remains clear for 1 minute.

Heavy metals—Dissolve 2 Gm. of Sodium Hypophosphite in enough distilled water to make 40 cc. of solution. To 10 cc. of this solution add 0.020 mg. of lead, dilute to 30 cc. with distilled water, and add 1 cc. of diluted acetic acid (A). To the remaining 30 cc. add 1 cc. of diluted acetic acid (B). To each solution add 10 cc. of hydrogen sulfide T.S. (B) is not darker than (A): the heavy metals limit of Sodium Hypophosphite is 20 parts per million.

Assay—Accurately weigh about 0.12 Gm. of Sodium Hypophosphite, dried over sulfuric acid for 2 hours, and proceed as directed in the *Assay* under *Calcium Hypophosphite*, page 108. Each cc. of 0.1 *N* bromine is equivalent to 0.002650 Gm. of $NaH_2PO_2.H_2O$.

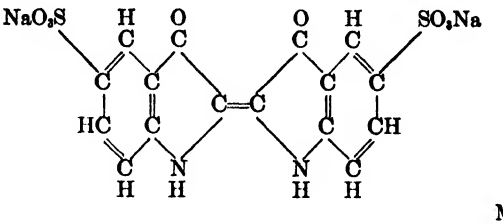
Storage—Preserve Sodium Hypophosphite in tight containers.

Average dose—0.5 Gm. (approximately $7^1/_2$ grains).

SODIUM INDIGOTINDISULFONATE

Sodii Indigotindisulfonas

Indigo Carmine



$C_{16}H_8N_2O_8S_2Na_2$ Mol. wt. 466.35

Sodium Indigotindisulfonate contains not less than 97 per cent of $C_{16}H_8N_2O_8S_2Na_2$ calculated on a dry basis, the loss on drying being determined on a separate portion by drying for 8 hours at 105°.

Description—Sodium Indigotindisulfonate occurs as a dusky purplish blue powder, or as blue granules with a coppery luster. It is affected by light. Solutions of Sodium Indigotindisulfonate have a blue or bluish purple color.

Solubility—One Gm. of Sodium Indigotindisulfonate dissolves in about 100 cc. of water at 25°. It is slightly soluble in alcohol and practically insoluble in most other organic solvents.

Identification—

A: The residue remaining after the incineration of Sodium Indigotindisulfonate responds to the tests for *Sodium*, page 727, and for *Sulfate*, page 727.

B: The addition of hydrochloric acid to an aqueous solution of Sodium Indigotindisulfonate changes the color to bluish violet; further dilution with water restores the original color.

C: The addition of sodium hydroxide T.S. to an aqueous solution of Sodium Indigotindisulfonate changes the color to a yellow or olive-brown.

D: The addition of sodium chloride to an aqueous solution of Sodium Indigotindisulfonate produces a blue precipitate.

Loss on drying—When dried for 8 hours at 105°, Sodium Indigotindisulfonate loses not more than 10 per cent of its weight.

Water-insoluble substances—Dissolve 1 Gm. of Sodium Indigotindisulfonate in 100 cc. of distilled water: the weight of the residue does not exceed 5 mg.

Arsenic—Place 4 Gm. of Sodium Indigotindisulfonate in a Kjeldahl flask, moisten with water, add 10 cc. of sulfuric acid and 5 cc. of nitric acid. As soon as the first violent reaction subsides, heat until most of the brown fumes are expelled. Repeat the addition of nitric acid, 1–3 cc. at a time, and heat until the Sodium Indigotindisulfonate is practically decomposed and most of the organic matter is in solution. Then add *cautiously and in small portions*, 5 cc. of 60 per cent perchloric acid. When the violence of the reaction has subsided, continue the addition of small amounts of nitric acid and heat as before until a colorless solution is obtained. (If the solution fails to clear up in 10 to 20 minutes after the addition of the perchloric acid, add 1 to 3 cc. more of this acid and continue the nitric acid treatment until the solution is colorless.) Boil for 10 to 15 minutes, cool, and neutralize with sodium hydroxide T.S. Transfer to a 100-cc. volumetric flask and dilute to volume with water. Five cc. of this solution meets the requirements of the test for *Arsenic*, page 689. Retain the rest of the solution for use in the test for lead.

Lead—Five cc. of the solution prepared for use in the test for *Arsenic* contains no more than 2 micrograms of lead (corresponding to not more than 10 parts per million) when tested according to the *Lead limit test*, page 729, using 3 cc. of am-

monium citrate solution, 1 cc. of potassium cyanide solution, and 0.5 cc. of hydroxylamine hydrochloride solution.

Lower sulfonated dyes—Dissolve about 0.4 Gm. of Sodium Indigotindisulfonate, accurately weighed, in 100 cc. of water. To 50 cc. of this solution add 0.25 cc. of hydrochloric acid. Extract the lower sulfonated dye by shaking the solution successively in 3 separatory funnels each containing 50 cc. of amyl alcohol. Wash the amyl alcohol extracts by shaking successively with 50-cc. portions of 0.0625 *N* hydrochloric acid until the washings are practically colorless, passing each acid portion through the separatory funnels in the order used for the original solution. Dilute the amyl alcohol extracts in each funnel with 1 to 2 volumes of petroleum benzin and remove the lower sulfonated dye by washing with several 10-cc. portions of water, passing each portion through the 3 funnels in an order the reverse of that previously followed. Determine the dye in the water extract by titration with 0.1 *N* titanium trichloride, page 788, using 15 Gm. of sodium acid tartrate and a volume of 100 cc. Perform a blank determination using the same quantities of the same reagents and 1 mg. of Sodium Indigotindisulfonate. Each cc. of 0.1 *N* titanium trichloride is equivalent to 0.01821 Gm. of Sodium Indigotinmonosulfonate. Sodium Indigotindisulfonate contains not more than 5 per cent of Sodium Indigotinmonosulfonate calculated on a dry basis, the loss on drying being determined on a separate portion by drying for 8 hours at 105°.

Assay—Dissolve about 0.5 Gm. of Sodium Indigotindisulfonate, accurately weighed, in 200 cc. of distilled water, add 15 Gm. of sodium acid tartrate, heat to boiling, and titrate with 0.1 *N* titanium trichloride, page 788, until the blue color disappears. The color change at the end point is from blue to colorless or reddish brown. Each cc. of 0.1 *N* titanium trichloride is equivalent to 0.02332 Gm. of $C_{16}H_8N_2O_8S_2Na_2$.

Storage—Preserve Sodium Indigotindisulfonate in tight, light-resistant containers.

AVERAGE DOSE—Subcutaneously and intramuscularly, **50 mg.** (approximately $^3/_4$ grain).

Intravenously, **8 mg.** (approximately $^1/_8$ grain).

Sodium Indigotindisulfonate Ampuls

SODIUM INDIGOTINDISULFONATE AMPULS
Ampullæ Sodii Indigotindisulfonatis

Amp. Sod. Indigotin. Indigo Carmine Injection Indigo Carmine Ampuls

Sodium Indigotindisulfonate Ampuls contain a sterile solution of sodium indigotindisulfonate in water for injection and yield not less than 95 per cent and not more than 105 per cent of the labeled amount of $C_{16}H_8N_2O_8S_2Na_2$.

Prepare the solution and fill the cleansed ampuls according to the requirements given on pages 687 to 689. Sterilize the filled ampuls by autoclaving or by any other adequate and suitable method of sterilization, and test for sterility according to the method described on page 746. The Ampuls also conform to the other requirements under *Ampuls*, page 687.

Assay—Adjust to a volume of about 200 cc. a sufficient quantity of the ampul solution to yield about 0.5 Gm. of sodium indigotindisulfonate and proceed as directed

in the *Assay* under *Sodium Indigotindisulfonate*, page 486, beginning with, "add 15 Gm. of sodium acid tartrate. . . ."

AVERAGE DOSE—Subcutaneously and intramuscularly, **50 mg.**; Intravenously, **8 mg.** of Sodium Indigotindisulfonate.

Sodium Iodide Ampuls

SODIUM IODIDE AMPULS
Ampullæ Sodii Iodidi

Ampul Sod. Iodid. Sodium Iodide Injection

Sodium Iodide Ampuls contain a sterile solution of sodium iodide in water for injection, and yield NaI, equal to not less than 95 per cent and not more than 103 per cent of the labeled amount of NaI.

Prepare the solution and fill the cleansed ampuls according to the requirements given on pages 687 to 689. Sterilize the filled ampuls by Process C, page 751, or by any other adequate and suitable method of sterilization, and test for sterility according to the method described on page 746. The Ampuls also conform to the other requirements under *Ampuls*, page 687.

Assay—Transfer to a suitable container an accurately measured volume of the ampul solution, containing about 0.25 Gm. of sodium iodide; add 200 cc. of distilled water and 10 drops of dichlorofluorescein T.S. as the indicator. Titrate the mixture with 0.1 *N* silver nitrate until the silver iodide flocculates and the mixture turns to a faint pink. Carry out the titration in diffused light, preferably from a northern sky, or artificial light, and against a white background. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.01499 Gm. of NaI.

AVERAGE DOSE—**1 Gm.** of Sodium Iodide.

Sodium Perborate, Aromatic, N. F.

N. F. AROMATIC SODIUM PERBORATE
Sodii Perboras Aromaticus N. F.

Sod. Perbor. Arom. N. F.

Peppermint Oil	**4 cc.**
Saccharin Sodium	**4 Gm.**
Sodium Perborate, a sufficient quantity,	
To make	**1000 Gm.**

Triturate the peppermint oil and the saccharin sodium with a portion of the sodium perborate. Then add a sufficient quantity of sodium perborate to make the product weigh 1000 Gm., and mix it thoroughly.

Storage—Preserve N. F. Aromatic Sodium Perborate in tight containers.

Sodium Phosphate Solution

SODIUM PHOSPHATE SOLUTION

Liquor Sodii Phosphatis

Liq. Sod. Phos.

Sodium Phosphate Solution contains, in each 100 cc., not less than 37 Gm. and not more than 41 Gm. of Na_2HPO_4.

Exsiccated Sodium Phosphate	**400 Gm.**
Citric Acid	**130 Gm.**
Glycerin	**150 cc.**
Distilled Water, a sufficient quantity,	
To make	**1000 cc.**

Add the exsiccated sodium phosphate, the citric acid, and the glycerin to 500 cc. of distilled water, and digest on a water bath until solution is effected. Filter, and pass sufficient distilled water through the filter to make the product measure 1000 cc.

NOTE: Crystallized Sodium Phosphate in proper proportion may be used for the preparation of Sodium Phosphate Solution. The amount of water present in the crystals used should be deducted from the amount of water indicated in the directions for preparation.

Description—Sodium Phosphate Solution is a clear, colorless liquid, of a thick, syrupy consistence, practically odorless, and with a cooling, salty taste. It is acid to litmus paper.

Specific gravity—The specific gravity of Sodium Phosphate Solution is about 1.385 at 25°.

Identification—Sodium Phosphate Solution responds to the tests for *Sodium*, page 727, and for *Phosphate*, page 727.

Arsenic—Sodium Phosphate Solution meets the requirements of the test for *Arsenic*, page 689.

Heavy metals—To 1 cc. of Sodium Phosphate Solution add 1 cc. of diluted hydrochloric acid and enough distilled water to make 25 cc.: the heavy metals limit, page 721, of Sodium Phosphate Solution is 10 parts per million.

Assay—Transfer 5 cc. of Sodium Phosphate Solution to a 500-cc. volumetric flask and dilute to volume with water. Mix well and transfer 15 cc. of the diluted solution to a 400-cc. beaker. Add 10 Gm. of ammonium nitrate and neutralize with ammonia T.S. Dilute to 100 cc. with water and warm to about 50°. Add 75 cc. of ammonium molybdate T.S. with stirring and stir for 15 minutes. Allow to settle for 15 minutes and decant through a Gooch crucible. Wash twice by de-

cantation using about 30 cc. of cold distilled water each time, then transfer the precipitate to the crucible and wash with cold water until the washings are neutral. Transfer the crucible and precipitate to the precipitating beaker, or other satisfactory container, add 30 cc. of 0.5 *N* sodium hydroxide and agitate until all of the yellow residue has dissolved. Titrate the excess 0.5 *N* sodium hydroxide with 0.5 *N* sulfuric acid using 5 drops of phenolphthalein T.S. as the indicator. Each cc. of 0.5 *N* sodium hydroxide is equivalent to 0.003087 Gm. Na_2HPO_4.

Storage—Preserve Sodium Phosphate Solution in tight containers, in a moderately warm place (not under 22°).

AVERAGE DOSE—**8 cc.** (approximately 2 fluidrachms).

One average metric dose contains 3.2 Gm. of Exsiccated Sodium Phosphate, equivalent to about 6 Gm. of crystallized Sodium Phosphate.

SODIUM PROPIONATE

Sodii Propionas

Sod. Prop.

CH_3CH_2COONa Mol. wt. 96.07

When rendered anhydrous by drying at 105° for 1 hour, Sodium Propionate contains not less than 99 per cent of CH_3CH_2COONa.

Description—Sodium Propionate occurs as colorless, transparent crystals or as a granular, crystalline powder. It is odorless, or has a faint acetic-butyric odor. It is deliquescent in moist air.

Solubility—One Gm. of Sodium Propionate dissolves in about 1 cc. of water at 25°, and in about 0.65 cc. of water at 100°. One Gm. of Sodium Propionate is also soluble in about 24 cc. of alcohol at 25°.

Identification—

A: An aqueous solution of Sodium Propionate (1 in 20) responds to the tests for *Sodium*, page 727.

B: Upon ignition, Sodium Propionate yields an alkaline residue which effervesces with acids.

C: When Sodium Propionate is warmed with sulfuric acid, propionic acid, recognized by its odor, is evolved.

Loss on drying—When dried at 105° for 1 hour, Sodium Propionate loses not more than 5 per cent of its weight.

Free alkali—Dissolve 2 Gm. of Sodium Propionate in 20 cc. of distilled water, and add 3 drops of phenolphthalein T.S.: if a pink color is produced, it is discharged by 0.6 cc. of 0.1 *N* sulfuric acid.

Arsenic—An aqueous solution of Sodium Propionate meets the requirements of the test for *Arsenic*, page 689.

Heavy metals—Dissolve 1 Gm. of Sodium Propionate in 3 cc. of 1 *N* hydrochloric acid and sufficient distilled water to make 25 cc. The heavy metals limit, page 721, of Sodium Propionate is 10 parts per million.

Assay—Weigh accurately in a tared platinum or porcelain crucible, about 0.25 Gm. of Sodium Propionate, previously dried for 1 hour at 105°. Heat at first very gently then gradually raise the temperature until the salt is thoroughly carbonized and proceed as directed in the *Assay* under *Potassium Citrate Solution*, page 408, beginning with "The final temperature must not exceed. . ." Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.00961 Gm. of CH_3CH_2COONa.

Storage—Preserve Sodium Propionate in tight containers.

Sodium Salicylate Ampuls

SODIUM SALICYLATE AMPULS

Ampullæ Sodii Salicylatis

Ampul. Sod. Salicyl. Sodium Salicylate Injection

Sodium Salicylate Ampuls contain a sterile solution of sodium salicylate in water for injection, and yield $C_6H_4.OH.COONa$, equal to not less than 95 per cent and not more than 103 per cent of the labeled amount of $C_6H_4.OH.COONa$.

Prepare the solution and fill the cleansed ampuls according to the requirements given on pages 687 to 689. Sterilize the filled ampuls by heating to 100° for 30 minutes, or by any other adequate and suitable method of sterilization, and test for sterility according to the method described on page 746. The Ampuls also conform to the other requirements under *Ampuls*, page 687.

Assay—Transfer to a 250-cc. separator a quantity of solution equivalent to 0.5 Gm. of sodium salicylate. Dilute to approximately 25 cc. with distilled water, add 75 cc. of ether and 10 drops of bromophenol blue T.S. Titrate the mixture with 0.1 *N* hydrochloric acid until a permanent pale green color is produced in the aqueous layer after vigorous shaking. Transfer the aqueous layer to a second separator. Wash the ether layer once with 5 cc. of distilled water and add this to the aqueous portion. Add 75 cc. of ether to the combined aqueous solutions and mix intimately. Continue the titration until a permanent pale green color remains in the aqueous layer after shaking. Each cc. of 0.1 *N* hydrochloric acid is equivalent to 0.01601 Gm. of $C_6H_4.OH.COONa$.

AVERAGE DOSE—**1 Gm.** of Sodium Salicylate.

Sodium Salicylate and Gelsemium Elixir, Compound

COMPOUND SODIUM SALICYLATE AND GELSEMIUM ELIXIR

Elixir Sodii Salicylatis et Gelsemii Compositum

Elix. Sod. Salicyl. et Gelsem. Comp.

Sodium Salicylate	**80 Gm.**
Potassium Iodide	**15 Gm.**
Cimicifuga Fluidextract	**32 cc.**
Gelsemium Fluidextract	**16 cc.**
Aromatic Elixir, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the sodium salicylate and potassium iodide in 800 cc. of aromatic elixir; add the fluidextracts and then sufficient aromatic elixir to make the product measure 1000 cc.; mix well, let it stand 24 hours, and filter, if necessary, until the product is clear.

Alcohol content—From 20 to 24 per cent, by volume, of C_2H_5OH.
Storage—Preserve Compound Sodium Salicylate and Gelsemium Elixir in tight, light-resistant containers.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains 0.32 Gm. of Sodium Salicylate, 60 mg. of Potassium Iodide, 0.128 cc. of Cimicifuga Fluidextract, and 0.064 cc. of Gelsemium Fluidextract.

Sodium Salicylate and Iodide Ampuls

SODIUM SALICYLATE AND IODIDE AMPULS

Ampullæ Sodii Salicylatis et Iodidi

Ampul. Sod. Salicyl. et Iodid. Sodium Salicylate and Iodide Injection

Sodium Salicylate and Iodide Ampuls contain a sterile solution of sodium salicylate and sodium iodide in water for injection, and yield $C_6H_4.OH.COONa$, and NaI, equal to not less than 93 per cent and not more than 103 per cent of the labeled amount of each.

Prepare the solution and fill the cleansed ampuls according to the requirements given on pages 687 to 689. Sterilize the filled ampuls by Process C, page 751, or by any other adequate and suitable method of sterilization, and test for sterility, according to the method described on page 746. The Ampuls also conform to the other requirements under *Ampuls*, page 687.

Assay for sodium salicylate—Proceed as directed in the *Assay* under *Sodium Salicylate Ampuls*, page 490.
Assay for sodium iodide—Proceed as directed in the *Assay* under *Sodium Iodide Ampuls*, page 487.

AVERAGE DOSE—**1 Gm.** of Sodium Salicylate and **1 Gm.** of Sodium Iodide.

Sodium Salicylate and Iodide with Colchicine Ampuls

SODIUM SALICYLATE AND IODIDE WITH COLCHICINE AMPULS

Ampullæ Sodii Salicylatis et Iodidi cum Colchicina

Ampul. Sod. Salicyl. et Iodid. c. Colchicin.

Sodium Salicylate and Iodide with Colchicine Injection

Sodium Salicylate and Iodide with Colchicine Ampuls contain a sterile solution of sodium salicylate, sodium iodide, and colchicine in water for injection, and yield $C_6H_4.OH.COONa$, and NaI, equal to not less than 93 per cent and not more than 103 per cent of the labeled amounts of each.

Prepare the solution and fill the cleansed ampuls according to the requirements given on pages 687 to 689. Sterilize the filled ampuls by Process C, page 751, or by any other adequate and suitable method of sterilization, and test for sterility according to the method described on page 746. The Ampuls also conform to the other requirements under *Ampuls*, page 687.

Identification—Transfer to a separator a definite volume of the ampul solution, representing about 3.2 mg. of colchicine. Extract once with 25 cc. of neutralized chloroform. Transfer the chloroform to a porcelain evaporating dish, reserving the aqueous solution, and evaporate the chloroform solution to dryness with gentle heating; to the residue add 1 drop of concentrated nitric acid: the color changes from blue or purple to yellow; and then add sodium hydroxide solution (1 in 5) to excess: the color changes to orange-red (*colchicine*). The aqueous solution from this test may be used in the assays below.

Assay for sodium salicylate—Transfer to a 250-cc. separator an accurately measured volume of the ampul solution, or of the aqueous solution remaining after the extraction with chloroform in the *Identification* test, containing about 0.25 Gm. of sodium salicylate. Proceed as directed in the *Assay* under *Sodium Salicylate Ampuls*, page 490.

Assay for sodium iodide—Transfer to a suitable container an accurately measured volume of the ampul solution, or of the aqueous solution remaining after the extraction with chloroform in the *Identification* test, containing about 0.25 Gm. of sodium iodide. Proceed as directed in the *Assay* under *Sodium Iodide Ampuls*, page 487.

AVERAGE DOSE—**1 Gm.** of Sodium Salicylate, **1 Gm.** of Sodium Iodide, and **0.65 mg.** of Colchicine.

Sodium Salicylate Elixir

SODIUM SALICYLATE ELIXIR

Elixir Sodii Salicylatis

Elix. Sod. Salicyl.

Sodium Salicylate Elixir contains, in each 100 cc., not less than 8 Gm. and not more than 9 Gm. of $C_6H_4.OH.COONa$.

Sodium Salicylate	**85 Gm.**
Syrup	**200 cc.**
Distilled Water	**460 cc.**
Aromatic Elixir, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the sodium salicylate in the distilled water, add the syrup and sufficient aromatic elixir to make the product measure 1000 cc.; mix well, and filter, if necessary, until the product is clear.

Assay—Transfer exactly 5 cc. of Sodium Salicylate Elixir into a 250-cc. separator, and proceed as directed in the *Assay* under *Sodium Salicylate Ampuls*, page 490.

beginning with "Dilute to approximately 25 cc. with distilled water, add 75 cc. of ether and 10 drops of bromophenol blue T.S. . . ."
Alcohol content—From 5 to 7 per cent, by volume, of C_2H_5OH.
Storage—Preserve Sodium Salicylate Elixir in tight containers.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains 0.34 Gm. of Sodium Salicylate.

SODIUM THIOCYANATE

Sodii Thiocyanas

Sod. Thiocyan. Sodium Sulfocyanate

NaSCN Mol. wt. 81.08

Sodium Thiocyanate, when dried to constant weight at 110°, contains not less than 98.5 per cent of NaSCN.

Description—Sodium Thiocyanate occurs as colorless or white, odorless crystals. It has a cooling, salty taste. It is hygroscopic and is affected by light. An aqueous solution of Sodium Thiocyanate (1 in 20) is neutral to litmus paper.
Solubility—One Gm. of Sodium Thiocyanate dissolves in about 0.7 cc. of water and in about 4 cc. of alcohol at 25°.
Identification—An aqueous solution of Sodium Thiocyanate (1 in 20) responds to the tests for *Sodium*, page 727, and for *Thiocyanate*, page 728.
Loss on drying—When dried to constant weight at 110° Sodium Thiocyanate loses not more than 5 per cent of its weight.
Chloride—To a solution of 4 Gm. of cupric sulfate in 20 cc. of distilled water, add 30 cc. of sulfurous acid T.S. and 1 Gm. of Sodium Thiocyanate dissolved in 10 cc. of distilled water. Boil the solution about 1 minute, cool it quickly, and filter it. Add 10 cc. of sulfurous acid T.S. to the filtrate. If additional precipitation takes place, filter it again, and add more sulfurous acid T.S. to the filtrate. To the clear filtrate add 5 cc. of nitric acid and 1 cc. of 0.1 *N* silver nitrate: the turbidity must not be greater than is produced in the same volume of distilled water containing 1.5 cc. of 0.02 *N* hydrochloric acid, the same quantity of sulfurous acid T.S. as is used in the test, enough cupric sulfate to match the color of the solution tested, and the same quantities of nitric acid and of silver nitrate as are used in the test.
Cyanide—Dissolve 1 Gm. of Sodium Thiocyanate in 10 cc. of distilled water, add 1 cc. of sodium hydroxide T.S. and 5 drops of ferrous sulfate T.S., and warm for 1 minute. Add 1 drop of ferric chloride T.S., acidify with diluted sulfuric acid, filter through white paper, and wash well with distilled water: no green or blue color appears on the paper.
Sulfate—A solution of 1 Gm. of Sodium Thiocyanate in 20 cc. of distilled water shows no more sulfate than corresponds to 0.25 cc. of 0.02 *N* sulfuric acid.
Ammonium salts—Ammonia is not evolved when 0.5 Gm. of Sodium Thiocyanate is heated with 5 cc. of sodium hydroxide T.S. for 1 minute.
Arsenic—Sodium Thiocyanate meets the requirements of the test for *Arsenic*, page 689, when prepared as follows: dissolve 0.2 Gm. of Sodium Thiocyanate in 1 cc. of distilled water, add 1 cc. of nitric acid and 2 cc. of sulfuric acid, and heat the solution, at first gently, gradually increasing the temperature until fumes of sulfur trioxide are copiously evolved; cool, cautiously add 10 cc. of sulfurous acid, and proceed with the test.
Heavy metals—Dissolve 1 Gm. of Sodium Thiocyanate in 1 cc. of diluted acetic acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Sodium Thiocyanate is 20 parts per million.

Assay—Dissolve about 0.2 Gm. of Sodium Thiocyanate, dried to constant weight at 110° and accurately weighed, in 100 cc. of distilled water, and add slowly, with constant agitation, 40 cc. of 0.1 *N* silver nitrate. Then add 2 cc. of ferric ammonium sulfate T.S. and 5 cc. of nitric acid, and titrate the excess silver nitrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.008108 Gm. of NaSCN.

Storage—Preserve Sodium Thiocyanate in tight, light-resistant containers.

AVERAGE DOSE—**0.3 Gm.** (approximately 5 grains).

Sodium Thiocyanate Elixir

SODIUM THIOCYANATE ELIXIR
Elixir Sodii Thiocyanatis

Elix. Sod. Thiocyan. Elixir of Sodium Sulfocyanate

Sodium Thiocyanate	**40 Gm.**
Sodium Phosphate	**40 Gm.**
Saccharin Sodium	**1 Gm.**
Alcohol	**125 cc.**
Orange Syrup	**200 cc.**
Aromatic Eriodictyon Syrup	**100 cc.**
Compound Sarsaparilla Syrup	**100 cc.**
Distilled Water, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the sodium thiocyanate, the sodium phosphate, and the saccharin sodium in 250 cc. of distilled water. Add the syrups, then the alcohol, and sufficient distilled water to make the product measure 1000 cc. Mix well, and filter if necessary, until the product is clear.

Alcohol content—From 12 to 15 per cent, by volume, of C_2H_5OH.

Storage—Preserve Sodium Thiocyanate Elixir in tight containers.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains 0.16 Gm. of Sodium Thiocyanate.

Sodium Thiosulfate Ampuls

SODIUM THIOSULFATE AMPULS
Ampullæ Sodii Thiosulfatis

Ampul. Sod. Thiosulf. Sodium Hyposulfite Injection

Sodium Thiosulfate Ampuls contain a sterile solution of sodium thiosulfate in freshly boiled water for injection, and yield $Na_2S_2O_3$, equal to not less than 61 per cent and not more than 67 per cent of the labeled amount of $Na_2S_2O_3.5H_2O$.

Prepare the solution, adjust it to a hydrogen-ion concentration within the range of *p*H 8.0 and *p*H 9.5, and fill the cleansed ampuls according to the requirements given on pages 687 to 689. Sterilize the filled ampuls by heating to 100° for 30 minutes, or by any other adequate and suitable method of sterilization, and test for sterility according to the method described on page 746. The Ampuls also conform to the other requirements under *Ampuls*, page 687.

Assay—Transfer to a suitable container an accurately measured volume of the ampul solution, containing about 1 Gm. of sodium thiosulfate, and neutralize, if necessary. Dilute to about 20 cc. and titrate with 0.1 *N* iodine, using starch T.S. as the indicator. Each cc. of 0.1 *N* iodine is equivalent to 0.01581 Gm. of $Na_2S_2O_3$.

AVERAGE DOSE—**1 Gm.** of Sodium Thiosulfate.

Solid Petroxolin, page 385
Solid Soap Liniment, page 468
Soluble Ferric Phosphate, page 218
Soluble Manganese Citrate, page 316

Solutions

Alkaline Aromatic Solution, page 63
Aluminum Acetate Solution, page 36
Aluminum Chloride Solution, page 38
Aluminum Subacetate Solution, page 38
Ammoniacal Silver Nitrate Solution, page 465
Ammonium Acetate Solution, page 44
Antiseptic Solution, N. F., page 54
Arsenic and Mercuric Iodides Solution, page 64
Arsenious Acid Solution, page 67
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Carmine Solution, page 127
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Coal Tar Solution, page 156
Cochineal Solution, page 158
Compound Sodium Borate Solution, page 476
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Lead Subacetate Solution, page 295
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Methylrosaniline Chloride Solution, page 344
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Sparteine Sulfate

SPARTEINE SULFATE

Sparteinæ Sulfas

Spartein. Sulf.

$C_{15}H_{26}N_2.H_2SO_4.5H_2O$ Mol. wt. 422.53

Description—Sparteine Sulfate occurs as colorless, rhombohedral crystals, or as white, crystalline powder. It is odorless, and has a slightly salty, somewhat bitter taste. It is hygroscopic and is affected by light. An aqueous solution of Sparteine Sulfate (1 in 20) is acid to litmus paper.

Solubility—One Gm. of Sparteine Sulfate dissolves in about 1.1 cc. of water and in about 3 cc. of alcohol, at 25°. It is insoluble in chloroform or ether.

Identification—

A: An aqueous solution of Sparteine Sulfate (1 in 20) responds to the tests for *Sulfate*, page 727.

B: Add 25 cc. of ether and 2 drops of ammonia T.S. to about 0.1 Gm. of Sparteine Sulfate in a test tube; then add to the mixture an ether solution of iodine (1 in 50) until the liquid, when shaken, turns from an orange to a dark, reddish brown color: after a short time the bottom and sides of the test tube will be coated with minute, dark, greenish brown crystals.

Loss on drying—When dried to constant weight at 105°, Sparteine Sulfate loses not more than 22 per cent of its weight.

Residue on ignition—Sparteine Sulfate yields not more than 0.1 per cent of residue on ignition, page 745.

Readily carbonizable substances—Dissolve 0.1 Gm. of Sparteine Sulfate in 2 cc. of sulfuric acid: the solution is colorless.

Ammonium salts—Shake about 0.1 Gm. of Sparteine Sulfate in a test tube with 5 cc. of sodium hydroxide T.S.: the liquid at first becomes turbid, and small, colorless, or nearly colorless drops of sparteine gradually collect on the surface. Suspend a strip of moistened red litmus paper in the mouth of the test tube, and apply a gentle heat: the test paper gradually acquires a blue color, but no odor of ammonia is perceptible.

Aniline—A mixture of about 0.1 Gm. of Sparteine Sulfate, 0.5 cc. of chloroform, and 0.5 cc. of 0.5 *N* alcoholic potassium hydroxide, when heated, does not emit an odor of phenyl isocyanide.

Storage—Preserve Sparteine Sulfate in tight, light-resistant containers.

AVERAGE DOSE—**30 mg.** (approximately 1/2 grain).

Spirits

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Anise Spirit, page 53
Benzaldehyde Spirit, page 79
Camphor Spirit, page 115
Chloroform Spirit, page 142
Compound Cardamom Spirit, page 146
Compound Ether Spirit, page 200
Compound Myrcia Spirit, page 349
Compound Vanillin Spirit, page 550
Ether Spirit, page 199
Ethyl Nitrite Spirit, page 204
Formic Acid Spirit, page 229
Glyceryl Trinitrate Spirit, page 239
Perfumed Spirit, page 383

Sprays

Aromatic Spray, page 64
Compound Ephedrine Spray, page 189
Compound Menthol Spray, page 321
Ephedrine Spray, page 188

SQUILL

Scilla

Scillæ bulbus P.I.

Squill consists of the cut and dried fleshy inner scale of the bulb of the white variety of *Urginea maritima* (Linné) Baker, known in commerce as White or Mediterranean Squill, or of *Urginea indica* Kunth, known in commerce as Indian Squill (Fam. *Liliaceæ*).

Unground Squill—Unground Squill occurs as irregular, curved or flattened pieces (White Squill) or in more or less shrivelled, curved or sickle-shaped strips, separated or connected, often several together, to a portion of the short axis (Indian Squill), from 0.5 to 5 cm. in length; weak yellowish orange to pale yellow, somewhat translucent; brittle when dry, and tough and flexible when damp.

Histology—Squill shows upper and lower epidermal layers of elongated thin-walled epidermal cells with a few elliptical stomata; a mesophyll of more or less polygonal thin-walled parenchyma cells, sometimes containing spheroidal aggregates of a sugar; occasional concentric bundles containing spiral tracheæ, reticulate tracheæ, and sieve tubes; and numerous elongated mucilage cells containing bundles of raphides of calcium oxalate varying in length and thickness in different cells.

Powdered Squill—Powdered Squill is yellowish white to very pale brown; having a slight odor, and a bitter, mucilaginous and acrid taste. It is very hygroscopic, caking in moist atmosphere, and shows numerous raphides of calcium oxalate up to 1000 microns in length, isolated and in bundles frequently embedded in mucilage; fragments of thin-walled parenchyma with occasional spiral, or more rarely, reticulate tracheæ, and fragments of epidermis.

Red Squill—Fragments of red, pink, or purplish epidermal or parenchyma bulb-scale tissue are absent.
Foreign organic matter—Squill contains not more than 2 per cent of foreign organic matter, page 760.
Acid-insoluble ash—Squill yields not more than 2 per cent of acid-insoluble ash, page 761.
Storage—Preserve Squill in well-closed containers, in a dry place.

Squill Fluidextract

SQUILL FLUIDEXTRACT
Fluidextractum Scillæ

Fldext. Scill.

Prepare the Fluidextract from squill, in moderately coarse powder, by percolation. Use a mixture of 2 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 48 hours, and percolate slowly. Concentrate the percolate by evaporation under reduced pressure, and at a temperature not exceeding 45° to a volume equal to about three-fourths of the finished Fluidextract; to this concentrate, add 4 times its volume of alcohol slowly and with constant stirring. Mix thoroughly, and set aside during 2 or 3 days, stirring several times during this period. Decant the clear liquid, and wash the residue with 2 portions (about 300 cc. each for 1000 Gm. of drug) of a mixture of 4 volumes of alcohol and 1 volume of water. Combine the clear alcoholic liquids, and distil off the alcohol under reduced pressure, and at a temperature not exceeding 45°, until a soft extract remains. Dissolve this in a sufficient quantity of a mixture of 525 volumes of alcohol and 475 volumes of water to make the complete volume of the finished Fluidextract, and filter.

Alcohol content—From 46 to 52 per cent, by volume, of C_2H_5OH.
Storage—Preserve Squill Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**0.1 cc.** (approximately $1^1/_2$ minims).

Squill Syrup

SQUILL SYRUP
Syrupus Scillæ

Syr. Scill.

Squill Vinegar	**450 cc.**
Sucrose	**800 Gm.**
Distilled Water, a sufficient quantity,	
To make	**1000 cc.**

Dissolve the sucrose in the squill vinegar with the aid of gentle heat, strain the syrup, and when cold, add enough distilled water through the strainer to make the product measure 1000 cc. Mix thoroughly.

Storage—Preserve Squill Syrup in tight containers.

AVERAGE DOSE—**2 cc.** (approximately 30 minims).

One average metric dose contains 0.9 cc. of Squill Vinegar.

Squill Syrup, Compound

COMPOUND SQUILL SYRUP
Syrupus Scillæ Compositus

Syr. Scill. Comp.	Hive Syrup
Squill Fluidextract	**80 cc.**
Senega Fluidextract	**80 cc.**
Antimony and Potassium Tartrate	**2 Gm.**
Sucrose	**720 Gm.**
Distilled Water, a sufficient quantity, To make	**1000 cc.**

Dissolve the antimony and potassium tartrate in 360 cc. of distilled water, add the fluidextracts, and allow the mixture to stand during 12 hours with occasional shaking. Filter, dissolve the sucrose in the clear filtrate by agitation, and add sufficient distilled water to make the product measure 1000 cc. Mix thoroughly and strain.

Alcohol content—From 7 to 8 per cent, by volume, of C_2H_5OH.
Storage—Preserve Compound Squill Syrup in tight containers, and avoid excessive heat.

AVERAGE DOSE—**2 cc.** (approximately 30 minims).

One average metric dose contains 0.16 cc. each of Squill Fluidextract and Senega Fluidextract, and 4 mg. of Antimony and Potassium Tartrate.

Squill Vinegar

SQUILL VINEGAR
Acetum Scillæ

Acet. Scill.	Acetum scillæ P.I.
Squill, in coarse powder	**100 Gm.**
Diluted Acetic Acid, a sufficient quantity, To make	**1000 cc.**

Macerate the squill with 900 cc. of diluted acetic acid during 7 days with frequent agitation. Then strain the mixture and wash the mass on the strainer with enough diluted acetic acid to make the strained liquid measure nearly 1000 cc. Heat this liquid to boiling, filter while hot, and when cold add sufficient diluted acetic acid to make the product measure 1000 cc.

Storage—Preserve Squill Vinegar in tight containers.

AVERAGE DOSE—**1 cc.** (approximately 15 minims).

Stainless Iodized Ointment, page 266

Sterculia Gum

STERCULIA GUM
Gummi Sterculiæ
Gum Karaya

Sterculia Gum is the dried gummy exudation from *Sterculia urens* Roxburgh, *Sterculia villosa* Roxburgh, *Sterculia tragacantha* Lindley or other species of *Sterculia* (Fam. *Sterculiaceæ*), or from *Cochlospermum gossypium* De Candolle, or other species of *Cochlospermum* (Fam. *Bixaceæ*).

Description—Sterculia Gum occurs in tears of variable size or in broken irregular pieces having a somewhat crystalline appearance, the latter being known in commerce as "crystal" gum. It is pale yellow to pinkish brown, translucent and horny and is often admixed with a few darker fragments and occasional pieces of bark. Sterculia Gum possesses a slightly acetous odor and a mucilaginous and slightly acetous taste.

Powdered Sterculia Gum—Powdered Sterculia Gum is light gray to pinkish gray and when mounted in alcohol exhibits irregular, polygonal, semi-transparent, colorless fragments, the larger fragments polarizing light without a play of colors, and a few lignified stone cells, fibers, and tracheæ.

Solubility—Sterculia Gum swells in water but is insoluble in alcohol and in chloroform.

Identification—

A: Add 2 Gm. of Sterculia Gum to 50 cc. of water: it swells and forms a granular, stiff, slightly opalescent mucilage containing occasional brownish cellular fragments.

B: Add a few drops of Millon's Reagent, page 771, to an aqueous solution of Sterculia Gum (1 in 100): a white curdy precipitate is produced.

C: Add 0.5 Gm. of Sterculia Gum to 50 cc. of diluted hydrochloric acid and warm until hydrolyzed. To a portion of this solution add an excess of sodium hydroxide and boil: a brown color and a fruity, characteristic odor are produced.

Reaction—An aqueous solution (suspension) of Sterculia Gum is acid to litmus paper, the *p*H being about 4.5.

Swelling properties—This test and the following *Water absorption* test are applicable only to the "crystal gum." Separate by screening fragments greater than 30-

but less than 10-standard mesh. Add 2 Gm. of these separated fragments, accurately weighed, to 500 cc. of water in a 500-cc. graduated cylinder, stir any particles rising to the top and allow to stand undisturbed for 18 hours. Read the volume to which the gum has swollen. This volume should not be less than 125 cc.

Water absorption—Pour the contents of the graduated cylinder in the *Swelling properties* test through moistened glass wool and allow the water to drain into a second 500-cc. graduated cylinder. Record the number of cc. of water retained by the Gum. Two Gm. of Sterculia Gum should absorb not less than 50 cc. of water.

Moisture—Sterculia Gum contains not more than 20 per cent of moisture, page 761.

Foreign gums—Sterculia Gum swells in 60 per cent alcohol by volume (*distinction from other gums*).

Starch—To an aqueous solution of Sterculia Gum (1 in 100) add iodine T.S.: no blue color is produced.

Bark and foreign organic matter—Add about 5 Gm. of Sterculia Gum, accurately weighed, to 50 cc. of a mixture of equal parts of diluted hydrochloric acid and water, in a 250-cc. Erlenmeyer flask, cover the flask with a small watch glass and boil gently until the mixture loses its viscosity: filter through a tared filtering crucible, wash the residue with water until the washings are free from acid, dry at 105°, and weigh. The weight of the dried residue does not exceed 3 per cent of the weight of the Sterculia Gum taken.

Acid-insoluble ash—Sterculia Gum yields not more than 1 per cent of acid-insoluble ash, page 761.

Chlorides and sulfates—Hydrolyze 1 Gm. of Sterculia Gum with 50 cc. of a mixture of equal parts of diluted nitric acid and water. When the hydrolysis is complete, filter through washed filter paper and divide into two portions. Test one portion for chlorides, page 758. The turbidity of the solution is no greater than that of a control solution containing 0.2 cc. of 0.02 *N* hydrochloric acid (*chlorides*). To the other portion add barium chloride T.S.: no precipitate is produced (*sulfates*).

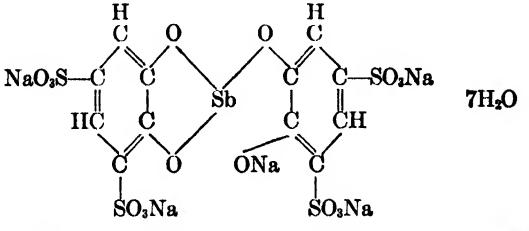
Storage—Store Sterculia Gum in a dry place.

Sterile Sulfapyridine Sodium, page 517

Stibophen

STIBOPHEN

Stibophenum



$C_{12}H_4O_{16}S_4SbNa_5 \cdot 7H_2O$ Mol. wt. 895.25

Stibophen contains not less than 15.6 and not more than 16.0 per cent of trivalent Sb, calculated on a moisture-free basis, the moisture being determined on a separate portion.

Description—Stibophen occurs as a white, crystalline, odorless powder. It is affected by light.

Solubility—Stibophen is freely soluble in water. It is nearly insoluble in alcohol, in ether, and in chloroform.

Identification—

A: To 5 cc. of an aqueous solution of Stibophen (1 in 100) add 0.3 cc. of diluted hydrochloric acid and 1 cc. of sodium sulfide T.S.: a reddish orange precipitate is produced.

B: To 3 cc. of an aqueous solution of Stibophen (1 in 100) add 1 drop of ferric chloride T.S.: a deep bluish green color which turns brownish red on the addition of ammonia T.S. appears.

C: To 1 cc. of an aqueous solution of Stibophen (1 in 100) add 2 drops of mercurous nitrate T.S.: a black precipitate is produced.

Loss on drying—When dried to constant weight in a vacuum oven at a temperature of not less than 20° nor more than 25° above the boiling point of water at a working pressure which does not exceed 100 mm. of mercury, Stibophen loses not less than 14 per cent and not more than 16 per cent of its weight.

Chloride—One Gm. of Stibophen shows no more chloride than corresponds to 0.1 cc. of 0.02 *N* hydrochloric acid, page 758.

Calcium—To 2 cc. of an aqueous solution of Stibophen (1 in 15) add 1 cc. of ammonia T.S. and 2 drops of ammonium oxalate T.S.: no turbidity is produced on standing for 1 minute.

Assay—Transfer about 0.5 Gm. of Stibophen, accurately weighed, to a glass-stoppered flask and add 30 cc. of distilled water and 10 cc. of diluted acetic acid. Warm to about 50° and titrate with 0.1 *N* iodine using starch T.S. as the indicator. Each cc. of 0.1 *N* iodine is equivalent to 0.006088 Gm. of Sb.

Storage—Preserve Stibophen in tight, light-resistant containers. It should not be brought into contact with iron or its compounds.

AVERAGE DOSE—**0.2 Gm.** (approximately 3 grains).

Stibophen Ampuls

STIBOPHEN AMPULS

Ampullæ Stibopheni

Stibophen Injection

Stibophen Ampuls contain a sterile solution of Stibophen in water for injection, and yield antimony, Sb, equal to not less than 12.9 per cent and not more than 14.3 per cent of the labeled amount of stibophen.

Prepare the solution and fill the cleansed ampuls according to the requirements given on pages 687 to 689. Sterilize the filled ampuls by Process C, page 751, or by any other adequate and suitable method of sterilization, and test for sterility according to the method described on page 746. The Ampuls also conform to the other requirements under *Ampuls*, page 687.

Assay—Transfer an accurately measured volume of the ampul solution, containing about 0.5 Gm. of stibophen, to a glass-stoppered flask, add 20 cc. of distilled water, 10 cc. of diluted acetic acid, and 3 cc. of formaldehyde T.S. and let stand for 5 minutes. Continue as directed in the *Assay* under *Stibophen*, page 502, beginning with "Warm to about 50° . . . ." Each cc. of 0.1 *N* iodine is equivalent to 0.006088 Gm. of Sb.

Storage—Preserve Stibophen Ampuls in light-resistant containers.

AVERAGE DOSE—**0.2 Gm.** of Stibophen.

STRAMONIUM CAPSULES

Capsulæ Stramonii

Cap. Stramon.

Stramonium Capsules contain a quantity of stramonium which will yield, upon assay, a quantity of the alkaloids of stramonium corresponding to not less than 0.238 and not more than 0.288 per cent of the labeled amount of stramonium.

Assay—Transfer, as completely as possible, the contents of a sufficient counted number of Stramonium Capsules to yield about 10 Gm. of stramonium into an extraction thimble and insert the thimble in a Soxhlet or similar extractor, and proceed as directed in the *Assay* under *Belladonna Root*, page 76, beginning with "Moisten the drug with a mixture of 3 cc. of stronger ammonia T.S. . . ." Each cc. of 0.02 *N* sulfuric acid is equivalent to 0.005787 Gm. of the alkaloids of stramonium.

Storage—Preserve Stramonium Capsules in well-closed containers.

Sizes—Stramonium Capsules usually available contain the following amounts of stramonium: **60 mg., 0.12,** and **0.2 Gm.** (approximately 1, 2, and 3 grains).

AVERAGE DOSE—**75 mg.** (approximately $1^1/_4$ grains) of Stramonium.

STRAMONIUM FLUIDEXTRACT

Fluidextractum Stramonii

Fldext. Stramon.

Stramonium Fluidextract yields, from each 100 cc., not less than 0.22 Gm. and not more than 0.28 Gm. of the alkaloids of stramonium.

Prepare the Fluidextract from stramonium, in moderately coarse powder, by Process A, as modified for assayed fluidextracts, page 718. Use a mixture of 3 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 48 hours, and percolate at a moderate rate.

Adjust the concentrated fluid so as to contain, in each 100 cc., 0.25 Gm. of the alkaloids of stramonium and 60 per cent, by volume, of C_2H_5OH.

Assay—Evaporate 10 cc. of Stramonium Fluidextract, accurately measured, on a water bath until the alcohol is all removed. Proceed as directed in the *Assay* under *Belladonna Leaf Fluidextract*, page 74, beginning with "Transfer this extract to 20 cc. of chloroform. . . ." Each cc. of 0.02 *N* sulfuric acid is equivalent to 0.005787 Gm. of the alkaloids of stramonium.

Alcohol content—From 57 to 63 per cent, by volume, of C_2H_5OH.

Storage—Preserve Stramonium Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**0.075 cc.** (approximately $1^1/_4$ minims).

Stramonium Ointment

STRAMONIUM OINTMENT

Unguentum Stramonii

Ung. Stramon.

Pilular Stramonium Extract	**100 Gm.**
Diluted Alcohol	**50 cc.**
Wool Fat	**50 Gm.**
Yellow Wax	**50 Gm.**
Petrolatum	**750 Gm.**
To make about	**1000 Gm.**

Triturate the pilular stramonium extract with the diluted alcohol until a smooth mixture is obtained; incorporate the wool fat thoroughly with this mixture; then add the mixture of yellow wax and petrolatum, previously melted and cooled, and mix thoroughly.

Storage—Preserve Stramonium Ointment in tight containers and avoid prolonged exposure to temperatures above 30°.

Strong Colchicum Corm Tincture, page 162
Strong Iodine Tincture, page 265
Strong Protein Silver, page 446

Strontium Bromide

STRONTIUM BROMIDE

Strontii Bromidum

Stront. Bromid.

$SrBr_2.6H_2O$ Mol. wt. 355.56

Strontium Bromide contains not less than 98 per cent of $SrBr_2.6H_2O$.

Description—Strontium Bromide occurs as colorless, transparent, hexagonal crystals. It is odorless, and has a bitter, salty taste. Strontium Bromide deliquesces in moist air, but effloresces in dry air. An aqueous solution of Strontium Bromide (1 in 20) is neutral to litmus paper.

Solubility—One Gm. of Strontium Bromide dissolves in about 0.35 cc. of water at 25°. It is soluble in alcohol but insoluble in ether.

Identification—An aqueous solution of Strontium Bromide (1 in 20) responds to the tests for *Strontium*, page 727, and for *Bromide*, page 723.

Loss on drying—When dried to constant weight at 200°, Strontium Bromide loses not more than 32 per cent of its weight.

Bromate—Drop 1 cc. of diluted sulfuric acid upon about 1 Gm. of powdered Strontium Bromide: no yellow color appears at once.

Chloride—Dissolve 0.1 Gm. of Strontium Bromide in 5 cc. of distilled water, add an excess of silver nitrate T.S. and a few drops of nitric acid, and filter. Wash the precipitate with distilled water, digest it for 10 minutes with 5 cc. of ammonium carbonate T.S., and filter. Dilute the filtrate with enough distilled water to make 40 cc.: a 10-cc. portion of this dilution, acidified with nitric acid and

further diluted with enough distilled water to make 50 cc., shows no more chloride than corresponds to 0.5 cc. of 0.02 *N* hydrochloric acid.

Iodide—Add a few drops of ferric chloride T.S. and 1 cc. of chloroform to 10 cc. of an aqueous solution of Strontium Bromide (1 in 20), and shake the mixture: the chloroform does not acquire a violet tint.

Barium—Dissolve 1 Gm. of Strontium Bromide and 1 Gm. of sodium acetate in 5 cc. of distilled water, and render the solution slightly acid with diluted acetic acid: the solution, upon the addition of 5 drops of potassium dichromate T.S. and agitation, does not become cloudy within 3 minutes.

Calcium—Dissolve 2 Gm. of Strontium Bromide in 2 cc. of distilled water, add 10 cc. of nitric acid, and evaporate to dryness on a water bath. Redissolve the residue in 2 cc. of distilled water, add 10 cc. of nitric acid, re-evaporate to dryness on a water bath, and finally dry at 120°. Pulverize the residue, add it to 20 cc. of dehydrated alcohol, allow the mixture to stand for 30 minutes with frequent shaking, and filter it. To 10 cc. of the filtrate add 0.5 cc. of sulfuric acid, evaporate to dryness, and ignite to constant weight: the weight of the residue does not exceed 30 mg.

Heavy metals—Dissolve 1 Gm. of Strontium Bromide in 1 cc. of diluted acetic acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Strontium Bromide is 10 parts per million.

Assay—Dissolve about 0.5 Gm. of Strontium Bromide, accurately weighed, in about 50 cc. of distilled water, and add 50 cc. of 0.1 *N* silver nitrate, 2 cc. of ferric ammonium sulfate T.S., and 2 cc. of nitric acid. Titrate the excess silver nitrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.01778 Gm. of $SrBr_2.6H_2O$.

Storage—Preserve Strontium Bromide in tight containers.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Strontium Salicylate

STRONTIUM SALICYLATE

Strontii Salicylas

Stront. Salicyl.

$(C_6H_4.OH.COO)_2Sr.2H_2O$ Mol. wt. 397.88

Strontium Salicylate, when dried for 2 hours over sulfuric acid, contains not less than 99 per cent of $(C_6H_4.OH.COO)_2Sr.2H_2O$.

Description—Strontium Salicylate occurs as a white, odorless, crystalline powder, having a somewhat sweet, salty taste. It is affected by light. An aqueous solution of Strontium Salicylate (1 in 20) is neutral or acid to litmus paper.

Solubility—One Gm. of Strontium Salicylate dissolves in about 19 cc. of water and in about 61 cc. of alcohol, at 25°. It is soluble in about 3.7 cc. of boiling water or in about 14 cc. of boiling alcohol.

Identification—An aqueous solution of Strontium Salicylate (1 in 20) responds to the tests for *Strontium*, page 727, and for *Salicylate*, page 727.

Loss on drying—When dried for 2 hours over sulfuric acid, Strontium Salicylate loses not more than 3 per cent of its weight.

Free salicylic acid—Agitate 1 Gm. of Strontium Salicylate with 20 cc. of chloroform, filter the liquid, and evaporate the filtrate to dryness: the weight of the residue does not exceed 10 mg.

Barium—Agitate 2 Gm. of Strontium Salicylate with 10 cc. of diluted acetic acid, heat the mixture, cool, and filter: the filtrate, upon the addition of 5 drops of potassium dichromate T.S. and agitation, does not become cloudy within 3 minutes.

Heavy metals—Dissolve 1 Gm. of Strontium Salicylate in 1 cc. of 0.1 *N* hydrochloric acid and enough distilled water to make 25 cc. The heavy metals limit, page 721, of Strontium Salicylate is 20 parts per million.

Assay—Transfer about 1.5 Gm. of Strontium Salicylate, dried for 2 hours over sulfuric acid and accurately weighed, to a tall beaker or flask of about 300-cc. capacity, and add 75 cc. of ether and 5 drops of methyl orange T.S. Titrate the mixture with 0.5 *N* hydrochloric acid, mixing intimately the aqueous and ether layers by vigorous stirring, until a permanent orange color is produced in the aqueous layer. Transfer the contents of the titration beaker to a separator, and draw the aqueous layer into a clean flask. Wash the ether layer once with 5 cc. of distilled water, and draw the separated aqueous layer into the flask. Add 20 cc. of ether to the aqueous liquid in the flask, and complete the titration with 0.5 *N* hydrochloric acid to the production of an orange color that persists on vigorous mixing of the 2 layers. Each cc. of 0.5 *N* hydrochloric acid is equivalent to 0.09947 Gm. of $(C_6H_4.OH.COO)_2Sr.2H_2O$.

Storage—Preserve Strontium Salicylate in well-closed, light-resistant containers, and avoid excessive heat.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Strophanthin

STROPHANTHIN
Strophanthinum

A glycoside or a mixture of glycosides obtained from *Strophanthus Kombé* Oliver (Fam. *Apocynaceæ*).

Strophanthin, when assayed as directed, shall possess a potency per mg. equivalent to 0.5 mg. of U. S. P. Ouabain Reference Standard. Strophanthin, adjusted to conform to the specified potency, will be considered to conform to the National Formulary requirement if the result of the assay does not vary more than 20 per cent from the specified potency.

Caution: Strophanthin is extremely poisonous.

Description—Strophanthin is a white or yellowish powder containing varying proportions of water, which it does not lose entirely without decomposition. It is stable in air, but is affected by light. Its aqueous solutions are neutral to litmus paper.

Solubility—Strophanthin dissolves in water and in diluted alcohol, but is less soluble in dehydrated alcohol. It is nearly insoluble in chloroform, in ether, and in benzene.

Identification—

A: When added to Strophanthin, sulfuric acid produces an emerald-green color which becomes brown.

B: Add a trace of ferric chloride T.S. and a few cc. of sulfuric acid to an aqueous solution of Strophanthin (1 in 50): there appears in the liquid a red precipitate which becomes dark green in 1 or 2 hours.

C: A solution of 0.1 Gm. of Strophanthin in 15 cc. of distilled water, when mixed with 5 cc. of hot alkaline cupric tartrate solution, produces no precipitate. Mix an aqueous solution of Strophanthin with a small amount of diluted hydrochloric acid, and heat the mixture to 70°: the Strophanthin is hydrolyzed into strophanthidin, which precipitates, and a sugar, capable of reducing alkaline cupric tartrate T.S., remains in solution.

D: An aqueous solution of Strophanthin is dextrorotatory, page 737.

Assay—*The standard preparation of ouabain*—Prepare a solution of the Ouabain Reference Standard by dissolving a weighed amount in sufficient alcohol to make a 1 to 1000 solution with an accuracy within 1 per cent. Preserve this as a stock solution in a cold place in a tight container of Type I glass, page 700. This standard preparation shall not be used in the assay after six months.

The stock preparation of strophanthin—Prepare and preserve this stock preparation in the same manner as *the standard preparation of ouabain.*

Preparation of the test dilutions—Dilute the standard preparation of ouabain and the stock solution of Strophanthin in such a manner that the estimated fatal dose per Kg. of cat is diluted to 15 cc. with a solution of 0.9 per cent of sodium chloride in distilled water. These dilutions shall not be used for assay after 24 hours.

The cats—Select domestic cats free of gross evidence of disease and weighing between 2.0 and 4.0 Kg. Do not use cats which upon gross examination are either obese, emaciated, lactating, or pregnant. Withhold food for from 16 to 28 hours prior to use. Assign all cats at random with the restriction that the two groups, the one for the standard preparation and the one for the specimen to be assayed, shall not differ by more than 50 per cent in the average of their weights. Lightly anesthetize the cat with ether, and immobilize, preparatory to the injection. Insert a cannula in a femoral vein and arrange to inject the appropriate test dilution from a burette calibrated to 0.1 cc. after insuring the absence of air bubbles from the injection apparatus. Maintain the anesthesia throughout the injection in such a state that pain is absent, the pupillary and corneal reflexes are present, the voluntary musculature is not relaxed, and the cat occasionally moves its tail or makes some other voluntary movement.

Injection of the dilutions—Inject 1 cc. of the diluted material for each Kg. of the body weight of the cat, within a few seconds. Repeat this dose at 5-minute intervals until the cat dies from cessation of the heart beat.

Use a total of not less than 6 cats for the Standard Preparation of Ouabain and not less than 6 cats for the preparation to be assayed. If the average number of doses for any given dilution required to produce death is less than 13 or greater than 19, regard these data as preliminary. Use them as a guide, and repeat with a fresh, higher or lower dilution. Complete the assay within a period of 15 days.

Calculation of the potency—Express the lethal dose of ouabain or strophanthin for each cat in terms of mg. per Kg. of live body weight. Compute the average lethal dose of the Standard Preparation and that of the preparation to be assayed. Compute the standard error of each average lethal dose as directed below and express each standard error as a percentage of the respective average lethal dose. If the standard error of either average exceeds 5.7 per cent, repeat the determination of the lethal dose of the Standard Preparation or of the preparation to be assayed, as the case may be, or use additional cats until the standard error falls within this limit. Express the potency of the preparation to be assayed in terms of the potency of 0.5 mg. of U. S. P. Reference Ouabain.

To compute the standard error of the average, take the difference between the average and the value found for each cat. Square these differences, take their sum, divide this sum by the number of cats, and divide this quotient by the number of cats diminished by 1. The square root of the last quotient is the standard error of the average.

The formula for the standard error (S.E.) is:

$$\sqrt{\frac{\text{sum } (c - \bar{c})^2}{N(N-1)}}$$

c = lethal dose for each cat.
$\bar{c}$ = average lethal dose for the group of cats.
N = number of cats in the group.

If necessary, adjust the product to conform to the official potency by admixture with a sufficient quantity of a more potent or less potent strophanthin, or with sodium chloride. After the adjustment, repeat the assay to insure compliance with the required potency.

NOTE: Strophanthin, adjusted to conform to the specified potency, shall be considered to conform to the requirement if the result of the assay by the above procedure does not vary more than 20 per cent from such requirement.

Storage—Preserve Strophanthin in tight, light-resistant containers.

AVERAGE DOSE—Intravenous, **0.5 mg.** (approximately $^1/_{120}$ grain).

Strophanthin Ampuls

STROPHANTHIN AMPULS
Ampullæ Strophanthini

Amp. Strophanthin. Strophanthin Injection

Strophanthin Ampuls contain a sterile solution of strophanthin in water for injection. Its potency shall be stated on the label of the container in terms of the quantity of U. S. P. Ouabain Reference Standard to which it is equivalent. It meets the requirements of the *Sterility Test for Liquids*, page 746.

Sterilize Strophanthin Ampuls preferably by Process D-1 or Process F. See *Sterilization Processes*, page 749. The Ampuls also conform to the other requirements under *Ampuls*, page 687.

Assay—Proceed as directed in the *Assay* under *Strophanthin*, page 507.

NOTE: Strophanthin Ampuls, adjusted to conform to the labeled potency, will be considered to conform to the National Formulary requirement if the result of the assay does not vary more than 20 per cent from the labeled potency.

AVERAGE DOSE—Intravenous, **0.5 mg.** of Strophanthin.

Strophanthus

STROPHANTHUS
Strophanthus
Strophanthus Seed

Strophanthus is the dried, ripe seed of *Strophanthus Kombé* Oliver, or of *Strophanthus hispidus* De Candolle (Fam. *Apocynaceæ*), deprived of the awns.

Strophanthus, when assayed by the prescribed method, possesses a potency, per gram, equivalent to not less than 55.0 mg. of U. S. P. Reference Ouabain.

Unground Strophanthus (Kombé)—Unground Strophanthus (Kombé) occurs as oblong-lanceolate, flattened, and obtusely edged seeds; from 8 to 25 mm. in length, from 2.5 to 5 mm. in width, and from 0.5 to 2.0 mm. in thickness, the raphe ridge extending from near the center of one side to the apex. They are pale yellow, with a greenish tinge, a few seeds being light brown to light olive, having a silky luster owing to a dense coat of closely appressed hairs. The fractured surface is yellowish gray to weak yellow, and oily.

Unground Strophanthus (hispidus)—Unground Strophanthus (hispidus) is light brown to dark brown; and otherwise resembles *S. Kombé* seed, excepting that it is smaller and has fewer and smaller hairs.

Histology—Strophanthus shows an epidermis with numerous, unicellular hairs usually bent and arising in *S. Kombé* seed, from the center of the surface of the epidermal cell, and in *S. hispidus* seed, from near the radial wall; an endosperm of 9 to 30 rows of parenchyma cells; and an embryo consisting of a short straight caulicle, 2 long plano-convex cotyledons, and a small radicle.

Powdered Strophanthus—Powdered Strophanthus is dusky yellow to light olive. It is odorless and has a very bitter taste. It shows epidermal cells with thickened, lignified radial walls; hairs slightly lignified and from 200 to 800 microns in length; fragments of endosperm and cotyledons with fixed oil, aleurone grains, and starch grains, the latter from 4 to 8 microns in diameter.

Identification—The endosperm tissue, either in the cut seed or in the powdered mount, usually becomes olive-green to yellowish green when brought into contact with sulfuric acid.

Purity—Prismatic crystals of calcium oxalate are absent in the seed-coat (*distinction from Strophanthus Courmonti seed*).

Assay—Prepare a tincture by the official process, and proceed as directed in the *Assay* under *Strophanthus Tincture*, page 509.

NOTE: Owing to many variable factors in this assay which make it difficult for different operators to obtain identical results, the evidence of potency within 20 per cent above or 20 per cent below the standard is accepted.

AVERAGE DOSE—**60 mg.** (approximately 1 grain).

STROPHANTHUS TINCTURE
Tinctura Strophanthi

Tr. Strophanth. Tinctura Strophanthi P.I.

Strophanthus Tincture, when assayed by the method given below, possesses a potency, per cc., equivalent to not less than 5.4 mg. and not more than 5.6 mg. of U. S. P. Reference Ouabain.

Strophanthus, in moderately coarse powder	**100 Gm.**
Petroleum Benzin,	
Alcohol, each, a sufficient quantity,	
To make	**1000 cc.**

Extract the fat from the strophanthus by percolation with petroleum benzin. Dry the defatted drug, and prepare from it the Tincture by Process P, as modified for assayed tinctures, page 758. Use alcohol for the menstruum, macerate the drug during 48 hours, and percolate slowly.

Adjust the percolate to conform to the above biological standard.

Assay—*Standard Solution of Ouabain:* Prepare a solution containing about 0.03 mg. of U. S. P. Reference Ouabain per cc. of finished solution, and with an alcohol content approximately that of the diluted tincture or preparation being assayed, but not greater than 25 per cent, by volume.

Frogs: Use healthy frogs of the same species (*Rana pipiens* Schreber) and of a fairly uniform size (15 to 35 Gm.).

Dosage: The doses of the diluted tincture or other preparation to be assayed and of the standard solution of ouabain are calculated according to the weights of the frogs, and are injected into the ventral lymph sac by means of a pipette or glass syringe which is graduated in hundredths of a cubic centimeter. The injection is made into the lymph sac through the floor of the mouth, care being taken not to puncture the skin. The amount of fluid to be injected into the different frogs should be as uniform in quantity as possible, approximately 0.015 cc. for each Gm. of body weight of frog. In case the alcohol content in any preparation after dilution is higher than 25 per cent, by volume, the preparation shall be subjected to careful evaporation and subsequent addition of distilled water until the original volume is restored and the alcohol content is not above the per cent specified. The frog is replaced in its cage in the tank after injection, the temperature being maintained at 20°.

About 58 minutes from the time of injection, each frog is pithed, the heart is exposed, and its condition examined. For the correct end reaction, at the expiration of 1 hour from the time of injection, the ventricle must be in systolic standstill, while the auricles are widely dilated. Following mechanical stimulations, feeble contractions may occur in the auricles and localized contractions in the ventricle, but no general contraction is allowable.

If, when the lymph sac is opened to expose the heart, any of the injected drug is found unabsorbed, the frog must be discarded and not considered in the results obtained.

If the largest doses of the respective preparations are not enough to give systolic standstill in at least 25 per cent of their respective groups, or if more than 75 per cent of either group receiving the smallest doses are in systolic standstill, proceed as follows: Inject a new series, increasing or decreasing the dosages as required until the amounts of the preparation being assayed and of the standard solution of ouabain, respectively, required to give equivalent percentages of positive reactions in approximately equal groups of frogs, are determined. From these amounts, calculate the relationship of the activity of the preparation being assayed to the reference preparation, and make the necessary adjustments so that the finished product will conform to the required biological standard.

NOTE: Owing to many variable factors in this assay which make it difficult for different operators to obtain identical results, the evidence of potency within 20 per cent above or 20 per cent below the standard is accepted.

Alcohol content—From 88 to 92 per cent, by volume, of C_2H_5OH.

Storage—Preserve Strophanthus Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**0.5 cc.** (approximately 8 minims).

Strychnine

STRYCHNINE

Strychnina

Strych.

$C_{21}H_{22}O_2N_2$ Mol. wt. 334.40

Strychnine is an alkaloid obtained chiefly from Nux Vomica.

Caution: Strychnine is extremely poisonous.

Description—Strychnine occurs as colorless, transparent, prismatic crystals, or as a white, crystalline powder. It is odorless, has a very bitter taste, and is stable in the air. Saturated solutions of Strychnine are alkaline to litmus paper.

Solubility—One Gm. of Strychnine dissolves in about 6420 cc. of water, in about 136 cc. of alcohol, in about 5 cc. of chloroform, and in about 180 cc. of benzene, at 25°; it is soluble in about 3100 cc. of boiling water, and in about 34 cc. of boiling alcohol. It is very slightly soluble in ether.

Identification—

A: Sulfuric acid containing 1 per cent of ammonium vanadate produces with Strychnine a deep violet-blue color, changing to a deep purple, and finally to a cherry-red.

B: When a small fragment of potassium dichromate is added to a solution of about 50 mg. of Strychnine in 1 cc. of sulfuric acid, a deep blue color is momentarily produced which changes to deep violet, then successively to purplish red, cherry-red, and finally to orange or yellow.

Residue on ignition—Strychnine yields not more than 0.1 per cent of residue on ignition, page 745.

Readily carbonizable substances—The color of a solution produced by dissolving 0.25 Gm. of Strychnine in 5 cc. of sulfuric acid is not deeper than matching fluid M, page 744.

Brucine—One cc. of a mixture of equal volumes of nitric acid and distilled water, added to about 0.1 Gm. of Strychnine, may produce a yellow, but not a red or reddish color.

Storage—Preserve Strychnine in well-closed containers.

AVERAGE DOSE—**1.5 mg.** (approximately $^1/_{40}$ grain).

Strychnine Nitrate

STRYCHNINE NITRATE

Strychninæ Nitras

Strych. Nitras

$C_{21}H_{22}O_2N_2.HNO_3$ Mol. wt. 397.42

Caution: Strychnine Nitrate is extremely poisonous.

Description—Strychnine Nitrate occurs as colorless, glistening needles or as a white, crystalline powder. It is odorless, has a very bitter taste, and is stable in the air.

Solubility—One Gm. of Strychnine Nitrate dissolves in about 45 cc. of water, in about 150 cc. of alcohol, in about 50 cc. of glycerin, and in about 105 cc. of chloroform, at 25°. One Gm. is soluble in about 10 cc. of boiling water, and in about 80 cc. of alcohol at 60°. It is insoluble in ether.

Optical rotation—An aqueous solution of Strychnine Nitrate is lævorotatory.

Identification—

A: Dissolve about 50 mg. of Strychnine Nitrate in 5 cc. of distilled water, add a few drops of ammonia T.S., and extract the liberated strychnine with 5 cc. of chloroform. Evaporate the chloroform solution to dryness on a water bath, cool, dissolve the residue in 2 cc. of sulfuric acid, add a fragment of potassium dichromate, and gently agitate the mixture. There appears in the mixture a blue color which immediately changes to violet, then to purplish red, and finally to orange or yellow.

B: An aqueous solution of Strychnine Nitrate, when superimposed in a test tube upon diphenylamine T.S., develops a blue color at the zone of contact.

C: Strychnine Nitrate, heated with hydrochloric acid, produces a bright red color.

Residue on ignition—Strychnine Nitrate yields not more than 0.1 per cent of residue on ignition, page 745.

Free acid—A solution of 0.5 Gm. of Strychnine Nitrate in 25 cc. of distilled water requires not more than 0.5 cc. of 0.02 *N* sodium hydroxide for neutralization, using 1 drop of methyl red T.S. as the indicator.

Chloride—The addition of 5 drops of silver nitrate T.S. to 20 cc. of an aqueous solution of Strychnine Nitrate (1 in 100), acidified with 2 drops of diluted nitric acid, produces no opalescence immediately.

Sulfate—The addition of 5 drops of barium chloride T.S. to 20 cc. of an aqueous solution of strychnine nitrate (1 in 100), acidified with 2 drops of hydrochloric acid, produces no turbidity immediately.

Readily carbonizable substances—The color of a solution produced by dissolving 0.25 Gm. of Strychnine Nitrate in 5 cc. of sulfuric acid is not deeper than a matching fluid consisting of 2.5 cc. of cobaltous chloride C.S., 2.3 cc. of ferric chloride C.S., and 0.2 cc. of cupric sulfate C.S.

Brucine—Add 1 cc. of a mixture of equal volumes of nitric acid and distilled water to about 0.1 Gm. of Strychnine Nitrate: the mixture may be yellow, but not red or reddish in color.

Storage—Preserve Strychnine Nitrate in well-closed containers.

AVERAGE DOSE—**2 mg.** (approximately $^1/_{30}$ grain).

Strychnine Nitrate Tablets

STRYCHNINE NITRATE TABLETS

Tabellæ Strychninæ Nitratis

Tab. Strych. Nitrat.

Strychnine Nitrate Tablets contain not less than 92.5 per cent and not more than 107.5 per cent of the labeled amount of $C_{21}H_{22}O_2N_2.HNO_3$ for tablets containing 20 mg. or more; not less than 91 per cent and not more than 109 per cent for tablets containing less than 20 mg., but not less than 1.2 mg.; and not less than 88 per cent and not more than 112 per cent for tablets containing less than 1.2 mg. of $C_{21}H_{22}O_2N_2.HNO_3$.

Identification—

A: A filtered aqueous solution of the Tablets, when superimposed upon diphenylamine T.S. in a test tube, develops a blue color at the zone of contact.

B: The Tablets, when heated with a few drops of hydrochloric acid in a porcelain dish, produce an orange-red color.

C: Dissolve the strychnine, as extracted in the assay process and dried on a water bath, in 2 cc. of sulfuric acid, and add a small fragment of potassium dichromate: a deep blue color is momentarily produced, which changes to deep violet, then successively to purplish red, cherry-red, and finally to orange or yellow.

Assay—Weigh not less than 20 of the Tablets, reduce them to a fine powder without an appreciable loss, and transfer an accurately weighed portion, equivalent to about 0.13 Gm. of strychnine nitrate, to a 100-cc. volumetric flask, and add 40 cc. of distilled water and 50 cc. of diluted sulfuric acid. Shake the mixture occasionally during 2 hours, and allow it to stand overnight, or for at least 12 hours. Add sufficient distilled water to make the mixture measure 100 cc. (or 200 cc., if necessary, to effect solution), mix it thoroughly, and filter. Transfer a portion of the filtrate, equivalent to about 60 mg. of strychnine nitrate, to a separator, make the solution distinctly alkaline with ammonia T.S., and completely extract the strychnine with small successive portions of chloroform. Combine the chloroform extracts, and for each 50 cc. of the chloroform extract add 10 cc. of dehydrated alcohol, and evaporate the mixture nearly to dryness on a water bath; then add 5

cc. of neutralized alcohol and 10 cc. of 0.05 *N* sulfuric acid, and warm on a water bath until the odor of chloroform is no longer perceptible. Titrate the excess acid with 0.02 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.05 *N* sulfuric acid is equivalent to 0.01987 Gm. of $C_{21}H_{22}O_2N_2.HNO_3$.

NOTE: This assay is applicable to these Tablets when not coated. Suitable modifications or another method may be necessary for assaying the Tablets when coated.

Storage—Preserve Strychnine Nitrate Tablets in well-closed containers.

Sizes—Strychnine Nitrate Tablets usually available contain the following amounts of strychnine nitrate: 1 and 2 mg. (approximately $^1/_{60}$ and $^1/_{30}$ grain).

AVERAGE DOSE—2 mg. (approximately $^1/_{30}$ grain) of Strychnine Nitrate.

STRYCHNINE PHOSPHATE

Strychninæ Phosphas

Strych. Phos.

$C_{21}H_{22}O_2N_2.H_3PO_4.2H_2O$ Mol. wt. 468.44

Strychnine Phosphate yields not less than 70 per cent and not more than 73 per cent of $C_{21}H_{22}N_2O_2$.

Caution: Strychnine Phosphate is extremely poisonous.

Description—Strychnine Phosphate occurs as white crystals, or as a white powder. It is odorless, has a very bitter taste, and is stable in the air. An aqueous solution of Strychnine Phosphate (1 in 50) is acid to litmus paper.

Solubility—One Gm. of Strychnine Phosphate is slowly soluble in about 30 cc. of water. It is slightly soluble in alcohol.

Identification—

A: Dissolve about 0.1 Gm. of Strychnine Phosphate in 2 cc. of sulfuric acid and add a fragment of potassium dichromate. On gentle agitation of the mixture a blue color is momentarily produced, changing to violet, then to purplish red, and finally to orange or yellow.

B: Dissolve about 0.5 Gm. of Strychnine Phosphate in 50 cc. of warm distilled water, add an excess of sodium hydroxide T.S., filter, and neutralize the filtrate with nitric acid: the resulting solution responds to the tests for *Phosphate*, page 727.

Readily carbonizable substances—The color of a solution produced by dissolving 0.25 Gm. of Strychnine Phosphate in 5 cc. of sulfuric acid is not deeper than matching fluid A, page 744.

Chloride—Five-tenths Gm. of Strychnine Phosphate shows no more chloride than corresponds to 0.2 cc. of 0.02 *N* hydrochloric acid, page 758.

Sulfate—Five-tenths Gm. of Strychnine Phosphate shows no more sulfate than corresponds to 0.5 cc. of 0.02 *N* sulfuric acid, page 759.

Brucine—The addition of 1 cc. of a mixture of equal volumes of nitric acid and distilled water to about 0.1 Gm. of Strychnine Phosphate may produce a yellow, but not a reddish color.

Assay—Dissolve about 0.4 Gm. of Strychnine Phosphate, accurately weighed, in about 25 cc. of warm distilled water in a separator, add a slight excess of ammonia T.S., and completely extract the strychnine by shaking with successive portions of chloroform. Wash the combined chloroform solution twice with 2

to 5 cc. of distilled water, reject the washings, and evaporate the chloroform on a water bath almost to dryness; then add 15 cc. of 0.1 *N* sulfuric acid and 20 cc. of distilled water. Warm until all of the chloroform is evaporated, cool, and titrate the excess acid with 0.1 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.03344 Gm. of $C_{21}H_{22}O_2N_2$.

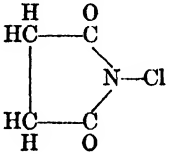
Storage—Preserve Strychnine Phosphate in well-closed containers.

AVERAGE DOSE—**2 mg.** (approximately $^1/_{30}$ grain).

Succinchlorimide

SUCCINCHLORIMIDE
Succinchlorimidum

$C_4H_4O_2NCl$



Mol. wt. 133.54

Succinchlorimide contains not less than 25 per cent and not more than 27 per cent of active Cl.

Description—Succinchlorimide occurs as a white, crystalline powder with the odor and taste of chlorine. It is affected by light. An aqueous solution of Succinchlorimide (1 in 50) is acid to litmus paper.

Solubility—One Gm. of Succinchlorimide dissolves in about 70 cc. of distilled water at 25°. It is sparingly soluble in chloroform and in carbon tetrachloride.

Melting point—Succinchlorimide melts between 148° and 149°, page 731.

Identification—

A: The addition of potassium iodide T.S. to an aqueous solution of Succinchlorimide (1 in 50) causes the liberation of iodine.

B: The addition of an aqueous solution of sodium bromide (1 in 10) to an aqueous solution of Succinchlorimide (1 in 50) causes the liberation of bromine.

C: Mix intimately about 2 mg. of Succinchlorimide with 20 mg. of resorcinol in a small test tube, add 5 drops of sulfuric acid and heat carefully over a small flame for about 1 minute. Cool, dilute with 10 cc. of distilled water and add an excess of ammonium hydroxide: a fluorescent red solution is produced.

Residue on ignition—The residue on ignition from 0.2 Gm. of Succinchlorimide is negligible.

Readily carbonizable substances—Dissolve 0.1 Gm. of Succinchlorimide in 5 cc. of sulfuric acid: the solution has no more color than corresponds to matching fluid A, page 744.

Assay—Dissolve about 0.3 Gm. of Succinchlorimide, accurately weighed, in 100 cc. of distilled water contained in a 500-cc. iodine flask. Add 2 Gm. of potassium iodide and 100 cc. of sulfuric acid (1 in 20), shake until solution is complete and allow to stand for 5 minutes. Titrate the liberated iodine with 0.1 *N* sodium thiosulfate using starch T.S. as the indicator. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.001773 Gm. of active Cl.

Storage—Preserve Succinchlorimide in tight, light-resistant containers.

SUCCINCHLORIMIDE TABLETS

Tabellæ Succinchlorimidi

Tab. Succinchlorimid.

Succinchlorimide Tablets contain not less than 90 per cent and not more than 130 per cent of $C_4H_4O_2NCl$.

Identification—Finely powder a number of the Tablets equivalent to about 0.5 Gm. of succinchlorimide: separate portions equivalent to about 50 mg. of succinchlorimide respond to the tests for *Identification* under *Succinchlorimide*, page 514.

Assay—Weigh a counted number of not less than 20 of the Tablets and reduce them to a fine powder without appreciable loss. Weigh accurately a portion equivalent to about 0.3 Gm. of succinchlorimide and proceed as directed in the *Assay* under *Succinchlorimide*, page 514. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.006677 Gm. of $C_4H_4O_2NCl$.

Storage—Preserve Succinchlorimide Tablets in tight, light-resistant containers.

Sizes—Succinchlorimide Tablets usually available contain the following amounts of succinchlorimide: **0.12** and **0.3 Gm.** (approximately 2 and 5 grains).

PREPARED SUET

Sevum Præparatum

Sev. Præp. Mutton Suet

Prepared Suet is the internal fat of the abdomen of the sheep, *Ovis aries* Linné (Fam. *Bovidæ*), purified by melting and straining.

Description—Prepared Suet is a white, solid fat, having, when fresh, a slight, characteristic odor, and a bland taste. It becomes rancid on prolonged exposure to the air and must not then be used.

Solubility—One part of Prepared Suet dissolves in about 45 parts of boiling alcohol and in about 60 parts of ether. It slowly separates in crystalline form from its solution in petroleum benzin when allowed to stand in a stoppered flask. Prepared Suet is insoluble in water and in cold alcohol.

Melting point—Prepared Suet melts between 45° and 50°, page 731.

Congealing point—Prepared Suet congeals between 37° and 40°, page 699.

Saponification value—The saponification value of Prepared Suet is not less than 193 and not more than 200, page 713.

Iodine value—The iodine value of Prepared Suet is not less than 33 and not more than 48, page 713.

Acid value—The free fatty acids in 10 Gm. of Prepared Suet require for neutralization not more than 6 cc. of 0.1 *N* sodium hydroxide, page 712.

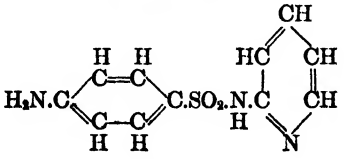
Storage—Preserve Prepared Suet in a cold place, in tight containers.

Sulfapyridine

SULFAPYRIDINE

Sulfapyridinum

Sulfapyridin.



$C_{11}H_{11}N_3O_2S$ Mol. wt. 249.28

Sulfapyridine, when dried at 105° for 4 hours, contains not less than 99 per cent of $C_{11}H_{11}N_3O_2S$.

Description—Sulfapyridine occurs as white or faintly yellowish white crystals, granules, or powder. It is odorless or nearly so, and is stable in air, but slowly darkens on exposure to light.

Solubility—One Gm. of Sulfapyridine dissolves in about 3500 cc. of water, in about 440 cc. of alcohol, and in about 65 cc. of acetone, at 25°. It is freely soluble in dilute mineral acids and in aqueous solutions of potassium and sodium hydroxides.

Melting point—Sulfapyridine melts between 191° and 193°, page 731.

Identification—

A: Add 5 cc. of diluted hydrochloric acid to 0.1 Gm. of Sulfapyridine, and boil gently for about 5 minutes. Cool in an ice bath, then add 4 cc. of an aqueous solution of sodium nitrite (1 in 100), dilute with distilled water to 10 cc., and place the mixture in an ice bath for 10 minutes. To 5 cc. of the cooled mixture add a solution of 50 mg. of betanaphthol in 2 cc. of an aqueous solution of sodium hydroxide (1 in 10): an orange-red precipitate is produced which darkens on standing.

B: Carefully heat about 50 mg. of Sulfapyridine in a small test tube over an open flame or in a sand bath until it melts: a brown color develops. On further heating, yellow fumes appear and an odor of sulfur dioxide is evolved. (Sulfanilamide produces a blue-violet color and the odor of ammonia.)

C: To about 20 mg. of Sulfapyridine suspended in 5 cc. of distilled water add, dropwise, sodium hydroxide T.S. until dissolved; then add 2 or 3 drops of copper sulfate T.S.: a green precipitate is formed which becomes grayish on standing. (Sulfathiazole gives a purple precipitate and sulfanilamide gives a blue color or precipitate.)

Free acid—Digest 2 Gm. of Sulfapyridine with 100 cc. of distilled water at about 70° for 5 minutes, cool at once to about 20°, and filter. Twenty-five cc. of the filtrate requires not more than 0.1 cc. of 0.1 *N* sodium hydroxide for neutralization, using 2 drops of phenolphthalein T.S. as the indicator. *Save the remainder of the filtrate for use in the tests for Chloride and Sulfate.*

Loss on drying—When dried at 105° for 4 hours, 1 Gm. of Sulfapyridine, accurately weighed, loses not more than 0.5 per cent of its weight.

Residue on ignition—Sulfapyridine yields not more than 0.1 per cent of residue on ignition, page 745.

Clarity and color of solution—A solution of 1 Gm. of Sulfapyridine in a mixture of 20 cc. of distilled water and 5 cc. of sodium hydroxide T.S. is clear and colorless.

Chloride—A 25-cc. portion of the filtrate prepared for the test for *Free acid* shows no more chloride than corresponds to 0.1 cc. of 0.02 *N* hydrochloric acid, page 758.

Sulfate—Another 25-cc. portion of the filtrate prepared for the test for *Free acid* shows no more sulfate than corresponds to 0.2 cc. of 0.02 *N* sulfuric acid, page 759.

Heavy metals—Dissolve 0.5 Gm. of Sulfapyridine in a mixture of 5 cc. of sodium hydroxide T.S. and 20 cc. of distilled water, and add to the solution 5 drops of

sodium sulfide T.S. If a darkening of the solution is produced, it is not more than that produced in a control made with the same reagents and to which 1 cc. of the standard lead solution, page 721, has been added, corresponding to a heavy metals limit of 20 parts per million.

Assay—Weigh accurately about 0.5 Gm. of Sulfapyridine, previously dried for 4 hours at 105°, and transfer it to a beaker or casserole. Add 5 cc. of hydrochloric acid and 50 cc. of distilled water, cool to 15°, add about 25 Gm. of crushed ice, and slowly titrate with 0.1 *M* sodium nitrite, stirring vigorously, until a blue color is produced immediately when a glass rod dipped into the titrated solution is streaked on a smear of starch iodide paste T.S. When the titration is complete, the end point is reproducible after the mixture has been allowed to stand for 1 minute. Each cc. of 0.1 *M* sodium nitrite is equivalent to 0.02493 Gm. of $C_{11}H_{11}N_3O_2S$.

Storage—Preserve Sulfapyridine in well-closed, light-resistant containers.

AVERAGE DOSE—**2 Gm.** (approximately 30 grains).

Sulfapyridine Sodium, Sterile

STERILE SULFAPYRIDINE SODIUM

Sulfapyridinum Sodicum Sterile

Sulfapyridin. Sod. Steril. Sterile Sodium Sulfapyridine

$C_{11}H_{10}N_3O_2SNa.H_2O$ Mol. wt. 289.29

Sterile Sulfapyridine Sodium, when dried at 105° for 4 hours, contains not less than 99 per cent of $C_{11}H_{10}N_3O_2SNa$. It meets the requirements of the *Sterility Tests for Solids*, page 746.

Description—Sterile Sulfapyridine Sodium occurs as white, odorless crystals or powder. On prolonged exposure to humid air it absorbs carbon dioxide with the liberation of sulfapyridine and becomes incompletely soluble in water. An aqueous solution of Sterile Sulfapyridine Sodium (1 in 20) is alkaline to phenolphthalein. It is affected by light.

Solubility—One Gm. of Sterile Sulfapyridine Sodium dissolves in about 1.5 cc. of water and in about 10 cc. of alcohol at 25°.

Identification—

A: Dissolve about 1 Gm. of Sterile Sulfapyridine Sodium in 25 cc. of distilled water, and add 2 cc. of acetic acid. A white precipitate of sulfapyridine is formed. Collect the precipitate on a filter, wash it well with cold distilled water, and dry for 4 hours at 105°. The sulfapyridine so obtained melts between 191° and 193° and responds to *Identification tests A, B, and C* under *Sulfapyridine*, page 516.

B: Ignite about 0.5 Gm. of Sterile Sulfapyridine Sodium: the residue responds to the tests for *Sodium*, page 727.

Loss on drying—When dried for 4 hours at 105°, Sterile Sulfapyridine Sodium loses not less than 5 per cent and not more than 7 per cent of its weight.

Chloride—Dissolve 2 Gm. of Sterile Sulfapyridine Sodium in 45 cc. of distilled water, add 5 cc. of acetic acid, and filter. One-half of the filtrate shows no more chloride than corresponds to 0.15 cc. of 0.02 *N* hydrochloric acid, page 758.

Sulfate—The remaining half of the filtrate from the test for chloride shows no more sulfate than corresponds to 0.2 cc. of 0.02 *N* sulfuric acid, page 759.

Heavy metals—Dissolve 0.5 Gm. of Sterile Sulfapyridine Sodium in 25 cc. of distilled water, and add 5 drops of sodium sulfide T.S. If a dark color is produced, it is not

darker than that produced in a control to which 1 cc. of the standard lead solution, page 721, has been added, corresponding to a heavy metals limit of 20 parts per million.

Assay—Weigh accurately about 0.5 Gm. of Sterile Sulfapyridine Sodium, previously dried at 105° for 4 hours, transfer it to a 250-cc. beaker, and proceed with the *Assay* as directed under *Sulfapyridine*, page 517, beginning with "Add 5 cc. of hydrochloric acid . . . ." Each cc. of 0.1 *M* sodium nitrite is equivalent to 0.02713 Gm. of $C_{11}H_{10}N_3O_2SNa$.

Storage—Preserve Sterile Sulfapyridine Sodium in containers so closed that the sterility of the product is maintained until the package is opened for use. Each package contains not more than 10 Gm. of Sterile Sulfapyridine Sodium. The quantity of Sterile Sulfapyridine Sodium and the lot number must be stated on the label of each package. The container may be of such size as to permit solution within the container.

AVERAGE DOSE—**2 Gm.** (approximately 30 grains).

Sulfapyridine Tablets

SULFAPYRIDINE TABLETS
Tabellæ Sulfapyridini

Sulfapyridine Tablets contain not less than 95 per cent and not more than 105 per cent of the labeled amount of $C_{11}H_{11}N_3O_2S$.

Identification—Triturate a quantity of finely powdered Sulfapyridine Tablets, equivalent to about 0.5 Gm. of sulfapyridine, with two 5-cc. portions of chloroform, and discard the chloroform. Triturate the residue with 10 cc. of ammonia T.S. for 5 minutes, add 10 cc. of distilled water, and filter. Warm the filtrate until most of the ammonia is expelled, cool, and add acetic acid to a distinctly acid reaction: a precipitate of sulfapyridine is formed. Collect the precipitate on a filter, wash it well with cold distilled water, and dry at about 80°. The sulfapyridine so obtained melts between 191° and 193°, page 731, and responds to *Identification tests A*, *B*, and *C* under *Sulfapyridine*, page 516.

Assay—Weigh a counted number of not less than 20 of the Tablets, and reduce them to a fine powder without appreciable loss. Weigh accurately a portion of the powder, equivalent to about 0.5 Gm. of sulfapyridine, and transfer it to a beaker or casserole. Add 5 cc. of hydrochloric acid and 50 cc. of distilled water. Cool to 15°, add about 25 Gm. of crushed ice, and slowly titrate with 0.1 *M* sodium nitrite until a blue color is produced immediately when a glass rod dipped in the solution is streaked on a smear of starch iodide paste T.S. When the titration is complete, the end point is reproducible after the mixture has been allowed to stand for 1 minute. Each cc. of 0.1 *M* sodium nitrite is equivalent to 0.02493 Gm. of $C_{11}H_{11}N_3O_2S$.

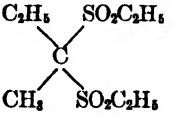
Storage—Preserve Sulfapyridine Tablets in well-closed containers.

Sizes—Sulfapyridine Tablets usually available contain the following amounts of sulfapyridine: **0.3** and **0.5 Gm.** (approximately 5 and 7½ grains).

AVERAGE DOSE—**2 Gm.** (approximately 30 grains) of Sulfapyridine.

SULFONETHYLMETHANE
Sulfonethylmethanum

Sulfonethylmeth. **Trional**



$C_8H_{16}O_4S_2$ Mol. wt. 242.34

Description—Sulfonethylmethane occurs as colorless, lustrous, odorless, crystalline scales, having a bitter taste. A saturated aqueous solution of Sulfonethylmethane is neutral to litmus paper.

Solubility—One Gm. of Sulfonethylmethane dissolves in about 200 cc. of water at 25°. It is more soluble in boiling water, and is soluble in alcohol and in ether.

Melting point—Sulfonethylmethane melts between 74° and 76°, page 731.

Identification—

A: Sulfonethylmethane decomposes when strongly heated, with the evolution of sulfur dioxide.

B: Heat about 0.1 Gm. of Sulfonethylmethane with an equal weight of powdered charcoal in a dry test tube: the characteristic, unpleasant odor of a mercaptan is evolved.

Residue on ignition—Sulfonethylmethane yields not more than 0.05 per cent of residue on ignition, page 745.

Loss on drying—When dried over sulfuric acid for 24 hours, Sulfonethylmethane loses not more than 1 per cent of its weight.

Readily oxidizable substances—Boil 2 Gm. of Sulfonethylmethane with 100 cc. of distilled water until solution is complete: no odor develops. Cool the solution, add sufficient distilled water to restore the volume to 100 cc., filter, and to 20 cc. of the filtrate add 0.05 cc. of 0.1 *N* potassium permanganate: the pink color does not disappear immediately. *Save the remainder of the filtrate for use in the tests for Chloride and Sulfate.*

Chloride—To 10 cc. of the filtrate obtained in the test for *Readily oxidizable substances* add a few drops of silver nitrate T.S.: no turbidity is produced immediately.

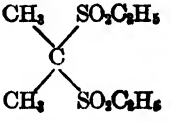
Sulfate—A 50-cc. portion of the filtrate obtained in the test for *Readily oxidizable substances* shows no more sulfate than corresponds to 1 cc. of 0.02 *N* sulfuric acid.

Storage—Preserve Sulfonethylmethane in well-closed containers.

AVERAGE DOSE—**0.75 Gm.** (approximately 12 grains).

SULFONMETHANE
Sulfonmethanum

Sulfonmeth. **Sulfonal**



$C_7H_{16}O_4S_2$ Mol. wt. 228.32

Description—Sulfonmethane occurs as white crystals, or as white powder. It is odorless and nearly tasteless. A saturated aqueous solution of Sulfonmethane is neutral to litmus paper.

Solubility—One Gm. of Sulfonmethane dissolves in about 365 cc. of water, in about 60 cc. of alcohol, in about 11 cc. of chloroform, and in about 64 cc. of ether, at 25°. One Gm. dissolves in about 16 cc. of boiling water and in about 3 cc. of boiling alcohol. It is soluble in benzene.

Melting point—Sulfonmethane melts between 124° and 126°, page 731.

Identification—

A: Sulfonmethane decomposes when strongly heated, with the evolution of sulfur dioxide.

B: Heat about 0.1 Gm. of Sulfonmethane with an equal weight of powdered charcoal in a dry test tube: the characteristic, unpleasant odor of a mercaptan is evolved.

Loss on drying—When dried over sulfuric acid for 24 hours, Sulfonmethane loses not more than 1 per cent of its weight.

Residue on ignition—Sulfonmethane yields not more than 0.05 per cent of residue on ignition, page 745.

Readily oxidizable substances—Boil 2 Gm. of Sulfonmethane with 100 cc. of distilled water until solution is complete: no odor develops. Cool the solution, and add sufficient distilled water to restore the volume to 100 cc.; filter, and to 20 cc. of the filtrate add 0.05 cc. of 0.1 *N* potassium permanganate: the pink color does not disappear immediately.

Chloride—To 10 cc. of the filtrate obtained in the test for *Readily oxidizable substances* add a few drops of silver nitrate T.S.: no turbidity is produced immediately.

Sulfate—A 50-cc. portion of the filtrate obtained in the test for *Readily oxidizable substances* shows no more sulfate than corresponds to 1 cc. of 0.02 *N* sulfuric acid.

Storage—Preserve Sulfonmethane in well-closed containers.

AVERAGE DOSE—**0.75 Gm.** (approximately 12 grains).

Sulfur Ointment, Alkaline

ALKALINE SULFUR OINTMENT

Unguentum Sulfuris Alkalinum

Ung. Sulfur. Alk.

Sublimed Sulfur	**200 Gm.**
Potassium Carbonate	**100 Gm.**
Water	**50 Gm.**
Wool Fat	**40 Gm.**
Yellow Wax	**40 Gm.**
Petrolatum	**570 Gm.**
To make	**1000 Gm.**

Triturate the sulfur with the potassium carbonate and the water until a smooth homogeneous mixture results; incorporate the wool fat with this mixture; then add the mixture of yellow wax and petrolatum, previously melted and cooled, and mix thoroughly.

Storage—Preserve Alkaline Sulfur Ointment in tight containers and avoid prolonged exposure to temperatures above 30°.

Sulfur Ointment, Compound

COMPOUND SULFUR OINTMENT

Unguentum Sulfuris Compositum

Ung. Sulfur. Comp. Wilkinson's Ointment Hebra's Itch Ointment

Precipitated Calcium Carbonate	**100 Gm.**
Sublimed Sulfur	**150 Gm.**
Juniper Tar	**150 Gm.**
Soft Soap	**300 Gm.**
Solid Petroxolin	**300 Gm.**
To make	**1000 Gm.**

Melt the solid petroxolin with the soft soap and add the juniper tar; then incorporate by trituration the sublimed sulfur and precipitated calcium carbonate, added in several portions, and rub the Ointment until it is smooth.

Storage—Preserve Compound Sulfur Ointment in tight containers and avoid prolonged exposure to temperatures above 30°.

Sulfur, Washed

WASHED SULFUR

Sulfur Lotum

Sulfur Lot.

S At. wt. 32.06

Washed Sulfur, when dried to constant weight over sulfuric acid, contains not less than 99.5 per cent of S.

Washed Sulfur may be prepared as follows:

Sublimed Sulfur	**100 Gm.**
Diluted Ammonia Solution	**10 cc.**

Distilled Water, a sufficient quantity.

Pass the Sublimed Sulfur through a No. 30 sieve, mix it thoroughly with 100 cc. of distilled water, add the diluted ammonia solution, and set the mixture aside for 3 days in a closed vessel, agitating occasionally. Then add 100 cc. of distilled water, transfer the mixture to a strainer, and wash the sulfur with distilled water until the washings cease to impart a blue color to red litmus paper. Then allow it to drain, press the residue strongly, dry it rapidly at a moderate temperature in a drying closet, and pass it through a No. 30 sieve.

Description—Washed Sulfur occurs as a fine, yellow, crystalline powder, without odor or taste.

Solubility—One Gm. of Washed Sulfur dissolves in about 150 cc. of ether, and in about 100 cc. of olive oil. One Gm. dissolves slowly and usually incompletely in about 2 cc. of carbon disulfide. It is practically insoluble in water, and nearly insoluble in alcohol.

Identification—Washed Sulfur burns in the air to sulfur dioxide, which can be recognized by its characteristic odor.

Residue on ignition—Washed Sulfur yields not more than 0.5 per cent of residue on ignition, page 745.

Reaction—Agitate 2 Gm. of Washed Sulfur with 10 cc. of distilled water, and filter the mixture: the filtrate is neutral to litmus paper.

Arsenic—Digest 0.5 Gm. of Washed Sulfur for 3 hours with 10 cc. of ammonia T.S., filter the liquid, and evaporate the clear filtrate to dryness on a water bath. Add 1 cc. of nitric acid, and again evaporate to dryness: the residue meets the requirements of the test for *Arsenic*, page 689.

Assay—Dry about 1 Gm. of Washed Sulfur to constant weight over sulfuric acid, weigh accurately, and transfer it to a flask containing 50 cc. of a solution of potassium hydroxide in diluted alcohol (1 in 10). Boil the mixture until the liquid is transparent and the sulfur is dissolved, then dilute it with distilled water to measure exactly 250 cc. Oxidize 25 cc. of this dilution by the addition of hydrogen peroxide solution in excess (using about 50 cc.), heat on a water bath for 30 minutes, acidify the liquid with hydrochloric acid, dilute it with 250 cc. of distilled water, heat to boiling, and add hot barium chloride T.S. in small portions to the resulting liquid until no further precipitation takes place. Heat this mixture on a water bath for 30 minutes, collect the resulting precipitate, wash, dry, ignite, and weigh it. Perform a blank determination, using the same quantities of reagents but omitting the sulfur, and before making the final calculation deduct the weight of barium sulfate thus obtained from that obtained in the assay. The weight of the barium sulfate thus obtained, multiplied by 0.1373, indicates its equivalent of S.

Storage—Preserve Washed Sulfur in well-closed containers.

AVERAGE DOSE—**4 Gm.** (approximately 60 grains).

Sulfurated Lime Solution, page 299
Sulfurated Potash, page 404

Sulfuric Acid

SULFURIC ACID
Acidum Sulfuricum

H_2SO_4 Mol. wt. 98.08

Sulfuric Acid contains not less than 94 per cent and not more than 98 per cent of H_2SO_4.

Caution: When Sulfuric Acid is mixed with other liquids, it should always be added to the diluent, and great caution should be observed.

