THE FIRST SUPPLEMENT TO THE PHARMACOPŒIA OF THE UNITED STATES OF AMERICA

ELEVENTH DECENNIAL REVISION

(U.S.P. XI - 1937 SUPPLEMENT)

CH 62
1937

Directions for Inserting the U. S. P. Supplement
in the
Looseleaf, Spring-Back Cover

Open the heavy board, spring-back cover and place it face down on the table. Grasp the front cover with the left hand, allowing the back cover to rest on the table, and bend the front cover backward until the spring opens. Then insert the Supplement. The Supplement should not be pushed all the way to the back, but should be placed about one-quarter inch from the edge before allowing the spring to close.

THE
FIRST SUPPLEMENT
TO THE
PHARMACOPŒIA
OF THE
UNITED STATES OF AMERICA

ELEVENTH DECENNIAL REVISION
(U. S. P. XI—1937 SUPPLEMENT)

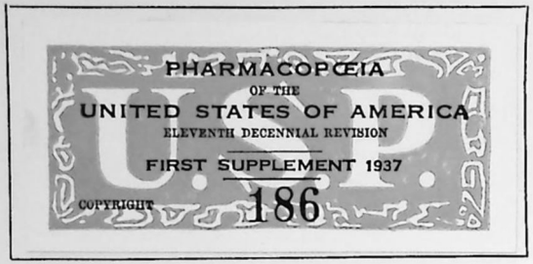
BY AUTHORITY OF THE
UNITED STATES PHARMACOPŒIAL CONVENTION
HELD AT WASHINGTON, D. C., MAY 13 AND 14, 1930

PREPARED BY THE COMMITTEE OF REVISION AND
PUBLISHED BY THE BOARD OF TRUSTEES

OFFICIAL FROM DECEMBER 1, 1937

AGENT

MACK PRINTING COMPANY
EASTON, PA.



Entered according to Act of Congress, in the year 1937, by
The Board of Trustees
of the
United States Pharmacopœial Convention
In the Office of the Librarian of Congress at Washington

All rights reserved

ELECTROTYPED AND PRINTED BY
MACK PRINTING COMPANY
EASTON, PA.

CONTENTS

Officers of the Convention 5

The Board of Trustees 5

The General Committee of Revision 5
Executive Committee and Sub-Committees 7
Special Committees, Commissions, and Advisory Boards 8

Preface 9

General Notices 11

Monographs on Vegetable and Animal Drugs, Chemicals, and Preparations .. 13

General Tests 91

Index 99

OFFICERS OF THE U. S. PHARMACOPŒIAL CONVENTION

1930-1940

WALTER A. BASTEDO, M.D.
President
NEW YORK CITY

H. A. B. DUNNING, PHAR.D.
First Vice-President
BALTIMORE, MD.

JOHN F. ANDERSON, M.D.
Second Vice-President
NEW BRUNSWICK, N. J.

EDWARD SPEASE, B.S.
Third Vice-President
CLEVELAND, OHIO

RUFUS A. LYMAN, M.D.
Fourth Vice-President
LINCOLN, NEB.

THOMAS ROACH
Fifth Vice-President
OKLAHOMA CITY, OKLA.

L. E. WARREN, M.SC.
Secretary
CHEVY CHASE, MD.

F. A. DELGADO, PH.G.
Assistant Secretary
WASHINGTON, D. C.

SAMUEL L. HILTON, PHAR.D.
Treasurer
WASHINGTON, D. C.

BOARD OF TRUSTEES

JAMES H. BEAL, SC.D.
Chairman
FORT WALTON, FLA.

S. SOLIS-COHEN, M.D.
PHILADELPHIA, PA.

SAMUEL C. HENRY, PH.M.
CHICAGO, ILL.

E. F. KELLY, PHAR.D.
WASHINGTON, D. C.

*W. BRUCE PHILIP, PHAR.D.
WASHINGTON, D. C.

ROBERT L. SWAIN, PH.M.
BALTIMORE, MD.

WALTER A. BASTEDO, M.D.
Ex-officio
NEW YORK CITY

E. FULLERTON COOK, PH.M.
Ex-officio
PHILADELPHIA, PA.

WILLIAM B. DAY, PH.G.
Secretary
CHICAGO, ILL.

GENERAL COMMITTEE OF REVISION

E. FULLERTON COOK, PH.M.
Chairman
PHILADELPHIA, PA.

A. G. DUMEZ, PH.D.
First Vice-Chairman
BALTIMORE, MD.

C. W. EDMUNDS, M.D.
Second Vice-Chairman
ANN ARBOR, MICH.

CHARLES H. LAWALL, SC.D.
Secretary
PHILADELPHIA, PA.

HENRY V. ARNY, PH.D.
NEW YORK CITY

WALTER A. BASTEDO, M.D.
Ex-officio
NEW YORK CITY

GEORGE D. BEAL, PH.D.
PITTSBURGH, PA.

E. J. G. BEARDSLEY, M.D.
PHILADELPHIA, PA.

OSCAR W. BETHEA, M.D.
NEW ORLEANS, LA.

FRANCIS E. BIBBINS, B.S.
INDIANAPOLIS, IND.

A. RICHARD BLISS, JR., M.D.
BIRMINGHAM, ALA.

*THEODORE J. BRADLEY, PHAR.D.
BOSTON, MASS.

* Deceased.

CHARLES L. BROWN, M.D.
ANN ARBOR, MICH.

MORTIMER BYE, A.B.
CINCINNATI, OHIO

CHARLES E. CASPARI, PH.D.
ST. LOUIS, MO.

BERNARD V. CHRISTENSEN, PH.D
GAINESVILLE, FLA.

HENRY A. CHRISTIAN, M.D.
BOSTON, MASS.

W. G. CROCKETT, M.S.
RICHMOND, VA.

EDWARD D. DAVY, B.SC.
CLEVELAND, OHIO

MARION S. DOOLEY, M.D.
SYRACUSE, N. Y.

BERNARD FANTUS, M.D.
CHICAGO, ILL.

E. N. GATHERCOAL, PH.M.
CHICAGO, ILL.

W. F. GIDLEY, B.S.
AUSTIN, TEXAS

LOYD E. HARRIS, PH.D.
NORMAN, OKLA.

L. D. HAVENHILL, B.S.
LAWRENCE, KANSAS

ARTHUR D. HIRSCHFELDER, M.D.
MINNEAPOLIS, MINN.

*E. V. HOWELL, PH.G.
CHAPEL HILL, N. C.

REID HUNT, M.D.
BOSTON, MASS.

C. W. JOHNSON, PH.D.
SEATTLE, WASH.

C. B. JORDAN, D.SC.
WEST LAFAYETTE, IND.

JOHN C. KRANTZ, JR., PH.D.
BALTIMORE, MD.

EDWARD H. KRAUS, PH.D.
ANN ARBOR, MICH.

H. A. LANGENHAN, PH.D.
SEATTLE, WASH.

J. LEON LASCOFF, PHAR.D.
NEW YORK CITY

TOWNES R. LEIGH, PH.D.
GAINESVILLE, FLA.

ERNEST LITTLE, PH.D.
NEWARK, N. J.

GEORGE W. MCCOY, M.D.
WASHINGTON, D. C.

HUGH C. MULDOON, D.SC.
PITTSBURGH, PA.

CARL E. NELSON
HAMMOND, IND.

ERWIN E. NELSON, M.D.
ANN ARBOR, MICH.

EDWIN L. NEWCOMB, PH.M.
NEW YORK CITY

†W. O. RICHTMANN, PH.D.
MADISON, WIS.

JOSEPH ROSIN, PH.M.
RAHWAY, N. J.

GEORGE B. ROTH, M.D.
WASHINGTON, D. C.

WILBUR L. SCOVILLE, SC.D.
DETROIT, MICH.

LEONARD A. SELTZER, SC.D.
DETROIT, MICH.

EARL R. SERLES, PH.D.
BROOKINGS, S. D.

VIRGIL E. SIMPSON, M.D.
LOUISVILLE, KY.

ISAAC STARR, M.D.
PHILADELPHIA, PA.

A. L. TATUM, M.D.
MADISON, WIS.

*FRANK P. UNDERHILL, PH.D.
NEW HAVEN, CONN.

CYRUS B. WOOD, M.D.
WASHINGTON, D. C.

H. C. WOOD, JR., M.D.
PHILADELPHIA, PA.

HEBER W. YOUNGKEN, PH.D.
BOSTON, MASS.

* Deceased.
† Resigned.

EXECUTIVE COMMITTEE AND SUB-COMMITTEES

E. FULLERTON COOK, *Chairman of the Executive Committee*
(The Chairmen of Sub-Committees constitute the Executive Committee)

EXECUTIVE COMMITTEE	SUB-COMMITTEES
1. *Scope (Admissions and Deletions)* REID HUNT, *Chairman.*	Messrs. Bastedo, Beardsley, Bethea, Brown, Christian, Dooley, DuMez, Edmunds, Fantus, Hirschfelder, Lascoff, LaWall, McCoy, C. E. Nelson, Roth, Seltzer, Simpson, Starr, Tatum, *Underhill, C. B. Wood, H. C. Wood.
2. *Therapeutics and Pharmacodynamics (Posology)* HENRY A. CHRISTIAN, *Chairman.*	Messrs. Bethea, Beardsley, Brown, Dooley, Hirschfelder, E. E. Nelson, Simpson, Starr, H. C. Wood.
3. *Biological Assays* C. W. EDMUNDS, *Chairman.*	Messrs. Bliss, Bye, Hirschfelder, †Howell, Hunt, McCoy, E. E. Nelson, Roth, Serles, Tatum, *Underhill.
4. *Biological Products and Diagnostic Tests* GEORGE W. MCCOY, *Chairman.*	Messrs. Bliss, Brown, Christensen, Dooley, Simpson.
5. *Botany and Pharmacognosy* EDWIN L. NEWCOMB, *Chairman.*	Messrs. Christensen, Gathercoal, Gidley, Havenhill, *Howell, †Richtmann, Youngken.
6. *Proximate Assays* C. B. JORDAN, *Chairman.*	Messrs. Beal, Bliss, Bye, Caspari, Davy, Harris, Havenhill, Johnson, Krantz, Langenhan, Rosin, Scoville, Serles.
7. *Inorganic Chemicals* JOHN C. KRANTZ, JR., *Chairman.*	Messrs. Arny, *Bradley, Caspari, Davy, Johnson, Jordan, Kraus, LaWall, Leigh, Little, Rosin.
8. *Organic Chemicals* GEORGE D. BEAL, *Chairman.*	Messrs. Arny, Caspari, Gidley, Harris, Johnson, Kraus, LaWall, Leigh, Muldoon, Rosin.
9. *Reagents and Test Solutions* ERNEST LITTLE, *Chairman.*	Messrs. Arny, Beal, *Bradley, LaWall, Rosin, Serles, C. B. Wood.
10. *Volatile Oils* †W. O. RICHTMANN (1930 to 1931), *Chairman.* CHARLES H LAWALL (1931), *Chairman.*	Messrs. Christensen, Gathercoal, *Howell, Serles, Youngken.
11. *Extracts, Fluidextracts and Tinctures* WILBUR L. SCOVILLE, *Chairman.*	Messrs. Bibbins, Bye, Crockett, Harris, Havenhill, Langenhan.
12. *Waters, Solutions, Spirits, Syrups, Elixirs* H. A. LANGENHAN, *Chairman.*	Messrs. Bibbins, Crockett, Fantus, Gathercoal, Gidley, Harris, Krantz, Lascoff, Muldoon, Scoville, Seltzer.
13. *Cerates, Ointments and Miscellaneous Galenicals* LEONARD A. SELTZER, *Chairman.*	Messrs. Bibbins, Crockett, Gidley, *Howell, Jordan, Lascoff.