Description—Sulfuric Acid is a colorless, odorless liquid of oily consistence. It is very caustic and corrosive. When strongly heated, Sulfuric Acid is vaporized with the evolution of dense, white fumes. It is acid to litmus paper even when highly diluted.

Solubility—Sulfuric Acid is miscible with water and with alcohol, in either case with the evolution of much heat.

Specific gravity—The specific gravity of Sulfuric Acid is about 1.84 at 25°.

Identification—

A: Sulfuric Acid responds to the tests for *Sulfate*, page 727.

B: Sulfuric Acid with or without the aid of heat chars sucrose, wood, and many other organic substances.

Residue on ignition—Evaporate 5 cc. of Sulfuric Acid in a platinum or porcelain dish, and ignite: the weight of the residue on ignition does not exceed 1 mg.

Sulfuric Acid, diluted with 15 volumes of distilled water, meets the requirements of the following tests for Chloride, Nitrate, Nitrite or sulfite, Arsenic, and Heavy metals:

Chloride—Silver nitrate T.S. produces no turbidity in the dilution.

Nitrate—Mix 5 cc. of the dilution with an equal volume of ferrous sulfate T.S., and superimpose the mixture upon Sulfuric Acid: the zone of contact does not assume a brown or brownish red color.

Nitrite or sulfite—A 10-cc. portion of the dilution does not at once discharge the color of 0.1 cc. of 0.1 *N* potassium permanganate.

Arsenic—A 5-cc. portion of the dilution meets the requirements of the test for *Arsenic*, page 689.

Heavy metals—To 15 cc. of the dilution add ammonia T.S. until the solution is neutral to litmus paper. Add 2 cc. of diluted acetic acid, and dilute to 25 cc. with distilled water: the heavy metals limit, page 721, for Sulfuric Acid is 10 parts per million.

Assay—Weigh accurately about 1 cc. of Sulfuric Acid in a tared, glass-stoppered flask. Dilute cautiously with 25 cc. of distilled water, and titrate with 1 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 1 *N* sodium hydroxide is equivalent to 0.04904 Gm. of H_2SO_4.

Storage—Preserve Sulfuric Acid in tight containers.

DILUTED SULFURIC ACID

Acidum Sulfuricum Dilutum

Acid. Sulfuric. Dil.

Diluted Sulfuric Acid is an aqueous solution containing, in each 100 cc., not less than 9.5 Gm. and not more than 10.5 Gm. of H_2SO_4.

Diluted Sulfuric Acid may be prepared as follows:

Sulfuric Acid	**57 cc.**
Distilled Water, a sufficient quantity, to make	**1000 cc.**

Pour the Acid gradually, with constant stirring, into 900 cc. of distilled water, and allow the solution to cool. Add sufficient distilled water to measure 1000 cc. and mix well.

Description—Diluted Sulfuric Acid is a colorless, odorless liquid having an acid taste. It is acid to litmus paper.

Specific gravity—The specific gravity of Diluted Sulfuric Acid is about 1.067 at 25°.

Other tests—Diluted Sulfuric Acid, without further dilution, meets the requirements of the tests for *Chloride, Nitrate, Nitrite or sulfite, Arsenic,* and *Heavy metals* under *Sulfuric Acid*, page 523.

Assay—Accurately measure 10 cc. of Diluted Sulfuric Acid, and dilute with about 20 cc. of distilled water. Titrate the solution with 1 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 1 *N* sodium hydroxide is equivalent to 0.04904 Gm. of H_2SO_4.

Storage—Preserve Diluted Sulfuric Acid in tight containers.

Sun Cream N. F.

N. F. SUN CREAM
Cremor Solis N. F.

Sun Tan Ointment

Phenyl Salicylate	50 Gm.
Ethyl Aminobenzoate	20 Gm.
Titanium Dioxide	10 Gm.
Neocalamine	10 Gm.
Yellow Ferric Oxide	1 Gm.
Coumarin	1 Gm.
White Wax	20 Gm.
Triethanolamine	5 Gm.
Stearyl Alcohol	80 Gm.
Stearic Acid	20 Gm.
Glycerin	100 Gm.
Distilled Water, a sufficient quantity,	
To make	1000 Gm.

Warm the triethanolamine and the stearic acid together on a water bath for 10 minutes, add the white wax and the stearyl alcohol, and continue to heat until completely melted. Dissolve the phenyl salicylate, ethyl aminobenzoate, and the coumarin in this mixture. Add the titanium dioxide, neocalamine, and yellow ferric oxide in a fine state of division and mix well. Add the distilled water and the glycerin, which have been previously heated together to about 70°, with constant stirring. Continue the stirring until the emulsion formed has an ointment-like consistency.

Storage—Preserve N. F. Sun Cream in tight containers and avoid prolonged exposure to temperatures above 30°.

Suprarenal

SUPRARENAL
Suprarenalum

Desiccated Suprarenal Dried Adrenal Substance Suprarenalum Siccum

Suprarenal is the dried, partially defatted and powdered suprarenal gland of cattle, sheep, or swine.

Suprarenal is derived from sound, clean, and entire glands that are freed from external connective tissue and external fat. It yields not less than 0.8 per cent of natural epinephrine of glandular origin and is free from diluents or preservatives. One part of Suprarenal represents

approximately 6 parts by weight of the fresh glands. If Suprarenal is dried by heat, it must be dried in vacuum, the temperature of the drying material not exceeding 60°.

Description—Suprarenal occurs as a light yellow to brown amorphous powder having a slight characteristic odor. No disagreeable odor suggestive of putrefaction is present.

Solubility—Suprarenal is only partially soluble in water.

Histology—Suprarenal shows numerous chromophile (chromaffin) cells, both isolated and in loose aggregates, the individual cells stellate to irregular, with spheroidal to oval nuclei and granular cytoplasm which take a brownish coloration with chromic acid T.S.; numerous clear, jointed segments of non-medullated nerve fibers, the axons of which are colored mauve with eosin and hematoxylin T.S.; numerous cortical cells both isolated and in masses, the individual cells cuboidal to irregularly rounded with spheroidal nuclei, some of the cells containing tiny fat globules, granules or pigment, the chromatin of the nucleus and granules staining blue, and the protoplasm red to purple with Delafield's hematoxylin T.S. and alcoholic eosin; numerous fragments of connective tissue fibers, fibrocytes and intercellular substance, the fibers wavy, the fibrocytes slender, linear to fusiform, and all colored blue with a mixture of Mallory's stain and phosphotungstic acid T.S.; numerous minute granules of crystalline appearance and irregular form, and many isolated nuclei; and a few elastic fibers.

Moisture—Suprarenal yields not more than 6 per cent of moisture when determined by Method VII, page 761.

Total ash—Suprarenal yields not more than 7 per cent of total ash, page 760.

Assay—Triturate thoroughly 0.5 Gm. of Suprarenal with 3 cc. of 0.1 *N* hydrochloric acid in a smooth glass or agate mortar, until a frothy, impalpable, homogeneous fluid results. Wash this material quantitatively into a suitable graduated container with more 0.1 *N* hydrochloric acid, diluting to a volume of 50 cc. Allow this mixture to macerate for 3 hours, with frequent agitation. The material should be protected from light at all times. Filter through a dry filter, and proceed with the assay of this filtrate as directed under *Epinephrine Hydrochloride Solution*, U. S. Pharmacopœia XIII.

Storage—Preserve Suprarenal in tight containers, and avoid excessive heat.

AVERAGE DOSE—To be determined by the prescriber.

Surgical Merbromin Solution, page 324
Sweet Rhubarb Tincture, page 444

Syrups

Acacia Syrup, page 15
Althea Syrup, page 35
Aromatic Eriodictyon Syrup, page 199
Bromides Syrup, page 91
Cacao Syrup, page 97
Cherry Syrup, page 140
Cinnamon Syrup, page 155
Compound Hypophosphites Syrup, page 259
Compound Squill Syrup, page 499
Compound White Pine Syrup, page 557
Compound White Pine Syrup with Codeine, page 558
Ephedrine Sulfate Syrup, page 194

Tablets

Procaine Hydrochloride Tablets, page 417
Red Mercuric Iodide Tablets, page 327
Santonin and Mild Mercurous Chloride Tablets, page 451
Santonin Tablets, page 452
Scopolamine Hydrobromide Tablets, page 454
Sodium Bicarbonate and Calcium Carbonate Tablets, page 473
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Strychnine Nitrate Tablets, page 512
Succinchlorimide Tablets, page 515
Sulfapyridine Tablets, page 518
Three Bromides Tablets, page 92
Tribasic Magnesium Phosphate Tablets, page 312
Yellow Mercurous Iodide Tablets, page 337

RECTIFIED TAR OIL
Oleum Picis Rectificatum

Ol. Pic. Rect. Oleum Picis Liquidæ Rectificatum

Rectified Tar Oil is the volatile oil from pine tar rectified by steam distillation.

Description—Rectified Tar Oil is a thin liquid, having a dark reddish brown color, and a strong, empyreumatic odor and taste. An alcohol solution of Rectified Tar Oil is acid to moistened blue litmus paper.
Solubility—Rectified Tar Oil is miscible in all proportions with alcohol.
Specific gravity—The specific gravity of Rectified Tar Oil is not less than 0.960 and not more than 0.990 at 25°.
Storage—Preserve Rectified Tar Oil in tight containers.

COMPOUND TAR OINTMENT
Unguentum Picis Compositum

Ung. Pic. Comp.

Rectified Tar Oil	40 Gm.
Benzoin Tincture	20 Gm.
Zinc Oxide	30 Gm.
Yellow Wax	250 Gm.
Lard	320 Gm.
Cottonseed Oil	340 Gm.
To make about	1000 Gm.

Melt the yellow wax and lard with the cottonseed oil at a gentle heat, and add the benzoin tincture. Then withdraw the heat, add the rectified tar oil, and incorporate this mixture gradually with the zinc oxide so that when cool, a smooth, homogeneous ointment results.

Storage—Preserve Compound Tar Ointment in tight containers and avoid prolonged exposure to temperatures above 30°.

Taraxacum

TARAXACUM
Taraxacum

Tarax. Dandelion Root

Taraxacum consists of the dried rhizomes and roots of *Taraxacum officinale* Weber, or *Taraxacum lævigatum* DC. (Fam. *Compositæ*).

Unground Taraxacum—Unground Taraxacum is cylindrical or somewhat flattened, gradually tapering, from 6 to 15 cm. in length and from 5 to 15 mm. in thickness, though usually broken; externally brownish black to moderate yellowish brown, longitudinally wrinkled, and has numerous roots and rootlet scars. The crown is simple or branched and has numerous leaf-bases showing annulate markings. The fracture is horny and non-fibrous.

Histology—Taraxacum shows an external cork up to 4 layers of tangentially elongated cells; an internal cork often found in the outer cortex or the innermost layers of the cortex adjoining the phloem; a narrow cortex, containing inulin-bearing parenchyma cells alternating with brownish layers of laticiferous vessels; a broad phloem, made up of sieve tubes and interrupted layers of laticiferous vessels; and a non-radiate xylem with wood fibers and tracheæ up to 84 microns in diameter.

Powdered Taraxacum—Powdered Taraxacum is pale brown to weak yellowish orange. It is odorless and has a bitter taste. It shows large parenchyma cells, thin-walled, and containing irregular glistening masses of inulin; fragments with brown to yellow anastomosing laticiferous vessels; spiral and reticulate tracheæ; and non-lignified wood fibers, with simple, irregular, or oblique pores. Starch is absent.

Foreign organic matter—Taraxacum contains not more than 2 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Taraxacum yields not more than 4 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**4 Gm.** (approximately 1 drachm).

COMPOUND TARAXACUM ELIXIR
Elixir Taraxaci Compositum

Elix. Tarax. Comp.

Taraxacum Fluidextract	35 cc.
Wild Cherry Fluidextract	20 cc.
Glycyrrhiza Fluidextract	60 cc.
Sweet Orange Peel Tincture	60 cc.
Cinnamon Tincture	30 cc.
Compound Cardamom Tincture	30 cc.
Glycerin	100 cc.
Aromatic Elixir, a sufficient quantity, To make	1000 cc.

Mix the fluidextracts, and add the tinctures, the glycerin, and sufficient aromatic elixir to make the product measure 1000 cc.; mix well, let it stand 24 hours, and filter, if necessary, until the product is clear.

Alcohol content—From 25 to 28 per cent, by volume, of C_2H_5OH.
Storage—Preserve Compound Taraxacum Elixir in tight containers.

TARAXACUM FLUIDEXTRACT
Fluidextractum Taraxaci

Fldext. Tarax. Dandelion Root Fluidextract

Prepare the Fluidextract from taraxacum, in moderately coarse powder, by Process B, page 718. Use a mixture of 1 volume of glycerin, 5 volumes of alcohol, and 4 volumes of water as Menstruum I, and diluted alcohol as Menstruum II; macerate the drug during 48 hours, and percolate at a moderate rate.

Alcohol content—From 32 to 38 per cent, by volume, of C_2H_5OH.
Storage—Preserve Taraxacum Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

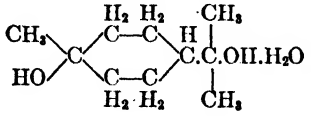
Terpin Hydrate

TERPIN HYDRATE

Terpini Hydras

Terpin. Hyd.

$C_{10}H_{20}O_2.H_2O$



Mol. wt. 190.28

Description—Terpin Hydrate occurs as colorless, lustrous crystals, or as a white powder. It has a slight odor, and is efflorescent in dry air. A hot aqueous solution of Terpin Hydrate (1 in 100) is neutral to litmus paper.

Solubility—One Gm. of Terpin Hydrate dissolves in about 200 cc. of water, in 13 cc. of alcohol, in 140 cc. of chloroform, and in about 140 cc. of ether, at 25°. One Gm. dissolves in 35 cc. of boiling water and in 3 cc. of boiling alcohol.

Melting point—When dried to constant weight in a vacuum over sulfuric acid, Terpin Hydrate melts between 102° and 105°, page 731.

Identification—Add a few drops of sulfuric acid to a hot, aqueous solution of Terpin Hydrate: the liquid becomes turbid and develops a strongly aromatic odor.

Residue on ignition—Terpin Hydrate yields not more than 0.1 per cent of residue on ignition, page 745.

Residual turpentine—Terpin Hydrate has no odor of turpentine.

Storage—Preserve Terpin Hydrate in tight containers.

Terpin Hydrate and Codeine Elixir

TERPIN HYDRATE AND CODEINE ELIXIR

Elixir Terpini Hydratis et Codeinæ

Elix. Terpin. Hyd. et Codein.

Codeine	2 Gm.
Terpin Hydrate Elixir, a sufficient quantity,	
To make	1000 cc.

Dissolve the codeine in a sufficient quantity of the terpin hydrate elixir to make the product measure 1000 cc.

Alcohol content—From 38 to 42 per cent, by volume, of C_2H_5OH.

Storage—Preserve Terpin Hydrate and Codeine Elixir in tight containers.

AVERAGE DOSE—4 cc. (approximately 1 fluidrachm).

One average metric dose contains 8 mg. of Codeine and 68 mg. of Terpin Hydrate

TERPIN HYDRATE ELIXIR

Elixir Terpini Hydratis

Elix. Terpin. Hyd.

Terpin Hydrate	17 Gm.
Sweet Orange Peel Tincture	20 cc.
Benzaldehyde Spirit	5 cc.
Glycerin	400 cc.
Alcohol	425 cc.
Syrup	100 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the terpin hydrate in the alcohol; add successively the tincture, the spirit, the glycerin, the syrup, and sufficient distilled water to make the product measure 1000 cc.; mix well and filter, if necessary, until the product is clear.

Alcohol content—From 38 to 42 per cent, by volume, of C_2H_5OH.
Storage—Preserve Terpin Hydrate Elixir in tight containers.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

One average metric dose contains 68 mg. of Terpin Hydrate.

THEOBROMINE AND SODIUM SALICYLATE

Theobromina et Sodii Salicylas

Theobrom. et Sod. Salicyl. Theobromine Sodio-Salicylate

Theobromine and Sodium Salicylate is a mixture of $C_7H_7O_2N_4Na$ and $NaC_7H_5O_3$ in approximately molecular proportions. It yields, when dried to constant weight at 110°, not less than 46.5 per cent of $C_7H_8O_2N_4$ and not less than 35 per cent of $HC_7H_5O_3$.

Description—Theobromine and Sodium Salicylate occurs as a white, odorless powder, having a sweetish, salty, and somewhat alkaline taste. It gradually absorbs carbon dioxide from the air with the liberation of theobromine, becoming incompletely soluble in water. It also frequently develops a characteristic odor. An aqueous solution of Theobromine and Sodium Salicylate (1 in 20) is alkaline to litmus paper.

Solubility—One Gm. of Theobromine and Sodium Salicylate dissolves in about 1 cc. of water, at 25°. It is slightly soluble in alcohol.

Identification—

A: When ignited, Theobromine and Sodium Salicylate yields a residue which colors a non-luminous flame intensely yellow. This residue effervesces with acids.

B: An aqueous solution of Theobromine and Sodium Salicylate (1 in 100), slightly acidified with acetic acid, is colored violet upon the addition of ferric chloride T.S.

C: To about 50 mg. of the precipitate obtained in the *Assay for theobromine* add 1 cc. of hydrochloric acid and about 0.1 Gm. of potassium chlorate, and evaporate to dryness on a water bath: a reddish yellow residue remains which becomes purple when moistened with a drop of ammonia T.S.

Loss on drying—When dried to constant weight at 110°, Theobromine and Sodium Salicylate loses not more than 10 per cent of its weight.

Water-insoluble substances—A freshly prepared aqueous solution of Theobromine and Sodium Salicylate (1 in 20) is colorless or nearly colorless and is clear or not more than slightly opalescent.

Carbonate—Dissolve 0.5 Gm. of Theobromine and Sodium Salicylate in 5 cc. of sulfuric acid: no effervescence is produced.

Caffeine—Dissolve 1 Gm. of Theobromine and Sodium Salicylate in 10 cc. of distilled water, add a few cc. of sodium hydroxide T.S., and shake the mixture with 10 cc. of chloroform. Separate the chloroform layer, evaporate it to dryness on a water bath, and dry to constant weight at 80°: the weight of the residue does not exceed 5 mg.

Assay for theobromine—Dissolve about 2 Gm. of Theobromine and Sodium Salicylate, previously dried to constant weight at 110° and accurately weighed, in 10 cc. of warm distilled water, and titrate the solution with 1 *N* hydrochloric acid, using phenolphthalein T.S. as the indicator: not more than 5.5 cc. of 1 *N* hydrochloric acid is required to neutralize 2 Gm. of the dried Theobromine and Sodium Salicylate. The solution should now be alkaline to litmus paper or be made so by the addition of 1 or 2 drops of very dilute ammonia T.S. Allow to stand at from 20° to 25° for 3 hours, stirring occasionally, transfer the precipitate of theobromine to a dried and weighed filter of 9 cm. diameter, wash the precipitate and filter with 4 successive portions of 5 cc. each of ice-cold distilled water, and dry to constant weight at 100°. *Save the filtrate for use in the Assay for salicylic acid.* To the weight of precipitate thus obtained add 0.13 Gm. (the approximate quantity of theobromine remaining in the liquid and washings). The total weight corresponds to not less than 46.5 per cent of the weight of dried Theobromine and Sodium Salicylate taken.

About 0.2 Gm. of the precipitate obtained in the assay for theobromine volatilizes when slowly heated, leaving only a negligible residue.

Assay for salicylic acid—Dilute the filtrate and washings obtained in the *Assay for theobromine* with distilled water to exactly 50 cc., transfer 25 cc. of the liquid to a separator, add 10 cc. of diluted sulfuric acid, and extract the liberated salicylic acid with 4 successive portions of 25, 15, 10, and 5 cc. each of chloroform. Pass the chloroform solutions through a filter previously moistened with chloroform, and wash the filter and the stem of the funnel with a few cc. of hot chloroform. Evaporate the combined chloroform solutions to about 5 cc. at a temperature not exceeding 40°, add 25 cc. of diluted alcohol, which has been previously neutralized with 0.1 *N* sodium hydroxide, using 3 drops of phenolphthalein T.S. as the indicator, and titrate with 0.1 *N* sodium hydroxide, until the pink color is restored. Each cc. of 0.1 *N* sodium hydroxide is equivalent to 0.01381 Gm. of $HC_7H_5O_3$.

Storage—Preserve Theobromine and Sodium Salicylate in tight containers.

AVERAGE DOSE—**1 Gm.** (approximately 15 grains).

Thin Pectin Paste, page 376
Three Bromides Elixir, page 91
Three Bromides Tablets, page 92

THYME
Thymus

Common Thyme Garden Thyme

Thyme consists of the dried leaves and flowering tops of *Thymus vulgaris* Linné (Fam. *Labiatæ*).

Thyme yields not less than 1.5 cc. of volatile thyme oil from each 100 Gm. of drug.

Unground Thyme—Unground Thyme occurs as quadrangular stems, about 0.5 mm. in diameter, dusky purplish red to dusky yellow-green in color, pubescent, with nodes up to 20 mm. apart, and occasionally with the opposite leaves attached. The leaves are linear, linear-lanceolate, ovate or oblong, up to 6 mm. in length and from 0.5 to 2 mm. in width; have an acute summit and an obtuse base, tapering into a short petiole. The margin is revolute. The upper surface is light gray or light brownish gray to weak olive-green, puberulent, with numerous hairs; and the lower surface is paler, pubescent, showing numerous non-glandular and glandular hairs. The inflorescence consists of about 12-flowered axillary whorls; the flowers polygamous; the calyx tubular, about 4 mm. in length, ovoid or slightly curved on the lower side near the base, up to 12-nerved, pubescent, the throat being bearded, bilabiate, the upper lip 3-toothed, and the lower lip having 2 hairy, ascending attenuate divisions. The corolla is about twice as long as the calyx, smooth within, slightly pubescent without, the upper lip emarginate, the lower spreading, and 3-lobed. The stamens are slightly didynamous and exserted and the stigma bifid. The nutlets are about 0.5 mm. in diameter, spheroidal and finely tuberculate.

Histology—The leaf shows a thick, uneven, and striated cuticle; hairs of several types: (1) sharp-pointed, unicellular, non-lignified hairs, up to 30 microns in length; (2) uniseriate, 2- to 3-celled, non-lignified hairs with papillose walls, up to 60 microns in length, and with the apical cell straight and pointed, or somewhat curved or hooked; (3) glandular hairs with a short stalk embedded in the epidermal layer and a unicellular head, or with an 8- to 12-celled head but without a stalk; a few stomata on the upper surface, broadly elliptical, up to 25 microns in length and surrounded by two neighbor cells; and a palisade of 2 to 3 layers of columnar chlorenchyma overlying the spongy parenchyma which bears the numerous vascular or fibro-vascular bundles.

The stems show an epidermis consisting of a layer of tangentially elongated cells bearing papillose, non-glandular 1- to 3-celled hairs up to 230 microns in length and short glandular hairs with a 1- to 2-celled stalk and a 1- to 2-celled head; a narrow zone of cortical parenchyma; an endodermis consisting of a layer of large thin-walled cells; a pericycle containing interrupted groups of lignified pericyclic fibers; a circle of open collateral fibro-vascular bundles separated by narrow medullary rays with lignified walls, each bundle with a narrow phloem patch, and a broad xylem wedge composed largely of wood fibers and spiral tracheæ; and a central pith.

Powdered Thyme—Powdered Thyme is pale brown to dusky yellow-green; and has an agreeable odor and an aromatic and warming taste. It shows numerous glandular and non-glandular hairs as described under *Histology;* fragments of leaf showing chlorenchyma, vascular tissues and epidermis; occasional fibers with thick, lignified walls and simple pores; and nearly spherical pollen grains about 20 microns in diameter.

Stems—Thyme contains not more than 3 per cent of stems of *Thymus vulgaris* more than 1 mm. in diameter.

Foreign organic matter—Thyme contains not more than 2 per cent of foreign organic matter, other than stems, page 760.

Acid-insoluble ash—Thyme yields not more than 4 per cent of acid-insoluble ash, page 761.

Assay—Place about 100 Gm. of Thyme, coarsely comminuted or powdered and accurately weighed, into the flask of the apparatus used for volatile oil determinations, and proceed as directed on page 764, Process A.

AVERAGE DOSE—**4 Gm.** (approximately 1 drachm).

Thyme Fluidextract

THYME FLUIDEXTRACT
Fluidextractum Thymi

Fldext. Thymi

Prepare the Fluidextract from thyme, in moderately coarse powder, by Process C, page 719. Use a mixture of 3 volumes of alcohol and 1 volume of water as a menstruum, macerate the drug during 48 hours, and percolate at a moderate rate.

Alcohol content—From 58 to 63 per cent, by volume, of C_2H_5OH.

Storage—Preserve Thyme Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

Thyme Oil

THYME OIL
Oleum Thymi

Thyme Oil is a volatile oil distilled from the flowering plant of *Thymus vulgaris* Linné or *Thymus Zygis* Linné and its var. *gracilis* Boiss (Fam. *Labiatæ*). Thyme Oil yields not less than 40 per cent, by volume, of phenols.

Description—Thyme Oil is a colorless, yellow, or red liquid with a characteristic, pleasant odor, and a pungent, persistent taste. It is affected by light.

Solubility in alcohol—Thyme Oil dissolves in 2 volumes of 80 per cent alcohol.

Specific gravity—The specific gravity of Thyme Oil is not less than 0.910 and not more than 0.935 at 25°.

Optical rotation—Thyme Oil is slightly lævorotatory, but the angle of rotation in a 100-mm. tube at 25° does not exceed −3°.

Refractive index—The refractive index of Thyme Oil is not less than 1.4950 and not more than 1.5050 at 20°, page 745.

Water-soluble phenols—Shake 1 cc. of Thyme Oil with 10 cc. of hot distilled water, and after cooling, pass the aqueous layer through a moistened filter: not even a transient blue or violet color is produced upon the addition of 1 drop of ferric chloride T.S.

Assay—Introduce exactly 10 cc. of Thyme Oil into a cassia flask, add 75 cc. of potassium hydroxide T.S., stopper the flask tightly, shake the mixture thoroughly, and let it stand overnight. Then add sufficient potassium hydroxide T.S. to raise the lower limit of the oily layer within the graduated portion of the neck of the flask; after the alkaline solution has become clear, adjust it to the temperature at which it was measured, and note the volume of the residual liquid. This measures not more than 6 cc., indicating the presence of not less than 40 per cent, by volume, of phenols.

Storage—Preserve Thyme Oil in tight, light-resistant containers.

AVERAGE DOSE—0.1 cc. (approximately $1^1/_2$ minims).

THYME SYRUP

Syrupus Thymi

Syr. Thymi

Thyme Fluidextract	200 cc.
Magnesium Carbonate	10 Gm.
Sucrose	800 Gm.
Distilled Water, a sufficient quantity, To make	1000 cc.

Triturate the fluidextract with the magnesium carbonate and 60 Gm. of the sucrose, add 280 cc. of distilled water, and stir until the sucrose is dissolved. Filter the solution, dissolve the remainder of the sucrose in the clear filtrate by means of agitation, without the aid of heat, and add sufficient distilled water if necessary, to make the product measure 1000 cc. Mix well.

Alcohol content—From 11 to 13 per cent, by volume, of C_2H_5OH.

Storage—Preserve Thyme Syrup in tight containers, and avoid excessive heat.

THYMOL IODIDE

Thymolis Iodidum

Thymol. Iodid.

Thymol Iodide is a mixture of iodine derivatives of thymol, principally dithymoldiiodide $(C_6H_2.CH_3.C_3H_7.OI)_2$, containing, when dried over sulfuric acid for 18 hours, not less than 43 per cent of I.

Description—Thymol Iodide occurs as a reddish brown or reddish yellow, bulky powder, with a very slight, aromatic odor. It is affected by light.

Solubility—Thymol Iodide is readily soluble in chloroform, in ether, in collodion, and in fixed and volatile oils, usually leaving a slight residue. It is slightly soluble in alcohol. Thymol Iodide is insoluble in water and in glycerin; and in cold and in hot solutions of the fixed alkali hydroxides.

Identification—When heated with sulfuric acid, Thymol Iodide is decomposed with the separation of iodine.

Loss on drying—When dried over sulfuric acid for 18 hours, Thymol Iodide loses not more than 2 per cent of its weight.

Residue on ignition—Thymol Iodide yields not more than 1.5 per cent of residue on ignition, page 745.

Soluble halides—Digest 0.1 Gm. of Thymol Iodide with 50 cc. of warm distilled water for 10 minutes, filter, cool, and add 5 drops of diluted nitric acid and 1 cc. of silver nitrate T.S.: any turbidity produced is not greater than that in a control test containing 2 mg. of potassium iodide.

Alkalies, free iodine—Shake 0.5 Gm. of Thymol Iodide with 10 cc. of distilled water, and filter the mixture: the filtrate is not alkaline to litmus paper (*alkalies*) and is not colored blue upon the addition of a few drops of starch T.S. (*free iodine*).

Assay—Mix thoroughly about 0.25 Gm. of Thymol Iodide, previously dried over sulfuric acid for 18 hours and accurately weighed, with about 3 Gm. of anhydrous potassium carbonate. Place the mixture in a platinum crucible, cover with about 1 Gm. of anhydrous potassium carbonate, and heat moderately, gradually increasing the heat but not exceeding a dull redness, until the mass is completely carbonized. Extract the residue with boiling distilled water until the last washing, after acidification with diluted nitric acid, produces no opalescence with silver nitrate T.S. Heat the combined washings, which measure about 150 cc., on a water bath, and add an aqueous solution of potassium permanganate (1 in 20) in small portions, until the hot liquid remains pink. Add just enough alcohol to remove the pink tint, cool to room temperature, dilute to exactly 200 cc., mix well, and filter through a dry filter, rejecting the first 50 cc. of filtrate. To exactly 100 cc. of the subsequent clear filtrate, add about 1 Gm. of potassium iodide (free from iodate) and an excess of diluted sulfuric acid, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate, adding starch T.S. near the end of the titration. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.002115 Gm. of I.

Storage—Preserve Thymol Iodide in tight, light-resistant containers.

Tinctures

Gelsemium Tincture, page 233
Hydrastis Tincture, page 254
Iodides Tincture, page 261
Ipecac and Opium Tincture, page 270
Ipecac Tincture, page 270
Kino Tincture, page 289
Larkspur Tincture, page 291
Lobelia Tincture, page 308
Nitromersol Tincture, page 356
Nux Vomica Tincture, page 363
Rhubarb Tincture, page 444
Strong Colchicum Corm Tincture, page 162
Strong Iodine Tincture, page 265
Strophanthus Tincture, page 509
Sweet Rhubarb Tincture, page 444
Valerian Tincture, page 547
Vanilla Tincture, page 549
Veratrum Viride Tincture, page 551

TITANIUM DIOXIDE
Titanii Dioxidum

TiO_2 Mol. wt. 79.90

Titanium Dioxide, when dried at 105° for 3 hours, contains not less than 99 per cent of TiO_2.

Description—Titanium Dioxide occurs as a white, amorphous, tasteless, odorless, infusible powder. A suspension of Titanium Dioxide (1 in 10) in distilled water is neutral to litmus paper.

Solubility—Titanium Dioxide dissolves in hot concentrated sulfuric acid, and in hydrofluoric acid. It is rendered soluble by fusion with potassium bisulfate or with alkali hydroxides or carbonates. Titanium Dioxide is insoluble in water, in hydrochloric acid, in nitric acid, and in dilute sulfuric acid.

Identification—To 0.5 Gm. of Titanium Dioxide add 5 cc. of sulfuric acid, and evaporate until fumes of sulfur trioxide appear. Cool the suspension, and cautiously dilute to 100 cc. Filter, and to 5 cc. of the clear filtrate add a few drops of hydrogen peroxide T.S.: an orange red color immediately develops in the solution.

Water-soluble substances—To 4 Gm. of Titanium Dioxide add 50 cc. of distilled water, mix thoroughly and allow to stand overnight. Transfer to a 200-cc. volumetric flask, add 2 cc. of ammonium chloride T.S., and mix thoroughly. If the Titanium Dioxide does not settle, add another 2-cc. portion of ammonium chloride T.S. After the suspension has settled, add distilled water to volume. Mix thoroughly and filter through a double thickness of filter paper, discarding the first 10-cc. portion of the filtrate. Collect 100 cc. of clear filtrate and evaporate to dryness in a tared platinum dish on a hot plate, then ignite at a dull red heat to constant weight. The weight of the residue does not exceed 3 mg.

Acid-soluble substances—Suspend 5 Gm. of Titanium Dioxide in 100 cc. of 0.5 *N* hydrochloric acid and heat on a water bath with occasional stirring for 30 minutes.

Filter through a Gooch crucible in which the mat has been built up in 3 layers using first medium coarse asbestos, second pulped filter paper, and finally fine asbestos. Wash with three 10-cc. portions of 0.5 *N* hydrochloric acid. Evaporate the filtrate to dryness in a platinum dish and ignite at a dull red heat to constant weight. The weight of the residue does not exceed 17.5 mg.

Loss on drying—When dried at 105° for 3 hours, Titanium Dioxide loses not more than 0.5 per cent of its weight. Retain the dried sample for the *Loss on ignition* test.

Loss on ignition—When ignited at about 800°, Titanium Dioxide, previously dried at 105° for 3 hours, loses not more than 0.5 per cent of its weight.

Lead—Place 2 Gm. of Titanium Dioxide in a platinum dish and add 5 cc. of 70 to 72 per cent perchloric acid. Evaporate on a hot plate with 2 successive 5-cc. portions of hydrofluoric acid until white fumes appear, add 5 cc. of hydrofluoric acid and heat until solution is effected. Cool and dilute with distilled water to 100 cc., and mix thoroughly. Prepare a blank by adding 4 cc. of standard lead solution to 0.5 cc. of 70 to 72 per cent perchloric acid and 1.5 cc. of hydrofluoric acid. Evaporate in a platinum dish until the appearance of white fumes, and dilute to 10 cc. Carry 10 cc. of the sample solution and the entire blank solution through the *Lead limit test*, page 729, using 6 cc. of ammonium citrate solution, 2 cc. of potassium cyanide solution, and 2 cc. of hydroxylamine hydrochloride solution. The color of the final chloroform extract of the sample is no deeper shade of violet than that from the blank, corresponding to not more than 20 parts per million.

Arsenic—Place 1 Gm. of Titanium Dioxide in a platinum dish and heat with a mixture of 5 cc. of sulfuric acid and 5 cc. of nitric acid until white fumes are given off. Heat until the appearance of white fumes on a hot plate with 3 successive 5-cc. portions of hydrofluoric acid. Cool and dilute cautiously with distilled water to 25 cc. A 5-cc. portion of this solution meets the requirements of the test for *Arsenic*, page 689.

Assay—Accurately weigh about 0.5 Gm. of Titanium Dioxide, previously dried at 105° for 3 hours, transfer to a 250-cc. beaker and add 20 cc. of sulfuric acid and 7 to 8 Gm. of ammonium sulfate. Mix well and heat on a hot plate until fumes of sulfur trioxide are evolved; continue heating over a strong flame until solution is complete or until it is apparent that the residue is composed of siliceous matter. Cool the solution, carefully dilute with 100 cc. of distilled water, stir, heat carefully to boiling while stirring, and let settle. Filter, and transfer the entire residue to the filter paper and wash thoroughly with cold diluted sulfuric acid. Dilute the filtrate to 200 cc. and add about 10 cc. of stronger ammonia T.S. to lower the acidity to about 5 per cent sulfuric acid by volume.

Insert a Jones' reductor through a stopper inserted into the neck of a 500-cc. suction flask. Prepare zinc amalgam by adding 20 to 30 mesh zinc to an aqueous solution of mercuric chloride (1 in 50), using about 100 cc. of the solution for each 100 Gm. of zinc. After about 10 minutes, decant the solution from the zinc, wash by decantation with distilled water and place the zinc into the reductor after first inserting a pledget of glass wool. Wash the zinc amalgam column with 100-cc. portions of diluted sulfuric acid until 100 cc. of the washings does not decolorize 1 drop of 0.1 *N* potassium permanganate. Place 50 cc. of ferric ammonium sulfate T.S. in the receiver, and add 0.1 *N* potassium permanganate until a faint pink color persists for 5 minutes. Attach the receiver to the reductor, and run 50 cc. of diluted sulfuric acid through the reductor at a rate of about 30 cc. per minute. Pass the prepared titanium solution through the reductor at the same rate followed by 100 cc. of diluted sulfuric acid and 100 cc. of distilled water. During these operations the reductor should always be filled with solution or water above the upper level of the zinc amalgam. Gradually release the suction, wash down the outlet tube of the reductor and the sides of the receiver, and titrate immediately with 0.1 *N* potassium permanganate. Perform a blank determination, using the same reagents, substituting 200 cc. of 5 per cent sulfuric acid for the titanium solution and washing the reductor as in the determination. Make any necessary correction for the blank. Each cc. of 0.1 *N* potassium permanganate is equivalent to 0.00799 Gm. of TiO_2.

Storage—Preserve Titanium Dioxide in well-closed containers.

N. F. TOOTHACHE DROPS

Odontalgicum

Odontalg.

Chlorobutanol	**25 Gm.**
Clove Oil, a sufficient quantity,	
To make	**100 cc.**

Dissolve the chlorobutanol in the clove oil.

Storage—Preserve Toothache Drops, N. F. in tight containers.

TRAGACANTH GLYCERITE

Glyceritum Tragacanthæ

Glycer. Trag.

Tragacanth, in fine powder	**125 Gm.**
Glycerin	**775 cc.**
Distilled Water	**185 cc.**

Mix the tragacanth and glycerin thoroughly, add the water, and stir the mixture until a homogeneous, thick paste results.

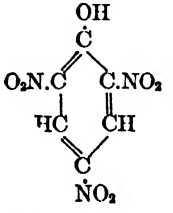
Storage—Preserve Tragacanth Glycerite in tight containers.

Tribasic Calcium Phosphate, page 110
Tribasic Magnesium Phosphate, page 311
Tribasic Magnesium Phosphate Tablets, page 312

TRINITROPHENOL

Trinitrophenol

Trinitrophen. Picric Acid



$C_6H_3N_3O_7$ Mol. wt. 229.11

Description—Trinitrophenol occurs as pale yellow prisms or scales. It is odorless and has an intensely bitter taste. An aqueous solution of Trinitrophenol is acid to litmus paper.

Caution: Trinitrophenol explodes when heated rapidly or when subjected to percussion. For safety in transportation, Trinitrophenol is usually mixed with from 10 to 20 per cent of water.

Before applying the following tests, dry the Trinitrophenol to constant weight over sulfuric acid.

Solubility—One Gm. of Trinitrophenol dissolves in 80 cc. of water, in 12 cc. of alcohol, in 35 cc. of chloroform, and in about 65 cc. of ether, at 25°. One Gm. dissolves in about 15 cc. of boiling water.

Melting point—Trinitrophenol melts between 121° and 123°, page 731.

Identification—

A: An aqueous solution of Trinitrophenol (1 in 100) has a yellow color, which becomes more intense on the addition of alkalies, and red on the addition of ammonium sulfide T.S. or a solution of an alkaline cyanide.

B: An aqueous solution of Trinitrophenol produces precipitates with solutions of most alkaloidal salts.

Sulfate—The addition of 5 drops of barium chloride T.S. to 10 cc. of an aqueous solution of Trinitrophenol (1 in 100), produces no opalescence immediately.

Insoluble matter—Dissolve 2 Gm. of Trinitrophenol in 50 cc. of benzene, collect the insoluble residue, if any, on a small counterpoised filter, or in a Gooch crucible with an asbestos layer, which has been dried at 105° and weighed, and wash the residue and filter with benzene until the last washing is colorless: the residue, dried at 105°, does not exceed 0.2 per cent.

Storage—Preserve Trinitrophenol in well-closed containers and avoid exposure to excessive heat.

Triticum

TRITICUM
Triticum

Tritic. Couchgrass Dog-grass

Triticum consists of the dried rhizome and roots of *Agropyron repens* (Linné) Beauvois (Fam. *Gramineæ*).

Unground Triticum—Unground Triticum occurs as a rhizome in long uncut pieces, or usually cut into pieces up to 12 mm. in length, from 1 to 2.5 mm. in diameter; externally light yellowish brown to moderate yellow, sometimes with darker nodes, longitudinally furrowed, smooth, and lustrous; the nodes having circular leaf-scars above, and a few root-scars and occasional slender roots below. The fracture is short and sometimes tough. Internally it has a large, hollow center. The roots are filiform, irregularly branching, usually broken, up to 5 cm. long when entire, not more than 0.5 mm. in thickness, and frequently covered with long root hairs.

Histology—The rhizome shows a strongly lignified epidermis; a hypodermis of from 3 to 6 rows of cells with strongly lignified walls; a cortex of from 10 to 16 rows of thin-walled parenchyma cells, rarely with starch grains, though occasionally with irregular masses of a more or less soluble carbohydrate; widely separated fibro-vascular bundles near the hypodermis, each with a closed sheath of fibers; an endodermis, the lateral and inner walls of the cells being moderately thickened, strongly lignified, and somewhat porous; a ring of fibers immediately inside the endodermis embedding an interrupted circle of collateral fibro-vascular bundles having large tracheæ, and adjoined by a band of parenchyma with a few fibro-vascular bundles. It is hollow at the center or shows a few more or less broken parenchyma cells.

Powdered Triticum—Powdered Triticum is weak yellow to weak yellowish orange; has a slight aromatic odor and a sweetish taste. It shows numerous fragments consisting of tracheæ with annular or spiral thickenings, or with simple pores and associated with long, narrow, rather thin-walled, strongly lignified sclerenchymatous fibers; fragments of epidermis with rectangular cells, the outer wall silicified, the longer radial walls thickened, strongly lignified, and with numerous pores, the end walls usually separated by a very short cell with thinner walls and a few pores; and numerous fragments of parenchyma with thin porous cell-walls.
Test for purity—Starch grains are few or absent (*rhizome and roots of Cynodon species*).
Foreign organic matter—Triticum contains not more than 2 per cent of foreign organic matter, page 760.
Acid-insoluble ash—Triticum yields not more than 3 per cent of acid-insoluble ash, page 761.

Triticum Fluidextract

TRITICUM FLUIDEXTRACT
Fluidextractum Tritici

Fldext. Tritic. Couchgrass Fluidextract

Prepare the Fluidextract from triticum, finely cut, by Process D, page 719. Evaporate the aqueous percolate to 80 per cent of the volume of the finished Fluidextract; when it is cold, add alcohol equal to 20 per cent of the volume of the finished Fluidextract, and sufficient water, if necessary, to make the product measure the full volume of the finished Fluidextract.

Alcohol content—From 17 to 20 per cent, by volume, of C_2H_5OH.
Storage—Preserve Triticum Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**10 cc.** (approximately $2^1/_2$ fluidrachms).

Turpentine

TURPENTINE
Terebinthina

Terebinth. Gum Thus Gum Turpentine

Turpentine is the concrete oleoresin obtained from *Pinus palustris* Miller and from other species of *Pinus* (Fam. *Pinaceæ*).

Description—Turpentine occurs as yellowish orange to yellow, opaque masses lighter internally, more or less glossy, sticky when warm, brittle in the cold. The odor and taste are characteristic. An alcohol solution of Turpentine is acid to litmus paper.
Solubility—Turpentine is freely soluble in alcohol, ether, chloroform, and glacial acetic acid. It is insoluble in water.

Alcohol-insoluble substances—Dissolve about 1 Gm. of Turpentine, accurately weighed, in 25 cc. of alcohol, and collect the insoluble residue, if any, on a tared filter. Wash the residue and filter with about 25 cc. of alcohol, and dry at 100°: the weight of the residue does not exceed 2 per cent.

Foreign organic matter—Turpentine contains not more than 2 per cent of foreign organic matter, page 760.

Turpentine Liniment

TURPENTINE LINIMENT
Linimentum Terebinthinæ

Lin. Terebinth. Kentish Ointment

Rosin Cerate	**650 Gm.**
Turpentine Oil	**350 Gm.**
To make	**1000 Gm.**

Melt the rosin cerate on a water bath, add the turpentine oil, and mix the ingredients thoroughly.

Storage—Preserve Turpentine Liniment in tight containers.

Turpentine Liniment, Acetic

ACETIC TURPENTINE LINIMENT
Linimentum Terebinthinæ Aceticum

Lin. Terebinth. Acet.

Linimentum Album, N. F. St. John Long's Liniment Stoke's Liniment

Turpentine Oil	**400 cc.**
Lemon Oil	**16 cc.**
Acetic Acid	**80 cc.**
Egg,	
Water, each, a sufficient quantity,	
To make	**1000 cc.**

Triturate or agitate the contents of 2 eggs and the yolks of 2 others with the turpentine oil and the lemon oil until they are thoroughly mixed. Then incorporate the acetic acid and 400 cc. of water and strain, if necessary. Finally add sufficient water to make 1000 cc., and mix it thoroughly.

NOTE: Shake the Liniment before dispensing.

Storage—Preserve Acetic Turpentine Liniment in tight containers.

TURPENTINE OIL
Oleum Terebinthinæ

Ol. Tereb. "Spirits of Turpentine"

Turpentine Oil is the volatile oil distilled from the oleoresin obtained from *Pinus palustris* Miller and other species of *Pinus* (Fam. *Pinaceæ*) which yield terpene oils exclusively.

Note: Rectified Turpentine Oil, page 544, is to be dispensed when Turpentine Oil is required for internal use.

Description—Turpentine Oil is a colorless liquid having a characteristic odor and taste, both of which become stronger and less pleasant as the Oil ages or is exposed to air. An alcohol solution of recently distilled Turpentine Oil (1 in 5) is neutral or acid to moistened litmus paper.

Solubility—Turpentine Oil dissolves in 5 volumes of alcohol.

Specific gravity—The specific gravity of Turpentine Oil is not less than 0.854 and not more than 0.868 at 25°.

Optical rotation—Turpentine Oil is optically active but its rotation is variable, page 737.

Refractive index—The refractive index of Turpentine Oil is not less than 1.4680 and not more than 1.4780 at 20°, page 745.

Distillation range—Place 100 cc. of Turpentine Oil in a standard 100-cc. Engler flask, having the side tube 8 cm. above the top of the bulb, and distil the Oil at the rate of 2 drops per second: not less than 90 per cent of the Oil distils between 154° and 170°, the temperature being read on a thermometer so placed that its bulb is opposite the side tube of the flask, and the top of its mercury column within the neck of the flask.

Fixed oils—Three drops of Turpentine Oil placed on white unsized paper and exposed to air, evaporate without leaving a permanent stain.

Mineral oil—Place 20 cc. of fuming sulfuric acid in a graduated, narrow-necked Babcock bottle, stopper, and place in an ice bath to cool, and then add slowly, dropwise, from a pipette, 5 cc. of the Oil, mixing it with the acid as added by gently shaking or rotating the bottle, and keeping the temperature of the mixture at about 60° to 65° by repeated immersion in the ice bath. When agitation no longer causes the mixture to become warm, shake it vigorously for about 30 seconds. Place the bottle on a water bath, and heat it between 60° and 65° for 10 minutes, keeping the contents of the bottle thoroughly mixed by shaking vigorously not less than 6 times during the heating period. (*If the shaking at first is too prolonged and too vigorous, the escaping sulfur dioxide is likely to force some of the mixture out of the neck of the bottle.*) Cool the mixture to room temperature, and add enough sulfuric acid (specific gravity about 1.84) to bring the oily layer into the graduated neck. Centrifuge the bottle and contents for 5 minutes at 1200 revolutions per minute, or for 15 minutes at 900 revolutions per minute, or allow it to stand overnight, lightly stoppered. The volume of the reddish or straw-colored viscous layer which separates on top of the dark acid does not exceed 1 per cent of the volume of the Oil taken for the test.

Caution: The addition of Turpentine Oil to the fuming sulfuric acid must be made only dropwise because of the violence of the reaction.

Mineral or rosin oils—Evaporate 5 cc. of Turpentine Oil in a small tared dish on a water bath: the weight of the residue does not exceed 0.1 Gm.

Other foreign substances—

A: A 5-cc. portion of the Oil, shaken with an equal volume of potassium hydroxide T.S., does not become darker than a light straw-yellow after standing for 24 hours.

B: A 5-cc. portion of the Oil, shaken vigorously with an equal volume of hydrochloric acid in a glass-stoppered cylinder and allowed to stand for 5 minutes, does not develop a color darker than a light straw-yellow in either layer.

Storage—Preserve Turpentine Oil in tight containers.

Turpentine Oil Emulsion

TURPENTINE OIL EMULSION

Emulsum Olei Terebinthinæ

Emuls. Ol. Tereb.

Rectified Turpentine Oil	150 cc.
Acacia, in very fine powder	50 Gm.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Place the powdered acacia in a dry bottle, add the turpentine oil, mix thoroughly, add 100 cc. of distilled water, stopper, and agitate briskly until an emulsion forms. Then gradually add sufficient distilled water to make the product measure 1000 cc., and mix thoroughly.

Storage—Preserve Turpentine Oil Emulsion in tight containers.

AVERAGE DOSE—2 cc. (approximately 30 minims).

Turpentine Oil, Rectified

RECTIFIED TURPENTINE OIL

Oleum Terebinthinæ Rectificatum

Ol. Tereb. Rect.

Rectified Turpentine Oil may be prepared as follows:

Turpentine Oil, a convenient quantity,
Sodium Hydroxide,
Distilled Water, each, a sufficient quantity.

Prepare a solution of sodium hydroxide, containing 5.3 Gm. of 95 per cent NaOH in each 100 cc., and equal in volume to the oil to be rectified. Mix this solution and the oil in a suitable still provided with a well-cooled condenser. Recover about three-fourths of the oil by distillation, and separate the clear oil from the water. Dry the oil by shaking it with anhydrous calcium chloride or with anhydrous sodium sulfate, and filter the product.

Note: Rectified Turpentine Oil is to be dispensed when Turpentine Oil is required for internal use. Oil that has become turbid must not be dispensed.

Description—Rectified Turpentine Oil is a colorless liquid which has the properties of and responds to the tests under *Turpentine Oil*, page 543, *Specific gravity* and *Mineral or rosin oils* excepted.

Specific gravity—The specific gravity of Rectified Turpentine Oil is not less than 0.853 and not more than 0.862 at 25°.

Non-volatile residue—Evaporate 5 cc. of Rectified Turpentine Oil rapidly in a tared dish on a water bath: the weight of the residue does not exceed 15 mg., page 745.

Storage—Preserve Rectified Turpentine Oil in well-filled, tight containers and avoid exposure to excessive heat.

AVERAGE DOSE—**0.3 cc.** (approximately 5 minims).

UVA URSI
Uva Ursi
Bearberry

Uva Ursi is the dried leaf of *Arctostaphylos Uva-ursi* (Linné) Sprengel or its varieties *coactylis* and *adenotricha* Fernald and MacBride (Fam. *Ericaceæ*).

Unground Uva Ursi—Unground Uva Ursi is usually unbroken, obovate, oblong or spatulate, from 12 to 30 mm. in length, from 5 to 13 mm. in breadth. The apex is obtuse or rounded; the margin entire, and slightly revolute; the base cuneate, tapering into a short stout petiole. The upper surface is olive-brown to olive, waxy, glabrous, finely reticulate; the under surface paler, glabrous (*A. Uva-ursi*) or pubescent, especially on the midrib and petiole (*var. coactylis* and *var. adenotricha*). The texture is coriaceous and the fracture short.

Histology—Uva Ursi shows an upper epidermis of large tangentially elongated cells, as seen in cross-section, with thickened cutinized outer walls covered with an additional layer of cutin which may attain a thickness of 8 microns; palisade parenchyma mostly 1 or 2 layers, occasionally 3 layers in width; spongy parenchyma of loosely arranged cells; a lower epidermis with numerous stomata and sometimes with a few unicellular, non-glandular straight or curved hairs (*A. Uva-ursi*), or with many unicellular, non-glandular serpentine hairs (*A. Uva-ursi*, var. *coactylis* and var. *adenotricha*), and with elongated, stipitate glandular hairs (*A. Uva-ursi* var. *adenotricha*); midrib possessing collenchyma beneath each epidermis, and a centralized oval-shaped strand of open-collateral bundles with a pericycle region (vars. *coactylis* and *adenotricha*) containing groups of thick-walled, lignified fibers (vars. *coactylis* and *adenotricha*), or with few, mostly isolated fibers (*A. Uva-ursi*).

Powdered Uva Ursi—Powdered Uva Ursi is dusky yellow to light olive. It has a slightly aromatic, tea-like odor, and an astringent, somewhat bitter taste. It shows polygonal epidermal cells; broadly elliptical stomata up to 40 microns in length surrounded by 5 to 8 radiate neighbor cells; mesophyll cells with chloroplastids and frequently with irregular masses of a carbohydrate; fragments of fibro-vascular bundles with spiral tracheæ associated with narrow, strongly lignified sclerenchymatous fibers and frequently with crystal fibers showing monoclinic prisms of calcium oxalate from 6 to 30 microns in diameter; lignified pericyclic fibers, irregular in shape, with thick, porous, tuberculated walls and curved ends; unicellular, non-glandular, short hairs, serpentine or straight, or with a 1- to 4-celled stalk and a small 1-celled glandular head (var. *adenotricha*); and numerous fragments made up of cells having a content which becomes bluish black upon the addition of ferric chloride T.S.

Identification—

A: Place 0.1 Gm. of powdered Uva Ursi on a watch glass, cover with another watch glass, and gently heat the powder; a crystalline sublimate of hydroquinone is formed upon the upper watch glass, consisting of long rods and feather-like aggregates which show a brilliant play of colors in polarized light.

B: Macerate 1 Gm. of powdered Uva Ursi with 10 cc. of boiling water, shake the mixture occasionally until cold, and filter; the filtrate yields a precipitate upon the addition of a few drops of ferrous sulfate T.S.

Stems—Uva Ursi contains not more than 3.5 per cent of the stems of the plant.

Foreign organic matter—Uva Ursi contains not more than 2 per cent of foreign organic matter, other than stems, page 760.

Acid-insoluble ash—Uva Ursi yields not more than 1.5 per cent of acid-insoluble ash, page 761.

Uva Ursi Fluidextract

UVA URSI FLUIDEXTRACT

Fluidextractum Uvæ Ursi

Fldext. Uvæ Ursi

Prepare the Fluidextract from uva ursi, in moderately coarse powder, by Process A, page 718. Use diluted alcohol as the menstruum, macerate the drug during 12 hours, and percolate rapidly.

Alcohol content—From 36 to 42 per cent, by volume, of C_2H_5OH.

Storage—Preserve Uva Ursi Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**2 cc.** (approximately 30 minims).

Valerian

VALERIAN

Valeriana

Valer.

Valerian consists of the dried rhizome and roots of *Valeriana officinalis* Linné (Fam. *Valerianaceæ*).

Unground Valerian—Unground Valerian occurs as an upright rhizome, from 2 to 4 cm. in length, and from 1 to 2 cm. in diameter, usually cut longitudinally into 2 to 4 pieces. Externally it is weak brown to moderate yellowish brown, the upper portion showing stem bases and frequently a short horizontal branch or stolon with numerous slender, brittle roots arising from the outer surface. The fracture of the rhizome is short and horny and shows internally a brown to moderate yellowish brown color and a thick bark and a narrow central cylinder.

Histology—The root shows an epidermal layer of papillose cells, some being modified to root hairs; a hypodermal layer bearing secretion cells with thickened, suberized walls and usually containing numerous small oil globules and occasionally small prismatic crystals; cortical parenchyma, the cells filled with starch, some of the cells near the hypodermis containing a few oil globules; an endodermis composed of cells with thickened radial walls; a pericambium composed of thin-walled

cells; a central cylinder with a radial fibro-vascular bundle. Older roots show a large central parenchyma region containing starch, a secondary thickening in the fibro-vascular bundles, and a periderm of a few layers of cells. The rhizome shows a thin periderm, a cortical parenchyma with scattered fibro-vascular bundles, a layer of altered cells of the endodermis, numerous, more or less twisted, collateral, fibro-vascular bundles and a large pith.

Powdered Valerian—Powdered Valerian is weak brown to moderate yellowish brown. It has an odor of valeric acid, becoming stronger upon aging, and a sweetish camphoraceous and somewhat bitter taste. It shows numerous starch grains, from 3 to 20 microns in diameter, spherical, plano-convex, polygonal, 2- to 4-compound and each usually with a central cleft; tracheal fragments, the walls having simple and bordered pores or scalariform and reticulate thickenings, accompanied by narrow fibers, the walls of the latter being thin, porous, and strongly lignified; occasional fragments of epidermis with root hairs, and fragments of cork.

Foreign organic matter—Valerian contains not more than 4 per cent of foreign organic matter, page 760.

Acid-insoluble ash—Valerian yields not more than 8 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**0.75 Gm.** (approximately 12 grains).

Valerian Fluidextract

VALERIAN FLUIDEXTRACT

Fluidextractum Valerianæ

Fldext. Valer.

Prepare the Fluidextract from valerian, in moderately coarse powder, by Process A, page 718. Use a mixture of 4 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 48 hours, and percolate at a moderate rate.

Alcohol content—From 61 to 68 per cent, by volume, of C_2H_5OH.

Storage—Preserve Valerian Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**1 cc.** (approximately 15 minims).

Valerian Tincture

VALERIAN TINCTURE

Tinctura Valerianæ

Tr. Valer.

Valerian, in moderately coarse powder	**200 Gm.**
Alcohol,	
Water, each, a sufficient quantity,	
To make	**1000 cc.**

Prepare the Tincture by Process P, page 758, using a mixture of 3 volumes of alcohol and 1 volume of water as the menstruum. Percolate the drug at a moderate rate.

Alcohol content—From 66 to 70 per cent, by volume, of C_2H_5OH.
Storage—Preserve Valerian Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**4 cc.** (approximately 1 fluidrachm).

Valerian Tincture, Ammoniated

AMMONIATED VALERIAN TINCTURE
Tinctura Valerianæ Ammoniata

Tr. Valer. Ammon.

Valerian, in moderately coarse powder	**200 Gm.**
Aromatic Ammonia Spirit, a sufficient quantity,	
To make	**1000 cc.**

Prepare the Tincture by Process P, page 758. Use aromatic ammonia spirit as the menstruum, macerate the drug during 24 hours, and percolate at a moderate rate.

Alcohol content—From 62 to 65 per cent, by volume, of C_2H_5OH.
Storage—Preserve Ammoniated Valerian Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—**2 cc.** (approximately 30 minims).

Vanilla

VANILLA
Vanilla

Vanilla Bean

Vanilla is the cured, full-grown, unripe fruit of *Vanilla planifolia* Andrews, known in commerce as Mexican or Bourbon Vanilla, or of *Vanilla tahitensis* Moore, known in commerce as Tahiti Vanilla (Fam. *Orchidaceæ*).

Vanilla yields not less than 12 per cent of anhydrous extractive soluble in diluted alcohol.

Unground Vanilla—Unground Vanilla occurs as a linear, flattened fruit, from 12 to 35 cm. in length and from 5 to 9 mm. in width; having an apex terminating in a flat, circular scar; a base gradually tapering, more or less curved or hooked, or in the Tahiti Vanilla, broad in the middle and tapering toward either end, the base closely resembling the summit. It is occasionally split into 3 parts near the tip; flexible and tough; externally dusky brown to moderate brown, longitudinally wrinkled, moist, glossy, and occasionally with an efflorescence of acicular crystals or monoclinic prisms of vanillin. Internally it is unilocular, with a brownish black pulp and numerous seeds. The odor and taste are characteristic, agreeably fragrant and aromatic.

Histology—Vanilla shows an epidermis with a distinct cuticle and occasional stomata, the epidermal cells containing red to brown bodies, occasionally prisms of calcium oxalate or crystals of vanillin; a collenchyma layer of 1 or 2 rows of cells; a thick sarcocarp, composed of parenchyma and an interrupted circle of fibro-vascular bundles; the latter, lepto-centric with a few tracheæ, and an outer circle of fibers with thin, strongly lignified walls, and numerous transverse simple pores; the tracheæ with walls possessing slit-like pores or spiral thickenings; the parenchyma cells usually thin-walled and deeply undulate, some thick-walled with oblique slit-like pores or broad spiral bands, and containing occasional bundles of calcium oxalate raphides up to 400 microns in length, or a thin protoplasmic layer inclosing numerous oil globules. The seeds on the placentæ arise from the endocarp, about 250 microns in diameter, reddish, flattened, irregularly triangulate, and are deeply reticulate. The endocarp hairs are numerous, long, nearly straight, and more or less matted together by a gummy resinous excretion.

Test for vanillin—Place a few of the crystals, occurring as an efflorescence on the fruit, on a microscope slide or watch glass; add a drop of phloroglucinol T.S. and a drop of hydrochloric acid: the solution immediately acquires a red color.

Assay—Place 2 Gm. of Vanilla, finely cut or in coarse powder and accurately weighed, into a suitable flask. Add 70 cc. of diluted alcohol, shake the mixture for 2 hours in a mechanical shaker or during 8 hours at about 30-minute intervals, and allow it to stand overnight. Then decant the liquid onto a filter, and wash the flask and residue of drug with small portions of diluted alcohol, passing the washings through the filter until the filtrate measures 100 cc. Mix the filtrate well, evaporate a 50-cc. portion to dryness in a suitable tared container on a water bath, and dry the residue to constant weight at 110°. The weight obtained represents the yield of anhydrous extractive soluble in diluted alcohol from 1 Gm. of Vanilla.

Storage—Preserve Vanilla in a cool place in tight containers where it will not become brittle.

NOTE: Vanilla which has become brittle should not be used.

Vanilla Tincture

VANILLA TINCTURE

Tinctura Vanillæ

Tr. Vanill.

Vanilla, cut into small pieces	100 Gm.
Sucrose, in coarse granules	200 Gm.
Alcohol,	
Diluted Alcohol,	
Water, each, a sufficient quantity,	
To make	1000 cc.

Add 200 cc. of water to the comminuted vanilla, in a suitable covered container, and macerate during 12 hours, preferably in a warm place. Add 200 cc. of alcohol to the mixture of vanilla and water, mix well, and macerate about 3 days. Transfer the mixture of vanilla and fluid to a percolator containing the sucrose, and drain; then pack the drug firmly, and percolate slowly, using diluted alcohol as the menstruum.

Alcohol content—From 38 to 42 per cent, by volume, of C_2H_5OH.
Storage—Preserve Vanilla Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

Vanillin Elixir, Compound

COMPOUND VANILLIN ELIXIR
Elixir Vanillini Compositum

Elix. Vanillin. Comp.

Compound Vanillin Spirit	**20 cc.**
Alcohol	**80 cc.**
Glycerin	**25 cc.**
Syrup	**300 cc.**
Caramel	**2 Gm.**
Distilled Water, a sufficient quantity, To make	**1000 cc.**

Mix the compound vanillin spirit with the alcohol, add the glycerin, the syrup, and 570 cc. of distilled water in several portions, shaking the mixture thoroughly after each addition. Then add the caramel and sufficient distilled water to make the product measure 1000 cc., mix well, and filter, if necessary, until the product is clear.

Alcohol content—From 7 to 9 per cent, by volume, of C_2H_5OH.
Storage—Preserve Compound Vanillin Elixir in tight containers.

Vanillin Spirit, Compound

COMPOUND VANILLIN SPIRIT
Spiritus Vanillini Compositus

Sp. Vanillin. Comp.

Vanillin	**200 Gm.**
Orange Oil	**50 cc.**
Cardamom Oil	**10 cc.**
Cinnamon Oil	**5 cc.**
Alcohol, a sufficient quantity, To make	**1000 cc.**

Dissolve the vanillin and the oils in sufficient alcohol to make the product measure 1000 cc.

Alcohol content—From 65 to 71 per cent, by volume, of C_2H_5OH.
Storage—Preserve Compound Vanillin Spirit in tight, light-resistant containers.

VERATRUM VIRIDE
Veratrum Viride

Green Hellebore American Hellebore

Veratrum Viride consists of the dried rhizome and roots of *Veratrum viride* Aiton (Fam. *Liliaceæ*).

Unground Veratrum Viride—Unground Veratrum Viride occurs as a more or less conical rhizome, from 2 to 7 cm. in length, from 1.5 to 3 cm. in diameter, externally brownish gray or brown; frequently bearing at the summit numerous, thin, closely arranged leaf-bases, otherwise rough and wrinkled and somewhat annulate from scars of bud-scales. The roots are numerous, nearly cylindrical from 3 to 8 cm. in length and from 1 to 4 mm. in diameter, usually transversely wrinkled, weak brown to weak yellowish orange. The fracture is brittle and more or less starchy.

Histology—The rhizome shows an outer layer of reddish brown to yellowish orange cork-like cells; parenchyma containing raphides of calcium oxalate and starch; the layer of endodermal cells broken in places by leaf-trace bundles; vascular bundles arranged in interrupted circles, single bundles scattered throughout the central parenchyma and also in the cortex.

The root shows epidermal cells with lignified thickened outer and radial walls; parenchyma similar to that of the rhizome but interspersed with large irregular cavities in the outer regions of the cortex; and endodermal cells with inner and radial walls thickened and slightly lignified, with U-shaped cavities about one-third the cell width.

Powdered Veratrum Viride—Powdered Veratrum Viride is pale brown to pale olive; inodorous but strongly sternutatory and has a bitter and acrid taste. It shows numerous starch grains from 3 to 20 microns in diameter, spheroidal or ellipsoidal, single or 2- to 3-compound; raphides from 15 to 150 microns in length, and scalariform or reticulate tracheæ, often with yellowish contents and associated with slightly lignified porous fibers; and a few fragments of cork.

Stems and other foreign organic matter—Veratrum Viride contains not more than 5 per cent of its stems or other foreign organic matter, page 760.

Acid-insoluble ash—Veratrum Viride yields not more than 4 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**0.1 Gm.** (approximately $1\frac{1}{2}$ grains).

VERATRUM VIRIDE TINCTURE
Tinctura Veratri Viridis

Tr. Verat. Vir.

Veratrum Viride, in fine powder	**100 Gm.**
Alcohol, a sufficient quantity,	
To make	**1000 cc.**

Prepare the Tincture by Process P, page 758, using alcohol as the menstruum. Percolate the drug slowly.

Alcohol content—From 88 to 92 per cent, by volume, of C_2H_5OH.
Storage—Preserve Veratrum Viride Tincture in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—1 cc. (approximately 15 minims).

Viburnum Opulus

VIBURNUM OPULUS
Viburnum Opulus

Viburn. Op. High-bush Cranberry Bark True Cramp Bark

Viburnum Opulus is the dried bark of *Viburnum Opulus* Linné var. *americanum* (Miller) Aiton (*Viburnum trilobum* Marshall) (Fam. *Caprifoliaceæ*).

Unground Viburnum Opulus—Unground Viburnum Opulus occurs as strips, or occasionally in quills or chip-like fragments, the bark up to 3 mm. in thickness. The outer surface of the thinner pieces is brownish gray to weak greenish yellow, the thicker pieces to dusky brown, sometimes with crooked longitudinal wrinkles and a few small light-colored lenticels with dark-colored apothecia, and is finely fissured or scaly. The inner surface is light brown to dusky yellow with short oblique or irregular striæ except where the wood adheres. The fracture is short with few or no projecting fibers in thinner bark to short and weak in thicker bark. The fractured surface shows an outer bark, a phelloderm, and an inner bark.

Histology—The young bark shows an exfoliating epidermis often replaced by cork composed of layers of cells having suberized walls alternating with layers of cells whose walls are partially to completely lignified; a primary cortex of chlorenchyma or parenchyma cells containing a greenish amorphous substance, rosette aggregates of calcium oxalate or small starch grains; lignified pericyclic fibers; and a phloem with strands of sieve tubes associated with phloem parenchyma, few or no bast fibers and transversed by medullary rays 1 or 2 cells wide.

The older bark shows a borke region with exfoliating primary tissues, a secondary phellogen and cork, the latter composed of zones of suberized-walled and lignified-walled cells, and a broad secondary phloem with groups of sieve tissue, starch- and crystal-bearing parenchyma, masses of stone cells, and intercepting medullary rays. Bast fiber groups are not numerous in the phloem strands (*distinction from Viburnum alnifolium stem bark*).

Powdered Viburnum Opulus—Powdered Viburnum Opulus is pale brown to weak yellowish orange. It has a slight but characteristic odor which becomes valeric acid-like when the bark is triturated with phosphoric acid. The taste is somewhat astringent and decidedly bitter. It shows numerous fragments of parenchyma-bearing starch and crystals; fragments of cork with polygonal, tabular cells, the walls occasionally lignified, the tangential ones frequently thickened; stone cells variable in shape, up to 124 microns in length and 35 microns in thickness; pericylic and bast fibers with walls somewhat lignified, thick, lamellated, and finely porous; numerous rosette aggregates of calcium oxalate, up to 42 microns in diameter; simple, spheroidal to ovoid starch grains, usually not exceeding 6 microns in diameter; and a few fragments of adhering wood having wood fibers with oblique, bordered pores, and associated with scalariform and pitted tracheæ.

Wood—Viburnum Opulus contains not more than 5 per cent of adhering wood.

Foreign organic matter—Viburnum Opulus contains not more than 2 per cent of foreign organic matter, other than adhering wood, page 760.
Acid-insoluble ash—Viburnum Opulus yields not more than 2 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**4 Gm.** (approximately 60 grains).

Viburnum Prunifolium

VIBURNUM PRUNIFOLIUM
Viburnum Prunifolium

Viburn. Prun. Blackhaw

Viburnum Prunifolium is the dried bark of the root or stem of *Viburnum prunifolium* Linné or of *Viburnum rufidulum* Rafinesque (Fam. *Caprifoliaceæ*).

Unground Viburnum Prunifolium—The root bark occurs as irregular, transversely curved or quilled pieces, up to 9 cm. in length, and up to 3.5 mm. in thickness. The outer surface is brown, or, where the outer cork has scaled off, reddish brown to yellowish brown, and irregularly longitudinally wrinkled. The inner surface is paler, frequently showing light-colored streaks and longitudinal striæ. The fracture is short but uneven, showing a dark-colored cork and a lighter-colored inner bark with numerous groups of yellowish stone cells. The stem bark occurs in irregular, transversely curved or quilled pieces up to 15 cm. in length and up to 6 mm. in thickness. The outer surface of young bark is grayish with raised, circular, or oval lenticels; the older bark brownish gray to black, but preferably rossed to the reddish brown to olive-brown middle bark. The inner surface is paler, longitudinally striated and the fracture short but uneven, showing scattered groups of yellowish stone cells in the light-colored inner bark.
Histology—Viburnum Prunifolium shows somewhat lignified cork cells, many with an orange or yellowish orange colored amorphous resin content; cortical parenchyma cells tangentially elongated; medullary rays nearly straight, mostly 1 or 2 cells, occasionally 3 cells in width; numerous groups of stone cells in both middle and inner bark; occasional characteristic rifts in the parenchyma; wavy borke areas, containing embedded groups of stone cells in unrossed old bark, and a few pericyclic fibers with irregular lumen and obtuse ends in young stem bark.
Powdered Viburnum Prunifolium—Powdered Viburnum Prunifolium is light brown to moderate yellowish brown; inodorous, but acquiring a mild valeric acid-like odor upon aging, or upon trituration with phosphoric acid. It has a bitter and astringent taste. It shows numerous rounded or elongated stone cells, in groups or isolated, up to 260 microns in length, with thick, porous, lignified walls; numerous fragments of lignified cork tissue; fragments composed of parenchyma cells containing oil globules, orange to olive-brown colored amorphous masses, calcium oxalate in rosettes or monoclinic prisms, up to 57 microns in diameter or length and simple or 2- to 3-compound starch grains, the individual grains spheroidal, ovate, elliptical, pyriform, or plano-convex, up to 23 microns in diameter or length; and a few fragments having wood fibers with lignified walls, some with bordered pits, and with lumina of irregular width.
Wood—Viburnum Prunifolium contains not more than 7 per cent of adhering wood.
Foreign organic matter—Viburnum Prunifolium contains not more than 2 per cent of foreign organic matter, other than adhering wood, page 760.
Acid-insoluble ash—Viburnum Prunifolium yields not more than 3 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**4 Gm.** (approximately 60 grains).

Viburnum Prunifolium Elixir

VIBURNUM PRUNIFOLIUM ELIXIR
Elixir Viburni Prunifolii

Elix. Viburn. Prun. Blackhaw Elixir

Viburnum Prunifolium Fluidextract	125 cc.
Compound Cardamom Tincture	75 cc.
Glycerin	150 cc.
Aromatic Elixir, a sufficient quantity,	
To make	1000 cc.

Mix the fluidextract, the tincture, and the glycerin; add a sufficient quantity of the aromatic elixir to make the product measure 1000 cc.; mix well, let it stand 24 hours, and filter, if necessary, until the product is clear.

Alcohol content—From 25 to 28 per cent, by volume, of C_2H_5OH.
Storage—Preserve Viburnum Prunifolium Elixir in tight containers.

AVERAGE DOSE—4 cc. (approximately 1 fluidrachm).

One average metric dose contains 0.5 cc. of Viburnum Prunifolium Fluidextract.

Viburnum Prunifolium Fluidextract

VIBURNUM PRUNIFOLIUM FLUIDEXTRACT
Fluidextractum Viburni Prunifolii

Fldext. Viburn. Prun. Blackhaw Fluidextract

Prepare the Fluidextract from viburnum prunifolium, in moderately coarse powder, by Process A, page 718. Use a mixture of 2 volumes of alcohol and 1 volume of water as the menstruum, macerate the drug during 48 hours, and percolate at a moderate rate.

Alcohol content—From 51 to 57 per cent, by volume, of C_2H_5OH.
Storage—Preserve Viburnum Prunifolium Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—4 cc. (approximately 1 fluidrachm).

Vinegar, Squill, page 499
Washed Sulfur, page 521

Waters

Bitter Almond Water, page 31
Chloroform Water, page 142
Hamamelis Water, page 247
Phenolated Water, page 387
Wintergreen Water, page 558

WHISKY

Spiritus Frumenti

Sp. Frum. Whiskey

Whisky is an alcoholic liquid obtained by the distillation of the fermented mash of wholly or partly malted cereal grains, and containing not less than 47 per cent and not more than 53 per cent, by volume, of C_2H_5OH, at 15.56°. It must have been stored in charred wood containers for a period of not less than 2 years.

Description—Whisky is a light to deep amber-colored liquid, having a characteristic odor and taste.

Specific gravity—The specific gravity of Whisky is not less than 0.923 and not more than 0.935 at 25°.

Free acid—A 25-cc. portion of Whisky, diluted with 50 cc. of distilled water, requires not less than 2 cc. and not more than 6 cc. of 0.1 *N* sodium hydroxide, for neutralization, using 5 drops of phenolphthalein T.S. as the indicator.

Total solids, glycerin, sugar—Evaporate 20 cc. of Whisky in a tared dish on a water bath and dry the residue to constant weight at 100°: the weight of the residue does not exceed 0.1 Gm. This residue is not sticky, it has a slightly astringent taste but is not distinctly sweet or bitter.

Storage in wood—Add 5 cc. of distilled water to the residue from the preceding test: the residue does not dissolve completely. Filter the mixture and add to the filtrate 1 drop of dilute ferric chloride T.S. (1 in 10): the liquid is greenish black in color.

Esters—Mix 100 cc. of Whisky with 15 cc. of distilled water and, using an efficient condenser, slowly recover 100 cc. of distillate. Neutralize 50 cc. of the distillate with 0.1 *N* sodium hydroxide, using 5 drops of phenolphthalein T.S. as the indicator, then add exactly 20 cc. more of the 0.1 *N* sodium hydroxide, and boil the mixture for 1 hour under a reflux condenser. When the liquid has cooled, titrate the excess of alkali with 0.1 *N* sulfuric acid. Perform a blank determination with distilled water instead of the distillate, using the same quantities of reagents, and in the same manner, and make any necessary correction. The volume of 0.1 *N* sodium hydroxide consumed is not less than 2 cc. and not more than 8 cc.

Acetone, other ketones, isopropyl alcohol, and tertiary butyl alcohol—To 2 cc. of the distillate from the preceding test, add 3 cc. of distilled water and 10 cc. of mercuric sulfate T.S., and heat on a bath of boiling water: no precipitate forms within 3 minutes.

Alkaloids—Acidify 10 cc. of Whisky with 5 drops of diluted hydrochloric acid, and evaporate to 5 cc. Dilute with distilled water to 10 cc. and filter. Add a few drops of iodine T.S. or of mercuric potassium iodide T.S. to the filtrate: no precipitate is produced.

Caramel and certain coal tar dyes—Dilute 10 cc. of Whisky with 2 cc. of distilled water, transfer the liquid to a test tube, and add 15 cc. of a mixture of 100 cc. of amyl alcohol, 3 cc. of phosphoric acid, and 3 cc. of distilled water. Shake the mixture gently for 2 minutes and allow the layers to separate completely: the lower aqueous layer is colorless or very nearly so.

Formaldehyde—Mix 2 cc. of an aqueous solution of phloroglucinol (1 in 100) with 5 cc. of sodium hydroxide T.S., and add 2 cc. of Whisky: the mixture has no red color.

Methanol—To 1 drop of the distillate from the test for *Esters*, add 1 drop of dilute phosphoric acid (1 in 20), and 1 drop of potassium permanganate solution (1 in 20). Mix, allow to stand 1 minute, and add sodium bisulfite solution (1 in 20) dropwise until the permanganate color is discharged. If a brown color remains, add 1 drop of the diluted phosphoric acid. To the colorless solution add 5 cc. of freshly prepared chromotropic acid T.S. and heat on a water bath for 10 minutes at 60°: no violet color appears.

Heavy metals—Evaporate 10 cc. of Whisky to 5 cc. and dilute with 10 cc. of distilled water; acidify with 5 drops of hydrochloric acid, and add 10 cc. of hydrogen sulfide T.S.: no precipitate is formed either before or after rendering the mixture alkaline with ammonia T.S.

Storage—Preserve Whisky in tight containers.

White Lotion

WHITE LOTION
Lotio Alba

Lot. Alb.	Lotio Sulfurata
Zinc Sulfate	40 Gm.
Sulfurated Potash	40 Gm.
Distilled Water, a sufficient quantity, To make	1000 cc.

Dissolve the zinc sulfate and the sulfurated potash separately, each in 450 cc. of distilled water, and filter each solution. Add slowly the sulfurated potash solution to the zinc sulfate solution with constant stirring. Then add sufficient distilled water to make 1000 cc., and mix the product well.

NOTE: The Lotion should be freshly prepared and shaken thoroughly before dispensing.

Storage—Dispense White Lotion in tight containers.

White Pine

WHITE PINE
Pinus Alba
White Pine Bark

White Pine is the dried inner bark of *Pinus Strobus* Linné (Fam. *Pinaceæ*).

Unground White Pine—Unground White Pine occurs as flat pieces of variable size, from 1 to 3.5 mm. in thickness. The outer surface is light brown to weak yellowish orange, occasionally having small patches of dark periderm adhering, and often showing small scattered pits. The inner surface is weak orange to yellowish orange, finely striated longitudinally, and transversely corrugated. The fracture is short and irregular.

Histology—White Pine shows a broad phloem composed of tangential bands of more or less compressed sieve alternating with phloem parenchyma, and transversed by wavy medullary rays, 1 to 4 cells broad, and up to 12 cells deep. The phloem strands contain sieve tubes having sieve plates on the longitudinal walls and a phloem parenchyma containing resin, starch, and occasionally prisms of calcium oxalate. It is interspersed with elongated fiber-like cells with thin unlignified walls and occasional short fiber-like cells containing calcium oxalate prisms embedded in a resinous material. Pieces with adherent periderm possess, in addition,

an outer borke zone composed of thick-walled cork cells and starch-bearing parenchyma cells, and interspersed with large rounded to irregularly oval secretion cells; 1 to 2 sclerenchyma bands, each of 4 to 6 layers of small stone cells with lignified walls and distinct, radiating pore canals, and 1 or more collapsed layers of phellogen.

Powdered White Pine—Powdered White Pine is weak yellowish orange to light yellowish brown with a slightly terebinthinate odor and a taste slightly mucilaginous, sweet, then bitter and astringent. It shows numerous fragments of sieve tube groups and fiber-like cells, some crossed by medullary rays; thin-walled parenchyma cells, isodiametric or elongated, many containing starch grains. The starch grains are numerous, simple, rounded or oval, up to 35 microns in diameter, some having a cleft through the center. Prisms of calcium oxalate are few, up to 25 microns in length. Resin occurs in orange-colored, angular masses. Borke elements and stone cells are few and tracheids are few or absent.

Outer bark—White Pine contains not more than 1.5 per cent of adhering outer bark.

Foreign organic matter—White Pine contains not more than 0.2 per cent of foreign organic matter, other than adhering outer bark, page 760.

Acid-insoluble ash—White Pine yields not more than 0.5 per cent of acid-insoluble ash, page 761.

AVERAGE DOSE—**2 Gm.** (approximately 30 grains).

White Pine Syrup, Compound

COMPOUND WHITE PINE SYRUP

Syrupus Pini Albæ Compositus

Syr. Pin. Alb. Comp.

White Pine, in moderately coarse powder	**85 Gm.**
Wild Cherry, in moderately coarse powder	**85 Gm.**
Aralia, in moderately coarse powder	**10 Gm.**
Poplar Bud, in moderately coarse powder	**10 Gm.**
Sanguinaria, in moderately coarse powder	**8 Gm.**
Sassafras, in moderately coarse powder	**10 Gm.**
Cudbear	**1 Gm.**
Chloroform	**6 cc.**
Sucrose	**625 Gm.**
Glycerin	**100 cc.**
Alcohol,	
Distilled Water, each, a sufficient quantity,	
To make	**1000 cc.**

Mix the vegetable drugs, and moisten the powder with a sufficient quantity of a menstruum composed of the glycerin, 100 cc. of alcohol, and 200 cc. of distilled water; pack the damp drug in a percolator, and macerate during 12 hours. Then percolate, using first the remainder of the menstruum and then a mixture of 1 volume of alcohol and 3 volumes of distilled water until the percolate measures 600 cc. Filter the percolate if necessary. In the clear percolate dissolve the sucrose, add the chloroform and sufficient distilled water to make the product measure 1000 cc., and mix well.

Alcohol content—From 10 to 12 per cent, by volume, of C_2H_5OH.
Storage—Preserve Compound White Pine Syrup in tight containers, and avoid excessive heat.

AVERAGE DOSE—4 cc. (approximately 1 fluidrachm).

One average metric dose represents 0.34 Gm. each of White Pine and of Wild Cherry, 40 mg. each of Aralia, Poplar Bud, and Sassafras, 32 mg. of Sanguinaria, and 0.024 cc. of Chloroform.

White Pine Syrup, Compound, with Codeine

COMPOUND WHITE PINE SYRUP WITH CODEINE

Syrupus Pini Albæ Compositus cum Codeina

Syr. Pin. Alb. Comp. c. Codein.

Codeine Phosphate	2 Gm.
Distilled Water	10 cc.
Compound White Pine Syrup, a sufficient quantity, To make	1000 cc.

Dissolve the codeine phosphate in the distilled water with the aid of heat, and mix the solution with the compound white pine syrup.

Alcohol content—From 10 to 12 per cent, by volume, of C_2H_5OH.
Storage—Preserve Compound White Pine Syrup with Codeine in tight containers, and avoid excessive heat.

AVERAGE DOSE—4 cc. (approximately 1 fluidrachm).

One average metric dose contains 8 mg. of Codeine Phosphate.

Whole Pituitary, page 399
Wild Cherry Fluidextract, page 140

Wintergreen Water

WINTERGREEN WATER

Aqua Gaultheriæ

Aq. Gaul.

Gaultheria Oil	5 cc.
Distilled Water, a sufficient quantity, To make	1000 cc.

Shake the gaultheria oil with 1000 cc. of distilled water in a suitable container and repeat the shaking several times during a period of about 15 minutes. Set the mixture aside for 12 hours or overnight, filter through a moistened filter paper, and pass enough distilled water through the filter to make the product measure 1000 cc.

Yellow Ferric Oxide, page 217

YELLOW LOTION
Lotio Flava

Lot. Flav. Yellow Wash

Mercury Bichloride	3 Gm.
Distilled Water, boiling	35 cc.
Calcium Hydroxide Solution, freshly prepared, a sufficient quantity,	
To make	1000 cc.

Dissolve the mercury bichloride in the boiling water, and add this solution gradually, with constant agitation, to sufficient of the calcium hydroxide solution to make the product measure 1000 cc.

NOTE: Shake Yellow Lotion thoroughly before dispensing. Yellow Lotion should be freshly prepared. The precipitate has a tendency to coagulate into larger particles on standing for some time.

Storage—Dispense Yellow Lotion in tight containers.

Yellow Mercurous Iodide, page 336
Yellow Mercurous Iodide Tablets, page 337

ZEA
Zea

Corn-silk

Zea consists of the fresh styles and stigmas of *Zea Mays* Linné (Fam. *Graminæ*).

Zea should be collected when the corn is in milk and used in the green condition for the manufacture of pharmaceutical preparations.

Description—Zea occurs as slender filaments from 10 to 20 cm. in length, and about 400 microns in diameter, purplish red through pink, reddish orange, brown, yellowish brown to greenish yellow. The stigmas are bifid, the segments being very slender, frequently unequal, and up to 3 mm. in length.

Histology—The styles consist for the most part of parenchyma and two parallel vascular bundles with narrow, spiral, or annular tracheæ; the epidermal cells are rectangular, frequently extended into multicellular hairs from 200 to 800 microns in length, the basal portion consisting of 2 to 5 united cells, the upper portion usually unicellular. The cells of the hairs are rich in cytoplasm, and each contains a small, spherical nucleus. The purplish red styles contain a purplish red cell sap.

Identification—Digest 1 Gm. of Zea in 10 cc. of diluted alcohol and filter; a yellow or yellowish orange solution is produced, separate portions of which, on the addi-

tion of acids, become distinctly red to yellowish orange; on the addition of alkalies, yellow to olive; on the addition of ferric chloride T.S., olive-brown or olive changing to olive-brown; and on the addition of an aqueous solution of alum, reddish or purplish, the color being quite permanent.

AVERAGE DOSE—4 Gm. (approximately 1 drachm).

Zea Fluidextract

ZEA FLUIDEXTRACT
Fluidextractum Zeæ

Fldext. Zeæ Corn-silk Fluidextract

Prepare the Fluidextract from zea, finely cut, by Process A, page 718. Use diluted alcohol as the menstruum, macerate the drug during 48 hours, and percolate at a moderate rate.

Alcohol content—From 27 to 32 per cent, by volume, of C_2H_5OH.
Storage—Preserve Zea Fluidextract in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

AVERAGE DOSE—4 cc. (approximately 1 fluidrachm).

Zinc Acetate

ZINC ACETATE
Zinci Acetas

Zinc. Acet.

$Zn(C_2H_3O_2)_2.2H_2O$ Mol. wt. 219.50

Zinc Acetate contains not less than 82.74 per cent and not more than 87.32 per cent of $(CH_3.COO)_2Zn$, corresponding to not less than 99 per cent of the hydrated salt, $(CH_3.COO)_2Zn.2H_2O$.

Description—Zinc Acetate occurs as crystals having a pearly luster, a faintly acid odor, and, in dilute solutions, an astringent, metallic taste. When exposed to air, the crystals gradually effloresce. An aqueous solution of Zinc Acetate (1 in 20) is neutral or acid to litmus paper.
Solubility—One Gm. of Zinc Acetate is soluble in 2.5 cc. of water and in 30 cc. of alcohol, at 25°. It is more soluble in hot solvents.
Identification—An aqueous solution of Zinc Acetate responds to the tests for *Zinc*, page 728, and for *Acetate*, page 722.
Alkalies and earths—Dissolve 1 Gm. of Zinc Acetate in 75 cc. of distilled water, add ammonium sulfide T.S. to precipitate the zinc completely, then dilute with distilled water to a volume of 100 cc. Mix well, and filter. To 50 cc. of the clear filtrate add 5 drops of sulfuric acid, evaporate to dryness, and ignite to constant weight: the weight of the residue does not exceed 5 mg.
Arsenic—An aqueous solution of Zinc Acetate meets the requirements of the test for *Arsenic*, page 689.
Heavy metals—Dissolve 0.5 Gm. of Zinc Acetate in 5 cc. of distilled water, and transfer the solution to a Nessler tube. Add 10 cc. of a solution of potassium cyanide (1 in 10), mix well, and allow the mixture to become clear. Designate the tube containing this solution as "A." In a similar matched Nessler tube "B" place 5 cc. of

distilled water, add exactly 2.5 cc. of standard lead solution, page 721, and 10 cc. of potassium cyanide solution (1 in 10). Add to the solution in each tube 0.1 cc. of sodium sulfide T.S. Mix the contents of each tube, and allow to stand for 5 minutes. Viewed downward against a white surface, the solution in "A" is no darker than that in "B," indicating not more than 50 parts per million of heavy metals.

Assay—Dissolve about 1 Gm. of Zinc Acetate, accurately weighed, in about 100 cc. of distilled water. Heat the solution to about 90°, and add sodium carbonate T.S., dropwise, to precipitate all of the zinc. Avoid a large excess of sodium carbonate. Boil the mixture for about 5 minutes, and set it aside to allow the precipitate to subside. Collect the precipitate in a tared Gooch crucible, and wash with hot distilled water until the last washing is free from alkali. Dry the residue, ignite, and weigh it. The weight of the zinc oxide thus obtained, multiplied by 2.254, indicates its equivalent to $(CH_3.COO)_2Zn$.

Storage—Preserve Zinc Acetate in tight containers.

ZINC CHLORIDE

Zinci Chloridum

Zinc. Chlorid.

$ZnCl_2$ Mol. wt. 136.29

Zinc Chloride contains not less than 95 per cent of $ZnCl_2$.

Description—Zinc Chloride occurs as a white, or nearly white, odorless, crystalline powder, or as porcelain-like masses, or molded in pencils. It is very deliquescent. An aqueous solution of Zinc Chloride (1 in 10) is acid to litmus paper.

Solubility—One Gm. of Zinc Chloride dissolves in 0.5 cc. of water, in about 1.5 cc. of alcohol, and in about 2 cc. of glycerin, at 25°. Its solution in water or in alcohol is usually slightly turbid but the turbidity disappears upon the addition of a small quantity of hydrochloric acid.

Identification—An aqueous solution of Zinc Chloride responds to the tests for *Zinc*, page 728, and for *Chloride*, page 724.

Oxychloride—Mix an aqueous solution of Zinc Chloride (1 in 20) with an equal volume of alcohol: the addition of 0.3 cc. of 1 *N* hydrochloric acid is sufficient to render 10 cc. of the mixture perfectly clear.

Sulfate—One Gm. of Zinc Chloride shows no more sulfate than corresponds to 0.3 cc. of 0.02 *N* sulfuric acid, page 759.

Ammonium salts—Add sufficient sodium hydroxide T.S. to 5 cc. of an aqueous solution of Zinc Chloride (1 in 10) to redissolve the precipitate which first forms, and then warm the solution: the odor of ammonia is not perceptible.

Alkalies and earths—Dissolve 2 Gm. of Zinc Chloride in about 150 cc. of distilled water contained in a 200-cc. volumetric flask. Precipitate the zinc completely by means of ammonium sulfide T.S., and add sufficient distilled water to make the mixture measure 200 cc. Mix well, and filter through a dry filter, rejecting the first portion of the filtrate. To 100 cc. of the subsequent filtrate add 5 drops of sulfuric acid, evaporate to dryness, and ignite: the weight of the residue does not exceed 10 mg.

Heavy metals—The heavy metals limit for Zinc Chloride, when determined as directed under *Zinc Acetate*, page 560, but using 15 cc. of potassium cyanide solution (1 in 10), is 50 parts per million.

Assay—Proceed as directed in the *Assay* under *Zinc Acetate*, page 561, using about 1 Gm. of Zinc Chloride. The weight of zinc oxide thus obtained, multiplied by 1.675, indicates its equivalent to $ZnCl_2$.

Storage—Preserve Zinc Chloride in tight containers.

ZINC COMPOUNDS AND EUGENOL CEMENT

Cæmentum Zinci Compositionum et Eugenolis

Cæment. Zinc. Comp. et Eugenol. Zinc-Eugenol Cement

1. The Powder

Zinc Acetate	**0.5 Gm.**
Zinc Stearate	**1 Gm.**
Zinc Oxide	**70 Gm.**
Rosin	**28.5 Gm.**

2. The Liquid

Eugenol	**85 cc.**
Cottonseed Oil	**15 cc.**

Powder the rosin and incorporate it with about an equal weight of zinc oxide until thoroughly mixed. Sift the mixture on a sieve of not less than 100-mesh. Regrind the material which does not pass through the sieve with more of the zinc oxide and sift again; repeat the process until all of the material readily passes through the sieve. Thoroughly mix the zinc stearate and zinc acetate with a portion of the zinc oxide and pass through a 100-mesh sieve. Thoroughly mix the two mixtures with the remainder of the zinc oxide.

Thoroughly mix the liquids together in the proportions specified.

To prepare the cement mix 10 parts of the Powder with 1 part of the Liquid to a thick paste immediately before use.

NOTE: The amount of Liquid may be varied to give any desired consistency.

The Powder

Description—The Powder is yellowish white to white in color.

Identification—

A: A mixture of 10 parts of the Powder with 1 part of the Liquid should harden within 40 minutes when placed in a beaker of distilled water at a temperature of 25°. The time required for hardening under ordinary conditions is from 5 to 10 minutes.

B: Triturate 1 Gm. of the Powder with 10 cc. of petroleum ether. Filter into a test tube and add 10 cc. of a fresh aqueous solution of copper acetate (1 in 200). Shake for a few minutes and allow the liquid layers to separate. The petroleum ether layer should show a green color.

C: The residue obtained in the assay for total zinc, dissolved in a slight excess of hydrochloric acid, responds to the tests for *Zinc*, page 728.

D: Triturate 5 Gm. of the Powder with 25 cc. of distilled water and filter. To 10 cc. of the clear filtrate add 1 cc. of ferric chloride T.S. in a test tube. Prepare a standard by adding 1 cc. of ferric chloride T.S. to 10 cc. of distilled water in a test tube of the same dimensions. The color produced in the filtrate should be redder than that produced in the standard when viewed downward in matched Nessler tubes against a white surface (*acetate*).

Assay for rosin—Place in a beaker, 1 Gm. of the Powder, accurately weighed, add 50 cc. of chloroform, and stir for several minutes. Filter through a tared Gooch crucible and completely transfer the insoluble material with additional portions of chloroform. Wash the crucible with chloroform and dry in an oven at 80°. Cool and weigh: the loss in weight of the original sample is not less than 0.27 Gm. and not more than 0.30 Gm.

Assay for total zinc as zinc oxide—Ignite the residue obtained from the above to constant weight, cool, and weigh: the weight of the ZnO so obtained is not less than 0.680 Gm. and not more than 0.720 Gm.

Storage—Preserve the Powder in well-closed containers.

The Liquid

Description—The Liquid is thin and colorless to weak yellow, having a strong aromatic odor of clove and a pungent, spicy taste. It is affected by light.

Solubility—The Liquid is miscible with alcohol, with chloroform, and with ether. It is only slightly soluble in water.

Specific gravity—The specific gravity of the Liquid is not less than 1.043 and not more than 1.048 at 25°.

Refractive index—The refractive index is not less than 1.528 and not more than 1.531 at 20°.

Identification—Shake 1 cc. of the Liquid with 20 cc. of distilled water, filter, and add 1 drop of ferric chloride T.S. to 5 cc. of the clear filtrate: the mixture exhibits a transient pale yellow-green color.

Storage—Preserve the Liquid in tight, light-resistant containers.

ZINC IODIDE

Zinci Iodidum

Zinc. Iodid.

ZnI_2 Mol. wt. 319.22

Zinc Iodide, when dried over sulfuric acid for 24 hours, contains not less than 98 per cent of ZnI_2.

Description—Zinc Iodide occurs as a white, or nearly white, granular powder. It is odorless, or nearly so, with a sharp, sweetish, metallic taste, and is very deliquescent. On exposure to the air and light, it becomes brown due to liberation of iodine. An aqueous solution of Zinc Iodide (1 in 10) is acid to litmus paper.

Solubility—Zinc Iodide is very soluble in water, freely soluble in alcohol, and soluble in ether.

Identification—

A: An aqueous solution of Zinc Iodide (1 in 10) responds to the tests for *Zinc*, page 728, and for *Iodide*, page 725.

B: Add ammonium carbonate T.S. in small portions to 10 cc. of an aqueous solution of Zinc Iodide (1 in 20): the precipitate produced is white, and redissolves completely in an excess of the reagent.

Loss on drying—When dried over sulfuric acid for 24 hours Zinc Iodide loses not more than 5 per cent of its weight.

Chloride—Mix 10 cc. of an aqueous solution of Zinc Iodide (1 in 20) with 5 cc. of ammonia T.S., and add, in small portions at a time, a solution of 0.6 Gm. of silver nitrate in 10 cc. of water. Shake well, filter, and add to the filtrate 3 cc. of nitric acid: not more than a slight turbidity is produced.

Sulfate—One Gm. of Zinc Iodide shows no more sulfate than corresponds to 0.5 cc. of 0.02 *N* sulfuric acid, page 759.

Alkalies and earths—Dissolve 1 Gm. of Zinc Iodide in 70 cc. of water, add sufficient ammonium sulfide T.S. to precipitate all of the zinc, dilute to 100 cc. with water, mix well, and filter. To 50 cc. of the filtrate add 5 drops of sulfuric acid; evaporate to dryness, ignite, and weigh: the weight of the residue does not exceed 5 mg.

Arsenic—Zinc Iodide meets the requirements of the test for *Arsenic*, page 689.

Assay—Dissolve about 0.5 Gm. of Zinc Iodide, dried over sulfuric acid for 24 hours and accurately weighed, in 100 cc. of water, and add, in small portions at a time with agitation, 50 cc. of 0.1 *N* silver nitrate. Add 2 cc. of ferric ammonium sulfate T.S. and 5 cc. of nitric acid, and titrate the excess silver nitrate with 0.1 *N* ammonium thiocyanate. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.01596 Gm. of ZnI_2.

Storage—Preserve Zinc Iodide in tight, light-resistant containers.

Zinc Oxide Paste

ZINC OXIDE PASTE
Pasta Zinci Oxidi

Past. Zinc. Oxid. Lassar's Plain Zinc Paste

Zinc Oxide Paste contains not less than 24 per cent and not more than 26 per cent of ZnO by weight.

Zinc Oxide	250 Gm.
Starch	250 Gm.
White Petrolatum	500 Gm.
To make	1000 Gm.

Mix the ingredients.

Assay—Weigh accurately in a tared porcelain crucible about 2 Gm. of Zinc Oxide Paste, heat it gently until melted, and continue the heating, gradually raising the temperature until the mass is thoroughly charred. Ignite the mass strongly until all of the carbonaceous material has been dissipated and the residue is uniformly yellow and the weight is constant. The increase in weight of the crucible represents the quantity of zinc oxide in the weight of the Paste taken.

Storage—Preserve Zinc Oxide Paste in well-closed containers.

Zinc Oxide Paste, Hard

ZINC OXIDE HARD PASTE
Pasta Zinci Oxidi Dura

Past. Zinc. Oxid. Dur. Unna's Hard Zinc Paste

Zinc Oxide	250 Gm.
Purified Siliceous Earth	50 Gm.
Benzoinated Lard	700 Gm.
To make	1000 Gm.

Thoroughly triturate the mixture of zinc oxide and purified siliceous earth with the benzoinated lard until a smooth product is obtained.

Storage—Preserve Zinc Oxide Hard Paste in well-closed containers.

Zinc Oxide Paste, Soft

ZINC OXIDE SOFT PASTE
Pasta Zinci Oxidi Mollis

Past. Zinc. Oxid. Moll. Unna's Soft Zinc Paste

Zinc Oxide, in very fine powder	**250 Gm.**
Precipitated Calcium Carbonate	**250 Gm.**
Oleic Acid	**25 Gm.**
Linseed Oil	**250 Gm.**
Calcium Hydroxide Solution	**225 Gm.**
To make about	**1000 Gm.**

Mix the zinc oxide and the precipitated calcium carbonate thoroughly in a mortar. To the linseed oil, contained in a beaker, add the oleic acid, and heat to between 60° and 65°; add the calcium hydroxide solution, and stir until thoroughly saponified; then add this to the mixed powders, and triturate until a smooth product is obtained.