* Deceased.
† Resigned.

EXECUTIVE COMMITTEE	SUB-COMMITTEES
14. *Tables, Weights and Measures* *Theodore J. Bradley, *Chairman.*	Messrs. DuMez, Kraus, Leigh, Little, C. E. Nelson, C. B. Wood.
15. *Nomenclature* A. G. DuMez, *Chairman.*	Messrs. Bethea, Fantus, Dooley, Muldoon, C. E. Nelson, Newcomb, †Richtmann, C. B. Wood, H. C. Wood, Youngken.

ADDITIONAL COMMITTEES AND BOARDS FOR THE CONSIDERATION OF SPECIAL FEATURES OF THE REVISION

Committee on Deterioration and Storage

Messrs. Beal, Bibbins, Krantz, Lascoff, Newcomb, Rosin, Scoville, Seltzer, Henry V. Arny, *Chairman.*

Committee on Extending Pharmacopœial Information

Messrs. Bastedo, Fantus, Kelly, LaWall, Seltzer, H. C. Wood, Jr., E. Fullerton Cook, *Chairman.*

Committee on Physico-Chemical Tests

Messrs. Beal, Krantz, Kraus, Leigh, Little, Rosin, E. Fullerton Cook, *Chairman.*

U. S. P. Auxiliary Commissions

Cuba	*Porto Rico*
Gerardo Fermandez Abreu	Julio B. Colón, M.D.
José P. Alaćan	Louis Torres Diaz
Angel Perez André, M.D.	Washington Llorens
Pedro A. Castillo	L. A. Salivia, M.D.
Eugenio L. Crabb	Jacobo Simonet, M.D.
José Capote Diaz	Luca Luis Velez
Francisco Hidalgo	*Philippine Islands*
Rosa Trina Lagomasino	Proceso Gabriel, M.D.
Celestino Garcia Morales	Daniel de la Paz, M.D.
Maria Amelia Mesa de Ponce	Mariano V. del Rosario, M.D.
Antonio Maria Valdes Dapena	Patrocinio Valenzuela, Ph.D.
José Guillermo Diaz, *Chairman*	*Leon Ma Guerrero, Sc.D., *Chairman.*

U. S. P. Vitamin Advisory Board

E. F. Kelly, Phar.D., Washington, D. C. E. M. Nelson, Ph.D., Washington, D. C.
*Lafayette B. Mendel, Ph.D., New Haven, Conn.
E. V. McCollum, Ph.D., Baltimore, Md.
Henry C. Sherman, Ph.D., New York, N. Y.
E. Fullerton Cook, Philadelphia, Pa., *Chairman.*

U. S. P. Anti-anemia Products Advisory Board

(With the cooperation of the Sub-Committee on Therapeutics)

William B. Castle, M.D., Boston, Mass. George R. Minot, M.D., Boston, Mass.
Raphael Isaacs, M.D., Ann Arbor, Michigan
Walter W. Palmer, M.D., New York, N. Y.
C. W. Edmunds, M.D., Ann Arbor, Michigan, *Chairman.*

*Deceased.
†Resigned.

PREFACE

Supplements to the Pharmacopœia have been established as an essential development in the program of revision. Because of the intensive studies to which official standards are constantly subjected, it has been found expedient to formulate a plan for revising standards, including tests and assays, and even adding new therapeutic agents whenever the advances in therapeutic knowledge or the presentation of new scientific facts indicate such changes to be warranted.

Authority to prepare lists of admissions or changes and Supplements to the Pharmacopœia was granted to the Committee of Revision by the U. S. P. Convention of 1930.

One list of corrections in the U. S. P. XI text was published just before the present Pharmacopœia became official but this method of correction does not always clearly indicate the exact character of alterations, especially were they to come before a court. These corrections are therefore included in the "First Supplement," together with such revisions as have been approved.

In order to indicate clearly the new official requirements, the "First Supplement" includes in full all monographs altered in any important measure since the appearance of the original text. As a convenience to users of the Pharmacopœia, alterations in the original text will be indicated in the Supplements by underlining those portions of the monographs which have been changed. As future Supplements are issued, each will carry those texts which have been revised since the appearance of the previous Supplement, and the latest Supplement will contain a cumulative index indicating all monographs of the original U. S. P. XI which have been revised or corrected, and the particular U. S. P. XI which have been revised or corrected, and the particular Supplement in which the latest text is published. The latest official standard may therefore be determined by consulting the index of the last Supplement and if not found there, it will be known that the monograph published in the original U. S. P. XI remains unchanged.

Supplements will represent the same careful review of texts which has always applied to regular revisions and those interested will be given the opportunity, in a public hearing, to express their views concerning the proposed changes. This plan was a part of the program in the preparation of this Supplement. The Committee of Revision passes upon and approves the final texts.

By revising the U. S. P. standards when necessary, and by adding

new therapeutic agents as their importance is demonstrated, the Pharmacopœia meets its responsibility to the medical profession and to the public. Through the operation of this plan, the Pharmacopœia also provides the necessary standards for drugs and medicines under the Food and Drugs Acts, and assures manufacturers and dispensers that official medicines conform to the high degree of quality and purity required for medicinal use.

The Committee of Revision wishes gratefully to acknowledge the assistance so generously given in the preparation of this "First Supplement" by many who are interested in the Pharmacopœia, including the members of the U. S. P. Vitamin Advisory Board, the officials of the Food and Drug Administration and of the U. S. Public Health Service, and also many experts associated with colleges, with chemical and pharmaceutical manufacturing laboratories and with other scientific and research institutions.

On the date indicated the revised monographs in this Supplement supersede the corresponding texts in the original U. S. P. XI and become a part of the official Pharmacopœia. Therefore, they should be carefully studied and official products made to conform to the new requirements.

GENERAL NOTICES

MONOGRAPHS AND GENERAL TESTS IN THIS SUPPLEMENT TO SUPERSEDE THE CORRESPONDING U. S. P. XI STANDARDS

The monographs and general tests published in this First Supplement to the Pharmacopœia of the United States, Eleventh Revision, supersede, on December 1, 1937, all corresponding standards found in the U. S. P. XI.

WATER FOR MANUFACTURE

The statement in the Preface of the U. S. P. XI, pages xi and xii, concerning the use of Distilled Water in manufacturing is superseded by the following:

Distilled Water—Distilled Water has been directed in the formulas of the U. S. Pharmacopœia, Eleventh Revision, but permission is granted by this Supplement, to use Water in the extraction of vegetable drugs, in the precipitation of resins, in the manufacture of soft soap, in liniments, and in solutions intended for external application. The standards for official Water will be found in this Supplement on page 17.

PAGE NUMBER REFERENCES

All page numbers in this supplement refer to the U. S. Pharmacopœia, Eleventh Revision, unless otherwise indicated.

MONOGRAPHS

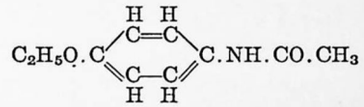
ON

VEGETABLE AND ANIMAL DRUGS, CHEMICALS, AND PREPARATIONS

ACETOPHENETIDINUM

Acetophenetidin

Acetphen.—Acetphenetidinum U. S. P. X, Phenacetin

$C_{10}H_{13}O_2N$  Mol. wt. 179.11

Paraacetaminophenetol.

Description and physical properties—Colorless, glistening crystals, usually scaly, or a fine, white, crystalline powder. It is odorless, has a slightly bitter taste, and is stable in the air.

One Gm. of Acetophenetidin is soluble in 1310 cc. of water, 15 cc. of alcohol, 14 cc. of chloroform, and in about 130 cc. of ether, at 25° C. One Gm. of it is soluble in 82 cc. of boiling water and in 2.8 cc. of boiling alcohol.

Tests for identity—Acetophenetidin melts between 134° and 135° C.

Boil about 0.1 Gm. of Acetophenetidin for one minute with 1 cc. of hydrochloric acid, dilute with 10 cc. of distilled water, cool, filter, and add a drop of potassium dichromate T.S. to the filtrate: the mixture slowly develops a ruby-red color.

Tests for purity—Ash: not more than 0.05 per cent, page 439.

Shake about 1 Gm. of Acetophenetidin with 20 cc. of distilled water during two minutes, and filter: the filtrate is neutral to litmus paper.

A mixture of about 0.005 Gm. of Acetophenetidin and 1 cc. of nitric acid develops a yellow color which becomes darker on standing.

The solution produced by dissolving 0.5 Gm. of Acetophenetidin in 5 cc. of sulfuric acid has no more color than matching fluid T, described under the test for *carbonizable substances*, page 441.

Boil 0.5 Gm. of Acetophenetidin with 10 cc. of distilled water for one minute, cool and filter the liquid, and add bromine T.S. to the filtrate, drop by drop, agitating after each addition, until the solution remains permanently yellow: neither turbidity nor precipitation results (*acetanilid*).

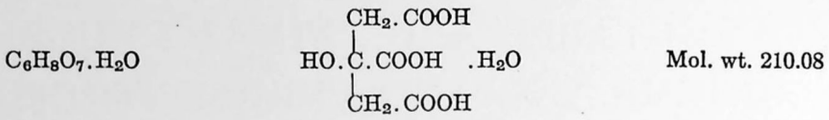
A mixture of 0.3 Gm. of Acetophenetidin with 1 cc. of alcohol and 1 drop of iodine T.S. does not acquire a red tint when diluted with three times its volume of distilled water and then boiled (*paraphenetidin*).

AVERAGE DOSE—Metric, 0.3 Gm.—Apothecaries, 5 grains.

ACIDUM CITRICUM

Citric Acid

Acid. Cit.



$C_6H_8O_7.H_2O$ Mol. wt. 210.08

Citric Acid contains not less than 99.5 per cent of $H_3C_6H_5O_7.H_2O$.

Description and physical properties—Colorless, translucent crystals, or a white, crystalline powder. It is odorless, has an acid taste, and is efflorescent in dry air.

One Gm. of Citric Acid is soluble in 0.5 cc. of water, in 1.8 cc. of alcohol, and in about 30 cc. of ether, at 25° C. One Gm. of the Acid is soluble in 0.5 cc. of boiling water.

Tests for identity—Citric Acid in aqueous solution is acid to litmus paper and responds to the tests for citrate, page 449.

When slowly ignited, Citric Acid is gradually decomposed without emitting an odor resembling that of burning sugar (difference from *tartaric acid*).

Tests for purity—Ash: not more than 0.05 per cent, page 439.

Neutralize 10 cc. of an aqueous solution of the Acid (1 in 10) with ammonia T.S., add 5 drops of diluted hydrochloric acid, cool, and add 2 cc. of calcium chloride T.S.: no turbidity is produced in the mixture (*oxalic acid*).

Add 1 cc. of barium chloride T.S. to 10 cc. of an aqueous solution of the Acid (1 in 100), to which has been added 3 drops of hydrochloric acid: no turbidity is produced in the mixture (*sulfate*).