Storage—Preserve Zinc Oxide Soft Paste in well-closed containers.

Zinc Oxide Paste with Salicylic Acid

ZINC OXIDE PASTE WITH SALICYLIC ACID
Pasta Zinci Oxidi cum Acido Salicylico

Past. Zinc. Oxid. c. Acid. Salicyl. Lassar's Zinc Paste with Salicylic Acid

Zinc Oxide Paste with Salicylic Acid contains not less than 23.5 per cent and not more than 25.5 per cent of ZnO by weight.

Salicylic Acid, in fine powder	**20 Gm.**
Zinc Oxide Paste, a sufficient quantity,	
To make	**1000 Gm.**

Thoroughly triturate the salicylic acid with a portion of the paste; then add the remaining paste, and triturate until a smooth mixture is obtained.

Assay—Place about 0.5 Gm. of Zinc Oxide Paste with Salicylic Acid, accurately weighed, into a tared porcelain crucible and proceed as directed in the *Assay* under *Zinc Oxide Paste*, page 564.

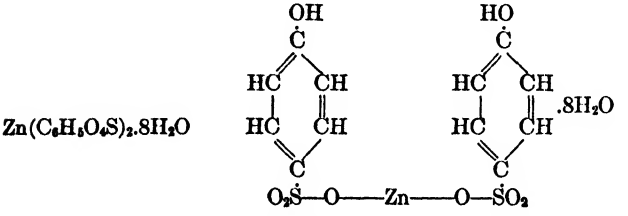
Storage—Preserve Zinc Oxide Paste with Salicylic Acid in well-closed containers.

Zinc Phenolsulfonate

ZINC PHENOLSULFONATE

Zinci Phenolsulfonas

Zinc. Phenolsulf. Zinc Sulfocarbolate



$Zn(C_6H_5O_4S)_2.8H_2O$ Mol. wt. 555.83

Zinc Phenolsulfonate contains not less than 73.7 per cent and not more than 77.4 per cent of $Zn(C_6H_4.OH.SO_3)_2$ (411.70), corresponding to not less than 99.5 per cent of the $Zn(C_6H_5O_4S)_2.8H_2O$.

Description—Zinc Phenolsulfonate occurs as colorless, transparent, rhombic prisms or tabular crystals, or as white granules or powder. It is odorless, and has an astringent, metallic taste. When exposed to the air, the salt effloresces, and upon exposure to light and air, may become slightly pink. An aqueous solution of Zinc Phenolsulfonate (1 in 10) is acid to litmus paper.

Solubility—One Gm. of Zinc Phenolsulfonate dissolves in about 1.6 cc. of water and in about 1.8 cc. of alcohol, at 25°; also in about 0.4 cc. of boiling water.

Identification—

A: An aqueous solution of Zinc Phenolsulfonate (1 in 10) responds to the tests for *Zinc*, page 728.

B: Ammonium carbonate T.S., when added in small portions to an aqueous solution of Zinc Phenolsulfonate (1 in 20), produces a white precipitate which redissolves completely upon the addition of an excess of the reagent.

C: An aqueous solution of Zinc Phenolsulfonate (1 in 100) is colored pale violet by ferric chloride T.S.

Sulfate—One-half Gm. of Zinc Phenolsulfonate shows no more sulfate than corresponds to 0.2 cc. of 0.02 *N* sulfuric acid, page 759.

Arsenic—Zinc Phenolsulfonate meets the requirements of the test for *Arsenic*, page 689.

Assay—Dissolve about 2 Gm. of Zinc Phenolsulfonate, accurately weighed, in about 100 cc. of distilled water. Heat the solution to about 90° and add sodium carbonate T.S., dropwise, until all of the zinc has been precipitated. Avoid an undue excess of sodium carbonate. Boil the mixture for about 5 minutes and set aside to allow the precipitate to subside. Collect the precipitate in a tared filter, wash with hot water until the washings are free from alkali, dry, ignite, and weigh the zinc oxide. Each Gm. of zinc oxide is equivalent to 5.059 Gm. of $Zn(C_6H_4.OH.SO_3)_2$.

Storage—Preserve Zinc Phenolsulfonate in tight, light-resistant containers.

AVERAGE DOSE—**0.125 Gm.** (approximately 2 grains).

COMPOUND ZINC SULFATE POWDER

Pulvis Zinci Sulfatis Compositus

Pulv. Zinc. Sulf. Comp.

Salicylic Acid	**5 Gm.**
Phenol	**1 Gm.**
Eucalyptol	**1 Gm.**
Menthol	**1 Gm.**
Thymol	**1 Gm.**
Zinc Sulfate	**125 Gm.**
Boric Acid, in impalpable powder	**866 Gm.**
To make	**1000 Gm.**

Triturate the salicylic acid and the zinc sulfate to a very fine powder, add the phenol, eucalyptol, menthol, and thymol, previously liquefied by trituration: Add the boric acid, and continue the trituration until a uniform mixture is obtained; finally pass the powder through a very fine sieve.

Test for antiseptic value—Liquefy about 100 cc. of Standard Agar in a suitable flask, and cool to 45°, on a water bath at constant temperature; add to the melted agar 0.5 cc. of 24-hour Standard Culture of *Staphylococcus aureus*, and mix well. Transfer approximately 20 cc. of the liquid agar mixture into each of 3 sterile petri dishes (of approximately 90 mm. inside diameter of bottom dish), and allow it to solidify; prepare squares measuring 10 mm. along an edge or circles 11 mm. in diameter of surgical gauze (type 1, with warp 44 threads, and filling 40 threads according to U. S. P. XIII for Absorbent Gauze); sterilize in an oven at 160° for 1 hour. With sterile forceps place 6 of these pieces on the powder to be tested, cover them with additional powder, and with a sterile spatula thoroughly rub the material into the meshes of the gauze; with sterile forceps lift these pieces, shake them gently to remove excess powder and place 2 pieces in well-separated positions on the hardened agar in each of the petri dishes so that the surface of the gauze closely rests under the surface of the agar. Incubate the dishes for 24 hours under unglazed porcelain tops at 37° and then examine for evidence of inhibition of growth of bacterial organisms. The average width of the 6 zones of inhibition is not less than 4 mm.

Storage—Preserve Compound Zinc Sulfate Powder in well-closed containers.

REAGENTS AND PREPARATIONS FOR USE IN THE CLINICAL LABORATORY

NOTES: Materials or preparations used in the formulas or as specific items in this chapter of the National Formulary shall meet the standards in the United States Pharmacopœia XIII or in the National Formulary VIII.

Care must be employed in the preparation of solutions or materials intended for clinical laboratory use. Frequently the exact weighing of chemicals on an analytical balance is necessary. Pipettes, burettes, and accurately graduated containers are usually required for measuring the designated quantities. Unless otherwise stated, all solutions shall be filtered if not clear.

REAGENTS AND TEST SOLUTIONS

FOR THE CHEMICAL EXAMINATION OF ASCITIC FLUID

For Protein

Qualitative Method

Acetic Acid Reagent (Rivalta Method)

Glacial Acetic Acid	0.1 cc.
Distilled Water	150 cc.

Mix them.

Quantitative Methods

Phosphotungstic Acid Reagent (Tsuchiya's Method), see page 601.

Sulfosalicylic Acid Reagents (Exton's Method, Folin's Method or Kingsbury and Clark's Method), see page 601.

Trinitrophenol Reagent (Esbach's Method), see page 602.

FOR THE MICROSCOPIC EXAMINATION OF ASCITIC FLUID

For Bacteria

Tubercle Bacilli, see page 632.

Gram's Staining Method, see page 631.

For Blood Cells

Blood Diluents, see pages 588 and 589.

Special Staining Technics for Blood, see page 629.

FOR THE CHEMICAL EXAMINATION OF BLOOD

Blood Anticoagulants

NOTE: These serve to prevent coagulation, and in a few instances deterioration, of blood samples for chemical determinations. Care must be exercised in the selection of anticoagulants that there is no interference with the chemical methods involved.

Ammonium, Lithium, Potassium, or Sodium Oxalate

Use 20 mg. (10 mg. to 15 mg. of lithium oxalate) of the chemical, reagent grade, for each 10 cc. of blood. Prepare as follows, whenever possible in the tube to be used for collecting the blood: Pipette 0.1 to 0.15 cc. of a 10 per cent aqueous solution of lithium oxalate, 0.2 cc. of a 10 per cent aqueous solution of potassium oxalate, or 0.7 cc. of a 3 per cent aqueous solution of ammonium or sodium oxalate (for each 10 cc. of blood to be collected) into the tube, spread about the inner surface of the lower portion of the tube, and dry in an oven at a temperature not exceeding 80°. The dry salt will be deposited in a finely divided state upon the inner surface of the tube.

Ammonium oxalate is not to be used if ammonium, non-protein nitrogen, urea, or total protein contents are to be determined. Potassium or sodium oxalate is not to be used if potassium, sodium, or total base content of blood is to be determined. No oxalate is to be used if calcium is to be determined.

Potassium or Sodium Fluoride

Use 60 mg. of the chemical, reagent grade, for each 10 cc. of blood, especially as a preservative. Fluorides are not to be used if chloride or urea by the urease method is to be determined.

Sodium Citrate

Use 200 mg. of sodium citrate for each 10 cc. of blood.

Sodium Fluoride Compound

Sodium Fluoride, reagent grade	20.0 Gm.
Thymol	1.0 Gm.

Mix them. Use 60 mg. of the mixture for each 10 cc. of blood.

For Alkali Reserve

Direct Method

Carbon Dioxide Capacity or Combining Power of Blood Plasma (Van Slyke and Cullen)

Potassium Oxalate

Potassium Oxalate, reagent grade (2 mg. for each cc. of blood), with or without liquid petrolatum. To preserve sample, transfer into a paraffined tube and cover with liquid petrolatum.

Carbon Dioxide

Carbon dioxide (5.5 per cent) mixture from a tank, or the alveolar air from the lungs of the operator, for saturating plasma with CO_2.

Ammonium Hydroxide Solution

Strong Ammonia Solution, reagent grade	1.0 cc.
Distilled Water	99 cc.

Phenolphthalein T.S., a sufficient quantity.

Mix the strong ammonia solution and the distilled water and add sufficient phenolphthalein T.S. to color.

Sulfuric Acid Solution

Sulfuric Acid	5.0 cc.
Distilled Water, a sufficient quantity, To make	100 cc.

Mix them.

Mercury

Caprylic Alcohol

Van Slyke Blood Gas Apparatus

Indirect Method

Alveolar Carbon Dioxide Tension (Fridericia)

Special Fridericia Alveolar Air Apparatus

Potassium Hydroxide Solution

Potassium Hydroxide	10 Gm.
Distilled Water, a sufficient quantity, To make	100 cc.

Dissolve the potassium hydroxide in the distilled water.

For Bilirubin in Blood Serum

Icterus Index

Blood Serum

Blood Serum, clear and without hemolysis.

Potassium Dichromate Standard Solution

Potassium Dichromate, reagent grade	50 mg.
Sulfuric Acid	0.2 cc.
Distilled Water	500 cc.

Dissolve the potassium dichromate in 400 cc. of distilled water, add the sulfuric acid and the remainder of the distilled water.

Isotonic Sodium Chloride Solution

Van den Bergh Test

Blood Serum

Blood Serum, clear and without hemolysis.

Ehrlich's Diazo Reagent, Modified

1. Sulfanilic Acid, reagent grade	1.0 Gm.
Hydrochloric Acid	15 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the sulfanilic acid in 100 cc. of distilled water, add the hydrochloric acid and sufficient distilled water to make 1000 cc. Mix well.

2. Sodium Nitrite	0.5 Gm.
Distilled Water	100 cc.

Dissolve the sodium nitrite in the distilled water.

3. Solution 1	25 cc.
Solution 2	0.75 cc.

Mix them. Prepare the reagent freshly for each determination.

Alcohol

Ammonium Sulfate Saturated Solution

Ammonium Sulfate, reagent grade	85 Gm.
Distilled Water	100 cc.

Add the ammonium sulfate to the distilled water and shake well. Decant the clear supernatant solution for use.

Potassium Permanganate Standard Solution

Potassium Permanganate, 0.1 *N*	0.7 cc.
Distilled Water, a sufficient quantity,	
To make	50 cc.

Mix them. This solution must be prepared freshly.

Cobalt Standard Solution

Cobaltous Sulfate, anhydrous	2.161 Gm.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Dissolve the cobaltous sulfate in the distilled water. Keep protected from light.

Caffeine and Sodium Salicylate

Distilled Water

For Calcium

Clark and Collip Method (Modification of Kramer-Tisdall Method)

Blood Serum

Blood Serum, clear and without hemolysis.

Distilled Water

Ammonium Oxalate Solution

Ammonium Oxalate, reagent grade	4.0 Gm.
Distilled Water, a sufficient quantity, To make	100 cc.

Dissolve the ammonium oxalate in the distilled water.

Ammonium Hydroxide Dilute Solution

Strong Ammonia Solution	2.0 cc.
Distilled Water, a sufficient quantity, To make	100 cc.

Mix them.

Sulfuric Acid, 1 N

Sodium Oxalate, 0.1 N

Sodium Oxalate, 0.01 N

Potassium Permanganate, 0.01 N

Prepare this solution and immediately before use standardize it against accurately prepared 0.01 *N* sodium oxalate.

For Chloride

Whitehorn Method

Protein-free Blood Filtrate (Tungstic Acid Precipitation Method), see page 578.

Silver Nitrate Solution

Silver Nitrate	5.810 Gm.
Distilled Water, a sufficient quantity, To make	1000 cc.

Dissolve the silver nitrate in the distilled water. Keep in amber-colored bottles protected from light. Each cc. is equivalent to 2 mg. of sodium chloride.

Standard Thiocyanate Solution

Ammonium Thiocyanate	2.5 Gm.
Distilled Water, a sufficient quantity, To make	1000 cc.

Dissolve the ammonium thiocyanate in the distilled water. Standardize against the silver nitrate solution, using about 0.3 Gm. of powdered ferric am-

monium sulfate as the indicator. Adjust the thiocyanate solution by dilution with distilled water, so that each cc. is equivalent to 1 cc. of the silver nitrate solution.

Three Gm. of Potassium Thiocyanate may be substituted for the Ammonium Thiocyanate.

Ferric Ammonium Sulfate, powdered

Nitric Acid, reagent grade

For Cholesterol

Lieboff Method

Chloroform, water-free

Keep calcium chloride in the chloroform, and decant the supernatant chloroform for use.

Acetic Anhydride

If not clear and colorless, redistil, the distillate being collected between 134° and 140°.

Sulfuric Acid

Cholesterol Stock Solution

Cholesterol	80 mg.
Chloroform, water-free	100 cc.

Dissolve the cholesterol in the chloroform. Keep in tightly stoppered, amber-colored bottles, preferably under refrigeration.

Cholesterol Working Solution

Cholesterol Stock Solution	25 cc.
Chloroform, water-free	225 cc.

Mix them. Keep in tightly stoppered, amber-colored bottles, preferably under refrigeration. Each cc. contains 0.08 mg. of cholesterol.

Fat-free Filter Paper

Myers and Wardell Method

Calcium Sulfate

Chloroform, water-free, Acetic Anhydride, Sulfuric Acid, Cholesterol Stock Solution and Cholesterol Working Solution, the same as under Lieboff Method, see page 573.

For Creatinine
("Apparent Creatinine")

Folin-Wu Method

Protein-free Blood Filtrate, Tungstic Acid Precipitation Method, see page 578.

Alkaline Picrate Solution

1. Trinitrophenol, previously dried	15 Gm.
Distilled Water	1000 cc.

Dissolve the trinitrophenol in the distilled water by means of heat; cool and decant the clear supernatant solution for use. Keep in a cool place protected from light.

2. Solution No. 1	25.0 cc.
Potassium or Sodium Hydroxide, 10 per cent aqueous solution	5.0 cc.

Mix them. This is to be freshly prepared for each determination.

Creatinine Stock Solution

Creatinine	0.10 Gm.
Hydrochloric Acid, 0.1 *N*	100 cc.

Dissolve the creatinine in the 0.1 *N* hydrochloric acid.

Creatinine Working Solution

Creatinine Stock Solution	3 cc.
Hydrochloric Acid, 0.1 *N*	100 cc.
Distilled Water, a sufficient quantity,	
To make	500 cc.

Mix them. Each 5 cc. contains 0.03 mg. of creatinine.

For Non-protein Nitrogen

Folin-Wu Method

Protein-free Blood Filtrate (Trichloroacetic Acid or Tungstic Acid Precipitation Method), see page 578.

Acid Digestion Stock Mixture

Cupric Sulfate, reagent grade	2.5 Gm.
Distilled Water	50 cc.
Phosphoric Acid	300 cc.
Sulfuric Acid	100 cc.

Dissolve the cupric sulfate in the distilled water and add the phosphoric acid. Mix, add the sulfuric acid and again mix. Keep in tightly stoppered bottles.

Acid Digestion Working Solution

Acid Digestion Stock Mixture	50.0 cc.
Distilled Water	50.0 cc.

Mix them. Prepare when needed for each determination.

Ammonium Sulfate Standard Solution

Ammonium Sulfate, reagent grade	0.4716 Gm.
Hydrochloric Acid	1.0 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the ammonium sulfate in distilled water, add the hydrochloric acid and sufficient distilled water to make 1000 cc. Each cc. is equivalent to 0.1 mg. of nitrogen.

Nessler's Stock Solution

Iodine	50 Gm.
Potassium Iodide	150 Gm.
Mercury	75 Gm.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Place the iodine, potassium iodide, mercury, and 100 cc. of distilled water in a flask. Shake vigorously and continuously until the iodine has dissolved (7 to 15 minutes). When the solution has become pale, but is still reddish, cool by holding the flask under tap water and continue shaking until the reddish color has been replaced by a greenish color. Decant the solution, and wash the mercury with a sufficient quantity of distilled water to make 1000 cc. when added to the solution.

Sodium Hydroxide Solution

Sodium Hydroxide	110 Gm.
Distilled Water	1000 cc.

Dissolve the sodium hydroxide in the distilled water and allow to stand. Before use, adjust with distilled water to a concentration of 10 per cent of NaOH, as determined by titration.

Nessler's Working Solution

Nessler's Stock Solution	150 cc.
Sodium Hydroxide Solution (preceding formula)	700 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Mix them.

For Phosphorus (Inorganic)

Fiske and Subbarrow Method

Trichloroacetic Acid Solution

Trichloroacetic Acid	100 Gm.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the trichloroacetic acid in the distilled water.

Sulfuric Acid, 10 N

Sulfuric Acid	300 cc.
Distilled Water	1000 cc.

Add the sulfuric acid slowly to the distilled water and mix. Adjust the concentration of the acid analogously with directions in U. S. P. XIII for the normal acid.

Molybdic Acid Solution

Ammonium Molybdate, reagent grade	25 Gm.
Sulfuric Acid, 10 *N*	300 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the ammonium molybdate in 200 cc. of distilled water, add the 10 *N* sulfuric acid and sufficient distilled water to make 1000 cc.

Aminonaphtholsulfonic Acid Reagent

Aminonaphtholsulfonic Acid 1:2:4	0.5 Gm.
Sodium Sulfite, reagent grade	1.0 Gm.
Sodium Bisulfite, reagent grade	30.0 Gm.
Distilled Water, a sufficient quantity,	
To make	200 cc.

Dissolve the sodium bisulfite in 190 cc. of distilled water, add the aminonaphtholsulfonic acid, then the sodium sulfite and sufficient distilled water to make 200 cc. Keep in amber-colored bottles and do not use this reagent if it is over 2 weeks old.

Standard Phosphate Solution

Potassium Biphosphate, reagent grade	0.3511 Gm.
Sulfuric Acid, 1 *N*	100 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the potassium biphosphate in distilled water, add the 1 *N* sulfuric acid and sufficient distilled water to make 1000 cc. Each 5 cc. is equivalent to 0.4 mg. of phosphorus.

Distilled Water

For Potassium

Looney and Dyer Method

Sodium Tungstate Solution

Sodium Tungstate	1.5 Gm.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Dissolve the sodium tungstate in the distilled water.

Copper Sulfate Solution

Copper Sulfate	2.5 Gm.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Dissolve the copper sulfate in the distilled water.

Sodium Cobaltinitrite Solution

Cobalt Nitrate	25 Gm.
Glacial Acetic Acid	12.5 cc.
Sodium Nitrite	120 Gm.
Distilled Water	230 cc.

Dissolve the cobalt nitrate in 50 cc. of distilled water and add the glacial acetic acid. Dissolve the sodium nitrite in 180 cc. of distilled water and add 210 cc. of the solution to the cobalt nitrate solution. Aerate the solution under a hood until all of the nitrous oxide fumes are driven off. Store in a refrigerator for no longer than 6 weeks. Filter each time before use.

Silver-Cobaltinitrite Solution

Sodium Cobaltinitrite Solution	20 cc.
Silver Nitrate Solution, 40 per cent	1 cc.

Mix well and filter.

Sulfanilamide Solution

Sulfanilamide	0.5 Gm.
Glacial Acetic Acid	30.0 cc.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Dissolve the sulfanilamide in the mixture of distilled water and glacial acetic acid. Do not keep longer than 1 week.

Coupling Reagent

N-(1-naphthyl) ethylenediamine Hydrochloride	0.1 Gm.
Glacial Acetic Acid	30 cc.
Distilled Water, a sufficient quantity	
To make	100 cc.

Dissolve the N-(1-naphthyl) ethylenediamine hydrochloride in a mixture of the glacial acetic acid and distilled water. Do not keep longer than 1 week.

Potassium Standard

Potassium Sulfate	0.2223 Gm.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the potassium sulfate in sufficient distilled water to make 1000 cc. Transfer exactly 10 cc. of this solution to a 100-cc. volumetric flask and dilute to the graduation mark with distilled water. Each cc. of the finished dilution contains 0.01 mg. of K.

Protein-free Blood Filtrate

Trichloroacetic Acid Precipitation Method

Trichloroacetic Acid Solution

Trichloroacetic Acid	10 Gm.
Distilled Water, a sufficient quantity, To make	100 cc.

Dissolve the trichloroacetic acid in the distilled water.

Tungstic Acid Precipitation Method (Folin-Wu Method, Hayden's Modification)

Sulfuric Acid, 0.0833 N

Sulfuric Acid, 1 *N*	83.3 cc.
Distilled Water, a sufficient quantity, To make	1000 cc.

Mix them.

Sodium Tungstate Solution

Sodium Tungstate, reagent grade	10.0 Gm.
Distilled Water, a sufficient quantity, To make	100 cc.

Dissolve the sodium tungstate in the distilled water.

Tungstomolybdic Precipitation Method (Benedict's Method)

Distilled Water

Tungstomolybdate Solution

Molybdic Anhydride, reagent grade	10.0 Gm.
Sodium Hydroxide, 1 *N*	50.0 cc.
Sodium Tungstate, reagent grade	80.0 Gm.
Distilled Water, a sufficient quantity, To make	1000 cc.

Add the molybdic anhydride to the 1 *N* sodium hydroxide contained in a flask and boil gently for 5 minutes. Filter the hot solution and pass through the filter 150 cc. of hot distilled water; cool. Dissolve the sodium tungstate in 600 cc. of distilled water. Mix the filtrate and the tungstate solution and add sufficient distilled water to make 1000 cc.

Sulfuric Acid Solution

Sulfuric Acid, 1 *N*	62 cc.
Distilled Water, a sufficient quantity, To make	100 cc.

Mix them.

Unlaked Blood Method (Folin Tungstic Acid Precipitation Method)

Sulfate-Tungstate Solution

Sodium Sulfate, reagent grade	15 Gm.
Sodium Tungstate, reagent grade	6 Gm.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the sodium sulfate and the sodium tungstate in the distilled water.

Sulfuric Acid, 0.333 N

Sulfuric Acid, 1 *N*	33.3 cc.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Mix them.

Zinc Precipitation Method (Somogyi-Shaffer-Hartman Method)

Distilled Water

Zinc Sulfate Solution

Zinc Sulfate	10.0 Gm.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Dissolve the zinc sulfate in the distilled water.

Sodium Hydroxide Solution

Adjust 0.5 *N* sodium hydroxide with distilled water so that from 10.8 to 11.2 cc. are required to produce a permanent pink color with exactly 10 cc. of the zinc sulfate solution, using phenolphthalein T.S. as the indicator.

For Sodium

Weinbach Method

Trichloroacetic Acid Solution

Trichloroacetic Acid	20 Gm.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Dissolve the trichloroacetic acid in the distilled water.

Uranyl Zinc Acetate Solution

Uranyl Acetate	77 Gm.
Glacial Acetic Acid	21 cc.
Zinc Acetate	231 Gm.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the uranyl acetate in 400 cc. of distilled water and 14 cc. of glacial

acetic acid and add sufficient distilled water to make exactly 500 cc. In a separate 500-cc. volumetric flask, dissolve the zinc acetate in about 400 cc. of distilled water and 7 cc. of glacial acetic acid, and add sufficient distilled water to make 500 cc. Heat both solutions and mix, while hot, in a 2000-cc. Erlenmeyer flask and filter. Store in the dark. If a film forms on the surface, filter a small portion as needed.

Acetone Wash Solution

Uranyl Zinc Acetate Solution	15 cc.
Sodium Chloride Solution, 1 per cent	1 cc.
Alcohol	5 cc.
Acetone, a sufficient quantity,	
To make	1000 cc.

Add the uranyl zinc acetate solution to the sodium chloride solution and add the alcohol in divided portions. Filter the resulting precipitate with suction and wash with four 5-cc. portions of alcohol, followed by four 5-cc. portions of ether. Add the precipitate to the acetone, shake well and allow to stand overnight. Filter to remove any undissolved precipitate.

Sodium Hydroxide, 0.02 N

Sodium Standard

Sodium Chloride	1.0 Gm.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the sodium chloride, accurately weighed, in sufficient distilled water to make exactly 1000 cc. Each cc. of the finished solution is equivalent to 0.393 mg. of Na or 6.84 cc. of 0.02 *N* sodium hydroxide.

For Sugar (Dextrose)

Folin-Wu Method

Protein-free Blood Filtrate (Tungstic Acid or Tungstomolybdic Precipitation Method), see pages 578 and 579.

Alkaline Copper Tartrate Solution

Cupric Sulfate, crystalline, reagent grade	4.5 Gm.
Tartaric Acid	7.5 Gm.
Sodium Carbonate, anhydrous, reagent grade	40.0 Gm.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the cupric sulfate in 300 cc. of distilled water, the tartaric acid in a second 300 cc., and the sodium carbonate in a third 300 cc. Pour the tartaric acid solution into the sodium carbonate solution, add the cupric sulfate solution, and sufficient distilled water to make 1000 cc.

Molybdate-Phosphate Solution

Sodium Tungstate, reagent grade	10 Gm.
Molybdic Anhydride, reagent grade	70 Gm.
Sodium Hydroxide	40 Gm.
Phosphoric Acid	250 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the sodium hydroxide in 750 cc. of distilled water; add the molybdic anhydride and sodium tungstate and boil for 30 minutes; cool. Add the phosphoric acid and sufficient distilled water to make 1000 cc.

Dextrose (Glucose) Stock Solution

Dextrose	1.000 Gm.
Benzoic Acid	0.25 Gm.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Dissolve the dextrose and benzoic acid in distilled water. Keep the solution under refrigeration.

The benzoic acid may be replaced by a few cc. of toluene.

Dextrose (Glucose) Standard Solution No. 1

Dextrose (Glucose) Stock Solution	1.0 cc.
Benzoic Acid	0.25 Gm.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Dissolve the benzoic acid in distilled water, add the dextrose stock solution and sufficient distilled water to make 100 cc. Keep the solution under refrigeration, and do not use if it is over 1 month old. Each 2 cc. is equivalent to 0.2 mg. of dextrose.

The benzoic acid may be replaced by a few cc. of toluene.

Dextrose (Glucose) Standard Solution No. 2

Dextrose (Glucose) Stock Solution	2.0 cc.
Benzoic Acid	0.25 Gm.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Dissolve the benzoic acid in distilled water, add the dextrose stock solution and sufficient distilled water to make 100 cc. Keep the solution under refrigeration, and do not use if it is over 1 month old. Each 2 cc. is equivalent to 0.4 mg. of dextrose.

The benzoic acid may be replaced by a few cc. of toluene.

Distilled Water

Somogyi-Shaffer-Hartman Method

Protein-free Blood Filtrate (Tungstic Acid Precipitation Method or Zinc Precipitation Method), see pages 578 and 579.

Alkaline Copper-Iodine Solution

Cupric Sulfate, crystalline, reagent grade	6.5 Gm.
Potassium and Sodium Tartrate	12.0 Gm.
Sodium Carbonate, anhydrous, reagent grade	20.0 Gm.
Potassium Iodide	10.0 Gm.
Potassium Iodate, reagent grade	0.8 Gm.
Potassium Oxalate, reagent grade	18.0 Gm.
Sodium Bicarbonate	25.0 Gm.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the cupric sulfate in 100 cc. of distilled water. Dissolve the potassium iodide, iodate, and oxalate in 200 cc. of distilled water. Dissolve the other salts in 500 cc. of distilled water. Into the alkaline solution pour the cupric sulfate solution with constant stirring, add the solution of potassium salts and sufficient distilled water to make 1000 cc.

Sulfuric Acid, 5 N

Sulfuric Acid	150 cc.
Distilled Water	1000 cc.

Add the sulfuric acid slowly to the distilled water and mix. Adjust the concentration of the acid analogously with directions in U. S. P. XIII for the normal acid.

Sodium Thiosulfate, 0.005 N

Prepare freshly for use each day.

Starch Test Solution

Folin and Malmros Micromethod

Tungstic Acid Solution

Sodium Tungstate, reagent grade	2.0 Gm.
Sulfuric Acid, 1 *N*	13.7 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the sodium tungstate in 700 cc. of distilled water. Dilute the 1 *N* sulfuric acid with 150 cc. of distilled water and add it with constant stirring to the tungstate solution; then add sufficient distilled water to make 1000 cc.

Potassium Ferricyanide Solution

Potassium Ferricyanide, reagent grade	4.0 Gm.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the potassium ferricyanide in the distilled water. Keep in amber-colored bottles in a dark place.

Cyanide-Carbonate Solution

Sodium Carbonate, anhydrous, reagent grade	16.0 Gm.
Sodium Cyanide, reagent grade	3.0 Gm.
Distilled Water, a sufficient quantity, To make	1000 cc.

Dissolve the sodium carbonate in 100 cc. of distilled water. Dissolve the sodium cyanide in 300 cc. of distilled water. Add the latter to the former solution; then add sufficient distilled water to make 1000 cc.

Ferric Iron Solution

Ferric Sulfate	5.0 Gm.
Gum Ghatti	20.0 Gm.
Potassium Permanganate, 1 per cent aqueous solution	15.0 cc.
Phosphoric Acid	75.0 cc.
Distilled Water	1100 cc.

In a cylinder containing 1000 cc. of water, suspend the gum ghatti on a galvanized iron or copper wire screen, just below the surface of the water. Cover for 18 hours; then remove the screen and strain the liquid through a double layer of gauze or a clean towel. Place the ferric sulfate in a beaker containing 100 cc. of distilled water, add the phosphoric acid, and heat if necessary until solution is effected. Cool and add this, stirring constantly, to the strained solution of gum ghatti. Then add the solution of potassium permanganate. If the final solution is slightly turbid, place it in a well-stoppered container in a warm place (37°) for a few days.

Distilled Water

Dextrose (Glucose) Standard Solution

Dextrose Stock Solution (see page 581)	1.0 cc.
Benzoic Acid	0.25 Gm.
Distilled Water, a sufficient quantity, To make	1000 cc.

Dissolve the benzoic acid in distilled water, add the dextrose stock solution and sufficient distilled water to make 1000 cc.

Picrate Light Filter

Filter Papers (heavy paper, with good absorbing qualities and about 185 mm. in diameter)	8 or 10
Trinitrophenol	5.0 Gm.
Methanol, reagent grade	100.0 cc.
Sodium Hydroxide, 10 per cent aqueous solution	5.0 cc.
Paraffin, 3 per cent solution in petroleum benzin, a sufficient quantity.	

Dissolve the trinitrophenol in the methanol and add the sodium hydroxide solution. Pour this mixture on the dry filter papers in a pile on a level and smooth mat of newspapers until the filter papers are saturated and an excess of

solution has soaked through at the bottom and flowed out at least 2 cm. from the filters on the newspaper mat. When all the liquid has evaporated and the filter papers are perfectly dry, pour over the pack an excess of the paraffin solution and again leave the papers to dry. All of the filters should be evenly stained yellow.

For Sulfonamide Compounds

Bratton and Marshall Method

Trichloroacetic Acid Solution

Trichloroacetic Acid	15 Gm.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Dissolve the trichloroacetic acid in the distilled water.

Sodium Nitrite Solution

Sodium Nitrite	0.1 Gm.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Dissolve the sodium nitrite in the distilled water. Keep in tightly closed containers in a refrigerator for no longer than 1 week.

Saponin Solution

Saponin	0.5 Gm.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the saponin in the distilled water.

Ammonium Sulfamate Solution

Ammonium Sulfamate	0.5 Gm.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Hydrochloric Acid, 4 N

Hydrochloric Acid	340 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Mix the acid with the distilled water.

Coupling Reagent

N-(1-naphthyl) ethylenediamine hydrochloride	0.1 Gm.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Dissolve the reagent in the distilled water.

Stock Standard Sulfanilamide Solution

Sulfanilamide	0.2 Gm.
Distilled Water, a sufficient quantity, To make	1000 cc.

Add about 800 cc. of distilled water to the sulfanilamide in a suitable container and heat on a water bath until dissolved. Let cool to room temperature, transfer to a 1000-cc. volumetric flask, and dilute with distilled water to the graduation mark. This solution, stored in a refrigerator, is stable for 3 months.

For Urea Nitrogen

Folin-Wu Method

Protein-free Blood Filtrate (Tungstic Acid Precipitation Method), see page 578.

Urease Solution

Soy Bean Meal	0.5 Gm.
Alcohol, 30 per cent aqueous solution	20 cc.

Shake the soy bean meal with the alcohol for 10 minutes and filter. This solution should be prepared freshly as needed.

Urease tablets or powder made from soy beans may be used, in which case no buffer mixture is needed.

Buffer Mixture

1. *Phosphate Solution*

Sodium Pyrophosphate, reagent grade	14.0 Gm.
Metaphosphoric Acid, reagent grade	2.0 Gm.
Distilled Water, a sufficient quantity, To make	250 cc.

Dissolve the sodium pyrophosphate and the metaphosphoric acid in the distilled water.

2. *Acetate Mixture*

Sodium Acetate	15.0 Gm.
Glacial Acetic Acid	1.0 cc.
Distilled Water, a sufficient quantity, To make	100 cc.

Dissolve the sodium acetate in 75 cc. of distilled water, add the glacial acetic acid and sufficient distilled water to make 100 cc.

Sodium Hydroxide Solution

Sodium Hydroxide, 10 per cent aqueous solution.

Antifoam Liquid

1. Caprylic Alcohol
2. Amyl Alcohol

Hydrochloric Acid, 0.1 N

Nessler's Working Solution, see page 575.

Ammonium Sulfate Standard Solution, see page 574.

Karr's Method

Protein-free Blood Filtrate, Urease Solution, and Buffer Mixture, see Folin-Wu Method, page 585.

Urea Nitrogen Stock Solution

Urea	0.1286	Gm.
Distilled Water, a sufficient quantity,		
To make	200	cc.

Dissolve the urea in the distilled water.

Urea Nitrogen Working Solution

Urea Nitrogen Stock Solution	5	cc.
Distilled Water, a sufficient quantity,		
To make	100	cc.

Mix them.

Gum Ghatti Solution

Gum Ghatti	1.0	Gm.
Distilled Water	100	cc.

Dissolve the gum ghatti in the distilled water.

Nessler's Working Solution, see page 575.

Van Slyke and Cullen Method

Urease Solution, see page 585.

Buffer Solution

Potassium Biphosphate, ammonium-free, reagent grade	6.0	Gm.
Sodium Phosphate, anhydrous, ammonium-free, reagent grade	2.0	Gm.
Distilled Water, a sufficient quantity,		
To make	1000	cc.

Dissolve the salts in the distilled water.

Potassium Carbonate Solution

Potassium Carbonate, anhydrous, ammonium-free, reagent grade	900	Gm.
Distilled Water, a sufficient quantity,		
To make	1000	cc.

Dissolve the potassium carbonate in the distilled water.

Antifoam Liquid

Caprylic Alcohol

Hydrochloric Acid, 0.01 N

Sodium Hydroxide, 0.01 N

Indicators

1. Alizarin, see page 639.
2. Methyl Red Test Solution.

For Uric Acid

Benedict's Method

Protein-free Blood Filtrate (Tungstic Acid Precipitation Method or Unlaked Blood Method), see pages 578 and 579.

Sodium Cyanide Solution

Sodium Cyanide, reagent grade	5.0 Gm.
Strong Ammonia Solution	2.0 cc.
Distilled Water, a sufficient quantity, To make	100 cc.

Dissolve the sodium cyanide in distilled water, add the strong ammonia solution and sufficient distilled water to make 100 cc. Keep under refrigeration preferably, and do not use if the solution is over 1 month old.

Arseno-Phosphotungstic Acid Reagent

Sodium Tungstate, reagent grade	100 Gm.
Arsenic Trioxide	50 Gm.
Hydrochloric Acid	20 cc.
Phosphoric Acid	25 cc.
Distilled Water, a sufficient quantity, To make	1000 cc.

Dissolve the sodium tungstate in 500 cc. of distilled water, add the arsenic trioxide, followed by the phosphoric acid and the hydrochloric acid. Boil for 20 minutes, cool, and add sufficient distilled water to make 1000 cc.

Uric Acid Stock Solution (Brown Method)

Uric Acid	1.0 Gm.
Lithium Carbonate	0.6 Gm.
Formaldehyde Solution	25.0 cc.
Glacial Acetic Acid	3.0 cc.
Distilled Water, a sufficient quantity, To make	1000 cc.

Place the uric acid, accurately weighed, in a liter flask. Place the lithium carbonate in a beaker containing 150 cc. of distilled water; heat to 60° and stir until the salt is dissolved. Pour this warm solution upon the uric acid, washing down crystals of the latter adhering to the neck of the flask, and shake. As soon as the uric acid is dissolved, cool under running water and add distilled water to make approximately 500 cc. Add the formaldehyde solution and

shake well; then add the glacial acetic acid and shake the mixture to remove most of the carbon dioxide; finally add sufficient distilled water to make 1000 cc.

Keep the solution in small tightly stoppered bottles in the dark.

Uric Acid Standard Solution

Uric Acid Stock Solution	5.0 cc.
Formaldehyde Solution	2.0 cc.
Sulfuric Acid, 1 *N*	13.7 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Mix them. Each 5 cc. is equivalent to 0.025 mg. of uric acid.

Distilled Water

FOR THE MICROSCOPIC EXAMINATION OF BLOOD

Blood Diluents

For Erythrocytes

Hayem's Fluid

Mercury Bichloride	0.5 Gm.
Sodium Chloride	1.0 Gm.
Sodium Sulfate	5.0 Gm.
Distilled Water	200 cc.

Dissolve the salts in the distilled water; filter. Refilter as necessary.

Sodium Citrate in Isotonic Sodium Chloride Solution

Sodium Citrate	10.0 Gm.
Sodium Chloride	9.0 Gm.
Distilled Water	1000 cc.

Dissolve the salts in the distilled water; filter. Refilter as necessary.

Toisson's Fluid

Crystal Violet	25 mg.
Sodium Chloride	1.0 Gm.
Sodium Sulfate	8.0 Gm.
Glycerin	30 cc.
Distilled Water	160 cc.

Dissolve the sodium chloride and sulfate in the distilled water. Dissolve the crystal violet in the glycerin. Mix the solutions and filter. Refilter as necessary.

For Granulocytes

Goodpasture's Peroxidase Stain

Benzidine, reagent grade	50 mg.
Basic Fuchsin	50 mg.
Sodium Nitroferricyanide, reagent grade	50 mg.
Hydrogen Peroxide Solution	0.5 cc.
Alcohol	100 cc.
Distilled Water, a sufficient quantity.	

Dissolve the sodium nitroferricyanide in 1 to 2 cc. of distilled water. Dissolve the benzidine in the alcohol. Mix the two solutions and add the basic fuchsin and hydrogen peroxide solution. Keep in amber-colored bottles.

For Leucocytes

Acetic Acid Diluting Fluids

1. Glacial Acetic Acid	1.0 to 3.0 cc.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Mix them. Filter as necessary and do not use the solution unless it is clear. The concentration of acetic acid is varied as desired.

2. Glacial Acetic Acid	1.0 cc.
Crystal Violet	10 mg.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Mix the glacial acetic acid and the distilled water; dissolve the crystal violet in this solution. Filter as necessary and do not use the solution unless it is clear.

3. Hydrochloric Acid, 0.1 *N*

For Platelets

Rees and Ecker Diluting Fluid

Sodium Citrate	38 Gm.
Formaldehyde Solution	2.0 cc.
Brilliant Cresyl Blue	1.0 Gm.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the sodium citrate and the brilliant cresyl blue in distilled water, add the formaldehyde solution and sufficient distilled water to make 1000 cc. To be used as a diluent when smears are to be stained for counting erythrocytes and blood platelets in the same specimen.

Fonio's Solution

Magnesium Sulfate	14 Gm.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Dissolve the magnesium sulfate in the distilled water. To be used as a diluent when smears are to be stained for estimating blood platelets.

For Reticulocytes

Brilliant Cresyl Blue Staining Solution with Oxalate

1. Oxalate the blood by adding, to each 10 cc., 20 mg. of potassium or sodium oxalate, see page 569.

2. Brilliant Cresyl Blue	1.0 Gm.
Isotonic Sodium Chloride Solution	100 cc.

Dissolve the brilliant cresyl blue in the isotonic sodium chloride solution.

Mix equal parts of 1 and 2, allow to stand 1 minute, mix again, and make smears.

Hemoglobin Estimation

Acid Hematin Methods

Newcomer's Reagent

Hydrochloric Acid	1 cc.
Distilled Water	99 cc.

Mix them.

Sahli's Reagent

0.1 *N* hydrochloric acid, or 0.1 *N* hydrochloric acid saturated with chloroform.

FOR THE CHEMICAL AND MICROSCOPICAL EXAMINATION OF CEREBROSPINAL FLUID

Cell Counting Diluent

Acetic Acid Diluting Fluids

1. Crystal Violet . . . . . 0.2 Gm.
   Glacial Acetic Acid . . . . . 10.0 cc.
   Distilled Water, a sufficient quantity,
   To make . . . . . 100 cc.

Dissolve the crystal violet in distilled water, add the glacial acetic acid and sufficient distilled water to make 100 cc. Filter as necessary and do not use the solution unless it is clear.

2. Glacial Acetic Acid . . . . . 2.0 to 3.0 cc.
   Distilled Water, a sufficient quantity,
   To make . . . . . 100 cc.

Mix them. Filter as necessary and do not use the solution unless it is clear.

3. Glacial Acetic Acid

Colloidal Suspension

Gum Mastic Suspension Reagents (Cutting's Test)

Mastic Solution

Mastic	0.20 Gm.
Absolute Alcohol	20 cc.
Distilled Water (freshly distilled)	80 cc.

Dissolve the mastic in the absolute alcohol, and filter; pour the filtrate rapidly into the distilled water and mix well.

Alkaline Saline Solution

Potassium Carbonate, reagent grade	5 mg.
Sodium Chloride	1.25 Gm.
Distilled Water	100 cc.

Dissolve the salts in the distilled water.

For Proteins

Qualitative Methods

Any of the qualitative methods for proteins, pages 600 and 601, may be used.

Quantitative Method

Sulfosalicylic Acid Reagent (Dennis and Ayer's Method)

Sulfosalicylic Acid, reagent grade	5.0 Gm.
Distilled Water	100 cc.

Dissolve the sulfosalicylic acid in the distilled water, and filter.

For Globulin

Ammonium Sulfate Reagent (Ross-Jones Test)

Ammonium Sulfate, reagent grade	85 Gm.
Distilled Water	100 cc.

Add the ammonium sulfate to the distilled water and shake well until a saturated solution is obtained; filter, or decant the clear supernatant solution.

Butyric Acid Reagents (Noguchi's Test)

1. Butyric Acid	10 cc.
Isotonic Sodium Chloride Solution, a sufficient quantity, To make	100 cc.

Mix them.

2. Sodium Hydroxide, 1 *N*

Phenol Reagent (Pandy's Test)

Phenol, melted	10 cc.
Distilled Water, a sufficient quantity, To make	100 cc.

Mix them. Use the supernatant liquid as the reagent.

FOR THE CHEMICAL EXAMINATION OF FECES

For Bile Pigments

Corrosive Sublimate Reagent (Schmidt's Test)

Mercury Bichloride	7.5 Gm.
Distilled Water	100 cc.

Add the mercury bichloride to the distilled water and shake well until a saturated solution is obtained; filter, or decant the clear supernatant solution.

Nitric Acid Reagent (Gmelin's Test), see page 599.

For Occult Blood

Benzidine Test Reagents

1. Benzidine, reagent grade . . . . . 10 Gm.
   Glacial Acetic Acid . . . . . 100 cc.

Add the benzidine to the glacial acetic acid and shake well until a saturated solution is obtained; filter, or decant the clear supernatant solution. Keep in amber-colored bottles or in a dark place. Preferably prepare freshly for immediate use. The solution should never be used if it is more than 1 week old.

2. Hydrogen Peroxide Solution

FOR THE MICROSCOPIC EXAMINATION OF FECES

For Fat

Sudan Red Reagent (Herxheimer's Stain)

Sudan IV, a sufficient quantity
Acetone . . . . . 50 cc.
Alcohol . . . . . 37 cc.
Distilled Water. . . . . 13 cc.

Mix the liquids, add the Sudan IV, and shake well until a saturated solution is obtained and a small excess of the dye remains; filter, or decant the clear supernatant solution.

For Protozoa

Iodine-Eosin Reagent (Donaldson Method, Kofoid Modification)

1. Eosin Y . . . . . 4.5 Gm.
   Isotonic Sodium Chloride Solution. . . . . 10 cc.

Add the eosin Y to the isotonic sodium chloride solution and shake well until a saturated solution is obtained; then filter.

2. Iodine, a sufficient quantity
   Potassium Iodide . . . . . 0.5 Gm.
   Isotonic Sodium Chloride Solution. . . . . 10 cc.

Dissolve the potassium iodide in the isotonic sodium chloride solution, add the iodine, and shake well until a saturated solution is obtained and a slight excess of iodine remains; then filter.

3. Isotonic Sodium Chloride Solution

4. Prepare the reagent freshly by mixing 2 cc. of Solution 1 with 1 cc. of Solution 2 and 2 cc. of Solution 3.

Sodium Chloride Saturated Solution

Sodium Chloride	40 Gm.
Distilled Water	100 cc.

Add the sodium chloride to the distilled water and shake well until a saturated solution is obtained; filter, or decant the clear supernatant solution.

For Starch

Iodine Reagent

Strong Iodine Solution (Lugol's Solution)

FOR THE CHEMICAL EXAMINATION OF GASTRIC CONTENTS

For Total Acidity

Volumetric Solutions

Hydrochloric Acid, 0.1 N

Hydrochloric Acid, 0.01 N

Sodium Hydroxide, 0.1 N

Sodium Hydroxide, 0.01 N

Indicator

Phenolphthalein Test Solution

For Total Free Acids

Volumetric Solutions

The same as listed under Total Acidity, see page 593.

Indicators

Alizarin Indicator (Bauer's Test Reagent)

Sodium Alizarinsulfonate	1.0 Gm.
Distilled Water	100 cc.

Dissolve the sodium alizarinsulfonate in the distilled water.

Congo Red Test Solution

Congo Red	0.5 Gm.
Alcohol	10 cc.
Distilled Water	90 cc.

Add the alcohol to the distilled water and dissolve the congo red in the solution.

Congo Red Paper (for Qualitative Testing)

Saturate thick filter paper with Congo Red Test Solution. Dry, cut the paper into strips, and preserve in well-stoppered glass vials.

For Free Hydrochloric Acid

Volumetric Solutions

The same as listed under Total Acidity, see page 593.

Indicators

Phloroglucinol-Vanillin Indicator (Günsburg's Reagent)

Phloroglucinol, reagent grade	2.0 Gm.
Vanillin	1.0 Gm.
Alcohol	100 cc.

Dissolve the phloroglucinol and vanillin in the alcohol.

Dimethylaminoazobenzene Indicator (Töpfer's Reagent)

Dimethylaminoazobenzene, reagent grade	0.5 Gm.
Alcohol	100 cc.

Dissolve the dimethylaminoazobenzene in the alcohol.

For Lactic Acid

Ferric Chloride Reagent (Kelling's Test)

Ferric Chloride, reagent grade	10 Gm.
Distilled Water, a sufficient quantity, To make	100 cc.

Dissolve the ferric chloride in the distilled water.

Ferric Chloride-Phenol Reagent (Uffelmann's Test)

Ferric Chloride	0.045 Gm.
Liquefied Phenol	1.0 cc.
Distilled Water	100 cc.

Dissolve the ferric chloride in the distilled water and add the liquefied phenol. The solution may be diluted with more distilled water if necessary. It should be transparent and of a light amethyst-blue color. The solution must be freshly prepared.

For Bile Pigments

Tests for Bile Pigments, see pages 598 and 599.

For Hemoglobin (Occult Blood)

Benzidine Reagent and other reagents for hemoglobin, see page 600.

For Protein Estimation

Phosphotungstic Acid Reagent (Wolff-Jungham Method)

Phosphotungstic Acid, reagent grade	3.0 Gm.
Hydrochloric Acid	1.0 cc.
Alcohol	20 cc.
Distilled Water, a sufficient quantity, To make	200 cc.

Dissolve the phosphotungstic acid in distilled water, add the hydrochloric acid, alcohol, and sufficient distilled water to make 200 cc.

FOR THE MICROSCOPIC EXAMINATION OF GASTRIC CONTENTS

For Starch

Iodine Reagent

Strong Iodine Solution (Lugol's Solution)

FOR THE CHEMICAL EXAMINATION OF HUMAN MILK

For Fat

Reagents for the Babcock Method, Modified

1. Sulfuric Acid

2. Hydrochloric Acid . . . . . 50 cc.
   Amyl Alcohol . . . . . 50 cc.

   Mix them.

For Lactose

Reagents for the Colorimetric Method

1. Sodium Tungstate, reagent grade . . . . . 10 Gm.
   Distilled Water, a sufficient quantity,
   To make . . . . . 100 cc.

   Dissolve the sodium tungstate in the distilled water by agitation.

2. Sulfuric Acid, 0.67 *N*
   Sulfuric Acid, 1 *N* . . . . . 66.6 cc.
   Distilled Water, a sufficient quantity,
   To make . . . . . 100 cc.

   Mix them. Adjust the concentration of the acid as directed in U. S. P. XIII.

3. Alkaline Copper Tartrate Solution (Folin-Wu), see page 580.
4. Molybdate-Phosphate Solution, see page 581.
5. Lactose Stock Solution
   Lactose . . . . . 1.00 Gm.
   Benzoic Acid . . . . . 0.25 Gm.
   Distilled Water, a sufficient quantity,
   To make . . . . . 100 cc.

   Dissolve the lactose and benzoic acid in the distilled water. Keep the solution under refrigeration.

6. Lactose Standard Solution
   Lactose Stock Solution. . . . . 3.0 cc.
   Benzoic Acid . . . . . 0.25 Gm.
   Distilled Water, a sufficient quantity,
   To make . . . . . 100 cc.

Dissolve the benzoic acid in distilled water, add the lactose stock solution and sufficient distilled water to make 100 cc. Preferably keep the solution under refrigeration and do not use if it is more than 1 month old. Each 2 cc. is equivalent to 0.6 mg. of lactose.

Reagents for the Volumetric Method

1. Diluted Acetic Acid
2. Benedict's Quantitative Reagent, see page 602.

For Proteins

Reagents for Bogg's Method

1. Phosphotungstic Acid, reagent grade . . . . . 25 Gm.
   Distilled Water . . . . . 125 cc.

   Dissolve the phosphotungstic acid in the distilled water.

2. Hydrochloric Acid. . . . . 25 cc.
   Distilled Water . . . . . 100 cc.

   Mix them.

Mix Solution 1 and Solution 2 and keep the finished preparation in a dark place.

Reagents for Total Nitrogen Method

1. Cupric Sulfate, crystalline, reagent grade. . . . . 0.1 Gm.
   Sodium Sulfate, anhydrous, reagent grade . . . . . 10.0 Gm.
   Sulfuric Acid . . . . . 30 cc.

   Add the salts to the sulfuric acid.

2. Sodium Hydroxide . . . . . 120 Gm.
   Distilled Water . . . . . 100 cc.

   Add the sodium hydroxide to the distilled water and shake well. Decant the clear supernatant solution.

3. Hydrochloric Acid, 0.1 *N*
4. Sodium Hydroxide, 0.1 *N*
5. Methyl Red Test Solution
6. Distilled Water (ammonia-free)

FOR THE CHEMICAL EXAMINATION OF SALIVA AND SPUTUM

For Hemoglobin (Occult Blood)

Benzidine Reagent or other reagents for hemoglobin, see page 600.

For Proteins

Trinitrophenol Reagent (Esbach's Method) or other reagents for proteins, see page 602.

For Salivary Urea Index

Reagents for Mercury-combining Power (Hench and Aldrich Method)

1. Mercury Bichloride	5.0 Gm.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Dissolve the mercury bichloride in the distilled water.

2. Monohydrated Sodium Carbonate	50 Gm.
Distilled Water	100 cc.

Add the monohydrated sodium carbonate to the distilled water and shake well until a saturated solution is obtained; filter, or decant the clear supernatant solution.

FOR THE MICROSCOPICAL EXAMINATION OF SALIVA AND SPUTUM

For Bacteria

Gram's Staining Method, see page 631.

For Blood Cells (Eosinophiles, etc.)

Giemsa's Staining Solution or Wright's Staining Solution, see page 629.

For Capsules

Hiss' Copper Sulfate Method, see page 629.

For Tubercle Bacilli

Ziehl-Neelsen Method or other suitable methods, see page 632.

FOR THE CHEMICAL EXAMINATION OF URINE

For Acetone

Frommer's Test Reagents

1. Salicylaldehyde	10 Gm.
Alcohol, a sufficient quantity,	
To make	100 cc.

Dissolve the salicylaldehyde in the alcohol.

2. Sodium Hydroxide	40 Gm.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Dissolve the sodium hydroxide in the distilled water.

Gunning's Test Reagents

1. Strong Iodine Solution (Lugol's Solution)
2. Diluted Ammonia Solution (Ammonia Water)

Lange, Legal, or Rothera Test Reagents

1. Sodium Nitroferricyanide, reagent grade . . . . . 10 Gm.
   Distilled Water . . . . . 30 cc.

   Dissolve the sodium nitroferricyanide in the distilled water. This solution should be freshly prepared just before use.

2. Glacial Acetic Acid
3. Diluted Ammonia Solution (Ammonia Water)
4. Ammonium Sulfate (in Rothera Test)

Lieben's Test Reagents

1. Strong Iodine Solution (Lugol's Solution)
2. Sodium Hydroxide . . . . . 10 Gm.
   Distilled Water, a sufficient quantity,
   To make . . . . . 100 cc.

   Dissolve the sodium hydroxide in the distilled water.

For Bile Acids

Furfural-Sulfuric Acid Reagents (Mylius' Test)

1. Furfural . . . . . 0.1 cc.
   Distilled Water . . . . . 100 cc.

   Mix them.

2. Sulfuric Acid

Hay's Surface Tension Test Reagent

Sublimed Sulfur

Oliver's Test Reagent

Peptone	8.33 Gm.
Salicylic Acid	1.12 Gm.
Acetic Acid	0.4 cc.
Distilled Water, a sufficient quantity, To make	1000 cc.

Dissolve the peptone and salicylic acid in distilled water; add the acetic acid and sufficient distilled water to make 1000 cc.

For Bile Pigments

Huppert's Test (Nakayama's Modification) Reagents

1. Barium Chloride, reagent grade . . . . . 10 Gm.
   Distilled Water, a sufficient quantity,
   To make . . . . . 100 cc.

   Dissolve the barium chloride in the distilled water.

2. Hydrochloric Acid	1.0 cc.
Ferric Chloride, reagent grade	0.4 Gm.
Alcohol, a sufficient quantity,	
To make	100 cc.

Dissolve the ferric chloride in the alcohol and add the hydrochloric acid.

3. Nitric Acid Reagent, see Nitric Acid Reagent (Gmelin's Test), page 599.

Iodine Reagent (Smith's Test)

Strong Iodine Tincture	10 cc.
Alcohol	90 cc.

Mix them.

Nitric Acid Reagent (Gmelin's Test)

Nitric Acid containing a trace of nitrous acid and slightly yellow in color. Colorless nitric acid will become yellow upon standing in the sunlight for a week or longer. For immediate use, boil colorless nitric acid with a match stick or a piece of pine wood.

For Diacetic Acid (Acetoacetic Acid)

Ferric Chloride Reagent (Gerhardt's Test)

Ferric Chloride	10 Gm.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Dissolve the ferric chloride in the distilled water.

For Diazo Reaction

Ehrlich's Reagent

1. Sodium Nitrite	0.5 Gm.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Dissolve the sodium nitrite in the distilled water. This solution tends to deteriorate rapidly upon standing.

2. Sulfanilic Acid	5.0 Gm.
Hydrochloric Acid	50 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Add the hydrochloric acid to about 700 cc. of distilled water, dissolve the sulfanilic acid in this solution, and add enough distilled water to make 1000 cc.

3. Solution 1	1.0 cc.
Solution 2	50 to 100 cc.

Mix them. The reagent should be freshly prepared for use. The quantity of Solution 2 may be varied as desired.

For Hemoglobin (Occult Blood)

Benzidine Reagent

Benzidine, reagent grade	0.2 Gm.
Glacial Acetic Acid	2.0 cc.
Hydrogen Peroxide Solution	2.0 cc.

Dissolve the benzidine in the glacial acetic acid. The hydrogen peroxide solution may be added to the reagent or be used separately. This solution should be freshly prepared just before use.

Guaiac Test Reagents

1. Guaiac . . . . . 1.0 Gm.
   Alcohol . . . . . 60 cc.

Dissolve the guaiac in the alcohol. Filter or decant, if necessary. This solution should be freshly prepared just before use.

2. Ozonized Turpentine Oil or Hydrogen Peroxide Solution

Ortho-tolidine Test Reagents

1. Ortho-tolidine . . . . . 4.0 Gm.
   Glacial Acetic Acid . . . . . 100 cc.

Dissolve the ortho-tolidine in the glacial acetic acid. This solution keeps for approximately 1 month.

2. Hydrogen Peroxide Solution

For Indican

Obermayer's Method

1. Ferric Chloride . . . . . 0.2 Gm.
   Hydrochloric Acid . . . . . 100 cc.

Dissolve the ferric chloride in the hydrochloric acid.

2. Chloroform

For Proteins (Albumens)

Qualitative Methods

Heat and Acid Tests

Acetic Acid Reagent

Diluted Acetic Acid

Nitric Acid Reagent

Nitric Acid

Purdy's Test Reagents

1. Glacial Acetic Acid . . . . . 50 cc.
   Distilled Water . . . . . 50 cc.

Mix them.

2. Sodium Chloride	30 Gm.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Add the sodium chloride to 87 cc. of distilled water, warm the mixture, and shake until solution takes place. Cool and add enough distilled water to make 100 cc.

Sulfosalicylic Acid Reagent (Exton's Method)

Sulfosalicylic Acid	5.0 Gm.
Sodium Sulfate	20 Gm.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Dissolve the sodium sulfate in 75 cc. of distilled water, add the sulfosalicylic acid, shake until dissolved, and then add sufficient distilled water to make 100 cc.

Ring or Contact Tests

Nitric Acid Reagent (Heller's Test)

Nitric Acid

Nitric Acid and Magnesium Sulfate Reagent (Robert's Test)

Nitric Acid	20 cc.
Magnesium Sulfate	57 Gm.
Distilled Water	65 cc.

Dissolve the magnesium sulfate in the distilled water, and add the nitric acid to the solution.

Sulfosalicylic Acid Reagent

Sulfosalicylic Acid	20 Gm.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Dissolve the sulfosalicylic acid in the distilled water.

Quantitative Methods

Phosphotungstic Acid Reagent (Tsuchiya's Method)

Phosphotungstic Acid, reagent grade	1.5 Gm.
Hydrochloric Acid	5.0 cc.
Alcohol, a sufficient quantity,	
To make	100 cc.

Dissolve the phosphotungstic acid in alcohol, add the hydrochloric acid and enough alcohol to make 100 cc.

Sulfosalicylic Acid Reagent (Exton's Method)

Use the same reagent as given under Qualitative Methods, see page 601.

Sulfosalicylic Acid Reagent (Folin's Method or Kingsbury and Clark's Method)

Sulfosalicylic Acid	3.0 Gm.
Distilled Water	100 cc.

Dissolve the sulfosalicylic acid in the distilled water.

Trinitrophenol Reagent (Esbach's Method)

Trinitrophenol	1.0 Gm.
Citric Acid	2.0 Gm.
Distilled Water	100 cc.

Dissolve the trinitrophenol and citric acid in the distilled water.

For Protein, Bence-Jones' (Proteoses or Albumoses)

Trichloroacetic Acid Reagent

Trichloroacetic Acid	250 Gm.
Distilled Water	25 cc.

Add the trichloroacetic acid to the distilled water and shake until a saturated solution is obtained, then filter or decant the clear solution.

For Reducing Sugars

(Routinely reported as dextrose or glucose)

Qualitative Tests

Benedict's Qualitative Reagent

Cupric Sulfate, crystalline	17.3 Gm.
Sodium Citrate	173 Gm.
Monohydrated Sodium Carbonate	117 Gm.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

With the aid of heat dissolve the sodium citrate and the monohydrated sodium carbonate in about 700 cc. of distilled water. Filter through paper, if necessary. Dissolve the cupric sulfate in about 100 cc. of distilled water, and slowly add this solution, with constant stirring, to the first solution; cool, and add sufficient distilled water to make the product measure 1000 cc. The mixed solution is ready for use, and does not deteriorate.

Do not use this reagent for Benedict's quantitative test.

Fehling's Qualitative Reagent

1. Cupric Sulfate, crystalline	34.64 Gm.
Distilled Water, a sufficient quantity,	
To make	500 cc.

Dissolve the cupric sulfate in the distilled water.

2. Sodium Hydroxide	50 Gm.
Potassium and Sodium Tartrate, crystalline	173 Gm.
Distilled Water, a sufficient quantity,	
To make	500 cc.

Dissolve the sodium hydroxide and the potassium and sodium tartrate in the distilled water.

Preserve the solutions separately in tightly stoppered containers. Keep Solution 2 in a non-soluble glass container with a paraffined glass stopper. Mix them in equal volumes when needed for use. The mixture tends to deteriorate.

Fermentation Test Reagent

Yeast (brewers' or compressed)
This is positive for dextrose (glucose), levulose (fructose), and galactose.

Haines' Qualitative Reagent

Cupric Sulfate, crystalline	10 Gm.
Potassium Hydroxide	40 Gm.
Glycerin	90 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the cupric sulfate in 400 cc. of distilled water and add the glycerin; dissolve the potassium hydroxide in 500 cc. of distilled water, and add slowly and with constant stirring to the cupric sulfate solution; then add sufficient distilled water to make 1000 cc.

Osazone Test Reagent

Phenylhydrazine Hydrochloride	2.0 Gm.
Sodium Acetate, anhydrous, reagent grade	2.0 Gm.

Mix well and keep dry. Osazone crystals of sugars other than dextrose (glucose) form with difficulty, if at all, in urine. Dextrose (glucose) and levulose (fructose) form osazone crystals of identical structure.

Quantitative Tests

Benedict's Quantitative Reagent

Cupric Sulfate, crystalline, reagent grade	18.000	Gm.
Monohydrated Sodium Carbonate	117	Gm.
Sodium Citrate	200	Gm.
Potassium Thiocyanate	125	Gm.
Potassium Ferrocyanide, 5 per cent aqueous solution	5	cc.
Distilled Water, a sufficient quantity,		
To make	1000	cc.

Dissolve the monohydrated sodium carbonate, sodium citrate, and potassium thiocyanate, with the aid of heat, in about 700 cc. of distilled water. Filter this solution, if necessary. Accurately weigh the cupric sulfate, dissolve it in about 100 cc. of distilled water, and pour this solution slowly and with constant stirring into the first solution. Add the potassium ferrocyanide solution, cool, and add sufficient distilled water to make 1000 cc.

Twenty-five cc. of this reagent is reduced by 50 mg. of dextrose (glucose), by 54 mg. of galactose, by 67 mg. of lactose, by 53 mg. of levulose, or by 74 mg. of maltose.

Dinitrosalicylic Acid Reagent (Sumner's Method)

1. Phenol	10.0 Gm.
Sodium Hydroxide	2.2 Gm.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Dissolve the sodium hydroxide in 80 cc. of distilled water, add the phenol and sufficient distilled water to make 100 cc.

2. Dinitrosalicylic Acid	8.8 Gm.
Sodium Bisulfite, reagent grade	6.9 Gm.
Sodium Hydroxide	13.5 Gm.
Potassium and Sodium Tartrate, crystalline	255 Gm.
Solution 1	69 cc.
Distilled Water	1210 cc.

Dissolve the sodium bisulfite in the 69 cc. of Solution 1. Dissolve the dinitrosalicylic acid, sodium hydroxide and potassium and sodium tartrate in the distilled water. Mix the two solutions. Keep in tight well-filled containers.

For Specific Sugars

Lactose

Rubner's Test Reagents

1. Lead Acetate
2. Strong Ammonia Solution (Stronger Ammonia Water)

Levulose (Fructose)

Borchardt's Test Reagents

1. Hydrochloric Acid	2.0 cc.
Distilled Water	1.0 cc.

Mix them

2. Resorcinol, crystalline
3. Sodium or Potassium Hydroxide
4. Ethyl Acetate (Acetic Ether)

Resorcinol Reagent (Seliwanoff's Reaction)

Resorcinol	50 mg.
Hydrochloric Acid	50 cc.
Distilled Water	50 cc.

Mix the hydrochloric acid and the distilled water; dissolve the resorcinol in the solution.

Pentoses

Orcinol-Ferric Chloride Reagent (Bial's Test)

Orcinol	1.5 Gm.
Ferric Chloride, 10 per cent aqueous solution	2.0 cc.
Hydrochloric Acid	500 cc.

Dissolve the orcinol in the hydrochloric acid and add the solution of ferric chloride.

For Urea Estimation

Hypobromite Reagent

1. Bromine	125 Gm.
Sodium Bromide	125 Gm.
Distilled Water, a sufficient quantity, To make	1000 cc.

Dissolve the sodium bromide in 800 cc. of distilled water in a well-stoppered container, add the bromine and agitate gently until it is dissolved; then add sufficient distilled water to make 1000 cc., and mix well. Keep the solution in well-stoppered containers, protected from light.

2. Sodium Hydroxide	225 Gm.
Distilled Water, a sufficient quantity, To make	1000 cc.

Dissolve the sodium hydroxide in the distilled water.

3. Solution 1	20 cc.
Solution 2	20 cc.
Distilled Water	60 cc.

Mix them. This solution should be freshly prepared for use.

Urease Reagents (Marshall's Method)

1. Urease powder or tablets, 10 per cent aqueous solution
2. Toluene
3. Hydrochloric Acid, 0.1 *N*
4. Methyl Orange Test Solution

Urease Reagents (Aeration Method of Van Slyke and Cullen)

1. Urease powder or tablets, 10 per cent aqueous solution
2. Caprylic Alcohol
3. Buffer Solution

Sodium Phosphate	14.2 Gm.
Sodium Biphosphate	12.0 Gm.
Distilled Water, a sufficient quantity, To make	100 cc.

Dissolve the salts in the distilled water.

4. Hydrochloric Acid, 0.02 *N* or 0.01 *N*
5. Sodium Hydroxide, 0.02 *N* or 0.01 *N*
6. Saturated Potassium Carbonate Solution
7. Methyl Red Test Solution

Schlesinger's Test Reagents

1. Strong Iodine Solution (Lugol's Solution)
2. Zinc Acetate . . . . . 3.0 Gm.
   Alcohol . . . . . 100 cc.

Heat the alcohol and dissolve the zinc acetate in it: add a few drops of acetic acid if necessary to clarify the solution.

3. Calcium Chloride . . . . . 10 Gm.
   Distilled Water, a sufficient quantity,
   To make . . . . . 100 cc.

Dissolve the calcium chloride in the distilled water.

For Urobilinogen

Para-dimethylaminobenzaldehyde Reagent (Ehrlich's Test)

Para-dimethylaminobenzaldehyde	2 Gm.
Hydrochloric Acid	20 cc.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Mix the hydrochloric acid with the distilled water and dissolve the para-dimethylaminobenzaldehyde in the solution.

CULTURE MEDIA

NOTES: (1) Dehydrated media are available commercially for the preparation of culture media. If these are used for the preparation of official culture media, they shall yield products conforming to the official ones. It is generally recognized that satisfactory dehydrated culture media will yield a more uniform product than will a combination of ingredients on a small scale. Certain special media cannot be made practicably in small quantities from the basic ingredients so dehydrated media are recommended.

(2) A culture medium which varies from the official formula shall not be designated by the official name of the medium. If a variation is made, and the official name is used in the title of the variation, this title shall indicate the nature of the variation.

(3) Directions in this text for the preparation of culture media usually do not specify the size or type of containers in which media are to be placed for sterilization, storage, or use. It is assumed that the worker preparing media knows the size or type of containers most suitable for this purpose. Other details of bacteriologic procedure in the preparation of media are left to the discretion of the worker.

(4) Processes of sterilization are given in detail on pages 749 to 754. Those usually employed for the sterilization of culture media are the following:

Process C—Steam under pressure (Autoclave Sterilization).

Process D—Moist Heat at 100° (Fractional Sterilization, Intermittent Sterilization, Arnold Steam Sterilization).

(5) Before use incubate all finished culture media for 48 hours at 37°, and then for 24 hours at room temperature. Combined media should again be incubated before use. Examine for contamination, and discard contaminated media.

(6) Store satisfactory media at a temperature of approximately 6°.

BASIC MEDIA

Nutrient Broth, Nutrient Bouillon N. F.

Beef Extract Broth N. F.

Beef Extract	3 Gm.
Peptone	10 Gm.
Sodium Chloride	5 Gm.
Sodium Hydroxide, 1 *N*	
Distilled Water, each, a sufficient quantity, To make	1000 cc.

Dissolve the beef extract, the peptone, and the sodium chloride in 975 cc. of distilled water by the aid of heat; add sufficient normal sodium hydroxide to raise the *p*H to 7.0, or to 0.2 higher than the *p*H desired in the finished broth, and filter. Add sufficient distilled water through the filter to make 1000 cc. Sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure).

Beef Infusion Broth N. F.

Beef, free from fat and finely minced	500 Gm.
Peptone	10 Gm.
Sodium Chloride	5 Gm.
Sodium Hydroxide, 1 *N*	
Distilled Water, each, a sufficient quantity, To make	1000 cc.

Cold extraction: Thoroughly mix the beef with 1000 cc. of distilled water, and keep under refrigeration for 12 to 24 hours. Strain the mixture through cheesecloth, squeezing the meat as dry as possible. Heat the liquid in a boiling water bath for 30 minutes with frequent stirring; filter and if the filtrate measures less than 1000 cc. add sufficient distilled water to make 1000 cc. Add the peptone and sodium chloride and dissolve them by the aid of heat if necessary.

Hot extraction (alternative method): Dissolve the peptone and sodium chloride in 1000 cc. of distilled water, add the beef, mix thoroughly, and heat in a water bath for one hour at 50°. If a scum of fat is present remove it with absorbent cotton, then strain the mixture through cheesecloth, squeezing the meat as dry as possible. Filter and add sufficient distilled water to make 1000 cc.

To the filtrate obtained by either method add sufficient normal sodium hydroxide to raise the *p*H to 7.0 or to 0.2 higher than the *p*H desired in the finished broth. Heat in a boiling water bath for 20 minutes, filter, and if the filtrate measures less than 1000 cc. add sufficient distilled water to make 1000 cc. Sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure). If necessary, refilter and sterilize.

A broth without the sodium chloride or with a reduced amount of peptone or an increased amount of beef is preferred for certain purposes, see Note 2, page 606.

Other meats, such as beef heart or veal, are employed for the preparation of broths; these broths bear the names of the respective meats used, such as Beef Heart Broth or Veal Broth.

Nutrient Broth for Water Analysis

Beef Extract	3 Gm.
Peptone	5 Gm.
Distilled Water	1000 cc.
Sodium Hydroxide, 1 *N*, a sufficient quantity,	

Dissolve the beef extract and the peptone in the distilled water with the aid of heat. Add sufficient 1 *N* sodium hydroxide so that the *p*H after sterilization will be between 6.4 and 7.0. Bring to a boil, cool to room temperature, make up the lost weight with distilled water and filter. Sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure).

Brain Broth, Brain Bouillon, Dextrose Brain Broth N. F.

Sodium Chloride	3 Gm.
Dextrose	2 Gm.
Phenol red T.S.	10 cc.
Nutrient Broth (need not have been sterilized, but if not sterile must be freshly prepared)	1000 cc.
Calf Brain, cut into about 1 cm. cubes,	
Calcium Carbonate, in small fragments or granules,	
Sodium Citrate, of each, a sufficient quantity.	

Dissolve the sodium chloride, dextrose, and phenol red T.S. in the nutrient broth and half fill 200 mm. culture tubes with the solution. Add to each tube three cubes of the calf brain and several granules of calcium carbonate. Sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure). If the Brain Broth is to be used for blood cultures, dissolve 5 Gm. of sodium citrate in each liter before tubing.

Brain-Heart Infusion Broth N. F.

Calf Brain, free from fat and finely minced	200 Gm.
Beef Heart, free from fat and finely minced	250 Gm.
Peptone	10 Gm.
Sodium Chloride	5 Gm.
Sodium Phosphate	2.5 Gm.
Dextrose	2.0 Gm.
Sodium Hydroxide, 1 *N*,	
Distilled Water, each, a sufficient quantity,	
To make	1000 cc.

Thoroughly mix the calf brain and beef heart with 1000 cc. of distilled water and keep under refrigeration for 12 to 24 hours. Strain the mixture through cheesecloth, squeezing the meat as dry as possible. Heat the liquid in a boiling

water bath for 30 minutes with frequent stirring; filter and add sufficient distilled water to make 1000 cc. Add the peptone, sodium chloride, and sodium phosphate and dissolve them by the aid of heat if necessary. Add the dextrose and sufficient normal sodium hydroxide to raise the *p*H to 7.6 or to 0.2 higher than the *p*H desired in the finished broth. Heat in a boiling water bath for 20 minutes, filter, and if the filtrate measures less than 1000 cc. add sufficient distilled water to make 1000 cc. Sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure).

Calcium Carbonate Broth N. F.

Dextrose	1.0 Gm.
Calcium Carbonate, sterile	1.0 Gm.
Nutrient Broth (need not have been sterilized or the *p*H adjusted, but if not sterile must be freshly prepared)	100 cc.

Sodium Hydroxide, 1 *N*, a sufficient quantity.

Dissolve the dextrose in the nutrient broth and add sufficient 1 *N* sodium hydroxide to raise the *p*H to 7.6, or to 0.2 higher than the *p*H desired in the finished broth. Add the calcium carbonate (powdered or in small pieces and previously sterilized by heating in a hot air oven at 160° for at least 1 hour) and sterilize by Process D, see page 752.

Carbohydrate-free Broth N. F.

Nutrient Broth (need not have been sterilized or the *p*H adjusted, but if not sterile must be freshly prepared)	1000 cc.

Sodium Hydroxide, 1 *N*, a sufficient quantity.

Add 10 cc. of a 24-hour-old broth culture of *Escherichia coli* and incubate for 48 hours. Heat in an Arnold steam sterilizer at 100° for 60 minutes, cool, and place in the refrigerator. Fill two fermentation tubes with this medium, reinoculate them with the culture of *E. coli* and incubate for 24 hours. If no gas is produced, add sufficient 1 *N* sodium hydroxide to raise the *p*H to 0.2 higher than the *p*H desired in the finished broth and sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure).

Dunham's Peptone Broth, Peptone Water N. F.

Peptone	10 Gm.
Sodium Chloride	5 Gm.
Distilled Water	1000 cc.

Sodium Hydroxide, 1 *N*, a sufficient quantity.

Dissolve the peptone and sodium chloride in the distilled water by the aid of heat. Add sufficient 1 *N* sodium hydroxide to raise the *p*H to 7.6 to 7.8. Cool, filter, and sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure).

The peptone to be used must contain sufficient available tryptophane to yield a positive response in the indole test.

Glycerin Broth, Glycerin Bouillon N. F.

Glycerin	6 cc.
Nutrient Broth (need not have been sterilized or the *p*H adjusted, but if not sterile must be freshly prepared)	94 cc.
Sodium Hydroxide, 1 *N*, a sufficient quantity.	

Mix the glycerin with the nutrient broth and add sufficient 1 *N* sodium hydroxide to raise the *p*H to 7.2, or to 0.2 higher than the *p*H desired in the finished broth. Sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure).

Glycerin Broth with a reduced amount of glycerin is preferred for certain purposes, see Note 2, page 606.

Liver Infusion Broth N. F.

Beef Liver, minced	500 Gm.
Peptone	10 Gm.
Sodium Chloride	5 Gm.
Crystal Violet (optional)	0.1 Gm.
Egg Albumen	10 Gm.
Sodium Hydroxide, 1 *N*, Distilled Water, each, a sufficient quantity, To make	1000 cc.

Mix the beef liver with 500 cc. of distilled water and heat in a boiling water bath for 20 minutes; stir well and continue heating for 1 hour. Filter through a wire sieve and then through glass wool. Dissolve the peptone and sodium chloride in the filtrate and, if it is desired to inhibit Gram-positive bacteria, the crystal violet; then add 450 cc. of distilled water. Add sufficient 1 *N* sodium hydroxide to raise the *p*H to 7.0, or to 0.2 higher than the *p*H desired in the finished broth. Dissolve the egg albumen in 50 cc. of distilled water and stir this into the solution at a temperature not exceeding 50°. Heat in a boiling water bath for 90 minutes. Filter through a wire sieve and then through glass wool and add sufficient distilled water through the filter to make 1000 cc. Sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure).

Nutrient Agar, Beef Extract Agar, Beef Infusion Agar N. F.

Agar, finely shredded or powdered	15 Gm.
Nutrient Broth (need not have been sterilized or the *p*H adjusted, but if not sterile must be freshly prepared)	1000 cc.

Dissolve the agar in the broth by means of heat. If clarification is desired, filter the medium while hot through cotton enclosed in gauze and into suitable containers. Sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure).

A medium with an increased or decreased amount of agar is preferred for certain purposes, see Note 2, page 606.

Tubes containing the liquefied Nutrient Agar to about one-fourth of their

capacity may be inclined on a rack until the medium is solidified so as to form long slants.

The *p*H of unadjusted Nutrient Agar approximates 7.0.

Nutrient Agar for Water Analysis

Agar, finely shredded or powdered	15 Gm.
Peptone	5 Gm.
Beef Extract	3 Gm.
Distilled Water	1000 cc.

Sodium Hydroxide, 1 *N*, a sufficient quantity.

Dissolve the agar in 800 cc. of distilled water by means of heat. Dissolve the peptone and beef extract in 200 cc. of distilled water. Mix the two solutions. Add sufficient 1 *N* sodium hydroxide to raise the *p*H to 7.0, or to 0.2 higher than the *p*H desired in the finished medium. If clarification is desired, filter the medium while hot through cotton enclosed in gauze into suitable containers. Sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure).

Glycerin Agar N. F.

Glycerin	6 cc.
Nutrient Agar (need not have been sterilized or the *p*H adjusted, but if not sterile must be freshly prepared), a sufficient quantity, To make	100 cc.

Mix the glycerin with the nutrient agar, liquefied by means of heat. Adjust the *p*H to 7.2. Sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure).

Liver Infusion Agar

Prepare as directed under Nutrient Agar, except to substitute Liver Infusion Broth for Nutrient Broth.

Nutrient Gelatin, Beef Extract Gelatin, Beef Infusion Gelatin N. F.

Gelatin, suitable for bacteriological media	150 Gm.
Nutrient Broth (need not have been sterilized or the *p*H adjusted, but if not sterile must be freshly prepared)	1000 cc.

Sodium Hydroxide, 1 *N*, a sufficient quantity.

Dissolve the gelatin in the nutrient broth by heating on a water bath, and add sufficient 1 *N* sodium hydroxide to raise the *p*H to 7.4. If clarification is desired, filter the medium while hot through cotton enclosed in gauze into suitable containers. Sterilize by Process D, see page 752, or by any other adequate and suitable method.

If a medium with an increased or decreased amount of gelatin is preferred, as the average temperature at which it is to be used varies, see Note 2, page 606.

Nutrient Gelatin is not placed in the incubator at a temperature higher than 25° (see Note 3, page 606).

Nutrient Gelatin for Water Analysis

Beef Extract	3 Gm.
Peptone	5 Gm.
Gelatin	120 Gm.
Distilled Water	1000 cc.
Sodium Hydroxide, 1 *N*, a sufficient quantity	

Dissolve the beef extract, peptone, and gelatin in the distilled water by heating to 65°. Make up any lost weight with distilled water and add sufficient 1 *N* sodium hydroxide so that the *p*H after sterilization will be between 6.4 and 7.0. Boil vigorously, again make up any lost weight and clarify. Sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure).

CARBOHYDRATE MEDIA

Blood (or Blood Serum)-Glucose-Cystine Agar N. F.

Cystine	0.5 Gm.
Blood (or Blood Serum), sterile	25 cc.
Dextrose Agar	500 cc.

Melt the dextrose agar and add the cystine aseptically, and cool to 45°. Aseptically add the blood or blood serum and rotate until the contents are well mixed. Tube and slant. Take all precautions against contamination.

Carbohydrate or "Sugar" Broths or Bouillons N. F.

The Carbohydrate	10 Gm.
Nutrient Broth (need not have been sterilized, but if not sterile must be freshly prepared)	1000 cc.

Dissolve the carbohydrate in the nutrient broth, using gentle heat if necessary, filter into suitable containers, and sterilize by Process D, see page 752, or by any other adequate and suitable method.

Carbohydrate Broths may contain indicators for designating the hydrogen-ion concentration or for other purposes.

A broth with an increased or decreased amount of the carbohydrate is preferred for certain purposes, see Note 2, page 606.

The name of the carbohydrate and occasionally the name of the indicator is given in the title of the broth, such as: *Arabinose Broth, Dextrin Broth, Dextrose Broth, Dulcitol Broth, Galactose Broth, Inulin Broth, Litmus-Lactose Broth, Maltose Broth, Mannitol Broth, Rhamnose Broth, Sucrose Broth, Xylose Broth, etc.*

Dextrose Agar N. F.

Dextrose	10 Gm.
Nutrient Agar (need not have been sterilized, but if not sterile must be freshly prepared)	1000 cc.

Dissolve the dextrose in the liquefied nutrient agar by means of heat, pour the hot product into suitable containers, and sterilize by Process D, see page 752, or by any other adequate and suitable method.

One per cent of Andrade indicator, or sufficient azolitmin solution or bromocresol purple solution to color may be added to this medium.

Tubes of Dextrose Agar may be slanted if desired.

Dextrose Brain Broth Agar N. F.

Agar, finely shredded or powdered	8 Gm.
Dextrose Broth (need not have been sterilized, but if not sterile must be freshly prepared)	1000 cc.
Calf Brain	
Calcium Carbonate	

Dissolve the agar in the dextrose broth with the aid of heat. Tube, add the calf brain and calcium carbonate, and sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure).

Azolitmin Lactose Agar N. F.

Lactose	10 Gm.
Azolitmin Solution	20 cc.
Distilled Water	50 cc.
Nutrient Agar (need not have been sterilized or the *p*H adjusted, but if not sterile must be freshly prepared)	950 cc.

Dissolve the lactose in the distilled water with the aid of heat and add to the liquefied nutrient agar; then add the azolitmin solution and mix well. Filter the hot product into suitable containers and sterilize by Process D, page 752, or by any other adequate and suitable method. The *p*H approximates 7.0 after the medium is sterilized.

Milk, Litmus or Bromocresol Purple

Litmus Milk is prepared in the same manner as plain milk, with the addition, just before tubing, of about 8 per cent of Litmus T.S. or of azolitmin solution to color.

Bromocresol Purple Milk is prepared by using bromocresol purple solution as the indicator.

Milk, Plain

Place fresh unpasteurized milk in the refrigerator for from 12 to 24 hours. Remove the cream from the top or siphon off the milk from below the cream line and place the skimmed milk in suitable containers. Sterilize by Process D, see page 752, or by any other adequate and suitable method.

Potato Cylinders

Large white potatoes are scrubbed thoroughly, boiled for 20 minutes, and pared. Cut cylinders from the potatoes with an apple corer or large cork borer and obliquely cut the cylinders into wedge-shaped pieces. Place each wedge-shaped piece in a culture tube, add water to cover the butt, but not the slant, and sterilize by heating in an autoclave for 30 minutes at 121.5° (about 15 pounds pressure).

DIFFERENTIAL MEDIA

Bismuth Sulfite Agar

A. Agar Base

Agar, granulated or powdered	20 Gm.
Beef Extract	5 Gm.
Peptone	10 Gm.
Distilled Water, hot, a sufficient quantity, To make	1000 Gm.

Dissolve the ingredients by autoclaving at 121.5° (about 15 pounds pressure) for 20 minutes. Cool, and store in a refrigerator.

B. Bismuth Sulfite Mixture

Bismuth Ammonium Citrate, scales	6 Gm.
Sodium Sulfite, anhydrous	10–20 Gm.
Dextrose	10 Gm.
Sodium Phosphate, anhydrous	10 Gm.
Distilled Water	200 cc.

Dissolve the bismuth ammonium citrate in 50 cc. of boiling, distilled water and the sodium sulfite separately in 100 cc. of boiling distilled water. Mix the bismuth and sulfite solutions and while boiling dissolve the sodium phosphate. Allow the solution to cool and add the dextrose previously dissolved in 50 cc. of boiling distilled water. Add water, if necessary, to make up lost weight and store in a dark cupboard.

C. Iron Citrate Brilliant Green Solution

Ferric Citrate	1 Gm.
Brilliant Green, 1 per cent solution	12.5 cc.
Distilled Water	100 cc.

Dissolve the ferric citrate in the distilled water with the aid of heat. Add the brilliant green solution and store in a dark cupboard.

D. The Finished Medium

Bismuth Sulfite Mixture B	200 cc.
Iron Citrate Brilliant Green Solution C	45 cc.
Agar Base A	1000 cc.

Melt the agar base, add the remaining solutions, and shake well. Pour immediately into porous-top petri dishes. After keeping at room temperature for 1 to 2 hours, store in a refrigerator until required.

NOTE: The special requirements of this medium and the fact that it cannot be stored satisfactorily when prepared make the use of the dehydrated product desirable.

Conradi-Drigalski Agar N. F.

Beef Extract	4 Gm.
Peptone	10 Gm.
Sodium Chloride	5 Gm.
Agar, finely shredded	20 Gm.
Lactose	15 Gm.
Nutrose	10 Gm.
Sodium Hydroxide, 1 *N*	50 cc.
Crystal Violet, 1:1000 aqueous solution	10 cc.
Distilled Water	1000 cc.

Litmus T.S., a sufficient quantity.

Dissolve the beef extract, peptone, sodium chloride, agar, nutrose, and 1 *N* sodium hydroxide solution in the water with the aid of heat, preferably in an autoclave. Adjust the reaction to a distinct alkalinity to litmus T.S., filter through cotton while hot, add the lactose and crystal violet solution and gently reheat if necessary to dissolve the lactose. Sterilize by Process D, see page 752, or by any other adequate and suitable method.

Bromocresol purple indicator may be used in place of the litmus T.S. if preferred.

Desoxycholate Agar

Peptone	10 Gm.
Agar	15 Gm.
Lactose	10 Gm.
Sodium Desoxycholate	0.5 Gm.
Sodium Chloride	5 Gm.
Sodium Citrate	2 Gm.
Neutral Red, 0.1 per cent in alcohol	35 cc.
Distilled Water	1000 cc.

Sodium Hydroxide, 1 *N*, a sufficient quantity.

Dissolve the peptone in the distilled water by gently heating and add sufficient 1 *N* sodium hydroxide to adjust the *p*H to 7.5. Boil and filter if necessary. Dissolve the agar in the peptone solution by boiling and add the remaining ingredients, excepting the neutral red solution, in the order named. Again adjust the *p*H to 7.5, replace any water lost by evaporation, add the neutral red solution, distribute in tubes, and sterilize by Process D, page 752.

NOTE: The special requirements of this medium and the fact that it cannot be stored satisfactorily when prepared make the use of the dehydrated product desirable.

Leifson's Desoxycholate Citrate Agar

Solution A

Pork, fresh, lean ground	400 Gm.
Hydrochloric Acid, 1 *N*	2 cc.
Distilled Water	1200 cc.

Sodium Hydroxide, 1 *N*, a sufficient quantity.

Add the distilled water to the pork and macerate for 1 hour. Add the hydrochloric acid, with stirring, and boil for 5 minutes. Strain through cheesecloth and filter through paper until free from visible fat. Adjust the *p*H to 8, boil for 10 minutes and filter. Restore the original volume, adjust to *p*H 7.4 and sterilize by Process C, page 751, for 30 minutes at 121.5° (about 15 pounds pressure). Cool and store in a refrigerator.

Solution B

Peptone	1 Gm.
Agar	2 Gm.
Lactose	1 Gm.
Sodium Citrate	2 Gm.
Ferric Ammonium Citrate	0.2 Gm.
Sodium Desoxycholate	0.5 Gm.
Neutral Red, 0.1 per cent solution	2 cc.
Solution A	100 cc.

To 100 cc. of *Solution A* add the peptone and agar and boil for 3 minutes. After standing for 15 minutes, dissolve the lactose, sodium citrate, ferric ammonium citrate, and sodium desoxycholate in the mixture. Adjust the *p*H to 7.3 to 7.5 and add the neutral red solution. Sterilize by Process D, page 752, for 15 minutes and dispense in sterile petri dishes.

Excessive heat is detrimental to the medium.

NOTE: The special requirements of this medium and the fact that it cannot be stored satisfactorily when prepared make the use of the dehydrated product desirable.

Endo's Medium (*Levine*) *N. F.* (For Colon-Typhoid Differentiation)

Lactose	10.0 Gm.
Sodium Carbonate, anhydrous	1.0 Gm.
Basic Fuchsin	0.3 Gm.
Sodium Bisulfite	1.0 Gm.
Alcohol	5.0 cc.
Distilled Water	35.0 cc.
Nutrient Agar (need not have been sterilized, but if not sterile must be freshly prepared)	960.0 cc.

Dissolve the lactose in the hot liquefied nutrient agar, the sodium carbonate in 10 cc. of distilled water, the basic fuchsin in the alcohol, and the sodium bisulfite in 25 cc. of distilled water. Add the sodium carbonate solution, the fuchsin solution, and the sodium bisulfite solution to the nutrient agar solution, mixing well after each addition. Place in suitable containers, and sterilize by Process D, page 752, or by any other adequate and suitable method.

Endo's Medium has a red or pink color when hot, which becomes a faint flesh color or disappears upon cooling. It has a *p*H of 7.6 to 8.0. It is preferable to prepare Endo's Medium freshly as needed as it deteriorates upon standing, especially if exposed to light,

Eosin-Methylene Blue Agar (*Levine*) (Coli-acrogenes Differentiation)

Peptone	10 Gm.
Dibasic Potassium Phosphate	2 Gm.
Agar, finely shredded	15 Gm.
Lactose, sterile 20 per cent aqueous solution	50 cc.
Eosin Y, sterile, 2 per cent aqueous solution	20 cc.
Methylene Blue, sterile, 0.5 per cent aqueous solution	20 cc.
Distilled Water	1000 cc.

Dissolve the peptone, dibasic potassium phosphate, and agar in the distilled water by heating in an autoclave for 15 minutes at 15 pounds pressure or by boiling in a water bath. Replace any of the water lost by heating. Adjustment of the *p*H and filtration of the medium are not required. Place 100-cc. quantities in flasks, and sterilize by heating in an autoclave for 15 minutes at 121.5° (about 15 pounds pressure).

Just prior to use, liquefy the medium with the aid of heat and to each flask containing 100 cc. aseptically add 5 cc. of the lactose solution, 2 cc. of the eosin Y solution, 2 cc. of the methylene blue solution, and mix well.

Krumwiede's Triple Sugar Agar

Lactose	10 Gm.
Sucrose	10 Gm.
Dextrose	1 Gm.
Phenol Red T.S.	10 cc.
Nutrient Agar (need not have been sterilized but if not sterile must be freshly prepared)	1000 cc.

Dissolve the lactose, sucrose, and the dextrose in the hot liquefied nutrient agar. Add the phenol red T.S., mix thoroughly, and pour into culture tubes. Sterilize by Process D, page 752, or by any other adequate and suitable method. The final *p*H should approximate 7.4.

Lead Acetate Agar N. F.

Lead Acetate, neutral, sterile 0.5 per cent aqueous solution	1 cc.
Lactose, sterile 25 per cent aqueous solution	4 cc.
Dextrose, sterile 25 per cent aqueous solution	4 cc.
Nutrient Agar	100 cc.

Melt the nutrient agar, cool to 50°, aseptically add the solutions, and mix well.

MacConkey's Agar

Agar, granulated or powdered	15 Gm.
Peptone	20 Gm.
Sodium Chloride	5 Gm.
Lactose	10 Gm.
Sodium Glycocholate	5 Gm.
Neutral Red, 1 per cent solution	5 cc.
Sodium Hydroxide, 1 *N*,	
Distilled Water, each, a sufficient quantity,	
To make	1000 cc.

Dissolve the agar in 500 cc. of distilled water by heating in an autoclave. Dissolve the peptone, sodium chloride, lactose, and bile in about 450 cc. of distilled water by heating on a water bath. Add sufficient 1 *N* sodium hydroxide to raise the *p*H to 7.4 and sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure). The neutral red is added to the molten agar just prior to use.

Russell's Double Sugar Agar N. F. (Colon-Typhoid-Paratyphoid Differentiation)

Lactose	10 Gm.
Dextrose	1 Gm.
Phenol Red T.S.	10 cc.
Nutrient Agar (need not have been sterilized, but if not sterile must be freshly prepared)	1000 cc.

Dissolve the lactose and dextrose in the hot liquefied nutrient agar. Add the phenol red, mix thoroughly, and pour into culture tubes. Sterilize by Process D, see page 752, or by any other adequate and suitable method. The final *p*H should approximate 7.4.

Ashworth's Agar

Agar	25 Gm.
Dibasic Potassium Phosphate	1 Gm.
Calcium Chloride	0.1 Gm.
Magnesium Sulfate	0.1 Gm.
Sodium Chloride	0.1 Gm.
Ferric Chloride	0.01 Gm.
Beef Extract	5 Gm.
Bromothymol Blue, 1.5 per cent	10 cc.
Urea	20 Gm.
Distilled Water, a sufficient quantity, To make	1000 cc.

Dissolve all of the ingredients except the urea in the distilled water with the aid of gentle heat. Sterilize by Process C, page 752, at 121.5° (about 15 pounds pressure) and add the urea aseptically.

NOTE: The special requirements of this medium and the fact that it cannot be stored satisfactorily when prepared make the use of the dehydrated product desirable.

ENRICHMENT MEDIA

Ascitic Agar N. F.

Ascitic Fluid, sterile	200 cc.
Nutrient Agar	1000 cc.

Liquefy the agar, cool to 50°, aseptically add the ascitic fluid previously warmed to about 50°, and mix well by rotation.

Ascitic Broth, Ascitic Bouillon N. F.

Ascitic Fluid, sterile	200 cc.
Nutrient Broth	1000 cc.

Aseptically add the ascitic fluid to the nutrient broth and mix well.

Blood Agar N. F.

Blood, defibrinated or citrated, and sterile	50 to 100 cc.
Nutrient Agar	950 to 900 cc.

Liquefy the nutrient agar and cool to 50°. Aseptically add the blood previously warmed to about 50° and mix well.

Blood Broth, Blood Bouillon N. F.

Blood, defibrinated or citrated, and sterile	50 to 100 cc.
Nutrient Broth	950 to 900 cc.

Aseptically add the blood to the nutrient broth and mix well.

Blood Serum Agar N. F.

Blood Serum, sterile	50 to 100 cc.
Nutrient Agar	950 to 900 cc.

Liquefy the nutrient agar and cool to 50°. Aseptically add the blood serum previously warmed to 50° and mix well.

Blood Serum Broth, Blood Serum Bouillon N. F.

Blood Serum, sterile	50 to 100 cc.
Nutrient Broth	950 to 900 cc.

Aseptically add the blood serum to the nutrient broth and mix well.

Brain Ascitic Agar N. F.

Ascitic Fluid, sterile	200 cc.
Agar, finely shredded	8 Gm.
Calf Brain, cut into about 1 cm. cubes	
Calcium Carbonate, in small fragments or granules	
Dextrose Broth (need not have been sterilized, but if not sterile must be prepared freshly)	1000 cc.

Dissolve the agar in the dextrose broth with the aid of heat and sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure). Using 200 mm. tubes, place three cubes of the calf brain and two or three pieces of calcium carbonate in each and sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure). Liquefy the agar and cool to 50°, aseptically add the ascitic fluid, mix well and pour aseptically into the previously sterilized tubes until each is about half filled.

Chocolate Agar N. F.

This is prepared in the same manner as Blood Agar, see page 619, except that the blood is added to the liquefied agar, mixed well avoiding air bubbles, and the temperature is then slowly raised to 95°.

Dorset's Egg Medium

Eggs	4
Distilled Water	25 cc.

Phenol, 5 per cent aqueous solution, a sufficient quantity.

Wash the eggs with water, then with the phenol solution and allow them to dry in a sterile covered beaker. Open the eggs by making holes in each end and collect the contents in a flask. Add the distilled water, mix thoroughly, and place in culture tubes. Coagulate the liquid at a temperature between 80° and 90° with the tubes usually in a slanting position and sterilize the coagulated mixture by Process D, see page 752, or by any other adequate and suitable method.

Loeffler's Blood Serum N. F.

Blood Serum, sterile	750 cc.
Dextrose Broth, *p*H 6.8 to 7.0	250 cc.

Mix them in a sterile flask. Into sterilized culture tubes pour suitable quantities of the mixture to form long slanted surfaces of the liquid when the tubes are in a slanting position. Coagulate at a temperature between 80° and 90° and sterilize the coagulated mixture by Process D, page 752, or by any other adequate and suitable method.

Selenite-F Broth N. F.

Sodium Selenite	4 Gm.
Peptone	5 Gm.
Lactose	4 Gm.
Sodium Biphosphate	10 Gm.
Distilled Water	1000 cc.

Sodium Hydroxide, 1 *N*, a sufficient quantity.

Add the ingredients in the order named to 800 cc. of distilled water and dissolve with the aid of gentle heat. Add sufficient 1 *N* sodium hydroxide to raise the *p*H to 7.0 to 7.1, add the remainder of the distilled water, dispense in tubes and sterilize by Process D, page 752.

NOTE: The special requirements of this medium and the fact that it cannot be stored satisfactorily when prepared make the use of the dehydrated product desirable.

SPECIAL MEDIA

Avery's Broth N. F.

Beef Infusion Broth, *p*H 7.4 to 7.8	100 cc.
Dextrose, sterile 20 per cent aqueous solution	5 cc.
Blood (of rabbits), defibrinated and sterile	5 cc.

Aseptically add the dextrose solution and the blood to the beef infusion broth and mix well.

Brilliant Green-Bile-Lactose Peptone

Lactose	10 Gm.
Peptone	10 Gm.
Ox Bile	20 Gm.
Brilliant Green, 0.1 per cent solution	13.3 cc.
Sodium Hydroxide, 1 *N*,	
Distilled Water, each, a sufficient quantity,	
To make	1000 cc.

Dissolve the lactose, peptone, and ox bile in 900 cc. of distilled water by the aid of gentle heat. Add sufficient 1 *N* sodium hydroxide to raise the *p*H to 7.4, add the brilliant green solution and sufficient distilled water to make 1000 cc. Filter and sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure).

Bordet-Gengou Potato Medium

Potato	125 Gm.
Glycerin	10 cc.
Sodium Chloride	5 Gm.
Agar, finely shredded	30 Gm.
Blood, sterile,	
Distilled Water, each, a sufficient quantity.	

Mix the potato, glycerin, and 250 cc. of distilled water and heat the mixture in an autoclave for 30 minutes at 121.5° (about 15 pounds pressure). Decant the supernatant liquid or strain through a metal strainer. To 250 cc. of this potato extract add the sodium chloride, the agar, and 750 cc. of distilled water. Dissolve the agar by the aid of heat, preferably in an autoclave. Filter through cotton and paper. Sterilize by heating in an autoclave for 30 minutes at 121.5° (about 15 pounds pressure). For use, melt the stock medium as prepared above, cool to 50°, to each four parts aseptically add one part of the blood, and mix well.

Cooked Meat Medium N. F.

Prepare beef heart broth preferably, or beef infusion broth, adjust to *p*H 8.4 or make slightly alkaline to litmus, and heat in an Arnold sterilizer. Place some of the pressed-out meat used in preparing the broth in each of several culture tubes to the height of 2 to 3 cm. and add 10 to 12 cc. of the broth. Sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure).

Unless the tubes have been sealed to exclude oxygen by the addition of 1 to 2 cc. of melted petrolatum to each tube before autoclaving, boil the culture tubes, just before inoculation, in a water bath for 10 minutes to remove any absorbed oxygen, and cool to 45°.

Corper's Crystal-Violet Potato Medium

Potatoes,
Sodium Carbonate, Anhydrous,
Crystal Violet,
Glycerin, 6 per cent aqueous solution,
Distilled Water, each, a sufficient quantity.

With a 15 mm. cork borer, cut from the potatoes cylinders about 75 mm. long. Obliquely cut each cylinder so as to form long slanting surfaces. Dissolve the anhydrous sodium carbonate and crystal violet in distilled water to give a solution containing 1 per cent anhydrous sodium carbonate and 0.0015 per cent crystal violet. Soak the potato slants in this solution until they acquire a faint blue tint (2 hours or less). Wipe each potato slant with a clean towel and place in a 150-mm. culture tube containing 1.5 cc. of the glycerin solution. Sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure).

Lauryl Sulfate-Lactose Broth N. F.

Peptone	20	Gm.
Lactose	5	Gm.
Potassium Phosphate, Dibasic	2.75	Gm.
Potassium Phosphate, Monobasic	2.75	Gm.
Sodium Chloride	5	Gm.
Sodium Lauryl Sulfate	0.1	Gm.
Distilled Water, a sufficient quantity,		
To make	1000	cc.

Dissolve the ingredients in 1000 cc. of cold distilled water. Dispense in tubes with inverted vials, 10 cc. per tube. Sterilize by heating in an autoclave for 15 minutes at 121.5° (about 15 pounds pressure). The final *p*H should be approximately 6.8.

For certain purposes this medium is made so that the ingredients are present in a proportion per 1000 cc. of one and one-half times the amounts listed above. In such case the medium is tubed as above, but in 20 cc. quantities.

Nitrate Broth N. F.

Potassium Nitrate	0.2	Gm.
Peptone	10	Gm.
Distilled Water	1000	cc.
Sodium Hydroxide, 1 *N*, a sufficient quantity.		

Dissolve the potassium nitrate and peptone in the distilled water by the aid of heat. Add sufficient 1 *N* sodium hydroxide to raise the *p*H to 7.4 to 7.6. Filter, and sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure).

Petroff's Medium

Beef, free from fat and finely minced	500	Gm.
Glycerin	75	cc.
Distilled Water	425	cc.
Eggs,		
Alcohol, 70 per cent aqueous solution,		
Crystal Violet, 1 per cent alcoholic solution, each, a sufficient quantity.		

Mix the glycerin and the water, add the meat, mix thoroughly, allow to stand for from 12 to 24 hours in a refrigerator, then strain through cheesecloth squeezing the meat as dry as possible. Filter the liquid through cotton and paper and then sterilize by filtration through a sterile filter.

Immerse the eggs in the alcohol for a few minutes. Remove them with sterile tongs, break them with a sterile spatula, pour the yolk and albumen into a sterile flask or beaker, and beat well with a sterile glass rod. Mix one volume of the previously prepared meat juice with two volumes of the beaten egg and to each 100 cc. of this mixture add 1 cc. of the crystal violet solution. Place in culture tubes, coagulate and sterilize by heating at 80° to 85° for 45 minutes on three successive days.

Ordinarily 350 cc. of the meat juice, 28 large eggs, and 10 cc. of the crystal violet solution are required for 1000 cc. of medium.

If the medium is to be used for the isolation of bovine tubercle bacilli the glycerin should be omitted.

Sabouraud's Dextrose Agar (Weidman's Modification)

Peptone	10 Gm.
Agar, finely shredded	18 Gm.
Dextrose	40 Gm.
Distilled Water	1000 cc.

Dissolve the peptone, agar, and dextrose in the distilled water by the aid of heat, filter through cheesecloth, and sterilize by Process D, see page 752, or by any other adequate and suitable method.

Semi-solid Agar Medium N. F.

Proceed as directed under Nutrient Agar, see page 610, using 2 Gm. of agar for each 1000 cc. of nutrient broth.

Serum Water N. F.

Blood Serum	200 cc.
Andrade Indicator	10 cc.
Distilled Water	800 cc.

Mix them and sterilize by Process D, see page 752.

Serum Water, Hiss'

Blood Serum	25 cc.
Any Desired Sugar	1.0 Gm.
Andrade Indicator	1.0 cc.
Distilled Water	74 cc.

Add the blood serum to the distilled water and dissolve the sugar in this solution with the aid of gentle heat if necessary. Add the Andrade indicator, mix, and place in culture tubes. Sterilize by Process D, see page 752.

Voges-Proskauer Reaction Medium N. F.

Peptone	5 Gm.
Dextrose	5 Gm.
Dibasic Potassium Phosphate	5 Gm.
Distilled Water	1000 cc.

Dissolve the peptone, dextrose, and dibasic potassium phosphate in the distilled water with the aid of gentle heat if necessary, filter, and sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure).

The peptone must be of such a quality that it is capable of giving proper reactions with typical colonies.

INDICATORS

Andrade Indicator

Acid Fuchsin	0.5 Gm.
Distilled Water	100 cc.

Sodium Hydroxide, 1 *N*, a sufficient quantity.

Dissolve the acid fuchsin in the distilled water and add the normal sodium hydroxide in small portions to the solution until the color changes from red to orange or yellow. The change in color is slow toward the end point and the normal sodium hydroxide should be added a drop at a time, shaking well after each addition and waiting for several minutes after the addition of each few drops. About 16 cc. of the normal sodium hydroxide is usually required. Filter the solution and sterilize by heating in an autoclave for 20 minutes at 121.5° (about 15 pounds pressure).

Culture medium containing Andrade indicator is pink when hot; at room temperature it is pink when acid, colorless at *p*H 7.2, and colorless or pale yellow when more alkaline.

Azolitmin Solution

Azolitmin	1 Gm.
Distilled Water	80 cc.
Alcohol	20 cc.

Heat the distilled water, dissolve the azolitmin in it, add the alcohol, and mix.

Bromocresol Purple Solution

Bromocresol Purple	0.1 Gm.

Diluted Alcohol, a sufficient quantity,

To make	100 cc.

Dissolve the bromocresol purple in the diluted alcohol.

The *p*H range is from 5.2 to 6.8. Unless otherwise specified, 1 cc. is used for each 1000 cc. of medium.

Bromothymol Blue Solution

Bromothymol Blue	0.1 Gm.

Diluted Alcohol, a sufficient quantity,

To make	100 cc.

Dissolve the bromothymol blue in the diluted alcohol.

The *p*H range is 6.0 to 7.6. Unless otherwise specified, 1 cc. is used for each 1000 cc. of medium.

Litmus Test Solution

Litmus, powdered . . . . . 25 Gm.
Alcohol,
Distilled Water, each, a sufficient quantity.

Extract the litmus with three successive portions of 100 cc. each of boiling alcohol continuing each extraction for about 1 hour. Filter, wash with alcohol, and discard the alcohol solutions. Digest the residue with about 25 cc. of cold distilled water, filter, and discard the filtrate. Finally extract the residue with 125 cc. of boiling distilled water, cool, and filter.

Litmus turns red with acids and blue with alkalies. The *p*H range is from 4.5 to 8.3. Preserve litmus T.S. in wide-mouthed containers, stoppered with loose plugs of purified cotton.

Phenol Red Solution

Phenol Red . . . . . 0.1 Gm.
Diluted Alcohol, a sufficient quantity,
To make . . . . . 100 cc.

Dissolve the phenol red in the diluted alcohol.

The *p*H range is 6.8 to 8.4. Unless otherwise specified, 1 cc. is used for each 1000 cc. of medium.

STAINING SOLUTIONS

Dyes certified by the Biological Stain Commission are most suitable for preparing the following solutions; dyes of higher or lower dye content may be employed, if the proper adjustment is made in the quantity used.

"Gentian-violet" is a mixture of chemically allied dyes. "Crystal-violet" is the name of one of these, hexamethyl-pararosaniline chloride, in nearly pure form. The name of the mixture is retained in the titles of certain solutions, but the purer dye is required in the formulas.

Acid Fuchsin Solution

Acid Fuchsin . . . . . 1.0 Gm.
Diluted Hydrochloric Acid . . . . . 0.1 cc.
Distilled Water . . . . . 100 cc.

Add the diluted hydrochloric acid to the distilled water and dissolve the acid fuchsin in the solution.

Alcoholic Eosin Solution

Ethyl Eosin . . . . . 1.0 Gm.
Alcohol . . . . . 100 cc.

Dissolve the ethyl eosin in the alcohol.

Aqueous Eosin Solution

Eosin Y . . . . . 0.1 to 1.0 Gm.
Distilled Water . . . . . 100 cc.

Dissolve the eosin Y in the distilled water. Variation in the concentration of the solution is permitted for specific purposes.

Aqueous Methylene Blue Solution

Methylene Blue	1.0 Gm.
Distilled Water	100 cc.

Dissolve the methylene blue in the distilled water.

Basic Fuchsin Solution

Basic Fuchsin	60 mg.
Distilled Water	100 cc.

Dissolve the basic fuchsin in the distilled water.

Bismarck Brown Solution

Bismarck Brown Y	0.2 Gm.
Distilled Water	100 cc.

Heat the distilled water and dissolve the bismarck brown in it by agitation.

Delafield's Hematoxylin Solution

Ammonium Alum	6.0 Gm.
Hematoxylin	0.4 Gm.
Alcohol	2.5 cc.
Glycerin	10 cc.
Methanol	10 cc.
Distilled Water	40 cc.

Dissolve the ammonium alum in the distilled water, and the hematoxylin in the alcohol; mix the two solutions, and expose the mixture to light and air in an unstoppered bottle for four days or longer; then filter and add the glycerin and the methanol to the filtrate. Allow this to stand in a well-stoppered container preferably for at least 2 months, and filter if necessary until the solution is clear. Dilute with water as desired before using.

Ehrlich's Aniline Gentian Violet Solution

Crystal Violet	1.2 Gm.
Aniline	2 cc.
Alcohol	12 cc.
Distilled Water	98 cc.

Shake the aniline with the distilled water, allow the mixture to stand several minutes and filter until clear. Dissolve the crystal violet in the alcohol. Mix the two solutions.

Heidenhain's Hematoxylin Solution

1. Ferric Ammonium Sulfate	3 Gm.
Distilled Water	100 cc.

Dissolve the ferric ammonium sulfate in the distilled water.

2. Hematoxylin	0.5 Gm.
Distilled Water	100 cc.

Dissolve the hematoxylin in the distilled water. Allow the solution to stand in a well-stoppered container for 4 or 5 weeks and filter if necessary.

Mix equal parts of the two solutions just before using as a stain.

Hematoxylin and Eosin Solution

1. Hematoxylin	1.0 Gm.
Distilled Water	100 cc.

Dissolve the hematoxylin in the distilled water. Allow the solution to stand in a well-stoppered container for 4 or 5 weeks and filter if necessary.

2. Aqueous Eosin Solution

Mix equal parts of the two solutions just before using as a stain.

Hucker's Gentian Violet Solution

Crystal Violet	2.0 Gm.
Ammonium Oxalate	0.8 Gm.
Alcohol	20 cc.
Distilled Water	80 cc.

Dissolve the crystal violet in the alcohol, and the ammonium oxalate in the distilled water; mix the two solutions and filter.

The concentration of crystal violet may be varied as desired. Twenty cc. of alcohol solution of the dye is to be mixed with 80 cc. of aqueous solution of the ammonium oxalate.

Iodine Water

Iodine,
Distilled Water, each, a sufficient quantity.

Add iodine to distilled water and shake repeatedly during 24 hours to obtain a saturated solution.

Loeffler's Alkaline Methylene Blue Solution

Methylene Blue	0.3 Gm.
Alcohol	30 cc.
Potassium Hydroxide, 1:10,000 aqueous solution	100 cc.

Dissolve the methylene blue in the alcohol, add the potassium hydroxide solution, and mix.

Mallory's Stain

1. Acid Fuchsin	0.5 Gm.
Distilled Water	100 cc.

Dissolve the acid fuchsin in the distilled water.

2. Aniline Blue, Water-soluble	0.5 Gm.
Orange G	2.0 Gm.
Phosphotungstic Acid	1.0 Gm.
Distilled Water	100 cc.

Dissolve the aniline blue, orange G, and phosphotungstic acid in the distilled water.

Mayer's Hemalum Solution

Hematein	1 Gm.
Alum	50 Gm.
Alcohol	50 cc.
Water	1000 cc.

Dissolve the hematein in the alcohol, the alum in the water, and add the hematein solution to the alum solution slowly with constant stirring. Allow this to stand for several days and, before using, filter until the solution is clear.

Nicollé Carbol-Gentian Violet Solution

Crystal Violet	1.0 Gm.
Phenol	1.0 Gm.
Alcohol	10 cc.
Distilled Water	100 cc.

Dissolve the crystal violet in the alcohol, and the phenol in the distilled water; mix the solutions and filter.

Neutral Red Solution

Neutral Red	1.0 Gm.
Distilled Water	100 cc.

Dissolve the neutral red in the distilled water.

Pappenheim's Methyl Green-Pyronin Solution

Methyl Green	1.00 Gm.
Pyronin Y	0.25 Gm.
Phenol	2.0 Gm.
Alcohol	5 cc.
Glycerin	20 cc.
Distilled Water	100 cc.

Dissolve the methyl green in the alcohol. Mix the glycerin and distilled water and dissolve the pyronin Y and phenol in the mixture. Mix the two solutions and filter.

Safranin Solution

Safranin O	0.25 Gm.
Alcohol	10 cc.
Distilled Water	100 cc.

Dissolve the safranin O in the alcohol, add the distilled water, and mix.

Stirling's Gentian Violet Solution

Crystal Violet	5.0 Gm.
Aniline	2.0 cc.
Alcohol	10 cc.
Distilled Water	88 cc.

Mix the aniline with the alcohol and dissolve the crystal violet in the mixture; add the distilled water, mix well, let stand for 24 hours or longer, and filter.

Ziehl-Neelsen Carbol-Fuchsin Solution

Basic Fuchsin	0.3 Gm.
Alcohol	10 cc.
Liquefied Phenol	5 cc.
Distilled Water	95 cc.

Dissolve the basic fuchsin in the alcohol, and the liquefied phenol in the distilled water; mix the solutions.

SPECIAL STAINING TECHNICS

For Blood

Giemsa's Staining Solution

Azure II-Eosin	3.0 Gm.
Azure II	0.8 Gm.
Glycerin	250 Gm.
Methanol	250 Gm.

Mix the methanol and glycerin, warm to 60°, and dissolve the dyes in the mixture. Allow this to stand for about 24 hours and filter.

The dyes are sometimes combined and marketed in a dry form as Giemsa's Stain. A corresponding quantity of this may be substituted for the dyes.

Wright's Staining Solution

Methylene Blue	0.9 Gm.
Sodium Bicarbonate	0.5 Gm.
Eosin Y	1.0 Gm.
Distilled Water	600 cc.
Methanol, a sufficient quantity.	

Dissolve the methylene blue and sodium bicarbonate in 100 cc. of distilled water, place in containers so that the depth of the solution is not more than 6 cm., and heat in a steam sterilizer at 100° for 1 hour. Cool the solution and filter. Dissolve the eosin Y in 500 cc. of distilled water. Add this to the methylene blue solution, mix thoroughly, filter, and dry the precipitate. This is Wright's stain.

For use dissolve 0.1 Gm. of Wright's stain in 60 cc. of methanol, allow the solution to stand for a day or two and filter.

Wright's stain is marketed in a dry form and a corresponding quantity of this may be used in preparing the solution.

For Capsules

Hiss' Copper Sulfate Method

1. Ziehl-Neelsen Carbol-Fuchsin Solution, or a Gentian Violet Solution, see page 629.

2. Cupric Sulfate	20 Gm.
Distilled Water, a sufficient quantity, To make	100 cc.

Dissolve the cupric sulfate in the distilled water.

For Diphtheria Bacilli

Albert's Method

Albert's Staining Solution

Toluidine Blue	0.15 Gm.
Methyl Green	0.2 Gm.
Glacial Acetic Acid	1.0 cc.
Alcohol	2.0 cc.
Distilled Water	100 cc.

Dissolve the toluidine blue and methyl green in the distilled water and add the glacial acetic acid and alcohol. Mix, let the solution stand for 24 hours, and filter.

Iodine Solution

Iodine	2.0 Gm.
Potassium Iodide	3.0 Gm.
Distilled Water	300 cc.

Dissolve the iodine and potassium iodide in 10 cc. of distilled water and mix this solution with the remainder of the water. If desired, 60 cc. of the distilled water may be replaced by an equal volume of 5 per cent aqueous solution of sodium bicarbonate.

Neisser's Method

Neisser's Staining Solution

Methylene Blue	0.1 Gm.
Alcohol	2.0 cc.
Glacial Acetic Acid	5.0 cc.
Distilled Water, a sufficient quantity, To make	100 cc.

Dissolve the methylene blue in distilled water, add the alcohol, glacial acetic acid, and sufficient distilled water to make 100 cc., and mix.

Counterstain

Bismarck Brown Solution, see page 626.

Neisser's Method, Modified

1. Neisser's Staining Solution
2. Crystal Violet . . . . . 1.0 Gm.
   Alcohol . . . . . 10 cc.
   Distilled Water . . . . . 300 cc.

Dissolve the crystal violet in the alcohol, add this to the distilled water, and mix well.

3. Chrysoidin Y . . . . . 1.0 to 2.0 Gm.
   Distilled Water . . . . . 300 cc.

Heat the distilled water, dissolve the chrysoidin Y in it, and filter. The concentration may be varied as desired.

For use, mix two parts of solution 1 with one part of solution 2 and counterstain with solution 3.

Ponder-Kinyoun Staining Solution

Toluidine Blue	100 mg.
Azure A	10 mg.
Methylene Blue	10 mg.
Glacial Acetic Acid	1.0 cc.
Alcohol	5.0 cc.
Distilled Water	120 cc.

Dissolve the dyes in the alcohol, add the distilled water, then the glacial acetic acid, and let stand for 24 hours before using. Do not filter. One or two drops more of glacial acetic acid may be added to intensify the stain if it loses intensity on standing.

Gram's Staining Method

Stain

A Gentian Violet Solution, see page 628.

Gram's Iodine

Iodine	1.0 Gm.
Potassium Iodide	2.0 Gm.
Distilled Water	300 cc.

Dissolve the iodine and potassium iodide in 5 cc. of distilled water and mix this solution with the remainder of the water.

Decolorizer

(a) Alcohol
(b) Acetone

Counterstain

(a) Bismarck Brown Solution, see page 626.
(b) Aqueous Eosin Solution, see page 625.

(c) Fuchsin Solution

Ziehl-Neelsen Carbol-Fuchsin Solution	10 cc.
Distilled Water	90 cc.

Mix them.

(d) Safranin Solution, see page 628.

For Spirochetes

Fontana's Staining Method

Fixative

Glacial Acetic Acid	1.0 cc.
Formaldehyde Solution	20 cc.
Distilled Water	100 cc.

Mix them.

Mordant

Tannic Acid	5.0 Gm.
Phenol	1.0 Gm.
Distilled Water	100 cc.

Dissolve the tannic acid and phenol in the distilled water.

Stain

Silver Nitrate	5.0 Gm.
Distilled Water	100 cc.

Strong Ammonia Solution, a sufficient quantity.

Dissolve the silver nitrate in the distilled water. Reserve a few cc. of the silver nitrate solution. To the remainder add strong ammonia solution, dropwise, until the precipitate which forms redissolves. Then add the reserved silver nitrate solution, dropwise, until a slight cloud is produced and this persists after shaking. This solution will keep for several months.

India Ink Method

India Ink Suspension, homogeneous and free from gross particles and bacteria.

For Tubercle Bacilli

Ziehl-Neelsen Method

Stain

Ziehl-Neelsen Carbol-Fuchsin Solution, see page 629.

Decolorizer

(a) Nitric Acid	10 cc.
Distilled Water	90 cc.

Mix them.

(b) Nitric Acid or Hydrochloric Acid . . . . . 2 to 5 cc.
Alcohol . . . . . 95 cc.

Mix them. The acid and the concentration of the solution may be varied as desired.

(c) Orth's Acid Alcohol
Hydrochloric Acid . . . . . 3 cc.
Alcohol . . . . . 70 cc
Distilled Water, a sufficient quantity,
To make . . . . . 100 cc.

Mix them.

Counterstain

(a) Loeffler's Alkaline Methylene Blue Solution, see page 627.
(b) Trinitrophenol Solution

Trinitrophenol . . . . . 1.0 Gm.
Distilled Water . . . . . 100 cc.

Dissolve the trinitrophenol in the distilled water.

Gabbett's Method

1. Ziehl-Neelsen Carbol-Fuchsin Solution, see page 629.
2. Methylene Blue . . . . . 2.0 Gm.
Sulfuric Acid . . . . . 25 cc.
Distilled Water, a sufficient quantity,
To make . . . . . 100 cc.

Mix the sulfuric acid with the distilled water and dissolve the methylene blue in this solution.

Pappenheim's Method

1. Ziehl-Neelsen Carbol-Fuchsin Solution, see page 629.
2. Rosolic Acid . . . . . 1.0 Gm
Methylene Blue . . . . . 1.3 Gm.
Glycerin . . . . . 20 cc.
Alcohol . . . . . 100 cc.

Dissolve the rosolic acid in the alcohol, add the methylene blue, and shake until dissolved, then add the glycerin, mix well, and filter.

MISCELLANEOUS REAGENTS AND ACCESSORIES

Clearing and Dehydrating Agents

Alcohol

Carbol-Xylene

(a) Phenol . . . . . 5.0 Gm.
Xylene . . . . . 100 cc.
(b) Phenol . . . . . 33 Gm.
Xylene . . . . . 67 cc.

Diluted Alcohol

Clove Oil

Xylene

Embedding Agents

Collodion

See U. S. Pharmacopœia XIII.

Paraffin

See page 372.

Paraffin with a melting point of 50° to 52° is suitable for use at usual room temperature (not above 25°). At somewhat higher room temperatures paraffin with a melting point of 53° to 55° is preferred. In the tropics and at room temperatures above 33°, paraffin with a melting point of 56° to 61° is most suitable.

Fixatives

Bouin's Fluid

Formaldehyde Solution	25 cc.
Glacial Acetic Acid	5 cc.
Trinitrophenol,	
Distilled Water, each, a sufficient quantity.	

Add sufficient trinitrophenol to distilled water to make a saturated solution and maintain an excess of trinitrophenol. Decant or filter, and to 75 cc. of the clear saturated solution of trinitrophenol add the formaldehyde solution and the glacial acetic acid and mix.

Chromic Acid Solution

Chromium Trioxide	10 Gm.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Dissolve the chromium trioxide in the distilled water. For use, this solution is to be diluted with water as desired.

Flemming's Fluid

Chromium Trioxide	0.75 Gm.
Osmium Tetroxide	0.40 Gm.
Glacial Acetic Acid	1.0 to 5.0 cc.
Distilled Water, a sufficient quantity,	
To make	100 cc.

Dissolve the chromium trioxide in 75 cc. of distilled water and the osmium tetroxide in 20 cc. of distilled water, mix these solutions and add the glacial acetic acid. Prepare freshly, as needed.

The amount of glacial acetic acid may be varied as desired. Because of the very irritating properties of osmium tetroxide, a sealed vial containing 1 Gm. of it may be broken under 50 cc. of distilled water to obtain the 20 cc. of osmium tetroxide solution. To preserve the remainder store in a tight container protected from light.

Formaldehyde Solution

Formaldehyde Solution, diluted with water as desired.

Osmic Acid Solution

Osmium Tetroxide	1.0 Gm.
Distilled Water	100 cc.

Dissolve the osmium tetroxide in the distilled water. Because of the very irritating properties of osmium tetroxide, a sealed vial containing 1 Gm. of it may be broken under 100 cc. of distilled water to obtain the solution.

Preserve in a tight container protected from light.

Schaudinn's Fluid

Mercury Bichloride	15 Gm.
Alcohol	100 cc.
Distilled Water	200 cc.

Mix the alcohol and the distilled water and dissolve the mercury bichloride in the solution.

Zenker's Fluid

Mercury Bichloride	5.0 Gm.
Potassium Dichromate	2.5 Gm.
Glacial Acetic Acid	5 cc.
Distilled Water	100 cc.

With the aid of heat dissolve the mercury bichloride and the potassium dichromate in the distilled water contained in a flask or an enamelled pan. This is Zenker's stock solution.

Immediately before use, add the glacial acetic acid to the stock solution.

If *Formol-Zenker* is desired, mix 10 cc. of formaldehyde solution with 90 cc. of Zenker's stock solution.

Immersion Oil

Cedar Oil

Cedar oil especially prepared to have a refractive index of 1.515 at 18°.

Mounting Media

Canada Turpentine (*Canada Balsam, Fir Balsam*)

Canada Turpentine, dried to remove the volatile oil.
Xylene, each, a sufficient quantity.

Dry the Canada turpentine to remove the volatile oil and dissolve it in xylene. The solution may be thinned by adding xylene or thickened by evaporation.

Glycerin Jelly

Gelatin	40 Gm.
Arsenic Trioxide, saturated aqueous solution	200 cc.
Glycerin	120 cc.

Dissolve the gelatin in the aqueous solution of arsenic trioxide with the aid of gentle heat, add the glycerin, mix well, and cool.

Preserve in tight containers.

Gum Damar

Damar
Benzene or Xylene, either, a sufficient quantity.

Dissolve damar in benzene or xylene to obtain a thin syrupy solution. Filter if necessary to remove insoluble material and evaporate at about 35° to the proper consistency.

INGREDIENTS OF REAGENTS AND PREPARATIONS FOR USE IN THE CLINICAL LABORATORY

In this section, standards are specified for reagents, ingredients of preparations, and for dyes used as biological stains.

REAGENTS

In the absence of explicit directions, those described under the heading "General Tests for Purity of Reagents in U. S. P. XIII" are to be used for the determination of *insoluble matter*, *chloride*, *sulfate*, *heavy metals*, and *iron*.

DYES USED AS BIOLOGICAL STAINS

In the chapter on Reagents and Preparations for use in the Clinical Laboratory, formulas for the preparation of a limited number of staining solutions are included. Monographs on the dyes used in the preparation of these staining solutions are included in this section. In the individual monographs some of these dyes are designated as "certified biological." This designation indicates that specifications for these dyes are essentially the same as those established by the Biological Stain Commission,* which was organized in 1922, as a Committee of the National Research Council. Since 1923 it has been an independent organization and as such does not have official status under the terms of the Federal Food, Drug, and Cosmetic Act. For that reason, monographs for some of the more important stains on the certification list of the Biological Stain Commission are included in this section. The specifications for the dyes described in these monographs have been made to conform with those required for certification by the Biological Stain Commission. *The dyes described in this section are to be used only as biological stains, and notice is hereby given that under no circumstances may these dyes be used as coloring agents for foods, drugs, or cosmetics.* Dyes for the latter purposes must be certified by the Federal Security Agency, Food and Drug Administration, Washington, D. C., and few, if any of the biological stains described in these National Formulary monographs are eligible for such certification.

Absorption Ratio

In the directions for the determination of absorption ratio, the spectrophotometer is not described because of the number of different types of instruments available for this purpose. In stating the absorption ratio, (E) refers to the extinction coefficient,

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and this is the logarithm (expressed as a negative number) of the transmittancy (T), and (T) is the ratio of the intensity of the light emerging from the solution to the intensity of light entering it.

Assay

The assay procedures for the dyes used as biological stains depend upon the reduction of the dye with 0.1 N titanium trichloride. In these determinations the same procedure is to be followed as directed for the preparation of 0.1 N titanium trichloride, page 788.

Reagents

Absolute Alcohol—Use *Dehydrated Alcohol*, page 27.

Acetic Acid—Use *Acetic Acid*, page 18.

Acetic Acid, Diluted—Use *Diluted Acetic Acid*, page 19.

Acetic Acid, Glacial—Use *Glacial Acetic Acid*, U. S. P. XIII.

Acetic Anhydride—Use *Acetic Anhydride*, reagent grade, U. S. P. XIII.

Acetone—Use *Acetone*, page 20.

Acid Fuchsin, Certified Biological, is the disodium salt of the trisulfonic acid of rosaniline, $C_{20}H_{17}N_3O_9S_3Na_2$, or pararosaniline, $C_{19}H_{15}N_3O_9S_3Na_2$, or mixtures of these.

Description—The dye occurs as a moderately coarse powder or as small lumps, moderate olive to dark olive-green.

Solubility—One Gm. of the dye is soluble in 7 cc. of water; it is slightly soluble in alcohol.

Absorption ratio—To obtain a solution of suitable concentration for use in a spectrophotometer, dissolve the dye in alcohol: the absorption ratio of the dye in this solution (E at 530 millimicrons over E at 560 millimicrons) is not less than 0.75 and not more than 0.95.

Decolorization test—When observed by transmitted light through a layer 1 cm. deep: an aqueous solution of the dye (1 in 6000) is purplish red or red, the addition of 2 drops of hydrochloric acid to 10 cc. of this solution causes no change in color, but the addition of 2 drops of saturated aqueous solution of sodium hydroxide to 10 cc. of this solution makes it colorless; an alcohol solution of the dye (1 in 5000) is red-purple; a solution of the dye in sulfuric acid (1 in 5000) is yellowish orange, dilution of this solution with water changes the color to purplish pink.

Color characteristic—To 100 cc. of an aqueous solution of the dye (1 in 500) add 1 N sodium hydroxide in small portions, agitating well after each addition, until decolorization is complete: not more than 25 cc. of the 1 N sodium hydroxide is required.

Staining characteristics—Properly prepare sections of animal connective tissue, stain deeply for 30 minutes to 3 hours with alum-hematoxylin, rinse in distilled water, and stain for 3 to 5 minutes with a mixture of 5 cc. of aqueous solution of the dye (1 in 100) and 100 cc. of saturated aqueous solution of trinitrophenol. Wash in tap water, differentiate in 95 per cent alcohol, dehydrate, clear, and mount in xylene-balsam: nuclei, cytoplasm, fibroglia, fibrils, axis cylinders, neuroglia fibers, and fibrin are stained red which shows but slight tendency to fade.

Follow the directions given under certified biological aniline blue, staining characteristics, see page 641. The results are the same as those given on page 641.

Assay—Dissolve about 0.5 Gm., accurately weighed, of the dye in a mixture of 150 cc. of distilled water and 50 cc. of alcohol. Add about 10 Gm. of sodium bitartrate, heat to boiling and titrate with 0.1 *N* titanium trichloride to an end point of distinct change from red to yellow. Not less than 20.7 cc. of the standard solution is required per Gm. of dye, equivalent to 60 per cent of dye content on an equal mixture basis.

Agar—Use *Agar*, U. S. P. XIII.

Albumen—Use *Egg Albumen*, page 658.

Alcohol—Use *Alcohol*, U. S. P. XIII.

Alcohol, Diluted—Use *Diluted Alcohol*, U. S. P. XIII.

Alizarin Red—Use *Sodium Alizarinsulfonate*, reagent grade, U. S. P. XIII.

Alkaline Cupric Tartrate Test Solution—Use *Alkaline Cupric Tartrate Test Solution*, U. S. P. XIII.

Aminonaphtholsulfonic Acid, 1,2,4, $C_{10}H_5.NH_2.OH.SO_3H.{}^1/_2H_2O$—Colorless or slightly gray crystals, insoluble in water, alcohol, ether, or benzene. Soluble in hot solutions of sodium bisulfite with a blue fluorescence, or in dilute solutions of caustic alkalies.

Alkaline solutions are oxidized readily in the air; the oxidation product gives by warming in alkaline solution, a brown dye, which dissolves in hot water with a green color.

Silver ammonium nitrate T.S. is readily reduced by an alkaline solution of the Acid.

No appreciable change takes place in the Acid on exposure to temperatures up to 120°.

Upon long exposure to light, the Acid, especially if somewhat moist, acquires a reddish color.

Ammonia Solution, Strong—Use *Ammonia Water, Stronger, Reagent*, U. S. P. XIII.

Ammonia Water—Use *Diluted Ammonia Solution*, U. S. P. XIII.

Ammonium Alum—Use *Alum (Ammonium)*, U. S. P. XIII.

Ammonium Molybdate, $(NH_4)_6Mo_7O_{24}.4H_2O$—Colorless, or slightly green or yellow crystals; soluble in water, insoluble in alcohol.

Insoluble—The insoluble matter from 10 Gm. is not more than 1 mg. (0.01 per cent).

Chloride—Dissolve 1 Gm. in 20 cc. of distilled water, add the solution gradually to 5 cc. of nitric acid, then add 1 cc. of silver nitrate T.S. Any turbidity produced corresponds to not more than 0.02 mg. (0.002 per cent) of chlorine.

Nitrate—To a solution of 1 Gm. in 10 cc. of distilled water add 1 drop of indigo carmine T.S. and 10 cc. of sulfuric acid; the blue color persists for 5 minutes.

Phosphate—Digest 10 Gm. with 100 cc. of distilled water on a water bath for 1 hour, and filter. Add 10 cc. of strong ammonia solution to the filtrate and pour it into a mixture of 50 cc. of nitric acid and 25 cc. of distilled water. Shake at 40° to 50° for 5 minutes and allow to stand for 1 hour. Any yellow precipitate is no greater than that obtained in a control, using 0.05 mg. (0.0005 per cent) of phosphate (PO_4) in the form of ammonium phosphate.

Sulfate—Evaporate to dryness 1.5 Gm. with 10 cc. of distilled water and 7 cc. of nitric acid. Digest the residue with 1 cc. of hydrochloric acid and 10 cc. of distilled water, dilute to 60 cc., and filter. Neutralize 40 cc. of the filtrate with ammonia T.S. and add 2 cc. of 1 *N* hydrochloric acid and 3 cc. of barium chloride T.S. Any turbidity corresponds to not more than 0.3 mg. (0.03 per cent) of sulfate.

Heavy metals—Dissolve 1 Gm. in 20 cc. of distilled water, and add 10 cc. of sodium hydroxide T.S., 2 cc. of ammonia T.S., and 5 cc. of hydrogen sulfide T.S. Any resulting brown color is not greater than that in a blank to which has been added 0.02 mg. (0.002 per cent) of lead in the form of lead acetate.

Assay—Weigh accurately about 0.5 Gm. and dissolve in about 50 cc. of distilled water. Add 2 cc. of glacial acetic acid and dilute to 200 cc. Bring to a boil, add a clear solution of 1.5 Gm. of lead acetate in 20 cc. of distilled water, and boil until the precipitate becomes granular. Wash by decantation 10 times with 50-cc. portions of hot water, then filter, dry, and ignite to constant weight. The weight of the lead molybdate thus obtained, multiplied by 0.3922, gives the weight of MoO_3. This is not less than 81 per cent of the sample weighed.

Ammonium Oxalate—Use *Ammonium Oxalate*, reagent grade, U. S. P. XIII.

Ammonium Sulfamate—Use *Ammonium Sulfamate*, reagent grade, U. S. P. XIII.

Ammonium Sulfate—Use *Ammonium Sulfate*, reagent grade, U. S. P. XIII.

Ammonium Thiocyanate—Use *Ammonium Thiocyanate*, reagent grade, U. S. P. XIII.

Ammonium Vanadate; Ammonium Metavanadate, NH_4VO_3—A white crystalline powder, slightly soluble in cold water, but soluble in hot water or in ammonia T.S.

Solubility—To 1 Gm. add a mixture of 3 cc. of stronger ammonia T.S. and 50 cc. of distilled water, and warm. A clear and colorless solution results.

Carbonate—To 0.5 Gm. add 2 cc. of diluted hydrochloric acid; no effervescence is produced.

Chloride—Dissolve 0.25 Gm. in 40 cc. of hot distilled water, add 2 cc. of nitric acid, and let stand for 1 hour. Filter, and to the filtrate add 0.5 cc. of silver nitrate T.S. The turbidity corresponds to not more than 0.5 mg. of chlorine (0.2 per cent).

Sulfate—Dissolve 0.5 Gm. in 50 cc. of hot distilled water, add 2 cc. of diluted hydrochloric acid and 1.5 Gm. hydroxylamine hydrochloride, and heat at 60° for 3 minutes. Filter, cool, add to the filtrate 2 cc. of barium chloride T.S. and allow to stand for 30 minutes. Any turbidity corresponds to not more than 0.1 mg. of sulfate (0.02 per cent).

Assay—Weigh accurately about 0.5 Gm., dissolve it in 30 cc. of distilled water, and add 5 cc. of diluted sulfuric acid. Pass sulfur dioxide through the solution until reduction is complete as indicated by the bright blue color. Expel the excess of sulfur dioxide by gently boiling in a current of carbon dioxide, cool, and titrate with 0.1 *N* potassium permanganate to a pink color. Each cc. of 0.1 *N* potassium permanganate is equivalent to 0.01170 Gm. of NH_4VO_3. The weight of ammonium vanadate found is not less than 98 per cent.

Amyl Alcohol—Use *Amyl Alcohol*, reagent grade, U. S. P. XIII.

Aniline—Use *Aniline*, reagent grade, U. S. P. XIII.

Aniline Blue, W. S., Certified Biological; *Water-soluble Aniline Blue*, is an acid dye consisting of sulfonation products of variable mixtures of phenylated rosaniline and pararosaniline.

Description—The dye occurs as a moderately coarse powder, very dusky reddish purple to dusky brown.

Solubility—One Gm. of the dye is soluble in 25 cc. of water; it is slightly soluble in alcohol.

Absorption ratio—To obtain a solution of suitable concentration for use in a spectrophotometer, dissolve the dye in a mixture of equal volumes of alcohol and distilled water to which has been added 1 drop of hydrochloric acid for every 100 cc. of solvent: the absorption ratio of the dye in this solution (*E* at 590 millimicrons over *E* at 620 millimicrons) is not less than 0.95 and not more than 1.05.

Decolorization test—When observed by transmitted light through a layer 1 cm. deep: an aqueous solution of the dye (1 in 10,000) is purplish blue, the addition of 2 drops of hydrochloric acid to 10 cc. of this solution changes the color to yellowish orange, or the addition of 1 drop of saturated aqueous solution of sodium hydroxide to 10 cc. of this solution changes the color to red; a saturated alcohol solution of the dye is purplish blue or bluish purple; a solution of the dye in sulfuric acid (1 in 2000) is red.

Color characteristic—A solution of the dye in sulfuric acid (1 in 50) when diluted with water yields a bluish purple precipitate. To 100 cc. of a 0.01 per cent aqueous solution of the dye add 2 cc. of 1 *N* sodium hydroxide. The color turns red immediately, fading after 10 minutes to a straw color and after 20 minutes becoming almost colorless. Addition of a few drops of 1 *N* acid restores the blue color almost instantly.

Staining characteristics—Stain properly prepared sections of embryonic animal tissue, fixed in Zenker's fluid, with an aqueous solution of biological acid fuchsin (1 in 200) for 5 minutes or longer. Transfer directly to an aqueous solution of phosphotungstic acid (1 in 100) containing 0.5 Gm. of certified biological aniline blue and 2.0 Gm. of biological orange G in each 100 cc., and stain for 10 minutes or longer. Dehydrate in several changes of alcohol, followed by dehydrated alcohol; clear, and mount in xylene-balsam: collagen fibrils, reticulum, and amyloid, mucus and certain other hyaline substances are blue; nuclei, cytoplasm, fibroglia fibers, axis cylinders, neuroglia fibers, and fibrin, are red; red blood corpuscles and myelin sheaths are yellow; elastic fibers are pink or yellow.

Assay—Dissolve about 0.5 Gm. of the dye, accurately weighed, in 150 cc. of distilled water. Add about 15 Gm. of sodium bitartrate, heat to boiling and titrate with 0.1 *N* titanium trichloride to an end point varying from yellow to yellow-green. Not less than 12.0 cc. of the standard solution is required per Gm. of dye.

Arabinose, *Anhydrous l-Arabinose*, is a pentose, $C_5H_{10}O_5$, obtained by the partial hydrolysis of arabans.

Description—Arabinose occurs as colorless crystals, or as a white crystalline powder; odorless and having a sweet taste.

Solubility—Arabinose is freely soluble in water, but insoluble in absolute alcohol and in ether. An aqueous solution of arabinose (1 in 10) is clear and colorless.

Optical rotation—The specific optical rotation, $[\alpha]_D^{20°}$, of Arabinose in an aqueous solution containing in each 100 cc. 5.0 Gm. of Arabinose, previously dried to constant weight at 105°, and 0.2 cc. of ammonia T.S., is not less than +103.0° and not more than +104.5°.

Loss on drying—When dried to constant weight at 105°, Arabinose loses not more than 0.50 per cent of its weight.

Residue on ignition—Arabinose yields not more than 0.20 per cent of its weight upon ignition.

Reaction—An aqueous solution of Arabinose (1 in 10) is neutral to litmus paper.

Chloride—One Gm. of Arabinose shows no more chloride than corresponds to 0.1 cc. of 0.02 *N* hydrochloric acid.

Sulfate—One Gm. of Arabinose shows no more sulfate than corresponds to 0.1 cc. of 0.02 *N* sulfuric acid.

Barium—An aqueous solution of Arabinose (1 in 10) does not respond to the tests for barium.

Calcium—An aqueous solution of Arabinose (1 in 10) does not respond to the tests for calcium.

Heavy metals—Dissolve 2 Gm. of Arabinose in 1 cc. of diluted acetic acid and sufficient water to make 25 cc. The heavy metals limit of Arabinose is 5 parts per million.

Arsenic Pentoxide (*Arsenic Acid Anhydride*), As_2O_5—White, amorphous lumps or powder, freely but slowly soluble in water or alcohol. Gradually deliquesces on exposure to air and very slowly combines with water to form orthoarsenic acid, H_3AsO_4. It should, therefore, be kept well stoppered.

Insoluble—The insoluble matter from 10 Gm. is not more than 1 mg. (0.01 per cent). See U. S. P. XIII.

Arsenic Trioxide—Dissolve 0.5 Gm. in 25 cc. of distilled water, add 2.5 Gm. of sodium bicarbonate, and titrate with 0.1 *N* iodine, using starch T.S. as indicator. Not more than 0.1 cc. is required (0.1 per cent).

Chloride—Dissolve 1 Gm. in 20 cc. of distilled water and add 1 cc. of nitric acid and 1 cc. of silver nitrate T.S.: any turbidity produced corresponds to not more than 0.05 mg. (0.005 per cent) of chlorine.

Nitrate—Moisten 1 Gm. with diphenylamine T.S.: not more than a slight blue color appears.

Heavy Metals and Iron—Dissolve 2 Gm. in 20 cc. of distilled water. Dilute one-half of this to 25 cc., make just alkaline with ammonia, and add 20 cc. of hydrogen sulfide T.S. Compare with a standard containing lead acetate, which has been treated in the same way. Treat the other half of the solution as directed for iron in reagents, U. S. P. XIII. The total of metals in these two tests does not exceed 0.05 per cent.

Assay—Weigh accurately about 0.25 Gm., dissolve in the smallest possible amount of sodium hydroxide T.S., and add 25 cc. of distilled water. Make slightly acid to litmus paper with hydrochloric acid, add 5 Gm. of potassium iodide, and then gradually add diluted hydrochloric acid until a permanent yellow precipitate is formed. Allow to stand for 15 minutes, add 100 cc. of distilled water, and titrate with 0.1 *N* sodium thiosulfate, adding starch T.S. as indicator just before the end point. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.005746 Gm. of As_2O_5. This corresponds to not less than 98 per cent.

Arsenic Trioxide—Use *Arsenic Trioxide*, reagent grade, U. S. P. XIII.

Ascitic Fluid, for Bacteriological Use is obtained under aseptic conditions from serous accumulations in humans. It has been filtered through a Berkefeld or other form of candle filter and contains no added preservative.

Ascitic Fluid meets the Sterility test for Liquids and Solids, page 746.

Azolitmin—Use *Azolitmin*, reagent grade, U. S. P. XIII.

Azure A, Certified Biological, Methylene Azure, is asymmetrical dimethylthionin chloride, $C_{14}H_{14}N_3SCl$.

Description—The dye occurs as a moderately coarse powder, olive-black to dusky olive-green.

Solubility—One Gm. of the dye is soluble in 25 cc. of water; it is slightly soluble in alcohol.

Decolorization test—When observed by transmitted light through a layer 1 cm. deep: an aqueous solution of the dye (1 in 50,000) is blue, the addition of 2 drops of hydrochloric acid to 10 cc. of this solution produces no change in color, but the addition of 2 drops of saturated aqueous solution of sodium hydroxide to 10 cc. of this solution changes the color to purplish red; an alcohol solution of the dye (1 in 50,000) is blue; a saturated chloroform solution of the dye is blue; a solution of the dye in sulfuric acid (1 in 10,000) is yellowish green, dilution of this solution with water (1 in 4) changes the color to purplish blue.

Staining characteristics—Stain properly prepared sections of animal connective tissue, fixed in Bouin's Zenker's fluid, for 5 minutes with an aqueous solution of the dye (3 in 200). Then place them in dehydrated alcohol for 5 to 10 seconds, then in a saturated solution of certified biological ethyl eosin in clove oil for 30 seconds, in xylene for 10 to 30 seconds, in fresh xylene for 1 to 2 minutes, again in fresh xylene for 1 to 2 minutes, and mount in xylene-balsam: nuclei are a clear distinct purple, cytoplasm is red.

Prepare tetrachrome stain made as follows: methylene blue chloride, 1.0 Gm.; azure A, 0.6 Gm.; methylene violet, 0.2 Gm.; eosin Y, 1.0 Gm.; are mixed together; dissolve 0.15–0.3 Gm. of the mixed dry ingredients in 100 cc. methyl alcohol (neutralized, acid-free) by heating to 50°; shake thoroughly and leave 1 to 2 days at 37° with occasional shaking. Filter and stain properly prepared blood smears with this solution for 1 to 3 minutes, then dilute with an equal quantity of distilled water and continue the staining for 2 to 6 minutes. Rinse in distilled water, air-dry, and examine unmounted: granules of the various leucocytes are differentially stained; erythrocytes are yellow pink.

Assay—Dissolve about 0.3 Gm. of the dye, accurately weighed, in 150 cc. of distilled water. Add about 10 Gm. of sodium bitartrate, heat to boiling, and titrate with 0.1 *N* titanium trichloride to a yellow end point. Not less than 37.7 cc. of the standard solution is required per Gm. of dye, equivalent to 55 per cent of dye content.

Azure II—A mixture of equal quantities of methylene blue chloride (tetramethylthionine hydrochloride) and of methylene azure chloride (methylene blue chloride sulfone). A deep green powder soluble in water with a deep blue color, less soluble in alcohol, and difficultly soluble in chloroform.

Azure II-Eosin—A mixture of methylene blue eosin and of methylene azure-eosin (methylene blue sulfone eosinate). A deep green powder difficultly soluble in water, but more easily soluble in alcohol, methanol, or glycerin.

Barium Chloride—Use *Barium Chloride*, reagent grade, U. S. P. XIII.

Basic Fuchsin, Certified Biological, is pararosaniline chloride or acetate, $C_{19}H_{18}N_3Cl$ or $C_{19}H_{18}N_3.C_2H_3O_2$, sometimes admixed with the corresponding salts of rosaniline, $C_{20}H_{20}N_3Cl$ or $C_{20}H_{20}N_3.C_2H_3O_2$.

Description—The dye occurs as a moderately coarse powder or as small lumps, moderate olive to dark olive-green.

Solubility—One Gm. of the dye is soluble in 15 cc. of alcohol; it is slightly soluble in water.

Absorption ratio—To obtain a solution of suitable concentration for use in a spec-

trophotometer, dissolve the dye in a mixture of equal volumes of alcohol and distilled water: the absorption ratio of the dye in this solution (*E* at 530 millimicrons over *E* at 560 millimicrons) is not less than 1.12 or more than 1.17 if the dye consists of relatively pure pararosaniline, or not less than 0.87 or more than 0.91 if the dye is rosaniline admixed with homologs. The absorption ratio of mixtures of pararosaniline and rosaniline will fall between 0.91 and 1.12.

Decolorization test—When observed by transmitted light through a layer 1 cm. deep: an aqueous solution of the dye (1 in 50,000) is purplish red, the addition of 5 drops of hydrochloric acid to 10 cc. of this solution makes it colorless, but if the dye concentration is higher, the color changes to yellowish orange, or the addition of 2 drops of a saturated aqueous solution of sodium hydroxide to 10 cc. of this solution makes it colorless, but if the dye concentration is higher the color changes to red; an alcohol solution of the dye (1 in 30,000) is red-purple to red; a solution of the dye in sulfuric acid (1 in 2500) is yellowish orange or yellow.

Color characteristic—Dissolve 0.5 Gm. of the dye in 100 cc. of boiling distilled water, cool to 50°, filter into a small flask, and add 10 cc. of 1 *N* hydrochloric acid to the filtrate. Add 0.5 Gm. of potassium metabisulfite, $K_2S_2O_5$, shake until dissolved, stopper tightly, and allow it to stand in the dark for 12 to 18 hours. The solution is colorless or not more than pale yellow (a yellowish orange, yellowish brown, or brown solution, especially with the presence of a dark sediment, indicates the poorer grades of fuchsin).

Inhibition test—Follow the directions given under certified biological brilliant green, inhibition test, see page 648, except that solutions of the standard and the unknown basic fuchsin are to be made in the following concentrations: 0.2%, 0.1%, and 0.05%; and the titration is to be conducted according to the following table:

Strength of dye solution			Dilution of dye in 10 cc. of medium
0.2%	0.1%	0.05%	
2.0 cc.			1: 2,500
	2.0 cc.		1: 5,000
	1.5 cc.		1: 7,500
	1.0 cc.		1:10,000
	0.75 cc.		1:15,000
		1.00 cc.	1:20,000
		0.87 cc.	1:25,000
		0.75 cc.	1:30,000
		0.62 cc.	1:35,000

To inhibit growth of these organisms the minimum concentration of certified biological basic fuchsin in aqueous solution is not more than one concentration step below the minimum inhibitory concentration of standard basic fuchsin in aqueous solution.

Staining characteristics—Properly prepare dry smears of *Mycobacterium tuberculosis*. With certified biological basic fuchsin prepare Ziehl-Neelsen carbol-fuchsin solution. Cover the smears with this solution and heat them on a water bath for 3 to 5 minutes. Rinse in tap water, decolorize with 3 per cent hydrochloric acid in 70 per cent alcohol until practically no red color is visible to the unaided eye, and again rinse in tap water. Then counterstain with an aqueous solution of certified

biological methylene blue (1 in 1000) for 1 minute, rinse in tap water, dry and examine unmounted: *Mycobacterium* organisms are red; other bacteria, leucocytes, and debris are blue.

Prepare an alcohol solution of the dye (3 in 100), let stand overnight, and filter. To 100 cc. of lactose agar, liquefied by heat and cooled to 45° in a water bath, aseptically add 1 cc. of this solution and 0.125 Gm. of anhydrous sodium sulfite dissolved in 5 cc. of distilled water; mix well and pour aliquot portions into 4 petri dishes (the medium is pink when warm, fading to yellow when cool). With platinum loops streak the surface of 2 dishes in parallel well-separated lines with a broth culture of *Escherichia coli* and the other 2 dishes with a broth culture of *Aerobacter aerogenes* and incubate the dishes at 37° for 24 hours: *Escherichia* colonies are red with a strong metallic sheen; *Aerobacter* colonies are pink without metallic sheen; the medium has not reddened except where growth has occurred.

Properly prepare sections of embryonic animal tissues. Rinse in cold 1 *N* hydrochloric acid, place in 1 *N* hydrochloric acid at 60° for 4 to 5 minutes, rinse in cold 1 *N* hydrochloric acid, and then in distilled water. Prepare a decolorized solution of certified biological basic fuchsin as follows: dissolve 0.5 Gm. of the dye in 100 cc. of boiling distilled water, shake thoroughly, cool to 50°, filter, add 10 cc. of 1 *N* hydrochloric acid and 0.6 Gm. of potassium metabisulfite ($K_2S_2O_5$) to the filtrate, and allow the solution to stand in the dark for 24 to 48 hours (the solution is completely decolorized, yellow or pink). Prepare a mixture of 6 cc. of 1 *N* hydrochloric acid, 5 cc. of an aqueous solution of potassium metabisulfite (1 in 10), and 100 cc. of distilled water, and place aliquot portions in 3 Coplin jars. Stain sections of animal tissue in the decolorized dye solution for 2 hours, or plant tissue for 3 to 5 hours, drain, and place quickly in one of the Coplin jars for 10 minutes; transfer to the second Coplin jar for 10 minutes; then to the third for 10 minutes. Rinse the sections in distilled water, counterstain animal tissue $1^1/_2$ to 2 minutes with an aqueous solution (1 in 100) of biological orange G, or, plant tissue $^1/_2$ to 2 minutes with an alcohol solution (1 in 200) of biological fast green; wash in alcohol until the color disappears, apply dehydrated alcohol, then xylene, and mount in xylene-balsam: chromosomes are purple.

Assay—Dissolve about 0.3 Gm. of the dye, accurately weighed, in a mixture of 75 cc. of alcohol and 50 cc. of distilled water. Heat to boiling, add 25 cc. of an aqueous solution of sodium tartrate (30 in 100), and titrate with 0.1 *N* titanium trichloride to a yellow end point. Not less than 53.3 cc. of standard solution is required per Gm. of dye, equivalent to 88 per cent of dye content on an equal mixture basis.

Beef, for Bacteriological Use is the coarsely ground skeletal muscle from slaughtered bovine cattle, previously freed of excess blood, and adhering fat and connective tissue. It presents no obvious indications of bacterial contamination and does not possess a putrescent odor. It may be dehydrated and powdered.

Beef Heart, for Bacteriological Use is the coarsely ground heart muscle from slaughtered bovine cattle, previously freed of excess blood, and adhering fat and connective tissue. It presents no obvious indications of bacterial contamination and does not possess a putrescent odor. It may be dehydrated and powdered.

Beef Liver, for Bacteriological Use is the coarsely ground liver from slaughtered bovine cattle, previously freed of excess blood, and adhering fat and connective tissue. It presents no obvious indications of bacterial contamination and does not possess a putrescent odor. It may be dehydrated and powdered.

Benzene—Use *Benzene*, reagent grade, U. S. P. XIII.

Benzin, Petroleum—Use *Petroleum Benzin*, U. S. P. XIII.

Benzidine—Use *Benzidine*, reagent grade, U. S. P. XIII.

Benzoic Acid—Use *Benzoic Acid*, U. S. P. XIII.

Bismarck Brown Y, Certified Biological, contains benzene-*m*-disazo-bis-*m*-phenylenediamine dihydrochloride, $C_{18}H_{20}N_8Cl_2$, together with some triaminoazobenzene and other bases.

Description—The dye occurs as a moderately coarse powder, purplish black to very dusky red.

Solubility—The dye is sparingly soluble in water; it is slightly soluble in alcohol. Aqueous solutions are unstable when heated.

Absorption ratio—To obtain a solution of suitable concentration for use in a spectrophotometer, dissolve the dye in a mixture of equal volumes of alcohol and distilled water: the absorption ratio of the dye in this solution (*E* at 500 millimicrons over *E* at 530 millimicrons) is not less than 1.75 or more than 2.28.

Decolorization test—When observed by transmitted light through a layer 1 cm. deep: an aqueous solution of the dye (1 in 25,000) is orange to orange-pink; a saturated alcohol solution of the dye is red; a solution of the dye in sulfuric acid (1 in 5000) is brownish black to reddish orange, dilution of this solution with water changes the color from orange to yellow.

Staining characteristics—Stain properly prepared sections of intestinal wall containing mucous goblet cells, and properly prepared sections of embryonic animal tissues containing cartilage, with an aqueous solution (1 in 100) of the dye for 5 to 10 minutes. Rinse the sections in 95 per cent alcohol, stain them with an aqueous solution of methyl green (1 in 200) until they appear dark green, then dehydrate, clear, and mount: mucus in the goblet cells is light brown, cartilage in the embryonic tissues is a deeper brown.

Prepare dry smears of diphtheria organisms for use in Neisser's method. Stain smears 2 or 3 seconds in acetic methylene blue (methylene blue, 0.1 Gm.; 95 per cent alcohol, 2 cc.; glacial acetic acid, 5 cc.; distilled water, 95 cc.). Wash in tap water, stain in the dye which has been dissolved in boiling water (1 in 500) and filtered; wash, dry, and examine unmounted: bacilli uniformly brown, or may show at one or both ends, a dark blue round body. True diphtheria organisms show blue bodies, pseudotypes few.

Assay—Dissolve about 0.2 Gm. of the dye, accurately weighed, in 200 cc. of diluted alcohol. Add about 10 Gm. of sodium bitartrate, heat to boiling, and titrate with 0.1 *N* titanium trichloride. The end-point, which is not always sharp, ranges from yellow to yellowish brown. Not less than 85.9 cc. of the standard solution is required per Gm. of dye equivalent to 45 per cent dye content.

Bismuth and Ammonium Citrate is bismuth citrate rendered soluble by the presence of ammonium citrate.

Description—It occurs in shining, pearly or translucent scales, or white powder, becoming opaque with loss of ammonia on exposure to the air. It is odorless and has a metallic taste.

Solubility—Bismuth and Ammonium Citrate is very soluble in water and sparingly soluble in alcohol.

Nitrate—Dissolve 50 mg. of Bismuth and Ammonium Citrate in 1 cc. of distilled

water, add 5 cc. of sulfuric acid, cool the mixture and carefully add 5 cc. of ferrous sulfate T.S. without mixing: no red or brown zone appears immediately.

Alkalies or alkali earths—Dissolve 1 Gm. of Bismuth and Ammonium Citrate in 50 cc. of distilled water and precipitate the bismuth completely with hydrogen sulfide. Filter and evaporate the filtrate to dryness and ignite to constant weight: the weight of the residue does not exceed 5 mg.

Lead, copper, and silver—A 3-Gm. portion of Bismuth and Ammonium Citrate meets the requirements of the test for *Copper, Lead, and Silver* under Bismuth Subnitrate, page 87.

Assay—Transfer about 1 Gm. of Bismuth and Ammonium Citrate, accurately weighed, to a tared porcelain crucible and ignite. Cool and dissolve the residue in 5 cc. of nitric acid added dropwise, warming until solution is effected. Evaporate this solution to dryness and carefully ignite it at red heat. The residue of Bi_2O_3 represents not less than 46 per cent and not more than 52 per cent of the sample taken.

Biuret Reagent—To a quantity of aqueous sodium hydroxide solution (1 in 3) add, dropwise, with constant stirring, aqueous cupric sulfate solution (1 in 100) until the mixture assumes a deep blue color. Preserve in tight containers.

Blood, for Bacteriological Use is obtained under aseptic conditions by bleeding a healthy horse, sheep, rabbit, or other warm-blooded animal. It is used as freshly drawn, or may be defibrinated, or a suitable anticoagulant may be added, but it contains no added antibacterial preservatives.

Blood meets the tests for sterility as given under Testing of Ampul Solutions for Sterility, see pages 746 to 749.

Blood Serum, for Bacteriological Use is the fluid separated from the clot formed in blood after standing under refrigeration for 48 hours or more. Obtain the blood under aseptic conditions by bleeding a healthy horse, sheep, rabbit, or other warm-blooded animal, filter the serum through a Berkefeld or other form of a candle filter, and add no preservative to it.

Blood serum is a nearly clear liquid, nearly colorless or pale yellow, and yields not less than 9 per cent of anhydrous *total solids* upon dehydration at 110°.

Blood serum meets the test for sterility as given under Testing of Ampul Solutions for Sterility, see pages 746 to 749.

Brain, for Bacteriological Use, *Calf Brain,* is the brain tissue from slaughtered, immature bovine cattle, freed of excess blood, adhering fat, and connective tissue, and coarsely ground or cut into about 1 cm. cubes. It presents no obvious indications of bacterial contamination and does not possess a putrescent odor. It may be dehydrated and powdered.

Brilliant Cresyl Blue, Certified Biological, is usually aminodimethylaminomethyldiphenazonium chloride, $C_{15}H_{16}N_3OCl$, although the dye may be the diethyl derivative.

Description—The dye occurs as a moderately coarse powder, very dusky red.

Solubility—One Gm. of the dye is soluble in 30 cc. of water; it is sparingly soluble in alcohol.

Absorption ratio—To obtain a solution of suitable concentration for use in a spectrophotometer, dissolve the dye in a mixture of equal volumes of alcohol and distilled water: the absorption ratio of the dye in this solution (*E* at 605 millimicrons over *E* at 635 millimicrons) is not less than 0.82 and not more than 0.95.

Decolorization test—When observed by transmitted light through a layer 1 cm.

deep: an aqueous solution of the dye (1 in 20,000) is purplish blue, the addition of 1 cc. of hydrochloric acid or 1 cc. of sodium hydroxide T.S. to 10 cc. of this solution changes the color to red; an alcohol solution of the dye (1 in 20,000) is blue; a solution of the dye in sulfuric acid (1 in 5000) is green (by reflected light this solution is blue-green).

Staining characteristics—Prepare a dry film on a cover-glass with filtered alcohol solution of certified biological brilliant cresyl blue (1 in 300), and add fresh blood to the film for 10 minutes. Then dry, counterstain with Wright's staining solution, wash in distilled water, dehydrate, clear, and mount in xylene-balsam: the reticulum of immature erythrocytes appears clear-cut blue on a paler blue or eosin colored background.

Assay—Dissolve about 0.2 Gm. of the dye, accurately weighed, in a mixture of 150 cc. of alcohol and 100 cc. of distilled water. Heat to boiling, add 50 cc. of a sodium bitartrate solution in hot distilled water (1 in 5), and titrate with 0.1 *N* titanium trichloride to a brown end-point which is not sharp. Not less than 31.5 cc. of the standard solution is required per Gm. of dye, equivalent to 50 per cent of dye content.

Brilliant Green, Certified Biological, is the acid sulfate of *p,p'*-tetraethyldiaminotriphenylcarbinol anhydride, $C_{27}H_{33}N_2.HSO_4$.

Description—The dye occurs as a moderately coarse powder, moderate olive to moderate olive-green.

Solubility—One Gm. of the dye is soluble in 20 cc. of water, or 20 cc. of alcohol.

Absorption ratio—To obtain a solution of suitable concentration for use in a spectrophotometer, dissolve the dye in a mixture of equal volumes of alcohol and distilled water: the absorption ratio of the dye in this solution (*E* at 620 millimicrons over *E* at 650 millimicrons) is not less than 1.51 and not more than 1.62.

Decolorization test—When observed by transmitted light through a layer 1 cm. deep: an aqueous solution of the dye (1 in 25,000) is greenish blue to blue-green, the addition of 2 drops of hydrochloric acid to 10 cc. of this solution changes the color to yellow, or the addition of 2 drops of saturated aqueous solution of sodium hydroxide to 10 cc. of this solution changes the color to yellowish orange (further addition of saturated aqueous solution of sodium hydroxide yields a brownish precipitate); an alcohol solution of the dye (1 in 20,000) is blue-green; a solution of the dye in sulfuric acid (1 in 10,000) is yellow to greenish yellow.

Inhibition test—Make daily transfers of *Bacillus cereus* and *Aerobacter aerogenes* and *Escherichia coli* for 5 days into a sterile aqueous solution of lactose and peptone (1 each in 100), having a *p*H of 7.2 after sterilization, at 37°, and incubate at this temperature. Prepare sterilized, aqueous solutions of standard brilliant green and of certified biological brilliant green each in the following concentrations: 0.01%, 0.001%, 0.0001%, and 0.00001%. Prepare 4 series of graduated tubes each containing 7.5 cc. of an aqueous solution of lactose and peptone (1.33 each in 100), *p*H 7.2 after sterilization. As soon as distinct turbidity appears in the fifth transfer, make a microscopic count of the organisms present in the culture by the use of a hemocytometer. The count should show from 4 to 20 million organisms per cc. At once aseptically dilute suitable quantities of each culture with distilled water containing 1 per cent of the first lactose-peptone solution, so that the final dilutions contain approximately 200 bacteria per cc. in an active growth phase of their life cycle. To the tubes of culture medium in each series, aseptically add the amount of dye solution indicated in the table below and sufficient sterile distilled water to make 9.5

cc. in each tube. Mix well by twirling in such a way as to avoid wetting the stoppers. Finally add 0.5 cc. of the bacterial dilutions to each tube of their respective series, and again mix well. Incubate the cultures at 37°, examine and record growth at the end of 24 hours, and again at the end of 48 hours.

To inhibit growth of these organisms, the minimum concentration of certified biological brilliant green in aqueous solution is not more than one concentration step

Aerobacter aerogenes			*Bacillus cereus*		
Strength of dye solution 0.01%	0.001%	Dilution of dye in 10 cc. of medium	Strength of dye solution 0.0001%	0.00001%	Dilution of dye in 10 cc. of medium
2.00 cc.		1: 50,000	2.00 cc.		1: 5,000,000
1.00 cc.		1:100,000	1.00 cc.		1:10,000,000
0.50 cc.		1:200,000	0.50 cc.		1:20,000,000
0.33 cc.		1:300,000	0.33 cc.		1:30,000,000
0.25 cc.		1:400,000	0.25 cc.		1:40,000,000
	2.00 cc.	1:500,000		2.00 cc.	1:50,000,000
	1.67 cc.	1:600,000		1.67 cc.	1:60,000,000
	1.43 cc.	1:700,000		1.43 cc.	1:70,000,000
	1.25 cc.	1:800,000		1.25 cc.	1:80,000,000

below the minimum inhibitory concentration of standard brilliant green in aqueous solution.

Assay—Dissolve about 0.3 Gm. of the dye, accurately weighed, in 150 cc. of diluted alcohol. Add 10 Gm. of sodium bitartrate, heat to boiling, and titrate with 0.1 *N* titanium trichloride to a permanent yellow end-point. Not less than 35.2 cc. of standard solution is required per Gm. of dye, equivalent to 85 per cent of dye content.

Bromine—Use *Bromine*, reagent grade, U. S. P. XIII.

Bromocresol Purple, *Dibrom-o-cresolsulfonphthalein,* $OSO_2.C_6H_4.C(C_6H_2Br_2CH_3\text{-}OH)_2$, is a light pink, crystalline powder, insoluble in water but soluble in alcohol or in dilute alkalies.

pH Range—The *p*H range of Bromocresol Purple is between 5.2 and 6.8, yellow to purple.

Sensitiveness—Dissolve 0.1 Gm. in a mixture of 50 cc. of alcohol and 50 cc. of water: the solution is clear or not more than faintly turbid. Add 5 drops of the solution to 100 cc. of water that is free from carbon dioxide: a greenish color is produced and this is changed to purple by 0.1 cc. of 0.02 *N* sodium hydroxide. In a similar solution the green color is changed to yellow by 0.1 cc. of 0.02 *N* hydrochloric acid.

Bromothymol Blue—Use *Bromothymol Blue Indicator,* U. S. P. XIII.

Butyric Acid, $CH_3(CH_2)_2COOH$, is a clear, colorless liquid of unpleasant rancid odor and strong acid taste.

Miscibility—Butyric Acid is miscible with water, alcohol, and ether.

Specific gravity—Butyric Acid has a specific gravity of 0.955 to 0.960 at 25°.

Boiling range—On distilling 50 cc. of Butyric Acid, not less than 47 cc. distils between 160° and 164°.

Residue—Evaporate 10 cc. of Butyric Acid on a water bath and dry at 110° for 2 hours: the weight of the residue is not more than 2 mg.

Chloride—One cc. of Butyric Acid shows no more chloride than corresponds to 0.1 cc. of 0.02 *N* hydrochloric acid.

Sulfate—To 10 cc. of an aqueous solution of Butyric Acid (1:20) add 5 drops of barium chloride T.S.: no turbidity is produced.

Heavy metals—Dissolve 1 Gm. of Butyric Acid in 1 cc. of diluted acetic acid and enough distilled water to make 25 cc. The heavy metals limit is 5 parts per million.

Assay—Weigh accurately from 0.25 to 0.30 Gm. of Butyric Acid, dilute with 50 cc. water, and titrate with 0.1 *N* sodium hydroxide using phenolphthalein as the indicator. Each cc. of 0.1 *N* sodium hydroxide is equivalent to 0.008810 Gm. of $CH_3(CH_2)_2COOH$. Each Gm. of Butyric Acid consumes not less than 111.5 cc. and not more than 114.7 cc. of 0.1 *N* sodium hydroxide.

Caffeine and Sodium Salicylate—Use *Caffeine and Sodium Salicylate*, page 98.

Calcium Carbonate—Use *Precipitated Calcium Carbonate*, U. S. P. XIII.

Calcium Chloride—Use *Calcium Chloride*, U. S. P. XIII.

Calcium Sulfate—Use *Calcium Sulfate*, reagent grade, U. S. P. XIII.

Calf Brain—Use *Brain for Bacteriological Use*, page 647.

Canada Turpentine—Use *Canada Turpentine*, reagent grade, U. S. P. XIII.

Capryl Alcohol, $CH_3(CH_2)_5CHOHCH_3$, is a clear, colorless, refractive liquid, having a pungent, slightly unpleasant odor.

Miscibility—It is slightly soluble in water, but is miscible with alcohol, ether, or benzene.

Specific gravity—The specific gravity of Capryl Alcohol is about 0.823 at 25°.

Boiling range—On distilling 50 cc. of Capryl Alcohol, not less than 47 cc. distils between 176° and 181°.

Residue—Evaporate 10 cc. on a water bath and dry at 110° for 2 hours: not more than 1 mg. of residue remains.

Acidity—To 20 cc. of ethyl alcohol contained in a 50-cc. glass-stoppered flask add 5 drops of phenolphthalein T.S., and, dropwise, 0.02 *N* sodium hydroxide until a pink color persists after shaking for 30 seconds. Then add 10 cc. of the Capryl Alcohol, mix gently, and again add 0.02 *N* sodium hydroxide until the pink color persists after shaking the mixture for 30 seconds; not more than 0.6 cc. of the additional 0.02 *N* sodium hydroxide is required to neutralize the Capryl Alcohol.

Water—Mix 5 cc. of Capryl Alcohol with 20 cc. of purified benzin: the mixture is clear.

Carbon Dioxide—Use *Carbon Dioxide*, U. S. P. XIII.

Cedar Oil—Use *Cedar Oil*, U. S. P. XIII.

Chloroform—Use *Chloroform*, U. S. P. XIII.

Cholesterol, *Cholesterin*, is a monoatomic alcohol, $C_{27}H_{45}OH$, usually obtained from the nerve tissue of domesticated animals that are used for food by man.

Description—Cholesterol occurs in white, or nearly white, pearly, almost odorless, unctuous scales or granules. Cholesterol tends to form a slight tan color and a slight, somewhat aromatic odor upon exposure to sunlight and heat.

Solubility—Cholesterol is freely soluble in hot alcohol, in chloroform, and in ether; soluble in acetone, in ethyl acetate, in benzene, in carbon disulfide, in purified benzin, in volatile oils, and in fats; sparingly soluble in cold alcohol; very slightly soluble in distilled water. A solution of Cholesterol in absolute solvent ether (1 in 10) may exhibit a slight flocculent precipitate.

Melting point—Cholesterol melts between 147° and 149°.

Optical rotation—Solutions of Cholesterol in chloroform, ether, or solvent ether are lævorotatory.

Identification—A solution of Cholesterol in boiling alcohol (1 in 20), filtered while hot, and the filtrate allowed to cool, slowly forms crystals visible under a microscope as thin, transparent rhombic plates.

Identification—Dissolve a few mg. of Cholesterol in 2 cc. of chloroform, add 20 drops of acetic anhydride and a single drop of sulfuric acid: a pink color is developed in the solution, which rapidly changes to red, then blue, and finally a brilliant green, the last color persisting for some time.

Loss on drying—When dried at 105°, for 6 hours, the loss in weight is negligible.

Free acid—Dissolve 1.0 Gm. of Cholesterol in 10 cc. of solvent ether; to this solution add 10 cc. of 1 *N* sodium hydroxide, heat slowly to drive off the ether and then to boiling for 5 minutes. Titrate the mixture with 1 *N* hydrochloric acid, using phenolphthalein T.S. as the indicator; not less than 9.7 cc. of 1 *N* hydrochloric acid is consumed in the titration.

Chromium Trioxide—Use *Chromium Trioxide*, U. S. P. XIII.

Chrysoidine Y is a basic dye containing meta-diaminoazobenzene hydrochloride, $C_{12}H_{13}N_4Cl$.

Description—The dye occurs as a moderately coarse powder, very dark red to very dusky purplish red.

Solubility—The dye is slightly soluble in water and sparingly soluble in alcohol.

Color characteristics—When observed by transmitted light through a layer 1 cm. deep: an aqueous solution of the dye (1 in 1400) is reddish orange (the addition of 5 drops of hydrochloric acid to 10 cc. of this solution causes no change in color, but the addition of 2 drops of saturated aqueous solution of sodium hydroxide to 10 cc. of the solution yields an orange to yellowish orange precipitate); an alcohol solution of the dye (1 in 2500) is reddish orange to orange; a solution of the dye in sulfuric acid (1 in 1000) is reddish orange to yellowish orange.

Citric Acid—Use *Citric Acid*, U. S. P. XIII.

Clove Oil—Use *Clove Oil*, U. S. P. XIII.

Cobalt Nitrate, $Co(NO_3)_2.6H_2O$.

Description—Cobalt Nitrate occurs as red crystals or granules. It is slightly deliquescent.

Solubility—One Gm. of Cobalt Nitrate dissolves in 1 cc. of distilled water. It is soluble in alcohol.

Insoluble matter—Dissolve 10 Gm. of Cobalt Nitrate in 100 cc. of distilled water and heat on a water bath for 1 hour. Filter through a filter crucible, wash well with distilled water, and dry for 1 hour at 105°: the weight of the residue does not exceed 1 mg.

Chloride—To 40 cc. of Cobalt Nitrate solution (1 in 20) add 3 cc. of nitric acid and divide into 2 equal portions. To each portion add 1 cc. of silver nitrate T.S., and to one add 0.2 cc. of 0.02 *N* hydrochloric acid as a control. The sample is no more turbid than the control.

Sulfate—Dissolve 5 Gm. of Cobalt Nitrate in 10 cc. of hot distilled water, add 10 cc. of hydrochloric acid and evaporate to dryness on a water bath. Dissolve the residue in 1 cc. of hydrochloric acid and 100 cc. of distilled water, filter if necessary, heat to boiling, add 10 cc. of barium chloride T.S. and let stand overnight. Filter through a filter crucible, wash with 3 successive 10-cc. portions of hot distilled water and ignite: the weight of the residue does not exceed 2.5 mg.

Alkalies and alkali earths—Dissolve 2 Gm. of Cobalt Nitrate in 90 cc. of distilled

water and add 2 cc. of hydrochloric acid. Neutralize with ammonia T.S. and add a slight excess. Precipitate the cobalt with hydrogen sulfide, dilute to 100 cc. and filter. To 50 cc. of the filtrate add 5 drops of sulfuric acid, evaporate to dryness and ignite: the weight of the residue does not exceed 3 mg.

Copper—To 100 cc. of an aqueous solution of Cobalt Nitrate (1 in 20) add 2 cc. of hydrochloric acid and saturate with hydrogen sulfide. Filter through a small filter paper and wash with hydrogen sulfide T.S. and ignite the filter paper. Dissolve the residue by warming with 0.5 cc. of nitric acid and a few drops of water and dilute to 25 cc. Filter, if necessary, and add 1 Gm. of ammonium acetate and 5 drops of freshly prepared potassium ferrocyanide T.S. Any red color produced is not darker than a control made by treating 0.25 mg. of copper in the form of copper sulfate in the same manner.

Nickel—Dissolve 1 Gm. of Cobalt Nitrate in 200 cc. of distilled water, add 2 Gm. of sodium citrate, heat to boiling and add 100 cc. of an alcohol solution of dimethylglyoxime (1 in 100) followed by 5 cc. of ammonia T.S. and let it stand overnight. Filter through a tared Gooch crucible and wash with 10 cc. of diluted alcohol and dry for 2 hours at 105°: the weight of the residue does not exceed 25 mg.

Cobaltous Sulfate, Dried, *Dried Cobalt Sulfate,* $CoSO_4.2H_2O$: a pink powder, having a bluish tinge.

Insoluble—Heat 1 Gm. with 20 cc. of water and 2 drops of sulfuric acid. A complete or practically complete solution results.

Chloride—Shake 1 Gm. with a mixture of 18 cc. of water and 2 cc. of nitric acid for 5 minutes, filter if necessary, and divide the filtrate into 2 equal portions. To one portion add 1 cc. of silver nitrate T.S., let stand for 10 minutes, and filter until clear; to the other portion add 1 cc. of silver nitrate T.S. Any turbidity resulting in the second portion is not greater than is produced by adding 0.1 mg. of chloride (Cl) to the first portion.

Nitrate—Dissolve 0.5 Gm. in 10 cc. of hot water, then add the solution, with stirring, to 10 cc. of aqueous solution of sodium hydroxide (1 in 10) and digest on a water bath for 15 minutes. Dilute with water to 25 cc., and filter. To 5 cc. of the filtrate add 0.1 cc. of indigo carmine T.S., and follow with 5 cc. of sulfuric acid: the blue color persists for 5 minutes.

Alkalies and Earths—Dissolve 0.5 Gm. in a mixture of 85 cc. of water and 2 cc. of hydrochloric acid, add a slight excess of ammonia T.S., and pass hydrogen sulfide into the solution until the cobalt is completely precipitated. Add sufficient water to make the volume 100 cc., and filter. Evaporate 50 cc. of the filtrate to dryness, and ignite to constant weight. The weight of the residue does not exceed 5 mg.

Ammonia—Warm 0.2 Gm. of the salt with 5 cc. of sodium hydroxide T.S.: the odor of ammonia is not evolved.

Copper—Dissolve 0.5 Gm. by warming in a mixture of 20 cc. of water and 1 cc. of hydrochloric acid (Solution A). Dissolve another 0.5 Gm. by warming in a mixture of 10 cc. of water and 1 cc. of hydrochloric acid, and add 10 cc. of hydrogen sulfide T.S.: no change in color is noticeable when compared with Solution A.

Iron—Dissolve 0.5 Gm. in a mixture of 20 cc. of water and 1 cc. of hydrochloric acid, then add a few drops of nitric acid, and heat to the boiling point. Add sufficient ammonia T.S. to dissolve the precipitate first formed, then filter and wash with a mixture of 1 volume of ammonia T.S. and 3 volumes of water, until the washings are colorless. Dissolve any precipitate on the filter with 10 cc. of hot dilute hydrochloric

acid and dilute with water to 45 cc. Cool, and add 3 cc. of ammonium thiocyanate T.S. Any resulting red color is no darker than a control made with 0.05 mg. of iron, 10 cc. of diluted hydrochloric acid, and 3 cc. of ammonium thiocyanate T.S.

Nickel—Dissolve 0.5 Gm. by warming with 10 cc. of water, and dilute with water to 200 cc. Add 2 Gm. of sodium citrate, heat to boiling, then add 100 cc. of 1 per cent alcohol solution of dimethylglyoxime, follow with 15 cc. of ammonium hydroxide T.S., and allow to stand overnight. Filter through asbestos in a weighed Gooch crucible, wash first with water then with 50 per cent alcohol, and dry to constant weight at 105° (0.8 per cent Ni).

Zinc—Dissolve 0.5 Gm. in 30 cc. of hot water, and add the solution, with stirring, to 20 cc. of 10 per cent sodium hydroxide solution. Allow to stand with frequent stirring for 15 minutes, and filter. To 20 cc. of the filtrate add 10 cc. of hydrogen sulfide T.S.: not more than a slight turbidity is produced.

Assay—Weigh accurately about 0.3 Gm. and transfer it to a 250-cc. glass-stoppered flask. Add 20 cc. of water and a few drops of hydrochloric acid, and heat until dissolved. Then add in small portions, while agitating, 25 cc. of aqueous solution of sodium hydroxide (1 in 10) and follow with 10 cc. of hydrogen peroxide T.S. Add about 20 cc. of water, boil gently until the excess hydrogen peroxide is completely destroyed and the volume reduced to about 25 cc. Cool, add 3 Gm. of potassium iodide, and follow with 25 cc. of aqueous solution of sulfuric acid (1 in 4). Stopper the flask and rotate until a clear solution results, then cool, if necessary, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate, adding starch T.S. toward the end. Each cc. of 1 *N* sodium thiosulfate corresponds to 0.0155 Gm. of $CoSO_4$. The assay should indicate not less than 78 per cent of anhydrous cobaltous sulfate ($CoSO_4$).

Compound Iodine Solution—Use *Strong Iodine Solution*, U. S. P. XIII.

Congo Red, Certified Biological, is the disodium salt of diphenyldisazo-bis-1-naphthylamine-4-sulfonic acid, $C_{32}H_{22}N_6O_6S_2Na_2$.

Description—The dye occurs as a fine powder, deep red to strong reddish brown.

Solubility—One Gm. of the dye is soluble in 20 cc. of water or it may form a colloidal suspension; it is very slightly soluble in alcohol.

Absorption ratio—To obtain a solution of suitable concentration for use in a spectrophotometer, dissolve the dye in a mixture of equal volumes of alcohol and distilled water: the absorption ratio of the dye in this solution (*E* at 500 millimicrons over *E* at 530 millimicrons) is not less than 1.19 and not more than 1.21.

Decolorization test—When observed by transmitted light through a layer 1 cm. deep: an aqueous solution of the dye (1 in 20,000) is orange or reddish orange, the addition of 1 drop of diluted hydrochloric acid to 10 cc. of this solution changes the color to bluish purple or the addition of 2 drops of a saturated aqueous solution of sodium hydroxide to 10 cc. of this solution produces only a slight change in color (but if the dye concentration is increased this yields a red precipitate).

Staining characteristics—Stain properly prepared sections of animal tissue, fixed in Bouin's fluid, with Mayer's hemalum for 5 minutes, dip in water once or twice to wash off the excess stain, and transfer directly to an aqueous solution of certified biological congo red (1 in 200) for 1 minute. Dip in tap water, dehydrate, clear, and mount in xylene-balsam: cytoplasm ranges in color from orange to reddish; erythrocytes are light orange; spindle fibers in mitotic figures are light red to deep orange; collagen fibers, smooth muscle, and cells of blood vessels are orange-pink.

Assay—Dissolve about 0.1 Gm. of the dye, accurately weighed, in 125 cc. of distilled water. Add 30 cc. of an aqueous solution of sodium tartrate (30 in 100), heat to boiling and titrate rapidly with 0.1 *N* titanium trichloride until near the endpoint (which is sharp and practically colorless), then titrate slowly. Not less than 86.2 cc. of standard solution is required per Gm. of dye, equivalent to 75 per cent dye content.

Creatinine, $CH_3NC(:NH)NHCOCH_2$, is obtained by the dehydration of creatine.

It is a white, crystalline powder. One Gm. of Creatinine is soluble in 10 cc. of water and in 1 cc. of alcohol at 25°. It melts with decomposition at 260°.

Crystal Violet, Certified Biological, is the chloride of hexamethylpararosanilin, $C_{25}H_{30}N_3Cl$.

Description—The dye occurs as a moderately coarse powder or as small lumps, moderate olive to moderate olive-green.

Solubility—One Gm. of the dye is soluble in 10 cc. of alcohol; it is slightly soluble in water.

Absorption ratio—To obtain a solution of suitable concentration for use in a spectrophotometer, dissolve the dye in a mixture of equal volumes of alcohol and distilled water: the absorption ratio of the dye in this solution (*E* at 575 millimicrons over *E* at 605 millimicrons) is not less than 1.02 and not more than 1.10.

Decolorization test—When observed by transmitted light through a layer 1 cm. deep: an aqueous solution of the dye (1 in 20,000) is purple, the addition of 1 cc. of hydrochloric acid to 10 cc. of this solution changes the color to greenish yellow or yellow-green; an alcohol solution of the dye (1 in 20,000) is purple.

Decolorization test—One cc. of sodium hydroxide T.S., when added to 10 cc. of a saturated aqueous solution of the dye, produces a purplish precipitate which becomes colorless upon warming. A solution of the dye in sulfuric acid (1 in 500) is pink to orange, gradual dilution of this solution with water changes the color through green and blue to purple-blue.

Inhibition test—Follow the directions given under certified biological brilliant green, inhibition test, see page 648, except that solutions of the standard and the unknown certified biological crystal violet are to be made in the following concentrations: 0.1%, 0.01%, 0.001%, and 0.0001%; and the titration is to be conducted according to the following table:

Aerobacter aerogenes			*Bacillus cereus*		
Strength of dye solution		Dilution of dye in 10 cc. of medium	Strength of dye solution		Dilution of dye in 10 cc. of medium
0.1%	0.01%		0.001%	0.0001%	
2.00 cc.		1: 5,000	0.25 cc.		1: 4,000,000
1.00 cc.		1:10,000		1.67 cc.	1: 6,000,000
0.50 cc.		1:20,000		1.25 cc.	1: 8,000,000
0.33 cc.		1:30,000		1.00 cc.	1:10,000,000
0.25 cc.		1:40,000		0.67 cc.	1:15,000,000
	2.00 cc.	1:50,000		0.50 cc.	1:20,000,000
	1.67 cc.	1:60,000		0.40 cc.	1:25,000,000
	1.43 cc.	1:70,000		0.33 cc.	1:30,000,000
	1.25 cc.	1:80,000		0.25 cc.	1:40,000,000

To inhibit growth of these organisms the minimum concentration of certified biological crystal violet in aqueous solution is not more than one concentration step below the minimum inhibitory concentration of standard crystal violet in aqueous solution.

Staining characteristics—Stain properly prepared smears of *Neisseria catarrhalis* and of *Corynebacterium diphtheriæ* with an aqueous solution of the dye (1 in 200) for 1 minute; wash in tap water, then cover with Gram's iodine solution for 1 minute, wash in tap water and blot dry; wash in alcohol for 30 seconds, stain with aqueous solution of certified biological safranin O (1 in 400) for 10 seconds, rinse in tap water, dry, and examine unmounted: the *Neisseria* organisms appear red and the *Corynebacterium* organisms blue in color.

Stain properly prepared sections from a growing root tip or bud, fixed in Flemming's fluid, with an aqueous solution of certified biological safranin O (1 in 100) for 20 to 60 minutes, rinse in distilled water, and stain with an aqueous solution of certified biological crystal violet (1 in 100) for 2 to 30 minutes; rinse in distilled water, dehydrate, differentiate for about 15 minutes in a saturated solution of certified biological orange G in oil of clove, clear, and mount in xylene-balsam: chromosomes and nucleoli are red, chromatin is deep purple, cytoplasm is orange.

Stain properly prepared sections from a growing root tip or bud, fixed in Navashin's fluid or one of its modifications, with an aqueous solution of the dye (1 in 100) for 3 to 10 minutes, rinse in distilled water, and treat for 15 to 50 seconds in a solution of iodine and potassium iodide in 80 per cent alcohol (1 each in 100); rinse in dehydrated alcohol, differentiate in oil of clove, clear, and mount in xylene-balsam: chromatin and nuclei are deep violet, cytoplasm is colorless.

Assay—Dissolve about 0.3 Gm. of the dye, accurately weighed, in a mixture of 60 cc. of water and 100 cc. of alcohol. Heat to boiling, add 30 cc. of an aqueous solution of sodium bitartrate (30 in 100), and titrate slowly with 0.1 *N* titanium trichloride to a sharp change from pink to pale yellow (the reaction is slow, especially near the end-point). To prevent precipitation of the reduction products keep the solution hot throughout the titration and add more alcohol. Not less than 43.2 cc. of the standard solution is required per gram of the dye, equivalent to 88 per cent of dye content.

Cupric Sulfate—Use *Cupric Sulfate*, reagent grade, U. S. P. XIII.

***l*-Cystine,** α-diamino-β-dithiolactic acid, $C_6H_{12}O_4N_2S_2$, is a white, crystalline powder, which decomposes on heating without melting.

Solubility—*l*-Cystine is slightly soluble in cold water, more soluble in hot water; insoluble in alcohol; readily soluble in dilute mineral acids and in dilute aqueous solutions of the alkali hydroxides.

Ash—*l*-Cystine yields not more than 0.40 per cent of its weight upon ignition.

Loss on drying—When dried to constant weight at 100°, *l*-Cystine loses not more than 0.60 per cent of its weight.

Optical rotation—The specific optical rotation, $[\alpha]_D^{20°}$ of *l*-Cystine in a solution containing 2 Gm. of cystine, previously dried to constant weight at 100°, in 50 cc. of 1 *N* hydrochloric acid and using a 200-mm. tube, is not less than −200°.

Damar, *Dammar Resin*, is a resinous exudation from *Shorea* spp. (Fam. *Dipterocarpaceæ*), occurring as nodules up to 3 cm. in diameter, mostly smaller; surface nodular or warty, dull, often dusty; nearly colorless to pale yellow, semitransparent; fracture conchoidal, rather friable.

Solubility—Damar is insoluble in water, moderately soluble in alcohol, and easily soluble in ether, chloroform, carbon disulfide, benzene, and partly soluble in turpentine oil.

Specific gravity—The specific gravity of Damar is not more than 1.12.

Melting point—The melting point of Damar is not more than 120°.

Dextrin is a soluble carbohydrate, $(C_6H_{10}O_5)_n.xH_2O$, formed by the partial hydrolysis of starch.

Description—Dextrin occurs as a white, amorphous powder; odorless and tasteless.

Solubility—It is incompletely soluble in cold water, but freely soluble in hot water, and insoluble in alcohol. An aqueous solution of Dextrin (1 in 10) is hazy, and neutral to litmus paper.

Loss on drying—When dried to constant weight at 105°, Dextrin loses not more than 5.0 per cent of its weight.

Ash—Dextrin yields not more than 0.50 per cent of its weight upon ignition.

Reducing sugars—Shake about 2 Gm. of Dextrin, accurately weighed, with 100 cc. of water for 10 minutes and filter until clear. To 50 cc. of the filtrate add 50 cc. of Fehling's Solution and boil for 3 minutes, collect the precipitate on a Gooch crucible, wash with water, alcohol, and ether, and dry at 105°. The reducing sugars, calculated as dextrose, as determined from the weight of the precipitate are equivalent to not more than 3 per cent of the sample taken.

Barium—A filtered aqueous solution of Dextrin (1 in 10) does not respond to the tests for barium.

Calcium—A filtered aqueous solution of Dextrin (1 in 10) does not respond to the tests for calcium.

Heavy metals—Dissolve 2 Gm. of Dextrin in 1 cc. of acetic acid, add sufficient water to make 25 cc., and filter. The heavy metals limit of Dextrin is 5 parts per million.

Dextrose, *Anhydrous d-Dextrose, Anhydrous d-Glucose* for bacteriological media is a hexose, $C_6H_{12}O_6$, obtained by the hydrolysis of a starch.

Description—Dextrose occurs as colorless crystals, or a white crystalline or granular powder; it is odorless and has a sweet taste.

Solubility—Dextrose is very soluble in water; sparingly soluble in alcohol; more soluble in boiling water and in boiling alcohol. An aqueous solution of Dextrose (1 in 10) is clear and colorless, and neutral to litmus paper.

Optical rotation—The specific optical rotation, $[\alpha]_D^{25°}$ of Dextrose in an aqueous solution containing in each 100 cc., 5.0 Gm. of Dextrose, previously dried to constant weight at 100°, and 0.2 cc. of ammonia T.S., and using a 200-mm. tube, is not less than +52.5° and not more than +53.0°.

Loss on drying—When dried to constant weight at 100°, Dextrose loses not more than 0.50 per cent of its weight.

Ash—Dextrose yields not more than 0.05 per cent of its weight upon ignition.

Chloride—One Gm. of Dextrose shows no more chloride than corresponds to 0.1 cc. of 0.02 *N* hydrochloric acid.

Sulfate—One Gm. of Dextrose shows no more sulfate than corresponds to 0.1 cc. of 0.02 *N* sulfuric acid.

Barium—A solution (1 in 10) of Dextrose in distilled water does not respond to tests for barium.

Calcium—A solution (1 in 10) of Dextrose in distilled water does not respond to the tests for calcium.

Heavy metals—Dissolve 2 Gm. of Dextrose in 1 cc. of acetic acid, add sufficient water to make 25 cc., and filter. The heavy metals limit of Dextrose is 5 parts per million.

Dibasic Potassium Phosphate—Use *Potassium Phosphate, Dibasic*, page 672.

Dibasic Sodium Phosphate—Use *Dibasic Sodium Phosphate*, page 677.

Diluted Acetic Acid—Use *Diluted Acetic Acid*, page 19.

Diluted Alcohol—Use *Diluted Alcohol*, U. S. P. XIII.

Diluted Hydrochloric Acid—Use *Diluted Hydrochloric Acid*, U. S. P. XIII.

***p*-Dimethylaminoazobenzene,** *Methyl Yellow, Butter Yellow*, $C_6H_5N:N.C_6H_4N(CH_3)_2$, occurs as yellow leaflets or yellow crystalline powder.

Solubility—*p*-Dimethylamino-azobenzene is insoluble in water, sparingly soluble in alcohol, soluble in chloroform, ether, or fatty oils. Dissolve 0.1 Gm. of *p*-Dimethylamino-azobenzene in 20 cc. of alcohol: the solution is complete or practically so and clear.

Melting point—*p*-Dimethylamino-azobenzene melts between 115° and 117°.

Ash—*p*-Dimethylamino-azobenzene yields not more than 0.1 per cent of its weight upon ignition.

Sensitiveness—Add 0.05 cc. of an alcohol solution (1 in 200), and 2 Gm. of reagent ammonium chloride, to 25 cc. of carbon dioxide-free water; the lemon-yellow color of the solution is changed to orange by 0.05 cc. of 0.1 *N* hydrochloric acid and restored on the subsequent addition of 0.05 cc. of 0.1 *N* sodium hydroxide.

***p*-Dimethylaminobenzaldehyde,** $(CH_3)_2N.C_6H_4.CHO$, occurs as white or yellowish crystals.

Solubility—*p*-Dimethylaminobenzaldehyde is slightly soluble in water, but soluble in alcohol, ether, and in diluted hydrochloric acid.

Solubility in alcohol—One Gm. dissolves completely in 25 cc. of alcohol.

Solubility in hydrochloric acid—Dissolve 1 Gm. in 20 cc. of 10 per cent hydrochloric acid. The solution is clear and colorless, or only slightly yellow.

Melting point—*p*-Dimethylaminobenzaldehyde melts between 73° and 75°.

Residue on ignition—Moisten 1 Gm. with 1 cc. of sulfuric acid, and ignite gently to constant weight. Not more than 1.0 mg. of residue remains.

3,5-Dinitrosalicylic Acid, $C_7H_4N_2O_7.H_2O$, occurs as yellow crystals or pale yellow crystalline powder.

Solubility—3,5-Dinitrosalicylic Acid is sparingly soluble in water; very soluble in alcohol or ether.

Melting point—Dinitrosalicylic Acid, previously dried to constant weight at 110°, melts between 172° and 174°.

Loss on drying—When dried to constant weight at 110°, 3,5-Dinitrosalicylic Acid loses not more than 8 per cent of its weight.

Residue on ignition—On ignition of 0.25 Gm., no weighable residue remains.

Disodium Phosphate—Use *Dibasic Sodium Phosphate*, page 677.

Distilled Water—Use *Distilled Water*, U. S. P. XIII.

Dulcitol, *Anhydrous Dulcitol, Dulcite*, is a hexahydric alcohol, $C_6H_8(OH)_6$, obtained by the reduction of *d*-galactose.

Description—Dulcitol occurs as colorless crystals or a white crystalline or granular powder; odorless and almost tasteless. Dulcitol is optically inactive.

Solubility—Dulcitol is easily soluble in warm water, but sparingly soluble in cold

water and slightly soluble in alcohol. A warm (50°) aqueous solution of Dulcitol (1 in 10) is clear and colorless, and neutral to litmus paper.

Melting point—Dulcitol melts between 187° and 188°.

Loss on drying—When dried to constant weight at 100°, Dulcitol loses not more than 0.10 per cent of its weight.

Ash—Dulcitol yields not more than 0.10 per cent of its weight upon ignition.

Chloride—One Gm. of Dulcitol shows no more chloride than corresponds to 0.1 cc. of 0.02 *N* hydrochloric acid.

Sulfate—One Gm. of Dulcitol shows no more sulfate than corresponds to 0.1 cc. of 0.02 *N* sulfuric acid.

Barium—A warm (50°) solution (1 in 10) of Dulcitol in distilled water does not respond to the tests for barium.

Calcium—A warm (50°) solution (1 in 10) of Dulcitol in distilled water does not respond to the tests for calcium.

Heavy metals—Dissolve 2 Gm. of Dulcitol in 1 cc. of diluted acetic acid and sufficient water to make 25 cc. The heavy metals limit of Dulcitol is 5 parts per million.

Egg Albumen is the white of eggs, carefully separated from the yolk.

Eosin Y, Certified Biological, *Yellowish Eosin Y*, is the sodium salt of tetrabromofluorescein, $C_{20}H_6O_5Br_4Na_2$.

Description—The dye occurs as a moderately coarse powder or as small lumps, deep red to strong reddish orange.

Solubility—One Gm. of the dye is soluble in 2 cc. of water, or in 50 cc. of alcohol.

Absorption ratio—To obtain a solution of suitable concentration for use in a spectrophotometer, dissolve the dye in a mixture of equal volumes of alcohol and distilled water, the latter containing 10 mg. of anhydrous sodium carbonate in each 100 cc.: the absorption ratio of the dye in this solution (*E* at 505 millimicrons over *E* at 535 millimicrons) is not less than 0.82 and not more than 1.01.

Decolorization test—When observed by transmitted light through a layer 1 cm. deep: an aqueous solution of the dye (1 in 12,000) is pink or reddish orange (with a yellowish fluorescence); a reddish orange to orange precipitate formed by the addition of 1 drop of hydrochloric acid to 10 cc. of an aqueous solution of the dye (1 in 100) when dissolved in 10 cc. of alcohol gives a solution which is reddish orange (and fluorescence is either lacking or less than that of the aqueous solution); an alcohol solution of the dye (1 in 12,000) is pink to purplish red (with a greenish yellow fluorescence); a solution of the dye in sulfuric acid (1 in 100) is orange to yellowish orange (the addition of an equal volume of water to this solution yields an orange to yellowish orange precipitate).

Color characteristic—The addition of 2 cc. of saturated aqueous solution of sodium hydroxide to 10 cc. of an aqueous solution of the dye (1 in 100) yields a red precipitate.