Mix 0.5 Gm. of powdered Citric Acid with 5 cc. of sulfuric acid in a test tube that has been previously rinsed with sulfuric acid, and maintain the temperature of the mixture at 90° C. for one hour: the color of the mixture is not darker than matching fluid K, described under the test for *carbonizable substances*, page 441.

Ten cc. of an aqueous solution of the Acid (1 in 50) mixed with 0.5 cc. of hydrochloric acid meets the requirements of the test for *heavy metals*, page 447.

Dissolve 10 Gm. of Citric Acid in 20 cc. of distilled water, add 2 cc. of sulfurous acid T.S., and boil the mixture until the odor of sulfur dioxide is barely perceptible. Cool the solution, mix it with 1 cc. of sodium cyanide T.S., and follow this immediately with stronger ammonia T.S. until the solution possesses a distinct odor of ammonia. Cool, transfer the solution to a 50-cc., graduated, glass-stoppered cylinder, dilute with sufficient distilled water to make the mixture measure 50 cc. and add 3 drops of sodium sulfide T.S. After mixing well, the color produced in the solution, if any, when viewed downward against a white surface, is not darker than the color of a control solution prepared as follows: dissolve 2 Gm. of reagent ammonium chloride in 20 cc. of distilled water, add 2 cc. of a solution containing 0.08 Gm. of lead nitrate in 1000 cc. of distilled water, and 1 cc. of diluted hydrochloric acid. Treat this solution with the same quantities of sulfurous acid, sodium cyanide T.S., and stronger ammonia T.S. as were used in the test mixture, transfer the mixture to another 50-cc. cylinder, dilute it with sufficient distilled water to make the mixture measure 50 cc., and add 3 drops of sodium sulfide T.S. Before adding the sodium sulfide T.S. the liquid must possess a distinct odor of ammonia. The two cylinders used must be matched, be of practically colorless glass, and have equal internal diameters (*lead*).

Assay—Place about 3 Gm. of Citric Acid in a tared flask and weigh accurately. Dissolve the Acid in about 40 cc. of recently boiled distilled water, and titrate with normal sodium hydroxide, using phenolphthalein T.S. as the indicator. Each cc. of normal sodium hydroxide is equivalent to 0.07003 Gm. of $H_3C_6H_5O_7.H_2O$.

Storage—Preserve Citric Acid in well-closed containers.

Preparation—Syrupus Acidi Citrici.

ACIDUM OLEICUM

Oleic Acid

Acid. Oleic.

A liquid acid obtained from tallow and other fats, and consisting chiefly of $CH_3(CH_2)_7CH:CH(CH_2)_7COOH$.

Description and physical properties—A pale yellow, or brownish-yellow, oily liquid. It has a peculiar, lard-like odor and taste. On exposure to air it gradually absorbs oxygen, and darkens.

Oleic Acid is almost insoluble in water, but is miscible with any of the following substances: alcohol, chloroform, ether, benzene, petroleum benzin, and with fixed and volatile oils.

Specific gravity: about 0.895 at 25° C.

When strongly heated Oleic Acid is decomposed with the production of acrid vapors.

Tests for identity and purity—The weight of the ash from 5 cc. of Oleic Acid does not exceed 0.005 Gm, page 439.

Congealing temperature: not above 10° C., page 442.

Acid value: not less than 188 and not more than 200, using about 1 Gm. of Oleic Acid, accurately weighed, page 444.

Iodine value: not less than 85 and not more than 95, page 445.

Shake 5 cc. of Oleic Acid with an equal volume of distilled water, allow the liquids to separate, and filter through a paper filter moistened with water: the aqueous filtrate is not reddened by the addition of a drop of methyl orange T.S. (*mineral acids*).

Boil 1 cc. of Oleic Acid with about 0.5 Gm. of sodium carbonate and 30 cc. of distilled water in a capacious flask: the resulting solution, while hot, is clear or at most opalescent (*neutral fat* or *mineral oil*).

Storage—Preserve Oleic Acid in well-closed glass or stoneware containers and in a cool place.

ACONITUM

Aconite

Aconit.—Aconite Root, Monkshood, Aconiti tuber P.I.

Aconite is the dried tuberous root of *Aconitum Napellus* Linné and its subspecies and varieties containing aconitine (Fam. *Ranunculaceæ*).

The potency of Aconite shall be such that 0.1 Gm. of it, when extracted and the extract assayed as directed under *Tinctura Aconiti*, on page 83 of this Supplement, shall possess an activity equivalent to not less than 0.150 milligram of reference aconitine. Aconite contains not more than 5 per cent of its stems and not more than 2 per cent of other foreign organic matter.

Description and physical properties—

Unground Aconite—More or less conical, from 4 to 10 cm. in length, and from 1 to 3.5 cm. in diameter at the crown; externally dark brown or grayish-brown, smooth or longitudinally wrinkled, the upper end with a bud, or remains of bud-scales and a stem-scar, the other portions with numerous root-scars or short rootlets; fracture short, horny or somewhat mealy; internally whitish, light brown, or dark brown; bark, 1 to 2 mm. in thickness, cambium zone usually 5- to 8-angled; odor very slight; taste sweetish, soon becoming acrid and developing a tingling sensation, followed by numbness (*Taste cautiously.*)

Structure—An outer layer of one or more rows of suberized cells with blackish-brown walls beneath which in younger portions of the root occur a primary cortex of starch-parenchyma in which usually occur scattered characteristic stone cells and a modified endodermis, all or a portion of these regions being suberized or exfoliated in older parts; an inner bark of many rows of starch-parenchyma and scattered islets of sieve tissue in the outer region of which may occur a number of stone cells; a 5- to 8-angled cambium, in each angle of which is a 2- to 4-rayed collateral bundle or a number of small bundles arranged in an irregular circle; occasional small bundles may occur along the cambium line between the angles; pith of large starch-bearing parenchyma cells.

Powdered Aconite—Grayish-brown; starch grains numerous, spherical, somewhat planoconvex, single or 2- to 5-compound, the individual grains from 0.003 to 0.020 mm. in diameter and frequently with a central cleft; tracheæ mostly with slit-like, simple pores, sometimes with spiral or reticulate thickenings or with bordered pores; stone cells single, or in small groups, tabular, irregular, rectangular or elongated in shape, from 0.1 to 0.4 mm. in length, walls strongly lignified and having large simple pores; a few fragments of cells with brownish walls; fragments of parenchyma numerous, the cells being filled with starch grains; fibers from stems few, very long, with lignified walls and marked by transverse or oblique, slit-like pores.

Assay—Prepare a tincture by the official process and assay it as directed under *Tinctura Aconiti* on page 83 of this Supplement.

Preparation—Tinctura Aconiti.

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

ACRIFLAVINA

Acriflavine

Acriflav.—Acriflavine Base, Neutral Acriflavine

A mixture of 2,8 diamino-10-methylacridinium chloride and 2,8 diaminoacridine containing, when dried to constant weight at 100° C., not less than 13.3 per cent and not more than 15.8 per cent of Cl.

Description and physical properties—A brownish-red, odorless, granular powder. One Gm. of Acriflavine is soluble in about 3 cc. of water; it is incompletely soluble in alcohol. It is nearly insoluble in ether, in chloroform, and in fixed oils.

Tests for identity and purity—Aqueous solutions of Acriflavine are brownish-red in color and fluoresce on dilution. Add a few drops of hydrochloric acid to an aqueous solution of Acriflavine that is just sufficiently diluted to show fluorescence; the fluorescence disappears, but partially reappears on further dilution with distilled water.

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*).

Add 2 drops of sulfuric acid to 1 cc. of an aqueous solution of Acriflavine (1 in 250) and agitate it: an orange-red crystalline precipitate is formed.

Dry Acriflavine, accurately weighed, to constant weight at 100° C.: the loss in weight does not exceed 7 per cent.

Moisten 1 Gm. of Acriflavine, accurately weighed, with 1 cc. of sulfuric acid and ignite to constant weight: the resulting residue weighs not more than 0.035 Gm.

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 100° C.: the residue does not exceed 0.5 per cent.

Acriflavine complies with the requirements of the test for *arsenic* under *Acriflavinæ Hydrochloridum*, page 33.

Acriflavine, when dried to constant weight at 100° C., contains not less than 13.3 per cent and not more than 15.8 per cent of Cl, when determined as directed under *Acriflavinæ Hydrochloridum*, page 33.

Storage—Preserve Acriflavine in tightly-closed containers.

AQUA

Water

Water (H_2O), conforming to the following requirements and tests.

Description and physical properties—A clear, colorless liquid practically tasteless and odorless.

Tests for purity—Place 10 cc. of Water in a clean test tube and add 2 drops of neutralized methyl red T.S.: no orange or red color is produced, indicating a pH of not less than 5.6. Another 10 cc. portion of Water does not show a pink or red color on the addition of 2 drops of phenolphthalein T.S., indicating a pH not greater than 8.3.

When heated nearly to the boiling point and agitated, Water evolves no disagreeable odor.

Evaporate 100 cc. of Water to dryness on a water bath and dry the residue in an oven to constant weight at 100° C.: not more than 0.050 Gm. of residue remains (*total solids*).

To 50 cc. of Water, heated to 50° C., add 1 cc. of diluted acetic acid and 50 cc. of freshly prepared hydrogen sulfide T.S. and allow the liquid to stand at room temperature for ten minutes. The color of the liquid when viewed downward over a white surface is not darker than the color of a mixture of 50 cc. of the same water with an equal volume of distilled water when viewed in a similar tube and in the same manner as the Water treated with the hydrogen sulfide T.S. (*heavy metals*).

To 50 cc. of Water contained in a glass tube add 3 drops of glacial acetic acid and 0.5 cc. of potassium ferrocyanide T.S. The solution does not show a greater turbidity than that produced by 50 cc. of distilled water in another glass tube when treated in the same manner and viewed downward over a dark surface. The two glass tubes must be matched, they must be of practically colorless glass, and have equal internal diameters (*zinc*).

Water meets the standards for freedom from *B. coli* as set forth in Reprint No. 1029 of the United States Public Health Reports.

AQUA DESTILLATA

Distilled Water

Aq. Dest.

Water (H_2O) purified by distillation.

Description and physical properties—A colorless, clear liquid, without odor or taste.

Tests for purity—Add 2 drops of methyl red, pH indicator, page 580, to 10 cc. of Distilled Water in a test tube: no orange or red color develops, indicating a pH of not less than 5.8.

Another 10-cc. portion does not show a blue color on the addition of 5 drops of bromthymol blue, pH indicator, page 580, indicating a pH of not more than 7.0.

Evaporate 100 cc. of Distilled Water to dryness on a water bath, and dry the residue in an oven to constant weight at 100° C.: not more than 0.0010 Gm. of residue remains.

Separate portions of 100 cc. each of Distilled Water are not rendered turbid or opalescent by the addition of barium chloride T.S. (*sulfate*), silver nitrate T.S. (*chloride*), or ammonium oxalate T.S. (*calcium*). In another 100-cc. portion no darkening is produced by the addition of hydrogen sulfide T.S. (*heavy metals*).

A 100-cc. portion of Distilled Water shows not more than a faint yellow color on the addition of 1 cc. of alkaline mercuric potassium iodide T.S. (*ammonia*).