Staining characteristics—Stain properly prepared sections of embryonic tissue, fixed in Zenker's fluid, with Heidenhain's hematoxylin and counterstain with a solution of certified biological eosin Y in 25 per cent alcohol (1 in 400) for 2 to 5 minutes. Dehydrate, clear, and mount in xylene-balsam: nuclei are black, cytoplasm is pink.

Prepare Wright's staining solution using Wright's stain which has been recently prepared with certified biological eosin Y. Stain properly prepared blood smears with this solution for 1 to 3 minutes, then dilute with an equal quantity of distilled water and continue the staining for 2 to 6 minutes. Rinse in distilled water, air-

dry, and examine unmounted: granules of the various leucocytes are differentially stained; erythrocytes are yellow-pink.

Prepare Eosin-Methylene-Blue media as follows: 1 Gm. peptone; 0.2 Gm. potassium biphosphate; 1.5 Gm. agar and 100 cc. distilled water. Dissolve by heat and add 5 cc. of aqueous (1 in 5) lactose, 2 cc. of aqueous (1 in 50) eosin Y and 2 cc. of aqueous (1 in 200) methylene blue. After sterilizing, pour into Petri dishes and inoculate with *Escherichia coli* and *Aerobacter aerogenes* and allow to incubate for 24 hours: red growth with a strong metallic sheen for the former organism, pink growth without metallic sheen for the latter, and no reddening of the medium except where growth has occurred.

Assay—Dissolve about 0.5 Gm. of the dye, accurately weighed, in about 500 cc. of distilled water, heat to boiling and add 30 cc. of 0.1 *N* hydrochloric acid. Cool, filter through a tared Gooch crucible, dry at 110°, and weigh. Multiply the weight of the residue by 1.068: the result is equivalent to not less than 80 per cent of the weight of the sample taken.

Ethyl Acetate—Use *Ethyl Acetate*, page 201.

Ethyl Eosin, Certified Biological, *Alcohol-soluble Eosin*, is the potassium or sodium salt of the ethyl ester of tetrabromofluorescein, $C_{22}H_{11}O_5Br_4K$ (or Na).

Description—The dye occurs as a moderately coarse powder, strong red in color.

Solubility—The dye is very slightly soluble in cold water, more soluble in warm water; it is sparingly soluble in alcohol.

Absorption ratio—To obtain a solution of suitable concentration for use in a spectrophotometer, dissolve the dye in a mixture of equal volumes of alcohol and distilled water, the latter containing 10 mg. of anhydrous sodium carbonate in each 100 cc.: the absorption ratio of the dye in this solution (*E* at 515 millimicrons over *E* at 545 millimicrons) is not less than 0.85 and not more than 1.02.

Decolorization test—When observed by transmitted light through a layer 1 cm. deep: a saturated aqueous solution of the dye is purplish pink, the addition of 1 cc. of hydrochloric acid to 10 cc. of this solution changes the color to orange-pink, or the addition of 2 drops of saturated aqueous solution of sodium hydroxide to 10 cc. of this solution changes the color to pink (with a greenish yellow fluorescence, further addition of saturated aqueous solution of sodium hydroxide yields a yellowish brown precipitate); an alcohol solution of the dye (1 in 2500) is reddish orange (with a greenish yellow fluorescence); a solution of the dye in sulfuric acid (1 in 2500) is orange (dilution of this solution with water yields a reddish orange precipitate).

Staining characteristics—Prepare sections from the central nervous system of rabid animals by placing pieces of the hippocampus major, 3–5 mm. in thickness between squares of ordinary writing paper (cut end next to the paper) and immerse in acetone 2½–6 hours. Remove paper and fix tissue in fresh paraffin at 58–60°, for 4 hours or overnight. Cut sections 5 microns thick, float onto glass slides and fix by gentle heat over a Bunsen burner, and place in oven for 45 minutes at 58–60°. Wash in two changes of xylene, pass through two changes of absolute alcohol, two changes of 95 per cent alcohol, then 70 per cent alcohol, to distilled water; stain 2 minutes in ethyl eosin in 95 per cent ethyl alcohol, adjust to *p*H 3.0 with 0.1 *N* hydrochloric acid. If this fails to stain, add acetic acid (1 in 100). Wash in distilled water, stain 30 seconds in a solution of 0.3 Gm. methylene blue in 30 cc. of 95 per cent ethyl alcohol and mix with 100 cc. distilled water, adjusting to *p*H 5.6 by adding 2 cc. of acetate-acetic acid (sodium acetate, 25 Gm.; glacial acetic acid, 5 cc.; distilled

water, 250 cc.) to 60 cc. of fluid, wash in distilled water and differentiate in water acidulated with acetic acid until the sections become brownish red, rinse in distilled water, dehydrate, clear and mount in balsam: nerve cells are blue, Negri bodies terra cotta to cardinal red.

Assay—Add about 0.5 Gm. of the dye, accurately weighed, to 500 cc. of distilled water containing 18 cc. of 1 *N* sodium hydroxide, and boil for 2 to 3 hours. Cool the solution, filter, and wash the filter well with cold water. To the combined filtrate and washings add 4 cc. of hydrochloric acid, and allow it to stand for 1 hour. Filter through a tared Gooch crucible, and wash with an aqueous solution of hydrochloric acid (1 in 500). Dry to constant weight at 110°, and weigh. Multiply the weight of the residue by 1.102: the result is equivalent to not less than 78 per cent of the weight of the sample taken (*anhydrous ethyl eosin*).

Extract of Beef—Use *Beef Extract*, page 71.

Ferric Ammonium Sulfate—Use *Ferric Ammonium Sulfate*, reagent grade, U. S. P. XIII.

Ferric Chloride—Use *Ferric Chloride*, U. S. P. XIII.

Ferric Citrate—Use *Ferric Citrate*, reagent grade, U. S. P. XIII.

Ferric Sulfate, $Fe_2(SO_4)_3.xH_2O$, occurs as a grayish white, hygroscopic powder, slowly soluble in water.

Insoluble—To a mixture of 50 cc. of water and 1 cc. of sulfuric acid add 2 Gm. of ferric sulfate, and digest on the water bath: not more than a small amount of insoluble residue remains.

Chloride—Dissolve 2 Gm. in a mixture of 25 cc. of water and 5 cc. of nitric acid; filter, and divide into two equal portions. To one portion add 1 cc. of silver nitrate T.S., let stand 10 minutes, filter until clear, and use as a blank. To the other portion add 1 cc. of silver nitrate T.S. The turbidity produced in the second portion is not greater than that produced in the blank to which 0.05 mg. of chloride (Cl) has been added (0.005 per cent).

Nitrate—Heat 2.5 Gm. with 75 cc. of water until no more dissolves, add ammonia T.S. to precipitate the iron, filter, and wash with hot water until the filtrate measures 100 cc. Evaporate 20 cc. of the filtrate to about 5 cc., cool, add 1 drop of dilute hydrochloric acid, 0.5 cc. of indigo carmine T.S., and 5 cc. of sulfuric acid. The blue color persists for 1 minute (about 0.02 per cent as NO_3).

Alkalies and Earths—Evaporate 40 cc. of the filtrate from the test for *Nitrate* to dryness, and ignite to constant weight. The weight of the residue is not more than 2 mg. (0.2 per cent).

Copper, Zinc—Neutralize 40 cc. of the filtrate from the test for *Nitrate* with glacial acetic acid, add an excess of 0.5 cc. of the acid, then add 1 cc. of freshly prepared potassium ferrocyanide T.S. Neither a pink color nor a white turbidity appears in 10 minutes.

Ferrous Iron—Dissolve 1 Gm. in a mixture of 50 cc. of water and 5 cc. sulfuric acid, and titrate with 0.1 *N* potassium permanganate. Not more than 0.1 cc. of the permanganate is required to produce a lasting reddish color.

Assay—Weigh accurately about 0.7 Gm. of ferric sulfate and dissolve it in a mixture of 50 cc. of water and 3 cc. of hydrochloric acid in a glass-stoppered flask. Add 3 Gm. potassium iodide, and let stand for 30 minutes in the dark. Then dilute with 100 cc. water, and titrate with 0.1 *N* sodium thiosulfate, adding starch toward the end. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.005585 Gm. of Fe.

The assay should indicate not less than 21.0 per cent and not more than 23.0 per cent of Fe.

Formaldehyde Solution—Use *Formaldehyde Solution*, U. S. P. XIII.

Fuchsin, Acid—Use *Acid Fuchsin, Certified Biological*, page 638.

Fuchsin, Basic—Use *Basic Fuchsin, Certified Biological*, page 643.

Furfural—Use *Furfural*, reagent grade, U. S. P. XIII.

Galactose, *Anhydrous d-Galactose*, is a hexose, $C_6H_{12}O_6$, obtained by the hydrolysis of lactose.

Description—Galactose occurs as colorless crystals or a white crystalline or granular powder; it is odorless and has a sweet taste.

Solubility—Galactose is freely soluble in water, but sparingly soluble in alcohol. An aqueous solution of Galactose (1 in 10) is clear and colorless, and neutral to litmus paper.

Optical rotation—The specific optical rotation, $[\alpha]_D^{20°}$, of Galactose in an aqueous solution containing in each 100 cc. 5 Gm. of galactose, previously dried to constant weight at 105°, and 0.2 cc. of ammonia T.S., and using a 200-mm. tube, is not less than +79.0° and not more than +81.0°.

Loss on drying—When dried to constant weight at 105°, Galactose loses not more than 0.50 per cent of its weight.

Ash—Galactose yields not more than 0.20 per cent of ash upon ignition.

Chloride—One Gm. of Galactose shows no more chloride than corresponds to 0.1 cc. of 0.02 *N* hydrochloric acid.

Sulfate—One Gm. of Galactose shows no more sulfate than corresponds to 0.5 cc. of 0.02 *N* sulfuric acid.

Barium—A solution (1 in 10) of Galactose in distilled water does not respond to the tests for barium.

Calcium—A solution (1 in 10) of Galactose in distilled water does not respond to the tests for calcium.

Heavy metals—Dissolve 2 Gm. of Galactose in 1 cc. of diluted acetic acid and sufficient water to make 25 cc. The heavy metals limit of Galactose is 5 parts per million.

Gelatin—Use *Gelatin*, U. S. P. XIII.

Glacial Acetic Acid—Use *Glacial Acetic Acid*, U. S. P. XIII.

Glycerin—Use *Glycerin*, U. S. P. XIII.

Guaiac—Use *Guaiac*, page 242.

Gum Ghatti, *Ghatti Gum, "Indian Gum,"* is an exudation from the stems of *Anogeissus latifolia* Wall (Fam. *Combretaceæ*).

Description—Gum Ghatti is rounded to vermiform in shape, transparent, brittle with a dull, rough surface and vitreous fracture; yellowish white to pale yellow.

Solubility—Gum Ghatti is entirely soluble in 5 parts of cold water, forming a very viscous mucilage.

Distinction from acacia—An aqueous solution (1 in 100) of Gum Ghatti gives a precipitate with tannic acid T.S.

Hematein, $C_{16}H_{12}O_6$, is prepared from logwood extract or from hematoxylin by treatment with ammonia and exposure to air.

Description—Hematein occurs as reddish brown crystals with a yellowish green metallic luster.

Solubility—Hematein is soluble in water (about 1 in 1700); slightly soluble in

alcohol or in ether; insoluble in benzene or in chloroform; freely soluble in diluted ammonia solution to form a solution of dusky purplish red color and in an aqueous solution of sodium hydroxide (1 in 50) to form a solution of bright red color, viewed in each case through a layer 1 cm. deep in a comparison apparatus.

Melting point—Hematein melts at a temperature above 200° and tends to decompose at 250°.

Hematoxylin, Certified Biological, consists of hydroxybrazilin, $C_{16}H_{14}O_6.3H_2O$, extracted by ether from the dried aqueous extract of the heartwood of *Hæmatoxylon campechianum* Linné (Fam. *Leguminosæ*).

Description—The dye occurs as a moderately coarse powder, moderate orange to dark yellow.

Solubility—One Gm. of the dye is soluble in 2 cc. of alcohol; it is sparingly soluble in water.

Color characteristics—When observed by transmitted light through a layer 1 cm. deep: a saturated aqueous solution of the dye is yellowish orange to greenish yellow; a saturated alcohol solution of the dye is reddish orange or red; a solution of the dye in diluted ammonia solution (1 in 5000) is red.

Color characteristics—Solution of the dye in the following solvents (1 in 2000) develops the colors indicated: stannous chloride T.S.—pink; cupric sulfate T.S.—bluish purple to purplish blue; potassium dichromate T.S.—brown after two hours; lead acetate T.S.—colorless to bluish purple after two hours.

Staining characteristics—Mordant properly prepared sections of animal tissue fixed in Zenker's fluid, in an aqueous solution of iron alum (1 in 40) for 30 minutes to 3 hours. Wash in water and stain with an aqueous solution of certified biological hematoxylin (1 in 200) for 1 to 3 hours. Wash in tap water, differentiate in the iron alum solution, controlling differentiation by microscopic examination, and wash in flowing water for 5 to 10 minutes. Counterstain with a solution of certified biological eosin Y in 75 per cent alcohol (1 in 1000), dehydrate, and mount in xylene-balsam: nuclei are black, cytoplasm is pink.

Stain properly prepared sections of animal tissue, fixed in Zenker's fluid, with Delafield's hematoxylin (prepared with certified biological hematoxylin) diluted with an equal volume of distilled water, for 15 minutes. Rinse in tap water and place in fresh tap water for 10 minutes. If the section is still very blue, add 2 drops of 35 per cent alcohol containing 1 per cent of hydrochloric acid to the slide, then put back into water. Stain with a solution of certified biological eosin Y in 75 per cent alcohol (1 in 1000) for 2 to 5 minutes. Wash quickly in distilled water, dehydrate, clear, and mount in xylene-balsam: nuclei are blue.

Hydrochloric Acid—Use *Hydrochloric Acid*, U. S. P. XIII.

Hydrochloric Acid, 0.1 *N*—Use *Tenth-Normal Hydrochloric Acid*, U. S. P. XIII.

Hydrochloric Acid, 0.02 *N*—Use *Fiftieth-Normal Hydrochloric Acid*, U. S. P. XIII.

Hydrochloric Acid, 0.01 *N*—Use *Hundredth-Normal Hydrochloric Acid*, U. S. P. XIII.

Hydrogen Peroxide Solution—Use *Hydrogen Peroxide Solution*, U. S. P. XIII.

India Ink—Use *India ink*, bacteria free.

Inulin, *Hydrous Inulin*, is a fructosan $(C_6H_{10}O_5)_n.xH_2O$, obtained from the subterranean organs of members of the family *Compositæ*.

Description—Inulin occurs as a white amorphous powder or granules. It is odorless and practically tasteless

Solubility—Inulin is soluble in hot water, slightly soluble in cold water and in alcohol, and insoluble in absolute alcohol. An aqueous solution of Inulin (1 in 10) is hazy.

Optical rotation—An aqueous solution of Inulin (1 in 10) is lævorotatory.

Loss on drying—When dried to constant weight at 105°, Inulin loses not more than 10 per cent of its weight.

Ash—Inulin yields not more than 0.10 per cent upon ignition.

Reaction—An aqueous solution of Inulin (1 in 10) is neutral to litmus paper.

Barium—A filtered aqueous solution of Inulin (1 in 10) does not respond to the tests for barium.

Calcium—A filtered aqueous solution of Inulin (1 in 10) does not respond to the tests for calcium.

Heavy metals—Dissolve 2 Gm. of Inulin in 1 cc. of diluted acetic acid and sufficient water to make 25 cc. The heavy metals limit of Inulin is 5 parts per million.

Iodine—Use *Iodine*, U. S. P. XIII.

Iodine Tincture—Use *Strong Iodine Tincture*, page 265.

Isotonic Sodium Chloride Solution—Use *Isotonic Sodium Chloride Solution*, U. S. P. XIII.

Jack Bean Meal—Use *Soy Bean Meal*, see page 680.

Lactose—Use *Lactose*, U. S. P. XIII.

Lead Acetate—Use *Lead Acetate*, U. S. P. XIII.

Liquefied Phenol—Use *Liquefied Phenol*, U. S. P. XIII.

Liquid Petrolatum—Use *Liquid Petrolatum*, U. S. P. XIII.

Lithium Carbonate—Use *Lithium Carbonate*, page 304.

Lithium Oxalate, $Li_2C_2O_4$, is a white crystalline powder, soluble in about 17 parts of water at room temperature. It is insoluble in alcohol.

Neutrality—Aqueous solutions are faintly alkaline to litmus paper but are not reddened by 1 drop of phenolphthalein T.S.

Chloride—Ignite 2 Gm., and to the residue add 20 cc. of distilled water. Neutralize the solution with nitric acid, and add 0.5 cc. excess of the acid. Filter, and add to the filtrate 1 cc. of silver nitrate T.S. Any turbidity produced is not greater than that produced in a blank to which 0.04 mg. of chlorine has been added.

Sulfate—Ignite 2 Gm. in a porcelain crucible protected from sulfur in the flame. Boil the residue with 20 cc. of distilled water and 2 cc. of bromine T.S., then add 5 cc. of hydrochloric acid and evaporate to dryness on a water bath. Dissolve the residue in 20 cc. of distilled water and 1 cc. of 1 *N* hydrochloric acid, filter, and add to the filtrate 2 cc. of barium chloride T.S. Any resulting turbidity is not greater than that in a control made as follows: evaporate 2 cc. of bromine T.S. and 5 cc. of hydrochloric acid to dryness on a water bath, dissolve the residue and 0.3 mg. of SO_4 in sufficient distilled water to make 20 cc., then add 1 cc. of 1 *N* hydrochloric acid and 2 cc. of barium chloride T.S.

Heavy metals—Ignite 4 Gm. gently in a porcelain crucible. Add to the residue 5 cc. of distilled water, 5 cc. of hydrochloric acid, and 2 cc. of nitric acid, and evaporate to dryness on a water bath. Dissolve the residue in 40 cc. of distilled water, and filter. To 10 cc. of the filtrate add 0.04 mg. of lead, as $Pb(C_2H_3O_2)_2$, dilute with distilled water to 30 cc., and add 1 cc. of 1 *N* acetic acid (A). To the remaining 30 cc. of the filtrate add 1 cc. of 1 *N* acetic acid (B). Then to each add 10 cc. of hydrogen sulfide T.S.; B is no darker than A.

Sodium—Ignite 1 Gm. in a platinum crucible and dissolve the residue in 10 cc. of 10 per cent hydrochloric acid, and filter. The solution tested on a platinum wire in the full-heat flame of a Bunsen burner imparts no distinct yellow color and only a fleeting orange tinge to the red lithium flame (less than 0.05 per cent sodium oxalate).

Potassium—Ignite 5 Gm. of the salt to carbonate in a platinum crucible, dissolve it in a small amount of distilled water, and neutralize the solution with hydrochloric acid, and filter. Evaporate this solution to dryness on a water bath and redissolve the residue in 15 cc. of distilled water (this is to concentrate the solution and remove any free acid). Add 5 cc. of sodium cobaltic nitrite T.S. and allow to stand overnight. Any precipitate formed should not be greater than that produced by an amount of potassium chloride equivalent to 0.50 mg. of K, dissolved in 15 cc. of distilled water and treated with 5 cc. of the same sodium cobaltic nitrite T.S. as used in the test, and allowed to stand overnight (0.01 per cent of K).

Assay—Weigh accurately about 1 Gm., previously dried to constant weight at 105°, dissolve in water, and dilute to exactly 200 cc. Dilute 25 cc. of the resulting solution with 75 cc. of water, add 3 cc. of sulfuric acid, and then add slowly 20 cc. of 0.1 *N* potassium permanganate. Heat to 70°, and complete the titration with the permanganate until a pale pink color persists for 15 seconds. One cc. of 0.1 *N* permanganate equals 0.005094 Gm. of $Li_2C_2O_4$. It shows not less than 99 per cent of $Li_2C_2O_4$.

Litmus, *Lacmus, Lackmus, Turnsole, Lacqueblue*—A blue pigment prepared from various species of *Roccella* DeCandolle, *Lecanora* Acharius, or other lichens (Fam. *Parmeliaceæ*).

Description—Cubes, masses, fragments, or granules, of an indigo-blue or deep violet color. It has the combined odor of indigo and violets, tinges the saliva a deep blue, and is somewhat pungent and saline to the taste.

Solubility—The indicator substances contained in litmus are soluble in water and less soluble or insoluble in alcohol.

Ash—Litmus yields not more than 60 per cent of total ash.

Color standard—Prepare Litmus Test Solution as directed on page 780, adding sufficient distilled water through the final filter to make the product measure 125 cc. To 1 cc. of this solution add sufficient distilled water and potassium hydroxide T.S. to make 100 cc., and develop a hydrogen-ion concentration equivalent to not less than *p*H 7.0. Compare the color of this freshly prepared dilution, in Nessler tubes or in a colorimeter, with a standard solution, prepared as follows: dilute exactly 2.6 cc. of an alkaline aqueous solution of bromothymol blue (1 in 10,000 and with a hydrogen-ion concentration equivalent to not less than *p*H 7.0) with 75 cc. of distilled water; add 2.0 cc. of an aqueous solution of crystal violet, certified biological (1 in 10,000), and sufficient distilled water to make 100 cc.

The color tint of the diluted litmus solution approximates that of the standard solution; the intensity of color of the diluted litmus solution, in a column ranging from 27.0 mm. to 33.0 mm. in height, closely matches that of the standard color solution in a column 30.0 mm. in height.

Lugol's Solution—Use *Strong Iodine Solution*, U. S. P. XIII.

Magnesium Sulfate—Use *Magnesium Sulfate*, U. S. P. XIII.

Maltose, *Hydrous Maltose, Malt Sugar*, is a disaccharide, $C_{12}H_{22}O_{11}.H_2O$, obtained by the partial hydrolysis of starch.

Description—Maltose occurs as colorless crystals or a white crystalline or granular powder; it is odorless and has a sweet taste.

Solubility—Maltose is very soluble in water and slightly soluble in alcohol. An aqueous solution of Maltose (1 in 10) is clear and colorless.

Optical rotation—The specific optical rotation, $[\alpha]_D^{20°}$, of Maltose in an aqueous solution containing in each 100 cc., 5 Gm. of maltose, previously dried to constant weight in vacuo at 90°, and 0.2 cc. of ammonia T.S., is not less than +137.5° and not more than +139.5°.

Loss on drying—When dried to constant weight in vacuo at 90°, Maltose loses not more than 5 per cent of its weight.

Ash—Maltose yields not more than 0.20 per cent of its weight upon ignition.

Reaction—An aqueous solution of Maltose (1 in 10) is neutral to litmus paper.

Chloride—One Gm. of Maltose shows no more chloride than corresponds to 0.2 cc. of 0.02 *N* hydrochloric acid.

Sulfate—One Gm. of Maltose shows no more sulfate than corresponds to 0.5 cc. of 0.02 *N* sulfuric acid.

Barium—An aqueous solution of Maltose (1 in 10) does not respond to the tests for barium.

Calcium—An aqueous solution of Maltose (1 in 10) does not respond to the tests for calcium.

Heavy metals—Dissolve 2 Gm. of Maltose in 1 cc. of diluted acetic acid and sufficient water to make 25 cc. The heavy metals limit of Maltose is 5 parts per million.

Mannitol, *Anhydrous d-Mannitol, Mannite,* is a hexahydric alcohol, $C_6H_8(OH)_6$, obtained by the reduction of mannose or by isolation from manna.

Description—Mannitol occurs as colorless crystals or a white crystalline or granular powder; it is odorless and has a sweet taste.

Solubility—Mannitol is freely soluble in water and in hot alcohol; it is sparingly soluble in alcohol and almost insoluble in cold absolute alcohol. An aqueous solution of Mannitol (1 in 10) is clear and colorless.

Optical rotation—The specific optical rotation, $[\alpha]_D^{20°}$, of Mannitol in an aqueous solution containing in each 100 cc., 8 Gm. of borax and 10 Gm. of mannitol previously dried to constant weight at 105°, and using a 200-mm. tube, is not less than +21.5° and not more than +22.5°.

Melting point—Mannitol melts between 166° and 167°.

Loss on drying—When dried to constant weight at 105°, Mannitol loses not more than 0.10 per cent of its weight.

Ash—Mannitol yields not more than 0.10 per cent of ash upon ignition.

Reaction—An aqueous solution of Mannitol (1 in 10) is neutral to litmus paper.

Chloride—One Gm. of Mannitol shows no more chloride than corresponds to 0.1 cc. of 0.02 *N* hydrochloric acid.

Sulfate—One Gm. of Mannitol shows no more sulfate than corresponds to 0.1 cc. of 0.02 *N* sulfuric acid.

Barium—An aqueous solution of Mannitol (1 in 10) does not respond to the tests for barium.

Calcium—An aqueous solution of Mannitol (1 in 10) does not respond to the tests for calcium.

Heavy metals—Dissolve 2 Gm. of Mannitol in 1 cc. of diluted acetic acid and suf-

ficient water to make 25 cc. The heavy metals limit of Mannitol is 5 parts per million.

Mastic—Use *Mastic*, page 319.

Mercury—Use *Mercury*, U. S. P. XIII.

Mercury Bichloride—Use *Mercury Bichloride*, page 337.

Metaphosphoric Acid—Use *Phosphoric Acid, Meta*, page 670.

Methanol—Use *Methanol*, reagent grade, U. S. P. XIII.

Methyl Green, Certified Biological, is the zinc chloride double salt of ethylhexamethylpararosaniline chlorobromide, $C_{27}H_{35}N_3ClBr.ZnCl_2$.

Description—The dye occurs as a moderately coarse powder, brownish black to dark yellowish green.

Solubility—One Gm. of the dye is soluble in 20 cc. of water; it is slightly soluble in alcohol.

Absorption ratio—To obtain a solution of suitable concentration for use in a spectrophotometer, dissolve the dye in a mixture of equal volumes of alcohol and distilled water: the absorption ratio of the dye in this solution (*E* at 620 millimicrons over *E* at 650 millimicrons) is not less than 0.88 or more than 1.00.

Decolorization test—When observed by transmitted light through a layer 1 cm. deep: an aqueous solution of the dye (1 in 25,000) is greenish blue or blue, the addition of 1 drop of hydrochloric acid to 10 cc. of this solution gives a bluish green to greenish blue color, or the addition of 2 drops of saturated aqueous solution of sodium hydroxide to 10 cc. of this solution makes it colorless; an alcohol solution of the dye (1 in 25,000) is greenish blue or blue; a solution of the dye in sulfuric acid (1 in 1000) is orange or reddish orange, dilution of this solution with water (1 in 10) changes the color to yellow or greenish yellow.

Staining characteristics—Stain properly prepared sections of intestine, trachea or embryonic tissue, fixed in Zenker's fluid, with an aqueous solution of certified biological methyl green (1 in 200) for 5 to 10 minutes until the sections appear green. Then dehydrate, clear, and mount in xylene-balsam: nuclei of the cells are green, mucus is brown, cartilage is darker brown.

Stain properly prepared smears of gonorrheal pus with Pappenheim's methyl green-pyronin solution for 15 seconds without heat. Dehydrate, clear, and examine unmounted: bacteria in the leucocytes are red, nuclei of the leucocytes are green, not purplish or blue.

Assay—Dissolve about 0.3 Gm. of the dye, accurately weighed, in a mixture of 75 cc. of 95 per cent alcohol and 75 cc. of distilled water. Heat to boiling, add 25 cc. of aqueous solution of sodium tartrate (30 in 100), and titrate with 0.1 *N* titanium trichloride to a practically colorless end-point. Not less than 19.9 cc. of standard solution is required per Gm. of dye, equivalent to 65 per cent of dye content.

Methyl Orange Test Solution—Use *Methyl Orange Test Solution*, U. S. P. XIII.

Methyl Red Test Solution—Use *Methyl Red Test Solution*, U. S. P. XIII.

Methylene Blue, Certified Biological, is tetramethyldiaminodiphenazothionium chloride, $C_{16}H_{18}N_3SCl$.

Description—The dye occurs as a moderately coarse powder or small lumps, moderate olive-green.

Solubility—One Gm. of the dye is soluble in 30 cc. of water, or in 60 cc. of alcohol.

Absorption ratio—To obtain a solution of suitable concentration for use in a spectrophotometer, dissolve the dye in a mixture of equal volumes of alcohol and distilled

water: the absorption ratio of the dye in this solution (*E* at 635 millimicrons over *E* at 665 millimicrons) is not less than 0.56 or more than 0.62.

Decolorization test—When observed by transmitted light through a layer 1 cm. deep: an aqueous solution of the dye (1 in 10,000) is purplish blue, the addition of 1 drop of hydrochloric acid to 10 cc. of this solution causes no change in color, or the addition of 1 cc. of saturated aqueous solution of sodium hydroxide to 10 cc. of this solution produces little change in color (further addition of saturated aqueous solution of sodium hydroxide yields a reddish purple to black precipitate); an alcohol solution of the dye (1 in 10,000) is purplish blue, (1 in 25,000) is greenish blue; a chloroform solution of the dye (1 in 20,000) is purplish blue to bluish purple; a solution of the dye in sulfuric acid (1 in 1000) is yellowish green, dilution of this solution with water (1 to 4) changes the color to blue.

Staining characteristics—Stain properly prepared sections of animal tissue, fixed in Zenker's fluid, with an aqueous solution of phloxine of 80 per cent dye content (1 in 20) until a deep stain has been obtained (20 minutes or longer), and wash in distilled water. Stain with an aqueous solution of certified biological methylene blue and sodium borate (1 each in 100) for 30 minutes, pouring the staining solution on and off several times. Wash in distilled water, differentiate and dehydrate in alcohol containing a trace of rosin, keeping the slides in motion so as to assure uniform decolorization, and controlling the process by noting under the microscope the return of a pink color to the section; then rapidly complete the dehydration, clear, and mount in xylene-balsam: nuclei are blue, cytoplasm is pink.

Properly prepare smears from a throat culture of *Corynebacterium diphtheriæ*. Freshly prepare (*a*) Loeffler's alkaline methylene blue solution, (*b*) an aqueous solution of methylene blue (1 in 100), and (*c*) a solution of methylene blue in 30 per cent alcohol (3 in 1000), using the same sample of certified biological methylene blue for each of these solutions. Stain separate smears with solutions (*a*), (*b*), and (*c*) for 5 seconds, then rinse in tap water, dry, and examine without mounting: each smear shows the barred or granular structure of the *Corynebacterium* organisms stained blue.

Prepare a smear of milk using 0.01 cc. over 1 sq. cm., dry with gentle heat, dip in xylene to remove fat, fix in alcohol, and stain for 2 minutes in a solution of certified biological methylene blue in 30 per cent alcohol (3 in 1000). Wash in alcohol until the smear is a very pale blue, dry, and mount in xylene-balsam: bacteria are blue on a paler blue background.

Follow the directions given under certified biological eosin Y, staining characteristics, beginning "Prepare Wright's staining solution," see page 658. Use Wright's stain which has been recently prepared with certified biological methylene blue. The results are as given on page 659.

Assay—Dissolve about 0.3 Gm. of the dye, accurately weighed, in 150 cc. of hot distilled water. Add about 10 Gm. of sodium bitartrate, heat to boiling, and titrate with 0.1 *N* titanium trichloride to a yellow end point. Not less than 51.2 cc. of standard solution is required per Gm. of dye, equivalent to 82 per cent of dye content.

Molybdic Anhydride—Use *Molybdic Anhydride*, reagent grade, U. S. P. XIII.

N-(1-Naphthyl)-Ethylenediamine Dihydrochloride, $C_{10}H_7HNCH_2CH_2NH_2.2HCl$, occurs as a white or slightly pinkish crystalline powder. It is soluble in water; and slightly soluble in alcohol.

Sensitiveness—(A) Dissolve 10 mg. of N-(1-naphthyl)-ethylenediamine dihydrochloride in 100 cc. of water, then dilute 2 cc. with water to 100 cc. (B) Dissolve 50

mg. of reagent sulfanilic acid in 4 cc. of glacial acetic acid and dilute with water to 100 cc. (C) Dissolve 350 mg. of sodium nitrite in 10 cc. of water.

To 10 cc. of (B) add 0.2 cc. of (C), allow to stand for 5 minutes then add 1 cc. of (A). A distinct pink color develops within 1 minute.

Clarity and completeness of solution—A solution of 100 mg. of N-(1-naphthyl)-ethylenediamine dihydrochloride in 5 cc. of water is complete and clear or practically so.

Residue on ignition—Ignite 200 mg. with a few drops of sulfuric acid. No weighable residue remains.

Neutral Red, Certified Biological, is aminodimethylaminotoluphenazonium chloride, $C_{15}H_{17}N_4Cl$.

Description—The dye occurs as a moderately coarse powder, very dusky red to dusky olive-green.

Solubility—One Gm. of the dye is soluble in 40 cc. of water, or in 45 cc. of alcohol.

Absorption ratio—To obtain a solution of suitable concentration for use in a spectrophotometer, dissolve the dye in a mixture of equal volumes of alcohol and distilled water containing 0.5 cc. of glacial acetic acid in each 50 cc.: the absorption ratio of the dye in this solution (*E* at 515 millimicrons over *E* at 545 millimicrons) is not less than 0.73 or more than 0.77.

Decolorization test—When observed by transmitted light through a layer 1 cm. deep: an aqueous solution of the dye (1 in 7000) is purplish red, the addition of 3 cc. of hydrochloric acid to 10 cc. of this solution gives a bluish purple to purplish red color, or the addition of 1 drop of saturated aqueous solution of sodium hydroxide to 10 cc. of this solution yields an orange or brown precipitate which dissolves in 2 cc. of ether to form a yellow or greenish yellow solution; an alcohol solution of the dye (1 in 16,000) is red-purple to red; a solution of the dye in sulfuric acid (1 in 10,000) is green or bluish green, dilution of this solution with water changes the color toward purple.

Staining characteristics—Prepare a saturated solution of the dye in neutralized alcohol freshly distilled over lime (about 125 mg. in 50 cc.). Dilute 2 cc. of this solution with an additional 10 cc. of the solvent and with this dilution prepare dry dye-films on scrupulously clean microscopic slides. Add freshly drawn rabbit's blood to form a film on the dry dye, cover, seal quickly with petrolatum of a high melting point, and observe under the microscope at a temperature maintained at 37°: basophilic granules become brilliant red, eosinophilic granules yellow or slightly orange, neutrophilic granules take the color of the neutral solution of the dye or show almost no color; neutrophilic leucocytes remain in constant ameboid motion for at least 1 hour, esoinophilic leucocytes for at least 30 minutes.

Prepare aqueous solutions of the dye in the following concentrations: 1 in 5000; 1 in 25,000; 1 in 80,000; and 1 in 100,000. To 10 cc. of each solution add 1 drop of a concentrated culture of *Paramecium:* the organisms remain alive in all concentrations of the dye even the strongest, as evidenced by ciliary activity, appearance of pellicle and lack of distortion; intracellular granules of the organisms are stained by all concentrations of the dye, even the weakest.

Assay—Prepare an aqueous solution of the dye (1 in 1000). To 1 cc. of this solution add 1 cc. of glacial acetic acid, 48 cc. of distilled water, and 50 cc. of alcohol. Measure the extinction coefficient of this solution in a layer 1 cm. deep at 540 milli-

microns and divide the value of the extinction coefficient by 0.0168. The result is not less than 50, equivalent to 50 per cent of anhydrous dye content.

Nitric Acid—Use *Nitric Acid*, page 352.

Nutrose—Use *Sodium Caseinate*, page 676.

Orange G, Certified Biological, is the disodium salt of benzene-azo-2-naphthol-6,8-disulfonic acid, $C_{16}H_{10}N_2O_7S_2Na_2$.

Description—The dye occurs as a moderately coarse powder or as small lumps, deep reddish orange to strong yellowish brown.

Solubility—One Gm. of the dye is soluble in 6 cc. of water; it is slightly soluble in alcohol.

Absorption ratio—To obtain a solution of suitable concentration for use in a spectrophotometer, dissolve the dye in a mixture of equal volumes of alcohol and distilled water: the absorption ratio of the dye in this solution (*E* at 500 millimicrons over *E* at 530 millimicrons) is not less than 4.4 or more than 5.8.

Decolorization test—When observed by transmitted light through a layer 1 cm. deep: an aqueous solution of the dye (1 in 500) is orange, the addition of 1 drop of hydrochloric acid to 10 cc. of this solution causes no change in color, but the addition of 1 drop of saturated aqueous solution of sodium hydroxide to 10 cc. of this solution changes the color to reddish orange or red; a saturated alcohol solution of the dye is orange or yellowish orange; a solution of the dye in sulfuric acid (1 in 5000) is orange.

Color characteristic—The addition of barium chloride T.S. to a saturated aqueous solution of the dye yields a reddish precipitate.

Staining characteristics—Stain properly prepared sections of embryonic animal tissues with Heidenhain's hematoxylin and counterstain with a solution of certified biological orange G in alcohol (1 in 200) for 15 seconds. Dehydrate, clear, and mount in xylene-balsam: nuclei are black, cytoplasm is pink.

Follow the directions given under certified biological crystal violet, staining characteristics, beginning "Stain properly prepared sections from a growing root tip or bud, fixed in Flemming's fluid, with an aqueous solution of certified biological safranin O," see page 655. The results are as given on page 655.

Follow the directions given under certified biological aniline blue, staining characteristics. The results are given on page 641.

Assay—Dissolve about 0.2 Gm. of the dye, accurately weighed in 100 cc. of distilled water. Add 10 Gm. of sodium bitartrate, heat to boiling, and titrate with 0.1 *N* titanium trichloride to a sharp change from yellowish brown to yellowish green. Not less than 71.7 cc. of standard solution is required per Gm. of dye, equivalent to 80 per cent of dye content.

Orcinol, *3,5-dihydroxytoluene*, $CH_3.C_6H_3.(OH)_2$, may be obtained from lichens or prepared synthetically.

It occurs as colorless, monoclinic crystals, soluble in water, alcohol, and ether. The melting point is 107° to 108°.

Ortho-tolidine—Use *o-Tolidine*, page 777.

Osmic Acid—Use *Osmium Tetroxide*, page 669.

Osmium Tetroxide, Osmic Acid, Perosmic Anhydride, OsO_4—Colorless or slightly yellow, hygroscopic crystals or crystalline granules; very pungent odor (*Caution: Osmium Tetroxide vapors are very irritating to the eyes and the respiratory membranes*); decomposed by light; slowly soluble in about 20 parts of water, soluble in alcohol

and ether with decomposition. It softens at about 35° and melts at 40–41°. The boiling point is about 100°.

Solubility—Dissolve 0.2 Gm. in 1 cc. of carbon tetrachloride. The solution is clear, not more than slightly yellow, and shows no appreciable insoluble residue.

Non-volatile matter—Evaporate the solution from the solubility test to dryness in a porcelain vessel on a water bath (in a well-ventilated hood) and then dry the vessel in an oven at 110°. The weight of the residue shall not exceed 0.4 mg. (0.2 per cent).

Heavy metals—Add 2 cc. of hydrochloric acid to the residue from the test for non-volatile matter, evaporate the solution to dryness, take up the residue in 10 cc. of distilled water. The solution meets the requirements of the test for heavy metals in reagents, U. S. P. XIII.

Oxalic Acid, 0.01 *N*—Use *Hundredth-Normal Oxalic Acid*, U. S. P. XIII.

Ox Bile, is the fresh bile of the ox, *Bos taurus* Linné (Fam. *Bovidæ*).

Description—Ox Bile is a brownish green or dark green, somewhat viscid liquid having a characteristic odor, and a disagreeable, bitter taste. A frothy mixture is produced when Ox Bile is shaken with water. It is neutral or faintly alkaline to litmus paper.

Specific gravity—The specific gravity of Ox Bile is not less than 1.015 and not more than 1.025 at 25°.

Identification—Mix 2 drops of Ox Bile with 10 cc. of water and 1 drop of a freshly prepared solution of 1 part of sucrose in 4 parts of water, and cautiously add sulfuric acid until the precipitate first formed is redissolved. The mixture gradually acquires a brownish red color, which changes successively to carmine, purple, and violet.

Oxgall—Use *Ox Bile*, page 670.

Para-dimethylaminobenzaldehyde—See *p-Dimethylaminobenzaldehyde*, page 657.

Para-dimethylazobenzene—See *p-Dimethylaminoazobenzene*, page 657.

Paraffin—Use *Paraffin*, page 372.

Peptone—Use *Peptone*, reagent grade, U. S. P. XIII.

Petrolatum—Use *Petrolatum*, U. S. P. XIII.

Petroleum Benzin—Use *Petroleum Benzin*, U. S. P. XIII.

Phenol—Use *Phenol*, U. S. P. XIII.

Phenolphthalein Test Solution—Use *Phenolphthalein Test Solution*, U. S. P. XIII.

Phenol Red—Use *Phenolsulfonphthalein*, U. S. P. XIII.

Phenol Red Indicator—Use *Phenol Red pH Indicator*, U. S. P. XIII.

Phenylhydrazine Hydrochloride, $C_6H_5.NH.NH_2HCl$—In silky leaflets, soluble in water and in alcohol. It darkens in color when exposed to air and light.

Melting point—Phenylhydrazine Hydrochloride melts between 240° and 243°.

Insoluble—Dissolve 2 Gm. in 20 cc. of warm distilled water: the solution is clear and free from suspended particles.

Phloroglucinol—Use *Phloroglucinol*, reagent grade, U. S. P. XIII.

Phosphomolybdic Acid—Use *Phosphomolybdic Acid*, reagent grade, U. S. P. XIII.

Phosphoric Acid—Use *Phosphoric Acid*, page 392.

Phosphoric Acid, Meta—Metaphosphoric Acid, occurs as white, glassy rods, containing sodium phosphate to render them firm. It is deliquescent and very soluble in water.

Insoluble—Dissolve 2 Gm. by heating on a water bath with 50 cc. of water: not more than a slight amount of insoluble residue remains.

Chloride—Dissolve 1 Gm. in 15 cc. of water, add 1 cc. of nitric acid and 1 cc. of silver nitrate T.S.: any turbidity produced is not greater than that produced in a blank to which 0.02 mg. of chloride has been added (0.002 per cent).

Nitrate—To a solution of 1 Gm. in 10 cc. of water add 0.05 cc. of indigo carmine T.S. and 10 cc. of sulfuric acid. The blue color persists for 10 minutes (about 0.003 per cent as NO_3).

Sulfate—Dissolve 1 Gm. in a mixture of 15 cc. of water and 5 cc. of 1 *N* hydrochloric acid, filter if necessary, and add to the filtrate 2 cc. of barium chloride T.S.: any turbidity produced is not greater than that produced in a blank to which 0.2 mg. of sulfate (SO_4) has been added (0.02 per cent).

Substances reducing permanganate—Dissolve 2 Gm. in 10 cc. of water, add 5 cc. of diluted sulfuric acid and 0.1 cc. of 0.1 *N* potassium permanganate, and heat on a water bath. The pink color is not entirely discharged in 5 minutes.

Arsenic—A solution of 0.5 Gm. in 5 cc. of water shows no more arsenic than corresponds to 0.003 mg. of As_2O_3.

Heavy metals—Dissolve 1 Gm. in 15 cc. of water, add 3 drops of phenolphthalein T.S., then add ammonia T.S. until a slight pink color is produced; then add 5 cc. of 1 *N* sulfuric acid and 5 cc. of hydrogen sulfide T.S.: any color produced is not darker than that produced by 0.02 mg. of lead and 5 cc. of hydrogen sulfide T.S. in the same volume of water as the final solution of the sample.

Phosphotungstic Acid—Use *Phosphotungstic Acid*, reagent grade, U. S. P. XIII.

Picric Acid—Use *Trinitrophenol*, page 539.

Potassium Biphosphate—Use *Potassium Biphosphate*, reagent grade, U. S. P. XIII.

Potassium Carbonate, Anhydrous—Use *Potassium Carbonate, Anhydrous*, reagent grade, U. S. P. XIII.

Potassium Dichromate—Use *Potassium Dichromate*, reagent grade, U. S. P. XIII.

Potassium Ferricyanide—Use *Potassium Ferricyanide*, reagent grade, U. S. P. XIII.

Potassium Ferrocyanide—Use *Potassium Ferrocyanide*, reagent grade, U. S. P. XIII.

Potassium Fluoride, $KF.2H_2O$, is a white powder or colorless crystals; deliquescent.

Insoluble matter—Dissolve 2 Gm. in 100 cc. of warm water in a platinum dish and allow to stand on a water bath for 1 hour. Filter through asbestos in a Gooch crucible, wash thoroughly with hot water, dry at 105° to 110°, and weigh. The weight should not exceed 1.0 mg. (0.05 per cent).

Chloride—Dissolve 0.3 Gm. in 20 cc. of water. Add 0.2 Gm. of boric acid, 1 cc. of nitric acid, and 1 cc. of 0.1 *N* silver nitrate. Any turbidity produced should not be greater than is produced by 0.3 mg. of chloride ion in an equal volume of solution containing the quantities of reagents used in the test (0.010 per cent).

Free acid—Dissolve 2 Gm. in 40 cc. of water in a platinum dish, add 10 cc. of saturated solution of potassium nitrate, and cool the solution to 0°. Add 3 drops of phenolphthalein T.S. If no pink color is produced, titrate with 0.1 *N* sodium hydroxide until the pink color persists for 15 seconds while the temperature of the solution is near 0°. Not more than 2 cc. of 0.1 *N* sodium hydroxide is required (0.2 per cent as HF).

Free alkali—If a pink color is produced on the addition of the phenolphthalein in the test for free acid, add 0.1 *N* acid, stirring the liquid only gently, until the pink

color is discharged. Not more than 0.5 cc. of the acid is required (0.34 per cent as K_2CO_3).

Potassium fluosilicate—Boil the solution from the preceding test and titrate while hot with 0.1 *N* alkali until a permanent pink color is obtained. Not more than 1.5 cc. of 0.1 *N* sodium hydroxide is required (0.40 per cent as K_2SiF_6).

Sulfate—Evaporate 0.5 Gm. in a platinum dish 4 or 5 times with 10-cc. portions of hydrochloric acid, evaporating the last time to dryness. Take up the residue in 20 cc. of water and 1 cc. of 0.1 *N* hydrochloric acid, and filter if necessary. Add to the filtrate 2 cc. of 10 per cent barium chloride solution. Any turbidity produced in 10 minutes is not greater than is produced by 0.15 mg. of SO_4 in a control made with the quantities of reagents used in the test (0.03 per cent as SO_4).

Sulfite—Dissolve 6 Gm. in 150 cc. of water, add 2 cc. of hydrochloric acid and a few drops of starch T.S., and titrate immediately with 0.1 *N* iodine. It requires not more than 0.1 cc. to produce a blue color (0.005 per cent as SO_3).

Heavy metals—Treat 2 Gm. in a platinum crucible with 10 cc. of hydrochloric acid, and evaporate to dryness. Repeat with another 10 cc. of acid. Warm the residue with a few drops of hydrochloric acid, and dissolve in 40 cc. of hot water. Neutralize exactly 20 cc. with ammonia T.S., add 1 cc. of 0.1 *N* hydrochloric acid, and saturate with hydrogen sulfide. Any color produced is not greater than is produced by 0.03 mg. of lead in an equal volume of water containing the quantities of reagents used in the test (0.003 per cent as Pb).

Iron—To the remaining 20 cc. from the test for *Heavy metals* add 2 cc. of hydrochloric acid, filter if necessary, and add 3 cc. of 10 per cent ammonium thiocyanate solution. Any red color produced is not more than is produced in a control test made with the same quantities of reagents and containing 0.03 mg. of iron (0.003 per cent).

Sodium—A 10 per cent solution tested on a platinum wire imparts no pronounced yellow color to a colorless flame.

Potassium Hydroxide—Use *Potassium Hydroxide*, U. S. P. XIII.

Potassium Iodate—Use *Potassium Iodate*, reagent grade, U. S. P. XIII.

Potassium Iodide—Use *Potassium Iodide*, U. S. P. XIII.

Potassium Nitrate—Use *Potassium Nitrate*, page 413.

Potassium Oxalate—Use *Potassium Oxalate*, reagent grade, U. S. P. XIII.

Potassium Permanganate—Use *Potassium Permanganate*, U. S. P. XIII.

Potassium Permanganate, 0.1 *N*—Use *Tenth-Normal Potassium Permanganate*, U. S. P. XIII.

Potassium Permanganate, 0.01 *N*—Use *Hundredth-Normal Potassium Permanganate*, U. S. P. XIII.

Potassium Phosphate, Dibasic—Use *Potassium Phosphate, Dibasic*, reagent grade, U. S. P. XIII.

Potassium and Sodium Tartrate—Use *Potassium and Sodium Tartrate*, U. S. P. XIII.

Potassium Thiocyanate—Use *Potassium Thiocyanate*, page 414.

Pyronin B, Certified Biological, is tetraethyldiaminoxanthenyl chloride, $C_{21}H_{23}N_2OCl$.

Description—The dye occurs as a moderately coarse powder, dusky olive-green to olive-black.

Solubility—One Gm. of the dye is soluble in 7 cc. of water; it is slightly soluble in alcohol.

Absorption ratio—To obtain a solution of suitable concentration for use in a spectrophotometer, dissolve the dye in a mixture of equal volumes of alcohol and distilled water: the absorption ratio of the dye in this solution (*E* at 530 millimicrons over *E* at 560 millimicrons) is not less than 0.50 nor more than 0.63.

Decolorization test—The properties of this dye are similar to those of Pyronin Y, page 673, except for a redder fluorescence and a bluer shade.

Staining Characteristics—This dye has almost identically the same staining behavior as Pyronin Y, page 673.

Assay—To 1 cc. of an aqueous solution of the dye (1 in 1000) add 49 cc. of distilled water and 50 cc. of alcohol. Measure the extinction coefficient of this solution in a layer 1 cm. deep at 555 millimicrons, and divide this value of the extinction coefficient by 0.0368. The result is not less than 25, equivalent to 25 per cent of anhydrous dye content.

Pyronin Y, Certified Biological, *Pyronin G,* is tetramethyldiaminoxanthenyl chloride, $C_{17}H_{19}N_2OCl$.

Description—The dye occurs as a moderately coarse powder, dusky olive-green to olive-black.

Solubility—One Gm. of the dye is soluble in 15 cc. of water; it is slightly soluble in alcohol.

Absorption ratio—To obtain a solution of suitable concentration for use in a spectrophotometer, dissolve the dye in a mixture of equal volumes of alcohol and distilled water: the absorption ratio of the dye in this solution (*E* at 530 millimicrons over *E* at 560 millimicrons) is not less than 0.76 and not more than 1.00.

Decolorization test—When observed by transmitted light through a layer 1 cm. deep: an aqueous solution of the dye (1 in 3000) is purplish red or red (with a brownish fluorescence); an alcohol solution of the dye (1 in 3000) is red-purple or purplish red (with a brownish fluorescence); a solution of the dye in sulfuric acid (1 in 2500) is reddish orange (with an olive-brown to olive-green fluorescence); the addition of saturated aqueous solution of sodium hydroxide to an aqueous solution of the dye yields a reddish precipitate which when dissolved in alcohol gives a red solution (with a purplish fluorescence).

Staining characteristics—Follow the directions given under certified biological methyl green, staining characteristics, beginning "Stain properly prepared smears of gonorrheal pus," see page 666. The results are as given on page 666.

Assay—To 1 cc. of an aqueous solution of the dye (1 in 1000) add 49 cc. of distilled water and 50 cc. of alcohol. Measure the extinction coefficient of this solution in a layer 1 cm. deep at 550 millimicrons, and divide the value of the extinction coefficient by 0.0315. The result is not less than 45, equivalent to 45 per cent of anhydrous dye content.

Resorcinol—Use *Resorcinol,* U. S. P. XIII.

Rhamnose, *Hydrous l-Rhamnose, Isodulcitol,* is a methyl pentose, $C_6H_{12}O_5.H_2O$, obtained from quercitrin, a glycoside of oak bark.

Description—Rhamnose occurs as colorless crystals or a white crystalline or granular powder; odorless and having a sweet taste.

Solubility—Rhamnose is soluble in water but sparingly soluble in alcohol. An aqueous solution of Rhamnose (1 in 10) is clear and colorless.

Optical rotation—The specific optical rotation, $[\alpha]_D^{20°}$, of Rhamnose in an aqueous solution, containing in each 100 cc., 5 Gm. of Rhamnose, previously dried to constant

weight in vacuo at 80°, and 0.2 cc. of ammonia T.S., and using a 200-mm. tube, is not less than +8.5° and not more than +8.6°.

Loss on drying—When dried to constant weight in vacuo at 80°, Rhamnose loses not more than 10 per cent of its weight.

Ash—Rhamnose yields not more than 0.10 per cent of its weight upon ignition.

Reaction—An aqueous solution of Rhamnose (1 in 10) is neutral to litmus paper.

Chloride—One Gm. of Rhamnose shows no more chloride than corresponds to 0.1 cc. of 0.02 *N* hydrochloric acid.

Sulfate—One Gm. of Rhamnose shows no more sulfate than corresponds to 0.1 cc. of 0.02 *N* sulfuric acid.

Barium—An aqueous solution of Rhamnose (1 in 10) does not respond to the tests for barium, page 723.

Calcium—An aqueous solution of Rhamnose (1 in 10) does not respond to the tests for calcium, page 723.

Heavy metals—Dissolve 2 Gm. of Rhamnose in 1 cc. of diluted acetic acid and sufficient water to make 25 cc. The heavy metals limit of Rhamnose is 5 parts per million.

Rose Bengal, Certified Biological, is the sodium salt of tetraiodotetrachlorofluorescein, $C_{20}H_2O_5I_4Cl_4Na_2$.

Description—The dye occurs as a moderately coarse powder, dark red.

Solubility—One Gm. of the dye is soluble in 4 cc. of water, or in 20 cc. of alcohol.

Decolorization test—When observed by transmitted light through a layer 1 cm. deep: an aqueous solution of the dye (1 in 25,000) is red (the addition of hydrochloric acid to this solution yields a reddish orange precipitate), the addition of 10 drops of saturated aqueous solution of sodium hydroxide to 10 cc. of this solution changes the color to purplish red (further addition of saturated aqueous solution of sodium hydroxide yields a red precipitate); an alcohol solution of the dye (1 in 2000) is purplish red; a solution of the dye in sulfuric acid (1 in 5000) is reddish orange (dilution of this solution with water yields a reddish orange precipitate).

Staining characteristics—Prepare a suspension (1 in 10 by weight) of soil rich in bacteria, in an aqueous solution of gelatin (3 in 20,000). Spread films of the suspension on clean glass slides and dry on a boiling water bath; leave on the water bath and cover with an aqueous solution of the dye (1 in 100) containing 0.01 per cent calcium chloride and 5 per cent phenol. Different lots of the dye are affected differently by calcium chloride so it is permissible to vary the per cent of calcium chloride in the staining solution. At the end of 1 minute remove the slides and wash rapidly in water, dry, and examine unmounted: bacteria are stained red, soil and organic matter are stained but lightly.

Assay—Dissolve about 0.5 Gm. of the dye, accurately weighed, in 500 cc. of water. Heat to boiling, and add slowly, with constant stirring, 3 cc. of hydrochloric acid. Cool to 25° and allow to stand 2 hours. Filter through a tared Gooch crucible, wash with an aqueous solution of hydrochloric acid (1 in 200), dry at 105°, and weigh. Multiply the weight of the residue by 1.045. The result is equivalent to not less than 80 per cent of the weight of the sample taken (*anhydrous dye*).

Rosolic Acid, *Aurin, Corallin,* is a mixture of rosolic acid and pararosolic acid with oxidized and methylated derivatives of the latter.

Description—The dye occurs as a moderately coarse powder, moderate olive to moderate reddish brown.

Solubility—One Gm. of the dye is soluble in 3 cc. of alcohol; it is slightly soluble in water.

Decolorization test—When observed by transmitted light through a layer 1 cm. deep: a saturated aqueous solution of the dye is orange-pink or orange, the addition of 2 drops of hydrochloric acid to 10 cc. of this solution changes the color to yellow or greenish yellow, or the addition of 1 cc. of sodium hydroxide T.S. to 10 cc. changes the color to pink; an alcohol solution of the dye (1 in 10,000) is yellowish orange or yellow; a solution of the dye in glacial acetic acid (1 in 10,000) is yellowish orange or yellow.

Safranin O, Certified Biological, is a mixture of diaminophenylditolazonium chloride, $C_{20}H_{19}N_4Cl$ and diamino-*o*-tolylditolazonium chloride, $C_{21}H_{21}N_4Cl$.

Description—The dye occurs as a moderately coarse powder, dusky brown to very dusky green.

Solubility—One Gm. of the dye is soluble in 35 cc. of water, or in 40 cc. of alcohol.

Absorption ratio—To obtain a solution of suitable concentration for use in a spectrophotometer, dissolve the dye in a mixture of equal volumes of alcohol and distilled water: the absorption ratio of the dye in this solution (*E* at 515 millimicrons over *E* at 545 millimicrons) is not less than 0.98 and not more than 1.08.

Decolorization test—When observed by transmitted light through a layer 1 cm. deep: an aqueous solution of the dye (1 in 10,000) is red, the addition of 0.5 cc. of hydrochloric acid to 10 cc. of this solution changes the color to purplish red or red-purple; an alcohol solution of the dye (1 in 2000) is red (with a reddish orange fluorescence); a solution of the dye in sulfuric acid (1 in 5000) or in hydrochloric acid (1 in 2000) is green or bluish green, dilution of these solutions with water changes the color through blue and purple toward red.

Color characteristic—The addition of saturated aqueous solution of sodium hydroxide to a saturated aqueous solution of the dye yields a reddish precipitate.

Staining characteristics—Follow the directions given under certified biological crystal violet, staining characteristics, beginning "Stain properly prepared sections from a growing root tip or bud, fixed in Flemming's fluid, with an aqueous solution of certified biological safranin O," see page 655. The results are as given on page 655.

Assay—Dissolve about 0.3 Gm. of the dye, accurately weighed, in 150 cc. of diluted alcohol. Heat to boiling, add 30 cc. of an aqueous solution of sodium tartrate (30 in 100), and titrate with 0.1 *N* titanium trichloride to a yellow end point. Not less than 44.7 cc. of standard solution is required per Gm. of dye, equivalent to 80 per cent of dye content.

Salicylaldehyde, *Salicylic Aldehyde, o-Hydroxybenzaldehyde,* $HO.C_6H_4.CHO$: A clear, colorless, oily liquid with bitter almond-like odor and burning taste.

Slightly soluble in water; soluble in alcohol or ether. It gives an orange color with sulfuric acid.

Congealing point—The congealing point of Salicylaldehyde is about −7°.

Boiling range—Salicylaldehyde distils between 196° and 197°.

Salicylic Acid—Use *Salicylic Acid*, U. S. P. XIII.

Saponin occurs as a white, or nearly white, amorphous powder.

Solubility—Saponin is freely soluble in water, sparingly soluble in alcohol, more soluble in hot alcohol; insoluble in benzene, in chloroform, or in ether. When water is shaken with Saponin foam is produced.

Insoluble matter and reaction—A solution of 1 Gm. of Saponin in 10 cc. of water is clear, complete, and neutral to litmus paper.

Residue on ignition—Saponin yields not more than 5 per cent of residue on ignition.

Loss on drying—When dried to constant weight at 105°, Saponin loses not more than 10 per cent of its weight.

Substances reducing silver nitrate—Add 5 cc. of a solution of Saponin (1 in 50) to 5 cc. of a solution of silver nitrate (1 in 40). The resulting liquid is clear and its color is not darker than that of 5 cc. of the same Saponin solution diluted with 5 cc. of distilled water.

Silver Nitrate—Use *Silver Nitrate*, U. S. P. XIII.

Sodium Acetate—Use *Sodium Acetate*, page 469.

Sodium Alizarinsulfonate—Use *Sodium Alizarinsulfonate*, reagent grade, U. S. P. XIII.

Sodium Bicarbonate—Use *Sodium Bicarbonate*, U. S. P. XIII.

Sodium Biphosphate—Use *Sodium Biphosphate*, U. S. P. XIII.

Sodium Bisulfite—Use *Sodium Bisulfite*, reagent grade, U. S. P. XIII.

Sodium Bitartrate—Use *Sodium Bitartrate*, reagent grade, U. S. P. XIII.

Sodium Bromide—Use *Sodium Bromide*, U. S. P. XIII.

Sodium Carbonate, Anhydrous—Use *Sodium Carbonate, Anhydrous*, reagent grade, U. S. P. XIII.

Sodium Carbonate, Monohydrated—Use *Monohydrated Sodium Carbonate*, U. S. P. XIII.

Sodium Caseinate, *Casein-Sodium*, *Nutrose*—Prepared by dissolving casein in an aqueous solution of sodium hydroxide and evaporating the product to dryness. It is a white, coarse, odorless, tasteless powder, soluble in water, though the solution usually shows some turbidity.

Casein-Sodium contains not less than 80 per cent of protein and yields not less than 13 per cent of *total nitrogen* as determined by the Kjeldahl method.

It contains not more than 8 per cent of *moisture*.

The *residue on ignition* does not exceed 6 per cent of the weight of the sample taken.

Sodium Chloride—Use *Sodium Chloride*, reagent grade, U. S. P. XIII.

Sodium Citrate—Use *Sodium Citrate*, U. S. P. XIII.

Sodium Cyanide—Use *Sodium Cyanide*, page 773.

Sodium Desoxycholate, $C_{24}H_{39}O_4Na$ (mol. wt. 414.55), occurs as a white crystalline powder with an odor resembling bile, and an intense, bitter taste. It is freely soluble in water, slightly soluble in anhydrous alcohol, and insoluble in ether. The specific rotation, $[\alpha]_D^{25°}$ is about 42.5° when tested in a 2 per cent aqueous solution. Such a solution has a *p*H of approximately 8.5.

Identification—Dissolve 1 Gm. of sodium desoxycholate in 100 cc. of water and render acid to congo red with hydrochloric acid. Filter and wash the precipitate with distilled water and dry at 105°. The desoxycholic acid melts between 170° and 172°.

Loss on drying—When dried at 105° for 1 hour, sodium desoxycholate loses not more than 5 per cent of its weight.

Residue on ignition—Sodium desoxycholate yields not less than 5.4 per cent and not more than 5.7 per cent of residue on ignition, using an anhydrous sample.

Sulfate—To 10 cc. of a solution of sodium desoxycholate (1 in 200) add 3 cc. of

diluted hydrochloric acid and filter. To 10 cc. of the filtrate add 1 cc. of barium chloride T.S.: no turbidity develops in 1 minute.

Assay—Dissolve about 0.2 Gm. of sodium desoxycholate, accurately weighed, in 20 cc. of distilled water and render neutral to phenolphthalein with 0.1 *N* sulfuric acid. Add 20 cc. of dioxane and titrate with 0.1 *N* sulfuric acid, using bromophenol blue T.S. as the indicator. Each cc. of 0.1 *N* sulfuric acid is equivalent to 0.0414 Gm. of sodium desoxycholate, and each Gm. of sodium desoxycholate consumes not less than 23 cc. and not more than 25.5 cc. of 0.1 *N* sulfuric acid.

Sodium Fluoride—Use *Sodium Fluoride*, reagent grade, U. S. P. XIII.

Sodium Glycocholate, $NaC_{26}H_{42}O_6N$, occurs as a yellowish white, hygroscopic and bitter salt. It is soluble in water and slowly soluble in alcohol. The specific rotation $[\alpha]_D^{25°}$ is about 30 when tested in a 2 per cent aqueous solution. Such a solution has a *p*H of approximately 6.6.

Assay—Dissolve 0.5 Gm. in 16 cc. of water, add 15 cc. of neutral alcohol, and titrate with 0.1 *N* sulfuric acid using methyl orange as the indicator. One cc. of 0.1 *N* sulfuric acid is equivalent to 0.0488 Gm. of the salt. The salt contains not less than 98 per cent sodium glycocholate.

Sulfate—Precipitate 0.5 Gm. dissolved in 100 cc. of water with diluted hydrochloric acid, and filter. The filtrate shows no cloudiness with barium chloride T.S. Wash the precipitate with water and dry at 105°. The melting point is between 120° and 133° (the melting point of pure glycocholic acid is between 130° and 133°).

Loss on drying—One Gm. dried at 100° for 3 hours loses not more than 1.5 per cent of its weight.

Ash—One Gm. ignited to constant weight in a muffle furnace at approximately 650°, yields not more than 6 per cent of ash.

Heavy metals—Dissolve 0.5 Gm. in 20 cc. of water and add 2 cc. of diluted hydrochloric acid. Allow to stand for 30 minutes and filter. Dilute the filtrate to 25 cc. with water. The heavy metals limit is 5 parts per million.

Sodium Hydroxide—Use *Sodium Hydroxide*, U. S. P. XIII.

Sodium Hydroxide, 1 *N*—Use *Normal Sodium Hydroxide*, U. S. P. XIII.

Sodium Hydroxide, 0.5 *N*—Use *Half-Normal Sodium Hydroxide*, U. S. P. XIII.

Sodium Hydroxide, 0.1 *N*—Use *Tenth-Normal Sodium Hydroxide*, U. S. P. XIII.

Sodium Hydroxide, 0.02 *N*—Use *Fiftieth-Normal Sodium Hydroxide*, U. S. P. XIII.

Sodium Hydroxide, 0.01 *N*—0.4 Gm. of NaOH in 1000 cc.

Prepare, standardize, and preserve as directed under normal sodium hydroxide, U. S. P. XIII.

Sodium Lauryl Sulfate—Use *Sodium Lauryl Sulfate*, U. S. P. XIII.

Sodium Nitrite—Use *Sodium Nitrite*, U. S. P. XIII.

Sodium Nitroferricyanide—Use *Sodium Nitroferricyanide*, reagent grade, U. S. P. XIII.

Sodium Oxalate—Use *Sodium Oxalate*, reagent grade, U. S. P. XIII.

Sodium Oxalate, 0.1 *N*—Use 0.1 *N Sodium Oxalate*, page 787.

Sodium Phosphate, Dibasic—Use *Sodium Phosphate*, U. S. P. XIII.

Sodium Phosphate, Dibasic, Anhydrous, Na_2HPO_4, is a white hygroscopic powder.

Insoluble matter—Dissolve 10 Gm. in 100 cc. of water, allow to stand on a water bath for 1 hour, filter through asbestos in a Gooch crucible, dry at 105° to 110°, and weigh. The weight of the residue does not exceed 1.0 mg. (0.010 per cent).

Loss on drying—Accurately weigh about 2 Gm., and dry to constant weight at 110°. The loss in weight does not exceed 1.0 per cent.

Neutrality—Dissolve 1.2 Gm. in 30 cc. of water at 15°, and add 3 drops of phenolphthalein T.S.. A red color is produced which is discharged by the addition of 0.6 cc. of 1 *N* hydrochloric acid. Boil the solution for 2 minutes, cool to 15°, and dilute to the original volume with cold water. No pink color appears.

Chloride—Dissolve 2 Gm. in 20 cc. of water, add 3 cc. of nitric acid and 1 cc. of 0.1 *N* silver nitrate. Any turbidity is not greater than that produced by 0.04 mg. of chloride ion in an equal volume of solution with the quantities of acid and silver nitrate used in the test (0.002 per cent).

Nitrogen compounds—Dissolve 2 Gm. in 30 cc. of water, add 20 cc. of aqueous sodium hydroxide solution (1 in 10) and 0.5 Gm. of aluminum wire in small pieces. Allow to stand for 3 hours protected from loss by evaporation or access to ammonia. Decant 25 cc. of the clear liquid and add 2 cc. of Nessler's solution. The color is not more than is produced in a similar aliquot of a solution obtained by treating a quantity of an ammonium salt containing 0.04 mg. of nitrogen with the quantity of water and reagents used in the test (0.002 per cent as N).

Sulfate—Dissolve 10 Gm. in 100 cc. of water, add 5 cc. of hydrochloric acid, and heat to boiling. Add 5 cc. of 10 per cent barium chloride, heat on a water bath for 2 hours, and allow to stand overnight. If a precipitate forms, filter, wash, ignite, and weigh. The weight of the ignited barium sulfate does not exceed 2.5 mg. (0.010 per cent as SO_4).

Arsenic—An aqueous solution of Dibasic Sodium Phosphate meets the requirements of the test for *Arsenic*, page 689.

Heavy metals—Dissolve 5 Gm. in 40 cc. of water and exactly neutralize the solution with 1 *N* sulfuric acid, using 3 drops of 1 per cent phenolphthalein solution as indicator. Add 15 cc. of 1 *N* sulfuric acid to 5 cc. of hydrogen sulfide T.S., and dilute to 100 cc. Any brown color which is immediately developed is not greater than is produced by 0.1 mg. of lead in the same volume of an aqueous solution of a lead salt treated with the same amount of hydrogen sulfide T.S. (0.002 per cent as Pb).

Iron—Dissolve 5 Gm. in 100 cc. of water. Dilute 10 cc. of the solution to 40 cc., add 1 cc. of ammonium hydroxide and 5 cc. of hydrogen sulfide T.S. Any green color is not greater than is produced by 0.01 mg. of iron in an equal volume of alkaline solution when 5 cc. of hydrogen sulfide T.S. is added (0.002 per cent).

Sodium Pyrophosphate—*Tetrasodium Pyrophosphate*, $Na_4P_2O_7.10H_2O$, occurs as colorless crystals, efflorescent in dry air, and soluble in about 10 parts of water; the solution is alkaline to litmus.

Insoluble—Dissolve 10 Gm. in 150 cc. of water. Filter off any insoluble matter on a weighed sintered glass crucible, dry at 105°, and weigh. The increase in weight does not exceed 2 mg. (0.02 per cent).

Chloride—Dissolve 2 Gm. in 20 cc. of water, add 5 cc. of nitric acid and 1 cc. of silver nitrate T.S. Any turbidity produced is not greater than is produced by 0.04 mg. of chloride ion in an equal volume of solution with the same quantities of acid and silver nitrate used in the test (0.002 per cent).

Nitrogen compounds—Dissolve 2 Gm. in 30 cc. of water, add 20 cc. of ten per cent sodium hydroxide solution and 0.5 Gm. of aluminum wire in small pieces. Allow to stand for 3 hours protected from loss or access of ammonia. Decant 25 cc. of the

clear liquid and add 2 cc. of Nessler's reagent. The color is not more than is produced by the same volume of solution obtained by treating a quantity of ammonium salt equivalent to 0.01 mg. of nitrogen with the same quantities of water and reagents used in the test.

Sulfate—Dissolve 10 Gm. in 100 cc. of water, add 5 cc. of hydrochloric acid, and heat to boiling. Add 5 cc. of barium chloride T.S., heat on a water bath for 2 hours, and allow to stand overnight. If a precipitate forms, filter, wash, ignite, and weigh. The weight of the ignited residue is not more than 2.5 mg. (0.025 per cent).

Orthophosphate—Add 2 cc. of silver nitrate T.S. to 1 Gm. of powdered sodium pyrophosphate. No yellow color is produced (about 0.2 per cent).

Arsenic—Determine on a 2-Gm. sample, page 689. The stain produced corresponds to not more than 0.010 mg. of arsenic.

Heavy metals—Dissolve 2 Gm. in 40 cc. of water, render neutral to litmus paper, add 0.5 cc. of hydrochloric acid and 5 cc. of hydrogen sulfide T.S., and dilute to 100 cc. Any brown color does not exceed that produced by an equal volume of solution containing 0.04 mg. of Pb ion with the same quantity of water and hydrogen sulfide used in the test.

Iron—Dissolve 5 Gm. in 100 cc. of water. Dilute 10 cc. of the solution to 40 cc., add 1 cc. of ammonia T.S. and 5 cc. of hydrogen sulfide T.S. Any green color should not be greater than that produced by an equal volume of solution containing 0.015 mg. of Fe ion treated with the same quantities of reagents used in the test.

Sodium Selenite, Anhydrous, Na_2SeO_3, occurs as a white, crystalline powder.

Solubility—Sodium Selenite is freely soluble in water and insoluble in alcohol. Its solution is alkaline to litmus paper.

Insoluble substances—A solution of 1 Gm. of Sodium Selenite in 10 cc. of distilled water is clear and complete, or practically so.

Loss on drying—When dried to constant weight at 105°, Sodium Selenite loses not more than 5 per cent of its weight.

Nitrate—To a solution of 0.5 Gm. of Sodium Selenite in 10 cc. of distilled water, add 0.1 cc. of indigo carmine T.S. and follow with 10 cc. of sulfuric acid: the blue color persists for 5 minutes (about 0.01 per cent).

Selenate, sulfate—Dissolve 0.2 Gm. of Sodium Selenite in 10 cc. of distilled water, and add 0.5 cc. of diluted hydrochloric acid and 1 cc. of barium chloride T.S.: no turbidity is produced in 5 minutes.

Assay—Weigh accurately about 0.2 Gm. of the dried Sodium Selenite obtained in the test for *Loss on drying* and dissolve in 50 cc. of distilled water in a glass-stoppered flask. Add 3 Gm. of potassium iodide and follow with 5 cc. of hydrochloric acid. Allow to stand for 5 minutes, then dilute with 50 cc. of water and titrate the liberated iodine with 0.1 *N* sodium thiosulfate until a slight yellow color is produced which persists for 1 minute. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.004324 Gm. of Na_2SeO_3. Not less than 96 per cent of Na_2SeO_3 is found.

Sodium Sulfate, Exsiccated—Use *Exsiccated Sodium Sulfate*, page 769.

Sodium Sulfite, Exsiccated—Use *Sodium Sulfite, Exsiccated*, reagent grade, U. S. P., XIII.

Sodium Thiosulfate, 0.005 *N*—Use *Two-Hundredth Normal Sodium Thiosulfate*, U. S. P. XIII.

Sodium Tungstate—Use *Sodium Tungstate*, reagent grade, U. S. P. XIII.

Soy Bean Meal—Soy Bean Meal is the flour sifted from the decorticated, ground seed of *Glycine Soja* (Fam. *Leguminosæ*), deprived of fat.

Description—Soy Bean Meal occurs as a very fine, yellowish white to pale yellow powder: it is practically odorless and tasteless.

Sulfated Ash—Carbonize a 1 to 2 Gm. sample of the meal, accurately weighed; allow to cool, and moisten the residue with sulfuric acid. Heat gradually until the excess acid is removed and then ignite. The residue does not exceed 5 per cent of the sample taken.

Activity of Urease—Transfer an accurately weighed sample of soy bean meal, between 50 mg. and 70 mg. in weight, to a test tube approximately 25 mm. in diameter and 200 mm. long. Add 5 cc. of a 1 per cent solution of urea and 2 drops of a solution containing 15 Gm. of sodium acetate and 1 cc. of glacial acetic acid per 100 cc. Stopper the tube and allow to stand for one hour at 25° with occasional shaking. Add 5 Gm. of sodium carbonate, 10 cc. of distilled water, and 2 drops of capryl alcohol. Immediately connect with a tube of similar size containing 0.43 cc. of 0.02 *N* sulfuric acid for each mg. of sample, measured to the nearest 0.1 cc., and 2 drops of methyl red T.S. Pass a rapid current of air through a wash bottle containing 5 per cent sulfuric acid, the tube containing the sample mixture, and the tube with the standard acid, until the color of the indicator has changed. If the color of the indicator does not change within 3 hours, the activity of the soy bean meal is substandard.

Absence of Ammonia—Use the test described above substituting 5 cc. of distilled water for the urea solution, and increasing the sample of soy bean meal to 0.5 Gm. Twenty-five cc. of 0.02 *N* sulfuric acid should be used and at the end of the aeration, titrated with 0.02 *N* sodium hydroxide. Not more than 0.3 cc. of 0.02 *N* sulfuric acid has been consumed.

Starch Test Solution—Use *Starch Test Solution*, U. S. P. XIII.

Sublimed Sulfur—Use *Sublimed Sulfur*, U. S. P. XIII.

Sucrose, *Anhydrous Sucrose, Saccharose*—Use *Sucrose*, U. S. P. XIII.

Sudan IV, Certified Biological, is *o*-toluene-azo-*o*-toluene-azo-β-naphthol, $C_{24}H_{20}N_4O$.

Description—The dye occurs as a moderately coarse powder, very dusky red to dusky reddish brown.

Solubility—The dye is insoluble in water, very slightly soluble in alcohol, readily soluble in fats.

Absorption ratio—To obtain a solution of suitable concentration for use in a spectrophotometer, dissolve the dye in alcohol: the absorption ratio of the dye in this solution (*E* at 500 millimicrons over *E* at 530 millimicrons) is not less than 0.90 and not more than 0.94.

Decolorization test—When observed by transmitted light through a layer 1 cm. deep a saturated alcohol solution of the dye is red.

Staining characteristic—Properly prepare sections from frozen animal tissue containing fat, such as mesentery. Dip the sections into 70 per cent alcohol and stain for 2 to 5 minutes with a saturated solution of certified biological sudan IV in a mixture of equal volumes of 70 per cent alcohol and acetone. Wash rapidly in 70 per cent alcohol and in distilled water, counterstain with Delafield's hematoxylin, wash thoroughly in water, and mount in glycerin or in glycerin jelly: fat globules are distinctly reddish orange.

Assay—Transfer about 1 Gm. of the dye, accurately weighed, to a suitable flask,

add 25 cc. of 23 per cent fuming sulfuric acid, and heat on a water bath for about 1 hour. Cool the mixture, and cautiously pour it into 500 cc. of distilled water contained in a 1000 cc. volumetric flask. Cool to 25°, and add sufficient distilled water to make 1000 cc. This solution is red and not turbid. Transfer 100 cc. into a flask, add 100 cc. of distilled water and 30 Gm. of sodium bitartrate. Heat to boiling, and titrate with 0.1 *N* titanium trichloride solution to a yellow end point. The color change from orange to yellow is gradual near the end point, but the last trace of orange is easily detected. Not less than 168 cc. of the standard solution is required per Gm. of dye, equivalent to 80 per cent of dye content.

Sulfanilic Acid—Use *Sulfanilic Acid*, reagent grade, U. S. P. XIII.

Sulfanilamide—Use *Sulfanilamide*, U. S. P. XIII.

Sulfosalicylic Acid—Use *Sulfosalicylic Acid*, reagent grade, U. S. P. XIII.

Sulfur, Sublimed—Use *Sublimed Sulfur*, U. S. P. XIII.

Sulfuric Acid—Use *Sulfuric Acid*, reagent grade, U. S. P. XIII.

Sulfuric Acid, 1 *N*—Use *Normal Sulfuric Acid*, U. S. P. XIII.

Tannic Acid—Use *Tannic Acid*, U. S. P. XIII.

Tartaric Acid—Use *Tartaric Acid*, U. S. P. XIII.

Thymol—Use *Thymol*, U. S. P. XIII.

Toluene—Use *Toluene*, reagent grade, U. S. P. XIII.

Toluidine Blue O, Certified Biological, is usually the zinc chloride double salt of aminodimethylaminotoluphenazthionium chloride, $C_{15}H_{16}N_3SCl + ZnCl_2$, but may also be prepared as the chloride.

Description—The dye occurs as a moderately coarse powder, reddish black to olive-black.

Solubility—One Gm. of the dye is soluble in 20 cc. of water; it is slightly soluble in alcohol.

Absorption ratio—To obtain a solution of suitable concentration for use in a spectrophotometer, dissolve the dye in a mixture of equal volumes of 95 per cent alcohol and distilled water: the absorption ratio of the dye in this solution (*E* at 620 millimicrons over *E* at 650 millimicrons) is not less than 0.99, and not more than 1.39.

Decolorization test—When observed by transmitted light through a layer 1 cm. deep: an aqueous solution of the dye (1 in 8000) is purplish red to purplish blue, the addition of 5 drops of hydrochloric acid to 10 cc. of this solution causes no change in color; an alcohol solution of the dye (1 in 6000) is purplish blue; a solution of the dye in sulfuric acid (1 in 3000) is yellowish green, dilution of this solution with water changes the color to blue.

Color characteristic—The addition of saturated aqueous solution of sodium hydroxide to a saturated aqueous solution of the dye yields a purplish precipitate.

Staining characteristics—Properly prepare sections from frozen animal tissue. Dip the sections in water immediately after cutting, stain them for 1 to 2 minutes with a solution of the dye in 20 per cent alcohol (1 in 200), wash in water, and mount in water: nuclei are well differentiated from cytoplasm.

Stain properly prepared sections of animal connective tissue for 5 minutes with an aqueous solution of the dye (3 in 200). Apply dehydrated alcohol for 5 to 10 seconds, clear and mount in xylene-balsam: nuclei are a clear purplish blue, cytoplasm is red.

Stain properly prepared smears with the following solution: toluidine blue, 0.15 Gm.; methyl green, 0.02 Gm.; glacial acetic acid, 1 cc.; 95 per cent ethyl alcohol,

2 cc.; distilled water, 100 cc. for 5 minutes. Drain off without washing and apply Lugol's iodine solution for 1 minute, wash briefly in tap water, blot with filter paper and examine: granules of the diphtheria bacilli are black, the bars of bacilli dark green to black, the body of the cell and other bacteria light green.

Assay—Dissolve about 0.3 Gm. of the dye, accurately weighed, in 150 cc. of distilled water, and add 10 Gm. of sodium bitartrate. Heat to boiling and titrate with 0.1 *N* titanium trichloride to a yellow end point. Not less than 32.7 cc. of the standard solution is required per Gm. of dye, equivalent to 50 per cent of dye content calculated on the basis of the anhydrous chloride of the dye.

Trichloroacetic Acid—Use *Trichloroacetic Acid*, U. S. P. XIII.

Trinitrophenol—Use *Trinitrophenol*, page 539.

Turpentine Oil—Use *Turpentine Oil*, page 543.

Uranyl Acetate—Use *Uranyl Acetate*, U. S. P. XIII.

Urea, *Carbamide*, $(NH_2)_2CO$ (mol. wt. 60.05)—Occurs as white or colorless, odorless crystals or crystalline powder. It melts between 132° and 133°. Very soluble in water, freely soluble in alcohol or methanol; almost insoluble in chloroform or in ether.

Ash—Ignite 2 Gm. Not more than 1 mg. of residue remains (0.05 per cent).

Insoluble in alcohol—Dissolve 3 Gm. in 30 cc. of warm alcohol, filter any undissolved residue, wash it with alcohol, and dry at 105°. The undissolved residue does not exceed 1 mg. (about 0.03 per cent).

Chloride—Dissolve 2 Gm. in 20 cc. of water, add 1 cc. of nitric acid and 1 cc. of silver nitrate T.S.; any resulting turbidity is not greater than a control made with 0.06 mg. of Cl (0.003 per cent).

Sulfate—Dissolve 2 Gm. in 20 cc. of water, add 1 cc. of 1 *N* hydrochloric acid and 1 cc. of barium chloride T.S.; any turbidity produced is not greater than that of a control made with 0.1 mg. of SO_4 (0.005 per cent).

Heavy metals—Dissolve 2 Gm. in 40 cc. of water, add 1 cc. of 1 *N* hydrochloric acid, and follow with 10 cc. of hydrogen sulfide T.S.: any coloration produced is not greater than that of a control made with 0.02 mg. of Pb (0.001 per cent).

Iron—Warm the residue obtained in the test for *Ash* with 2 cc. of hydrochloric acid and 5 drops of nitric acid for 10 minutes. Dilute to 45 cc. with water and add 5 cc. of ammonium thiocyanate T.S.; any red color produced is not darker than that of a control made with 0.05 mg. of Fe (0.001 per cent).

Urease is a urealytic enzyme obtained from the Soy Bean, *Glycine Soja*, or Jack Bean, *Canavalia ensiformis* (Lewis).

Urease is a fine, white or cream-colored powder with little taste or odor.

Urease is readily soluble in slightly alkaline water. When finely powdered and triturated, 1 Gm. of it dissolves in about 1000 cc. of distilled water at 25° to give a turbid solution (colloidal), which is neutral to methyl orange, and gives no precipitate with hydrochloric acid T.S., though a faint turbidity is permissible.

Urease responds to the biuret reaction and gives a positive test with Millon's reagent (*proteins containing* NH_2 *groups*).

Digest 25 mg. of Urease in an aqueous solution of Urea (1 in 50) at 50° for exactly 15 minutes: not less than 60 mg. of urea is converted to ammonium carbonate, titrate the mixture with 0.1 *N* hydrochloric acid, using methyl orange T.S. as the indicator: not less than 20 cc. of the 0.1 *N* acid is required.

Uric Acid, $C_5H_4N_4O_3$—Uric Acid occurs as white or slightly brownish white,

odorless crystals or powder. Practically insoluble in water or alcohol. Soluble in glycerin and in solutions of sodium acetate or sodium phosphate.

Ash—Ignite 0.5 Gm. Not more than 1 mg. of residue remains.

Chloride—Digest 2 Gm. with 100 cc. water on a water bath for 10 minutes. Cool to 20°, dilute with water to 100 cc., and filter. To 20 cc. of the filtrate add 0.5 cc. of nitric acid and 1 cc. of silver nitrate T.S.; any turbidity produced is not greater than that of a control made with 0.02 mg. of Cl.

Sulfate—To another 20 cc. of the filtrate obtained in the test for chloride, add 1 cc. of 1 *N* hydrochloric acid and 1 cc. of barium chloride, T.S.; any resulting turbidity is not greater than that of a control made with 0.02 mg. of SO_4.

Ammonia—To another 20-cc. portion of the filtrate from the test for chloride add 2 cc. of Nessler's solution; any color produced is not greater than that produced in a control made with 0.02 mg. of NH_3.

Assay—Powder the uric acid and dry at constant weight over sulfuric acid. Weigh accurately about 0.15 Gm. of the dried sample and determine the nitrogen by the Kjeldahl method. It should show not less than 98.5 per cent of $C_5H_4N_4O_3$. Each cc. of 0.1 *N* hydrochloric acid consumed is equivalent to 0.004203 Gm. of $C_5H_4N_4O_3$.

Vanillin—Use *Vanillin*, U. S. P. XIII.

Veal—Use *Beef*, page 645.

Water—Use *Water*, U. S. P. XIII.

Water, Distilled—Use *Distilled Water*, U. S. P. XIII.

Xylene—Use *Xylene*, reagent grade, U. S. P. XIII.

Xylose, *Anhydrous l-Xylose* is a pentose, $C_5H_{10}O_5$, obtained by the hydrolysis of xylans.

Description—Xylose occurs as colorless needles or as a white crystalline powder; odorless and having a sweet taste.

Solubility—Xylose is readily soluble in water and hot alcohol, but insoluble in ether. An aqueous solution of Xylose (1 in 10) is clear and colorless.

Optical rotation—The specific optical rotation, $[\alpha]_D^{20°}$ of Xylose in an aqueous solution containing in each 100 cc., 5 Gm. of Xylose, previously dried to constant weight at 105°, and 0.2 cc. of ammonia T.S. is not less than +18.5° and not more than +19.5°.

Ash—Xylose yields not more than 0.10 per cent of its weight upon ignition.

Loss on drying—When dried to constant weight at 105°, Xylose loses not more than 0.10 per cent of its weight.

Reaction—An aqueous solution of Xylose (1 in 10) is neutral to litmus paper.

Chloride—One Gm. of Xylose shows no more chloride than corresponds to 0.1 cc. of 0.02 *N* hydrochloric acid.

Sulfate—One Gm. of Xylose shows no more sulfate than corresponds to 0.5 cc. of 0.02 *N* sulfuric acid.

Barium—An aqueous solution of Xylose (1 in 10) does not respond to the tests for barium.

Calcium—An aqueous solution of Xylose (1 in 10) does not respond to the tests for calcium.

Heavy metals—Dissolve 2 Gm. of Xylose in 1 cc. of diluted acetic acid and sufficient water to make 25 cc. The heavy metals limit of Xylose is 5 parts per million.

Yeast, Compressed—The moist, living cells of *Saccharomyces cerevisiæ* Meyen or of other species of *Saccharomyces* (Fam. *Saccharomycetaceæ*) combined with a starchy or absorbent base.

Description—White or yellowish white, soft and easily broken masses, having a characteristic, slightly sour odor, and not more than a faintly acid reaction to litmus paper. When examined under the microscope, numerous saccharomyces, and also oidium and mycoderma cells and starch grains are visible. Compressed yeast must not be used unless fresh, and free from mildew and musty or foul odors.

Zinc Acetate—Use *Zinc Acetate*, page 560.

Zinc Sulfate—Use *Zinc Sulfate*, U. S. P. XIII.

GENERAL TESTS, PROCESSES AND APPARATUS

ALCOHOL DETERMINATION

General Process—Measure accurately not less than 25 cc. of the liquid in which the alcohol is to be determined, and note its temperature. Transfer it to a suitable distilling apparatus and, if its alcohol content is thought to be not more than 30 per cent, dilute it with an equal volume of distilled water, using the water to rinse the vessel that was used for measuring unless this vessel is a graduated pipette which has been standardized on the basis of the amount delivered. Distil, and collect a volume of distillate of about 2 cc. less than the volume of the original test liquid, adjust to the temperature at which the original test liquid was measured, add sufficient distilled water to measure exactly the original volume of the test liquid and mix thoroughly. Determine the specific gravity of the liquid at 25° and from this result ascertain the percentage, by volume, of alcohol contained therein, see *Alcoholometric Table*, U. S. P. XIII. The proportion of alcohol by volume in the distillate equals that in the liquid examined.

If the liquid under examination contains more than 30 per cent of alcohol, proceed as directed above, except: dilute the sample with about twice its volume of distilled water and collect a volume of distillate about 2 cc. less than twice the volume of the original test liquid, cool or bring to the temperature at which the original liquid was measured, add sufficient distilled water to measure exactly twice the original volume of the test liquid and determine its specific gravity. The proportion of alcohol by volume in this distillate, as ascertained from its specific gravity, equals one-half that in the liquid examined.

The distillate must be clear or only slightly cloudy, must not contain any nonvolatile material and not more than traces of volatile substances other than alcohol and water.

This general method is suitable for examining most fluidextracts and tinctures, provided the capacity of the distilling flask is sufficient (commonly 2 to 4 times the volume of the liquid to be distilled) and the rate of distillation is such that clear distillates are produced. Some alcoholic preparations will, however, require special treatment or the observance of special precautions to yield suitable distillates. All distillates must be clear or nearly so. If cloudy, they may be clarified by agitation with purified talc, or with precipitated calcium carbonate, and filtered, after which the temperature of the filtrate is adjusted and the alcohol determined by specific gravity. All of this should be done under conditions that will minimize the loss of alcohol by evaporation.

Frothing—Liquids which froth to a troublesome extent during distillation may be distilled by strongly acidifying them with phosphoric or sulfuric acid, or by the addition of a slight excess of calcium chloride solution, or by the addition of a little paraffin or yellow wax to the distilling flask.

Bumping—Liquids that tend to bump when heated (particularly resinous solutions) may be distilled by making them alkaline with magnesia magma or by placing pieces of pumice, glass beads, or similar materials in the distilling flask with the liquid, or by similar means of distributing the heat.

Glycerin—Liquids that contain glycerin must be diluted with sufficient distilled water so that the residue, after distillation, will contain at least 50 per cent of water.

Iodine—All solutions of iodine must be deprived of free iodine, before being distilled, by treatment with powdered zinc, or by the addition of just sufficient solution of sodium thiosulfate followed by a few drops of sodium hydroxide T.S. to fix volatile sulfur compounds.

Volatile Substances—Spirits, elixirs, tinctures, etc., that contain appreciable proportions of volatile materials other than alcohol and water, such as volatile oils, chloroform, ether, camphor, etc., are treated as follows: Mix the accurately measured liquid with about an equal volume of saturated solution of sodium chloride in a separator, then add a volume of petroleum benzin equal to the sample, and shake the mixture to extract the interfering volatile ingredients. Draw off the separated lower layer, and extract the benzin solution with 2 successive portions of a saturated solution of sodium chloride, using about one-half as much each time as was used in the first extraction mixture. Combine the aqueous saline solutions, and distil the mixture in the usual way, collecting a volume of distillate having a simple ratio to the volume of the original liquid.

If a troublesome emulsion develops in the liquid mixture when shaken with the benzin, dilute a fresh portion of the original liquid with water and distil it as directed in the general process. Then treat this distillate as directed above, using petroleum benzin and sodium chloride solution, and distil the aqueous saline solution so produced to obtain a distillate which is free from volatile substances other than alcohol and water.

In preparing *collodion* for distillation, use water in place of the saturated solution of sodium chloride directed above.

If volatile oils are present in small proportions only, and a cloudy distillate is obtained, the benzin treatment not having been employed, the distillate may be clarified and rendered suitable for the specific gravity determination by shaking it with about one-fifth its volume of petroleum benzin, or by filtering it through a thin layer of purified talc.

Other Preparations Requiring Special Treatment—Preparations containing free ammonia, as *anisated ammonia spirit*, must be rendered slightly acid with sulfuric acid before being distilled.

Ethyl nitrite spirit and *glyceryl trinitrate spirit* must be treated with a small excess of sodium hydroxide before being distilled. The use of this expedient in examining ethyl nitrite spirit necessitates that a suitable correction be subtracted from the apparent result of the alcohol determination to compensate for the alcohol produced during the decomposition of the ethyl nitrite.

Preparations containing soap, such as Compound Soft Soap Liniment and Solid Soap Liniment are treated with an excess of sulfuric acid to effect decomposition of the soap before they are extracted with petroleum benzin as directed in the general process.

Alkali Salts of Organic Acids

Heat about 2.0 Gm. of the salt, accurately weighed, in a platinum or porcelain crucible (do not use platinum for lithium salts), at first very gently, then gradually raising the temperature until the salt is thoroughly carbonized. The final temperature must not exceed a dull red heat and the flame of the burner must not come in contact

with the carbonized mass. After allowing the carbonized mass to cool, disintegrate it with the aid of a stout glass rod, and transfer the mass and crucible to a beaker. Add 50 cc. of distilled water and exactly 50 cc. of 0.5 *N* sulfuric acid, cover the beaker with a watch glass, and boil the contents for 30 minutes. Filter the solution, and wash the residue with hot distilled water until the washings cease to redden blue litmus paper. Determine the residual acid in the cooled filtrate by titration with 0.5 *N* sodium hydroxide, using methyl orange T.S. as the indicator. The volume of the acid consumed, multiplied by the proper equivalent of the salt, represents the quantity of the salt present in the quantity taken.

If desirable, or if more convenient, 0.3 to 0.4 Gm. of the organic salt may be used for the test, in which case 0.1 *N* sulfuric acid and 0.1 *N* sodium hydroxide are used in place of 0.5 *N* sulfuric acid and 0.5 *N* sodium hydroxide, respectively.

Ampuls

Ampuls are hermetically sealed containers commonly made of glass and, when filled, contain sterile preparations, usually solutions or suspensions of drugs, intended for parenteral use. The terms "parenteral" and "for injection" refer to administration into or through one or more layers of the skin or mucus membrane. In the United States Pharmacopœia each preparation packaged in ampuls and intended for parenteral administration, is designated an "injection," but the term "ampuls" is officially recognized as a synonym. In this National Formulary the same types of preparations are designated as "ampuls" with the term "injection" recognized as a synonym. The contents of National Formulary ampuls are referred to in this section as "ampul solutions" and "ampul suspensions."

The provisions of this section apply to all National Formulary ampul solutions and suspensions, unless otherwise stated in the individual monograph, and to other National Formulary preparations for which compliance is indicated in the individual monograph.

Aqueous Vehicles—*Water for Injection*, U. S. P. XIII, is generally used as the vehicle for aqueous ampul solutions. *Isotonic Sodium Chloride Solution*, U. S. P. XIII, *Ringer's Solution*, U. S. P. XIII, or other suitable solutions in water may be used instead of *Water for Injection* when the latter is designated in an individual monograph. All water vehicles meet the requirements of the *Pyrogen Test*, page 742.

Non-aqueous Vehicles—Fatty oils are generally used as the vehicle for non-aqueous ampul solutions and suspensions. Such oils shall be of vegetable origin, odorless or nearly so, with no odor or taste suggesting rancidity. They remain clear at 10°. They meet the requirements of the test for *Mineral oil* under Expressed Almond Oil, U. S. P. XIII, and have a *Saponification value* not less than 185 and not more than 200, page 713, and an *Iodine value* not less than 79 and not more than 128, page 713. The free fatty acids in 10 Gm. of a suitable oil require for neutralization not more than 1 cc. of 0.1 *N* sodium hydroxide, page 712.

If a fatty acid is used as a component of an ampul solution or suspension, *Oleic Acid*, U. S. P. XIII, shall be used.

Synthetic mono- or di-glycerides may be used as vehicles for ampul solutions or suspensions, provided they are fluid at 10° and have an *Iodine value* not more than 140, page 713.

Other non-aqueous vehicles may be used which are themselves non-toxic in the

volume of ampul solution or suspension administered and which do not interfere with the therapeutic efficacy of the preparation.

Preparation of Ampul Solutions or Suspensions—Throughout the preparation of ampul solutions or suspensions every care must be observed to prevent undue contamination. Equipment in which the ampul solutions or suspensions are prepared should be kept covered as much as possible; vehicles should be protected, and unused portions should be discarded or promptly sterilized for subsequent use.

Ampul solutions or suspensions are prepared, filled into suitable containers, the containers sealed, and the completed unit sterilized preferably within one working day. If this is not practicable, and unless the bulk ampul solution or suspension is bacteriostatic or can be sterilized, it must be placed in containers holding not more than the amount which can be completely processed in a working day, and stored under refrigeration at a temperature below that at which deterioration or bacterial growth will occur.

Ampul solutions or suspensions containing suspended medicaments should be passed through a standard sieve of 200-mesh or finer or should be processed in a colloid or similar type mill. If processed in a colloid or similar type mill the finished product must be of a sufficient degree of fineness to pass through a standard 200-mesh sieve.

Added Substances—Substances may be added to ampul solutions or suspensions to assure the permanency or usefulness of the products, unless otherwise provided in the individual monograph; but such substances must be non-toxic and harmless in the amounts administered and must not interfere with the therapeutic efficacy of the preparations, the assays, and the response to other tests given in the individual monographs.

Special care must be observed in the choice and usage of added substances in ampul solutions or suspensions which are administered in volumes exceeding 5 cc.

A bacteriostatic agent must be added to ampul solutions or suspensions packaged in multiple-dose containers, regardless of the method of sterilization employed, unless otherwise directed in the individual monograph.

A bacteriostatic agent may be added to ampul solutions or suspensions packaged in single-dose containers. If bacteriostatic agents are added, they must be used in concentrations which will prevent the growth of all bacteria in the ampul solutions or suspensions, and sterilization processes or aseptic manipulation must be employed even though bacteriostatic agents are used.

Containers—The type of container to be used for ampul solutions or suspensions is not specified in the individual monograph. See *General Notices*, page 6, and *Containers for Injections* (Ampuls), page 699.

Volume of Ampul Solution or Suspension in Containers—Each container shall be filled with a volume of ampul solution or suspension in excess of that designated which excess shall be sufficient only to permit the withdrawal and the administration of the volume indicated.

Determination of Volume of Ampul Solution or Suspension in Containers—To determine the volume of an ampul solution or suspension in containers, drain thoroughly into a dry, graduated cylinder, a counted number of not less than 5 of the containers if the size is 3 cc. or less, of not less than 3 of the containers if the size is more than 3 cc. and less than 10 cc., or of at least 1 container if the size is more than 10 cc., and note the volume at 25°. The size of the graduated cylinder must

be such that the volume of the ampul solution or suspension from the number of containers used will occupy at least 40 per cent of the graduated capacity of the cylinder.

In measuring the volume of ampul solutions or suspensions containing oil or suspended substances, warm the containers if necessary, to facilitate mixing and draining, and thoroughly shake immediately before draining into the graduated cylinder. Then allow the liquid to cool to 25°, and note the volume.

Clarity of Solutions—National Formulary ampul solutions, or solutions of medicaments intended for parenteral administration, unless exempted by the individual monographs, must be substantially free of any turbidity or undissolved material which can be detected readily, without accessory magnification (except for such optical correction as may be required to establish normal vision), when the solution is examined against a black and against a white background with a light which at a point 10 inches below the source provides an intensity of illumination not more than 350 nor less than 100 foot-candles. This intensity of illumination may be obtained from a 100-watt, inside-frosted, incandescent lamp operating at rated voltage, or from fluorescent lamps, or from any equivalent source of light, see page 694.

Sterilization—Safe processes of sterilization are designated in the individual monographs. Other processes of sterilization equally effective may be used instead of the indicated processes, provided the ampul solution or suspension is not altered thereby, and conforms to all official requirements.

Sterility—Ampul solutions or suspensions meet the requirements of the *Sterility Test for Liquids*, page 746.

Labeling—If the concentration of a drug in an ampul solution or suspension is not specified, the label on each container of such preparation shall indicate the percentage content of drug, or the amount of such drug in a definite volume of the preparation.

If a water vehicle other than *Water for Injection*, U. S. P. XIII, is used, the name of the vehicle used, if it is an official preparation, or its composition if it is not an official preparation, shall be indicated on the labeling of each package.

If a non-aqueous medium is used as the vehicle, the name and percentage of each component of the vehicle shall be indicated on the labeling of the package.

A manufacturing lot number shall appear on each container.

If one or more substances not specified in an ampul monograph are added to assure the permanency or usefulness of the product, the name and quantity or proportion of each substance so used shall be indicated on the label.

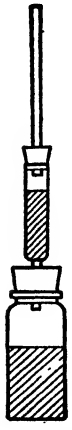
Ampuls for veterinary use shall be so labeled.

Arsenic Test

Reagents satisfactory for use in the arsenic test and in the preparation of the chemical for the test produce either no stain in a blank test or a stain which is scarcely perceptible.

Test Apparatus—Prepare several generators as follows (see the illustration): Select a generator bottle of about 50-cc. capacity having a mouth about 2.5 cm. in diameter, and provide a well-fitting rubber stopper suitably perforated. Through the perforation insert a vertical exit tube about 12 cm. in total length and 1 cm. in diameter along the entire upper portion (for about 8 cm.) and constricted at its lower extremity to a tube of about 4 cm. in length and about 5 mm. in diameter. The smaller portion of the tube should extend but slightly below the stopper. Place in the tube a pledget of purified cotton, 5 cm. in length and extending downward from a point 3 cm. below the top of the tube. Moisten the pledgets of cotton in

the several generator exit tubes uniformly with a mixture of equal volumes of lead acetate T.S. and distilled water. To remove the excess of lead acetate solution from the cotton and adhering droplets from the walls of the tube apply gentle suction to the constricted end of the tube. In the upper end of this tube, insert through a tightly fitting, perforated rubber stopper a glass tube 12 cm. in length and having an internal diameter of from 2.5 to 3 mm. Place a strip of mercuric bromide test paper (page 780) in this tube, bending the upper end of the strip so that it will retain its position. This strip should extend to within about 2 cm. of the perforated rubber stopper and must not be placed in the tube until the test is to be made. This tube must be thoroughly cleaned and dried each time it is used.



Arsenic Test Apparatus

Standard Arsenic Test Solution—Dissolve 0.1 Gm. of arsenic trioxide which has been finely pulverized, dried over sulfuric acid, and accurately weighed, in about 5 cc. of a 20 per cent solution of sodium hydroxide. Neutralize the solution with diluted sulfuric acid, and add 10 cc. more of diluted sulfuric acid and sufficient recently boiled distilled water to bring the volume of the solution to exactly 1000 cc. at 25°. Accurately measure 10 cc. of this solution, transfer it to a 1000-cc. flask, and add 10 cc. of diluted sulfuric acid and sufficient recently boiled distilled water to make exactly 1000 cc. of solution at 25°. Use this solution, which contains 0.001 mg. of arsenic trioxide in each cc. (at 25°) in preparing the standard stain. Keep this solution in a glass-stoppered bottle. It is advisable to make fresh solutions when new standard stains are to be prepared.

Preparation of the Chemical to Be Tested—Add 1 cc. of sulfuric acid to 5 cc. of an aqueous solution of the chemical substance (1 in 25), unless another quantity is directed in the monograph. This acidification is not necessary in the case of inorganic acids. Now, unless especially directed otherwise, add 10 cc. of sulfurous acid. Evaporate the liquid in a small beaker, on a water bath, until it is free from sulfurous acid and has been reduced to about 2 cc. in volume. Dilute this evaporated liquid to 5 cc. with distilled water. Substances subjected to special treatments directed in the monographs need not be further prepared for testing.

The Test

Preparation of the Standard Stain—Place in the generator bottle 5 cc. of potassium iodide T.S., 2 cc. (accurately measured at 25°) of the standard arsenic T.S., 5 cc. of stannous chloride T.S., acid, and 28 cc. of distilled water. Now add 1.5 Gm. of granulated reagent zinc (in No. 20 powder), and immediately insert the stopper containing the exit tubes prepared according to the description under *Test Apparatus*. Keep the generator bottle immersed in water at 25° during the period of the test. If the reaction is too violent, the stain will not take the form of a distinctive band, and the comparison of color intensity will be difficult. After the test has continued for 1 hour, remove the mercuric bromide test paper and place it in a clean, dry tube for comparison. This stain represents 0.002 mg. of arsenic trioxide. Since light, heat, and moisture cause the stain to fade rapidly, comparison should be made as soon as possible. The stained test papers may be preserved by dipping in hot, melted paraffin or by keeping them over phosphorus pentoxide, protected from light.

Testing the Chemical—Place in the generator bottle 5 cc. of potassium iodide

T.S., 5 cc. of the solution to be tested for arsenic, and add 5 cc. of acid stannous chloride T.S. Set the apparatus aside at room temperature for a period of 10 minutes then add 25 cc. of distilled water and 1.5 Gm. of granulated reagent zinc (in a No. 20 powder), and immediately insert the stopper with exit tubes, as previously described under *Preparation of the Standard Stain.* Keep the generator bottle immersed in water at 25° during the period of the test. When the evolution of hydrogen has proceeded actively for 1 hour, remove the mercuric bromide test paper, and carefully compare the stain upon it with the standard stain prepared as previously described. The stain produced by the chemicals tested does not exceed in length or intensity of color that prepared as the standard, indicating not more than 1 part of arsenic trioxide in 100,000 parts of the substance being tested.

Interfering Chemicals—Antimony, if present in the substance being tested, will produce a gray stain. *Sulfites, sulfides, thiosulfates,* and other compounds which liberate hydrogen sulfide or sulfurous acid when treated with sulfuric acid, must be oxidized by means of nitric acid and then reduced by means of sulfurous acid as directed under *Preparation of the Chemical to Be Tested* before they are placed into the apparatus. Certain *sulfur compounds* as well as *hydrogen phosphide* give a bright yellow band on the test paper. If sulfur compounds are present, a darkening of the absorbent cotton previously moistened with lead acetate T.S. will occur. If such is the case, the operation as directed under *Preparation of the Chemical to Be Tested* must be repeated upon a fresh portion of the solution being tested, and greater care must be used in effecting the complete removal of the sulfurous acid. In testing hypophosphites special care should be observed to oxidize completely the solution being tested as directed, otherwise the evolution of hydrogen phosphide may result in a yellow stain which might be confused with the orange-yellow color produced by arsine. The stain produced by hydrogen phosphide is differentiated from that given by arsine by moistening it with ammonia T.S. A stain caused by arsine will become dark when so treated, but a stain produced by hydrogen phosphide will not materially change in color. The test apparatus must be thoroughly cleaned and dried immediately before and after use.

Arsenic Test, Modified, Fleitmann's—The Arsenic Test Apparatus is employed, omitting the cotton. Place in the generator 0.6 Gm. of granulated aluminum (in No. 20 powder), followed by the solution of the substance to be tested. Now add 10 cc. of a 10 per cent solution of sodium hydroxide and allow the reaction to proceed for 30 minutes. Keep the generator bottle immersed in water at 25° during the period of the test.

Remove the mercuric bromide test paper and place it in a clean, dry test tube for comparison.

Boiling or Distilling Temperatures

To determine the temperatures between which an official liquid may boil or the percentage of the material which distils between specified temperatures, use Method I or Method II as directed in the text. The minimum boiling point is the temperature shown by the thermometer when the first 5 drops of the liquid have been collected from the condenser. The maximum boiling point is the temperature at which the last liquid evaporates from the bottom of the flask (Dry Point) or when the proportion specified in the text has been collected.

Method I

This method is to be used with liquids for which the permissible range in boiling temperature is 5° or less.

Apparatus Required—A distilling bulb of from 50- to 60-cc. capacity to the lower part of the neck; the length of the neck is from 10 to 12 cm. and its internal diameter from 14 to 16 mm. The outlet tube, of from 10 to 12 cm. in length and from 4 to 5 mm. internal diameter, is to be attached to the neck at approximately its midpoint, forming an angle from 70° to 75° with the lower portion of the neck. A straight glass condenser with a water jacket from 40 to 60 cm. in length; the distance from the upper end of the water jacket to the neck of the bulb being from 18 to 25 cm.

Thermometer—An accurately standardized thermometer of the Anschütz type without emergent stem correction, or a thermometer of Type VI or VII with emergent stem correction, U.S.P. XIII, may be employed. When placed in position, the top of the bulb of the thermometer is level with the center of the opening of the outlet tube.

Provide an asbestos board 12 to 15 cm. square and 3 to 5 mm. thick, having a circular perforation, located centrally, for the reception of the bulb. The edge of the asbestos around the perforation should fit closely to the bulb when the latter is set into it. The size of the perforation should be such that when the bulb is set into it the portion of the bulb below the upper surface of the asbestos will have a capacity of from 3 to 4 cc.

Procedure—Place the asbestos board on a tripod or other suitable support. Place in the distilling bulb 25 cc. of the liquid to be tested, insert the thermometer, stand the bulb in an upright position in the perforation of the asbestos board, and connect it with the condenser. Then distil the liquid by the application of heat, from a suitable source, at the rate of 1 cc. for each 15 to 20 seconds, noting the temperature as soon as 5 drops of the liquid have distilled into the receiver, and when the last liquid evaporates from the bottom of the flask or when the specified percentage has distilled over. Correct the observed temperature readings for any variation in the barometric pressure from the normal (760 mm.) by allowing 0.1 degree for each 2.7 mm. of variation, adding if the pressure is lower, or subtracting if higher than 760 mm., and apply emergent stem correction when necessary.

NOTE: In order to have the entire volatile portion distil over at the prescribed rate, it is best to make a preliminary distillation of a separate portion of 25 cc. of the liquid, during which the source of heat is regulated so that the distillation proceeds at the prescribed rate. Having thus regulated the heat, temporarily remove it. Then clean the bulb, recharge it with a fresh portion of 25 cc. of the liquid, and conduct a new distillation as described above.

Method II

This method is to be used with liquids for which the permissible range in boiling temperature exceeds 5°.

Apparatus Required—A 200-cc. distilling bulb with an outlet tube attached about midway of the neck and making an angle of from 70° to 75° with the lower portion of the neck. The length of the neck is from 10 to 12 cm. and its inside diameter is from 18 to 24 mm. The length of the outlet tube is from 10 to 12 cm. and its inside diameter is from 5 to 6 mm.

Use a straight glass condenser, a thermometer, and an asbestos board as in *Method I*. The diameter of the perforation in the asbestos board is 50 mm.

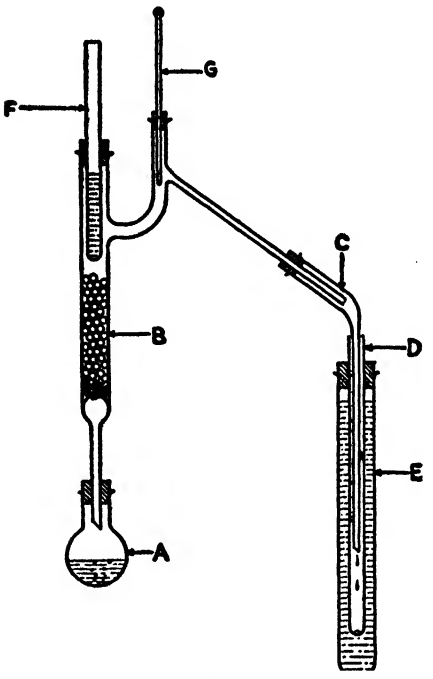
Procedure—Place the distilling bulb in an upright position in the perforation in the asbestos board and connect it with the condenser. The outlet tube is to extend from 25 to 35 mm. into the condenser beyond the connecting stopper.

Measure 100 cc. of the liquid to be tested, using a cylinder having 1-cc. graduations. Note the temperature of the liquid, and transfer it as completely as possible to the distilling bulb. Use this cylinder as the receiver for the distillate without rinsing out any of the adhering liquid. Insert the thermometer, connect the distilling bulb with the condenser as described in *Method I*, and distil by the application of heat, from a suitable source, at the rate of from 4 to 5 cc. per minute, collecting the distillate coming over between the temperatures specified in the text. Bring the distillate to the same temperature as that at which the liquid was originally measured, and note its volume. Correct the temperature reading for barometric pressure.

Liquids which begin to distil below 80° are cooled to from 10° to 15° before measuring the 100 cc. for the test. The end of the condensing tube is fitted with an adapter bent at the suitable angle and the end of the adapter is passed through a cork inserted into the receiving cylinder. The cork has a small perforation to permit the exit of air. The receiving cylinder is kept immersed in ice to within 2.5 cm. of its height during the distillation.

Chloroform Determination

This method may be used for the determination of chloroform in mixtures with alcohol or with alcohol and water. The apparatus required consists of a 100-cc. extraction flask, *A;* a dephlegmator, *B;* an adapter, *C;* a carbon tube (Eggertz Color Comparison Tube), *D;* having a capacity of 30 cc. and graduated to 0.1 cc. and a water jacket, *E;* for the carbon tube. The dephlegmator consists of a glass tube of 25 mm. internal diameter and 27.5 cm. in length which is sealed at one end to a glass tube of 6 mm. internal diameter and 10 cm. in length, the end of which is ground to an angle of 45°. At a distance of 25 mm. above the joint the larger tube is indented at four points equally spaced about its circumference, the indentations nearly meeting in the center of the tube. The top of the tube is finished with a ring. A side tube of 12 mm. internal diameter is sealed to the larger tube at a point 87 mm. below the top, and this tube is bent vertically upward with a smooth curve so that the distance between the opposing walls of the tubes is 50 mm. and the top of the side tube 50 mm. above the top of the larger tube. A delivery tube of 6 mm. internal diameter and 22.5 cm. in length is sealed to the side tube about midway of its length, the delivery tube forming an angle of about 120° to the upward extension of the side tube. The top of the main tube is closed with a 1-hole cork stopper, the surface of which has been lightly charred, which carries a glass refluxing tube, *F*, of 12 mm. internal diameter and 25 cm. in length, sealed at the lower end, and extending to about 12 mm. below the entrance to the side tube, the refluxing tube being filled to about one-half its length with alcohol. A pledget of glass wool is placed upon the indentations in the main tube and the tube then filled to a height of about 12 cm. with glass beads. The open end of the side tube is closed with a lightly charred cork carrying a thermometer, *G*, graduated to 100°. The delivery tube is attached by a lightly charred cork to a bent adapter, the extension of which is bent vertically downward and extends about two-thirds of the distance to the bottom



Chloroform Determination Apparatus

of the carbon tube. The carbon tube is supported by means of a 1-hole stopper in a test tube of about 37 mm. internal diameter and 30 cm. in length, which is to be filled with a mixture of finely crushed ice and water during the distillation.

Place 50 cc. of distilled water in the extraction flask and add exactly 50 cc. of Chloroform Spirit by holding the tip of the pipette just below the surface of the water. Connect the flask to the dephlegmator by a 1-hole cork stopper, the surface of which has been lightly charred after boring. Fill the refluxing tube to about one-half its depth with alcohol. Place 5 cc. of distilled water in the carbon tube, connect the dephlegmator with an adapter which extends to within about 25 mm. of the water in the carbon tube, and surround the carbon tube with a mixture of ice and water. The carbon tube should be lowered as necessary during the distillation to keep the end of the adapter above the liquid in the carbon tube.

Heat the liquid in the flask until it boils gently, and continue the heating until no more chloroform is seen to sink through the water in the carbon tube and the interior walls of the dephlegmator and adapter are free from globules. The temperature recorded by the thermometer should not rise above 78° during the distillation. When distillation of the chloroform is complete, fill the carbon tube to the 30-cc. mark, swirl it vigorously to dissolve any alcohol carried over with the chloroform, and then tap the carbon tube sharply on the desk to collect any globules of chloroform adhering to the walls. Finally, place the carbon tube in a bath of water at 25°, and read the volume of chloroform when that temperature has been attained.

Chromic Acid Cleansing Mixture

Sodium Dichromate	200 Gm.
Water	100 cc.
Sulfuric Acid	1500 cc.

Dissolve the sodium dichromate in the water, then add the sulfuric acid slowly and with stirring.

Clarity of Parenteral (Ampul) Solutions

Examination of Parenteral Solutions in Ampuls, Vials, or in Larger Containers—A suitable device for observing the clarity of parenteral solutions may be provided

by placing a "gooseneck" desk lamp in front of a vertical screen. The screen, covered with black or white for the detection of light or dark colored particles, has a dull or "flat" finish, to reduce reflection to a minimum. The desk lamp is provided with a parabolic, hemispherical or hemispheroidal shade, preferably lined in frosted white to prevent reflection of images. The front of the reflector is tilted downwards slightly to protect the observer's eyes from direct illumination. With such a lamp the source of light is a 100-watt, inside-frosted, incandescent bulb operating at rated voltage. Approximately the same intensity of illumination is given by three 15-watt fluorescent lamps. The intensity of illumination, determined with a light-meter, at a distance of 10 inches from the source, is not less than 100 nor greater than 350 foot-candles.

For examination the surface of the ampul or other container of a parenteral solution shall be free from attached labels and thoroughly cleaned. Holding the container by the neck, slowly invert it to prevent the formation of fine air bubbles, and twirl it slightly to rotate the liquid therein. Then hold the container horizontally about 4 inches below the front edge of the light source and examine the contents against the white and the black backgrounds. Preferably make the examination in subdued light or in a dark room to eliminate extraneous light from the walls of the container.

Color Names Determination by the ISCC-NBS Method

The ISCC-NBS (Inter-Society Color Council—National Bureau of Standards) method of designating colors consists first of determining the Munsell notation of the color or colors of a representative sample of the drug or test and then obtaining the corresponding color name from the color-name charts. The color-name charts may be obtained from the American Pharmaceutical Association. The Munsell Book of Color may be obtained from the Munsell Color Company.

Different degrees of accuracy are possible under this system of color specification. For very accurate work, the Munsell notation itself can be used. For external colors of crude drugs, or powdered drugs and chemicals and certain tests, the complete color names defined herein are used. For the colors of microscopic structures, some liquids and most chemical tests, where the hue range or change is so great that the value and chroma changes are relatively unimportant, the outermost hue names of the hue range covered by the samples are used. For tests in which the color is unimportant but is included for descriptive purposes only, the adjectival form of the generic hue name, such as brownish or greenish, is used. If the presence of a structure is to be indicated but its color is not to be given the terms light or lighter colored and dark or darker colored, or paler, such as paler beneath, are used. Where more than one name is used, they are arranged in sequence according to the Munsell hue sequence (red-yellow-green-blue-purple-red), as weak yellowish orange to light yellow.

When specifying the color of a liquid or solid viewed by transmitted light, substitute the following six color names in the ISCC-NBS system: colorless for white, faint pink for pinkish white, faint yellow for yellowish white, faint green for greenish white, faint blue for bluish white, and faint purple for purplish white. All of the other color names are used interchangeably both for samples viewed by transmitted light and by reflected light.

Instructions for Determining the Color Name of an Opaque Powder (grain size

less than 2 mm.)—The sample is placed, slightly heaped, in a holder at least 3 mm. deep, over which is placed a colorless coverglass about 1 mm. thick, which is pressed down with a rotary motion and held in place by a small rubber band.

The sample and Munsell charts are illuminated by north-sky daylight, by light from a skylight, or by a source of artificial daylight; but lacking these, windows facing in any direction may be used if equipped with suitable diffusing curtains. Either the sample is illuminated from above, in which case it is viewed at an angle of 45° and a piece of black cloth hung on the other side of the sample from the operator, or it is illuminated at 45° as by light from a window, and viewed normally to the surface. Under these conditions, a canopy of black cloth is hung above the sample opposite the operator. The black cloth prevents errors which would arise from the reflection of light from any light-colored surface, in the coverglass. Illumination at 45° and perpendicular viewing are recommended by the International Commission on Illumination, but perpendicular illumination and 45° viewing give results equivalent to the I.C.I. recommended method. It is important that the illumination on the sample and working standards (Munsell samples) be closely the same both in amount and quality, otherwise different Munsell notations will be found upon interchanging them. Even with presumably uniform illumination, it is good practice to make this interchange as a check during the comparison.

Select the two adjacent Munsell hue charts between which the hue of the sample falls. Place these charts under the holes in the wide flaps and the sample under the central opening of the triple-aperture shield. Most operators prefer to estimate first the value, then the chroma, and finally the hue. Determine, by comparison with the charts, which Munsell value most closely corresponds to that of the sample, remembering that all Munsell samples of the same value notation are of the same lightness. Upon observing the three colored rectangles (1 sample and 2 standards) note whether the sample is lighter or darker than the standards. Move the chart whose hue is closest to that of the sample up and down from one value level to another and find the two values between which that of the sample falls. Next estimate to the nearest *tenth of a value step* the value of the sample relative to the two levels between which it falls. Record this number in front of a shilling mark as, for example, 3.2/. Then move the charts horizontally from one chroma to another and by similar interpolation determine the Munsell chroma (saturation or strength) of the color of the sample. In this comparison special attention must be paid to the Munsell samples having *values* nearest that of the sample, and secondary attention to those next nearest. Although all Munsell samples of the same chroma notation are intended to have the same saturation or strength, sometimes a slightly different estimate of chroma will be obtained by comparison with the samples of the next nearest value. In such an instance record an average notation for chroma. Note that there are two chroma steps between each two adjacent columns of Munsell samples. Estimate the chroma to the nearest *half-step* and record this number after the value notation and shilling mark as, for example, 3.2/6.5.

Then with the corresponding Munsell samples of value and chroma closest to those of the sample showing through the apertures of the shield, estimate the hue of the sample relative to that of the two Munsell charts. Record the hue estimated by this interpolation to the nearest *step* in front of the value/chroma designation and separated from it by a *space* as, for example, 9YR 3.2/6.5. If the value and chroma do not correspond very closely to those of any of the Munsell samples, it is advisable

to repeat the interpolation for hue with the next nearest pair of samples and take an average notation for hue. Check the Munsell notation, particularly hue and value, with the charts interchanged.

Then select the color-name chart referring to the hue of the sample (see hue abbreviation in the upper right-hand corner). Plot the value and chroma of the sample on this chart noting that chroma from zero to 1.5 has, for convenience, been plotted to a more open scale than the remainder (see the vertical double line dividing the two scales). If the point falls on a value or chroma boundary or if the notation falls exactly between successive charts yielding different hue names, the names of all the color-name blocks touching the point should, strictly speaking, be recorded; but for most practical purposes, the name of any of the blocks is usually sufficient. Record the name of the block in which the point falls as the color name of the sample.

Instructions for Determining the Color Name of an Unground (Whole) Vegetable or Animal Drug—Hold the part of the sample, the color of which is to be determined, a short distance above the charts and compare it with the Munsell samples by moving it back and forth. Time will be saved by arranging the charts in hue sequence and taking care that the sample does not cast a shadow on the samples. The type and conditions of illumination are the same as specified for a powdered sample. Since the samples are held above the plane of the color samples, it is important that the illumination on the two horizontal planes be the same in amount and quality. Care must be taken to hold the surface of the sample as nearly in a horizontal plane as possible. Errors in Munsell value by as much as a whole step are possible through inadvertent tilting of the sample surface. If a source of artificial daylight is used giving diffused even illumination over a large area from above, or if the comparison is made out of doors by the diffuse light from a large part of the sky, the angle at which the sample is held with respect to the light source is less critical.

For minimizing difficulties due to uneven illumination on samples such as roots having approximately cylindrical surfaces, the axis of the cylinder must be held horizontal and pointed in the direction of the light source, so that neither side of the sample is shaded. For samples having shiny surfaces the use of a black canopy or curtain is required as described above.

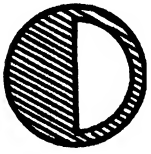
The color of an unground vegetable drug may be designated either by giving the name of the average color found in the lot, if the range of color is small, or preferably by giving the full color names corresponding to the maximum permissible range of color found in the lot. Such a color range may be in hue, in lightness, in saturation, or in any combination of these. Departures from such a range are frequently an indication of *deterioration or impurity.*

Instructions for Determining the Color Name of a Microscopic Structure—Unless otherwise specified, the sample, whether consisting of a powder or of a microscopic section, is mounted in a colorless mounting medium. A frosted Mazda lamp is used for illumination and is placed above and to one side of the microscope base where it will illuminate both the substage mirror of the microscope and the Munsell charts. The proper *daylight filter* (blue glass) must be placed in the eye-piece of the comparison ocular or in the ocular of the Abbé-type camera lucida.

When using a comparison ocular, place one end over the ocular of the microscope and support the other end by a condenser clamp. If an Abbé-type camera lucida is used, it must be modified somewhat to give a split field. To do this, cut out of a circular piece of tin foil just large enough to slip into the ocular of the microscope,

a semi-circle as shown in the accompanying diagram. This shield is placed on top of the ocular micrometer and constitutes the dividing line. Then place a piece of black cloth (preferably velvet) on the table beneath the reflecting mirror of the camera lucida so that its outer edge coincides with the vertical edge of the shield in the ocular. This cloth must cover everything on the table visible in the upper half of the reflecting mirror which is set at an angle of 45°.

Now place the mount, consisting of a slide having the section or powder mounted in a suitable mounting medium and covered with a coverglass, on the stage of the microscope. Place a suitable reflectance standard such as a N 9.6/Munsell paper or a magnesium carbonate block under the open end of the comparison ocular or under the mirror of the camera lucida. Adjust the substage condenser, the substage iris diaphragm, or both, of the microscope until the brightness of the slide image on the one side matches that of the image of the reflectance standard on the other. This adjustment must be repeated for each mount studied. Move the slide until the sample image touches the dividing line in the middle of the field. Place the appropriate Munsell charts on the table in place of the reflectance standard, and make the comparison for hue, as described for determining the color name of an opaque powder, except that when using a camera lucida, the inner edge of the chart must be slipped under the outer edge of the black cloth.



Since the value and chroma vary greatly with the thickness of the sample, or with the amount of dye absorbed by it, it is sufficient to determine only the hue of the sample. A more general term may be used as indicated in the second paragraph if the range is unimportant. Estimate the hue to the nearest *step*, but judge the value and chroma only accurately enough to determine into which part of the color-name chart the point representing the sample will fall. For example, if the Munsell hue of the sample is 3G, 4G, or 5G, the sample will receive the color name *green* regardless of value or chroma; but if the Munsell hue were found to be 5R, a sample whose value is above 6.5 would receive the color name *pink*, while another whose value is below 6.5 would receive the color name *red*.

Instructions for Determining the Color Name of a Chemical

For Opaque Solids and Liquids—The color names of opaque powdered chemicals are determined in the same way as for powdered drugs. The color designation of a precipitate can be obtained in the test tube if the menstruum is not strongly colored; otherwise it should be determined on filter paper. The hue notation is usually sufficient. The colors of opaque liquids may be obtained in clear glass vials, test tubes, or bottles held above the charts as for unground vegetable drugs.

For Clear Liquids—Except in the instance of a commercial liquid whose color is held nearly constant and which would receive the complete color name, the hue notation is usually sufficient for most tests. These may be obtained by holding a test tube containing the sample above the white shield. To obtain the complete color name, fill the etched vial to a depth of 1 cm. taken at the bottom of the meniscus; place the vial in the holder which has a rectangular opening in the bottom and hold it about 20 cm. above the white shield illuminated as for powdered drugs. Look downward through the liquid at the rectangular opening and compare this color with those of the proper Munsell charts under the shield. By moving the shield into vari-

ous positions and exposing corresponding Munsell samples, the comparisons described for obtaining the Munsell notation of an opaque powder are made.

For Clear Crystals, Glass, Resins, etc.—The color designations of clear solids may be obtained if the faces of the sample are nearly parallel, smooth, and free from dust or powder (light-scattering particles). Estimate the hue notation of the color of the sample when held over the white shield illuminated as described for an opaque powder. If the size of the particles is less than 2 mm., proceed as for an opaque powder.

For Translucent or Cloudy Solids and Liquids—Sometimes the color designations of translucent samples, that is, those which both transmit and reflect light, can be obtained by transmitted light but usually they are more easily specified by reflected light. The procedure is the same as described under unground vegetable drugs.

For Fluorescent Liquids and Solids—The color of the fluorescence of a liquid is determined by holding the test tube or vial containing it directly in front of a vertical black cloth so that the liquid is illuminated by natural or artificial daylight chiefly in directions perpendicular to the line of sight. Any light incident on the sample from the back should be avoided because it will produce a mixture of fluorescence and body colors in unknown proportions. The fluorescence color will appear strongest on the side toward the light source. The Munsell charts must receive light from the same source and must be held beside the test tube to facilitate comparison. The hue notation is usually sufficient. The color names for opaque solid and liquid chemicals, for clear liquids, for clear crystals, glass, resins, etc., for translucent or cloudy solids and liquids, and for fluorescent liquids and solids, are determined as described in the second paragraph and under opaque powders.

Congealing Temperature

Unless otherwise directed, place about 10 cc. of the liquid or 10 Gm. of the melted solid to be tested in a dry test tube of from 18 to 20 mm. internal diameter. Then cool in water or in a suitable freezing mixture, the temperature of which should be about 5 degrees lower than the supposed congealing point of the liquid. To induce congelation, rub the inner walls of the tube with a standard thermometer of Type I or Type II, page 757, or add a small solid piece of the substance being tested. By alternate immersion of the tube in the bath, or removal from the bath and constant stirring with the thermometer, the temperature is so adjusted that the greater part of the liquid gradually congeals. The highest temperature remaining constant for a short time during the congelation is defined as the congealing temperature.

Containers for Injections (Ampuls)

Under the heading "Containers for Injections" of the National Formulary, the terms "Ampul," "Container," and "Containers for Injection" are to be considered as synonymous. Ampuls are hermetically sealed containers commonly made of glass and, when filled, contain sterile preparations usually intended for parenteral use.

Ampuls shall be so constructed and packaged that the quality and sterility of the contents are not impaired. As it is important to examine the appearance of the contents, ampuls should be composed of clear glass not colored or clouded unless the contents are affected by light. Even in the case of the latter, enclosing the ampul or ampuls of clear glass in closed cartons, impervious to light, will protect the contents.

The immediate ampul must be sterile before being filled unless the ampul and contents are subsequently to be sterilized by Process C or other suitable effective process.

The ampul must be sealed or otherwise protected so as to exclude all organisms. An ampul or container of multiple doses, designed to permit the withdrawal of successive volumes on different occasions, should be closed with a suitable rubber cap or other suitable closure.

Types of Glass Containers (Ampuls)

Ampuls or other glass containers for injections must meet the following requirements:

Ampuls or other containers for injections and other N. F. preparations for parenteral use other than those in oily vehicles, shall be of one of the following types:

Type I. Glass containers of any capacity, conforming to the requirements on page 700.

Type II. Glass containers of not over 100-cc. capacity, conforming to the requirements on page 701.

Type III. Glass containers of any capacity, conforming to the requirements on page 701.

Type IV. Glass containers of over 100-cc. capacity conforming to the requirements on page 702.

Glass containers which satisfy the requirements for Type I may be of any capacity and may be used for any preparation.

When containers of Type II are directed in a monograph, containers of Type I may be used.

When containers of Type III are directed in a monograph, containers of Type I may be used in any capacity, those of Type II if the capacity be not over 100 cc., and those of Type IV if the capacity be greater than 100 cc.

When containers of Type IV are directed in a monograph, containers of Type I of the same capacity may be used.

When containers of Type II and Type III are used, they must be sterilized by dry heat prior to filling.

Containers of Type II and Type III are designed only for preparations that are sterilized in bulk, then filled into previously sterilized containers under aseptic conditions.

Containers shall be of transparent glass. When protection from light is required, the container preferably shall be placed in an opaque outer container.

The container must be sealed or otherwise properly closed to exclude the entrance of all organisms. Containers packaged for multiple doses, so as to permit the withdrawal of successive volumes on different occasions, should be closed with a suitable rubber cap or other suitable stopper.

Test for Containers of Type I—Take a sufficient number of containers at random, not less than 6, cleanse them thoroughly, rinse in distilled water, and dry. Crush the containers to about 25 mm. size and take from 100 to 120 Gm. of the well-mixed glass and reduce it to a powder in a suitable steel mortar. Place the powder on a No. 20 sieve nested in a No. 40 sieve, which in turn is nested in a No. 50 sieve, and sift briefly. Remove the glass on the No. 20 and No. 40 sieves, recrush in the mortar, and sift a second time. Again remove the glass on the No. 20 and No. 40

sieves, crush again, and sift for the third time. Return the glass retained on the No. 40 and No. 50 sieves to the sieve assembly and sift again for 5 minutes. A mechanical sieve shaker, page 717, may be used if desired. Spread the glass powder retained on the No. 50 sieve, which should weigh from 10 to 15 Gm., on a sheet of paper and pass a magnet through it several times to remove any particles of iron. Transfer the powder to a small basket of No. 50 brass or copper gauze and agitate the basket containing the powder in a beaker of distilled water for 1 minute and then for 30 seconds in each of 2 beakers of alcohol. At this time, the particles should be of uniform size and free from small particles or agglomerates of powder. Dry the washed sample at 140° for 20 minutes and cool in a desiccator. Place 10 Gm. of the dried glass, accurately weighed, in a resistance glass flask of about 125-cc. capacity, add 40 cc. of distilled water which has not come in contact with copper, loosely cap the flask with a resistance glass cover, and autoclave for 30 minutes at 15 pounds steam pressure (121.5°). Cool the autoclave to atmospheric pressure within 30 minutes, then remove the flask, cool rapidly to room temperature, and titrate with 0.02 *N* sulfuric acid, using phenol red *p*H indicator. Perform a blank test with distilled water from the same lot and using the same kind of flask, and make any necessary correction: not more than 0.6 cc. of 0.02 *N* sulfuric acid is consumed.

Test for Containers of Type II—Take a sufficient number of containers at random, not less than 6, and rinse them 6 times with distilled water. Fill each container to its rated capacity with distilled water at 80°, which has not been in contact with copper, and which, just previous to use, has been boiled down to three-fourths of its original volume, and to which has been added subsequently 2 drops of phenolphthalein T.S. for each 100 cc. of water. Place the containers in a large beaker or other glass vessel and cover the vessel with an inverted crystallizing dish or clock glass so arranged that the condensate will fall outside the vessel, or, instead, cover each container with an inverted resistance glass beaker. Place the containers in an autoclave and heat at 15 pounds steam pressure (121.5°) for 1 hour. Cool the autoclave to atmospheric pressure within 30 minutes, remove the container and immediately titrate 100 cc. of the water, accurately measured and taking an equal volume from each container, with 0.02 *N* sulfuric acid; not more than 0.5 cc. of 0.02 *N* sulfuric acid is required to discharge the pink color.

Test for Containers of Type III—Take at least 6 containers at random if less than 100-cc. capacity, at least 3 if not over 500-cc. capacity, and at least 2 if not over 1000-cc. capacity. Cleanse them thoroughly, rinse in distilled water, and dry. Crush the containers to about 25 mm. size and take from 100 to 120 Gm. of the well-mixed glass. Reduce the glass to powder, as directed under the test for containers of Type I, and wash and dry the powdered glass retained on the No. 50 sieve as directed therein. Place 10 Gm. of the powdered glass, accurately weighed, in a 200-cc. Erlenmeyer flask of resistance glass, which has previously been digested with 50 cc. of 0.02 *N* sulfuric acid for 24 hours at 90°, rinsed with distilled water, and dried. Add to the flask 50 cc. of 0.02 *N* sulfuric acid, accurately measured, and stopper the flask with a 1-hole rubber stopper. Immerse the flask in a water bath previously heated to 90°, so that the bottom of the flask is 50 mm. below the surface of the water, and maintain the temperature of the bath at 90°, ± 0.5°, for 4 hours. Remove the flask, cool it quickly in running water, remove the stopper, and rinse into the flask with a small amount of distilled water. Add 5 drops of methyl red indicator and titrate with 0.02 *N* sodium hydroxide. Titrate a fresh 50-cc. portion

of the same 0.02 *N* sulfuric acid to the same end point. The difference between the two titrations corresponds to not more than 5 cc. of 0.02 *N* sulfuric acid.

Test for Containers of Type IV—Take a sufficient number of containers at random, not less than 6, cleanse them thoroughly with hot water, and rinse them with distilled water. Nearly fill the containers with distilled water which has not come in contact with copper, invert resistance glass beakers over the openings of the containers and autoclave them for 30 minutes at 15 pounds pressure (121.5°). Cool the autoclave to about 100° within 30 minutes and remove the containers. Transfer an accurately measured suitable quantity, but not less than 100 cc. from each container, to a resistance glass beaker, add 1 cc. of diluted sulfuric acid, evaporate the solution to a volume of 30 to 40 cc., and transfer the contents to a previously ignited, tared, platinum dish. Evaporate the solution to dryness and ignite at a dull red heat to constant weight. Perform a blank test with distilled water from the same lot in the same manner and make any necessary correction: the total solids dissolved amount to not more than 3.5 parts per million.

NOTE: The most effective type of steel mortar used in the examination of containers of Types I and III for crushing the glass is commonly referred to as a "diamond" mortar. A suitable mortar and pestle may be made from "Oil Die" steel as follows: The mortar should have an external diameter of 75 mm. and an overall height of 60 mm., and the outside edges should be slightly rounded. The cavity in the mortar should be 35 mm. deep and have a diameter of exactly 50 mm. The angle at the bottom edge of the cavity should be turned to a radius of 0.8 mm.

The solid pestle should have an overall length of 106 mm. The head of the pestle should have a width of 50.4 mm. and a length of 45 mm. The bottom edge of the head should be turned to a radius of 0.8 mm., and the upper edge be slightly rounded. The handle end of the pestle should be 30 mm. in diameter, the junction of the handle and head be turned to a radius of 6 mm., and the top edge should be slightly rounded. No deep tool marks should be left in the cavity of the mortar or on the head of the pestle.

The mortar and the head of the pestle should be hardened by heating to 840°, (1550° F.), quenching in oil, and drawing at 150° (300° F.). The inner surface of the mortar and the surface of the head should be cleaned with emery cloth after hardening. The top 25 mm. of the handle should be left soft.

To crush the glass, put from 30 to 40 Gm. of the glass, in not over 25 mm. pieces, into the mortar, insert the pestle, and strike the pestle 4 sharp blows with a 2-pound hammer.

To screen the crushed glass, nest together Nos. 20, 40, and 50 sieves with a sieve pan underneath, and place the sieve assembly in a mechanical sieve shaker, page 717. The No. 20 sieve is used to reduce abrasion of the No. 40 sieve. The glass remaining on the No. 20 and No. 40 sieves is returned to the mortar for further crushing after all of the glass has been reduced for the first time.

Screening is preferably done on a mechanical sieve shaker, page 717, in which the nested sieves may be shaken. If necessary to screen by hand, place each crushing from the mortar in turn on the No. 20 sieve fitted with the pan, hold the sieve in one hand while slightly inclined, and tap the side of the sieve against the palm of the other hand at the rate of about 150 times per minute for 1 minute, turning the sieve about one-sixth of a revolution after each 25 strokes, and repeat the operation with the No. 40 and No. 50 sieves.

Suggested Types of Glass Containers for Preparations for Injection

It is suggested that the following glass container types be used for aqueous preparations for injection for the substances listed below. No suggestions are offered for injections made with an oil medium.

Aqueous Parenteral Solutions	*Types of Glass*
Calcium Chloride	Type I
Calcium Levulinate	Type I
Ephedrine Sulfate	Type I
Ferric Cacodylate	Type I
Green Ferric Ammonium Citrate	Type I
Iodine	Type I
Magnesium Sulfate	Type I
Mercuric Succinimide	Type I
Methenamine	Type I
Procaine Hydrochloride	Type I
Quinine and Urea Hydrochloride	Type I
Quinine Dihydrochloride	Type I
Sodium Cacodylate	Type I
Sodium Indigotindisulfonate	Type I
Sodium Iodide	Type I
Sodium Salicylate	Type I
Sodium Salicylate and Iodide	Type I
Sodium Salicylate and Iodide with Colchicine	Type I
Sodium Thiosulfate	Type I
Stibophen	Type I
Strophanthin	Type I

Stoppers for Containers

Caps or stoppers used for closing containers are to be made from good quality material. They are to be cleansed by boiling in several changes of water and then rinsed in the water for injection, or by other suitable processes, placed in covered wide-mouth containers, and sterilized by Process C. Large rubber stoppers are to be individually wrapped before sterilization, and must be long enough to be inserted and removed without contaminating the lip of the container. The sterilized wrapper of the rubber stopper or other suitable sterilized cover may be employed as a cap. Non-absorbent cotton stoppers if used to close extemporaneously prepared injections should be wrapped in layers of gauze and capped with suitable metallic foil or stout paper.

Containers, Standards for Light Transmission

Apparatus—Several makes of apparatus of suitable sensitivity and accuracy are available. Among these are the Coleman Spectrophotometer, the General Electric Recording Spectrophotometer, and the Cenco-Sheard Spectrophotelometer. Other instruments of equivalent accuracy may be used.

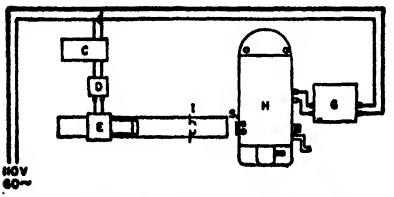
The description given below applies to the Cenco-Sheard instrument; the essential features, or their equivalents, may be found in other instruments. Detailed directions for their operation are furnished by the manufacturer.

The optical system of the photo-electric spectrophotelometer (*II*) is mounted

within a dust-proof metal housing. It consists of an entrance slit (*S*) from which light is directed with a mirror to a concave diffraction grating, an exit slit, an absorption cell carriage, and a photocell.

A crank on the right side of the housing operates a mechanism which rotates and shifts the grating, causing the first order spectrum to traverse the slit, and keeping the portion of the spectrum falling on the slit in focus. A revolution counter located above the crank registers the wave length of the light to the nearest millimicron at the center of the slit. An eyepiece with crosshair and reflecting prism is provided on top of the housing for visual scanning of the spectrum. It is introduced into the light path in front of the exit slit by pushing it downward in the mounting tube. In this position, the light seen at the crosshair is of the wave length indicated by the revolution counter. The absorption cell carriage, made to carry 2 cells, is located between the exit slit and the photocell.

A galvanometer (*G*) of high sensitivity is required to indicate the photocell current. One visual spectrum light source (*E*) with transformer (*D*), one high pressure mercury arc with transformer (for measurements down to 3340 Å), one constant voltage transformer (*C*), one quartz condensing lens, two filters, one iris diaphragm, and a bench support are necessary accessories. A schematic diagram of the spectrophotometer is given in the illustration.



Schematic Diagram of Photo-electric Spectrophotometer with Light Source and Transformers

Preparation of Sample—If the container material is homogeneous throughout its thickness with regard to transmission of light, the samples should be prepared approximately 2 mm. in thickness with plane polished parallel surfaces. The sample size should be that accommodated by the particular instrument to be used for the measurement. If the surface of the container material has been treated in order to affect its light transmission properties, the efficacy of this treatment shall not be impaired in the preparation of the sample. In no case shall the sample be of more than 2 mm. in thickness, unless the material is homogeneous in color throughout its thickness.

Measure the thickness of the test specimen to an accuracy of 0.01 mm. Clean the surfaces of the glass thoroughly, and be careful when placing the sample in the instrument to see that no fingerprints are left on the surfaces through which light must pass. Place the test specimen in the right-hand compartment of the absorption cell carriage so that it is normal to, and covers, the opening in the compartment. Leave the left-hand compartment empty.

Procedure—Set up the visual spectrum light source (ribbon filament lamp) for measurements in the range from 4100 Å to 7500 Å (see spectrophotometric illustration). Carefully adjust the lamp bulb so that the center of the filament is on the axis of the optical system. Focus the light so that the image of the filament just covers the slit. Adjust the entrance slit to a width of 1.5 mm., and insert the 100 Å exit slit. If the glass being tested has a very low transmission factor, wider slits must be used. However, if the glass contains narrow absorption bands, both slits must be made narrow accordingly.

Set the wave length indicator to 420 by turning the crank in a clockwise direction.

If the indicator is turned past this point, it must be reset after the crank has been turned 4 or 5 revolutions in a counter-clockwise direction. Place the blank compartment in the light path and note the deflection (I_0) of the galvanometer. Adjust the iris diaphragm to bring the galvanometer deflection between 80 and 100. Record this reading as shown on the typical data sheet, page 706. Immediately move the compartment containing the test sample into the light path and record the deflection (I). The ratio I/I_0 is the transmission factor of the glass for the wave length shown on the indicator. Make measurements at successive intervals of 200 Å. Insert a red filter (Cenco No. 87308-B610) in the filter holder in front of the entrance slit for all measurements above 6500 Å. No filter is needed for measurements between 4100 Å and 6500 Å. In some instances, narrow absorption bands may be encountered, in which cases more frequent measurements are necessary.*

To make measurements below 4100 Å, set up the mercury arc light, using the quartz condensing lens to focus the image of the light source on the slit. Insert a blue filter (Cenco No. 87308-335) in the filter holder. Set the indicator on the wave length of a principal line in the mercury spectrum, which falls near the lower limit of wave lengths for which measurements are desired. Obtain transmission factors at the successive principal lines of the mercury spectrum up to 4050 Å, as outlined above.

In order to compare the transmission values of two glasses, the transmission factors must be obtained on the basis of a common glass thickness, and curves plotted of per cent transmission against wave length. A thickness of 2.0 mm. is taken as the basis of comparison. It is quite difficult to polish all of the samples to be tested to exactly the same thickness; therefore, the following graphical method of converting the transmission factor of a glass from one thickness to the factor for another thickness is suggested.

Prepare a chart on a sheet of 2-cycle, semi-logarithmic paper (Keuffel and Esser, No. 359-63; see illustrations of typical graphs for recording transmission factors) by laying off any convenient scale on the equal parts side to include the thickness of the sample tested, and the thickness for which transmission factors are desired. Draw lines on the graph to represent each of these thicknesses.

Mark off the logarithmic scale in per cent, as indicated. This scale represents the amount of light transmitted by the glass after correction for reflection losses, which amount to about 4 per cent of the incident light on each surface. Since the transmission factors are not corrected for reflection losses, 92 per cent must be taken as the maximum per cent transmission, or as a basis for the graphical calculation.

Draw a straight line through the 92 per cent point at zero thickness, and any transmission factor for a glass at its measured thickness, to obtain the correct transmission factor of this glass at any other thickness. On the graph, a transmission of 5.3 per cent at 1.7 mm. glass thickness is converted to 3.2 per cent transmission for a thickness of 2.0 mm.

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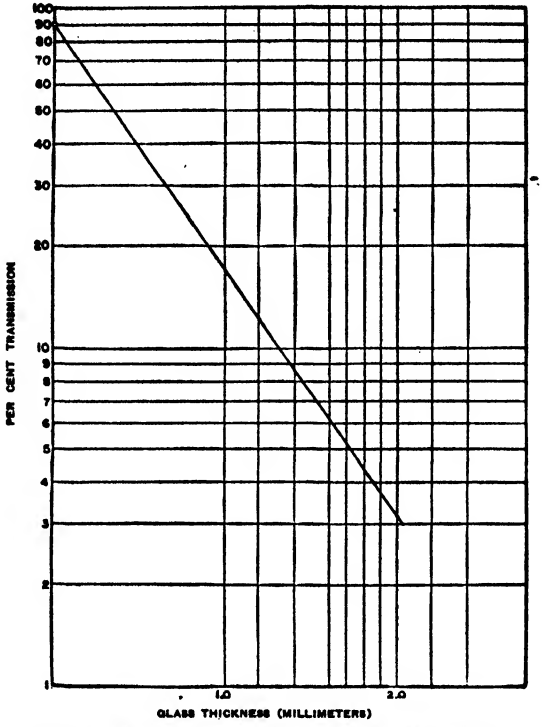
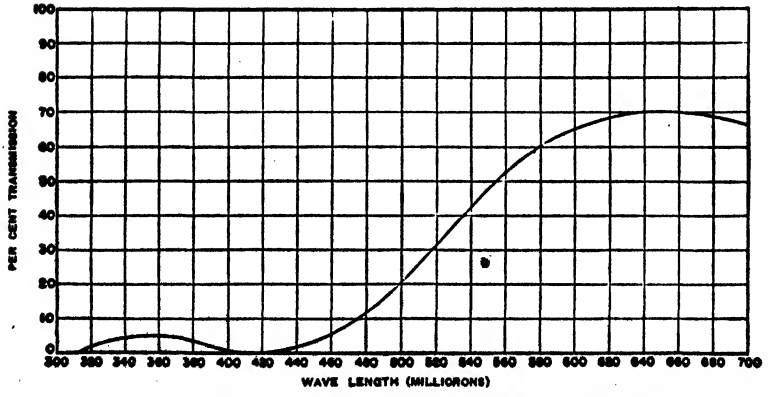
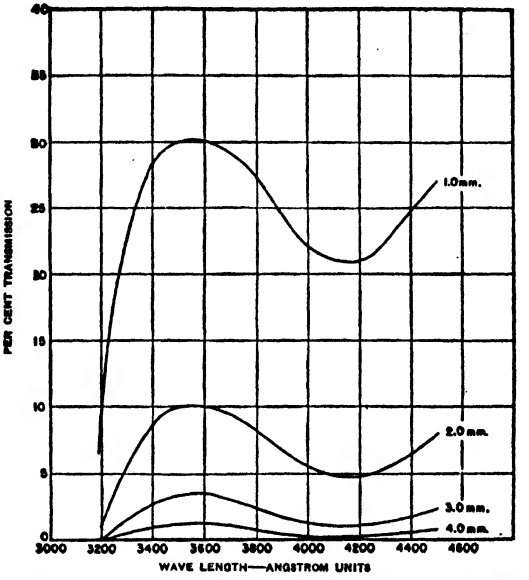
* The intensity of the visual spectrum light source is fairly constant over the range in which it is used up to about 6800 Å.
Therefore, to detect absorption bands in the visible region, place the test sample in the light path, and traverse the range of wave lengths over which measurements are to be made. Any sudden change in the deflection (I) of the galvanometer will indicate an absorption band at the wave length where the sudden change in deflection occurred.



Typical Graph for Recording the Transmission Factor for Glass



Characteristic Spectral Transmission Curve of an Amber Glass



Spectral Transmission of Amber Glass for Different Thickness from 1.0 Mm. to 4.0 Mm.

Typical Data Sheets

Sheet I—Following are a typical data sheet and transmission curve for an amber glass:

Wave Length, mμ	I_0	I	Transmission Factor	
			T_1 = 1.7 Mm.	T_2 = 2.0 Mm.
313	...	0	0	0
334	6.6	0.40	0.061	0.037
365	100	8.3	0.083	0.055
385	20.0	1.06	0.053	0.032
405	100	3.4	0.034	0.019
420	95.2	3.05	0.032	0.018
440	90.0	4.95	0.055	0.032
460	86.7	8.3	0.096	0.065
480	89.2	14.4	0.162	0.120
500	92.3	24.0	0.260	0.210
520	96.5	34.9	0.362	0.310
540	87.2	41.8	0.480	0.432
560	98.0	55.6	0.568	0.528
580	94.0	59.4	0.632	0.595
600	88.5	60.5	0.684	0.643
620	91.5	64.4	0.703	0.672
640	89.2	64.2	0.719	0.689
660	81.0	58.3	0.719	0.689
680	37.2	26.5	0.712	0.682
700	15.0	10.6	0.705	0.674

Measurements in the ultra-violet were made at the principal lines of mercury.

Sheet II—Transmissions at various wave lengths between 2900 Å and 4500 Å for various thicknesses of an amber glass when maximum transmission in 2.0 mm. thickness is 10%. A typical glass was chosen for the "standard" data. Transmissions include loss by reflection.

Wave Length, Å	(Standard)			
	1.0 Mm.	2.0 Mm.	3.0 Mm.	4.0 Mm.
2900	?	0	0	0
3000	?	0	0	0
3100	?	0	0	0
3200	11.0	1.3	0.15	0.02
3300	23.4	6.0	1.54	0.39
3400	28.8	9.0	2.80	0.87
3500	30.1	10.0	3.30	1.10
3600	30.1	10.0	3.30	1.10
3700	29.0	9.2	2.90	0.92
3800	27.0	8.0	2.35	0.69
3900	24.0	6.5	1.70	0.45
4000	22.1	5.4	1.30	0.31
4100	21.0	4.8	1.10	0.25
4200	21.0	4.8	1.10	0.25
4300	22.6	5.6	1.35	0.34
4400	25.0	6.8	1.75	0.46
4500	27.0	8.0	2.40	0.70

Emulsions

In preparing National Formulary emulsions, methods of emulsification other than those described in the several monographs may be used, and the quantity of acacia may be reduced, or it may be replaced in whole or in part with gelatin, tragacanth, agar, or mixtures of these.

Gelatin meeting U. S. P. specifications but particularly designed for the preparation of emulsions is available in 2 types, known as pharmagel A and pharmagel B, each of which is used under different circumstances.

Pharmagel A is prepared from acid-treated precursors, and is used without other emulsifying agents and at a *p*H of about 3.2. It is usually to be preferred if other emulsifying agents are not to be used also. For the extemporaneous preparation of emulsions using pharmagel A the following procedure is recommended:

Gelatin (Pharmagel A)	8.0 Gm.
Tartaric Acid	0.6 Gm.
Flavor as desired	
Alcohol	60 cc.
Oil	500 cc.
Distilled Water, a sufficient quantity,	
To make	1000 cc.

Add the pharmagel A and the tartaric acid to about 300 cc. of distilled water, allow to stand a few minutes, then heat until the gelatin is dissolved. Raise the temperature to about 98° and maintain this temperature for about 20 minutes. Cool to 50°, add the flavor, the alcohol, and sufficient distilled water to make 500 cc. Add the oil, agitate the mixture thoroughly, and pass it through a homogenizer or a

colloid mill, several times, until the oil is completely and uniformly dispersed. This emulsion cannot be prepared by trituration or by the usual stirring devices.

Pharmagel B is prepared from alkali-treated precursors, and is used with or without other emulsifying agents, and at a *p*H of about 8.0. For 1000 cc. of an emulsion containing 50 per cent of oil, a mixture of 5 Gm. of pharmagel B and 2.5 Gm. of sodium bicarbonate should be used, adding sufficient tragacanth or agar to provide the required viscosity. For further information on the use of pharmagel B the pharmacist is referred to the literature.

The vanillin in Liquid Petrolatum Emulsion with Phenolphthalein may be replaced by not more than 1 per cent of any other flavoring substance or any mixture of flavoring substances recognized in either this National Formulary or the United States Pharmacopœia. Instead of the alcohol in Liquid Petrolatum Emulsion with Phenolphthalein, 60 cc. of Sweet Orange Peel Tincture or 2 Gm. of benzoic acid may be used.

Extracts

Extracts are concentrated preparations of vegetable or animal drugs obtained by extracting the active constituents of the respective drugs with suitable menstrua, evaporating all or nearly all of the solvent and adjusting the residual masses or powders to the prescribed standards.

Extracts are made in three forms: Semi-liquid or those of syrupy consistency; plastic masses, known as *pilular extracts;* and dry powders, known as *powdered extracts.* Pilular extracts and powdered extracts of any one drug are interchangeable medicinally, but each has its pharmaceutical advantages.

In the manufacture of most extracts, the drugs are extracted by the process of percolation. The rate of flow of percolates, directed under the several monographs, is defined on page 718. The entire percolates are concentrated by distillation under reduced pressure, with a few exceptions, in order to expose the drug principles to as little heat as possible. If the active principles of a drug are damaged by high temperatures or by prolonged heating, the temperature at which its percolate is concentrated is not to exceed 60° at any stage.

Diluents—Extracts which must be adjusted to prescribed standards may need diluents for that purpose. While in the National Formulary liquid glucose is directed as the diluent for pilular extracts, and starch dried at 100° for powdered extracts, the following additional diluents are permitted: malt extract for pilular extracts, and for powdered extracts, sucrose, lactose, powdered glycyrrhiza, magnesium carbonate, magnesium oxide, calcium phosphate, the finely powdered marc remaining after the extraction of the drug, or other inert, non-toxic diluents. Magnesium carbonate and magnesium oxide should not be used in powdered extract of hyoscyamus. The diluent for a powdered extract may be colored with chlorophyll or caramel to produce a color corresponding to the normal color of the extract, but an excess of coloring agent must not be added.

Defatting Extracts—Powdered extracts which are made from drugs that contain a material proportion of inactive oily or fatty matter should have this removed in order to obtain a satisfactory product. Any suitable method for defatting either the drug or the extract may be employed. The following methods of treating the extract are recommended:

Method I—Prepare the extract in the regular manner to the point where before

final adjustment it is dried with a portion of starch. To this dry powder add petroleum benzin (about 300 cc. of benzin for each 100 Gm. of drug extracted) and stir well several times during 2 hours. Allow to settle and decant or drain off the excess of liquid. Mix the residue with another (smaller) portion of petroleum benzin, stir thoroughly, and separate the excess of benzin. Repeat the washing with a third portion of petroleum benzin, then drain the powder, and dry it thoroughly at a temperature not exceeding 70°. Weigh the dried powder, and adjust it to the prescribed quantity or strength.

Method II—To the soft extract obtained by the evaporation of the percolate, add slightly acidified water at a temperature of about 80° in the proportion of about 80 cc. of acidified water to each 100 Gm. of soft extract or crude drug represented. Stir the mixture thoroughly, and allow it to stand until almost cold. Remove and discard any oily or fatty matter which has risen, then separate and retain the water liquid. Treat the undissolved extract residue twice as just described, combine and evaporate the water liquids to a soft extract at a temperature not exceeding 70°. Mix the soft extract thus obtained with a portion of starch, dry the mixture at a temperature not exceeding 70°, and complete the extract in the usual way.

The acidified water suggested above should contain about 0.05 per cent of HCl or about 0.2 per cent of tartaric acid.

Storage—Preserve Extracts in tight, light-resistant containers, preferably at a temperature not above 30°.

Fats and Fatty Oils

Preparation of Sample—If a sample of oil shows turbidity owing to separated stearin, warm the container in a bath of water at 50° until the turbidity has disappeared and the oil is clear. Thoroughly mix the clarified oil before weighing the samples. If the oil does not become clear on warming, filter it through dry filter paper in a funnel contained in a hot water jacket. Weigh at one time as many portions as are needed for the various determinations, using preferably a bottle having a pipette dropper, or a weighing burette. Keep the sample melted, if solid at room temperature, until the desired samples are withdrawn.

Specific Gravity—The specific gravity of a fat or oil shall be determined at 25°, except when the substance is a solid at that temperature. In this case the specific gravity shall be determined at the temperature directed in the respective monograph and referred to water at 25°.

Clean a pycnometer (use a Sprengel or other suitable pycnometer with a well-fitted capillary stopper) by filling it with a chromic acid cleansing mixture, page 694, and allowing it to stand for at least 4 hours. Empty the pycnometer, and rinse it thoroughly with distilled water; then fill it with recently boiled distilled water previously cooled to about 20°, and place in a constant temperature bath at 25°. At the end of 30 minutes adjust the level of the water to the proper point on the pycnometer; put the perforated cap or stopper in place; remove from the bath, wipe dry with a clean cloth, free from lint; and after allowing to stand for 30 minutes, weigh. Empty the pycnometer, rinse several times with alcohol and then with ether, allow it to become perfectly dry, remove any ether vapor, and weigh. Ascertain the weight of the contained water at 25° by subtracting the weight of the pycnometer from its weight when full.

Fill the clean, dry pycnometer with the oil at a temperature below that at which

the determination is to be made; place it in a constant temperature bath at the specified temperature for 30 minutes; adjust the level of the oil to the proper point on the pycnometer; put the cap or stopper in place, wipe dry; allow to stand for 30 minutes; and weigh. Subtract the weight of the empty pycnometer from its weight when filled with oil, and divide the difference by the weight of water contained at 25°. The quotient is the specific gravity at the temperature of observation, referred to water at 25°.

Index of Refraction—The index of refraction shall be determined by means of the Abbé refractometer. The determination shall be made at the temperature specified for each oil, maintaining the temperature by circulating water at the proper temperature through the heating jackets surrounding the prisms of the refractometer.

Melting Point—Determine the melting point as directed for substances of Class II, page 732.

Solidification Temperature of Fatty Acids. (Frequently referred to as the *"titer."*)

Preparation of the Fatty Acids—Heat 75 cc. of glycerin-potassium hydroxide solution (made by dissolving 25 Gm. of potassium hydroxide in 100 cc. of glycerin) to 150° in an 800-cc. beaker, and add 50 cc. of the clarified fat, melted if necessary. Heat the mixture for 15 minutes with frequent stirring, but do not allow the temperature to rise above 150°. When saponification is complete, the mixture is homogeneous, with no particles clinging to the beaker at the meniscus. Pour the soap into 500 cc. of nearly boiling distilled water in an 800-cc. beaker or casserole, add slowly 50 cc. of dilute sulfuric acid (made by adding 1 volume of sulfuric acid to 3 volumes of distilled water) and heat the solution with frequent stirring, until the fatty acids separate cleanly as a transparent layer. Wash the acids with boiling water until free from sulfuric acid, collect them in a small beaker, and place on a boiling water bath or steam bath until the water has settled and the fatty acids are clear. Allow the acids to cool, melt, and filter into a dry beaker while hot, and dry for 20 minutes at 100°.

Test for Complete Saponification—Place 3 cc. of the dry acids in a test tube and add 15 cc. of alcohol. Heat the solution to boiling and add an equal volume of ammonia T.S. A clear solution should result.

Determination of the Solidification Temperature—Cool the dry, filtered acids to from 15 to 20 degrees above the expected reading, and transfer to a glass tube 25 mm. in diameter and 100 mm. in length, the glass being 1 mm. in thickness. By means of a perforated cork fasten the tube in a wide-mouth bottle of clear glass, approximately 70 mm. in diameter and 150 mm. in height. Suspend a thermometer of Type V, page 756, in the melted acids so that it will serve as a stirrer, cooling if necessary, and stir the mass slowly until the mercury remains stationary for 30 seconds. Then allow the thermometer to hang quietly, with the bulb in the center of the acids, and observe the rise of the mercury column. The highest point to which it rises is the Solidification Temperature of the fatty acids.

Acetyl Value of Fatty Acids

The acetyl value of fatty acids is the number of mg. of potassium hydroxide required to neutralize the acetic acid obtained by the saponification of 1 Gm. of acetylated fatty acids. It is determined as follows: Boil about 30 Gm. of the fatty acids, obtained as described in the monograph, with 30 cc. of acetic anhydride under a reflux condenser for 2 hours. Pour the mixture into 500 cc. of distilled water con-

tained in an 800-cc. beaker and boil gently for 15 minutes while bubbling carbon dioxide through the mixture. Siphon off the greater part of the water and repeat the boiling operation with 2 successive 500-cc. portions of distilled water. Transfer the acetylated oil into a pear-shaped 500-cc. separator and wash with two 200-cc. portions of distilled water warmed to about 50°. Separate as much of the water as possible and add 5 Gm. of anhydrous sodium sulfate, shake well, allow to stand 30 minutes, then filter through a folded filter, carrying out the filtration in a drying oven at 105°, if necessary.

Determine the saponification value on about 2 Gm. of the acetylated acids, page 713. Determine the acid value, expressed in mg. of potassium hydroxide per Gm. of acid, page 712. Calculate the acetyl value, A, by the following formula:

$$A = \frac{S - F}{1 - 0.00075\,S}$$

A is the acetyl value of the free fatty acids.
S is the saponification value of the acetylated fatty acids.
F is the acid value of the original fatty acids expressed as mg. of potassium hydroxide required to neutralize 1 Gm. of fatty acids.

Acid Value (*Free Fatty Acids*)

The acid value is the number of mg. of potassium hydroxide required to neutralize the free acids in 1 Gm. of substance. The acidity may also be expressed as the number of cc. of 0.1 N sodium hydroxide required to neutralize the free acid in 10 Gm. of substance. The acidity of fats, oils, waxes, fatty acids, resins, and balsams is determined by dissolving a weighed quantity of the sample in alcohol or a mixture of equal volumes of alcohol and ether (either solvent having been neutralized with dilute sodium hydroxide to a phenolphthalein end point), adding phenolphthalein T.S. as the indicator, and titrating with standard sodium hydroxide solution to a pink color that persists after shaking the mixture for 30 seconds.

The method: Unless otherwise directed, dissolve about 10 Gm. of the substance, accurately weighed, in 50 cc. of a mixture of equal volumes of alcohol and ether (which has been neutralized to phenolphthalein with 0.1 N sodium hydroxide) contained in a flask. If the sample does not dissolve in the cold solvent, connect the flask with a reflux condenser and warm slowly, with frequent shaking, until the sample has dissolved. Add 1 cc. of phenolphthalein T.S. and titrate with 0.1 N sodium hydroxide until the solution remains faintly pink after shaking for 30 seconds. Calculate either the *Acid Value* or the volume of 0.1 N alkali required to neutralize exactly 10 Gm. of sample, as directed.

If the oil has been saturated with carbon dioxide for the purpose of preservation, the solution in alcohol-ether must be boiled gently for 10 minutes under the reflux condenser before titration. The oil may also be freed from carbon dioxide by exposing it in a shallow dish in a vacuum desiccator for 24 hours before weighing the samples.

Ester Value

The Ester Value is the number of mg. of potassium hydroxide required to saponify the esters in 1 Gm. of fatty or volatile oil, fat, wax, resin, balsam, or similar organic

substance. If the Saponification Value and the Acid Value have been determined, the difference between these two represents the Ester Value.

To determine the Ester Value directly, proceed as follows: Shake from 1.5 to 2 Gm. of the substance, accurately weighed in a 200- to 250-cc. tared flask, with from 20 to 30 cc. of alcohol, add 1 cc. of phenolphthalein T.S., and titrate with 0.5 *N* alcoholic potassium hydroxide until the free acid is neutralized. Add exactly 25 cc. of 0.5 *N* alcoholic potassium hydroxide, and proceed as directed under *Saponification Value*, beginning with "Insert in the neck of the flask" and omitting the further addition of phenolphthalein T.S. The difference between the number of cc. of 0.5 *N* hydrochloric acid consumed in the actual test and in the blank, multiplied by 28.05 and divided by the weight of the substance taken, gives the Ester Value.

Iodine Value (*Hanus method*)

The Iodine Value of a fat or oil represents the number of Gm. of iodine capable of being absorbed, under the prescribed conditions, by 100 Gm. of the substance. It is determined as follows: Introduce about 0.8 Gm. of a solid fat or about 0.3 Gm. of an oil, accurately weighed, into a glass-stoppered flask or bottle of 250-cc. capacity, dissolve it in 10 cc. of chloroform, add 25 cc. of iodobromide T.S., accurately measured from a burette or pipette, stopper the vessel securely, and allow it to stand for thirty minutes protected from light. Then add in the order named 30 cc. of potassium iodide T.S. and 100 cc. of distilled water, and titrate the liberated iodine with 0.1 *N* sodium thiosulfate, shaking thoroughly after each addition of thiosulfate. When the iodine color becomes quite pale, add 1 cc. of starch T.S. and continue the titration with thiosulfate until the blue color is discharged. Carry out a blank test at the same time with the same quantities of chloroform and iodobromide solution, allowing it to stand for the same length of time and titrating as directed. The difference between the number of cc. of thiosulfate consumed by the blank test and the actual test, multiplied by 1.269 and divided by the weight of sample taken, gives the Iodine Value.

NOTE: If more than half of the iodobromide T.S. is absorbed by the portion of the substance taken, the determination must be repeated, using a smaller portion of the substance under examination.

Saponification Value

The Saponification Value is the number of mg. of potassium hydroxide required to neutralize the free acids and saponify the esters contained in 1 Gm. of a fat, fatty or volatile oil, wax, resin, balsam, or similar substance. It is determined as follows: Place from 1.5 to 2 Gm. of the sample, accurately weighed, in a flask of from 200- to 250-cc. capacity, and add to it exactly 25 cc. of alcoholic 0.5 *N* potassium hydroxide. Insert into the neck of the flask, by means of a perforated stopper, an air condenser consisting of a glass tube from 70 to 80 cm. in length and from 5 to 8 mm. in diameter, and heat the flask on a water bath for 30 minutes, frequently rotating the contents. Then add 1 cc. of phenolphthalein T.S. and titrate the excess of potassium hydroxide with 0.5 *N* hydrochloric acid. Make a blank test at the same time, using exactly the same amount of alcoholic 0.5 *N* potassium hydroxide. The difference between the number of cc. of 0.5 *N* hydrochloric acid consumed in the actual test and in the blank test, multiplied by 28.05 and divided by the weight of sample taken, gives the Saponification Value.

If the oil has been saturated with carbon dioxide for the purpose of preservation,

it should be exposed in a shallow dish in a vacuum desiccator for 24 hours before the portions are weighed for this determination.

Unsaponifiable Matter

The term Unsaponifiable Matter in oils or fats refers to those substances present that are not saponifiable by alkali hydroxides and are insoluble in water. It is determined as follows: Weigh 5 Gm. of the oil or fat into a 250-cc. Erlenmeyer flask, add a solution of 2 Gm. of potassium hydroxide in 40 cc. of alcohol, and heat under a reflux condenser for 2 hours, keeping the alcohol gently boiling. Evaporate the alcohol on a water bath, dissolve the residue in 50 cc. of hot distilled water, and transfer the solution to a separator, rinsing the flask with two 25-cc. portions of hot distilled water which are added to the separator. Cool to room temperature, and extract with 2 successive portions of 50 cc. each of ether, adding a few drops of alcohol to facilitate the separation of the 2 liquids. Combine the ether extracts in another separator and wash the ether solution first with 20 cc. of an aqueous solution of sodium hydroxide (4 in 1000), then with 20 cc. of an aqueous solution of sodium hydroxide (8 in 1000), and finally with 15-cc. portions of distilled water until the last washing is not reddened by the addition of 2 drops of phenolphthalein T.S. Transfer the ether solution to a tared beaker, and rinse the separator with 10 cc. of ether, adding the rinsings to the beaker. Evaporate the ether just to dryness on a water bath, and dry the residue for 30 minutes at 100°. Cool the beaker in a desiccator for 30 minutes, and weigh the residue of Unsaponifiable Matter.

Water and Sediment in Fatty Oils

The Centrifuge—The preferred centrifuge shall have a diameter of swing (tip to tip of whirling tubes) of from 38 to 43 cm. and be operated at a speed of about 1500 r.p.m. If a centrifuge of different dimensions is used, the rate of revolution shall be calculated by the use of the following formula:

$$\text{r.p.m.} = 1500 \sqrt{\frac{40.6}{d}}$$

in which d represents the diameter in cm. (from tip to tip of the whirling tubes) of the centrifuge used.

The Centrifuge Tubes—The centrifuge tubes shall be pear-shaped, shall be made of suitable glass, and thoroughly annealed. The total capacity of each tube shall be about 125 cc. and the mouth shall be suitably constricted for closing with a cork. The graduations shall be clear and distinct, reading upward from the bottom of the tube. The tube shall be graduated according to the following scale:

Range	*Scale Division*
0 to 3 cc	0.1 cc.
3 to 5 cc	0.5 cc.
5 to 10 cc	1.0 cc.
10 to 25 cc	5.0 cc.
25 to 50 cc	25.0 cc.
50 to 100 cc	50.0 cc.

Method—Place exactly 50 cc. of benzene in each of 2 centrifuge tubes and to each tube add exactly 50 cc. of the oil, warmed if necessary to reincorporate sepa-

rated stearin, and thoroughly mixed at 25°. Tightly stopper the tubes and shake them vigorously until the contents are thoroughly mixed, then immerse the tubes in a water bath at 50° for 10 minutes. Place the tubes on opposite sides of the centrifuge and whirl for 10 minutes. Read the combined volume of water and sediment at the bottom of each tube. Repeat the whirling for 10-minute periods until the combined volume of water and sediment remains constant for 3 consecutive readings. The sum of the volumes of combined water and sediment in the 2 tubes represents the percentage, by volume, of water and sediment in the oil.

Fineness of Powders

The fineness of powders in the National Formulary is expressed in descriptive terms, each of which is related to the number assigned to a certain standard sieve.

Sieves for National Formulary Testing

Sieves for National Formulary testing shall be of wire cloth woven (not twilled) from brass, bronze, or other suitable wire, and shall not be coated or plated. The following table gives the nominal dimensions, permissible variations, and limits for woven wire cloth of standard sieves.

Nominal Dimensions of Standard Sieves

Microns	Number	Sieve Opening, Mm.	Permissible Variation in Average Opening, Per Cent	Permissible Variation in Maximum Opening, Per Cent	Wire Diameter, Mm.
9520	2	9.52	±3	+ 5	2.11 to 2.59
4760	4	4.76	±3	+10	1.14 to 1.68
2000	10	2.00	±3	+10	0.68 to 1.00
840	20	0.84	±5	+15	0.38 to 0.55
590	30	0.59	±5	+15	0.29 to 0.42
420	40	0.42	±5	+25	0.23 to 0.33
297	50	0.297	±5	+25	0.170 to 0.253
250	60	0.250	±5	+25	0.149 to 0.220
210	70	0.210	±5	+25	0.130 to 0.187
177	80	0.177	±6	+40	0.114 to 0.154
149	100	0.149	±6	+40	0.096 to 0.125
125	120	0.125	±6	+40	0.079 to 0.103
74	200	0.074	±7	+60	0.045 to 0.061

In any sieve, the average opening between the adjacent warp and the adjacent shoot wires, taken separately, shall conform to the width of opening specified within the specified percentage of permissible variation in the average opening. The maximum width of opening between any adjacent warp or shoot wires shall not exceed the width of opening specified by more than the specified percentage permissible variation in maximum opening. The average diameter of the warp and shoot wires, taken separately of the cloth in any given sieve, shall be within the range of wire diameters given in the table.

For details regarding the standardization of sieves, reference should be made to National Bureau of Standards *Letter Circular* 72, July 26, 1922, or to Specification E11-39 of the American Society for Testing Materials.

Fineness of Powdered Vegetable or Animal Drugs

The fineness of vegetable and animal drugs is expressed in the National Formulary by the following terms: *Very coarse powder* (No. 8), *coarse powder* (No. 20), *moderately coarse powder* (No. 40), *fine powder* (No. 60), *very fine powder* (No. 80). A powder to conform with any one of these specified terms must meet the following requirements. In the preparation of ground or powdered drugs, no portion of the drug shall be rejected during milling or sifting unless specifically permitted under the official description of the drug. It is permissible, however, to withhold *final tailings* not exceeding 5 per cent of the drug being powdered, which may be added in no greater percentage to other lots of the same drug in subsequent millings.

Standards

A *very coarse powder* (No. 8) is one in which all particles will pass through a No. 8 standard mesh sieve and not more than 20 per cent through a No. 60 standard mesh sieve.

A *coarse powder* (No. 20) is one in which all of the particles will pass through a No. 20 standard mesh sieve and not more than 40 per cent through a No. 60 standard mesh sieve.

A *moderately coarse powder* (No. 40) is one in which all of the particles will pass through a No. 40 standard mesh sieve and not more than 40 per cent through a No. 80 standard mesh sieve.

A *fine powder* (No. 60) is one in which all of the particles will pass through a No. 60 standard mesh sieve and not more than 40 per cent through a No. 100 standard mesh sieve.

A *very fine powder* (No. 80) is one in which all of the particles will pass through a No. 80 standard mesh sieve.

Fineness of Powdered Chemicals

The fineness of chemicals is expressed in the National Formulary by the following terms: *coarse powder* (No. 20), *moderately coarse powder* (No. 40), *fine powder* (No. 80), *very fine powder* (No. 120).

Standards

A *coarse powder* (No. 20) is one in which all of the particles will pass through a No. 20 standard mesh sieve, and not more than 60 per cent will pass through a No. 40 standard mesh sieve.

A *moderately coarse powder* (No. 40) is one in which all of the particles will pass through a No. 40 standard mesh sieve, and not more than 60 per cent will pass through a No. 60 standard mesh sieve.

A *fine powder* (No. 80) is one in which all of the particles pass through a No. 80 standard mesh sieve.

A *very fine powder* (No. 120) is one in which all of the particles pass through a No. 120 standard mesh sieve.

Method for Determining Uniformity of Fineness—For determining uniformity of degree of fineness of powdered drugs, the following process may be used, employing standard testing sieves which meet the requirements set forth above.

For *very coarse*, *coarse*, and *moderately coarse powders*, place from 25 to 100 Gm. of the powder to be tested upon the proper standard testing sieve with a tightly

fitting receiving pan and cover. Shake the sieve in a rotary horizontal direction and vertically by tapping on a hard surface for not less than 20 minutes or until no appreciable number of particles pass through the sieve. Weigh accurately the amount remaining on the sieve and in the receiving pan and calculate to per cent.

In the case of *fine* or *very fine powders*, proceed as for *coarse* or for *moderately coarse powders*, but shake the sieve for at least 30 minutes or until no appreciable number of particles pass through the sieve.

In the case of oily or other powders which tend to clog the openings, the screen should be carefully brushed at intervals during the test. In the case of powders which tend to form lumps, such lumps should be carefully disintegrated during the sifting test. Do not increase the fineness of the powder during the sieve testing.

*Mechanical Sieve Shaker**—The fineness of a powdered drug or chemical may also be determined by screening through standard sieves in a mechanical sieve shaker. The purpose of the sieve shaker is to reproduce the circular and tapping motion given to testing sieves in hand sieving but with a uniform mechanical action. A sieve or a nest of sieves rests upon a horizontal solid metal base plate which is attached to a bar one end of which is revolving in a circle 1.125 inches in diameter, the other traveling linearly to and from the center of rotation of the first, the bar measuring 14.75 inches between centers. The frequency of oscillation of the sieves is 285 ± 3 cycles per minute. At the top of the stack of sieves is placed a solid metal cover plate bearing a cork insert which projects 1 inch above the top surface of the cover plate. The cork insert is tapped at the top with a hammer striking a blow of 2.5 pounds, falling through a distance of 1.0625 inches at a rate of 150 times per minute. The cork insert must be replaced when necessary to retain the distance of the blow. The sieves are to be placed upon the sieve supporting plate, and the lower carrying plate so adjusted that it is just possible to make a complete turn of the cover plate with the unaided fingers.

Fluidextracts

Fluidextracts are liquid preparations of vegetable drugs, containing alcohol as a solvent or as a preservative, or both, and so made that each 1 cc. contains the therapeutic constituents of 1 Gm. of the standard drug which it represents.

The official fluidextracts are made by the process of percolation, the menstruum to be used being specified in each monograph. Manufacture by the usual process calls for concentration of the more diluted portion of percolate by distillation. This should be done in a vacuum distillation apparatus, the temperature in the still being kept below 60°.

The time of maceration and the rate of flow during percolation are varied for different drugs to compensate for peculiarities in extraction and in some cases to accomplish partial rejection of non-active constituents. In all cases the maceration and rate of flow are designed to extract completely the medicinally active or important constituents from the specified quantities of drugs; but the time and rate specified may be varied to accomplish this purpose when larger or smaller quantities of drug are being treated.

Usually a cylindrical form of percolator is the best type for making fluidextracts,

* The description and manner of use given here apply, specifically, to the Ro-Tap Testing Sieve Shaker. Any other mechanical device which duplicates the shaking and tapping force and speed of this shaker may be used in National Formulary tests.

but for use with drugs which swell considerably in the menstruum a flaring form of percolator may be preferred.

The rate of flow of the percolate is directed in these terms: "percolate slowly," "percolate rapidly," and "percolate at a moderate rate." With reference to the extraction of 1000 Gm. of drug, "percolate slowly" means a rate not exceeding 1 cc. of percolate per minute; "percolate rapidly" means a rate of from 3 to 5 cc. per minute; "percolate at a moderate rate" means a rate of from 1 to 3 cc. per minute.

A fluidextract which may deposit sediment may be aged and filtered or the clear portion decanted, provided the resulting clear liquid conforms to the official standards.

The general processes of manufacture directed by the National Formulary are as follows:

Process A. This process is used for preparing fluidextracts which are made with menstrua of alcohol or with mixtures of alcohol and water, by ordinary percolation.

Carefully mix 1000 Gm. of the ground drug with a sufficient quantity of the prescribed menstruum to render it evenly and distinctly damp. This usually requires from 600 cc. to 800 cc. of menstruum Allow the dampened drug to stand for about 15 minutes, then pack it firmly in a suitable percolator, and pour on sufficient menstruum to saturate the drug and leave a stratum above. When the liquid is about to drop from the percolator, close the lower orifice, cover the percolator, and allow the drug to macerate for about the prescribed period of time. Then proceed with the percolation at the specified rate, adding fresh menstruum as needed until the drug is exhausted of its active principles. Reserve the first 850 cc. of percolate (unless otherwise directed in the formula), recover the alcohol from the percolate subsequently collected, and concentrate the residue to a soft extract at a temperature not exceeding 60°. Dissolve this extract in the reserved percolate, and if no assay is directed, add enough of a mixture of alcohol and water to make the fluidextract measure 1000 cc. and contain the required proportion of C_2H_5OH. Mix thoroughly. If the fluidextract being prepared is to be adjusted to a standard, assay a portion of the reserved percolate in which the soft extract has been dissolved, and dilute the remainder to the volume determined as necessary by calculation from the assay, using a sufficient quantity of an alcohol and water mixture to provide the required proportion of C_2H_5OH. Mix thoroughly.

Process B. This process is used in preparing fluidextracts, portions of the menstrua for which contain, in addition to alcohol, or a mixture of alcohol and water, definite quantities of other components such as an acid or glycerin, the two menstrua being successively employed.

Carefully mix 1000 Gm. of the ground drug with a sufficient quantity of Menstruum I (containing the special ingredient) to render it evenly and distinctly damp. From 600 cc. to 800 cc. of menstruum is usually required. Allow the dampened drug to stand for about 15 minutes, then pack it firmly in a suitable percolator, and pour on the remainder of Menstruum I. When the liquid is about to drop from the percolator, close the lower orifice, cover the percolator, and allow the drug to macerate for about the prescribed period of time. Then proceed with the percolation at the specified rate, and when the first menstruum has disappeared from the surface of the drug, use Menstruum II as needed until the drug is exhausted of its active principles. Reserve the first 850 cc. of percolate, recover the alcohol from the percolate subsequently collected, and evaporate the residue to a soft extract at a temperature not

exceeding 60°. Dissolve this extract in the reserved percolate, and if no assay is directed, add enough of a mixture of alcohol and water to make the fluidextract measure 1000 cc. and contain the required proportion of C_2H_5OH. Mix thoroughly. If the fluidextract being prepared is to be adjusted to a standard, assay a portion of the reserved percolate in which the soft extract has been dissolved, and dilute the remainder to the volume determined as necessary by calculation from the assay, using a sufficient quantity of an alcohol and water mixture to provide the required proportion of C_2H_5OH. Mix thoroughly.

Process C. *Fractional or Divided Percolation.*

This process is used for preparing fluidextracts, the constituents of which are injured by heat, or as an alternative for Process A or B, or in case suitable facilities for distillation and concentration are lacking. When Process C is used to prepare a fluidextract directed to be made by Process B, Menstruum I is used throughout the percolation.

Divide 1000 Gm. of the ground drug into three portions, consisting of 500 Gm., 300 Gm., and 200 Gm. Mix the first portion (500 Gm.) with sufficient of the prescribed menstruum to render it evenly and distinctly damp, transfer the dampened powder to a suitable percolator, the capacity of which should not greatly exceed the bulk of the moist drug when packed firmly, and allow it to stand for about 15 minutes. Then pack the drug in the percolator, saturate it with the menstruum, and allow it to macerate for about the prescribed period of time. Then proceed with the percolation, first collecting and reserving 200 cc. of percolate, and afterwards collecting five successive portions of percolate of 300 cc. each, numbering them in the order in which they are obtained.

Dampen the second portion (300 Gm.) of the drug with a sufficient quantity of the first of the 300-cc. portions of percolate from the preceding lot of drug, and carry out the percolation as just directed for the first lot, except that the five 300-cc. portions of percolate from the first lot of drug shall first be used as menstruum in the order in which they were received, followed, if necessary, by sufficient fresh menstruum to supply the following portions of percolate: reserve the first 300 cc. of percolate, and then collect five successive portions of 200 cc. each, numbering them in the order in which they are collected.

Now dampen the third portion (200 Gm.) of the drug with a sufficient quantity of the first numbered portion of percolate from the second lot of drug, and proceed with the percolation as before, using as the menstruum the 200-cc. portions of percolate from the second lot of drug in the order received. If no assay is directed, collect and reserve 500 cc. of percolate. Mix the three reserved percolates from the three lots of drug to make 1000 cc. of fluidextract.

If the fluidextract being prepared by Process C is to be adjusted to a standard, collect and reserve only 420 cc. of percolate from the third portion of drug instead of the 500 cc. directed above. Mix the three reserved percolates from the three lots of drug, and assay a portion of the mixture. Dilute the remainder to the volume determined as necessary by calculation from the assay, using a sufficient quantity of an alcohol and water mixture to provide the required proportion of C_2H_5OH. Mix thoroughly.

Process D. This process is used for preparing fluidextracts with boiling distilled water as the menstruum, alcohol being added as a preservative to the concentrated percolate.

To 1000 Gm. of the coarsely ground drug add about 3000 cc. of boiling water, mix well, and allow it to macerate in a suitable, covered metallic percolator for 2 hours. Then allow the percolation to proceed at the specified rate, gradually adding boiling water until the drug is exhausted. Evaporate the percolate on a water bath to the volume specified, cool, add the alcohol, and allow the mixture to stand in a stoppered container for several days. Then decant the clear liquid, filter the remainder into the decanted liquid, and wash the residue on the filter with a sufficient quantity of a mixture of alcohol and water to make the fluidextract measure 1000 cc. and contain the required proportion of C_2H_5OH. Mix thoroughly.

Process E. This process is a modification of Process C, and can be used as an alternative for Processes A, B, or C. The percolation is conducted on a column of drug much greater in length than in diameter.

To 1000 Gm. of the ground drug add a sufficient quantity of the prescribed menstruum to render it evenly and distinctly damp. Allow the dampened drug to stand for about 15 minutes, then pack it into a cylindrical percolator or series of such percolators joined together and having a total length sufficient to insure practically complete extraction of the drug by the collection of 1000 cc. of percolate. Saturate the drug at a slow rate by forcing the menstruum through under pressure. Allow the drug to macerate for the prescribed period and proceed with percolation under pressure, at about one half the rate specified for the other type processes, adding fresh menstruum as needed. It is necessary to work out conditions of percolation for each drug. The alcohol content of the percolate from some drugs will exceed the limit specification in the monograph; therefore, in those cases it is desirable to reduce the alcohol content of the menstruum accordingly.

Storage—Preserve Fluidextracts in tight, light-resistant containers and avoid exposure to direct sunlight or to excessive heat.

Freezing Point of Phenothiazine

For the purpose of the National Formulary, the freezing point of a substance is defined as that temperature, approached by cooling a liquid, at which the solid phase is in equilibrium with the liquid phase. If supercooling does not take place, this is the lowest temperature remaining constant for a short period of time. In the presence of supercooling this point is the highest temperature remaining constant for a short period of time during the solidification of a substance from its molten state.

Apparatus Required—1. A pyrex test tube approximately 2.5 × 15 cm. to serve as a melting tube.

2. A larger pyrex test tube, 4 × 17 cm., to serve as an air jacket. The smaller tube is fitted through a cork stopper of such dimension that the tube may be inserted into the larger tube, telescope fashion.

3. Two 600-cc. beakers containing oil or other suitable bath fluid suitable for use at a temperature as high as 215°. The first bath is maintained at 210° ± 5°; the second at 175° ± 2°.

4. A ring stirrer made from a glass rod 3 mm. in diameter bent in such a manner that it fits into the smaller tube and permits free vertical motion around the thermometer.

5. A Type II thermometer, page 756.

6. A watch or clock with a second hand.

Procedure—Fit the smaller test tube through the cork stopper and add about 5 Gm. of phenothiazine. Place in the bath at 210° and stir until the phenothiazine melts, then add successive 5-Gm. portions, melting each one with stirring before adding the next, until about 30 Gm. have been added or until the molten phenothiazine reaches the immersion mark on the thermometer. Place this tube inside the larger tube and immerse in the cooling bath at 175°. Insert the thermometer into the molten phenothiazine and stir continuously with the ring stirrer. After the sample has reached 185° remove the heat from the oil bath, or adjust in such a manner that the bath cools at the approximate rate of 1° per minute. While maintaining constant stirring of the sample, record its temperature every 30 seconds. If supercooling does not occur, the temperature will continue to fall until it reaches the freezing point when it becomes constant. After the temperature has reached the minimum, the recording of 5 consecutive readings establishes the end point. In samples which exhibit supercooling, the end of supercooling will be indicated by a rise in temperature, and the highest reading obtained at the time of this rise is taken as the freezing point. Report as the freezing point the highest reading obtained after supercooling or the constant value obtained during the cooling period, estimated to the nearest 0.1°.

Heavy Metals Test

The Heavy Metals Test is designed to determine the content of those metallic impurities in official substances that are colored by hydrogen sulfide under the conditions of the test. In chemicals the proportion of any such impurity is expressed as the quantity of lead required to produce a color of equal depth in a standard comparison solution, this quantity being stated as the Heavy Metals Limit as equivalent parts of lead per million parts of the substance (by weight).

Reagents

Diluted Acetic Acid—See page 19.

Hydrochloric Acid—All concentrations of hydrochloric acid used in the Heavy Metals Test must be prepared from reagent hydrochloric acid, page 770, and distilled water.

Ammonia T.S.—See page 788.

The heavy metals limits of Ammonia T.S. used in this test shall not exceed 2 parts per million, when determined as directed in the monograph for *Diluted Ammonia Solution*, U. S. P. XIII.

Hydrogen Sulfide T.S.—See page 779.

Stock Solution of Lead Nitrate—Dissolve 0.1598 Gm. of lead nitrate in 100 cc. of distilled water to which has been added 1 cc. of nitric acid, then dilute to 1000 cc. with distilled water. This solution must be prepared and stored in glass containers free from soluble lead salts.

Standard Lead Solution—Dilute 10 cc. of the stock solution of lead nitrate, accurately measured, to 100 cc. with distilled water. This solution must be freshly prepared. Each cc. of this standard lead solution contains the equivalent of 0.01 mg. of lead. When 0.1 cc. of standard lead solution is employed to prepare the standard to be compared with a solution of 1 Gm. of the substance being tested, the comparison solution thus prepared contains the equivalent of 1 part of lead per million parts of the substance tested.

Procedure for Testing Chemicals

Solution A—Introduce into a 50-cc. Nessler tube 2 cc. of diluted acetic acid, and exactly the quantity of standard lead solution containing the lead equivalent of the heavy metals limit specified for the substance to be tested, and make up to 25 cc. with distilled water.

Solution B—This consists of 25 cc. of the solution prepared for this test according to the specific directions in each monograph.

Transfer solutions A and B to similar 50-cc. Nessler tubes, add 10 cc. of hydrogen sulfide T.S. to each tube, mix, allow to stand for 10 minutes, then view downward over a white surface: the color of Solution B is no darker than that of Solution A.

Procedure for Testing Volatile Oils

Shake 10 cc. of the oil with an equal volume of distilled water to which a drop of hydrochloric acid has been added, and pass hydrogen sulfide through the mixture until it is saturated: no darkening in color is produced in either the oil or the water.

Identification Tests—General

Under this heading are placed tests which are frequently referred to in the National Formulary. To conserve space they are grouped here and in the text are referred to by title and page.

These tests are to be used for the identification of official chemicals. They are not intended to be applicable to mixtures of substances unless specific directions are given for such use.

Acetate—When warmed with concentrated sulfuric acid, acetates evolve acetic acid. If acetic acid or an acetate is warmed with sulfuric acid and alcohol, the characteristic odor of ethyl acetate is evolved. With neutral solutions of acetates, ferric chloride T.S. produces a deep red color which is destroyed by the addition of mineral acids.

Aluminum—Solutions of aluminum salts yield with ammonia T.S. a gelatinous white precipitate which is insoluble in an excess of ammonium hydroxide. Sodium hydroxide T.S. or sodium sulfide T.S. produces the same precipitate which dissolves in an excess of either of these reagents.

Ammonium—Ammonium salts are decomposed by the addition of an excess of sodium hydroxide T.S., with the evolution of ammonia, recognizable by its odor and by its alkaline effect upon moistened red litmus paper exposed to the gas. Warming the solution accelerates the decomposition.

Antimony—Solutions of antimonous compounds, strongly acidified with hydrochloric acid, yield with hydrogen sulfide an orange precipitate of antimony sulfide which is insoluble in ammonia T.S., but soluble in ammonium sulfide T.S.

Arsenate—Soluble arsenates yield with silver nitrate T.S. a reddish brown precipitate which is soluble in diluted nitric acid and in ammonia T.S. Soluble arsenates yield a white precipitate with magnesia mixture T.S. This precipitate is soluble in hydrochloric acid, which solution, when heated, yields with hydrogen sulfide a yellow precipitate, soluble in ammonium sulfide T.S.

Arsenite—Neutral solutions of arsenites yield with silver nitrate T.S. a yellow precipitate. The precipitate is soluble in either ammonia T.S. or in diluted nitric acid. Neutral solutions of arsenites yield with cupric sulfate T.S. a green precipi-

tate. When boiled with sodium hydroxide T.S. the precipitate becomes red in color. Solutions of arsenous salts which have been acidified with hydrochloric acid yield a yellow precipitate with hydrogen sulfide. The precipitate is insoluble in hydrochloric acid, but soluble in ammonium carbonate T.S.

Barium—Solutions of barium salts yield a white precipitate with diluted sulfuric acid. This precipitate is insoluble in hydrochloric or nitric acid. Barium salts impart a yellowish green color to a non-luminous flame, appearing blue when viewed through green glass.

Benzoate—In neutral solutions, benzoates yield a salmon-colored precipitate with ferric chloride T.S. In moderately concentrated aqueous solutions, benzoates yield a precipitate of benzoic acid upon acidification with diluted sulfuric acid. This precipitate is readily soluble in ether.

Bicarbonate—(*See Carbonate*).

Bismuth—When dissolved in a slight excess of nitric or hydrochloric acid, bismuth salts yield a white precipitate upon dilution with water. This precipitate is colored brown by hydrogen sulfide, and the resulting compound dissolves in a warm mixture of equal parts of nitric acid and water.

Bisulfite—(*See Sulfite*).

Borate—Solutions of borates, acidified with hydrochloric acid, color turmeric paper brownish red; the color becomes intensified by drying; the color changes to greenish black by moistening with ammonia T.S. When a borate is treated with sulfuric acid, methyl alcohol added, and the mixture ignited, it burns with a green-bordered flame.

Bromate—Sulfurous acid added, dropwise, to a solution of a bromate produces a yellow color, which disappears upon the addition of an excess of sulfurous acid. Bromates, when ignited gently with charcoal, yield bromides which may be recognized by the characteristic reactions.

Bromide—In solutions of bromides, the addition of chlorine T.S., dropwise, liberates bromine which is dissolved by shaking with chloroform, coloring the chloroform red to reddish brown. Silver nitrate T.S. produces in solutions of bromides a yellowish precipitate which is insoluble in nitric acid, and slightly soluble in ammonia T.S.

Cadmium—Neutral, alkaline, or moderately acid solutions of cadmium salts yield a yellow precipitate with hydrogen sulfide. This precipitate is insoluble in alkali hydroxides, alkali sulfides, and in cold diluted acids. It is soluble in cold moderately diluted nitric acid, hot diluted hydrochloric acid, or hot moderately diluted sulfuric acid.

Calcium—In neutral or alkaline solutions of calcium salts, ammonium oxalate T.S. produces a white precipitate. This precipitate is insoluble in acetic acid, but dissolves in hydrochloric acid. Calcium salts moistened with hydrochloric acid impart a transient yellowish red color to a non-luminous flame.

Carbonate—Carbonates or bicarbonates effervesce with acids, yielding a colorless gas, which when passed into calcium hydroxide T.S. produces an immediate white precipitate. A cold aqueous solution of a soluble carbonate is colored red by phenolphthalein T.S., while a similar solution of a bicarbonate remains unchanged or is only slightly colored.

Cerium—When a cerium salt is mixed with about two and one-half times its

weight of lead dioxide, and the mixture boiled with nitric acid, the liquid becomes yellow.

Chlorate—Solutions of chlorates yield no precipitate with silver nitrate T.S. The addition of sulfurous acid to this mixture produces a white precipitate which is insoluble in nitric acid but soluble in ammonia T.S. Upon ignition, chlorates yield chlorides, recognizable by appropriate tests. When concentrated sulfuric acid is added to a dry chlorate, decrepitation occurs and a greenish yellow gas is evolved. *Caution:* Only a small amount of chlorate should be used for this test and extreme caution must be exercised in performing it.

Chloride—Solutions of chlorides yield a white, curdy precipitate with silver nitrate T.S., which is insoluble in nitric acid, but dissolves in a slight excess of ammonia T.S. When testing alkaloidal hydrochlorides, the mixture, after the addition of ammonia, is filtered and the filtrate acidified with nitric acid. Solutions of chlorides when warmed with potassium permanganate and diluted sulfuric acid evolve the characteristic odor of chlorine.

Chromate—Solutions of chromates or dichromates, free from mineral acids, yield with lead acetate T.S. a yellow precipitate, which is insoluble in acetic acid. When a chromate or a dichromate is acidified with diluted sulfuric acid and solution of hydrogen peroxide added, a transient blue color is produced. Upon shaking with ether immediately, the blue color passes into the ether layer.

Citrate—To a solution of 5 cc. of a citrate (1 in 10) add 1 cc. of calcium chloride T.S. and 3 drops of bromothymol blue T.S., and slightly acidify with diluted hydrochloric acid. Add 0.1 *N* sodium hydroxide until the color changes to a clear blue; then boil the solution for 3 minutes, agitating it gently during the heating period: a white, crystalline precipitate appears in the liquid. This precipitate is insoluble in sodium hydroxide T.S., but dissolves in diluted hydrochloric acid.

When to a solution of a citrate, one-tenth its volume of mercuric sulfate T.S. is added, the mixture heated to boiling, then potassium permanganate T.S. added, a white precipitate is produced.

Cobalt—Solutions of cobaltous compounds yield a blue precipitate with sodium hydroxide T.S. This precipitate rapidly changes color, becoming olive-green, but if boiled soon after its formation, it becomes rose-red. Solutions of cobalt salts, when saturated with potassium chloride and treated with potassium nitrite and acetic acid, yield a yellow precipitate.

Copper—Solutions of cupric compounds, acidified with hydrochloric acid, deposit a red film of metallic copper upon a bright untarnished surface of metallic iron. An excess of ammonia T.S., added to a solution of a cupric salt, produces first a bluish precipitate and then a deep blue-colored solution. With potassium ferrocyanide T.S., solutions of cupric salts yield a red precipitate, insoluble in diluted acids.

Cyanide—To 10 cc. of a dilute solution of a cyanide, add 3 drops of freshly prepared ferrous sulfate T.S., 1 cc. of sodium hydroxide T.S., a few drops of ferric chloride T.S., warm, and finally acidify with diluted sulfuric acid; a blue precipitate is produced.

Dichromate—(*See Chromate*).

Ferricyanide—Solutions of ferricyanides yield a blue precipitate with ferrous sulfate T.S. This precipitate is insoluble in diluted hydrochloric acid, but is decomposed by sodium hydroxide T.S.

Ferrocyanide—Solutions of ferrocyanides yield a blue precipitate with ferric

chloride T.S. With cupric sulfate T.S., ferrocyanides yield a red precipitate insoluble in diluted acids.