Add 50 cc. of calcium hydroxide T.S. to 25 cc. of Distilled Water: the mixture remains clear and transparent (*carbon dioxide*).

ATROPINÆ SULFAS

Atropine Sulfate

Atrop. Sulf.

$(C_{17}H_{23}O_3N)_2.H_2SO_4.H_2O$ Mol. wt. 694.47

Description and physical properties—Colorless crystals, or a white, crystalline powder. It effloresces in dry air.

Caution—Atropine Sulfate is extremely poisonous.

One Gm. of Atropine Sulfate is soluble in 0.4 cc. of water, in 5 cc. of alcohol, in 2.5 cc. of glycerin, in 420 cc. of chloroform, and in 3000 cc. of ether, at 25° C. One Gm. of it is soluble in 2.5 cc. of boiling alcohol.

Tests for identity—Melting point: not below 188° C., page 455.

Add a few drops of nitric acid to about 0.01 Gm. of Atropine Sulfate, contained in a porcelain dish, and evaporate the mixture to dryness on a water bath: a yellow residue is obtained. Add to the cooled residue a few drops of alcoholic potassium hydroxide T.S. and a fragment of potassium hydroxide: the mixture is intensely violet in color (*hyoscyamine* and *scopolamine* similarly treated produce the same color as Atropine, but the presence of *other alkaloids* obscures the color effect).

Gold chloride T.S. produces in an aqueous solution of Atropine Sulfate (1 in 50) a lusterless precipitate (*hyoscyamine* yields a lustrous precipitate).

Barium chloride T.S. produces in an aqueous solution of Atropine Sulfate (1 in 20) a white precipitate which is insoluble in hydrochloric acid.

Tests for purity—An aqueous solution of Atropine Sulfate (1 in 20) is neutral to litmus paper.

The ash from 0.1 Gm. of Atropine Sulfate is negligible, page 439.

The solution produced by dissolving 0.2 Gm. of Atropine Sulfate in 5 cc. of sulfuric acid has no more color than matching fluid A, described under the test for *carbonizable substances*, page 441, and the solution becomes only light yellow upon the addition of 0.2 cc. of nitric acid (*many other alkaloids*).

In an aqueous solution of Atropine Sulfate (1 in 50), mixed with a few drops of hydrochloric acid, platinic chloride T.S. produces no precipitate (*most other alkaloids*).

Prepare an aqueous solution of Atropine Sulfate (1 in 60). Treat a portion of this solution with sodium hydroxide T.S.: the mixture is turbid. Add 2 cc. of ammonia T.S. to a separate 5-cc. portion of the solution: the mixture does not immediately become turbid (*apoatropine* or *belladonnine*).

Storage—Preserve Atropine Sulfate in well-closed containers.

AVERAGE DOSE—Metric, 0.0005 Gm.—Apothecaries, 1/120 grain.

BISMUTHI SUBGALLAS

Bismuth Subgallate

Bism. Subgal.—Basic Bismuth Gallate, Dermatol

Bismuth Subgallate is a basic salt, which, when dried for three hours at 100° C., yields upon ignition not less than 52 per cent and not more than 57 per cent of Bi_2O_3.

Description and physical properties—An amorphous, bright yellow powder. It is odorless and tasteless, and is stable in the air.

Bismuth Subgallate is practically insoluble in water, in alcohol, and in ether. It is readily dissolved with decomposition by warm, moderately dilute hydrochloric, nitric, or sulfuric acid; insoluble in very dilute mineral acids. It is readily dissolved by solutions of alkali hydroxides, forming a clear, yellow liquid, which rapidly assumes a deep red color.

Tests for identity—When heated to redness, Bismuth Subgallate at first chars, leaving finally a yellow residue, which is blackened by hydrogen sulfide T.S. This residue responds to the tests for bismuth, page 448.

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 one drop of ferric chloride T.S.: a blue-black mixture is produced.

Tests for purity—Shake 1 Gm. of Bismuth Subgallate with 20 cc. of alcohol for one minute, filter, and evaporate the filtrate to dryness on a water bath: not more than 0.005 Gm. of residue remains (*free gallic acid*).

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 0.005 Gm. (*alkalies* and *earths*).

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 brownish-red color appears at the zone of contact of the two liquids (*nitrate*).

Ignite 3 Gm. of Bismuth Subgallate in a porcelain crucible, cool, and cautiously add, drop by drop, just sufficient nitric acid to dissolve the residue upon warming. Evaporate the solution to dryness, again ignite, and cool. Cautiously dissolve this 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 *lead*, *copper*, or *silver* under *Bismuthi Subcarbonas*, page 88.

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: this solution meets the requirements of the test for *arsenic*, page 436.

Assay—Dry about 1 Gm. of Bismuth Subgallate for three hours at 100° C., then weigh the residue accurately and ignite it in a porcelain crucible. Allow it to cool, and add nitric acid to the residue, drop by drop, warming until complete solution has been effected. Evaporate this solution to dryness and carefully ignite the residue to constant weight. This residue of Bi_2O_3 is not less than 52 per cent and not more than 57 per cent of the amount of Bismuth Subgallate taken for the assay.

Storage—Preserve Bismuth Subgallate in well-closed containers and protected from light.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

CALCII BROMIDUM

Calcium Bromide

Calc. Brom.

$CaBr_2.2H_2O$ Mol. wt. 235.94

Calcium Bromide is a hydrated salt, containing not less than 84 per cent and not more than 94 per cent of $CaBr_2$.

Description and physical properties—A white, granular salt, having no odor. It is very deliquescent.

One Gm. of Calcium Bromide is soluble in 0.7 cc. of water and in 1.3 cc. of alcohol, at 25° C. One Gm. of the salt is soluble in 0.4 cc. of boiling water. It is insoluble in chloroform and in ether.

Tests for identity—An aqueous solution of the salt (1 in 20) responds to the tests for calcium, page 449, and for bromide, page 449.

Tests for purity—An aqueous solution of Calcium Bromide (1 in 20) is neutral or slightly alkaline to litmus paper. Add a few drops of ferric chloride T.S. and 1 cc. of chloroform to 10 cc. of an aqueous solution of the salt (1 in 20), and shake the mixture: the chloroform does not acquire a violet tint (*iodide*).

Drop 1 cc. of diluted sulfuric acid upon about 1 Gm. of Calcium Bromide: the salt does not at once become yellow (*bromate*).

Dissolve 0.1 Gm. of the salt 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 ten 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, acidulated 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 fiftieth-normal hydrochloric acid, page 471.

Add several drops of potassium ferrocyanide T.S. to 20 cc. of an aqueous solution of Calcium Bromide (1 in 200): the solution does not assume a blue color at once (*iron*).

Acidulate 5 cc. of an aqueous solution of the salt (1 in 20) with 1 drop of hydrochloric acid, and add 1 cc. of barium chloride T.S.: no immediate turbidity is produced (*sulfate*).

Dissolve 1 Gm. of Calcium Bromide and 1 Gm. of sodium acetate in 5 cc. of distilled water, and render the solution slightly acid by the addition of a sufficient quantity (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: it is not rendered cloudy within five minutes (*barium*).

Dissolve 1 Gm. of the salt 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 one 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 should not exceed 0.004 Gm. (*magnesium* and *alkali salts*).

An aqueous solution of the salt meets the requirements of the test for *heavy metals*, page 447.

Assay—Weigh accurately in a glass-stoppered weighing tube about 0.4 Gm. of Calcium Bromide, 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., then make slightly alkaline with ammonia T.S. Heat the mixture on a water bath for two hours, filter through hardened filter paper and wash thoroughly with warm distilled water. Puncture the filter paper, and wash the precipitate into a beaker by means of a stream of hot distilled water, followed by 30 cc. of dilute sulfuric acid (1 in 3). Heat the solution, if necessary, to 60° C. and titrate with tenth-normal potassium permanganate. Each cc. of tenth-normal potassium permanganate is equivalent to 0.009996 Gm. of $CaBr_2$.

Storage—Preserve Calcium Bromide in air-tight containers.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

CALCII CARBONAS PRÆCIPITATUS

Precipitated Calcium Carbonate

Calc. Carb. Præc.—Precipitated Chalk

$CaCO_3$ Mol. wt. 100.08

Precipitated Calcium Carbonate, when dried to constant weight at 200° C., contains not less than 98 per cent of $CaCO_3$.

Description and physical properties—A fine, white, microcrystalline powder, without odor or taste. It is stable in the air.

Precipitated Calcium Carbonate is practically insoluble in water. Its solubility in water is increased by the presence of any ammonium salt and by the presence of carbon dioxide. Any alkali hydroxide reduces its solubility. It is insoluble in alcohol. It dissolves with effervescence in diluted acetic, in diluted hydrochloric, and in diluted nitric acids.

Tests for identity—The addition of acetic acid to Precipitated Calcium Carbonate produces effervescence, and the resulting solution, after boiling to expel carbon dioxide and neutralizing with ammonia T.S., responds to the tests for calcium, page 449.

Tests for purity—Mix 2 Gm. of Precipitated Calcium Carbonate with 10 cc. of distilled water and add hydrochloric acid, drop by drop, with agitation until effervescence ceases. Then add sufficient distilled water to make the mixture measure 100 cc. and filter. A platinum wire, dipped in this filtrate and held in a non-luminous flame, does not impart to the latter a green color (*barium*). A 10-cc. portion of this filtrate does not respond to the test for *heavy metals*, page 447. Wash the insoluble residue on the filter with distilled water until the washings show no chloride, and then ignite it: the weight of the residue does not exceed 0.004 Gm.

Dissolve 1 Gm. of Precipitated Calcium Carbonate in a mixture of 20 cc. of distilled water and 10 cc. of diluted hydrochloric acid. Heat to boiling, neutralize with ammonia T.S., and completely precipitate the calcium by the addition of ammonium oxalate T.S. Heat the mixture on a water bath for one 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 0.005 Gm. (*magnesium* and *alkalies*).

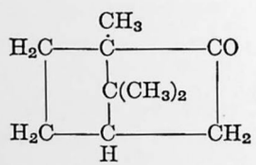
Assay—Dry about 0.4 Gm. of Precipitated Calcium Carbonate to constant weight at 200° C., weigh accurately, dissolve it in a mixture of 10 cc. of diluted hydrochloric acid and 10 cc. of distilled water, and boil the solution to expel all carbon dioxide. Transfer this solution to a 200-cc. volumetric flask, add 100 cc. of tenth-normal oxalic acid, render it alkaline with ammonia T.S., shake the mixture well, and allow it to stand for three hours at from 60° to 70° C., or over night at room temperature. Cool the liquid if necessary, add sufficient distilled water to make the mixture measure 200 cc., mix well, and pass through a filter, which has not been previously moistened, into a dry flask, rejecting the first 20 cc. of the filtrate. Acidulate 100 cc. of the subsequent filtrate (corresponding to one-half of the Precipitated Calcium Carbonate taken) with diluted sulfuric acid, then add 25 cc. more of the diluted sulfuric acid, warm the solution to about 60° C., and titrate with tenth-normal potassium permanganate. Each cc. of tenth-normal oxalic acid is equivalent to 0.005004 Gm. of $CaCO_3$.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

CAMPHORA

Camphor

Camph.



$C_{10}H_{16}O$ Mol. wt. 152.12

A ketone obtained from *Cinnamomum Camphora* (Linné) Nees et Ebermaier (Fam. *Lauraceæ*) (Natural Camphor); or produced synthetically (Synthetic Camphor).