Glycerophosphate—Solutions of glycerophosphates yield no precipitate in the cold with ammonium molybdate T.S., but upon prolonged boiling a yellow precipitate is formed. Moderately diluted solutions of glycerophosphates, when treated with calcium chloride T.S., remain unaffected in the cold, but on boiling a precipitate is produced. When a glycerophosphate is mixed with an equal weight of powdered potassium bisulfate and gently heated in a test tube over a free flame, the very pungent odor of acrolein is evolved.

Gold—Solutions of auric salts produce with sodium hydroxide T.S. a brown precipitate which is soluble in an excess of the reagent. Solutions of auric salts when treated with stannous chloride T.S. and allowed to stand, slowly form a purple precipitate.

Hypophosphite—When strongly heated, hypophosphites evolve spontaneously inflammable hydrogen phosphide. Hypophosphites in solution yield a white precipitate with mercuric chloride T.S. This precipitate becomes gray when an excess of hypophosphite is present. Solutions of hypophosphites, acidified with sulfuric acid and warmed with copper sulfate T.S., yield a red precipitate.

Iodide—Solutions of iodides, upon the addition of chlorine T.S., dropwise, liberate iodine which colors the solution yellow to red. On shaking with chloroform the latter is colored violet. The iodine thus liberated gives a blue color with starch T.S. Silver nitrate T.S. produces in solutions of iodides a yellow, curdy precipitate which is insoluble in nitric acid and in ammonia T.S.

Iron—Ferrous or ferric compounds in solution yield a black precipitate with ammonium sulfide T.S. This precipitate is dissolved by cold diluted hydrochloric acid with the evolution of hydrogen sulfide.

Ferric Salts—Acid solutions of ferric salts yield a dark blue precipitate with potassium ferrocyanide T.S. With an excess of sodium hydroxide T.S., a reddish brown precipitate is formed. Solutions of ferric salts produce with ammonium thiocyanate T.S. a deep red color which is not destroyed by diluted mineral acids.

Ferrous Salts—Solutions of ferrous salts yield a dark blue precipitate with potassium ferricyanide T.S. This precipitate is insoluble in diluted hydrochloric acid, but is decomposed by sodium hydroxide T.S. Solutions of ferrous salts yield with sodium hydroxide T.S. a greenish white precipitate, the color rapidly changing to green and then to brown on shaking.

Lactate—Solutions of lactates, when acidified with sulfuric acid, potassium permanganate T.S. added, and the mixture heated, evolve acetaldehyde which is recognizable by its odor.

Lead—Solutions of lead salts yield with diluted sulfuric acid a white precipitate which is insoluble in diluted hydrochloric or nitric acid, but completely soluble in warm sodium hydroxide T.S. and in ammonium acetate solution. With potassium chromate T.S. solutions of lead salts, free or nearly free from mineral acids, yield a yellow precipitate which is insoluble in acetic acid but soluble in sodium hydroxide T.S.

Lithium—Moderately concentrated solutions of lithium salts, made alkaline with sodium hydroxide, yield with sodium carbonate T.S. a white precipitate on boiling. The precipitate is soluble in ammonium chloride T.S. Lithium salts moistened with hydrochloric acid impart an intense crimson color to a non-luminous flame. Solu-

tions of lithium salts are not precipitated by diluted sulfuric acid or soluble sulfates (difference from *strontium*).

Magnesium—Solutions of magnesium salts in the presence of ammonium chloride yield no precipitate with ammonium carbonate T.S., but on the subsequent addition of sodium phosphate T.S. a white crystalline precipitate is produced which is insoluble in ammonia T.S.

Manganese—Solutions of manganous salts yield a salmon-colored precipitate with ammonium sulfide T.S. This precipitate is dissolved by acetic acid.

Mercury—Solutions of mercury salts free from excess of nitric acid, when applied to bright copper foil, yield a deposit, which, upon rubbing, becomes bright and silvery in appearance. With hydrogen sulfide, solutions of mercury compounds yield a black precipitate which is insoluble in ammonium sulfide T.S., or in boiling diluted nitric acid.

Mercuric Salts—Solutions of mercuric salts yield a yellow precipitate with sodium hydroxide T.S. They yield also, in neutral solutions, a scarlet precipitate with potassium iodide T.S. very soluble in an excess of the reagent.

Mercurous Salts—Mercurous compounds are decomposed, producing a black color, by sodium hydroxide T.S. Solutions of mercurous salts yield with hydrochloric acid a white precipitate which is blackened by ammonia T.S. With potassium iodide T.S., a yellow precipitate is produced which may become green upon standing.

Molybdate—When a dry molybdenum compound is covered with sulfuric acid and heated until the acid is almost completely removed a blue residue remains. Solutions of molybdates acidified with nitric acid, yield a yellow precipitate on warming with a small amount of sodium phosphate T.S. This precipitate is soluble in aqueous sodium hydroxide solutions and in ammonia T.S.

Nitrate—When a solution of a nitrate is mixed with an equal volume of sulfuric acid, the mixture cooled, and a solution of ferrous sulfate superimposed, a brown color is produced at the junction of the two liquids. When a nitrate is heated with sulfuric acid and metallic copper, brownish red fumes are evolved. Nitrates do not decolorize acidified potassium permanganate T.S. (difference from *nitrites*).

Nitrite—When treated with diluted mineral acids or with acetic acid, nitrites yield brownish red fumes. On adding a few drops of potassium iodide T.S. and a few drops of diluted sulfuric acid to a solution of a nitrite, iodine is liberated which colors starch T.S. blue.

Nitroferricyanide (*Nitroprusside*)—The addition of a dilute solution of a soluble sulfide to a solution of a nitroferricyanide produces a transient purple to deep violet color; the intensity and shade of color depend upon the concentration of the solutions.

Oxalate—Neutral or alkaline solutions of oxalates yield a white precipitate with calcium chloride T.S. This precipitate is insoluble in acetic acid but is dissolved by hydrochloric acid. Hot acidified solutions of oxalates decolorize potassium permanganate T.S.

Palladium—Solutions of palladous salts yield with ammonia T.S. a salmon-colored precipitate which is soluble in an excess of the reagent. Hydrochloric acid added to this solution produces a yellow precipitate. Solutions of palladous salts yield with potassium iodide T.S. a black precipitate.

Permanganate—Solutions of permanganates acidified with sulfuric acid are decolorized by hydrogen peroxide solution and by sodium bisulfite T.S., in the cold, or by oxalic acid T.S. in hot solution.

Peroxide—Solutions of peroxides slightly acidified with sulfuric acid yield a deep blue color upon the addition of potassium dichromate T.S. On shaking the mixture with an equal volume of ether and allowing the liquids to separate, the blue color will be found in the superimposed ether layer.

Phosphate—Neutral solutions of orthophosphates yield with silver nitrate T.S. a yellow precipitate, which is soluble in diluted nitric acid or in ammonia T.S. With ammonium molybdate T.S., a yellow precipitate is produced which is soluble in ammonia T.S.

Phosphotungstate—(*See Tungstate*).

Potassium—Potassium compounds impart a violet color to a non-luminous flame, but the presence of small quantities of sodium masks the color. In neutral, concentrated or moderately concentrated solutions of potassium salts (depending upon the solubility and the potassium content of the salt), sodium bitartrate T.S. produces a white crystalline precipitate which is soluble in ammonia T.S., alkali hydroxides or carbonates. The formation of the precipitate, which is usually slow, is accelerated by stirring or rubbing the inside of the test tube with a glass rod. The addition of a little glacial acetic acid or alcohol also promotes the formation of the precipitate.

Salicylate—In moderately dilute solutions of salicylates, ferric chloride T.S. produces a violet color. The addition of acids to moderately concentrated solutions of salicylates produces a white crystalline precipitate of salicylic acid.

Selenate—Solutions of selenates yield with stannous chloride T.S. a red precipitate which redissolves upon boiling.

Selenite—Solutions of selenites yield a red precipitate with sodium bisulfite T.S.

Silver—Solutions of silver salts yield with hydrochloric acid a white, curdy precipitate, which is insoluble in nitric acid but is easily soluble in ammonia T.S. To a solution of a silver salt add ammonia T.S. and a small quantity of formaldehyde solution; upon warming, a mirror of metallic silver is deposited upon the sides of the test tube.

Sodium—Sodium compounds after conversion to chloride or nitrate yield with cobalt-uranyl acetate T.S. a golden yellow precipitate, which forms after several minutes agitation. Sodium compounds impart an intense yellow color to a non-luminous flame.

Strontium—Calcium sulfate T.S. produces a white precipitate with solutions of strontium salts. Strontium compounds, moistened with hydrochloric acid, impart a crimson color to a non-luminous flame.

Sulfate—Solutions of sulfates yield with barium chloride T.S. a white precipitate, which is insoluble in hydrochloric or nitric acid. With lead acetate T.S. sulfates yield a white precipitate soluble in ammonium acetate solution. Hydrochloric acid produces no precipitate when added to solutions of sulfates (difference from *thiosulfates*).

Sulfide—When treated with an acid, many sulfides yield hydrogen sulfide, recognizable by its characteristic, pungent odor.

Sulfite—When treated with hydrochloric acid, sulfites and bisulfites yield colorless sulfur dioxide, recognizable by its pungent odor which is the same as the odor of burning sulfur. This gas blackens filter paper moistened with mercurous nitrate T.S.

Tartrate—With neutral solutions of tartrates, silver nitrate T.S. produces a white precipitate. Upon dissolving this precipitate in just sufficient ammonia T.S. and warming, metallic silver is deposited on the side of the test tube, forming a mirror.

On adding to an aqueous solution of tartaric acid or of a tartrate, acidified with a few drops of acetic acid, a drop of ferrous sulfate T.S., then a few drops of hydrogen peroxide T.S. and finally an excess of sodium hydroxide T.S., a purplish violet color is produced.

Thiocyanate—Solutions of thiocyanates yield a red color with ferric chloride T.S. which is not destroyed by moderately concentrated mineral acids.

Thiosulfate—Solutions of thiosulfates yield with hydrochloric acid a white precipitate which soon turns yellow, sulfur dioxide is liberated, recognizable by its odor. The addition of ferric chloride T.S. to solutions of thiosulfates produces a dark violet color which quickly disappears.

Tin—When metallic zinc is placed in a solution of a salt of tin acidified with hydrochloric acid, the tin is precipitated in metallic form. When dissolved in hydrochloric acid, tin produces a white or gray precipitate with mercury bichloride T.S.

Stannic—Solutions of stannic compounds yield with hydrogen sulfide a yellow precipitate, insoluble in diluted hydrochloric acid but soluble in colorless solutions of alkali sulfides.

Stannous—Solutions of stannous salts yield with mercury bichloride T.S. a white or gray precipitate, and with hydrogen sulfide, a brownish black precipitate.

Tungstate—Solutions of tungstates or phosphotungstates yield with stannous chloride T.S. a yellow precipitate, which, upon heating with hydrochloric acid, changes to blue. Solutions of tungstates, when evaporated to dryness with hydrochloric acid, leave a yellow residue which is soluble in ammonia T.S.

Vanadate—Solutions of vanadates yield with ammonium sulfide T.S. a brown precipitate, moderately soluble in an excess of the reagent to produce a reddish brown solution.

Zinc—In the presence of sodium acetate, zinc salts yield a white precipitate with hydrogen sulfide. This precipitate is insoluble in acetic acid but is dissolved by diluted hydrochloric acid. Ammonium sulfide produces a similar precipitate in neutral or alkaline solutions. Zinc salts in solution yield with potassium ferrocyanide T.S. a white precipitate which is insoluble in diluted hydrochloric acid.

Infusions

Caution: The drug concentration of an infusion representing a potent drug should be specified by the physician.

An infusion may be dispensed only if it has been recently prepared.

If the drug concentration of an infusion is not otherwise specified, it is to be prepared according to the following general formula:

The Drug, coarsely comminuted	50 Gm.
Distilled Water, a sufficient quantity, To make	1000 cc.

Moisten the drug in a suitable vessel, preferably of earthenware and provided with a cover, with 50 cc. of cold distilled water, and allow it to stand during 15 minutes. Then add 900 cc. of boiling distilled water, cover the vessel tightly, and allow it to macerate during 30 minutes. Then strain the mixture, and pass enough distilled water through the strainer to make the Infusion measure 1000 cc. If the activity of

the Infusion is affected by the temperature of boiling water, cold distilled water should be used.

Lead Limit Test

The lead limit test is designed to determine the limit of lead as an impurity in some official substances to which the official heavy metals test cannot be applied or for other reasons where the application of this test appears to be expedient.

NOTE: All glassware used in the preparation and storage of reagents and in carrying out the test must be made of pyrex glass or its equivalent. Before use it must be carefully cleaned and finally rinsed with nitric acid (1 in 2) followed by distilled water.

Reagents

Ammonium Hydroxide—Stronger ammonia water, reagent grade, is used for the test. If contaminated with lead it must be rendered substantially lead-free by distillation of the ammonia gas into ice cold distilled water.

Ammonium Citrate Solution—Dissolve 40 Gm. of reagent citric acid in 100 cc. of distilled water and make alkaline to phenol red with ammonium hydroxide. The solution is deleaded by shaking with small portions of dithizone solution until the dithizone retains its original green color.

Potassium Cyanide Solution—Dissolve 50 Gm. of potassium cyanide in sufficient distilled water to make 100 cc. Remove the lead by shaking with portions of the extraction dithizone solution. Part of the dithizone remains in the aqueous phase but can be removed, if desired, by washing with chloroform. The strong potassium cyanide solution is then diluted to a concentration of 10 Gm. in 100 cc.

Hydroxylamine Hydrochloride Solution—Dissolve 20 Gm. of hydroxylamine hydrochloride in sufficient distilled water to make about 65 cc. and add a few drops of thymol blue *p*H indicator solution. Add ammonium hydroxide until a yellow color appears. An approximately 4 per cent solution of sodium diethyldithiocarbamate is added in sufficient quantity to combine with all the lead and to leave an excess reagent. After a few minutes completely extract with chloroform. This point is reached when a portion of the chloroform extract is shaken with a dilute solution of a copper salt and no yellow color appears in the chloroform layer. Hydrochloric acid is added to the solution until the indicator turns pink and distilled water is added to make the final volume 100 cc.

Dithizone Extraction Solution—Dissolve 30 mg. of dithizone in 1000 cc. of chloroform and add a few cc. of alcohol. The amount of dithizone to be used for one day is shaken with about 100 cc. of 1 per cent nitric acid just before use. Store the solution in a refrigerator.

Standard Dithizone Solution—This solution is one-third the strength of the dithizone extraction solution (10 mg. in 1000 cc.). It is kept in a glass-stoppered pyrex bottle which is wrapped in heavy paper or kept in a wooden box and stored in the refrigerator.

Ammonium-Cyanide Mixture—To 20 Gm. of potassium cyanide add 150 cc. of ammonium hydroxide (specific gravity 0.9) or its equivalent and make to 1000 cc. with distilled water.

Nitric Acid Solution, 1 per cent—Dissolve 10 cc. of nitric acid in enough distilled water to make a liter.

Stock Lead Solution—Dissolve 0.1598 Gm. of lead nitrate in 1000 cc. of 1 per cent nitric acid solution.

Standard Lead Solution—Dilute 10 cc. of the stock lead solution to 1000 cc. with 1 per cent nitric acid solution. Each cc. of standard lead solution contains 1 microgram (0.001 mg.) of lead.

Procedure

To the prepared sample in a separatory funnel add the proper quantities of ammonium citrate solution, potassium cyanide solution and hydroxylamine hydrochloride solution as indicated in the monograph. Add 3 drops of phenol red T.S. and make alkaline with ammonium hydroxide. Immediately extract the solution with 5-cc. portions of the dithizone extraction solution, draining off each extract into another separatory funnel until the lead is completely removed, and the dithizone retains its original green color. If it is necessary to release the pressure during extraction procedures, do not open the stopcock since portions of the solution of the sample may be blown into the stem and become a source of contamination in future determinations. Remove the lead from the combined chloroform extracts by shaking the mixture with 20 cc. of 1 per cent nitric acid and discard the chloroform layer.

To the 1 per cent nitric acid solution containing the lead, accurately add 4 cc. of ammonium-cyanide mixture and 5 cc. of standard dithizone solution and immediately shake for half a minute. Drain the dithizone extract into a clean, dry test tube and observe the color over a white background. This color is compared, in the absence of direct sunlight, with a standard containing exactly 5 cc. of the *standard lead solution* which is prepared in the same manner as the substance being analyzed. The color of the dithizone extract from the sample being tested is no deeper shade of violet than the dithizone extract obtained from 5 cc. of the *standard lead solution* containing 5 micrograms of lead.

If the color of the dithizone extract from the sample being tested is of a deeper shade of violet or pink in color, an amount of lead in excess of the control is indicated and a smaller aliquot should be taken and the test repeated, if desirable, to ascertain the quantity of lead present.

Loss on Drying for Chemicals

Unless otherwise directed in the monograph, 1 to 2 Gm. of the properly mixed sample, accurately weighed, is used for the test. If the chemical is in the form of large crystals, reduce it to particle size of not larger than about 2 mm. by quick crushing. Weigh the chemical directly in a tared, glass-stoppered, shallow weighing bottle, which has been previously dried together with its closure for 30 minutes at the same temperature or in the same apparatus as the chemical is to be dried. The diameter of the weighing bottle should be such that the layer of the chemical is not thicker than about 5 mm. For bulky substances, the layer should not be thicker than about 10 mm. After weighing, distribute the chemical as evenly as practicable over the bottom of the bottle by gentle sidewise shaking. Then place the bottle in the drying chamber, remove the cover and place it beside the bottle. Close the bottle before removing it from the drying chamber for re-weighing, and allow it to return to room temperature before weighing.

If the chemical melts at a lower temperature than that designated for the determination of *Loss on drying* expose the bottle with its contents for 1 to 2 hours to a

temperature 5° to 10° below the melting temperature, then dry at the designated temperature.

When the drying is to be done over sulfuric acid, the acid in the desiccator should be renewed if it has been in use for longer than 10 days.

Melting Points

For the purpose of the National Formulary the melting points or ranges of solids are defined as those points or ranges of temperature at which or within which they are observed to melt when treated as directed in the following tests:

For the determination of their melting points, National Formulary solids are divided into two classes:

CLASS I—Materials readily reduced to a powder.

CLASS II—Materials not readily reduced to a powder, such as fats, fatty acids, paraffin, and waxes.

Apparatus Required:

1. *A round-bottom glass tube* of from 30 mm. to 40 mm. internal diameter and about 12 cm. long, flaring slightly at the top like an ordinary test tube. The walls of the tube are not more than 1.5 mm. thick at any point. The tube is made of glass which will withstand heating over an open Bunsen flame.

2. A stirring device, which may be made from a glass rod of about 2 mm. external diameter. It is made circular at the end to fit the container and is bent twice at right angles above the top of the container to bring its outer end within reach for convenient manipulation.

Any other melting point apparatus or method, capable of equal accuracy, may be used.

3. *A standard thermometer* of Type I or Type II, page 756, covering the desired range of temperature.

4. A capillary glass tube about 9 cm. long and from 0.8 to 1.2 mm. internal diameter, the walls from 0.2 to 0.3 mm. thick and the tube closed at one end.

Procedure for Testing Materials of Class I: Reduce the sample to a very fine powder, and, unless otherwise directed, render it anhydrous when it contains water of hydration by drying it at the temperature specified in the text, or, when the substance contains no water of hydration, by drying it for 24 hours over sulfuric acid.

Select a bath suitable for the limiting temperature to be determined, and fill the container to a depth which will permit immersion of the thermometer to the specified depth, with the bottom of the bulb from 2 to 3 cm. above the bottom of the container.

Charge the capillary glass tube with sufficient of the dry powder to form a column in the bottom of the tube from 2.5 to 3.5 mm. high when packed down as closely as possible by moderate tapping on a solid surface. Attach the capillary tube to the thermometer by wetting both with the liquid of the bath or by means of a piece of platinum wire and adjust its height so that the material in the capillary is beside the thermometer bulb.

Heat the bath by means of a free Bunsen flame until a temperature approximately 30° below the expected melting point is reached, introduce the sample, continue heating at a temperature increment of approximately 3° per minute until a temperature 3° below the expected melting point is attained, then carefully regulate the rise in temperature to about 1° per minute until the melting is complete. The tem-

perature at which the material becomes liquid throughout is the end of melting. The bath must be stirred constantly throughout the heating.

NOTE—Suggestions regarding liquids to be used for baths in testing materials belonging to Class I:

For temperatures up to 200°, a purified, concentrated sulfuric acid is a suitable bath. For higher temperatures, up to about 350°, a pure grade of cottonseed oil (almost colorless) will serve for a limited number of determinations. Other substitutes for sulfuric acid for use at high temperatures are: (1) a pure grade of paraffin which has been freshly distilled; (2) clean, white, hydrogenated vegetable oil. A very satisfactory bath is prepared by dissolving, with aid of heat, 30 parts of potassium sulfate with 70 parts of sulfuric acid, stirring constantly until the potassium sulfate is dissolved.

Procedure for Testing Materials of Class II: Carefully melt the material to be tested at as low a temperature as possible and draw it into a capillary tube, which is open at both ends, to a depth of about 10 mm. Cool the charged tube at 10°, or lower, for 24 hours, or in contact with ice for at least 2 hours. Then attach the tube to a standard thermometer by means of a rubber band, adjust and heat it in a water bath, as directed under procedure for testing materials in Class I, except that, within 5 degrees of the assumed melting temperature, the rate of rise of temperature is carefully regulated to about 0.5° per minute.

The temperature at which the material is observed to rise in the capillary tube is taken as the melting point.

Melting Point for Paraffin—A standard test tube approximately 25 mm. in diameter and 100 mm. in length is used as the sample container. The test thermometer is supported centrally in the test tube by means of a cork. A wire stirrer, about 30 cm. in length having a loop formed at one end in such a manner that the loop lies in a horizontal plane when the rest of the wire is in a vertical position, passes through an opening at one side of the center of the test tube cork.

The sample container is supported, by means of a cork, in a suitable water-tight cylinder about 50 mm. in inside diameter by 11 cm. in length. The cylinder in turn is supported in a suitable water bath sufficient to provide at least a 37-mm. layer of water surrounding the sides and bottom of the cylinder.

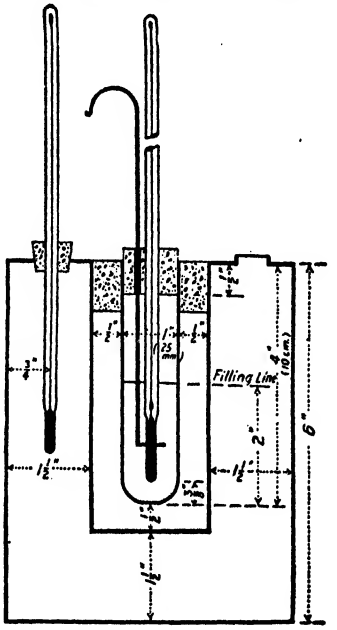
Thermometers—The thermometers shall be of the etched stem type of suitable temperature range. The bulbs shall be of normal Corning or equally suitable thermometer glass and the stems shall be of suitable thermometer tubing with enamel backs. Good quality chemical thermometers of the partial immersion type (not to exceed 76 mm. immersion) shall be used. The subdivisions shall be sufficiently spaced to permit temperature readings to be estimated to 0.2°. The graduation marks shall be clean-cut and fine. The error at any point in the scale shall not exceed 0.2°.

Procedure—The sample is melted and poured into the test tube to a height of 50 mm. The temperature of the melted sample shall not be more than 20° above its expected melting point.

The apparatus is assembled (see Figure) with the thermometer bulb immersed halfway between the top and bottom of the sample in the test tube. The water bath is filled to within 12 mm. of the top with water at a temperature 4° to 5° below the approximate melting point of the sample.

When the sample has cooled to a temperature 5° above its approximate melting

point the water bath is adjusted to a temperature 7° to 8° below the approximate melting point. The sample is stirred continuously during the remainder of the test, the stirring loop being moved up and down throughout the entire length of the test tube in a steady motion at the rate of 20 complete cycles per minute. The melting point thermometer reading, estimated to 0.2°, is observed and recorded every 30 seconds. The temperature of the sample falls gradually at first, then becomes almost constant, or rises slightly and then becomes almost constant, and again falls gradually. Some substances deviate from this normal cycle of temperature changes due to the occurrence of pronounced supercooling. If this occurs, the test should be repeated, introducing small particles into the material under test in solid form at 1° intervals when the temperature approaches the expected melting point.



The melting point thermometer reading, estimated to 0.2°, is observed and recorded every 30 seconds for at least 3 minutes after the temperature again begins to fall after remaining almost constant. The average of the first 4 consecutive readings that lie within a range of 0.2° is taken as the melting point.

NOTE: For substances melting below room temperature a bath temperature 10° to 15° below the expected melting point is maintained throughout the test.

Nitrite Assay

Apparatus—Fit a 300-cc. Erlenmeyer flask with a 2-hole rubber stopper. Through one hole pass an aeration tube leading to the bottom of the flask and tapered to an internal diameter of about 1 mm. at the lower end. Through the other hole pass a glass tube, of at least 6 mm. internal diameter, which will extend about 1 cm. above and below the stopper. Connect the aeration tube with a cylinder or generator of air-free carbon dioxide.

Method—Place 10 Gm. of potassium iodide in the flask and add 40 cc. of boiling, deaerated distilled water. Insert the stopper in the flask and pass a stream of carbon dioxide through the flask at a rate of 5 bubbles per second until the solution has cooled to room temperature. Add 10 cc. of dilute hydrochloric acid (1 in 2) through the outlet tube, and continue the stream of carbon dioxide for at least 5 minutes. If any iodine is liberated, as shown by the appearance of a yellow color, cautiously add 0.1 *N* sodium thiosulfate from a burette, through the outlet tube, until the color is just discharged.

Add the directed volume of the nitrite solution with a transfer pipette, passing the pipette through the outlet tube until the tip is just above the surface of the potassium iodide solution. Touch the tip of the pipette to the outlet tube to remove

adhering nitrite solution, then rinse the outlet tube with a fine jet of aldehyde-free alcohol from a wash bottle. At once titrate the liberated iodine with 0.1 *N* sodium thiosulfate, introducing the tip of the burette through the outlet tube. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.01135 Gm. of glyceryl trinitrate, $C_3H_5(NO_3)_3$.

Nitrite Assay, Nitrometer Method

The content of $C_2H_5NO_2$ in Ethyl Nitrite Spirit is to be determined by the volume of gas (nitric oxide, NO) given off during a definite reaction in a nitrometer prepared as follows: The stopcock of the measuring tube of the nitrometer having been opened and the open equilibrium tube having been raised to a higher level, pour into the latter a saturated solution of sodium chloride, until the measuring tube, including the bore of the stopcock, is completely filled. Then close the latter and adjust the equilibrium tube at a low level. Having ascertained that the closed stopcock is air-tight, and having, if necessary, wiped out the funnel top of the nitrometer, introduce into it exactly 10 cc. of the alcoholic solution of the nitrite, and allow this to flow slowly into the measuring tube, being careful not to admit any air. Rinse the funnel top with 5 cc. of alcohol introduced in the same manner, and follow this with 10 cc. potassium iodide T.S., and then with 5 cc. of diluted sulfuric acid. When the reaction moderates, remove the measuring tube from its clamp, and, being careful to hold it constantly so that the liquid contained therein stands at a higher level than that in the equilibrium tube, shake its contents without permitting any gas to pass into the equilibrium tube. When the reaction has completely ceased and the volume of gas has become constant, which requires from 30 to 60 minutes, restore the tube to its clamp and allow the apparatus and contents to acquire the ordinary temperature of the room which is assumed to be close to 25°. Then adjust the two tubes so that the liquid columns are at exactly the same level. Then correct the volume of gas by adding $^1/_{273}$ of the volume for each degree of temperature below 25° or subtracting $^1/_{273}$ of the volume for each degree above 25° and by adding $^1/_{760}$ of the volume for each mm. pressure above 760 mm. or subtracting $^1/_{760}$ of volume for each mm. of pressure below 760 mm. One cc. of nitric oxide, NO, is the equivalent of 0.00307 Gm. of Ethyl Nitrite, $C_2H_5NO_2$, at 25° and 760 mm.

Nitrogen (Total) by the Kjeldahl Method (Method I)

Nitrates and Nitrites Absent—Place about 1 Gm. of the substance, accurately weighed, in a 500-cc. Kjeldahl flask of hard glass. The material to be tested, if solid or semi-solid, may be wrapped in a sheet of nitrogen-free filter paper for convenience in transferring it to the flask. Add 10 Gm. of powdered potassium sulfate or anhydrous sodium sulfate, 0.5 Gm. of powdered cupric sulfate, or 0.3 Gm. of selenium, and 20 cc. of sulfuric acid. Incline the flask at an angle of about 45° and gently heat the mixture, keeping the temperature below the boiling point of the mixture until frothing has ceased. Increase the heat until the acid boils briskly, and continue the heating until the solution has been clear green in color for 30 minutes. Allow the mixture to cool, add 150 cc. of distilled water, thoroughly mix the contents of the flask, and cool again. Add cautiously 100 cc. of a 30 per cent aqueous solution of sodium hydroxide, added so as to cause the solution to flow down the inner side of the flask to form a layer under the acid solution. Add a few pieces of granulated zinc,

connect the flask, by means of a Kjeldahl connecting bulb, with a condenser, the delivery tube from which dips beneath the surface of a mixture of 30 cc. of 0.5 *N* hydrochloric or sulfuric acid and 25 cc. of distilled water contained in an Erlenmeyer flask or a wide-mouth bottle of about 500 cc. capacity. Mix the contents of the Kjeldahl flask by gentle rotation, and distil until about two-thirds of the contents of the flask has distilled over. Add about 3 drops of methyl red T.S. to the contents of the receiving flask and determine the excess of acid by titration with 0.5 *N* sodium hydroxide. Run a blank test and make necessary corrections. Each cc. of 0.5 *N* acid consumed is equivalent to 0.007004 Gm. of nitrogen.

When the nitrogen content of the substance is known to be low, the 0.5 *N* hydrochloric or sulfuric acid may be replaced by 0.1 *N* acid and 0.1 *N* alkali should then be used in titrating the excess of acid. One cc. of 0.1 *N* hydrochloric or sulfuric acid is equivalent to 0.0014008 Gm. of nitrogen.

With Nitrates Present—Place a quantity of the substance, accurately weighed, corresponding to about 0.15 Gm. of nitrogen, in a 500-cc. Kjeldahl flask of hard glass, and add thereto 25 cc. of sulfuric acid in which 1 Gm. of salicylic acid has previously been dissolved. Mix the contents of the flask thoroughly, and allow the mixture to stand for 30 minutes with frequent shaking. Add to the mixture 5 Gm. of powdered sodium thiosulfate and again mix thoroughly, then add 0.5 Gm. of powdered cupric sulfate, or 0.3 Gm. of selenium, and proceed as directed previously for *Nitrates and Nitrites Absent*, beginning with "Incline the flask at an angle of about 45°."

When the nitrogen content of the substance is known to exceed 10 per cent, from 0.5 to 1.0 Gm. of benzoic acid may be added, prior to digestion, to facilitate the decomposition of the substance.

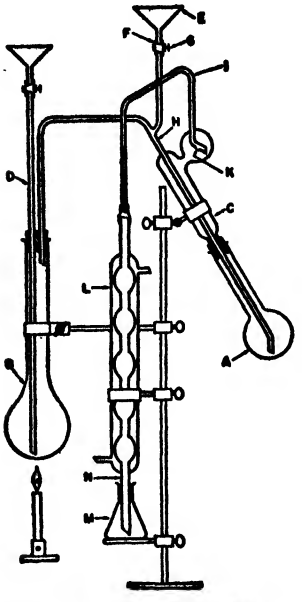
NOTE: There are certain alkaloids and other nitrogen-containing organic compounds that will not yield all of their nitrogen to digestion with sulfuric acid, and this method, therefore, cannot be used for the determination of nitrogen in all organic compounds.

Nitrogen (Total) by the Semi-Micro Kjeldahl Method (Method II)

Apparatus—The apparatus (see illustration) should be constructed throughout of glass of the resistance type. The digestion and distillation flask (*A*) is a 200-cc. round-bottom boiling flask, with a neck approximately 120 mm. long. The steam generator (*B*) is a 1000-cc. Kjeldahl flask. The distillation head (*C*) serves as a spray trap and as a means for the introduction of alkali and of steam into flask *A*. The tube (*D*), which is fitted with a funnel at its top, serves as a safety valve for the flask *B* and allows replenishment of the supply of water. The funnel (*E*) is attached by rubber tubing (*F*), closed by the pinch cock (*G*), to the steam tube (*H*), and permits the addition of alkali to flask *A*. The delivery tube (*I*) is pierced with a hole at the point *K* to avoid clogging by condensate. The condenser (*L*) has a jacket 30 to 40 cm. long and is so arranged that the bottom of the condensing tube (*N*) dips beneath the surface of the solution in the absorption flask (*M*), which has a capacity of 250 to 300 cc. The end of the condensing tube is beveled. When the distillation apparatus is permanently assembled, the distillation head with its accessory tubes may be lagged with a paste of asbestos and magnesia. The flask (*A*) may also be shielded from the air by cloth or asbestos paper during the distillation.

The rubber stopper used for attaching the digestion flask to the distillation

apparatus should be lubricated with glycerin. All rubber used in the apparatus should be boiled for 10 minutes in approximately 1 *N* sodium hydroxide and thoroughly washed with distilled water before its first use.



Semi-Micro Kjeldahl Apparatus

The steam generator (*B*) is filled with distilled water to which has been added a few drops of sulfuric acid. Fragments of pumice stone should be placed in the generator to prevent bumping. Other anti-bumping devices may be employed if desired. The apparatus should be steamed out, with the digestion flask (*A*) containing 30 cc. of an aqueous solution of sodium hydroxide (4 in 10), before beginning a series of analyses. Place in the absorption flask (*M*) 15 cc. of an aqueous solution of boric acid (1 in 25), 3 drops of methyl red T.S., and sufficient distilled water to cover the open end of the condensing tube (*N*). Collect from 80 to 100 cc. of distillate, and titrate with 0.01 *N* sulfuric acid to obtain the correction factor to be applied to each test.

The absorption flasks should be reserved for this purpose, and after use should be thoroughly rinsed with distilled water, stoppered tightly, and set aside to await subsequent use.

Method—Place in the digestion flask (*A*) an accurately weighed or measured quantity of the material, using a quantity thought to contain from 2 to 3 mg. of nitrogen. Add 1 Gm. of a powdered mixture of 10 parts of potassium sulfate and 1 part of cupric sulfate, or 0.6 part of selenium, and finally wash down any adhering material from the neck of the flask with a fine jet of distilled water. Add 7 cc. of sulfuric acid, allowing it to rinse down the wall of the flask, then, while swirling the flask, add 1 cc. of 30 per cent hydrogen peroxide, adding it cautiously down the side of the flask.

Heat the flask over a free flame or an electric heater until the solution has a clear blue color and the sides of the flask are free from carbonaceous material. (Do not add hydrogen peroxide during the digestion.) Cautiously add to the digestion mixture 20 cc. of distilled water, cool the solution, and connect the flask to the distillation apparatus. Add through the funnel (*E*) 30 cc. of an aqueous solution of sodium hydroxide (4 in 10), rinse the funnel with 10 cc. of distilled water, tightly close clamp (*G*), and begin the distillation with steam at once. Receive the distillate in 15 cc. of an aqueous solution of boric acid (1 in 25), to which have been added 3 drops of methyl red T.S., and sufficient distilled water to cover the end of the condensing tube. Continue the distillation until the distillate measures from 80 to 100 cc. Remove the absorption flask, rinsing the end of the condensing tube with a small quantity of distilled water, and titrate the distillate with 0.01 *N* sulfuric acid.

NOTE: If a quantity of material containing greater amounts of nitrogen is taken, 0.02 *N* or 0.1 *N* sulfuric acid may be employed in the titration, using such a normality of acid that at least 15 cc. will be required for the titration. If the total dry weight

of material taken is greater than 0.1 Gm., the quantities of sulfuric acid and of sodium hydroxide should be increased proportionately.

Optical Rotation

In a ray of *ordinary light* the vibrations are transverse, that is, they take place in a plane at right angles to the direction of propagation, but the vibration direction is constantly changing. In a ray of *plane polarized light*, commonly designated as *polarized light*, the vibrations are also transverse, but they take place in only one direction.

Polarized light is used in the polarizing microscope and the polariscope, frequently termed a polarimeter. The type of polariscope that is used for determining the percentage of sucrose in solution is called a saccharimeter. These instruments are very serviceable in the determination of the optical properties of solid and liquid substances, the polarizing microscope being used more often for testing solid substances, while the polariscope is primarily adapted for liquids. The polariscope is primarily employed to study liquids, or solutions of solid substances, that rotate the plane of polarization. Such substances are called optically active. If the rotation of the plane of polarization is to the right (as viewed in the direction of propagation) the substance is designated as *dextrorotatory*, and to the left as *lævorotatory*.

The extent of the optical activity of any substance is measured in degrees of rotation, and the instrument used for the determination is generally called a polariscope. The determination of the angle of rotation and the character of rotation, that is, to the right or left, is of importance in ascertaining the identity or purity of the material under consideration. Among the materials recognized in the National Formulary there are a number, particularly certain volatile oils and related bodies, for which the determination of the optical activity is of great importance. In some cases the proof of optical inactivity is also very significant.

The property of optical activity is inherently related to the chemical constitution of the substance possessing the property. A knowledge of the extent and character of the optical activity of a specimen may constitute important evidence as to its purity or its concentration in a solution, the other components of which are optically inactive.

Polarimeters are so designed that the angle of rotation may be read to a fraction of a degree. Saccharimeters are provided with a scale that permits the percentage of sucrose in solution to be read directly. The field of vision in these instruments is one of the *penumbral* or *half-shadow* type, that is, the halves of the field may be unequally illuminated, the reading being taken at the point of equal shadow.

Polarimeters and saccharimeters should be used in a dark room, and the determinations made with monochromatic light, unless otherwise directed. There are many methods and devices for the production of monochromatic light, but one of the simplest methods is to introduce into the non-luminous flame of a Bunsen burner a small quantity of sodium chloride on a loop of platinum wire. A monochromatic light of more definite characteristics may be obtained by means of a sodium vapor lamp. The monochromatic light thus obtained corresponds to the D line of the solar spectrum.

The following factors are employed for converting readings of a saccharimeter into angular degree readings of a polarimeter:

1° Laurent (French sugar scale) equals 0.2167° angular rotation D.

1° Ventzke sugar scale equals 0.3468° angular rotation D.

The Ventzke sugar scale is employed upon the Schmidt and Hänsch, Peters and Fric saccharimeters. The French sugar scale is employed upon the Laurent-Jobin and Duboscq-Pellin saccharimeters.

The scale reading for any optically active liquid is directly proportional to the length of the transmitting column of liquid; hence it is essential that the length of the tube employed in any test be known. The choice of tube length is influenced by the intensity of color of the test specimen as well as by the extent of optical activity of the specimen.

The specific rotation of a liquid is defined as the angular rotation in degrees through which the plane of polarization of polarized monochromatic (D) light is rotated by passage through 1 decimeter of the liquid, calculated to the basis of a specific gravity of 1. In case of a solution of an optically active substance the angular rotation is further calculated to the basis of a concentration of 1 Gm. of solute in 1 cc. of solution.

The temperature at which the rotatory activity of a liquid is observed must be designated for the reason that both the specific gravity and the degree of rotatory effect of the liquid vary considerably with temperature.

The specific rotation of an optically active substance is usually expressed by the term $[\alpha]_D^t$ which indicates both the temperature and the kind of light used and so stated expresses a characteristic constant for the substance. In this term the letter t represents the numerical designation of the centigrade temperature at which the Specific Rotation was determined, while the letter D indicates that sodium light is used. The absence of any indication of the wave length of the light means that white light is to be used. The temperature at which determinations are to be made for this National Formulary is 25°, except where otherwise indicated. By international agreement, 20° has been adopted as the standard temperature at which to take all saccharimeter readings and is likewise the temperature most often presumed in arranging tabulations of Specific Rotatory Power of Liquids and Solids.

It is customary to indicate the character of the rotation by placing a plus sign (+) or a minus sign (−) before the number indicating the angular rotation, as +20°, meaning 20° to the right or −8°, meaning 8° to the left.

For calculating the specific rotatory power of an optically active liquid substance, or solution of an optically active solid, the following formulas are of general application:

I. For liquid substances $[\alpha]_D^t = \frac{a}{ld}$.

II. For solutions $[\alpha]_D^t = \frac{100a}{lpd}$ or $[\alpha]_D^t = \frac{100a}{lc}$.

For calculating the specific rotation $[\alpha]$ using these formulas, the determination of the following factors is necessary:

a = observed rotation in degrees of the liquid at a temperature t using a sodium light.

l = the length of the tube in decimeters.

d = the specific gravity of the liquid or solution at the temperature of observation.

p = concentration of solution expressed as the number of grams of active substance in 100 grams of solution.

c = concentration of solution expressed as the number of grams of active substance in 100 cc. of solution.

Pills

The General Directions given below are to be followed in preparing the pills official in this Formulary, unless otherwise directed.

Triturate potent or liquid medicaments thoroughly with about an equal bulk of a mixture of the less potent, powdered ingredients. To this first triturate, add the remainder of the mixed powders, in divided portions, triturating or mixing thoroughly after each addition to produce a uniform mixture. Then form a mass with the specified excipient, and prepare the required number of pills of uniform size.

When a pilular extract is used, soften it with a little diluted alcohol or distilled water, and use it as a potent medicament, if it be such; or if it be non-potent and in considerable quantity, use it as the excipient or associated with the excipient.

When pill formulas official in this Formulary are to be made with mechanical equipment into either pills or tablets, excipients other than those specified in the formula and harmless to the patient may be used, and the amounts of diluent may be varied to produce a mass best adapted for such equipment, provided the amounts of medicinal ingredients per pill are not changed.

A suitable coating for any specific purpose may be applied to any of the pills official in this Formulary, provided the coating will disintegrate in the alimentary tract and is composed only of ingredients harmless to the patient.

Proximate Assays

Most alkaloids are practically insoluble in water, but they are soluble in certain organic solvents which are immiscible with water, such as chloroform, ether, amyl alcohol, benzene, etc., or mixtures of these. The salts of the alkaloids, however, are usually soluble in water, but in most cases insoluble in nearly all of the organic solvents. The process of assay by immiscible solvents, which is generally known as the "shaking out" process, is based on this property of alkaloids. It is carried out by treating the drug, or a concentrated liquid extract of it, with a solvent immiscible with water, in the presence of an excess of alkali which liberates the alkaloid. The free alkaloid is dissolved by the immiscible solvent from which it is removed by means of an excess of dilute acid. The acid solutions are then extracted with an immiscible solvent in the presence of an excess of alkali, and the immiscible solvent evaporated to obtain the alkaloid which is either weighed or titrated with standard acid.

Preparation of the Drug for Assay—The drug to be extracted should be ground to a powder of a fineness designated. The definition of powders will be found on page 715. Care should be taken to avoid the loss of water during the powdering of the drug. If it is impossible to avoid this loss, the drug should be dried at a low temperature before powdering, the loss of water noted, and a correction made in the final calculations.

Weighing for Assay—In weighing bulky, crude drugs for the assay an accuracy to within 10 mg. for quantities of 5 Gm. and over is sufficient. Portions of pilular extracts or ointments may be weighed on a piece of waxed or parchmentized paper, the surplus paper cut away, and the paper with the sample dropped into the vessel containing the solvent. In transferring weighed portions to a separator, the vessel

containing the material to be assayed should be thoroughly rinsed and the rinsings added to the separator.

Extraction of Drugs—The alkaloidal content of alkaloid-bearing drugs is usually extracted by one of the following methods:

A. Maceration—An accurately weighed portion of the ground drug is treated with the specified solvent or mixture of solvents, made alkaline with ammonia T.S., and thoroughly mixed. It is then allowed to macerate for 12 to 24 hours with occasional agitation, or for a shorter period with continuous agitation. At the end of this period, the drug is allowed to settle, an aliquot of the solvent decanted, and treated as described for the purification of the alkaloids.

B. Percolation—An accurately weighed quantity of the ground drug is placed in a suitable container and completely saturated with the specified solvent or mixture of solvents, and allowed to stand for 5 minutes. A quantity of ammonia T.S. sufficient to make the mixture distinctly alkaline is added and thoroughly mixed with the drug. The mixture is then transferred to a cylindrical percolator, previously prepared by packing the outlet with purified cotton. A small amount of the solvent may be used to rinse the container and the rinsing added to the percolator. The drug is allowed to macerate for a suitable period of time (from 1 to 12 hours or overnight, depending upon the drug to be assayed). Then the drug is firmly packed, a pledget of purified cotton placed above it, and percolated slowly with the solvent until the drug is completely exhausted of its alkaloid contents. Complete extraction of the alkaloid is determined by evaporating about 4 cc. of the last percolate to dryness, dissolving the residue in 0.5 cc. of approximately 0.5 *N* acid, and adding a drop of mercuric iodide T.S. (Valser's Reagent) or, when testing for caffeine or colchicine, a drop of iodine T.S.: not more than a slight turbidity should be produced. The percolate is then treated for the purification of the alkaloids.

C. Continuous Extraction—An accurately weighed portion of the ground drug is placed in an extraction thimble and the thimble inserted into a suitable extractor (a Soxhlet extractor of appropriate size is satisfactory). The drug is moistened with the specified solvent and mixed by means of a stirring rod and allowed to stand about 5 minutes. It is then made alkaline with the specified quantity of ammonia T.S. and thoroughly mixed. The stirring rod is rinsed with a small portion of the solvent and the drug macerated for 6 to 12 hours or overnight. The drug is then covered with a pledget of purified cotton, packed in the thimble, a sufficient quantity of solvent is added, and the drug extracted for a specified period of time or until completely extracted.

Purification of the Alkaloids—The alkaloidal solution obtained by any of the extraction methods is usually contaminated with other extractives which interfere with the volumetric or gravimetric determinations of the alkaloids. To effect their purification, the alkaloids are removed from the immiscible solvent by shaking out with an acid, then the acid solution, after alkalinization, usually with alkali hydroxide, is extracted with an immiscible solvent.

The volume and strength of the acid to be used are usually left to the discretion of the operator. It is best, however, to keep the total volume as small as possible. For the first extraction, it is advisable to use at least 10 cc. of approximately 1 *N* acid or sufficient to render the mixture distinctly acid. When the drug contains a large amount of fat the use, for the first extraction, of a smaller volume of more concentrated acid may be advantageous in preventing emulsions. For succeeding

extractions, it is preferable to use a dilution of 5 cc. of the acid with 5 cc. of distilled water. In all assays, the extraction should be continued until 0.5 cc. of the last acid washing shows not more than a slight turbidity on the addition of a drop of mercuric iodide T.S. (Valser's Reagent), or, in the case of caffeine and colchicine, on the addition of a drop of iodine T.S. The acid extracts, before proceeding with the next step, should be clear or practically so. If not clear, filter or treat as follows: Shake the combined acid extracts with one or more 10-cc. portions of the appropriate immiscible solvent until the acid solution is clear or practically so. Then wash the immiscible solvent extracts with one or more 5-cc. portions of distilled water acidified with hydrochloric or sulfuric acid, and add these washings to the acid solution.

The acid solution is then made alkaline, in most cases with ammonia T.S., and extracted with several successive portions of the appropriate immiscible solvent. The volume of the latter to be used in each operation is not less than half that of the aqueous solution, and the operation must be repeated as long as any alkaloid is extracted by the immiscible solvent. To determine the completion of extraction, evaporate 1 cc. of the last extraction and dissolve the residue in 0.5 cc. of approximately 0.5 *N* hydrochloric acid: the resulting solution should show not more than a slight turbidity on the addition of a drop of mercuric iodide T.S. (Valser's Reagent) or, in the case of caffeine and colchicine, on the addition of a drop of iodine T.S. The number of extractions required depends largely on the character of the alkaloid. With most alkaloids it is advisable to extract several times before testing.

Washing—The stems of separators and funnels and the lips of flasks, separators and graduates, from which solvents, containing alkaloids, have been drawn or poured, should be carefully washed with some of the solvent to prevent loss and to remove any of the alkaloids left by evaporation. These washings should be added to the other extractions containing the alkaloids.

Determination of Alkaloids—The solution of the purified alkaloids in the immiscible solvent is carefully evaporated to dryness on a steam bath or with a current of air. When the alkaloidal residue is to be determined volumetrically it should be softened by the addition of about 1 cc. of neutralized alcohol or ether, an accurately measured volume of volumetric acid added, usually one and one-half to twice the volume required for the quantity of alkaloid present, and the mixture gently warmed to insure the complete solution of the alkaloid. If preferred, the alkaloidal residue may be dissolved in chloroform, the standard acid added, and the chloroform completely removed by evaporation. A sufficient quantity of distilled water is added to make the volume of the mixture measure at least 25 cc. and the excess of acid titrated with volumetric alkali, using 1 to 2 drops of the appropriate indicator.

When the alkaloidal residue is to be weighed, it is dried to constant weight at 100–110°. If the final solvent has been chloroform, the last traces of that solvent should be removed by the addition of a few cc. of neutralized ether or alcohol, followed by evaporation. Care must be taken to avoid loss by decrepitation, especially when evaporating chloroform solutions of nux vomica alkaloids. Decrepitation may usually be prevented by the addition of a little alcohol after the solution has been reduced to a volume of 1 or 2 cc., evaporating at a low temperature, and rotating the container during the evaporation.

Indicators—Methyl red T.S. is to be used as the indicator in volumetric determinations. The same solution of indicator used in titrating the alkaloids should also be used in evaluating the volumetric solutions.

Aliquots—When using "aliquots," the solvent and the aliquot should be measured at the same temperature. When handling volatile liquids, a lower temperature and a more quickly conducted operation reduce the loss by evaporation.

Apparatus for Proximate Assays—When a container of definite size and shape is recommended in a proximate assay process, it is understood that this is advisory and not obligatory, except when volumetric flasks, measuring burettes, or other exact measuring apparatus are specified.

Adsorbents—In assaying fluidextracts, tinctures and other preparations of alkaloid-bearing drugs, it is often necessary to evaporate these to dryness and, to avoid loss and to aid in the evaporation, they are usually added to some adsorbent material. Paper pulp or asbestos fibers should be used for this purpose. Such adsorbent material must be acid- and alkali-washed and then rendered neutral by washing with distilled water and dried before use.

Emulsions—The shaking or rotation of an aqueous solution with an immiscible solvent in a separator should ordinarily be continued for about 1 minute. Long or violent agitation should be avoided as emulsions are likely to form, especially in alkaline solutions. Hyoscyamus, belladonna, and stramonium leaves sometimes contain saponins which cause troublesome emulsions. Should emulsions prove persistent, draw off the emulsified portion, and add an excess of either solvent. This usually breaks the emulsion and permits a complete separation. It is sometimes preferable to break the separated emulsion by the addition of a small amount of anhydrous sodium sulfate. If this is done it becomes necessary to wash the residue with additional solvent to remove the alkaloid completely.

Emulsification is sometimes prevented by increasing the volume of the aqueous or of the immiscible solvent. Chloroform and ether solutions of drugs which contain large proportions of fat may form troublesome emulsions. In such cases it is advisable to add sufficient sulfuric acid to assure acidity, and to evaporate the volatile solvent, while stirring with a rubber-tipped glass rod. When the resinous and fatty matter has been agglutinated, cool the acid solution and filter it through a small, wetted filter into a separator. Redissolve the residue in 15 cc. of ether, add 5 to 10 cc. of 0.1 *N* acid, evaporate the ether as before, with continued stirring, and pour the acid solution through the filter into the separator. Repeat the extraction of the fatty residue with dilute acid 2 or 3 times and finally wash the filter free from alkaloids.

Pyrogen Test

Test Animal—Use healthy rabbits weighing 1500 Gm. or more which have been maintained for at least 1 week on a uniform unrestricted diet and have not lost weight during this period. Use an accurate clinical rectal thermometer and test it to determine the time required to reach maximum temperature. Other recording devices of equal sensitivity are acceptable. Do not use animals which have been used for previous pyrogen tests unless they have had a rest period of not less than 48 hours. In testing allergen-containing materials the test animal shall not be used more than once with the same allergen. If the animals have not been used for tests during the previous two weeks, take four rectal temperature readings on each of the animals at 2-hour intervals 1 to 3 days before use. Insert the thermometer or other recording device beyond the internal sphincter, and allow it to remain a sufficient time to reach maximum temperature, as determined above, before the reading is recorded. Do not

use in the test those animals with a temperature in excess of 39.8°. House test animals in individual cages protected from disturbances likely to cause excitement. Exercise particular care to avoid exciting the animals on the day of taking the control temperatures and on the test day. Maintain the animals in an environment of uniform temperature (±5°) for at least 48 hours prior to and during the test period. Preferably they should be in quarters maintained at constant temperature and humidity.

Conduct of Test—Perform the test in a room in which the temperature and the humidity are maintained at the same level as that of the room in which the animals are housed for the test. During the test, the animals may be restrained in a suitable type of holder. Withhold food from any animal used, beginning 1 hour before the first temperature reading, and permit no food until the day's record is completed. Access to water may be allowed. On the day of the test take the control temperature prior to beginning the injection. However, a period of not more than 15 minutes should elapse, after the removal of the animal from the cage, to the time of taking the control temperature if it is to be restrained in a holder during the test. Animals may be used for the test provided the control temperature reading taken on the day of the test does not fall below 38.9° and does not exceed 39.8°. The reading taken on the day of the test constitutes the normal temperature of the test animal from which a subsequent rise following the injection of the test material is calculated. Warm the product to be tested to approximately 37° and inject intravenously, through an ear vein, 10 cc. per Kg. of rabbit, within 15 minutes subsequent to the control temperature reading on the day of the test. Record the temperature at 1 hour subsequent to the injection and each hour thereafter until 3 recordings have been made. Syringes and needles used for these injections must have been treated to render them pyrogen-free and then immediately sterilized. The syringes and needles may be rendered pyrogen-free by heating in a muffle furnace at 250° for not less than 30 minutes, or by any other suitable method. Three rabbits shall be used for each test and the test shall be considered positive if 2 or 3 animals show an individual rise in temperature of 0.6° or more above the normal established for each of these animals. If only one animal shows a temperature rise of 0.6° or more, or if the sum of the temperature rises of the 3 animals exceeds 1.4°, the test must be repeated using 5 rabbits. The test shall be considered positive if 2 or more of the group of 5 rabbits show an individual rise in temperature of 0.6° or more above the normal established for these animals.

The Pyrogen Test is designed for products which can be tolerated by the test rabbit in a dose of 10 cc. per Kg. For products requiring the use of test doses of less volume or for products requiring dilution, the individual monograph will specify the test dose, or the required dilution to be used.

Readily Carbonizable Substances

In tests for readily carbonizable substances, unless otherwise directed, add the specified quantity of the substance, finely powdered if in solid form, in small portions to the comparison container, which is made of colorless glass resistant to the action of sulfuric acid, and containing the specified volume of sulfuric acid, which contains not less than 94.5 per cent and not more than 95.5 per cent H_2SO_4, determined by titration. Stir the mixture with a glass rod until solution is complete, allow the

solution to remain at rest for 15 minutes, unless otherwise directed, and compare the color of the solution with that of the specified matching fluid in a comparison container which is also of colorless glass and has the same internal dimensions and cross-section, viewing the fluids transversely against a background of white porcelain or white glass.

When heat is directed in order to effect solution of the substance in the sulfuric acid, the sample and the acid are to be mixed in a test tube and heated as directed, and the solution then transferred to the comparison container for matching.

Preparation of the Matching Fluids—Accurately measure the prescribed volume of the colorimetric test solutions (see *Colorimetric Solutions*, page 783) and distilled water with either burettes or pipettes, having graduations in 0.1 cc. or less, into one of the matching containers, and thoroughly mix the solutions in the container. For purposes of comparison the formulas are given below for a series of 20 matching fluids, each designated by a letter of the alphabet. The Matching Fluids should be freshly prepared each day as required.

Matching Fluids	Parts of Cobaltous Chloride C.S.	Parts of Ferric Chloride C.S.	Parts of Cupric Sulfate C.S.	Parts of Distilled Water
A	0.1	0.4	0.1	4.4
B	0.3	0.9	0.3	8.5
C	0.1	0.6	0.1	4.2
D	0.3	0.6	0.4	3.7
E	0.4	1.2	0.3	3.1
F	0.3	1.2	0.0	3.5
G	0.5	1.2	0.2	3.1
H	0.2	1.5	0.0	3.3
I	0.4	2.2	0.1	2.3
J	0.4	3.5	0.1	1.0
K	0.5	4.5	0.0	0.0
L	0.8	3.8	0.1	0.3
M	0.1	2.0	0.1	2.8
N	0.0	4.9	0.1	0.0
O	0.1	4.8	0.1	0.0
P	0.2	0.4	0.1	4.3
Q	0.2	0.3	0.1	4.4
R	0.3	0.4	0.2	4.1
S	0.2	0.1	0.0	4.7
T	0.5	0.5	0.4	3.6

Reference Standards

Reference Standards have been provided as a basis of comparison for National Formulary assays or for other purposes. National Formulary Reference Standards can be obtained from the Chairman of the Committee on National Formulary. Other Reference Standards required for National Formulary assays can be obtained from the Chairman of the Committee of Revision of the United States Pharmacopoeia.

N. F. Reference Standards available are: Aconitine Reference Standard, Papain Reference Standard, Pepsin Reference Standard, Rennin Reference Standard, and Yellow Ferric Oxide Reference Standard.

Refractive Index (for Liquids)

The refractive index (n) of a transparent substance is the ratio of the velocity of light in air to its velocity in that material under like conditions. It is equal to the ratio of the sine of the angle of incidence made by a ray in air to the sine of the angle of refraction made by the ray in the material being tested. This physical constant is used as a means for identification of, and detection of impurities in, volatile oils. The Abbé refractometer measures the range of indices of the National Formulary materials for which these values are given. Other refractometers of equal or greater accuracy may be employed at the discretion of the operator.

Refractive Index (for Solids)

Amorphous substances and those crystallizing in the isometric system possess one index of refraction, usually designated by the letter n. Substances which crystallize in the hexagonal and tetragonal systems have two principal indices of refraction, designated as ω and ϵ, while those of the orthorhombic, monoclinic or triclinic systems possess three principal indices, represented by the letters, α, β, and γ. These physical constants are used as a means of identification of amorphous and crystalline solids.

Indices of refraction may be readily determined by means of the polarizing microscope, which can be used for testing solids even if the latter are available only in small fragments or in minute quantities. Immersion oils of known refractive index are used as mounting media and while several methods are adaptable, that of the Becke Line determination is the most commonly used. The accurate determination of the index of refraction necessitates the use of monochromatic light and temperature control.

Residue on Ignition

Weigh accurately from 1 to 2 Gm., or the amount of the chemical directed in the monograph, in a tared crucible of platinum, porcelain, or other suitable material. Ignite until thoroughly charred, cool, then, unless otherwise directed in the monograph, moisten the residue with 1 cc. of sulfuric acid, and cautiously ignite until the carbon is completely consumed. Conduct the ignition in a place protected from air currents, and use as low a temperature as possible to effect the combustion of the carbon. When the carbon has completely disappeared, cool the crucible in a desiccator, and weigh.

To test for non-volatile matter in volatile inorganic chemicals, proceed as directed in the preceding paragraph, using the lowest effective temperature.

Rosin Test

In testing for rosin as an adulterant in resins, gum resins, and balsams, unless otherwise directed, place in a small mortar 1 Gm. of the substance, powdered or crushed if necessary, and add 10 cc. of petroleum benzin. Triturate well for 1 or 2 minutes, filter into a test tube, and add to the filtrate 10 cc. of a fresh aqueous solution of cupric acetate (1 in 200). Shake well and allow the liquids to separate: the benzin layer should not show a green color.

Solubilities

The statements concerning solubilities given under the heading *Solubility* in the National Formulary monographs are not intended as standards or tests for purity, but primarily as information required by those employed in connection with the preparation and dispensing of medicines. However, when a special test involving solubility is given, or in case of solubility of volatile oils in alcohol of specific strengths, the test for such solubility is intended as a test for purity and the substance must conform to the test.

The solubility of National Formulary compounds in the given solvents is considered to be of minor importance as a means for their identification or determination of purity; for these purposes dependence is placed upon the other tests directed in the monographs.

When the exact solubility (*General Notices*, page 9) of a National Formulary substance is not known, a descriptive term is used to indicate its solubility. The following table indicates the meanings of such terms:

Descriptive Terms	*Relative quantities of solvent for 1 part of solute*
Very soluble	Less than 1 part
Freely soluble	From 1 to 10 parts
Soluble	From 10 to 30 parts
Sparingly soluble	From 30 to 100 parts
Slightly soluble	From 100 to 1000 parts
Very slightly soluble	From 1000 to 10,000 parts
Practically insoluble	More than 10,000 parts

Sterility Tests for Liquids and Solids

When a test for the sterility of a liquid or solid is prescribed, the following procedures shall be used:

Sterility Test Media—

I. Fluid Thioglycollate Medium

l-Cystine	0.75 Gm.
Agar, granulated (moisture content not in excess of 15 per cent)	0.75 Gm.
Sodium Chloride	2.5 Gm.
Dextrose	5.5 Gm.
Water-soluble Yeast Extract	5.0 Gm.
Pancreatic Digest of Casein	15.0 Gm.
Sodium Thioglycollate	0.5 Gm.
or Thioglycollic Acid	0.3 cc.
Resazurin Solution, 0.1 per cent, freshly prepared	1.0 cc.
Distilled Water	1000 cc.

Mix the *l*-cystine, agar, sodium chloride, dextrose, water-soluble yeast extract, and pancreatic digest of casein with 1000 cc. of distilled water, and heat on a water

bath until solution is effected. Dissolve the sodium thioglycollate or thioglycollic acid in the solution and, if necessary, adjust the solution with 1 *N* sodium hydroxide so that, after sterilization, it will have a *p*H of 7.1 ± 0.1. If filtration is necessary, reheat the solution without boiling, and filter through moistened filter paper. Add the resazurin solution, mix thoroughly, place the medium in culture tubes and sterilize in an autoclave at 121.5° (15 pounds pressure) for 20 minutes. Cool promptly to 25° and store the medium preferably between 20° and 30°, protected from light.

NOTE: Do not use this medium if evaporated to an extent affecting its fluidity or if more than the upper one-third has changed to a pink color. However, one reheating on a water bath, until the pink color disappears is permitted.

II. ALTERNATE FLUID MEDIUM FOR STERILITY TESTS

l-Cystine	0.05 Gm.
Sodium Thioglycollate	0.5 Gm.
or Thioglycollic Acid	0.3 cc.
Dextrose	1.1 Gm.
Sodium Chloride	2.5 Gm.
Water-soluble Yeast Extract	5.0 Gm.
Pancreatic Digest of Casein	15.0 Gm.
Distilled Water	1000 cc.

Heat the ingredients in a suitable container on a water or steam bath until solution is effected. Mix thoroughly and, if necessary, adjust the solution with 1 *N* sodium hydroxide so that, after sterilization, it will have a *p*H between 7.1 ± 0.1. Filter, if necessary, place in Smith fermentation tubes, and sterilize in an autoclave at 121.5° (15 pounds pressure) for 20 minutes.

NOTE: Certain products are turbid or otherwise unsuitable for culturing in Fluid Thioglycollate Medium because of its viscosity. The above medium (Medium II) is acceptable in place of Fluid Thioglycollate Medium (Medium I) provided it is used in Smith fermentation tubes and heated prior to use in a boiling water or steam bath so as to drive the dissolved oxygen out of the medium in the closed arm.

III. HONEY MEDIUM FOR MOLDS AND YEASTS

Pancreatic Digest of Casein	10 Gm.
Honey	60 cc.
Distilled Water, a sufficient quantity	
To make	1000 cc.

Dissolve the pancreatic digest of casein in the distilled water with gentle heat, add the honey and, if necessary, adjust the reaction to *p*H 6.0. Filter if necessary, place in culture tubes and sterilize at 121.5° (15 pounds pressure) for 20 minutes. The final reaction should approximate *p*H 5.6.

NOTE: Dehydrated media are available commercially for the preparation of culture media. If these are used for the preparation of official culture media, they shall yield products conforming to the official ones.

SUGGESTED TECHNIQUE FOR CONDUCTING TESTS FOR STERILITY

All bacteriological tests shall be conducted by trained workers under the most rigid aseptic precautions. It is desirable that all manipulations be conducted in a dust-proof room supplied with filtered air under positive pressure or by any other suitable means for eliminating air contamination.

Procedure for Testing Liquids

Opening Containers—Immerse all glass ampuls in alcohol or wipe them with alcohol to remove dust particles. With the aid of sterile forceps, flame the ampul adequately, but avoid heating the contents. Open the ampul, using a sterile file.

In the case of containers, closed with rubber caps or other closures, remove dust particles from the closure and from the neck of each container with sterile cotton saturated with alcohol and treat adequately with Iodine Tincture or by other suitable means. If the contents of the container is under vacuum, admit sterile air into the container by means of suitable sterile equipment such as a syringe needle attached to a syringe barrel filled with non-absorbent cotton.

Removing and Culturing Contents—Remove the contents for culturing with a sterile pipette. If necessary the contents may be removed with a sterile syringe and needle. Sterilize pipettes, syringes, and needles preferably by Process B, page 750.

In testing preparations in their final containers, plant one or more tubes of Fluid Thioglycollate Medium with the liquid from each container to be tested. The amount of inoculum and the volume of medium shall be varied according to the volume of liquid being tested as follows:

Content of Container	*Minimum Volume of Inoculum*	*Volume of Medium*
Less than 20 cc.	1 cc.	15 cc.
From 20 cc. to 50 cc.	5 cc.	40 cc.
More than 50 cc.	10 cc.	40 cc.

For 15 cc. of medium use tubes preferably 20 × 150 mm. and for 40 cc. of medium use tubes preferably 25 × 200 mm.

Liquids which are inherently bacteriostatic or contain bacteriostatic agents shall be treated with a suitable sterile, inactivating agent or diluted beyond the bacteriostatic level by planting in a greater volume of culture medium, so that growth will not be inhibited.

Mix the liquid thoroughly with the medium. If the test material is an oil, shake the mixture vigorously to disperse the oil in the medium at the time of planting and at frequent intervals during the incubation period.

Make final readings for sterility after not less than 7 days of incubation at 37°. When the liquid to be tested renders the medium turbid, so that final interpretation of growth cannot be made at the end of 7 days, confirm the presence or absence of bacterial growth by microscopic examination of stained smears or make transfers from the tubes originally planted to tubes of fresh medium and incubate these tubes at 37° for not less than 3 days.

Incubate cultures of material in honey medium for molds and yeasts at 22° to 25° for 15 days. Confirm cultures showing macroscopic growth by a microscopic examination of stained smears.

When the liquid in final containers is tested, representative samples consisting of not less than 3 per cent of the total number shall be tested, but the number need not exceed ten containers from any one lot.

When the liquid in bulk containers for repackaging or manufacturing purposes is tested, plant one or more tubes of medium employing a total of at least 10 cc. of liquid from each container.

If the liquid under test is found to be contaminated, discard it or treat it in such a manner as to render it free from living microorganisms.

Procedure for Testing Solids

Crystalline or Powdered Solids—Proceed as directed under *Procedure for Testing Liquids, Opening containers*, on page 748.

Removing and Culturing Contents—Take portions in duplicate or triplicate from each carton, package, and similar container, using sterile instruments and equipment. Transfer these portions of the material, as rapidly as possible, to the necessary number of tubes, each containing 40 cc. of fluid thioglycollate medium, and also to tubes of honey medium for detecting molds and yeasts. In case of solids inherently bacteriostatic or containing bacteriostatic agents not neutralized by the medium, it is necessary to treat them with suitable, sterile inactivating fluids or by adequate dilution in the culture medium.

Cultures of solids are to be incubated at 37° for 7 days before negative results are recorded. Cultures of materials in honey medium are to be incubated at 22° to 25° for 15 days. All cultures showing growth may be confirmed by a microscopic examination of stained smears.

If the product under test may be bacteriostatic when cultured as directed above, inoculate at least 5 per cent of all negative tubes of Medium I or II with 1 cc. of a 1 to 100,000 dilution of an 18- to 24-hour broth culture of *Clostridium novyi* and incubate at 37° for 3 days. In a similar manner inoculate 5 per cent of all negative tubes of Medium I or II with 1 cc. of a 1 to 100,000 dilution of an 18- to 24-hour old broth culture of *Escherichia coli* and incubate at 37° for 3 days. Also inoculate 5 per cent of all negative tubes of honey medium with 1 cc. of a 1 to 1000 dilution of a 72-hour honey medium culture of *Monilia albicans* and incubate at 22° to 25° for 3 days. Failure of growth is evidence that bacteriostatic or fungistatic agents carried over in the test material may be responsible for the negative results.

Controls

Prepare the following controls simultaneously when testing any material for sterility:

(a) Test each lot of Medium I or II for its growth-promoting and oxidation-reduction qualities, using one or more bacteria that are exacting in their growth requirements. At the end of the incubation period used for the sterility test, less than 60 per cent of the medium in the tube shall have changed color.

(b) Confirm the sterility of each lot of sterilized test medium used in sterility tests.

Sterilization Processes

"Sterilization" refers to the destruction of all living organisms and their spores in, or their removal from, materials. This may be accomplished in various ways.

Cleansing—Preparatory to sterilization, all containers and especially glassware and stoppers must be thoroughly cleansed by a suitable method. Boiling for not less than 10 minutes in water to which a suitable soap has been added, followed by rinsing in water and another boiling in from 0.1 per cent to 0.3 per cent HCl or HNO_3 is advocated. When necessary, special cleaning fluids are used to remove

organic matter not affected by previous washing. Thorough rinsing with water followed by freshly distilled water is practiced as the final treatment in all instances. It is important to see that each container is filled with the various solutions during the washing treatment as well as with water during the rinsings.

The methods of sterilization most frequently employed for empty containers, apparatus and materials used in the manufacture of preparations for injection, and for sterilizing the latter are presented.

Process A—

Direct Flame—(This process employed in sanitary procedures is known also as incineration. The latter is used for the sterilization of substances which have little or no value. Burning such materials in a furnace or flame is practiced.) Usefulness of the direct flame for the sterilization of articles possessing definite value is limited to those which are not injured or adversely affected by the application of a hot flame, as the Bunsen flame. Platinum, nichrome, and other metallic needles and wires, iron and nickel spatulas, tweezers and forceps are quickly sterilized by heating to redness in a Bunsen or alcohol flame. Slabs, mortars and one-piece pestles, stoneware, metallic orifices of bacteria-proof filters, or any metallic ware may, in emergencies, be sterilized in the direct flame of a Bunsen burner, provided that the application of such direct flame is for a period of not less than 20 seconds to each part thus treated. Care must be taken to be assured that the article to be treated will not be broken or injured by this technique. Though slides and cover-slips, glass rods and the lips of tubes, bottles and flasks may be sterilized by passing them through a flame for the period of time previously mentioned, such procedure is not recommended for glassware, as there is always the possibility of breaking the latter by heating in a direct flame. Other safe methods described below should be used. However, if a small number of ampuls are needed as containers for a preparation to be dispensed quickly, such ampuls, if not already sterile, can be sterilized, in an emergency, in the direct flame, using care and supporting them (neck-downward) in the meshes of a wire basket until cool, when they are to be filled immediately and quickly sealed.

Process B—

Dry Heat—Dry or hot-air heat has a limited use. However, exposure to dry heat in a suitable hot-air sterilizer or oven is the usual procedure for sterilizing all empty glass, porcelain and metallic containers which are *to be kept on hand for future use.* Such containers can readily be sterilized in an autoclave and this technique should be used if containers are required for immediate use or need not be dry. Containers made of heavy or thick glass are best sterilized in the autoclave. All materials sterilized by dry heat (hot-air) must be thoroughly clean and free from traces of organic matter. To insure sterilization of materials by this method, they should be exposed to a temperature not below 170°, preferably for 2 hours, but never for less than 1 hour. To avoid the cracking of glassware, both heating and subsequent cooling in this and other heating sterilization processes should be done gradually. A thermo-regulating valve may be used but a recording thermometer must be present on the sterilizer. All objects sterilized by this or any other process should be suitably wrapped or protected so that they remain sterile. Non-absorbent cotton plugs or other suitable stoppers in flasks and other containers must be wrapped on the outside with a piece of metallic foil or with a layer of gauze or muslin, or covered

with stout paper and secured with cord around the neck of the container. Adequate attention must be given to the preparation of the materials to be sterilized in a hot-air oven as well as to the details of loading this and other types of sterilizers used in the different sterilization processes. All materials should be distributed and arranged loosely in the chamber or in other sterilizers. Avoid tight packing. In sterilizing combustible articles in a hot-air chamber, it should be remembered that cotton and paper are browned at 190° and over. Apparatus or material not stoppered or wrapped with inflammable coverings, as petri dishes, pipettes and ampuls (placed in metallic containers), and jars stoppered with metallic or enamel tops can be sterilized at a temperature of 200° or higher and for at least 45 minutes.

Substances, as glycerin, liquid petrolatum, oils, oily solutions and suspensions, fats and powders, which resist penetration by moist heat, may be more conveniently sterilized in a hot-air oven, where a prolonged uniform temperature can be obtained. Oily solutions or suspensions, oils, ointment vehicles, and powders in covered petri dishes (in strata not more than 1/4 inch in thickness) which are not decomposed or otherwise affected by the treatment, are sterilized at a temperature of at least 170° to 180° for not less than 1 hour, care being taken that the *entire contents* in each container is maintained at this temperature for the designated time period. For medicaments, as sulfanilamide, which are decomposed at high temperatures, a lower temperature for a more prolonged period (140° for 4 hours) may be used.

Process C—

Steam under Pressure (Heating in an Autoclave)—The use of steam under pressure makes available moist heat at temperatures higher than that obtainable by boiling water under normal pressure. By this means, spores as well as vegetative forms of bacteria are destroyed by one short exposure. It is the most satisfactory method of heat sterilization available. It is the method which is to be used for sterilizing preparations for injection and is applicable to the sterilization of any material or object which is not injured by moisture and the high temperature employed, and which can be conveniently placed in the apparatus at hand. The steam pressure kettle may be used for small-scale operations. In the laboratory, the device most commonly used is the autoclave. Steam pressure sterilizers intended for the sterilization and drying of surgical material, dressings and other hospital equipment are constructed in different shapes and sizes, in various designs and types, and of different kinds of material. The successful use of an autoclave or steam sterilizer depends upon its proper operation. Skill and experience on the part of the operator are required. Adequate attention must be given to the preparation of the materials to be sterilized as well as to the details of loading. It is advisable to remove all the air possible by a preliminary vacuum by reducing the pressure to 250 mm. (10 inches) of mercury for 15 minutes, and provision should be made for the escape of the residual air from the bottom of the chamber during the process of sterilization. Where a preliminary vacuum is not used, the exposure should be prolonged for at least twice the period of time given below. Heating a mixture of steam and air under pressure will yield a lower temperature than is attained by steam alone generated under like pressure. Furthermore, air pockets prevent diffusion of the steam and the latter may not reach infective objects and materials. All autoclaves should be equipped with thermometers, located in the exhaust line and at the lowest point in the sterilizer. The temperature actually attained is more reliable than pounds of

pressure recorded. Exposure to saturated steam under 15 pounds of pressure at 121.5° for at least 20 minutes in an autoclave properly loaded and operated will destroy all living organisms including spores. A higher pressure for the same period of time or a longer exposure at the pressure mentioned is to be used, depending upon the load in the autoclave. Time must be allowed for the steam to penetrate to the center of the material or substance to be sterilized. The usual steam pressures employed, the corresponding temperatures attained, and the necessary periods of time required, after reaching the indicated temperature, to assure adequate sterilization are:

10 pounds pressure (115.5°) for 30 minutes
15 pounds pressure (121.5°) for 20 minutes
20 pounds pressure (126.5°) for 15 minutes

Process D—Moist Heat at 100°—

1. Free-Flowing Steam—Exposure to live or free-flowing steam (100°) yields results similar to those obtained with boiling water. At high altitudes where the atmospheric pressure is less than at sea level, the temperature at which water boils and that of free flowing steam is below 100°. In industries on a large scale, where large quantities of live steam are available, the latter is used for destroying the vegetative forms of bacteria in tanks, refrigerators, and other containers.

Free-flowing steam (under atmospheric pressure) is used extensively in the laboratories. Different types of equipment have been designed to utilize the moist heat of free-flowing steam. False bottoms placed in covered buckets or wash boilers provide apparatus useful as steam sterilizers. The Arnold sterilizer, however, is the type most frequently employed. The steam in the latter can be used continuously or intermittently. One prolonged exposure to steam (at 100°) may be employed; and this can replace the boiling water bath. In practice, the *intermittent, fractional, interrupted,* or *discontinuous* method of sterilization, also known as Tyndallization, is used most frequently with the Arnold sterilizer. In this procedure, the material is exposed to free-flowing steam (at 100°) for periods of time varying from 30 to 60 minutes on each of at least 3 consecutive days. During intervals between heating in all fractional methods of moist-heat sterilization, materials should be kept either at room temperature or in an incubator at body temperature. This method of sterilization is not to replace autoclaving or the use of steam under pressure if either of the latter is suitable. In noting the time of exposure in this or any other sterilizing technique, note the time after the entire contents in the containers have reached the required temperature and keep the materials at this temperature for the designated length of time. Allow the sterilizer to cool before removing the contents.

2. Boiling Water—Instruments, hypodermic needles, catheters, syringes, rubber tubing, and stoppers may be sterilized by boiling in water. The water should submerge the materials or be above the level of the fluid to be sterilized. Boiling is to be continued for at least 15 minutes. The addition of 1 to 2 per cent of sodium carbonate or 5 per cent phenol or 2 to 3 per cent saponated solution of cresol will increase the sterilizing efficiency of the boiling water bath.

Solutions which are not adversely affected by a temperature of 100° but which are affected by higher temperatures, and which are in sealed sterile containers may be sterilized in a bath of boiling water if a steam sterilizer is not available. Exposure

of the entire contents from 30 to 60 minutes at 100°, on each of three consecutive days, is required. During intervals between heating, keep at room temperature or in an incubator at body temperature.

If time does not permit more than one heating period, and fractional sterilization is required or applicable as in an emergency when preparations are prepared extemporaneously, heating for at least one period should be conducted. One heating at 100° for 30 minutes in a steam sterilizer with a bacteriostatic agent added to the preparation should be carried out.

Process E—

Fractional Moist-Heat Sterilization at Low Temperatures (Inspissation)—Materials which are injured by a temperature of 100° or higher are treated in the manner described in Process D-1, except that the temperature in the water bath or inspissator is maintained at the highest temperature which the substances being treated can bear without decomposing or being altered. Usually this is between 60° and 80°. Frequently the fractional heating is extended over a period of from 4–7 days. Medicinal preparations treated by this method shall contain an added bacteriostatic agent, unless the ingredients possess bacteriostatic properties. The added bacteriostatic agent must be in a concentration which will prevent the growth of all microörganisms in the materials.

This process is not a safe method of sterilization. Process F is to be used in its place wherever applicable.

Process F—

Bacteriological Filtration—This term is employed to indicate a bacteria-free filtrate in contrast to other methods of filtration in which the resultant product is not necessarily sterile. This method is employed for sterilizing those liquids in which the active agents are soluble and which in many instances are injured by heat. Bacteriological filters used to obtain bacteria-free filtrates are made of porcelain, diatomaceous earth, asbestos, sintered glass, and other materials. They are available in different sizes and in different degrees of porosity. Some forms of apparatus are fitted with suitable filtering pads or disks or membranes. The pads or disks, also available in various degrees of porosity, are used only once and then discarded. The other types of filters are tested at frequent intervals to determine their efficiency. Suction or pressure is usually employed to force liquids through these filters.

New filters should be cleansed, sterilized, and tested for impermeability to bacteria with a broth culture of a suitable microörganism. Thereafter, each time before the filter is used, it is to be examined for flaws and the entire filter apparatus and attachments, including the receiving vessels, are to be cleansed and sterilized by a suitable method, preferably by Process C. The liquid to be filtered should first be either centrifuged or filtered, if necessary, through paper pulp or a fine filter paper to remove visible suspended particles and to reduce clogging. After use, bacteriological filters should be cleansed immediately, and then sterilized. Liquid petrolatum and other oils are not to be sterilized by this method as they may increase the permeability of the filter to bacteria. This process is exceedingly complicated. It is not a simple mechanical procedure governed only by the relative size of the pores of the filter and of the particles to be filtered, but a consideration of many factors is involved. The most important are: the composition and electrical charge of the filter; the *p*H and

electric charge of the material being filtered; the adsorption of protein and other substances; the temperature, pressure, and the duration of the procedure.

Bacteriological filtration may not function perfectly under all conditions. It is important to determine in all instances that solutions thus treated have been rendered sterile and not otherwise altered. Medicinal preparations treated by this method shall contain a bacteriostatic agent unless otherwise directed in an individual monograph.

When preparations in bulk for injection are sterilized by this process, the distribution, filling, and sealing in the final containers must be conducted under strictly aseptic conditions.

Process G—

Oil Bath—Surgical and other instruments can be sterilized by boiling in a light, mineral oil. (Light Liquid Petrolatum is satisfactory.) The oil can be used repeatedly. A temperature of 160° for 60 or more minutes is employed. By this method, injury to the finish and the cutting edge of instruments is avoided. In the case of glass and metallic catheters, not only sterilization, but lubrication also is effected.

Aseptic Manipulation—Preparations which would be decomposed or otherwise injured by the regular processes of sterilization, or preparations which are required to be prepared in an emergency, may be prepared by aseptic manipulation. By this procedure all apparatus and equipment to be used is previously sterilized, and all ingredients which will withstand sterilization are also sterilized, the final preparation then being made, using every possible precaution to maintain ultimate sterility of the finished product.

This procedure is to be used only when the regular processes of sterilization are not applicable, and the label is to indicate the date when prepared and the notation: "Prepared by aseptic manipulation. Keep in a cool place and use within two (2) days."

Containers, bottles, ointment jars, collapsible metal tubes, graduates, pipettes, spatulas, glass rods, and similar equipment are cleansed and sterilized by Process B or Process C. Packs of filter paper wrapped in paper or placed in covered dishes or jars, powders (not decomposed by high temperatures) placed in covered dishes or jars in strata not more than 1/4 inch in thickness, fixed oils, liquid petrolatum, ointment vehicles, glycerin, cotton, and funnels are sterilized by Process B. Cork and rubber stoppers are placed in suitable containers, and sterilized by Process C. Ingredients, previously sterilized if possible, are weighed on sterile watch glasses or on sterile paper. The actual compounding should be conducted within a restricted area preferably under a cover and in such a manner that contamination will not occur. A bacteriostatic agent shall be added in all instances, unless otherwise directed in an individual monograph.

Note on Sterilizing by Heating Processes

If the volume of the solution in each container exceeds 10 cc. or if dry materials are present in amounts exceeding 2 Gm., it is important to see that the materials are exposed to the designated temperature for a period of time sufficient to be assured that the *entire contents* in each of the respective materials attain the required tem-

perature, and are kept at that temperature for the time periods mentioned above. This may necessitate exposure for longer time intervals than indicated above.

The use of thermocouples is advocated when sterilizing heavy loads so as to determine the actual temperature and duration attained in the center of the load.

When sterilization of injections can be effected by Process C or Process F without decomposing or otherwise changing the injection so treated, these processes are to be used.

Sterilization of injections by heating processes is carried out preferably in the final container in which the injection is dispensed.

Sulfur Determination, Parr Bomb Method

In the determination of total sulfur in organic material by means of the Parr Peroxide Bomb, the material being examined is intimately mixed with sodium peroxide and an ignition accelerator, either potassium chlorate or potassium perchlorate, sealed tightly in the fusion cup of an especially designed bomb made of corrosion-resisting metal, and ignited either electrically or by heating externally with a flame. The fused mixture is dissolved in water, acidified with hydrochloric acid, gaseous by-products expelled by boiling, and the sulfate ion determined in the usual manner by precipitation with barium chloride. The operation of the bomb is simply carried out, and there can be no danger of an explosion resulting if the procedure for the ignition is followed without variation.

Caution: It is desirable, however, to place the bomb inside a piece of steel pipe when the charge is ignited, to prevent possible injury to the operator if the bomb should burst.

There are several modifications of the bomb available, all with adequate instructions accompanying them, and any one of the several forms may be used. The bomb consists of three essential parts: a fusion cup to receive the charge, a cover grooved to fit over the rim of the fusion cup, and a collar by means of which the cup and cover may be held together firmly. The groove in the cover is provided with a gasket by means of which a gas-tight seal is obtained, and this gasket should be examined frequently and replaced at once if it shows signs of damage.

The accelerator, potassium chlorate or potassium perchlorate, furnishes quickly a part of the oxygen required for combustion of the sample, and causes ignition to take place at a lower temperature. The accelerator, which must be powdered and free from lumps, should be placed on the bottom of the fusion cup.

Sodium peroxide provides the balance of the oxygen required for combustion, and also provides the alkali needed to absorb the carbon dioxide formed during combustion, thereby eliminating internal pressure. This may be measured instead of weighed, using the scoop provided with the bomb. The supply of sodium peroxide must be kept in an air-tight container to prevent the absorption of moisture.

To avoid the possibility of premature combustion, it is desirable to adhere to a strict order of preparing the charge. The procedure recommended is to place the finely powdered accelerator, free from lumps, in the bottom of the fusion cup, and add thereto the material to be tested, together with the auxiliary carbonaceous material, if required, mixing the powders thoroughly with a dry glass rod having a rounded end. Then add the sodium peroxide, likewise lump-free. The cover should then be placed on the fusion cup, the bomb sealed tightly, and the contents thoroughly mixed by shaking vigorously for 2 minutes. If electrical ignition is to be used, a piece of ignition wire of the proper diameter and length is fixed to the terminals on

the cover before finally assembling the unit. After mixing the charge by shaking vigorously, the charge should be settled by tapping the edge of the bottom on a hard surface.

When electrical ignition is used, the amount of current needed to fuse the ignition wire should be determined in advance and the resistances set at the proper point. External ignition is best obtained by allowing the pointed flame of a blast lamp to impinge upon the bottom or side of the fusion cup for a brief period. When ignition occurs the combustion will be complete in 1 minute, after which the bomb may be cooled, disassembled, and the fused mixture dissolved for determination of sulfate ion. The exact procedure to be followed throughout is described under *Dioctyl Sodium Sulfosuccinate*, page 184.

The quantity of sulfur in the reagents used must be determined by following the directed procedure, using 0.5 Gm. of powdered sucrose alone, and the correction so obtained applied in the calculation of the result. The blank determination must be repeated whenever any new lot of reagent is used.

Thermometers for National Formulary Testing

These thermometers conform to the specifications of the American Society for Testing Materials, the specifications being designated as follows:

Types	*A.S.T.M. designation*
I—For general purposes	E1 (1C-39)
II—For general purposes	E1 (2C-39)
III—For petrolatum and other Type III melting points	E1 (14C-39)
IV—For determining kinematic viscosity	E1 (18C-39)
V—For determining the titer of fatty acids	E1 (36C-42)
VI—For boiling or distilling temperatures	E1 (7C-39)
VII—For boiling or distilling temperatures	E1 (8C-42)

The stem of each thermometer shall be made of suitable thermometer tubing and shall have a plain front and an enameled back. All graduation lines, figures, and letters shall be clear-cut on the glass stem and shall be uniformly well filled with insoluble colored pigment.

The bulb of each thermometer shall be made of Corning normal or equally suitable thermometric tubing.

The thermometers shall be so thoroughly annealed that there will be no appreciable change in their indications after long-continued exposure to the highest temperature on the scale.

For further details regarding the standardization of these thermometers, reference

(*Footnote for table on page 757*)

[a] The thermometer shall be standardized for 76-mm. or 3-in. immersion and for the following temperatures of the emergent mercury column. These stem temperatures have been chosen as corresponding, on the average, to those likely to occur in the use of the thermometer.

Thermometer Reading	Average Temperature of Emergent Mercury Column	Thermometer Reading	Average Temperature of Emergent Mercury Column
50° C.	35° C.	122° F.	94° F.
100° C.	48° C.	212° F.	118° F.
150° C.	55° C.	320° F.	131° F.

Thermometer Specifications

Thermometer Type	I	II	III	IV	V	VI	VII
Liquid	Mercury	Mercury	Mercury	Mercury	Mercury	Mercury	Mercury
Filling above liquid	Nitrogen	Nitrogen	Nitrogen	Nitrogen	Nitrogen	Nitrogen	Nitrogen
Temperature range	−20° to +150° C.	−5° to +300° C.	38° to 82° C.	34° to 42° C.	−2° to +68° C.	0° to 300° C.	0° to 400° C.[c]
Subdivisions	1° C.	1° C.	0.1° C.	0.1° C.	0.2° C.	1° C.	1° C.
Total length	303 to 307 mm.	379 to 383 mm.	365 to 371 mm.	252 to 256 mm.	385 to 390 mm.	378 to 384 mm.	378 to 384 mm.
Stem diameter	6.0 to 7.0 mm.	6.0 to 7.0 mm.	6.0 to 7.0 mm.	6.0 to 7.0 mm.	6.0 to 7.0 mm.	6.0 to 7.0 mm.	6.0 to 7.0 mm.
Bulb diameter	5.0 to 6.0 mm.	5.0 to 6.0 mm.	Not greater than stem	5.0 mm. to diam. of stem	5.5 to 7.0 mm.	5.0 to 6.0 mm.	5.0 to 6.0 mm.
Bulb length	19 to 25 mm.	10 to 15 mm.	Not over 28 mm.	25 to 35 mm.	15 to 25 mm.	10 to 15 mm.	10 to 15 mm.
Bottom of bulb to graduation line at distance	−18° C. 90 to 100 mm.	0° C. 100 to 110 mm.	38° C. 105 to 115 mm.	34° C. 135 to 150 mm.	−2° C. 50 to 60 mm.	0° C. 100 to 110 mm.	0° C. 25 to 45 mm.
Top of thermometer to graduation line at distance	150° C. 20 to 35 mm.	300° C. 25 to 50 mm.	82° C. 25 to 40 mm.	42° C. 20 to 35 mm.	68° C. 20 to 35 mm.	300° C. 30 to 45 mm.	400° C. 30 to 45 mm.
Longer graduation lines at each	5° C.	5° C.	0.5° C.	0.5° C.	1° C.	5° C.	5° C.
Graduations numbered at each multiple of	10° C.	10° C.	1° C.	1° C.	2° C.	15° C.	5° C.
Immersion	76 mm.	76 mm.	79 mm.	Total	45 mm.	Total	Total
Scale error at any point, when standardized, shall not exceed	0.5° C.	1° C.	0.1° C.	0.1° C.	0.2° C.	0.5° C.	1° C.
Standardization	[a]	[b]	Every 10° and for average temp. 25° of emergent stem	Total immersion	Ice point and at 20° intervals and for ave. temp. 25° of emergent stem	Ice point every 50° and at 300°	Every 50° and at 370° C.

(*See bottom of page 756 for footnote a*)

[b] The thermometer shall be standardized for 76-mm. or 3-in. immersion and for the following temperatures of the emergent mercury column. These stem temperatures have been chosen as corresponding, on the average, to those likely to occur in the use of the thermometer.

Thermometer Reading	Average Temperature of Emergent Mercury Column	Thermometer Reading	Average Temperature of Emergent Mercury Column
50° C.	35° C.	122° F.	94° F.
100° C.	49° C.	212° F.	120° F.
150° C.	61° C.	302° F.	142° F.
200° C.	70° C.	392° F.	158° F.
250° C.	76° C.	482° F.	169° F.
300° C.	80° C.	572° F.	176° F.

[c] Under certain test conditions, the bulb of the thermometer may be 28° C. above the temperature indicated by the thermometer, and at an indicated temperature of 371° C. the temperature of the bulb is approaching a critical range in the glass. It is not desirable to use this thermometer under such conditions at indicated temperatures above 371° C. without checking the ice point.

should be made to A.S.T.M. Standards, Part III, American Society for Testing Materials.

Tinctures

Tinctures are alcoholic or hydro-alcoholic solutions prepared from animal or vegetable drugs or from chemical substances.

The proportion of drug represented in the different kinds of tinctures is not uniform but varies according to the established standards for each. Tinctures of potent drugs essentially represent the activity of 10 Gm. of the drug in each 100 cc. of tincture. This conforms in principle to the recommendation of the International Protocol as adopted at Brussels, and with international standards. In this group are most of the tinctures which are assayed and adjusted to standards. Most of the other tinctures represent 20 Gm. of the respective drugs in each 100 cc. of tincture. Compound tinctures are made according to long established formulas.

The general processes to be employed for the manufacture of tinctures, unless otherwise directed in the individual monographs, are as follows:

Process P. Carefully mix the ground drug or mixture of drugs with a sufficient quantity of the prescribed menstruum to render it evenly and distinctly damp, allow it to stand for 15 minutes, transfer it to a suitable percolator, and pack the drug firmly. Pour on enough of the prescribed menstruum to saturate the drug, cover the top of the percolator, and when the liquid is about to drip from the percolator, close the lower orifice, and allow the drug to macerate for 24 hours or for the time specified in the monograph. If no assay is directed, allow the percolation to proceed slowly, or at the specified rate, gradually adding sufficient menstruum to produce 1000 cc. of tincture, and mix thoroughly.

If an assay is directed, collect only 950 cc. of percolate; mix this thoroughly, and assay a portion of it as directed. Dilute the remainder with such a quantity of the prescribed menstruum as calculation from the assay indicates is necessary to produce a tincture that conforms to the prescribed standard. Mix well. The rate of flow of percolates is defined on page 718.

Process M. Macerate the drug or mixture of drugs in a container which can be closed, in a moderately warm place, with 750 cc. of the prescribed menstruum, agitating it frequently for 3 days or until the soluble matter is dissolved. Transfer the mixture to a filter, and when most of the liquid has drained away, wash the residue on the filter with a sufficient quantity of the prescribed menstruum, combining the filtrates, to produce 1000 cc. of tincture. Mix the product well.

Storage—Preserve Tinctures in tight, light-resistant containers and avoid exposure to direct sunlight and to excessive heat.

Turbidimetric Tests

These tests are applied to certain official chemicals, to insure the absence of excessive amounts of chloride or sulfate.

In carrying out these turbidimetric tests, the following points are to be observed: The same quantities of the same reagents must be used in the test of the substance under examination and in the control test. The glass cylinders in which the tests are made must be of the same diameter and match in all other respects as closely as possible. The precipitating reagent must be added to both in immediate sequence.

Chloride—The prescribed quantity of the substance to be tested is dissolved in

from 30 to 40 cc. of distilled water, and the solution neutralized, if necessary, with nitric acid, using litmus paper as the indicator. One cc. of nitric acid and 1 cc. of silver nitrate T.S. are added and then sufficient distilled water to make 50 cc. After mixing well and allowing to stand 5 minutes protected from direct sunlight, the turbidity, if any, is compared with that produced in a control test made with the specified volume of 0.02 *N* hydrochloric acid.

Bismuth salts are first dissolved in a few cc. of distilled water and 2 cc. of nitric acid, then diluted with distilled water to 50 cc.

Sulfate—The specified quantity of the substance to be tested is dissolved in from 30 to 40 cc. of distilled water, and the solution neutralized, if necessary, with hydrochloric acid, using litmus paper as the indicator. One cc. of diluted hydrochloric acid and 1 cc. of barium chloride T.S. are added and then sufficient distilled water to make 50 cc. After mixing well, it is allowed to stand for 10 minutes and the turbidity, if any, is compared with that produced in a control test made with the specified volume of 0.02 *N* sulfuric acid.

If the solution, after the addition of acid, is not perfectly clear, it is filtered through a filter paper free from chloride or sulfate, then the silver nitrate or the barium chloride is added.

When the tests for chloride or sulfate are to be applied to a specified volume of a solution of a substance prepared as directed in the text, and the permissible limit for these impurities corresponds to 0.2 cc. or less of 0.02 *N* hydrochloric or sulfuric acid, the solution is not to be further diluted. The control test is also made with the same volume of water (or other specified solvent) as in the test.

In applying the turbidimetric tests to salts of heavy metals, which normally show an acid reaction, their aqueous solutions prepared for the test are not to be neutralized.

Vegetable and Animal Drugs, Methods for Sampling and Analysis

I—Sampling from Original Containers

I-a—It is recommended that gross samples of vegetable or animal drugs in which the component parts are 1 cm. or less in any dimension, and all powdered or ground drugs, be taken by means of a sampler which removes a core from the top to the bottom of the container, not less than 2 cores being taken in opposite directions; that when the total weight of the drug to be sampled is less than 100 kilos (200 pounds) at least 250 Gm. shall constitute an *official sample.* When the total weight of the drug to be sampled is in excess of 100 kilos, repeated samples shall be taken by the above method, and according to the schedule given below, mixed and quartered, 2 of the diagonal quarters being rejected, the remaining 2 quarters being combined and carefully mixed, and again subjected to a quartering process in the same manner until 2 of the quarters weigh at least 250 Gm., which latter quarters shall constitute an *official sample.*

I-b—It is recommended that gross samples of vegetable drugs in which the component parts are over 1 cm. in any dimension be taken by hand. When the total weight of the drug to be sampled is less than 100 kilos, at least 500 Gm. shall constitute an *official sample,* and this shall be taken from different parts of the container or containers. When the total weight of the drug to be sampled is in excess of 100 kilos, repeated samples shall be taken by the above method and according to the schedule

below, mixed and quartered, 2 of the diagonal quarters being rejected, and the remaining 2 quarters being combined and carefully mixed, and again subjected to a quartering process in the same manner until 2 of the quarters weigh not less than 500 Gm., which latter quarters shall constitute an *official sample*.

SCHEDULE RECOMMENDED FOR SAMPLING

Number of packages in shipment	*Number of packages to be sampled*
1 to 10	1 to 3
10 to 25	3 to 4
25 to 50	4 to 6
50 to 75	6 to 8
75 to 100	8 to 10

When over 100, the total number sampled should not be less than 10.

I-c—When the total weight of a drug to be sampled is less than 10 kilos it is recommended that the above methods be followed but that somewhat smaller quantities be withdrawn, and in no case should the final *official sample* weigh less than 125 Gm.

I-d—In addition to the withdrawing of *official samples* according to methods I-a, I-b, and I-c, the *official sample* may consist of the total amount of a direct purchase made by Federal, State, or Municipal Food and Drugs Act enforcement officials.

II—Foreign Organic Matter in Whole Vegetable Drugs

Withdraw from 25 to 500 Gm. from the *official sample*, spread out in a thin layer, and separate the foreign matter by hand as completely as possible. Weigh it and determine the per cent of foreign organic matter, calculated upon the weight of drug taken. Use the maximum quantity of sample for coarse or bulky drugs.

III—Preparation of Vegetable or Animal Drugs for Analysis

The following method is to be used where specific directions are not otherwise given in the text: Withdraw as much as may be necessary of the *official sample* by quartering, taking pains to see that the portion is representative of the gross sample. In the case of unground or unpowdered drugs, grind the withdrawn sample so that it will pass through a No. 20 standard mesh sieve. If the sample cannot be ground, reduce it to as fine a state as possible. Mix by rolling it on paper or sampling cloth, spread it out in a thin layer and withdraw the portion for analysis. The disintegration of semi-solid drugs may be facilitated by the use of a meat grinder or a similar apparatus.

IV—Total Ash in Vegetable Drugs

Accurately weigh a quantity of the ground drug, representing from 2 to 4 Gm. of the air-dried material, in a tared crucible and incinerate at a low temperature, not to exceed very dull redness, until free from carbon, and determine the weight of the ash. If a carbon-free ash cannot be obtained in this way, exhaust the charred mass with hot distilled water, collect the insoluble residue on an ashless filter paper, incinerate the residue and filter paper until the ash is white or nearly so, then add the filtrate, evaporate it to dryness, and heat the whole to a low redness. If a carbon-free ash cannot be obtained in this way, cool the crucible, add 15 cc. of alcohol, break

up the ash with a glass rod, burn off the alcohol, and again heat the whole to a low redness. Finally determine the weight of the ash. Calculate the percentage of total ash from the weight of the drug taken.