Description and physical properties—Colorless, transparent crystals or crystalline masses; white, translucent, tough masses or granules. It has a penetrating, characteristic odor, a pungent, aromatic taste, and is readily pulverizable in the presence of a little alcohol, ether, or chloroform. It slowly volatilizes at ordinary temperatures.

One Gm. of Camphor is soluble in about 800 cc. of water, in 1 cc. of alcohol, in 0.5 cc. of chloroform, and in 1 cc. of ether, at 25° C. It is freely soluble in carbon disulfide, in petroleum benzin, and in fixed or volatile oils.

Tests for identity—Specific gravity: about 0.990 at 25° C.

Camphor melts between 174° and 177° C., page 455.

The specific rotation $[\alpha]_D$ of Natural Camphor, determined at 25° C., in a solution containing 10 Gm. of Camphor in sufficient alcohol to make 100 cc. and using a 200-mm. tube, is between +41° and +42°, page 459.

Tests for purity—A solution of Camphor in petroleum benzin (1 in 10) is clear (*water*).

Gradually heat about 2 Gm. of Camphor: it sublimes without carbonization and without leaving more than 0.05 per cent of non-volatile matter.

Mix 0.1 Gm. of finely divided Camphor with 0.2 Gm. of sodium peroxide in a clean, dry, hard glass test tube of about 25 mm. internal diameter and 20 cm. in length. Suspend the tube at an angle of about 45° by means of a clamp placed at the upper end, and gently heat the tube, starting at the upper end and gradually bringing the heat toward the lower part of the tube until incineration is complete. Dissolve the residue in 25 cc. of warm distilled water, acidify with nitric acid, and filter the solution into a comparison tube. Wash the test tube and filter with two portions of 10 cc. each of hot distilled water, adding the washings to the filtered solution. Add to the filtrate 0.5 cc. of tenth-normal silver nitrate, dilute with distilled water to 50 cc., and mix thoroughly. The turbidity is no greater than that produced in a control test with the same quantities of the same reagents and 0.05 cc. of fiftieth-normal hydrochloric acid (*halogens*).

Storage—Preserve Camphor in well-closed containers, in a cool place and protected from light.

Preparations—Aqua Camphoræ, Linimentum Camphoræ, Linimentum Camphoræ et Saponis, Linimentum Chloroformi (from Camphor and Soap Liniment), Spiritus Camphoræ, Tinctura Opii Camphorata.

AVERAGE DOSE—By mouth or hypodermic, Metric, 0.2 Gm.—Apothecaries, 3 grains.

CARBO ACTIVATUS

Activated Charcoal

Carbo Activat.

The residue from the destructive distillation of various organic materials, treated to increase its adsorptive power.

Note—When "Carbo Ligni" is prescribed, "Carbo Activatus" may be dispensed.

Description and physical properties—A fine, black, odorless, and tasteless powder, free from gritty matter.

Tests for purity—When Activated Charcoal is dried to constant weight at 120° C., the loss does not exceed 15 per cent (*volatile substances*).

Ignite about 0.5 Gm. of Activated Charcoal, accurately weighed, to constant weight in a platinum crucible: the residue does not exceed 4 per cent (*ash*).

Boil 1 Gm. of Activated Charcoal with a mixture of 20 cc. of distilled water and 5 cc. of hydrochloric acid for five minutes and filter into a tared porcelain crucible. Add 1 cc. of sulfuric acid to the filtrate, evaporate to dryness, and ignite the residue to constant weight at a dull red heat: the weight of the residue does not exceed 0.035 Gm. (*acid soluble substances*).

To 0.25 Gm. of Activated Charcoal add 10 cc. of sodium hydroxide T.S., heat to boiling, and filter: the filtrate is colorless (*completeness of carbonization*).

Boil 3 Gm. of Activated Charcoal with 60 cc. of distilled water for five minutes, allow to cool, dilute to the original volume with distilled water, and filter: the filtrate is colorless, and neutral to litmus paper.

A 10-cc. portion of the filtrate shows no more *chloride* than is equivalent to 1.5 cc. of fiftieth-normal hydrochloric acid, page 471.

Another 10-cc. portion of the filtrate shows no more *sulfate* than is equivalent to 1 cc. of fiftieth-normal sulfuric acid, page 471.

Boil 0.5 Gm. of Activated Charcoal with a mixture of 20 cc. of distilled water and 5 cc. of hydrochloric acid: lead acetate test paper is not blackened when held in the vapor of the boiling mixture (*sulfide*).

Place a mixture of 5 Gm. of Activated Charcoal, 50 cc. of distilled water, and 2 Gm. of tartaric acid in a distilling flask connected with a condenser provided with a tightly fitting adapter, the end of which dips under the surface of a mixture of 2 cc. of sodium hydroxide T.S. and 10 cc. of distilled water contained in a small flask surrounded by ice. Heat the mixture in the distilling flask to boiling and distil about 25 cc. Dilute the distillate to 50 cc. with distilled water and mix thoroughly. To 25 cc. of the diluted distillate add about 0.05 Gm. of ferrous sulfate dissolved in 1 cc. of distilled water, heat the mixture almost to boiling, cool, and add 1 cc. of hydrochloric acid: no blue color is produced (*cyanogen compounds*).

Boil 1 Gm. of Activated Charcoal with a mixture of 20 cc. of diluted hydrochloric acid and 5 cc. of bromine T.S. for five minutes, filter, and wash the Charcoal and filter with 50 cc. of boiling distilled water. Evaporate the filtrate and washings to dryness, and extract the residue with a mixture of 1 cc. of normal hydrochloric acid, 20 cc. of distilled water, and 5 cc. of sulfurous acid T.S. Boil the solution until all of the sulfur dioxide is expelled, then dilute it to a volume of 50 cc. with distilled water. To 10 cc. of the solution add 5 cc. of freshly prepared hydrogen sulfide T.S.: the solution does not show a darker coloration in ten seconds than that produced by 10 cc. of distilled water, to which 0.1 cc. of lead nitrate solution, containing 0.1599 Gm. of lead nitrate in 1000 cc. of distilled water, has been added, and treated with 5 cc. of freshly prepared hydrogen sulfide T.S. (*heavy metals*).

Dissolve 0.1 Gm. of strychnine sulfate in 50 cc. of distilled water, add 1 Gm. of Activated Charcoal, shake the mixture vigorously for five minutes, filter immediately through a dry filter, and reject the first 20 cc. of filtrate. The addition of 1 drop of hydrochloric acid and 5 drops of mercuric potassium iodide T.S. to a 10-cc. portion of the subsequent filtrate produces no turbidity (*adsorptive power*).

Dissolve 0.25 Gm. of methylthionine chloride in enough distilled water to make 250 cc. of solution. Measure exactly 50 cc. of this solution, at 25° C., into each of two 100-cc., glass-stoppered flasks. Add to one flask exactly 0.25 Gm. of Activated Charcoal, stopper the flask, and shake it vigorously for five minutes. Filter the contents of each flask through a filter, which has not been previously moistened, rejecting the first 20 cc. of each filtrate. Measure exactly 25 cc. of the remaining filtrates into each of two 250-cc., volumetric flasks. Add to each flask 50 cc. of an aqueous solution of sodium acetate (1 in 10) and mix thoroughly, then add from a burette 35 cc. of tenth-normal iodine, keeping the mixture in constant rotation. Stopper the flasks and allow them to stand for fifty minutes, shaking them vigorously at intervals of ten minutes. Dilute each mixture to exactly 250 cc. with distilled water, mix thoroughly, allow to stand for ten minutes, and filter each through a filter, which has not been previously moistened, rejecting the first 30 cc. of each filtrate. Determine the excess of iodine in 100 cc. of each filtrate by titration with tenth-normal sodium thiosulfate. Calculate the number of cubic centimeters of tenth-normal iodine consumed in each titration: the difference between the two titrations, multiplied by 5, amounts to not less than 3.5 cc. (*adsorptive power*).

Into each of two flasks place 185 cc. of distilled water and 5 cc. of glacial acetic acid and mix thoroughly. By means of a pipette add to each flask 10 cc. of a solution of 2.5 Gm. of crystallized sodium sulfide in 100 cc. of distilled water, placing the tip of the pipette at the bottom of the flask during delivery. Rotate the flasks gently for thirty seconds, add to one of the flasks 1 Gm. of Activated Charcoal, stopper the flasks, and shake them for five minutes. Filter the contents of each flask through a filter that has not been previously moistened, rejecting the first 20 cc. of each filtrate. Titrate

100 cc. of each subsequent filtrate with tenth-normal iodine, using starch T.S. as the indicator. The filtrate from the Activated Charcoal consumes at least 5 cc. less of tenth-normal iodine than the filtrate from the solution to which no Activated Charcoal was added (*adsorptive power*).

Storage—Preserve Activated Charcoal in well-closed containers.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

CARBROMALUM

Carbromal

Carbrom.

$C_7H_{13}O_2N_2Br$ $(C_2H_5)_2.CBr.CO.NH.CONH_2$ Mol. wt. 237.03

Bromdiethylacetylurea.

Description and physical properties—A white, odorless, crystalline powder.

One Gm. of Carbromal is soluble in about 3000 cc. of water, in 18 cc. of alcohol, in 3 cc. of chloroform, and in 14 cc. of ether, at 25° C. It is very soluble in boiling alcohol. It dissolves in sulfuric, nitric, or hydrochloric acids, from which solutions it is precipitated by the addition of water. It is dissolved by solutions of alkali hydroxides.

Tests for identity—Carbromal melts between 116° and 119° C., page 455.

On boiling about 0.2 Gm. of Carbromal with 5 cc. of an aqueous solution of sodium hydroxide (1 in 10), ammonia is evolved.

Mix 0.1 Gm. of Carbromal with 0.5 Gm. of anhydrous sodium carbonate, and ignite them gently until the decomposition is complete. Dissolve the residue in 5 cc. of hot distilled water, cool the solution, acidulate with acetic acid, and filter. Add to the filtrate 2 cc. of chloroform and then chlorine T.S., drop by drop, shaking the mixture: the chloroform acquires a red-brown color.

Tests for purity—The ash from 0.5 Gm. of Carbromal is negligible, page 439.

The solution produced by dissolving 0.5 Gm. of Carbromal in 5 cc. of sulfuric acid has no more color than matching fluid A, described under the test for *carbonizable substances*, page 441.

Shake 1 Gm. of Carbromal with 20 cc. of distilled water during five minutes, and filter the mixture: the filtrate is neutral to litmus paper.

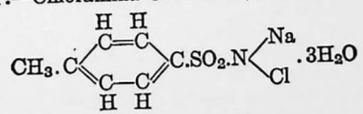
Separate, 5-cc. portions of the filtrate obtained in the preceding test show no more *chloride* than corresponds to 0.1 cc. of fiftieth-normal hydrochloric acid, page 471, and no more *sulfate* than corresponds to 0.1 cc. of fiftieth-normal sulfuric acid, page 471.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

CHLORAMINA-T

Chloramine-T

Chloram.-T.—Chloramina U. S. P. X, Chloramine



$C_7H_7O_2NSClNa.3H_2O$ Mol. wt. 281.62

Sodium paratoluenesulfonchloramide contains the equivalent of not less than 11.5 per cent and not more than 13 per cent of active Cl.

Description and physical properties—A white or faintly yellow, crystalline powder, having a slight odor of chlorine. It slowly decomposes on exposure to air, losing chlorine.

One Gm. of Chloramine-T is soluble in about 7 cc. of water at 25° C. and in about 2 cc. of boiling water. It is soluble in alcohol but the solution decomposes on standing. It is insoluble in benzene, in chloroform, and in ether.

Between 95° and 100° C. Chloramine-T loses its water of hydration without decomposition.

Tests for identity—An aqueous solution of Chloramine-T (1 in 20) is alkaline to litmus paper and to phenolphthalein T.S.

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*).

An acid produces in an aqueous solution of Chloramine-T (1 in 20) a white turbidity or precipitate which redissolves in an excess of an alkaline hydroxide solution. When strong mineral acids are used, chlorine is also liberated.

Test for purity—Dissolve 0.2 Gm. of Chloramine-T in 5 cc. of sulfuric acid: chlorine is evolved but the solution has no more color than matching fluid A, described under the test for *carbonizable substances*, page 441.

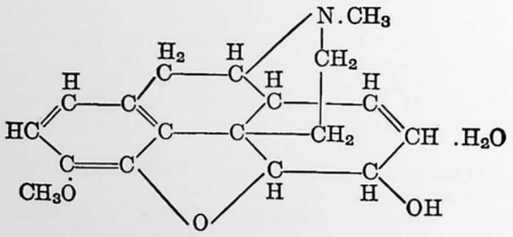
Assay—Dissolve about 0.5 Gm. of Chloramine-T, accurately weighed, in 50 cc. of distilled water, add 5 cc. of potassium iodide T.S. and 5 cc. of acetic acid, and allow the mixture to stand in a glass-stoppered bottle for ten minutes. Titrate the liberated iodine with tenth-normal sodium thiosulfate, using starch T.S. as the indicator. Each cc. of tenth-normal sodium thiosulfate is equivalent to 0.001773 Gm. of active chlorine.

Storage—Preserve Chloramine-T in well-closed containers and protected from light.

CODEINA

Codeine

Codein.



$C_{18}H_{21}O_3N.H_2O$ Mol. wt. 317.19

An alkaloid obtained from opium or prepared from morphine by methylation.

Description and physical properties—Colorless crystals, or a white, crystalline powder. It effloresces slowly in dry air.

One Gm. of Codeine is soluble in 120 cc. of water, in 2 cc. of alcohol, in 0.5 cc. of chloroform, in 50 cc. of ether, and in 13 cc. of benzene, at 25° C. One Gm. of it is soluble in 1.2 cc. of alcohol at 60° C.

Tests for identity—When heated in an amount of water insufficient for complete solution, Codeine melts to oily drops which crystallize on cooling.

Codeine, rendered anhydrous by drying at 80° C., melts between 154° and 156° C., page 455.

A saturated, aqueous solution of Codeine is alkaline to litmus paper, and is lævorotatory.

Sulfuric acid containing 0.005 Gm. of selenous acid in each cc. produces with Codeine a green color, which changes rapidly to blue, then slowly back to green.

Dissolve about 0.01 Gm. 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 red on the addition of a drop of nitric acid.

Tests for purity—Codeine, dried to constant weight at 80° C., loses not more than 6 per cent of its weight (*water*).

The ash from 0.5 Gm. of Codeine is negligible.

The solution produced by dissolving 0.01 Gm. of Codeine in 5 cc. of sulfuric acid has no more color than matching fluid S, described under the test for *carbonizable substances*, page 441.

Dissolve about 0.05 Gm. of potassium ferricyanide in 10 cc. of distilled water, 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 at once in the solution (*morphine*).

Storage—Preserve Codeine in well-closed containers and protected from light.

AVERAGE DOSE—Metric, 0.03 Gm.—Apothecaries, ½ grain.

CODEINÆ PHOSPHAS

Codeine Phosphate

Codein. Phos.

$C_{18}H_{21}O_3N.H_3PO_4.1\frac{1}{2}H_2O$ Mol. wt. 424.24

Codeine Phosphate contains not less than 70 per cent of anhydrous codeine ($C_{18}H_{21}O_3N$).

Description and physical properties—Fine, white, needle-shaped crystals or a white, crystalline powder. It is odorless. Codeine Phosphate readily loses water of hydration on exposure to air.

One Gm. of Codeine Phosphate is soluble in 2.3 cc. of water, in 325 cc. of alcohol, in 4500 cc. of chloroform, and in 1875 cc. of ether, at 25° C. One Gm. of the salt is soluble in 0.5 cc. of water at 80° C., and in 125 cc. of boiling alcohol.

Tests for identity—An aqueous solution of Codeine Phosphate (1 in 20) is acid to litmus paper.

Codeine Phosphate responds to the identity tests with selenous acid, and with ferric chloride and nitric acid prescribed under *Codeina*, page 125.

In an aqueous solution of Codeine Phosphate neutralized with ammonia T.S., silver nitrate T.S. produces a yellow precipitate which is soluble in diluted nitric acid and in ammonia T.S.

Tests for purity—Separate portions of 10 cc. each of an aqueous solution of Codeine Phosphate (1 in 100) show no turbidity at once on the addition of a few drops of barium chloride T.S. (*sulfate*), and no opalescence with a few drops of silver nitrate T.S. and 2 drops of nitric acid (*chloride*).

Codeine Phosphate complies with the test for *morphine* prescribed under *Codeina*, page 125.

Assay—Dissolve about 0.5 Gm. of Codeine Phosphate, accurately weighed, in 10 cc. of distilled water, in a separator, add 10 cc. of sodium hydroxide T.S., and extract the codeine with four successive portions of 15 cc., 10 cc., 10 cc.,

and 5 cc. of chloroform, or a sufficient quantity to complete the extraction. Shake the combined chloroformic solutions with 5 cc. of distilled water, and completely separate the chloroform from the aqueous layer. Evaporate the chloroformic solution almost to dryness on a water bath, dissolve the residue by warming it with 15 cc. of tenth-normal sulfuric acid, heat the solution on a water bath until it no longer has a perceptible odor of chloroform, cool, dilute with about 10 cc. of distilled water, and titrate the excess of acid with tenth-normal sodium hydroxide, using 2 drops of methyl red T.S. as the indicator. Each cc. of tenth-normal sulfuric acid is equivalent to 0.02992 Gm. of anhydrous codeine ($C_{18}H_{21}O_3N$).

Storage—Preserve Codeine Phosphate in well-closed containers and protected from light.

AVERAGE DOSE—Metric, 0.03 Gm.—Apothecaries, ½ grain.

COLCHICI SEMEN

Colchicum Seed

Colch. Sem.—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.

Description and physical properties—

Unground Colchicum Seed—Ovoid or irregularly globular, minutely pointed at the hilum, and with a distinct beak or caruncle approximately opposite to the hilum; from 2 to 3 mm. in diameter and, when fresh, with a tendency to cohere in small clumps; externally dark brown, finely pitted; tough and of bony hardness; internally whitish or light brown; nearly inodorous; taste bitter and acrid.

Structure—Seed coat of a few layers of more or less collapsed cells with thin, reddish-brown walls; the endosperm parenchyma, with thick, porous walls, containing fixed oil and aleurone grains, the latter from 0.003 to 0.015 mm. in diameter; the embryo small; the beaked portion or caruncle containing thin-walled parenchyma with ovoid, ellipsoidal or polygonal starch grains from 0.005 to 0.020 mm. in diameter.

Assay—Place 15 Gm. of Colchicum Seed, in fine powder, in a suitable flask, and add 290 cc. of distilled water and 10 cc. of lead subacetate T.S. Weigh the flask and contents, and digest the mixture at from 60° to 70° C. for three hours with occasional agitation. Cool, add distilled water to restore the original weight, and filter, collecting 200 cc. of filtrate. Add 2 Gm. of sodium phosphate to the clear filtrate, or sufficient to precipitate the lead completely, shake the mixture frequently during half an hour, filter, collect 100 cc. of filtrate, representing 5 Gm. of Colchicum Seed. Completely extract the alkaloid from the filtrate with chloroform, as shown by testing with iodine T.S., and evaporate the solution in a tared flask. Add 1 cc. of alcohol, and again evaporate. Repeat this operation once more, and dry the residue to constant weight at 100° C. To this weighed residue in the flask, add 5 cc. of tenth-normal sulfuric acid, 5 cc. of distilled water, and a few drops of chloroform, and heat the mixture at 70° C. for ten minutes. Filter the liquid through a pledget of purified cotton, wash the flask and cotton with distilled water, reject the filtrate and washings, and remove as much of the water from the cotton as possible. Dissolve the residue, if any, which may remain on the cotton by washing it first with a little alcohol and then with ether; collect the alcohol-ether washings in the flask, evaporate, and dry the residue to constant weight at 100° C. Deduct this weight from the weight of residue previously obtained. The difference is the weight of colchicine obtained from 5 Gm. of Colchicum Seed. See *Proximate Assays*, page 462.

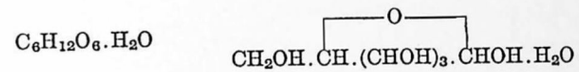
Preparation—Tinctura Colchici Seminis.

AVERAGE DOSE—Metric, 0.2 Gm.—Apothecaries, 3 grains.

DEXTROSUM

Dextrose

Dextros.—*d*-Glucose



A sugar usually obtained by the hydrolysis of starch.

Description and physical properties—Colorless crystals, or a white, crystalline or granular powder; odorless, having a sweet taste.

One Gm. of Dextrose is soluble in about 1 cc. of water, and in about 59 cc. of alcohol at 25° C. Dextrose is more soluble in boiling water and in boiling alcohol.

Tests for identity—An aqueous solution of Dextrose (1 in 20) is neutral to litmus paper, and is dextrorotatory.

The specific rotation $[\alpha]_D$ of Dextrose determined at 25° C. in an aqueous solution containing, in each 100 cc., 10 Gm. of Dextrose, previously dried to constant weight at 100° C., 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°.

Add a few drops of an aqueous solution of Dextrose (1 in 20) to 5 cc. of hot alkaline cupric tartrate T.S.: a copious red precipitate of cuprous oxide appears in the mixture (difference from *sucrose*).

Tests for purity—Dextrose loses not less than 8 per cent and not more than 10 per cent of its weight when dried to constant weight at 100° C.

Ash: not more than 0.1 per cent, page 439.

Boil 1 Gm. of finely powdered Dextrose with 15 cc. of alcohol under a reflux condenser: it dissolves completely (*dextrin*).

To a solution of 1 Gm. of Dextrose in 10 cc. of distilled water add 1 drop of iodine T.S.: the liquid is colored yellow (*soluble starch, sulfite*).

An aqueous solution (1 in 20) of Dextrose meets the requirements of the test for *heavy metals*, page 447.

Dissolve 1.5 Gm. of Dextrose in 5 cc. of distilled water, add 5 cc. of diluted sulfuric acid and 1 cc. of bromine T.S., and heat for five minutes on a water bath. Add 0.5 Gm. of potassium iodide, follow with 5 drops of stannous chloride T.S., cool, and test for *arsenic*, page 436. The stain produced, if any, is not more intense than that produced in a similar test made with like quantities of the same reagents and 2 cc. of the standard arsenic solution.