V—Acid-insoluble Ash in Vegetable Drugs

Boil the ash obtained under paragraph IV with 25 cc. of diluted hydrochloric acid for 5 minutes, collect the insoluble matter on a tared Gooch crucible or ashless filter, wash with hot distilled water, ignite, and weigh. Determine the per cent of acid-insoluble ash calculated from the weight of drug taken.

Moisture in Vegetable and Animal Drugs

VI—Preparation of Sample

In the case of unground or unpowdered drugs, prepare about 10 Gm. of the *official sample* by cutting, granulating, or shredding, so that the parts are about 3 mm. in thickness. Seeds or fruits smaller than 3 mm. should be cracked. High-speed mills should not be used for preparing the sample and care should be taken that no appreciable amount of moisture is lost during the preparation and that the portion taken is representative of the *official sample*.

VII—Moisture Method for Drugs Containing No Constituents Volatile at 100°

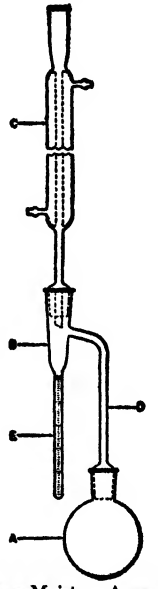
Accurately weigh about 10 Gm. of the drug as prepared under paragraph VI in a tared evaporating dish. Dry at a temperature of 100° for 5 hours, and weigh. Continue the drying and weighing at 1-hour intervals until the loss is not more than 0.25 per cent in 1 hour's drying.

VIII—Moisture Method for Drugs Containing Ether-soluble Constituents Volatile at 100°

Proceed as under paragraph VII. Determine the volatile ether-soluble extractive (paragraph XV) and subtract the percentage of volatile ether-soluble extractive from the percentage lost during drying. The difference represents the percentage of moisture.

IX—Moisture Method by Toluene Distillation

Apparatus—The apparatus (see illustration) required consists of a glass flask (*A*) connected by means of a trap (*B*) to a reflux condenser (*C*). All joints in the apparatus should be of ground glass. The flask should have a capacity of 500 cc., should be either of the short-neck, round-bottom type or of the Erlenmeyer type, and should be made of resistance glass.



Toluene Moisture Apparatus

The length of the trap should be between 23.5 and 24 cm., and the distance between the connecting tube (*D*) and the receiving tube (*E*) should be between 45 and 55 mm. The internal diameter of the connecting tube should be between 9 and 11 mm. and where sealed to the body of the trap should be inclined at an angle of 15° from the horizontal. The length of the cylindrical portion of the re-

ceiving tube should be between 14 and 15 cm., and the internal diameter of the neck of the trap should be between 22 and 24 mm. The receiving tube shall be graduated to contain 5 cc. and shall be subdivided into 0.1-cc. divisions, each 1-cc. line being numbered from 5 cc. at the top. The error in any indicated capacity may not be greater than 0.05 cc.

The jacket of the condenser should be approximately 400 mm. in length, and the inner tube of the condenser should have an external diameter between 9.5 and 12.7 mm. The end of the condenser that is inserted into the trap should be ground off at an angle of 30° from the vertical axis, and when inserted into the trap, the tip of the condenser should be about 7 mm. above the surface of the liquid in the trap after the distillation conditions have been established.

The source of heat is preferably an electric heater with rheostat control or an oil bath. The upper portion of the flask and the connecting tube may, if desired, be wrapped with asbestos paper or asbestos cord.

The receiving tube and the condenser must be chemically clean in order to permit the sharp separation of water. These parts should be cleaned with chromic acid cleansing mixture, thoroughly rinsed with distilled water, and dried in an oven.

The toluene used in the moisture determination should first be saturated with distilled water by shaking with a small quantity of distilled water, separating it from the excess water, and distilling the toluene.

Determination—Place in the dry flask a quantity of the substance, weighed accurately to the nearest centigram, which it is estimated will yield from 2 to 4 cc. of water. If the substance is of a pasty character, it is best weighed in a boat of metal foil of a size that will just pass through the neck of the flask. If the substance is likely to cause bumping, add enough dry sand to cover the bottom of the flask, or a number of capillary melting-point tubes, about 100 mm. in length, sealed at the upper end. Place about 200 cc. of toluene in the flask, connecting the apparatus as illustrated, and fill the receiving tube (*E*) with toluene poured through the top of the condenser. Heat the flask gently for 15 minutes, and when the toluene begins to boil, distil at the rate of about 2 drops per second until most of the water has passed over; then increase the rate of distillation to about 4 drops per second. When the water has apparently all distilled over, rinse the inside of the condenser tube with toluene while brushing down the tube with a tube brush attached to a copper wire and saturated with toluene. Continue the distillation for 5 minutes, then remove the heat and allow the receiving tube to cool to room temperature. If any droplets of water adhere to the walls of the receiving tube, force them down with a rubber band wrapped around a copper wire and wet with toluene. When the water and toluene have separated completely, read the volume of water and calculate the percentage that was present in the substance.

X—Crude Fiber

Exhaust a weighed quantity of the prepared drug (paragraph III), representing about 2 Gm. of the drug, with ether or use the residue from the determination of the volatile ether-soluble extractive (paragraph XV). Add 200 cc. of boiling sulfuric acid solution, adjusted to exactly 1.25 per cent by titration, to the ether-exhausted drug, in a 500-cc. flask, and connect the flask with a reflux condenser, the tube of which passes only a short distance below the rubber stopper, into the flask. Heat the mixture to boiling and continue the boiling exactly 30 minutes. Then filter through a

linen or hardened-paper filter and wash the residue on the filter with boiling distilled water until no longer acid. Rinse the residue back into the flask with 200 cc. of boiling sodium hydroxide solution, adjusted to exactly 1.25 per cent by titration and free from sodium carbonate. Again heat the mixture to boiling and continue the boiling exactly 30 minutes under the reflux condenser as described under the treatment with acid, then rapidly filter through a tared filter, wash the residue with boiling distilled water until the last washing is neutral, dry it at 110° until of constant weight, and note the weight. Now completely incinerate the dried residue and weigh the ash: the loss of weight is considered to be the weight of the crude fiber.

NOTE: The boiling with acid and alkali should continue *exactly* 30 minutes from the time that the liquid (which is cooled below the boiling point by adding it to the cold flask) again boils. After the solution has been brought to boiling, the flame should be turned low enough just to maintain boiling. During the boiling the flask should be gently rotated from time to time to catch any particles which may adhere to the walls of the flask. A slow current of air introduced into the flask during the boiling operation will be very helpful to keep down excessive frothing.

Extractives

XI—Alcohol-soluble Extractive

Weigh 2 Gm. of the prepared drug (paragraph III) into a dried and tared paper extraction thimble, using a glass-stoppered weighing bottle as the container, and place 0.2 Gm. of sodium hydroxide in the receiving flask. Extract the drug in a continuous extraction apparatus with alcohol, during 5 hours. Dry the insoluble residue at 100° for 30 minutes and weigh. Determine the moisture in the drug by the *toluene distillation method*, page 761, calculate the weight of moisture in the quantity of drug taken for the test and subtract it from the original weight of the drug taken for the test. The difference between this result and the weight of the residue determined as directed above represents the amount of alcohol-soluble extractive.

XII—Diluted Alcohol-soluble Extractive

Macerate about 2 Gm. of the prepared drug (paragraph III), accurately weighed, in about 70 cc. of diluted alcohol in a suitable flask. Shake the mixture during 8 hours at 30-minute intervals and then allow it to stand for 16 hours without shaking. Filter and wash the flask and residue with small portions of diluted alcohol, passing the washings through the filter, until the filtrate measures 100 cc. Evaporate a 50-cc. aliquot portion of this filtrate to dryness in a suitable tared dish on a water bath and dry to constant weight at 110°. Calculate the percentage of this extractive from the weight of drug taken.

XIII—Petroleum Benzin-soluble Extractive

Extract completely about 2 Gm. of the prepared drug (paragraph III), accurately weighed, by subjecting it during 20 hours to the action of petroleum benzin in a continuous extraction apparatus. Transfer the benzin solution to a tared porcelain dish and allow it to evaporate spontaneously. Then dry it over sulfuric acid for 18 hours and weigh. Calculate the percentage of this extractive from the weight of drug taken.

XIV—Non-volatile Ether-soluble Extractive

Proceed as directed under *Volatile Ether-soluble Extractive* (paragraph XV). The weight of the extract after drying in a desiccator and then at 110° until of constant weight represents the non-volatile portion of the extract.

XV—Volatile Ether-soluble Extractive

Extract completely 2 Gm. of the prepared drug (paragraph III), dry over sulfuric acid for not less than 12 hours, and subject it, during 20 hours, to the action of absolute ether (page 766) in a continuous extraction apparatus. Transfer the ether solution to a tared porcelain dish and allow it to evaporate spontaneously. Then dry it over sulfuric acid during 18 hours and weigh the total ether extract. Now heat the extract gradually up to 110° until the weight becomes constant: the loss in weight represents the volatile portion of the extract.

XVI—Water-soluble Extractive

Proceed as directed under paragraph XII, using distilled water instead of diluted alcohol.

XVII—Volatile Oil Determination

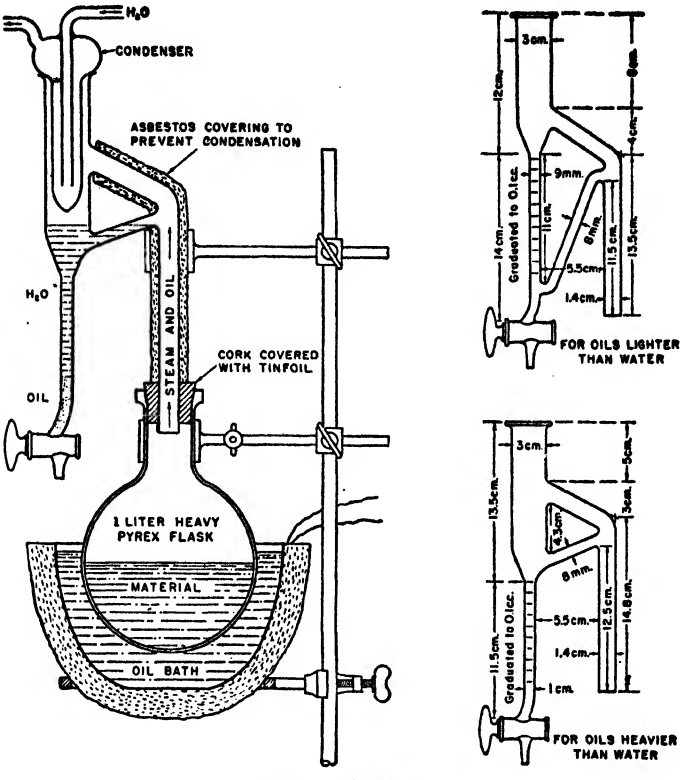
Set up an apparatus as shown in the illustration, using an appropriate volatile oil trap as illustrated. Use a suitable oil bath for heating.

Determination—(*A*) *For Products Containing but Little Starch or Mucilage*—Coarsely comminute a sufficient quantity of the drug to yield from 1 cc. to 3 cc. of volatile oil. Small seeds or fruits or broken leaves or herbs ordinarily do not need comminution. Very fine powders are to be avoided. If this is not possible, it may be necessary to mix them with purified sawdust or purified sand. Place a suitable quantity of the drug, accurately weighed, in the flask and fill it one-half with water. Attach the condenser and the proper separator. Glass beads or a glass rod may be added to prevent bumping. Boil the contents of the flask, using a suitable source of heat to maintain gentle boiling for two hours, or until the volatile oil has been completely separated from the drug and no longer collects in the graduated tube of the separator.

If a proper quantity of the volatile oil has been obtained in the graduated tube of the separator, it can be read to tenths of a cc., and the volume of volatile oil from each 100 Gm. of drug can be calculated from the weight of the drug taken. The graduations on the separator "for oils heavier than water" are so placed that oil remains below the aqueous condensate which automatically flows back into the flask.

(*B*) *For Products Containing Considerable Starch or Mucilage*—Exhaust an accurately weighed quantity of the drug with alcohol or ether in an automatic extractor; transfer the extract to a suitable container and evaporate the solvent from the extract, using as little heat as possible and a gentle current of air. When the odor of the solvent is no longer perceptible, mix the extract with a quantity of dry, purified sawdust, transfer the mixture to the flask used for the volatile oil determinations, add a suitable amount of water, and proceed as directed under (A).

(*C*) *For Fluid Preparations Containing Volatile Oil*—Place a suitable quantity of the fluid preparation into the flask of the apparatus used for volatile oil determina-



Volatile Oil Apparatus

tions and evaporate the solvent, using as little heat as possible and a current of air, until the odor of the solvent is no longer perceptible; add water to the flask and proceed as directed under (A).

REAGENTS, TEST SOLUTIONS, COLORIMETRIC SOLUTIONS, INDICATORS, VOLUMETRIC APPARATUS, VOLUMETRIC SOLUTIONS, HYDROGEN IONS, AND pH

All items listed in this Section for which no definite specifications or directions are provided in this National Formulary, must comply with the requirements under the same heading in the U. S. Pharmacopœia XIII.

Reagents—For definition see *Reagents*, U. S. P. XIII.

Test Solutions (T.S.)—For definition see *Test Solutions*, U. S. P. XIII.

Indicators—For definition see *Indicators*, U. S. P. XIII.

Volumetric Solutions—For definition see *Volumetric Solutions*, U. S. P. XIII.

Colorimetric Solutions (C.S.)—For definition see *Colorimetric Solutions (C.S.)* U. S. P. XIII.

Reagent Acids and Ammonia—See *Reagent Acids and Ammonia*, U. S. P. XIII.

Water—See *Water*, U. S. P. XIII.

Reagents

General Tests for Purity of Reagents

Unless otherwise directed, the following U. S. P. XIII general methods of testing are to be used in the examination of *Reagents*, for which specifications are prescribed in this National Formulary.

Insoluble Matter—Proceed as directed for the determination of *Insoluble Matter* in reagents, U. S. P. XIII.

Chloride in Reagents—Proceed as directed for the determination of *Chloride in Reagents*, U. S. P. XIII.

Sulfate in Reagents—Proceed as directed for the determination of *Sulfate in Reagents*, U. S. P. XIII.

Heavy Metals in Reagents—Proceed as directed for the determination of *Heavy Metals in Reagents*, U. S. P. XIII.

Iron in Reagents—Proceed as directed for the determination of *Iron in Reagents*, U. S. P. XIII.

Reagent Standards

The standards for the quality of the reagents described or referred to in this Chapter are based upon the degree of purity required for the proper performance of the tests and assays in this National Formulary.

Absolute Ether—Use *Ether, Absolute*, reagent grade, U. S. P. XIII.

Acetic Acid—Use *Acetic Acid*, page 18.

Acetic Acid, Diluted—Use *Diluted Acetic Acid*, page 19.

Acetic Acid, Glacial—Use *Glacial Acetic Acid*, U. S. P. XIII.

Acetic Anhydride—Use *Acetic Anhydride*, reagent grade, U. S. P. XIII.

Acetone—Use *Acetone*, page 20.

Acetyl Chloride—Use *Acetyl Chloride*, reagent grade, U. S. P. XIII.

Acid Fuchsin—Use *Acid Fuchsin*, page 638.

Activated Charcoal—Use *Activated Charcoal*, U. S. P. XIII.

Alcohol—Use *Alcohol*, U. S. P. XIII.

Alcohol, Absolute—Use *Dehydrated Alcohol*, page 27.

Alcohol, Aldehyde-free—Use *Alcohol, Aldehyde-free*, reagent grade, U. S. P. XIII.

Alcohol, Amyl—Use *Amyl Alcohol*, reagent grade, U. S. P. XIII.

Alcohol, Dehydrated—Use *Dehydrated Alcohol*, page 27.

Alcohol, Diluted—Use *Diluted Alcohol*, U. S. P. XIII.

Alcohol, Methyl—Use *Methanol*, reagent grade, U. S. P. XIII.

Alcohol, Neutralized—Use *Alcohol, Neutralized*, U. S. P. XIII.

Alizarin Red—Use *Sodium Alizarinsulfonate*, reagent grade, U. S. P. XIII.

Alum—Use *Alum*, U. S. P. XIII.

Ammonia Water—Use *Ammonia T.S.*, U. S. P. XIII.

Ammonia Water, Stronger—Use *Ammonia Water, Stronger, Reagent*, U. S. P. XIII.

Ammonium Carbonate—Use *Ammonium Carbonate*, U. S. P. XIII.

Ammonium Chloride—Use *Ammonium Chloride*, reagent grade, U. S. P. XIII.

Ammonium Citrate—Use *Ammonium Citrate, Dibasic*, reagent grade, U. S. P. XIII.

Ammonium Nitrate—Use *Ammonium Nitrate*, reagent grade, U. S. P. XIII.

Ammonium Oxalate—Use *Ammonium Oxalate*, reagent grade, U. S. P. XIII.

Ammonium Phosphate, Dibasic—Use *Ammonium Phosphate, Dibasic*, reagent grade, U. S. P. XIII.

Ammonium Sulfate—Use *Ammonium Sulfate*, reagent grade, U. S. P. XIII.

Ammonium Vanadate—Use *Ammonium Vanadate*, page 640.

Amyl Alcohol—Use *Amyl Alcohol*, reagent grade, U. S. P. XIII.

Aniline—Use *Aniline*, reagent grade, U. S. P. XIII.

Aniline Blue—Use *Aniline Blue*, page 640.

Asbestos—Use *Asbestos*, U. S. P. XIII.

Azolitmin—Use *Azolitmin*, reagent grade, U. S. P. XIII.

Barium Carbonate, $BaCO_3$, occurs as a white powder insoluble in water (free from carbon dioxide), slightly soluble in carbonated water, and readily soluble with effervescence in hydrochloric, nitric, and acetic acids.

Insoluble in dilute hydrochloric acid—Dissolve 5 Gm. in 50 cc. of water and 5 cc. of hydrochloric acid. Dilute to 100 cc., filter through asbestos in a Gooch crucible, wash the insoluble residue with diluted hydrochloric acid, dry at 105° to 110°, and weigh. The weight of the residue does not exceed 1 mg. (0.02 per cent).

Chloride—To 1 Gm. add 20 cc. of water and gradually add, with stirring, 1 cc. of nitric acid. Filter, if necessary, and wash with hot water, dilute to 30 cc., and add 1 cc. of silver nitrate T.S. Any turbidity produced is not greater than is produced by 0.02 mg. of chloride ion in an equal volume of solution containing the same quantities of the same reagents used in the test (about 0.002 per cent).

Soluble alkali hydroxides and carbonates—Shake 5 Gm. of the sample for 5 minutes

with 50 cc. of warm, carbon dioxide-free water, cool, and filter. To 30 cc. of the filtrate add 2 drops of phenolphthalein T.S. If a pink color is produced, it is discharged by 1 drop of 0.1 *N* hydrochloric acid.

Nitrate—Dissolve 3 Gm. in 23 cc. of water containing 15 mg. of sodium chloride and add 7 cc. of acetic acid. To 10 cc., add 0.2 cc. of indigo carmine solution (1 in 1000) and 10 cc. of sulfuric acid. Heat on a water bath 1 hour with occasional stirring. The blue color of the clear solution is not completely discharged.

Sulfide—Dissolve 1 Gm. in 8 cc. of warm distilled water and 2 cc. of glacial acetic acid, add 5 drops of alkaline lead solution (made by adding sodium hydroxide to lead acetate T.S. until the precipitate is dissolved). No darkening of the solution occurs within 5 minutes (about 0.001 per cent sulfide).

Calcium and alkali salts—Dissolve 2.5 Gm. in 150 cc. of hot water and 5 cc. of reagent hydrochloric acid. Heat to boiling and add 25 cc. of dilute reagent sulfuric acid (1 volume of acid in 15 cc. of distilled water), dilute exactly to 250 cc. and allow to stand for 18 hours. Decant 100 cc. through a filter, evaporate, and ignite to constant weight: the weight of the residue does not exceed 2 mg. (0.20 per cent).

Heavy Metals—Dissolve 2 Gm. in 20 cc. of warm water by adding hydrochloric acid dropwise until the barium carbonate is dissolved. The solution conforms to the test for heavy metals in reagents, U. S. P. XIII.

Iron—The iron in 2 Gm. corresponds to not more than 0.02 mg. of Fe (0.001 per cent), U. S. P. XIII.

Barium Chloride—Use *Barium Chloride*, reagent grade, U. S. P. XIII.

Barium Hydroxide—Use *Barium Hydroxide*, reagent grade, U. S. P. XIII.

Basic Fuchsin—Use *Basic Fuchsin*, page 643.

Benzene—Use *Benzene*, reagent grade, U. S. P. XIII.

Benzidine—Use *Benzidine*, reagent grade, U. S. P. XIII.

Benzin, Petroleum—Use *Petroleum Benzin*, U. S. P. XIII.

Betanaphthol—Use *Betanaphthol*, U. S. P. XIII.

Bromine—Use *Bromine*, reagent grade, U. S. P. XIII.

Calcium Hydroxide—Use *Calcium Hydroxide*, U. S. P. XIII.

Canada Turpentine—Use *Canada Turpentine*, reagent grade, U. S. P. XIII.

Carbon Dioxide—Use *Carbon Dioxide*, U. S. P. XIII.

Carbon Disulfide—Use *Carbon Disulfide*, reagent grade, U. S. P. XIII.

Carbon Tetrachloride—Use *Carbon Tetrachloride*, reagent grade, U. S. P. XIII.

Casein—Use *Casein*, reagent grade, U. S. P. XIII.

Charcoal—Use *Activated Charcoal*, U. S. P. XIII.

Charcoal, Activated—Use *Activated Charcoal*, U. S. P. XIII.

Charcoal, Purified Animal—Use *Purified Animal Charcoal*, page 135.

Chloranil—Use *Chloranil*, reagent grade, U. S. P. XIII.

Chlorinated Lime—Use *Chlorinated Lime*, reagent grade, U. S. P. XIII.

Chloroform—Use *Chloroform*, U. S. P. XIII.

Chromotropic Acid—Use *Chromotropic Acid*, reagent grade, U. S. P. XIII.

Chromic Acid—Use *Chromium Trioxide*, U. S. P. XIII.

Chromium Trioxide—Use *Chromium Trioxide*, U. S. P. XIII.

Citric Acid—Use *Citric Acid*, U. S. P. XIII.

Copper—Use *Copper*, reagent grade, U. S. P. XIII.

Cupric Acetate—Use *Cupric Acetate*, reagent grade, U. S P. XIII.

Cupric Sulfate—Use *Cupric Sulfate*, reagent grade, U. S. P. XIII.

Dehydrated Alcohol—Use *Dehydrated Alcohol*, page 27.

Dehydrated Ether—Use *Ether, Absolute*, reagent grade, U. S. P. XIII.

Dibasic Potassium Phosphate—Use *Potassium Phosphate, Dibasic*, reagent grade, U. S. P. XIII.

Dichlorofluorescein, $C_{20}H_{10}O_5Cl_2$, occurs as a weak orange powder.

Solubility—Dichlorofluorescein is sparingly soluble in water, soluble in alcohol, and in solutions of alkali hydroxides.

Residue on ignition—Ignite 0.2 Gm. of dichlorofluorescein with 5 drops of sulfuric acid: the weight of the residue does not exceed 1 mg. (0.5 per cent).

Sensitiveness—Weigh accurately about 0.1 Gm. of potassium iodide, previously dried to constant weight at 105°, and dissolve it in 50 cc. of distilled water. Add 1 cc. of dichlorofluorescein T.S. and 1 cc. of glacial acetic acid, and titrate with 0.1 *N* silver nitrate until the color of the precipitate changes from pale yellowish orange to pink. The volume of 0.1 *N* silver nitrate consumed should not be in excess of 0.1 cc. over the calculated volume, based on the KI content of the dried potassium iodide as determined under *Potassium Iodide*, U. S. P. XIII.

Diluted Acetic Acid—Use *Diluted Acetic Acid*, page 19.

Diluted Alcohol—Use *Diluted Alcohol*, U. S. P. XIII.

Diluted Hydrochloric Acid—Use *Diluted Hydrochloric Acid*, reagent grade, U. S. P. XIII.

Diluted Nitric Acid—Use *Nitric Acid, Diluted*, reagent grade, U. S. P. XIII.

Diluted Sulfuric Acid—Use *Sulfuric Acid, Diluted*, reagent grade, U. S. P. XIII.

Diphenylamine—Use *Diphenylamine*, reagent grade, U. S. P. XIII.

Diphenylthiocarbazone—Use *Dithizone*, reagent grade, U. S. P. XIII.

Dithizone—Use *Dithizone*, reagent grade, U. S. P. XIII.

Ether—Use *Ether*, or *Ethyl Oxide*, U. S. P. XIII.

Ether, Absolute—Use *Ether, Absolute*, reagent grade, U. S. P. XIII.

Ether for Anesthesia—Use *Ether*, U. S. P. XIII.

Ethyl Oxide—Use *Ether*, U. S. P. XIII.

Exsiccated Sodium Sulfate—Use *Sodium Sulfate, Anhydrous*, reagent grade, U. S. P. XIII.

Ferric Ammonium Sulfate—Use *Ferric Ammonium Sulfate*, reagent grade, U. S. P. XIII.

Ferric Chloride—Use *Ferric Chloride*, reagent grade, U. S. P. XIII.

Ferrous Sulfate—Use *Ferrous Sulfate*, U. S. P. XIII.

Formic Acid—Use *Formic Acid*, page 228.

Freshly Slaked Lime—Use *Lime, Freshly Slaked*, reagent grade, U. S. P. XIII.

Fuming Nitric Acid—Use *Nitric Acid, Fuming*, reagent grade, U. S. P. XIII.

Fuming Sulfuric Acid—Use *Sulfuric Acid, Fuming*, reagent grade, U. S. P. XIII.

Glacial Acetic Acid—Use *Glacial Acetic Acid*, U. S. P. XIII.

Glass Wool—Use *Glass Wool*, U. S. P. XIII.

Glycerin—Use *Glycerin*, U. S. P. XIII.

Gold Chloride—Use *Gold Chloride*, reagent grade, U. S. P. XIII.

Gold Leaf—occurs as pure gold in very thin transparent sheets with a bluish or greenish color; it is not affected by nitric acid or tarnished by ammonia, but is soluble in nitrohydrochloric acid.

Guaiac—Use *Guaiac*, page 242.

Hematoxylin—Use *Hematoxylin*, page 662.

Hydrochloric Acid—Use *Hydrochloric Acid*, reagent grade, U. S. P. XIII.

Hydrochloric Acid, Diluted—Use *Hydrochloric Acid, Diluted*, reagent grade, U. S. P. XIII.

Hydrofluoric Acid—Use *Hydrofluoric Acid*, reagent grade, U. S. P. XIII.

Hydrogen Peroxide Solution—Use *Hydrogen Peroxide Solution*, U. S. P. XIII.

Hydrogen Peroxide, 30 per cent—Use *Hydrogen Peroxide, 30 per cent*, reagent grade, U. S. P. XIII.

Hydrogen Sulfide—Use *Hydrogen Sulfide*, U. S. P. XIII.

Hydroxylamine Hydrochloride—Use *Hydroxylamine Hydrochloride*, reagent grade, U. S. P. XIII.

Indicators—See page 783.

Iodic Acid—HIO_3, occurs as colorless or slightly yellow crystals or crystalline powder. It is soluble in 0.5 part of water and somewhat soluble in alcohol of 87 per cent or less concentration. At about 170° it decomposes into iodic anhydride I_2O_5, and water.

Residue on ignition—Ignite 10 Gm. in a porcelain crucible. Cool and weigh. The weight of the residue does not exceed 5 mg. (0.05 per cent).

Chloride and bromide—Mix 1 Gm. of the powdered sample with 0.3 Gm. of powdered potassium hydroxide and add 2 Gm. of pure sucrose. Thoroughly mix and ignite at a low temperature in a porcelain crucible in small portions, by making small additions of the material to the crucible when the reaction has subsided. Treat the residue with 10 cc. of hot water and 1 cc. of nitric acid, filter, wash with 10 cc. of hot water. Cool and add 5 cc. of ammonia T.S. Add 20 cc. of 5 per cent silver nitrate solution with constant stirring, dilute to 50 cc. and filter. To 25 cc. of the filtrate add a slight excess of nitric acid. The turbidity should not be greater than that produced by 0.1 mg. of chloride ion in the same volume of solution made with the same quantities of the same reagents used in the test (0.002 per cent).

Iodide—Dissolve 1 Gm. in 20 cc. of water, add 1 cc. of chloroform and 0.5 cc. of 1 *N* sulfuric acid. No violet color is produced in the chloroform in 1 minute.

Sulfate—Add 0.1 Gm. of sodium carbonate to 5 Gm. of the sample and evaporate to dryness with 20 cc. of hydrochloric acid and repeat twice using 10 cc. of acid each time. Dissolve the residue in 50 cc. of water, add 1 cc. of dilute hydrochloric acid (1:3), filter, heat to boiling, add 5 cc. of barium chloride T.S., and allow to stand overnight. Any turbidity should not be greater than that produced by 0.5 mg. of sulfate ion in a solution of the same volume and containing the same quantities of the same reagents used in the test (0.01 per cent).

Heavy metals—Dissolve 2 Gm. and 0.1 Gm. of sodium carbonate in 10 cc. of hydrochloric acid and evaporate to dryness. Successively add 5-cc. portions of hydrochloric acid and evaporate to dryness after each addition. Dissolve the residue in 20 cc. of water, neutralize with ammonia T.S., add 1 cc. of 0.1 *N* hydrochloric acid, and pass hydrogen sulfide through the solution. Any darkening should not exceed that produced in a blank containing 0.02 mg. of Pb ion (0.001 per cent).

Iron—Add ammonia T.S. to the solution obtained in the test for heavy metals until it is alkaline. Any green color observed should not be greater than that produced in a blank containing 0.02 mg. of Fe ion (0.001 per cent).

Iodine—Use *Iodine*, reagent grade, U. S. P. XIII.

Kaolin—Use *Kaolin*, page 287.

Kerosene—Use *Kerosene*, reagent grade, U. S. P. XIII.

Lactose—Use *Lactose*, U. S. P. XIII.

Lead Peroxide—Use *Lead Dioxide* (Lead Peroxide), reagent grade, U. S. P. XIII.

Lead Subacetate Solution—Use *Lead Subacetate Solution*, page 295.

Lime, Freshly Slaked—Use *Lime, Freshly Slaked*, U. S. P. XIII.

Manganese Dioxide (*Precipitated Manganese Dioxide*)—It consists chiefly of manganese dioxide (MnO_2) with small amounts of other oxides of manganese, but containing not less than 80 per cent of MnO_2. It occurs as a heavy, very fine, black powder insoluble in water or alcohol. In hot hydrochloric acid, it is dissolved as manganous chloride and with the evolution of chlorine.

Insoluble substances—Add 20 cc. of distilled water to 1 Gm. of manganese dioxide and 2 Gm. of oxalic acid; then add 3 cc. of sulfuric acid, and digest the mixture for several hours on a water bath: not more than 0.2 per cent of residue remains.

Assay—Dissolve about 0.2 Gm. of manganese dioxide, accurately weighed, in a mixture of 50 cc. of 0.1 *N* oxalic acid and 3 cc. of sulfuric acid, heat to 80° on a water bath, and titrate the residual oxalic acid with 0.1 *N* potassium permanganate. Each cc. of 0.1 *N* oxalic acid is equivalent to 0.004347 Gm. of MnO_2.

Mercuric Chloride—Use *Mercury Bichloride*, reagent grade, U. S. P. XIII.

Mercuric Oxide, Yellow—Use *Yellow Mercuric Oxide*, U. S. P. XIII.

Mercury Nitrate Solution (*Millon's Reagent*)—Dissolve 3 cc. of mercury in 27 cc. of fuming nitric acid without heat; then dilute the solution with an equal volume of water. *Mercury Nitrate Solution must be recently prepared.*

Methanol—Use *Methanol*, reagent grade, U. S. P. XIII.

Millon's Reagent—Use *Mercury Nitrate Solution*, page 771.

Molybdic Acid—Use *Molybdic Anhydride*, reagent grade, U. S. P. XIII.

Monobasic Potassium Phosphate—Use *Potassium Phosphate, Monobasic*, page 772.

Mucilage, Acacia—Use *Acacia Mucilage*, U. S. P. XIII.

Neutral Alcohol—Use *Alcohol, Neutralized*, U. S. P. XIII.

Nitric Acid—Use *Nitric Acid*, reagent grade, U. S. P. XIII.

Nitric Acid, Diluted—Use *Nitric Acid, Diluted*, reagent grade, U. S. P. XIII.

Nitric Acid, Fuming—Use *Nitric Acid, Fuming*, reagent grade, U. S. P. XIII.

Nitrohydrochloric Acid—Use *Nitrohydrochloric Acid*, page 353.

Osmic Acid—Use *Osmium Tetroxide*, page 669.

Oxalic Acid—Use *Oxalic Acid*, reagent grade, U. S. P. XIII.

Perchloric Acid—Use *Perchloric Acid*, reagent grade, U. S. P. XIII.

Petroleum Benzin—Use *Petroleum Benzin*, U. S. P. XIII.

Phenol—Use *Phenol*, U. S. P. XIII.

Phenylhydrazine—Use *Phenylhydrazine*, reagent grade, U. S. P. XIII.

Phenylhydrazine Hydrochloride—Use *Phenylhydrazine Hydrochloride*, page 670.

Phloroglucinol—Use *Phloroglucinol*, reagent grade, U. S. P. XIII.

Phosphomolybdic Acid—Use *Phosphomolybdic Acid*, reagent grade, U. S. P. XIII.

Phosphoric Acid—Use *Phosphoric Acid*, reagent grade, U. S. P. XIII.

Phosphotungstic Acid—Use *Phosphotungstic Acid*, reagent grade, U. S. P. XIII.

Picric Acid—Use *Trinitrophenol*, page 539.

Potassium and Sodium Tartrate—Use *Potassium and Sodium Tartrate*, U. S. P. XIII.

Potassium Bisulfate—Use *Potassium Bisulfate*, reagent grade, U. S. P. XIII.

Potassium Bromate—Use *Potassium Bromate*, reagent grade, U. S. P. XIII.

Potassium Bromide—Use *Potassium Bromide*, U. S. P. XIII.

Potassium Carbonate, Anhydrous—Use *Potassium Carbonate, Anhydrous*, reagent grade, U. S. P. XIII.

Potassium Chlorate—Use *Potassium Chlorate*, reagent grade, U. S. P. XIII.

Potassium Cyanide—Use *Potassium Cyanide*, reagent grade, U. S. P. XIII.

Potassium Dichromate—Use *Potassium Dichromate*, reagent grade, U. S. P. XIII.

Potassium Dihydrogen Phosphate—Use *Potassium Phosphate, Monobasic*, page 772.

Potassium Ferricyanide—Use *Potassium Ferricyanide*, reagent grade, U. S. P. XIII.

Potassium Ferrocyanide—Use *Potassium Ferrocyanide*, reagent grade, U. S. P. XIII.

Potassium Hydrogen Phosphate (*Dibasic Potassium Phosphate, Potassium Monophosphate*), K_2HPO_4—Use *Potassium Phosphate, Dibasic*, reagent grade, U. S. P. XIII.

Potassium Hydroxide—Use *Potassium Hydroxide*, U. S. P. XIII.

Potassium Iodate—Use *Potassium Iodate*, reagent grade, U. S. P. XIII.

Potassium Iodide—Use *Potassium Iodide*, U. S. P. XIII.

Potassium Nitrate—Use *Potassium Nitrate*, reagent grade, U. S. P. XIII.

Potassium Oxalate—Use *Potassium Oxalate*, reagent grade, U. S. P. XIII.

Potassium Permanganate, Powdered—Use *Potassium Permanganate*, U. S. P. XIII.

Potassium Phosphate, Monobasic—Monopotassium Phosphate, Potassium Phosphate Monobasic, Potassium Dihydrogen Phosphate, KH_2PO_4, occurs as colorless deliquescent crystals, soluble in about four parts of water, insoluble in alcohol.

Insoluble, calcium and ammonium hydroxide precipitate—Dissolve 10 Gm. in 100 cc. of water, add 5 cc. of ammonium oxalate T.S., and add ammonia T.S. until the solution is distinctly alkaline to litmus. Add an excess of 15 cc. of ammonia T.S. and allow to stand overnight. If a precipitate is formed, filter, wash, ignite at a low red heat, and weigh. The weight does not exceed 1 mg. (0.01 per cent).

Loss on drying over sulfuric acid—Accurately weigh about 2 Gm. and dry for 24 hours over sulfuric acid. The loss in weight does not exceed 0.20 per cent.

Loss on ignition—Ignite carefully to constant weight the dried residue obtained in the previous test. The loss in weight is not less than 13.15 per cent and not more than 13.35 per cent.

Hydrogen-ion concentration—Prepare a 0.2 *M* solution and determine the *p*H by the use of indicators or electrometrically. The *p*H is between 4.4 and 4.7. Take 10-cc. portions of the solution in 4 test tubes and to each of 2 add 5 drops of 0.04 per cent bromophenol blue.

To each of the other 2 add 5 drops of a 0.02 per cent solution of methyl red. To 1 tube with bromophenol blue add 0.05 cc. of 0.1 *N* hydrochloric acid and to 1 of the tubes with methyl red add 0.05 cc. of 0.1 *N* sodium hydroxide. The solution in the tubes to which acid and alkali have been added show distinct changes of color when compared with the corresponding tubes to which neither acid nor alkali was added.

Chloride—Dissolve 2 Gm. in 20 cc. of water, add 2 cc. of nitric acid, and 1 cc. of 0.1 *N* silver nitrate. Any turbidity produced is not greater than is produced by 0.2 mg. of chloride ion in an equal volume of distilled water on the addition of the same quantities of the same reagents used in the test (0.001 per cent).

Nitrogen compounds—Dissolve 2 Gm. in 30 cc. of water, add 20 cc. of sodium hydroxide (1 in 10) and 0.5 Gm. of aluminum wire in small pieces. Allow to stand for

3 hours protected from loss or access of ammonia, decant 25 cc., and add 2 cc. of Nessler's Reagent. Any color is not greater than is produced by a quantity of an ammonium salt containing 0.01 mg. of nitrogen (0.001 per cent).

Sulfate—Dissolve 10 Gm. in 100 cc. of water, add 1 cc. of hydrochloric acid, and heat to boiling. Add 5 cc. of barium chloride T.S. and allow to stand overnight. No precipitate is formed.

Heavy metals—Dissolve 5 Gm. in 40 cc. of water and exactly neutralize with ammonium hydroxide using 3 drops of phenolphthalein T.S. as an indicator. Add 40 cc. of 1 *N* sulfuric acid, add 5 cc. of hydrogen sulfide T.S., and dilute to 100 cc. Any brown color which is immediately produced is not darker than that produced by 0.05 mg. of lead in the same volume of an aqueous solution of lead salt treated with the same amount of hydrogen sulfide T.S. (0.001 per cent).

Iron—Dissolve 5 Gm. in 100 cc. of water, take 5 cc. of this solution and dilute to 40 cc., and add 2 cc. of ammonia T.S., and 5 cc. of hydrogen sulfide T.S. Any green color is not greater than is produced by 0.005 mg. of iron under the same conditions (0.002 per cent).

Sodium—A 10 per cent solution tested on a platinum wire in the flame imparts no distinct yellow color to the flame (about 0.03 per cent).

Potassium Sulfate—Use *Potassium Sulfate*, reagent grade, U. S. P. XIII.

Purified Animal Charcoal—Use *Purified Animal Charcoal*, page 135.

Purified Benzin—Use *Petroleum Benzin*, U. S. P. XIII.

Pyridine—Use *Pyridine*, reagent grade, U. S. P. XIII.

Resazurin—Use *Resazurin*, reagent grade, U. S. P. XIII.

Sand, Clean (*Purified or Washed Sand*)—Use *Sand, Washed*, U. S. P. XIII.

Selenous Acid—Use *Selenous Acid*, reagent grade, U. S. P. XIII.

Silver Nitrate—Use *Silver Nitrate*, reagent grade, U. S. P. XIII.

Sodium Acetate—Use *Sodium Acetate*, reagent grade, U. S. P. XIII.

Sodium Acetate, Anhydrous—Use *Sodium Acetate, Anhydrous*, reagent grade, U. S. P. XIII.

Sodium Alizarinsulfonate—Use *Sodium Alizarinsulfonate*, reagent grade, U. S. P. XIII.

Sodium Bicarbonate—Use *Sodium Bicarbonate*, U. S. P. XIII.

Sodium Bisulfite—Use *Sodium Bisulfite*, reagent grade, U. S. P. XIII.

Sodium Bitartrate—Use *Sodium Bitartrate*, reagent grade, U. S. P. XIII.

Sodium Borate—Use *Sodium Borate*, U. S. P. XIII.

Sodium Bromide—Use *Sodium Bromide*, U. S. P. XIII.

Sodium Carbonate, Anhydrous—Use *Sodium Carbonate, Anhydrous*, reagent grade, U. S. P. XIII.

Sodium Carbonate, Monohydrated—Use *Sodium Carbonate, Monohydrated*, U. S. P. XIII.

Sodium Chloride—Use *Sodium Chloride*, reagent grade, U. S. P. XIII.

Sodium Cyanide, NaCN, occurs as white granules or fused fragments. It is freely soluble in water, and slightly soluble in alcohol.

Caution: Due to the extremely toxic nature of this reagent and the gas evolved from it when it is treated with acids, all tests must be conducted in a hood provided with a strong draft, taking care to avoid the inhalation of the fumes. Pipettes must not be used to measure its solutions.

Assay—Weigh accurately about 0.4 Gm. of the sample and dissolve it in 30 cc. of

distilled water. Add 3 drops of potassium iodide T.S., 1 cc. of stronger ammonia T.S. and titrate with 0.1 *N* silver nitrate to a slight permanent turbidity. Each cc. of 0.1 *N* silver nitrate is equivalent to 0.0098 Gm. of NaCN. Not less than 95 per cent of NaCN must be found.

Chloride—Measure 20 cc. of a solution of NaCN (1 in 20) and pour into a long-necked flask. Add 10 cc. of distilled water and 25 cc. of diluted sulfuric acid and evaporate, under a hood with a strong draft, to half of the original volume. Replace the water lost and evaporate again to half of the original volume. Cool, filter, dilute to 50 cc. with distilled water, and add 2 cc. of nitric acid and 1 cc. of 0.1 *N* silver nitrate. The turbidity should not be greater than that produced by 0.33 mg. of sodium chloride dissolved in 50 cc. of distilled water when treated with the nitric acid and silver nitrate in the same manner.

Ferrocyanide—To 20 cc. of a solution of sodium cyanide (1 in 20) add 3 cc. of hydrochloric acid and 1 drop of freshly prepared ferric chloride T.S. No blue or green color should develop within 1 hour.

Sulfate—To 20 cc. of a solution of sodium cyanide (1 in 20) add 2.5 cc. of hydrochloric acid and 2 cc. of barium chloride T.S. At the end of 10 minutes, any turbidity is not greater than that in a control made with 0.1 mg. of SO_4 (0.02 per cent).

Sulfide—To 20 cc. of a solution of sodium cyanide (1 in 20) add 3 drops of a solution made by adding sodium hydroxide solution (1 in 10) to lead acetate solution (1 in 10) until the precipitate first formed redissolves. If a color is produced, it is not darker than that produced by the same quantity of alkaline lead solution in 20 cc. of distilled water containing 0.03 mg. of sulfide ion.

Thiocyanate—To 20 cc. of a solution of sodium cyanide (1 in 20) add, under a hood, 4 cc. of hydrochloric acid and 4 drops of ferric ammonium sulfate T.S. The color of the solution is not darker than a blank.

Heavy Metals—Add 10 cc. of hydrogen sulfide T.S. to a solution of sodium cyanide (1 in 30). No darkening of the solution occurs nor does a dark color appear upon adding 7 cc. of diluted hydrochloric acid to the solution.

Sodium Fluoride—Use *Sodium Fluoride*, reagent grade, U. S. P. XIII.

Sodium Hydrosulfite—Use *Sodium Hydrosulfite*, reagent grade, U. S. P. XIII.

Sodium Hydroxide—Use *Sodium Hydroxide*, reagent grade, U. S. P. XIII.

Sodium Nitroferricyanide—Use *Sodium Nitroferricyanide*, reagent grade, U. S. P. XIII.

Sodium Nitroprusside—Use *Sodium Nitroprusside*, reagent grade, U. S. P. XIII.

Sodium Oxalate—Use *Sodium Oxalate*, reagent grade, U. S. P. XIII.

***p*-Sodium Periodate**, $Na_3H_2IO_6$, occurs as a white odorless powder with a slightly saline taste. It is very slightly soluble in distilled water, but freely soluble in the presence of hydrochloric acid. It is practically insoluble in alcohol, ether, or chloroform.

Loss on drying—When dried to constant weight at 100°, *p*-sodium periodate loses not more than 1 per cent of its weight.

Reaction—An aqueous solution of *p*-sodium periodate is alkaline to litmus paper.

Chloride and bromide—Mix 1 Gm. of the powdered *p*-sodium periodate with 2 Gm. of sucrose and ignite carefully at a low temperature, taking small portions at a time. Treat the residue with 10 cc. of hot distilled water, and 1 cc. of nitric acid (1 in 5), filter and wash with 10 cc. of hot distilled water. Cool and add 6 cc. of stronger ammonia T.S. Add 20 cc. of silver nitrate solution (1 in 20) with constant stirring,

dilute to 50 cc., and filter. To 25 cc. of the filtrate add a slight excess of nitric acid. The turbidity is not greater than that produced by 0.25 mg. of chloride ion in an equal volume of solution containing the same quantities of the same reagents (about 0.05 per cent as Cl).

Iodide—Dissolve 1 Gm. of *p*-sodium periodate in a mixture of 10 cc. of distilled water and 10 cc. of diluted sulfuric acid and add 1 cc. of chloroform; no red-purple color should be produced in the chloroform in 1 minute (about 0.01 per cent I).

Manganese—Add 1 Gm. of *p*-sodium periodate to 200 cc. of distilled water and 10 cc. of nitric acid. Add 2 cc. of phosphoric acid and heat to boiling for 1 minute. No pink color is developed.

Sulfate—Evaporate 2 Gm. of *p*-sodium periodate to dryness with 10 cc. of hydrochloric acid and repeat the evaporation twice with 5-cc. portions of the acid; the residue dissolved in 25 cc. of distilled water shows no more sulfate than corresponds to 0.1 mg. of SO_4 (0.005 per cent), U. S. P. XIII.

Heavy metals—To 2 Gm. of *p*-sodium periodate add 5 cc. of distilled water and 10 cc. of hydrochloric acid and evaporate to dryness on a steam bath. Repeat the evaporation twice with 5 cc. of hydrochloric acid. Dissolve the residue in 20 cc. of distilled water and add 2 cc. of diluted acetic acid. If this is yellowish, discharge the color with 1 or 2 drops of sodium thiosulfate T.S. and add the same quantity to the control. Dilute to 30 cc. with distilled water, transfer to a Nessler tube and proceed with the test for heavy metals in reagents, U. S. P. XIII. The heavy metals limit for *p*-sodium periodate is 20 parts per million.

Iron—The iron in 2 Gm. of *p*-sodium periodate corresponds to not more than 0.04 mg. of Fe (20 parts per million), U. S. P. XIII.

Assay—To a 500-cc. Erlenmeyer flask add about 0.12 Gm. of *p*-sodium periodate, accurately weighed, and add 200 cc. of distilled water, 5 cc. of hydrochloric acid, and 2.5 Gm. of potassium iodide. Swirl the flask gently for 15 seconds and titrate immediately with 0.1 *N* sodium thiosulfate. When the solution becomes faintly yellow, add 1 cc. of starch T.S. and continue the titration until the solution is colorless. Each cc. of 0.1 *N* sodium thiosulfate is equivalent to 0.003674 Gm. of $Na_3H_2IO_6$. It shows not less than 98.5 per cent of $Na_3H_2IO_6$.

Sodium Peroxide—Use *Sodium Peroxide*, reagent grade, U. S. P. XIII.

Sodium Phosphate—Use *Sodium Phosphate*, U. S. P. XIII.

Sodium Pyrophosphate—Use *Sodium Pyrophosphate*, page 678.

Sodium Salicylate—Use *Sodium Salicylate*, U. S. P. XIII.

Sodium Sulfate, Anhydrous—Use *Sodium Sulfate, Anhydrous*, reagent grade, U. S. P. XIII.

Sodium Sulfate, Exsiccated—Use *Sodium Sulfate, Anhydrous*, reagent grade, U. S. P. XIII.

Sodium Sulfite—Use *Sodium Sulfite, Anhydrous*, reagent grade, U. S. P. XIII.

Sodium Sulfite, Heptahydrate, $Na_2SO_3.7H_2O$, occurs as colorless, efflorescent crystals. It is freely soluble in water, and slightly soluble in alcohol.

Assay—Weigh accurately about 0.5 Gm. and add it to 50 cc. of 0.1 *N* iodine (the sulfite must be added to the iodine solution). After standing for 5 minutes, add 1 cc. of hydrochloric acid and titrate the excess iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. Each cc. of 0.1 *N* iodine is equivalent to 0.0126 Gm. of $Na_2SO_3.7H_2O$. It contains not less than 97 per cent of $Na_2SO_3.7H_2O$.

Insoluble—The insoluble matter from 10 Gm. is not more than 1.0 mg.

Free acid—Dissolve 1 Gm. in 10 cc. of distilled water and add 2 drops of phenolphthalein T.S.: a pink color should be produced.

Free alkali—Dissolve 1 Gm. in 10 cc. of distilled water and add 1.5 cc. of 30 per cent hydrogen peroxide solution which has been previously neutralized to methyl red T.S. Shake the mixture well and allow it to stand for 30 minutes. Titrate with 0.1 *N* acid, using methyl red T.S. as the indicator: not more than 0.6 cc. of the 0.1 *N* acid should be required to neutralize the solution (0.30 per cent as Na_2CO_3).

Chloride—Dissolve 0.5 Gm. in 10 cc. of distilled water, add 10 cc. of hydrogen peroxide T.S., and dilute with distilled water to 100 cc.: a 20-cc. portion of the solution shows no more chloride than corresponds to 0.01 mg. of Cl (0.01 per cent).

Heavy metals—Dissolve 6 Gm. in 30 cc. of hot distilled water, add slowly 12 cc. of hydrochloric acid and evaporate to dryness on a water bath. Add 15 cc. of hot water and 3 cc. of hydrochloric acid, re-evaporate to complete dryness and dissolve the residue in 60 cc. of distilled water. To 10 cc. of the solution add 0.04 mg. of Pb, dilute to 30 cc., and add 2 cc. of diluted acetic acid (A). To 30 cc. of the remaining solution add 2 cc. of diluted acetic acid (B); then to each add 10 cc. of hydrogen sulfide T.S.: B is not darker than A (20 parts per million).

Sodium Thioglycollate—Use *Sodium Thioglycollate*, reagent grade, U. S. P. XIII.

Solution, Hydrogen Peroxide—Use *Hydrogen Peroxide Solution*, U. S. P. XIII.

Solution, Lead Subacetate—Use *Lead Subacetate Solution*, page 295.

Starch—Use *Starch, Arrowroot*, reagent grade, U. S. P. XIII.

Starch, Potato—Use *Potato Starch*, reagent grade, U. S. P. XIII.

Stronger Ammonia Water—Use *Ammonia Water, Stronger, Reagent*, U. S. P. XIII.

Sucrose—Use *Sucrose*, U. S. P. XIII.

Sulfanilic Acid—Use *Sulfanilic Acid*, reagent grade, U. S. P. XIII.

Sulfosalicylic Acid—Use *Sulfosalicylic Acid*, reagent grade, U. S. P. XIII.

Sulfur—Use *Precipitated Sulfur*, U. S. P. XIII.

Sulfuric Acid—Use *Sulfuric Acid*, reagent grade, U. S. P. XIII.

Sulfuric Acid, Diluted—Use *Sulfuric Acid, Diluted*, reagent grade, U. S. P. XIII.

Sulfurous Acid, H_2SO_3, is an aqueous solution having the odor of sulfur dioxide. It oxidizes in the air. Keep in small bottles.

Assay—Tare a glass-stoppered, Erlenmeyer flask containing 50 cc. of 0.1 *N* iodine. Quickly add about 2 cc. of the Acid, stopper, and weigh. Titrate the excess of iodine with 0.1 *N* sodium thiosulfate, using starch T.S. as the indicator. It contains not less than 6 per cent of SO_2.

Non-volatile matter—Evaporate 20 cc. to dryness, ignite at cherry redness for 5 minutes, cool, and weigh: the weight of the residue should not exceed 1.0 mg. (0.005 per cent).

Chloride—Digest 10 cc. with 2 cc. of nitric acid on a water bath for 1 hour and dilute with distilled water to 25 cc.: this solution shows no more chloride than corresponds to 0.05 mg. of Cl (0.0005 per cent).

Arsenic—Mix 5 cc. with 0.5 cc. of sulfuric acid and evaporate on a water bath until free from sulfur dioxide and the volume has been reduced to about 2 cc. Dilute to 5 cc. and test as described on page 689. The stain produced corresponds to not more than 0.0025 mg. of As (0.5 part per million).

Heavy metals—Dilute 5 cc. (5 Gm.) with 15 cc. of distilled water and boil gently to remove SO_2. Cool, add 1 drop of phenolphthalein T.S. and follow with diluted

ammonia T.S. until slightly pink. Add 0.5 cc. of 1 *N* hydrochloric acid and dilute with distilled water to 30 cc. The heavy metals limit for sulfurous acid is 10 parts per million.

Iron—Evaporate 2 cc. to dryness on a steam bath, add 1 cc. of hydrochloric acid and 5 drops of nitric acid and re-evaporate to dryness on the steam bath. Warm the residue with 2 cc. of hydrochloric acid, dilute with distilled water to 20 cc. and add 2 cc. of ammonium thiocyanate T.S.: any red color produced corresponds to not more than 0.01 mg. of Fe (5 parts per million).

Thioglycollic Acid—Use *Thioglycollic Acid*, reagent grade, U. S. P. XIII.

Thorium Nitrate—Use *Thorium Nitrate*, reagent grade, U. S. P. XIII.

Titanium Trichloride (*Titanous Chloride*)—$TiCl_3$, occurs as a black, hygroscopic power; unstable in air. It is soluble in water, the solution depositing titanic acid on exposure to air. It is usually furnished as 15 per cent to 20 per cent aqueous solutions. *Keep in tightly closed, glass-stoppered bottles, protected from light.*

***o*-Tolidine** (*4,4'-diamino-3,3'-dimethylbiphenyl*) $H_2N.CH_3.C_6H_3.C_6H_3.CH_3.NH_2$ 4:3:3':4' occurs as white to reddish crystals or crystalline powder, slightly soluble in water; soluble in alcohol, ether, and dilute acids.

Melting Point—*o*-Tolidine melts between 129° and 131°.

Storage—Preserve in well-closed containers protected from light.

Toluene—Use *Toluene*, reagent grade, U. S. P. XIII.

***o*-Toluidine** (*2-aminotoluene, 2-methylaniline*)—$C_6H_4.CH_3.NH_2$ 1:2, is a light yellow liquid becoming reddish brown on exposure to air and light. It is slightly soluble in water, soluble in alcohol, ether, and dilute acids.

Specific Gravity—The specific gravity of *o*-Toluidine is 1.008 at 20°.

Boiling Point—*o*-Toluidine boils between 200° and 202°.

Storage—Preserve in well-closed containers protected from light.

Trichloroacetic Acid—Use *Trichloroacetic Acid*, U. S. P. XIII.

Trinitrophenol—Use *Trinitrophenol*, reagent grade, U. S. P. XIII.

Triphenylchloromethane (trityl chloride), $(C_6H_5)_3CCl$, occurs as white to grayish white or yellowish crystals or as a crystalline powder, soluble in water with decomposition.

Melting point—Triphenylchloromethane melts between 112° and 113°.

Identification—To 5 cc. of a saturated solution of Triphenylchloromethane in glacial acetic acid add 1 cc. of distilled water: a white precipitate is formed.

Identification—To 5 cc. of a saturated solution of Triphenylchloromethane in glacial acetic acid add 1 cc. of hydrochloric acid: a yellow precipitate is formed.

Xylene—Use *Xylene*, reagent grade, U. S. P. XIII.

Yellow Mercuric Oxide—Use *Yellow Mercuric Oxide*, U. S. P. XIII.

Zinc—Use *Zinc*, reagent grade, U. S. P. XIII.

Zinc Dust—Use *Zinc*, reagent grade, U. S. P. XIII.

Zinc Oxide—Use *Zinc Oxide*, U. S. P. XIII.

Test Solutions (T.S.)

For the preparation of Test Solutions reagents of the quality indicated under *Reagents*, pages 766 to 777, are to be used.

Albumen Test Solution—Use *Albumen Test Solution*, U. S. P. XIII.

Alkaline Cupric Tartrate Test Solution (*Fehling's Solution*)—Use *Alkaline Cupric Tartrate Test Solution*, U. S. P. XIII.

Ammonia Test Solution—Use *Ammonia Test Solution*, U. S. P. XIII.

Ammonia Test Solution, Alcoholic—Use *Ammonia Test Solution, Alcoholic*, U. S. P. XIII.

Ammonia Test Solution, Stronger—Use *Stronger Reagent Ammonia Water*, U. S. P. XIII.

Ammonium Carbonate Test Solution—Use *Ammonium Carbonate Test Solution*, U. S. P. XIII.

Ammonium Chloride Test Solution—Use *Ammonium Chloride Test Solution*, U. S. P. XIII.

Ammonium Molybdate Test Solution—Use *Ammonium Molybdate Test Solution*, U. S. P. XIII.

Ammonium Oxalate Test Solution—Use *Ammonium Oxalate Test Solution*, U. S. P. XIII.

Ammonium Phosphate, Dibasic, Test Solution—Use *Ammonium Phosphate, Dibasic, Test Solution*, U. S. P. XIII.

Ammonium Sulfide Test Solution—Use *Ammonium Sulfide Test Solution*, U. S. P. XIII.

Ammonium Thiocyanate Test Solution—Use *Ammonium Thiocyanate Test Solution*, U. S. P. XIII.

Barfoed's Reagent—Use *Cupric Acetate Test Solution, Stronger*, U. S. P. XIII.

Barium Chloride Test Solution—Use *Barium Chloride Test Solution*, U. S. P. XIII.

Barium Hydroxide Test Solution—Use *Barium Hydroxide Test Solution*, U. S. P. XIII.

Barium Nitrate Test Solution—Use *Barium Nitrate Test Solution*, U. S. P. XIII.

Bromine Test Solution (*Bromine Water*)—Use *Bromine Test Solution*, U. S. P. XIII.

Calcium Chloride Test Solution—Use *Calcium Chloride Test Solution*, U. S. P. XIII.

Calcium Hydroxide Test Solution—Use *Calcium Hydroxide Solution*, U. S. P. XIII.

Chloral Hydrate Test Solution—Use *Chloral Hydrate Test Solution*, U. S. P. XIII.

Chlorine Test Solution (*Chlorine Water*)—Use *Chlorine Test Solution*, U. S. P. XIII.

Chromic Acid Test Solution—Use *Chromic Acid Solution*, page 634.

Chromotropic Acid Test Solution—Use *Chromotropic Acid Test Solution*, U. S. P. XIII.

Cobaltous Chloride Test Solution—Use *Cobaltous Chloride Test Solution*, U. S. P. XIII.

Copper Sulfate Test Solution—Use *Cupric Sulfate Test Solution*, U. S. P. XIII.

Cupric Acetate Test Solution—Use *Cupric Acetate Test Solution*, U. S. P. XIII.

Cupric Acetate Test Solution, Stronger (*Barfoed's Reagent*)—Use *Cupric Acetate Test Solution, Stronger*, U. S. P. XIII.

Cupric-Ammonium Sulfate Test Solution—Use *Cupric-Ammonium Sulfate Test Solution*, U. S. P. XIII.

Cupric Oxide, Ammoniated, Test Solution—Use *Cupric Oxide, Ammoniated, Test Solution*, U. S. P. XIII.

Cupric Sulfate Test Solution—Use *Cupric Sulfate Test Solution*, U. S. P. XIII.

Denigès' Reagent—Use *Mercuric Sulfate Test Solution*, U. S. P. XIII.

Dichlorofluorescein Test Solution—Dissolve 0.1 Gm. of dichlorofluorescein in 60 cc. of alcohol, add 2.5 cc. of 0.1 *N* sodium hydroxide solution. Mix and dilute to 100 cc. with distilled water.

Diiodofluorescein Test Solution—Use *Diiodofluorescein Test Solution*, U. S. P. XIII.

Dinitrophenylhydrazine Test Solution—Use *Dinitrophenylhydrazine Test Solution*, U. S. P. XIII.

Diphenylamine Test Solution—Use *Diphenylamine Test Solution*, U. S. P. XIII.

Eosin and Methylene Blue Test Solution—Dissolve 0.5 Gm. each of Methylene Blue and Eosin Y in sufficient distilled water to make 100 cc.

Fehling's Solution—Use *Alkaline Cupric Tartrate Test Solution*, U. S. P. XIII.

Ferric-Ammonium Sulfate Test Solution—Use *Ferric-Ammonium Sulfate Test Solution*, U. S. P. XIII.

Ferric Chloride Test Solution—Use *Ferric Chloride Test Solution*, U. S. P. XIII.

Ferrous Sulfate Test Solution—Use *Ferrous Sulfate Test Solution*, U. S. P. XIII.

Ferrous Sulfate Test Solution, Acid—Use *Ferrous Sulfate Test Solution, Acid*, U. S. P. XIII.

Formaldehyde Test Solution—Use *Formaldehyde Solution*, U. S. P. XIII.

Fuchsin-Sulfurous Acid Test Solution—Use *Fuchsin-Sulfurous Acid Test Solution*, U. S. P. XIII.

Gelatin Test Solution—Use *Gelatin Test Solution*, U. S. P. XIII.

Gold Chloride Test Solution—Use *Gold Chloride Test Solution*, U. S. P. XIII.

Hydrogen Peroxide Test Solution—Use *Hydrogen Peroxide Solution*, U. S. P. XIII.

Hydrogen Sulfide Test Solution—Use *Hydrogen Sulfide Test Solution*, U. S. P. XIII.

Hydroxylamine-Bromophenol Blue Test Solution—Triturate 0.1 Gm. of bromophenol blue with 3 cc. of 0.05 *N* sodium hydroxide. When solution is complete, dilute to 25 cc. with distilled water. Dissolve 20 Gm. of hydroxylamine hydrochloride in 40 cc. of distilled water, dilute to 400 cc. with alcohol, add with stirring 300 cc. of 0.5 *N* alcoholic potassium hydroxide and 2.5 cc. of the bromophenol blue solution, and filter the mixture. Only a sufficient quantity for immediate use should be prepared at one time.

Hydroxylamine Hydrochloride Test Solution—Use *Hydroxylamine Hydrochloride Test Solution*, U. S. P. XIII.

Hypophosphorous Acid Test Solution—Use *Hypophosphorous Acid*, U. S. P. XIII.

Indigo Carmine Test Solution—Use *Indigo Carmine Test Solution*, U. S. P. XIII.

Iodine and Potassium Iodide Test Solution—Use *Iodine and Potassium Iodide Test Solution*, U. S. P. XIII.

Iodine Monochloride Test Solution—Dissolve 10 Gm. of potassium iodide and 6.44 Gm. of potassium iodate in 75 cc. of water; add 75 cc. of hydrochloric acid and 5 cc. of chloroform in a glass-stoppered bottle and adjust to a faint iodine color (in the chloroform) by adding dilute potassium iodide or potassium iodate solution. If there is much iodine set free, use a stronger solution of potassium iodate than 0.01 *M* at first, making the final adjustment with the 0.01 *M* potassium iodate. This solution should be kept in a dark place and re-adjusted to a faint iodine color as necessary.

Iodine Test Solution—Use *Tenth-Normal Iodine*, U. S. P. XIII.

Iodobromide Test Solution—Use *Iodobromide Test Solution*, U. S. P. XIII.

Lead Acetate Test Paper—Use *Lead Acetate Test Paper*, U. S. P. XIII.

Lead Acetate Test Solution—Use *Lead Acetate Test Solution*, U. S. P. XIII.

Lead Acetate Test Solution, Alcoholic—Use *Lead Acetate Test Solution, Alcoholic*, U. S. P. XIII.

Lead Subacetate Test Solution—Use *Lead Subacetate Test Solution*, U. S. P. XIII.

Lead Subacetate Test Solution, Diluted—Use *Lead Subacetate Test Solution Diluted*, U. S. P. XIII.

Litmus Test Solution—Use *Litmus Test Solution*, U. S. P. XIII.

Magnesia Mixture Test Solution—Use *Magnesia Mixture Test Solution*, U. S. P. XIII.

Magnesium Sulfate Test Solution—Use *Magnesium Sulfate Test Solution*, U. S. P. XIII.

Manganese Sulfate Test Solution—Use *Manganese Sulfate Test Solution*, U. S. P. XIII.

Mayer's Reagent—Use *Mercuric-Potassium Iodide Test Solution*, U. S. P. XIII.

Mercuric Bromide Test Paper—Use *Mercuric Bromide Test Paper*, U. S. P. XIII.

Mercuric Bromide Test Solution, Alcoholic—Use *Mercuric Bromide Test Solution, Alcoholic*, U. S. P. XIII.

Mercuric Chloride Test Solution—Use *Mercury Bichloride Test Solution*, U. S. P. XIII.

Mercuric Iodide Test Solution (*Valser's Reagent*)—Use *Mercuric Iodide Test Solution*, U. S. P. XIII.

Mercuric Nitrate Test Solution—Use *Mercuric Nitrate Test Solution*, U. S. P. XIII.

Mercuric-Potassium Iodide Test Solution (*Mayer's Reagent*)—Use *Mercuric-Potassium Iodide Test Solution*, U. S. P. XIII.

Mercuric-Potassium Iodide Test Solution, Alkaline (*Nessler's Reagent*)—Use *Mercuric-Potassium Iodide Test Solution, Alkaline*, U. S. P. XIII.

Mercuric Sulfate Test Solution (*Denigès' Reagent*)—Use *Mercuric Sulfate Test Solution*, U. S. P. XIII.

Mercuric Sulfate Test Solution (*Denigès' Reagent*)—(NOTE: *Specifically for use in the assay of pyrethrum*, page 423)—Mix 5 Gm. of yellow mercuric oxide, reagent grade, with 40 cc. of distilled water and, while stirring, slowly add 20 cc. of sulfuric acid; then add another 40 cc. of distilled water and stir until complete solution is produced. Test for the absence of mercurous mercury by adding a few drops of iodine monochloride T.S. to 10 cc. and titrating with 0.01 *M* potassium iodate, as directed under the assay of pyrethrum, page 423, beginning with, "Add 30 cc. of hydrochloric acid and 20 cc. of water to the flask and allow to cool."

Mercurous Nitrate Test Solution—Use *Mercurous Nitrate Test Solution*, U. S. P. XIII.

Mercury Bichloride Test Solution—Use *Mercury Bichloride Test Solution*, U. S. P. XIII.

Naphthylamine Acetate Test Solution—Use *Naphthylamine Acetate Test Solution*, U. S. P. XIII.

Nessler's Reagent—Use *Mercuric Potassium Iodide Test Solution*, U. S. P. XIII.

Orthophenanthroline Test Solution—Use *Ortho-Phenanthroline Test Solution*, U. S. P. XIII.

Oxalic Acid Test Solution—Use *Oxalic Acid Test Solution*, U. S. P. XIII.

Palladous Chloride Test Solution—Use *Palladous Chloride Test Solution*, U. S. P. XIII.

Phenoldisulfonic Acid Test Solution—Use *Phenoldisulfonic Acid Test Solution*, U. S. P. XIII.

Phloroglucinol Test Solution—Use *Phloroglucinol Test Solution*, U. S. P. XIII.

Phosphotungstic Acid Test Solution—Use *Phosphotungstic Acid Test Solution*, U. S. P. XIII.

Picric Acid Test Solution—Use *Trinitrophenol Test Solution*, U. S. P. XIII.

Platinic Chloride Test Solution—Use *Platinic Chloride Test Solution*, U. S. P. XIII.

Potassium Acetate Test Solution—Use *Potassium Acetate Test Solution*, U. S. P. XIII.

Potassium Carbonate Test Solution—Use *Potassium Carbonate Test Solution*, U. S. P. XIII.

Potassium Chromate Test Solution—Use *Potassium Chromate Test Solution*, U. S. P. XIII.

Potassium Dichromate Test Solution—Use *Potassium Dichromate Test Solution*, U. S. P. XIII.

Potassium Ferricyanide Test Solution—Use *Potassium Ferricyanide Test Solution*, U. S. P. XIII.

Potassium Ferrocyanide Test Solution—Use *Potassium Ferrocyanide Test Solution*, U. S. P. XIII.

Potassium Hydroxide Test Solution—Use *Potassium Hydroxide Test Solution*, U. S. P. XIII.

Potassium Hydroxide Test Solution, Alcoholic—Use *Half-Normal Alcoholic Potassium Hydroxide*, U. S. P. XIII.

Potassium Iodide Test Solution—Use *Potassium Iodide Test Solution*, U. S. P. XIII.

Potassium Permanganate Test Solution—Use *Tenth-Normal Potassium Permanganate*, U. S. P. XIII.

Potassium Sulfate Test Solution—Use *Potassium Sulfate Test Solution*, U. S. P. XIII.

Pyrogallol Test Solution, Alkaline—Use *Pyrogallol Test Solution, Alkaline*, U. S. P. XIII.

Resorcinol Test Solution—Use *Resorcinol Test Solution*, U. S. P. XIII.

Schweitzer's Reagent—Use *Cupric Oxide, Ammoniated, Test Solution*, U. S. P. XIII.

Silver Ammonium Nitrate Test Solution—Use *Silver Ammonium Nitrate Test Solution*, U. S. P. XIII.

Silver Nitrate Test Solution—Use *Tenth-Normal Silver Nitrate*, U. S. P. XIII.

Silver Sulfate Test Solution—Use *Silver Sulfate Test Solution*, U. S. P. XIII.

Sodium Acetate Test Solution—Use *Sodium Acetate Test Solution*, U. S. P. XIII.

Sodium Alizarinsulfonate Test Solution—Use *Sodium Alizarinsulfonate Test Solution*, U. S. P. XIII.

Sodium Bisulfite Test Solution—Use *Sodium Bisulfite Test Solution*, U. S. P. XIII.

Sodium Bitartrate Test Solution—Use *Sodium Bitartrate Test Solution*, U. S. P. XIII.

Sodium Carbonate Test Solution—Use *Sodium Carbonate Test Solution*, U. S. P. XIII.

Sodium Cobaltinitrite Test Solution—Use *Sodium Cobaltinitrite Test Solution*, U. S. P. XIII.

Sodium Fluoride Test Solution—Use *Sodium Fluoride Test Solution*, U. S. P. XIII.

Sodium Hydrosulfite Test Solution, Alkaline—Use *Sodium Hydrosulfite Test Solution, Alkaline*, U. S. P. XIII.

Sodium Hydroxide Test Solution—Use *Sodium Hydroxide Test Solution*, U. S. P. XIII.

Sodium Hypobromite Test Solution—Use *Sodium Hypobromite Test Solution*, U. S. P. XIII.

Sodium Hypochlorite Test Solution—Use *Sodium Hypochlorite Test Solution*, U. S. P. XIII.

Sodium Nitroferricyanide Test Solution (*Sodium Nitroprusside*)—Use *Sodium Nitroferricyanide Test Solution*, U. S. P. XIII.

Sodium Nitroprusside Test Solution—Use *Sodium Nitroferricyanide Test Solution*, U. S. P. XIII.

Sodium Phosphate Test Solution—Use *Sodium Phosphate Test Solution*, U. S. P. XIII.

Sodium Phosphotungstate Test Solution—Use *Sodium Phosphotungstate Test Solution*, U. S. P. XIII.

Sodium Sulfide Test Solution—Use *Sodium Sulfide Test Solution*, U. S. P. XIII.

Sodium Tartrate Test Solution—Use *Sodium Tartrate Test Solution*, U. S. P. XIII.

Sodium Thiosulfate Test Solution—Use *Tenth-Normal Sodium Thiosulfate*, U. S. P. XIII.

Stannous Chloride Test Solution—Use *Stannous Chloride Test Solution*, U. S. P. XIII.

Stannous Chloride Test Solution, Acid—Use *Stannous Chloride Test Solution, Acid*, U. S. P. XIII.

Starch Iodide Paste Test Solution—Use *Starch Iodide Paste Test Solution*, U. S. P. XIII.

Starch-Potassium Iodide Test Solution—Use *Starch-Potassium Iodide Test Solution*, U. S. P. XIII.

Starch Test Solution—Use *Starch Test Solution*, U. S. P. XIII.

Sulfanilic Acid Test Solution—Use *Sulfanilic Acid Test Solution*, U. S. P. XIII.

Sulfuric Acid Test Solution—Use *Diluted Sulfuric Acid*, page 523.

Sulfuric Acid-Formaldehyde Test Solution—Use *Sulfuric Acid-Formaldehyde Test Solution*, U. S. P. XIII.

Sulfurous Acid Test Solution—Use *Sulfurous Acid*, U. S. P. XIII.

Tannic Acid Test Solution—Use *Tannic Acid Test Solution*, U. S. P. XIII.

Tartaric Acid Test Solution—Use *Tartaric Acid Test Solution*, U. S. P. XIII.

Thorium Nitrate Test Solution—Dissolve 1 Gm. of thorium nitrate in sufficient distilled water to make 100 cc. Filter if necessary.

Trinitrophenol Test Solution (*Picric Acid Test Solution*)—Use *Trinitrophenol Test Solution*, U. S. P. XIII.

Turmeric Test Solution—Use *Turmeric Test Solution*, U. S. P. XIII.

Colorimetric Solutions (C.S.)

For general information on *Colorimetric Solutions*, see U. S. P. XIII.

Cobaltous Chloride Colorimetric Solution—Use *Cobaltous Chloride Colorimetric Solution*, U. S. P. XIII.

Ferric Chloride Colorimetric Solution—Use *Ferric Chloride Colorimetric Solution*, U. S. P. XIII.

Cupric Sulfate Colorimetric Solution—Use *Cupric Sulfate Colorimetric Solution*, U. S. P. XIII.

Volumetric Apparatus

For general information on the calibration of volumetric apparatus, *Units of Capacity*, *Measuring Flasks*, *Cylinders*, *Transfer Pipettes*, *Burettes*, and *General Directions*, refer to U. S. P. XIII.

Indicators for Volumetric Determinations

For general information on *Indicators* and *Indicator Test Solutions*, see U. S. P. XIII.

Bromophenol Blue—Use *Bromophenol Blue*, U. S. P. XIII.

Bromophenol Blue Test Solution—Use *Bromophenol Blue Test Solution*, U. S. P. XIII.

Bromothymol Blue—Use *Bromothymol Blue*, U. S. P. XIII.

Bromothymol Blue Test Solution—Use *Bromothymol Blue Test Solution*, U. S. P. XIII.

Cochineal—Use *Cochineal*, U. S. P. XIII.

Cochineal Test Solution—Macerate 1 Gm. of unbroken cochineal (see Coccus, U. S. P. XIII) during 4 days with 20 cc. of alcohol and 60 cc. of distilled water, then filter. The color of this solution is turned violet by alkalies, and yellowish red by acids.

Methyl Orange—Use *Methyl Orange*, U. S. P. XIII.

Methyl Orange Test Solution—Use *Methyl Orange Test Solution*, U. S. P. XIII.

Methyl Red—Use *Methyl Red*, U. S. P. XIII.

Methyl Red Test Solution—Use *Methyl Red Test Solution*, U. S. P. XIII.

Phenolphthalein—Use *Phenolphthalein*, U. S. P. XIII.

Phenolphthalein Test Solution—Use *Phenolphthalein Test Solution*, U. S. P. XIII.

Thymol Blue—Use *Thymol Blue*, U. S. P. XIII.

Thymol Blue Test Solution—Use *Thymol Blue Test Solution*, U. S. P. XIII.

Indicator Papers

For general information on indicator papers see *Indicator Papers*, U. S. P. XIII.

Litmus Paper, Blue—Use *Litmus Paper, Blue*, U. S. P. XIII.

Litmus Paper, Red—Use *Litmus Paper, Red*, U. S. P. XIII.

Phenolphthalein Paper—Use *Phenolphthalein Paper*, U. S. P. XIII.

Potassium Iodate-Starch Paper—Strips of white filter paper impregnated with a solution prepared by mixing a 5 per cent solution of potassium iodate with an equal volume of freshly prepared starch T.S.

Starch Iodide Paper—Use *Starch Iodide Paper*, U. S. P. XIII.

Turmeric Paper—Use *Turmeric Paper*, U. S. P. XIII.

Volumetric Solutions

Normal Solutions—See *Normal Solutions*, U. S. P. XIII.

Molar Solutions—See *Molar Solutions*, U. S. P. XIII.

Empirical Solutions—See *Empirical Solutions*, U. S. P. XIII.

Preparation and Methods of Standardization of Volumetric Solutions

For *Preparation and Methods of Standardization of Volumetric Solutions*, see U. S. P. XIII.

Ammonium Thiocyanate, 0.1 *N*—Use *Ammonium Thiocyanate, Tenth-Normal*, U. S. P. XIII.

Barium Hydroxide, 0.1 *N*

$Ba(OH)_2.8H_2O$ = 315.50 — 15.775 Gm. in 1000 cc.

Dissolve approximately 18 Gm. of reagent barium hydroxide in 1000 cc. of recently boiled distilled water at 25°, and quickly filter the solution. Keep this solution in rubber-stoppered bottles with a soda-lime tube attached to protect it from the carbon dioxide of the air.

Accurately measure, from a burette, about 30 cc. of 0.1 *N* hydrochloric acid, add 2 drops of phenolphthalein T.S., and slowly add the barium hydroxide solution from a burette, with constant stirring, until a permanent pale pink color is produced. Calculate the normality and, if desired, adjust exactly to 0.1 *N* with freshly boiled and cooled distilled water.

The normality of this solution is likely to decrease as it stands. For this reason it should be restandardized before using.

It is preferable to connect the burette which is used for this titration directly to the bottle containing the barium hydroxide solution to protect it from the carbon dioxide of the air.

One cubic centimeter of 0.1 N Barium Hydroxide is the equivalent of:

	Gram
Barium Hydroxide, $Ba(OH)_2.8H_2O$	0.01578
Sulfuric Acid, H_2SO_4	0.004904

Bromine, 0.1 *N*—Use *Bromine, Tenth-Normal*, U. S. P. XIII.

Ceric Sulfate, 0.1 *N*—Use *Ceric Sulfate, Tenth-Normal*, U. S. P. XIII.

Ferrous Ammonium Sulfate, 0.02 *N*—Use *Ferrous Ammonium Sulfate, Fiftieth-Normal*, U. S. P. XIII.

Hydrochloric Acid, 1 *N*—Use *Hydrochloric Acid, Normal*, U. S. P. XIII.

Hydrochloric Acid, 0.5 *N*—Use *Hydrochloric Acid, Half-Normal*, U. S. P. XIII.

Hydrochloric Acid, 0.1 *N*—Use *Hydrochloric Acid, Tenth-Normal*, U. S. P. XIII.

Hydrochloric Acid, 0.05 *N*

$HCl = 36.47$ 1.8235 Gm. in 1000 cc.

One cubic centimeter of 0.05 N Hydrochloric Acid is the equivalent of:

	Gram
Hydrogen Chloride, HCl	0.001824
Quinine Sulfate, $(C_{20}H_{24}O_2N_2)_2H_2SO_4.2H_2O$	0.01957

Hydrochloric Acid, 0.02 *N*—Use *Hydrochloric Acid, Fiftieth-Normal*, U. S. P. XIII.

Hydrochloric Acid, 0.01 *N*—Use *Hydrochloric Acid, Hundredth-Normal*, U. S. P. XIII.

Iodine, 0.1 *N*—Use *Iodine, Tenth-Normal*, U. S. P. XIII.

Oxalic Acid, 0.1 *N*—Use *Oxalic Acid, Tenth-Normal*, U. S. P. XIII.

Periodic Acid, 0.1 *M*

Weigh exactly 9.394 Gm. of *p*-sodium periodate and transfer into a 1-liter volumetric flask by the aid of 100 to 150 cc. of distilled water. Add 100 cc. of 1 *N* sulfuric acid and dilute to 1000 cc. with distilled water.

Potassium Arsenite, 0.1 *N*—Use *Potassium Arsenite, Tenth-Normal*, U. S. P. XIII.

Potassium Bromate, 0.1 *N*—Use *Potassium Bromate, Tenth-Normal*, U. S. P. XIII.

Potassium Dichromate, 0.1 *N*—Use *Potassium Dichromate, Tenth-Normal*, U. S. P. XIII.

Potassium Dichromate, 0.01 *N*

$K_2Cr_2O_7 = 294.21$ 0.4904 Gm. in 1000 cc.

One cubic centimeter of 0.01 N Potassium Dichromate is the equivalent of:

	Gram
Potassium Dichromate, $K_2Cr_2O_7$	0.0004904

Potassium Dichromate, 0.005 *N*

$K_2Cr_2O_7 = 294.21$ 0.2452 Gm. in 1000 cc.

One cubic centimeter of 0.005 N Potassium Dichromate is the equivalent of:

	Gram
Potassium Dichromate, $K_2Cr_2O_7$	0.0002452

Potassium Ferrocyanide, 0.1 *N*

$K_4Fe(CN)_6.3H_2O = 422.39$ 14.079 Gm. in 1000 cc.

Dissolve 15 Gm. of reagent potassium ferrocyanide in sufficient distilled water to make 1000 cc. at 25°.

Accurately weigh about 0.1 Gm. of reagent zinc into a 400-cc. beaker. Cover with water and dissolve in 10 cc. of diluted hydrochloric acid, covering the beaker

with a watch glass. After the zinc has dissolved wash the watch glass and sides of the beaker down with distilled water. Neutralize with stronger ammonia water, make slightly acid with diluted hydrochloric acid, and add 6 cc. of the acid in excess. Dilute to 200 cc. with distilled water, heat to the boiling point, reserve 50 cc., and add 4 drops of aqueous solution of ferrous ammonium sulfate (1 in 1000) to the major portion. Titrate the hot solution with the potassium ferrocyanide solution, vigorously stirring, until the blue color of the solution changes to pinkish, and add 0.5 cc. in excess. Add all but about 5 cc. of the reserve, titrate to the end point, and add 0.1 cc. of the solution in excess. Add the last 5 cc. of reserve and titrate dropwise to the final end point. Calculate the normality of the potassium ferrocyanide solution, and, if desired, adjust exactly to 0.1 *N*.

One cubic centimeter of 0.1 N Potassium Ferrocyanide is the equivalent of:

	Gram
Potassium Ferrocyanide, $K_4Fe(CN)_6.3H_2O$	0.01408
Zinc, Zn	0.003269
Zinc Oxide, ZnO	0.004069

Potassium Hydroxide, 1 *N*—Use *Potassium Hydroxide, Normal*, U. S. P. XIII.

Potassium Hydroxide, Alcoholic, 0.5 *N*—Use *Potassium Hydroxide, Alcoholic, Half-Normal*, U. S. P. XIII.

Potassium Hydroxide, Alcoholic, 0.1 *N*—Use *Potassium Hydroxide, Alcoholic, Tenth-Normal*, U. S. P. XIII.

Potassium Iodate, 0.05 *M*—Use *Potassium Iodate, Twentieth-Molar*, U. S. P. XIII.

Potassium Iodate, 0.02 *M*

KIO_3 = 214.02 — 4.2804 Gm. in 1000 cc.

One cubic centimeter of 0.02 M Potassium Iodate is the equivalent of:

	Gram
Potassium Iodate, KIO_3	0.004280
Arsenic Trioxide, As_2O_3	0.003956
Yellow Mercurous Iodide, HgI	0.008734
Red Mercuric Iodide, HgI_2	0.009089

Potassium Iodate, 0.01 *M*

Dissolve 2.14 Gm. of potassium iodate, previously dried at 105°, in distilled water and dilute to 1000 cc.

Potassium Permanganate, 0.1 *N*—Use *Potassium Permanganate, Tenth-Normal*, U. S. P. XIII.

Potassium Permanganate, 0.05 *N*

$KMnO_4$ = 158.03 — 1.5803 Gm. in 1000 cc.

One cubic centimeter of 0.05 N Potassium Permanganate is the equivalent of:

	Gram
Potassium Permanganate, $KMnO_4$	0.001580

Potassium Permanganate, 0.01 *N*—Use *Potassium Permanganate, Hundredth-Normal*, U. S. P. XIII.

Silver Nitrate, 0.1 *N*—Use *Silver Nitrate, Tenth-Normal*, U. S. P. XIII.

Sodium Arsenite, 0.1 *N*

$NaAsO_2$ = 129.91 6.4955 Gm. in 1000 cc.

Dissolve 4.9455 Gm. of reagent arsenic trioxide, which has been pulverized and dried to constant weight at 105°, in 75 cc. of 1 *N* sodium hydroxide and neutralize any excess alkali with diluted sulfuric acid using phenolphthalein T.S. as the indicator. Add 500 cc. of distilled water containing 25 Gm. of sodium bicarbonate. If a pink color develops, add dropwise, diluted sulfuric acid until the color is discharged. Dilute the solution to a volume of exactly 1000 cc. at 25° with distilled water.

Sodium Hydroxide, 1 *N*—Use *Sodium Hydroxide, Normal*, U. S. P. XIII.

Sodium Hydroxide, 0.5 *N*—Use *Sodium Hydroxide, Half-Normal*, U. S. P. XIII.

Sodium Hydroxide, 0.1 *N*—Use *Sodium Hydroxide, Tenth-Normal*, U. S. P. XIII.

Sodium Hydroxide, 0.05 *N*—Use *Sodium Hydroxide, Twentieth-Normal*, U. S. P. XIII.

Sodium Hydroxide, 0.02 *N*—Use *Sodium Hydroxide, Fiftieth-Normal*, U. S. P. XIII.

Sodium Hydroxide, 0.01 *N*

NaOH = 40.01 0.4001 Gm. in 1000 cc.

Prepare, standardize and preserve this solution as directed under *Sodium Hydroxide, Normal*, U. S. P. XIII, using the appropriate amount of sodium hydroxide to form the solution. This solution should be frequently standardized.

One cubic centimeter of 0.01 N Sodium Hydroxide is the equivalent of:

	Gram
Sodium Hydroxide, NaOH	0.0004001

Sodium Nitrite, 0.1 *M*—Use *Sodium Nitrite, Tenth-Molar*, U. S. P. XIII.

Sodium Oxalate, 0.1 *N*

$Na_2C_2O_4$ = 134.01 6.7 Gm. in 1000 cc.

Method I—Dissolve exactly 6.7 Gm. of reagent Sodium Oxalate, previously dried at 110°, in sufficient distilled water to make 1000 cc. at 25°.

Method II—Dissolve about 6.7 Gm. of reagent Sodium Oxalate, previously dried at 105°, in sufficient distilled water to make 1000 cc. at 25°. Acidify a convenient quantity with sulfuric acid and ascertain its normality by titration against 0.1 *N* potassium permanganate as directed in U. S. P. XIII.

One cubic centimeter of 0.1 N Sodium Oxalate is the equivalent of:

	Gram
Sodium Oxalate, $Na_2C_2O_4$	0.006701
Potassium Permanganate, $KMnO_4$	0.003161

Sodium Thiosulfate, 0.1 *N*—Use *Sodium Thiosulfate, Tenth-Normal*, U. S. P. XIII.

Sodium Thiosulfate, 0.01 *N*—Use *Sodium Thiosulfate, Hundredth-Normal*, U. S. P. XIII.

Sodium Thiosulfate, 0.005 *N*—Use *Sodium Thiosulfate, Two-Hundredth-Normal*, U. S. P. XIII.

Sulfuric Acid, 38 *N*

Accurately weigh a glass-stoppered flask containing about 50 cc. of distilled water, then cautiously add about 1 cc. of fuming sulfuric acid, and reweigh. Titrate with 1 *N* sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of 1 *N* sodium hydroxide is equivalent to 0.04904 Gm. of H_2SO_4. Calculate the per cent of H_2SO_4 in the sample. In a similar manner determine the per cent of H_2SO_4 in sulfuric acid. Add a calculated weight of sulfuric acid to a convenient weight of the fuming sulfuric acid to produce a mixture containing 100.92 per cent. The 38 *N* sulfuric acid thus prepared contains not less than 100.77 per cent and not more than 101.07 per cent of H_2SO_4 when determined as directed above for fuming sulfuric acid.

Sulfuric Acid, 1 *N*—Use *Sulfuric Acid, Normal*, U. S. P. XIII.

Sulfuric Acid, 0.5 *N*—Use *Sulfuric Acid, Half-Normal*, U. S. P. XIII.

Sulfuric Acid, 0.1 *N*—Use *Sulfuric Acid, Tenth-Normal*, U. S. P. XIII.

Sulfuric Acid, 0.05 *N*

H_2SO_4 = 98.076 — 2.452 Gm. in 1000 cc.

One cubic centimeter of 0.05 N Sulfuric Acid is the equivalent of:

	Gram
Sulfuric Acid, H_2SO_4	0.002452
Apomorphine Hydrochloride, $C_{17}H_{17}O_2N.HCl.{}^1/_2H_2O$	0.01564
Cocaine Hydrochloride, $C_{17}H_{21}O_4N.HCl$	0.01699
Morphine Sulfate, $(C_{17}H_{19}O_3N)_2.H_2SO_4.5H_2O$	0.01897
Scopolamine Hydrobromide, $C_{17}H_{21}O_4N.HBr.3H_2O$	0.02192
Strychnine Nitrate ($C_{21}H_{22}O_2N_2.HNO_3$)	0.01987

Sulfuric Acid, 0.02 *N*—Use *Sulfuric Acid, Fiftieth-Normal*, U. S. P. XIII.

Titanium Trichloride, 0.1 *N*

Dilute 75 cc. of 20 per cent solution of titanium trichloride and 75 cc. of hydrochloric acid to 1000 cc. with distilled water.

Apparatus—The bottle containing the solution should be connected to the titrating burette and the air in the apparatus replaced with hydrogen. The burette should be designed so that as the solution is used, it can be replaced with hydrogen. All joints should be air-tight.

A 500-cc. pyrex flask with a wide mouth is used for titration. It should be closed with a rubber stopper fitted with a burette, carbon dioxide inlet, reflux condenser, and mechanical stirrer. Both the hydrogen and carbon dioxide should be passed through wash bottles containing a solution of titanium trichloride acidified with hydrochloric acid to remove any possible oxygen.

Standardization—Place 25 cc. of 5 per cent solution of ferric ammonium sulfate (approximately 0.1 *N*) which has been standardized by the assay method for iron described under Ferric Chloride Solution, page 212, in the titrating flask and pass a rapid stream of carbon dioxide through it until all the air has been removed from the flask. Titrate with the titanium trichloride, when the reaction is nearly complete, add 5 cc. of ammonium thiocyanate T.S., and titrate until the solution is colorless. The number of cc. of titanium trichloride consumed in the titration multiplied by the Gm. of Fe contained in 25 cc. of the solution of ferric ammonium sulfate and the product multiplied by 179.1 gives the factor for the 0.1 *N* titanium trichloride solution. This solution is unstable and should be frequently restandardized.

pH Measurements—See *pH Measurements*, U. S. P. XIII.

pH Indicators and Preparation of Their Solutions—See *pH Indicators and Preparation of Their Solutions*, U. S. P. XIII.

Table of pH Indicators—See *Table of pH Indicators*, U. S. P. XIII.

Solutions Used in the Preparation of Buffer Solutions—See *Solutions Used in the Preparation of Buffer Solutions*, U. S. P. XIII.

Buffer Mixtures of Clark and Lubs—See *Buffer Mixtures of Clark and Lubs*, U. S. P. XIII.

Atomic and Molecular Weights—For a table of molecular weights of all chemical substances mentioned in the U. S. Pharmacopœia XIII and in the National Formulary VIII, see U. S. P. XIII.

Alcoholometric Table—See *Alcoholometric Table*, U. S. P. XIII.

Acid and Alkali Tables—See *Acid and Alkali Tables*, U. S. P. XIII.

Thermometric Equivalents—See *Thermometric Equivalents*, U. S. P. XIII.

Reduction of Apparent to True Specific Gravity—See *Reduction of Apparent to True Specific Gravity*, U. S. P. XIII.

Calibration of Pycnometers—See *Calibration of Pycnometers*, U. S. P. XIII.

Calibration of Glass Measuring Apparatus—See *Calibration of Glass Measuring Apparatus*, U. S. P. XIII.

Weight and Volume Relations—See *Weight and Volume Relations*, U. S. P. XIII.

Equivalents of Weights and Measures—See *Equivalents of Weights and Measures*, U. S. P. XIII.

Equivalents of Linear Measures—See *Equivalents of Linear Measures*, U. S. P. XIII.

Table for Converting Metric Quantities in Pharmaceutical Processes to Quantities in the Avoirdupois Weights—See *Table for Converting Metric Quantities in Pharmaceutical Processes to Quantities in the Avoirdupois Weights*, U. S. P. XIII.

Table for Converting Metric Quantities in Pharmaceutical Processes to Quantities in Apothecaries Measures—See *Table for Converting Metric Quantities in Pharmaceutical Processes to Quantities in Apothecaries Measures*, U. S. P. XIII.

Table for Converting Metric Quantities in Pharmaceutical Processes to Quantities in Apothecaries Weights—See *Table for Converting Metric Quantities in Pharmaceutical Processes to Quantities in Apothecaries Weights*, U. S. P. XIII.

Optical Crystallographic Constants of National Formulary Crystalline Substances

Substance	System	n_α	n_β	n_γ	Optic sign.	Axial Angle	Orientation
Aluminum Chloride ($6H_2O$)	Trigonal	1.507 (ϵ)	...	1.560 (ω)	−	.....	Extinction parallel
Aluminum Sulfate ($18H_2O$)	Monoclinic	1.474	1.476	1.483	..	.....	
Ammonium Bromide	Isometric	1.712	...	...	..	.....	
Ammonium Iodide	Isometric	1.703	...	...	..	.....	
Ammonium Salicylate	.....	1.570	1.695	>1.695	..	.....	Extinction parallel
Antipyrine	Monoclinic	1.570	1.694	1.732	−	$2V = 54°20'$	Optic plane = 010
Arecoline Hydrobromide	.....	1.555	1.590	1.655	..	.....	Elongation negative Extinction parallel
Arsenic Triiodide	Hexagonal	2.230 (ϵ)	...	2.590 (ω)	−	.....	0001 plates
Barium Chloride ($2H_2O$)	Monoclinic	1.635	1.646	1.660	+	$2V = 83°41'$	$Z \wedge c$ 8° Optic plane = 010
Brucine Sulfate	.....	1.512	1.595	1.688	..	.....	Elongation positive Extinction parallel
Calcium Hypophosphite	Monoclinic	1.543	...	1.578	..	.....	
Carbromal	.....	1.520	1.533	1.601	..	.....	
Chloramine-T	.....	1.497	1.563	1.585	..	.....	
Cinchonidine Sulfate	Monoclinic	1.562	1.604	1.660	..	.....	Extinction parallel
Cinchonine Sulfate	Monoclinic	1.587	1.641	1.667	..	.....	Extinction parallel
Cinchophen	.....	1.545	1.575	>1.734	..	.....	
Codeine ($1H_2O$)	Orthorhombic	1.543	1.636	1.684	−	$2V = 53°$	Optic plane = 010
Ethylhydrocupreine Hydrochloride	.....	1.513	...	1.619	..	.....	
Eucaine Hydrochloride	.....	1.506	1.585	1.645	−	.....	
Ferrous Gluconate ($2H_2O$)	.....	1.545	1.555	1.565	..	.....	Elongation positive Extinction parallel
Gold and Sodium Thiosulfate ($2H_2O$)	Monoclinic	1.617	1.679	1.734	−	$2V$ large	Elongation negative Extinction inclined
Iodoform	Hexagonal	1.750 (ϵ)	...	1.800 (ω)	−	.....	
Lithium Benzoate	.....	1.585	...	1.640	..	.....	
Lithium Bromide	Isometric	1.784	...	...	..	.....	
Lithium Carbonate	Monoclinic	1.428	1.567	1.572	−	$2V = 15°$	$X \wedge c$ approx. 0° Optic plane $\perp$ 010
Magnesium Phosphate Tribasic ($8H_2O$)	Monoclinic	1.510	1.520	1.543	+	$2V = 71°$	$Y = b$ $Z \wedge c = 29°$
Mercuric Cyanide	Tetragonal	1.492 (ϵ)	...	1.645 (ω)	−	.....	
Red Mercuric Iodide	Tetragonal	2.455 (ϵ)	...	2.748 (ω)	−	.....	

Mercury Bichloride	Orthorhombic	1.725	1.859	1.965	−	.....	
Morphine Hydrochloride	.....	1.540	1.590	1.635	..	.....	Extinction parallel
Papaverine Hydrochloride	.....	1.555	1.734	>1.734	..	.....	
Phenothiazine	Orthorhombic	1.610	1.734	>1.734	..	.....	
Pilocarpine Hydrochloride	.....	1.513	1.570	1.594	−	.....	Extinction parallel
Potassium Bitartrate	Orthorhombic	1.510	1.550	1.590	−	$2V = 88°2'$	Optic plane = 001
Potassium Chlorate[b]	Monoclinic	1.408	1.517	1.523	−	$2V = 28°15'$	$X \wedge c = 57°30'$ Optic plane ⊥ 010
Potassium Guaiacolsulfonate	Monoclinic	1.516	1.552	1.627	−	.....	
Potassium Nitrate[a]	Orthorhombic	1.334	1.505	1.506	−	$2V = 7°12'$	$X = c$. Optic plane = 100
Potassium Thiocyanate	Monoclinic	1.532	1.660	1.730	−	$2V = 68°$	$Z \wedge c = 16°$
Proflavine Hydrochloride ($2H_2O$)	.....	1.585	1.675	>1.734	..	.....	Elongation negative Extinction parallel
Proflavine Sulfate ($1H_2O$)	.....	1.570	1.703	>1.734	..	.....	Elongation negative Extinction parallel
Quinine	Orthorhombic	1.620	1.625	1.630	..	.....	Extinction parallel
Quinine Phosphate	.....	1.575	1.595	1.655	..	.....	Extinction parallel
Quinine Salicylate	.....	1.602	1.620	1.682	..	.....	Extinction parallel
Salicin	.....	1.505	1.590	1.603	−	.....	
Santonin	Orthorhombic	1.589	1.592	1.639	−	.....	$Z = b$ Optic plane = 100
Sodium Glycerophosphate ($6H_2O$)	Monoclinic	1.444	1.455	1.468	+	$2V = 85°$	
Sodium Glycerophosphate ($5H_2O$)	Monoclinic	1.474	1.489	1.499	−	$2V = 79°$	
Sodium Thiocyanate	Orthorhombic	1.545	1.625	1.695	−	$2V = 82°$	Extinction parallel
Strontium Salicylate	.....	1.485	...	1.693	−	.....	
Strychnine	Orthorhombic	1.61	1.68	1.74	−	$2V$ large	Optic plane = 100
Strychnine Nitrate[b]	Monoclinic	1.610	1.624	1.675	..	$2V$ large	Elongation negative
Strychnine Phosphate	Monoclinic	1.589	1.597	1.655	..	$2V$ moderate	Elongation ±
Sulfapyridine	.....	1.680	1.733	>1.733	..	.....	
Sulfapyridine Sodium	.....	1.590	...	1.700	..	.....	
Sulfonethylmethane	Monoclinic	1.504	...	1.549	..	.....	
Sulfonmethane	Monoclinic	1.518	1.541	1.572	..	.....	
Titanium Dioxide	Tetragonal	2.493 (ϵ)	...	2.554 (ω)	−	.....	
Zinc Chloride	Uniaxial ?	1.687 (ω)	...	1.713 (ϵ)	+	.....	
Zinc Phenolsulfonate ($8H_2O$)	.....	1.480	1.551	1.625	..	.....	

Refractive Indices are given for the D-line (Na) at 20°. [a] Dispersion $r < v$ (strong). [b] Dispersion $r > v$.

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