Two-Gm. portions of Dextrose show no more *chloride* than 0.5 cc. of fiftieth-normal hydrochloric acid, and no more *sulfate* than 0.5 cc. of fiftieth-normal sulfuric acid, page 471.

NOTE—In preparing aqueous solutions of Dextrose it is permissible to use a dextrose which does not conform to the official requirements for water of hydration, provided the product meets all other official tests for purity and

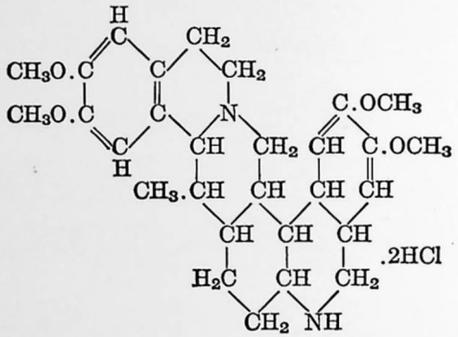
also provided suitable allowance is made for the difference in water content. If such a solution is labeled with respect to its dextrose content the label should indicate the number of Gm. of U.S.P. (hydrous) Dextrose contained in each 100 cc.

Storage—Preserve Dextrose in well-closed containers.

EMETINÆ HYDROCHLORIDUM

Emetine Hydrochloride

Emet. Hydrochlor.



$C_{29}H_{40}O_4N_2.2HCl$ Mol. wt. 553.26

The hydrochloride of an alkaloid obtained from ipecac or prepared synthetically.

Description and physical properties—A white or very slightly yellowish, odorless, crystalline powder.

Emetine Hydrochloride is freely soluble in water and in alcohol.

Tests for identity—Aqueous solutions of Emetine Hydrochloride (1 in 100) yield precipitates with iodine T.S., with mercuric potassium iodide T.S., and with platinic chloride T.S.

Sulfuric acid, containing in each cc. about 0.005 Gm. of molybdic acid, when added to Emetine Hydrochloride produces a bright green mixture.

Silver nitrate T.S. produces in an aqueous solution of Emetine Hydrochloride (1 in 2) a white precipitate insoluble in nitric acid.

Tests for purity—The ash from 0.2 Gm. of Emetine Hydrochloride is negligible.

Emetine Hydrochloride, dried to constant weight at 100° C., loses not less than 8 per cent and not more than 16 per cent of its weight (*water*).

A solution of 0.1 Gm. of Emetine Hydrochloride in 10 cc. of distilled water requires not more than 0.5 cc. of fiftieth-normal sodium hydroxide for neutralization, using 1 drop of methyl red T.S. as the indicator.

The solution produced by dissolving 0.1 Gm. of Emetine Hydrochloride in 5 cc. of sulfuric acid has no more color than matching fluid H, described under the test for *carbonizable substances*, page 441.

Dissolve 0.2 Gm. of Emetine Hydrochloride in 10 cc. of distilled water, add 5 cc. of sodium hydroxide T.S., and extract the mixture successively with 20 cc. of ether and then with 10-cc. portions of ether, until the residue obtained by evaporating 2 cc. of the last ether extraction, dissolved in 1 drop of diluted hydrochloric acid and 1 cc. of distilled water, no longer yields a

distinct turbidity with iodine T.S. Discard the ethereal solutions, acidulate the aqueous liquid with diluted sulfuric acid, then add ammonia T.S. until the mixture is alkaline, and extract with four successive 10-cc. portions of ether. Evaporate the combined ethereal solutions to dryness on a water bath, and dry the residue at 100° C. The weight of the residue does not exceed 0.004 Gm. (*cephaëline*).

Storage—Preserve Emetine Hydrochloride in well-closed containers, in a cool place and protected from light.

AVERAGE DOSE—Daily, by parenteral injection, Metric, 0.06 Gm.—Apothecaries, 1 grain.

EPHEDRINÆ SULFAS

Ephedrine Sulfate

Ephedrin. Sulf.

$(C_{10}H_{15}ON)_2.H_2SO_4$ Mol. wt. 428.33

Ephedrine Sulfate, when dried over sulfuric acid for twenty-four hours, contains not less than 75.5 per cent and not more than 77.3 per cent of anhydrous ephedrine ($C_{10}H_{15}ON$).

Description and physical properties—Fine, white, odorless crystals or powder. It is freely soluble in water and in hot alcohol; more difficultly soluble in cold alcohol.

Tests for identity—(The melting point has been omitted.)

The specific rotation $[\alpha]_D$ of Ephedrine Sulfate, determined at 25° C. in an aqueous solution containing 0.5 Gm. of the salt in each 10 cc. and using a sodium light, is not less than −29.5° and not more than −32°.

Dissolve 0.01 Gm. of Ephedrine Sulfate 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 ethereal layer is purple while the aqueous layer is blue.

Dissolve about 0.1 Gm. of Ephedrine Sulfate in 10 cc. of distilled water in a separator, add 1 cc. of ammonia T.S., and extract with two successive, 15-cc. portions of chloroform. Filter the chloroform solution through a chloroform-saturated pledget of purified cotton, allow to stand over night, then allow the chloroform to evaporate spontaneously: white crystals of ephedrine hydrochloride appear, which, when dissolved in water, respond to the identity tests for chloride, page 449.

A solution of Ephedrine Sulfate in distilled water responds to the tests for sulfate, page 453.

Tests for purity—Ash: not more than 0.1 per cent.

An aqueous solution of Ephedrine Sulfate (1 in 10) is neutral to litmus paper.

A 0.2-Gm. portion of Ephedrine Sulfate shows no more *chloride* than corresponds to 0.4 cc. of fiftieth-normal hydrochloric acid, page 471.

Dry about 0.5 Gm. of Ephedrine Sulfate, accurately weighed, for twenty-four hours over sulfuric acid: the loss in weight does not exceed 2 per cent (*moisture*).

Assay—Transfer about 0.5 Gm. of Ephedrine Sulfate, dried over sulfuric acid for twenty-four hours and accurately weighed, to a separator; add 10 cc. of distilled water and 5 cc. of ammonia T.S., and extract with six portions of ether, using 40 cc., 30 cc., 20 cc., 20 cc., 20 cc., and 20 cc., respectively. Collect the extracts in a beaker, allow the ether to evaporate at room temperature to about 5 cc., add 10 cc. of alcohol, previously neutralized to bromthymol

blue T.S. with tenth-normal sodium hydroxide, and add from a burette an excess of tenth-normal hydrochloric acid. Titrate the excess of acid with tenth-normal sodium hydroxide, using bromthymol blue T.S. as the indicator. The ephedrine thus found is not less than 75.5 and not more than 77.3 per cent of the weight of Ephedrine Sulfate taken. One cc. of tenth-normal hydrochloric acid is equivalent to 0.01651 Gm. of ephedrine.

Storage—Preserve Ephedrine Sulfate in well-closed containers and protected from light.

AVERAGE DOSE—Metric, 0.025 Gm.—Apothecaries, 3/8 grain.

ERYTHRITYLIS TETRANITRAS DILUTUS

Diluted Erythrityl Tetranitrate

Erythrit. Tetranit. Dil.—Diluted Erythrol Tetranitrate, Diluted Tetranitrol

Diluted Erythrityl Tetranitrate is a mixture of erythrityl tetranitrate and lactose, and occurs as a white powder, or in the form of tablets. The powder contains not less than 47 per cent and not more than 53 per cent of $C_4H_6(NO_3)_4$ (302.08). Tablets of Erythrityl Tetranitrate do not vary more than 7.5 per cent above and not more than 7.5 per cent below the labeled amount of erythrityl tetranitrate [$C_4H_6(NO_3)_4$].

Description and physical properties—Diluted Erythrityl Tetranitrate is partially soluble in alcohol and in ether (*erythrityl tetranitrate*), and is partially soluble in water (*lactose*).

Tests for identity and purity—The residue obtained in the assay melts between 60° and 61° C.

Caution—The erythrityl tetranitrate used in this test may explode on percussion. The operator must be protected by a glass screen while determining the melting point.

Dissolve about 0.01 Gm. of the assay residue in 1 cc. of distilled water and 2 cc. of sulfuric acid, cool, and overlay with 3 cc. of ferrous sulfate T.S.: a brown color is produced at the zone of contact of the two liquids.

Assay—Weigh accurately about 0.25 Gm. of Diluted Erythrityl Tetranitrate. Transfer it to a small, lipped, glass mortar with the aid of small quantities of ether. Then add enough ether to make the total liquid measure about 10 cc. Cautiously triturate the Diluted Erythrityl Tetranitrate with the ether for five minutes, then allow it to subside, and carefully decant the ether through a small filter paper wetted with ether into a tared beaker. Repeat this extraction several times, each time with about 5 cc. of ether, until 0.5 cc. of the filtrate, evaporated to dryness at room temperature, leaves no weighable residue. Wash the filter paper and the stem of the funnel with 5 cc. of ether and evaporate the combined ethereal extracts and washings to dryness at a temperature not exceeding 35° C., then dry for two hours over sulfuric acid, and weigh the erythrityl tetranitrate thus obtained.

For the assay of Tablets of Erythrityl Tetranitrate take at least 5 tablets, or more if necessary to make about 0.25 Gm. Weigh, and from this weight calculate the average weight of the tablets. Then proceed with the assay as just described, triturating with the ether for ten minutes the first time.

Caution—The operator must take precautions against injury from an explosion.

Storage—Preserve Diluted Erythrityl Tetranitrate in a cool place and protected from light.

AVERAGE DOSE—Metric, 0.03 Gm.—Apothecaries, ½ grain.

EXTRACTUM BELLADONNÆ

Extract of Belladonna

Ext. Bellad.—Extractum Belladonnæ Foliorum, Extractum Belladonnæ P.I.

Extract of Belladonna yields, from each 100 Gm., not less than 1.18 Gm. and not more than 1.32 Gm. of the alkaloids of belladonna leaf.

PILULAR EXTRACT OF BELLADONNA

Prepare an extract by percolating 1000 Gm. of belladonna leaf, using a mixture of 3 volumes of alcohol and 1 volume of distilled water as the menstruum. Macerate the drug during sixteen 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° C., and adjust the remaining extract, after assaying, by dilution with glucose so that the finished Extract will contain 1.25 Gm. of the alkaloids of belladonna leaves in each 100 Gm.

Assay—Proceed as directed under the *Assay of Pilular Extract of Hyoscyamus*, page 158, using approximately 3 Gm. of Pilular Extract of Belladonna, accurately weighed. Each cc. of fiftieth-normal acid is equivalent to 0.00578 Gm. of the alkaloids of belladonna leaf.

POWDERED EXTRACT OF BELLADONNA

Prepare an extract by percolating 1000 Gm. of belladonna leaf, using alcohol as the menstruum. Macerate the drug during sixteen hours and then percolate it slowly. Evaporate the percolate to a soft extract under reduced pressure and at a temperature not exceeding 60° C., add 50 Gm. of dry starch, and continue the evaporation, at the same temperature, until the product is dry. 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 *Extracta*, page 152.

Assay the powdered residue and add sufficient starch, dried at 100° C., to make the finished Extract contain, in each 100 Gm., 1.25 Gm. of the alkaloids of belladonna leaf.

Mix the powders thoroughly and pass the Extract through a fine sieve.

Assay—Proceed as directed under the *Assay of Powdered Extract of Hyoscyamus*, page 158, using approximately 2 Gm. of Powdered Extract of Belladonna, accurately weighed. Each cc. of fiftieth-normal acid is equivalent to 0.00578 Gm. of the alkaloids of belladonna leaf.

Preparation—Unguentum Belladonnæ (from the Pilular Extract).

AVERAGE DOSE—Metric, 0.015 Gm.—Apothecaries, ¼ grain.

EXTRACTUM HYOSCYAMI

Extract of Hyoscyamus

Ext. Hyosc.—Extract of Henbane, Extractum Hyoscyami P.I.

Extract of Hyoscyamus yields, from each 100 Gm., not less than 0.135 Gm. and not more than 0.175 Gm. of the alkaloids of hyoscyamus.

PILULAR EXTRACT OF HYOSCYAMUS

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 distilled water as the menstruum. Macerate the drug during sixteen 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° C., and adjust the remaining extract, after assaying, by dilution with glucose, so that the finished Extract will contain, in each 100 Gm., 0.155 Gm. of the alkaloids of hyoscyamus.

Assay—Dissolve approximately 5 Gm. of Pilular Extract of Hyoscyamus, accurately weighed (see Proximate Assays, page 462, for method of weighing), in 10 cc. of chloroform, add 10 cc. of approximately tenth-normal sulfuric acid and 40 cc. of distilled water, and evaporate the mixture on a water bath until the chloroform is removed. Complete the assay as directed under *Hyoscyamus*, page 194, beginning with the words "Filter this mixture, collecting the filtrate in a separator." Each cc. of fiftieth-normal acid is equivalent to 0.00578 Gm. of the alkaloids of hyoscyamus.

POWDERED EXTRACT OF HYOSCYAMUS

Prepare an extract by percolating 1000 Gm. of hyoscyamus, in moderately coarse powder, using alcohol as the menstruum. Macerate the drug during sixteen hours and then percolate it slowly. Evaporate the percolate to a soft extract under reduced pressure and at a temperature not exceeding 60° C., add 50 Gm. of dry starch, and continue the evaporation at the same temperature until the product is dry. 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 *Extracta*, page 152.

Assay the powdered residue and add sufficient starch, dried at 100° C., 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—Digest approximately 5 Gm. of Powdered Extract of Hyoscyamus, accurately weighed, in 10 cc. of chloroform, add 10 cc. of approximately tenth-normal sulfuric acid and 40 cc. of distilled water. Mix well, filter through purified cotton wetted with weak sulfuric acid, wash the cotton and the residue with acidulated distilled water until free from alkaloids, discard the cotton and the residue, and evaporate the filtrate on a water bath until the chloroform is removed. Complete the assay as directed under *Hyoscyamus*, page 194, beginning with the words "Filter this mixture, collecting the filtrate in a separator." Each cc. of fiftieth-normal sulfuric acid is equivalent to 0.00578 Gm. of the alkaloids of hyoscyamus.

AVERAGE DOSE—Metric, 0.05 Gm.—Apothecaries, 5/6 grain.

EXTRACTUM NUCIS VOMICÆ

Extract of Nux Vomica

Ext. Nuc. Vom.—Powdered Extract of Nux Vomica, Extractum Strychni P.I.

Extract of Nux Vomica yields, from each 100 Gm., not less than 7 Gm. and not more than 7.75 Gm. of strychnine.

Prepare an extract by percolating 1000 Gm. of nux vomica, in moderately coarse powder, 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 twenty-four hours and then percolate it at a moderate rate, first using Menstruum I and then completing the extraction with Menstruum II. Evaporate the percolate at a temperature not exceeding 100° C., to a volume of about 200 cc., add to it 150 cc. of distilled water and about 200 cc. of purified petroleum benzin, and agitate the mixture frequently during half an hour. Separate and reject the benzin and again wash the aqueous mixture with another portion of about 150 cc. of purified petroleum benzin. Separate and reject the benzin and evaporate the aqueous liquid, thus deprived of its fatty matter, to dryness at a temperature not exceeding 60° C. Powder the product and adjust the extract by assay and the addition of sufficient starch, dried at 100° C., to contain, in each 100 Gm., 7.4 Gm. of strychnine.

Assay—Place about 1.5 Gm. of Extract of Nux Vomica, accurately weighed, in a dish and digest it on a water bath with about 10 cc. of diluted alcohol, acidulated 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 alcoholic 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. Then proceed as directed under the *Assay* for *Nux Vomica*, U. S. P. XI Supplement, page 56, beginning in the first paragraph with the words "Extract the combined chloroformic solution" etc. Each cc. of tenth-normal sulfuric acid is equivalent to 0.03342 Gm. of strychnine.

AVERAGE DOSE—Metric, 0.015 Gm.—Apothecaries, 1/4 grain.

EXTRACTUM STRAMONII

Extract of Stramonium

Ext. Stramon.

Extract of Stramonium yields, from each 100 Gm., not less than 1.10 Gm. and not more than 1.30 Gm. of the alkaloids of stramonium.

PILULAR EXTRACT OF STRAMONIUM

Prepare an extract by percolating 1000 Gm. of stramonium, in moderately coarse powder, using a mixture of 3 volumes of alcohol and 1 volume of distilled water as the menstruum. Macerate the drug during sixteen 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° C., and adjust the remaining extract, after assaying, by dilution with glucose, so that the finished Extract will contain, in each 100 Gm., 1.20 Gm. of the alkaloids of stramonium.

Assay—Proceed as directed under the *Assay of Pilular Extract of Hyoscyamus*, page 158, using approximately 3 Gm. of Pilular Extract of Stramonium, accurately weighed. Each cc. of fiftieth-normal acid is equivalent to 0.00578 Gm. of the alkaloids of stramonium.

POWDERED EXTRACT OF STRAMONIUM

Prepare an extract by percolating 1000 Gm. of stramonium, in moderately coarse powder, using alcohol as the menstruum. Macerate the drug during sixteen hours and then percolate it slowly. Evaporate the percolate to a soft extract, under reduced pressure and at a temperature not exceeding 60° C., add 50 Gm. of dry starch, and continue the evaporation, at the same temperature, until the product is dry. 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 *Extracta*, page 152.

Assay the powdered residue and add sufficient starch, dried at 100° C., to make the finished Extract contain, in each 100 Gm., 1.20 Gm. of the alkaloids of stramonium.

Mix the powders thoroughly and pass the Extract through a fine sieve.

Assay—Proceed as directed under the *Assay of Powdered Extract of Hyoscyamus*, page 158, using approximately 2 Gm. of Powdered Extract of Stramonium, accurately weighed. Each cc. of fiftieth-normal acid is equivalent to 0.00578 Gm. of the alkaloids of stramonium.

AVERAGE DOSE—Metric, 0.02 Gm.—Apothecaries, ⅓ grain.

FLUIDEXTRACTA

Fluidextracts

Fluid Extracts

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 case. The manufacture by the usual process calls for concentration of the more dilute portion of percolate by distillation; this should be done in a vacuum distillation apparatus, the temperature in the still being kept below 60° C.

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 or chemically incompatible 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 drug; 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, 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 that the resulting clear liquid conforms to the official standards.

The general processes of manufacture directed by the Pharmacopœia 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 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 fifteen 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° C. Dissolve this extract in the reserved percolate, and, if no assay is directed, add enough of the menstruum to make the fluidextract measure 1000 cc., and mix thoroughly. In case 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 the prescribed menstruum as the diluent. Mix the product well.

Process B. This process is used in preparing fluidextracts, the menstrua for which contain, in addition to alcohol, or a mixture of alcohol and distilled 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 fifteen 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° C. Dissolve this extract in the reserved percolate,

and, if no assay is directed, add enough of Menstruum II to make the fluidextract measure 1000 cc., and mix thoroughly. In case 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 Menstruum I as the diluent. Mix the product well.

Process C. *Fractional or Divided Percolation.*

This process is used for preparing fluidextracts, the constituents of which are injured by heat, or as a desirable alternative for Processes A or B, or in case suitable facilities for distillation and concentration are lacking. When Process B is adapted to Process C, Menstruum I only is used throughout the percolation.

Divide 1000 Gm. of the ground drug into three portions, consisting of 500 Gm., 300 Gm., and 200 Gm., respectively. 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 fifteen 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 afterward 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, excepting 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 successive 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 as the diluent a sufficient quantity of menstruum of the same alcoholic strength as the original. Mix the product well.

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 distilled water, mix well, and allow it to macerate in a suitable, covered, metallic percolator for two hours. Then allow the percolation to proceed at the specified rate, gradually adding boiling distilled 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 seven 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 distilled water, of the same alcoholic strength as the filtered liquid, to make the fluidextract measure 1000 cc. Mix the product well.

Storage—Preserve Fluidextracts in tightly-closed containers and protected from direct sunlight or abnormal temperatures.

GLYCERINUM

Glycerin

Glycerin.—Glycerol

$C_3H_8O_3$ $CH_2OH.CHOH.CH_2OH$ Mol. wt. 92.06

Glycerin is a polyhydric alcohol which contains not less than 95 per cent of $C_3H_5(OH)_3$.

Description and physical properties—A clear, colorless, syrupy liquid, having a sweet taste. It has not more than a slight, characteristic odor which is neither harsh nor disagreeable. When exposed to moist air, it absorbs water.

Glycerin is miscible with water and with alcohol. It is insoluble in chloroform, ether, benzene, petroleum benzin, carbon disulfide, and in fixed or volatile oils.

Test for identity—Heat in a test tube a few drops of Glycerin with about 0.5 Gm. of potassium bisulfate: pungent vapors of acrolein are evolved.

Tests for purity—Glycerin is colorless when viewed transversely in a tube of colorless glass about 30 mm. in diameter, held in a vertical position.

Specific gravity: not below 1.249 at 25° C.

An aqueous solution of Glycerin (1 in 20) is neutral to litmus paper.

Heat 50 Gm. of Glycerin in an open, shallow, 100-cc. porcelain dish until it ignites, and allow it to burn without further application of heat in a place free from drafts: the weight of the carbonaceous and mineral residue does not exceed 0.015 per cent of the weight of Glycerin taken for the test. Ignite this residue at a low red heat, until combustion is complete: not more than 0.007 per cent of mineral residue remains.

Vigorously shake 5 cc. of Glycerin with 5 cc. of sulfuric acid in a glass-stoppered 25-cc. cylinder for one minute and allow the liquid to stand for one hour; it does not become darker than 10 cc. of matching fluid H, described under the test for *carbonizable substances*, page 441

Mix 50 Gm. of Glycerin with 50 cc. of freshly boiled distilled water and 5 cc. of half-normal sodium hydroxide, boil the mixture for five minutes, then cool it, and titrate the excess of alkali with half-normal hydrochloric acid, using phenolphthalein T.S. as the indicator. Conduct a blank test with 100 cc. of freshly boiled distilled water and make any necessary correction: not less than 4 cc. of half-normal hydrochloric acid is required by the mixture containing the glycerin (*fatty acids* and *esters*).

Separate, 10-cc. portions of an aqueous solution of Glycerin (1 in 10) remain clear on the addition of 0.5 cc. of calcium chloride T.S. (*oxalate*), or of 0.5 cc. of silver nitrate T.S. (*chloride*), and no turbidity is produced in another 10-cc. portion of the solution, previously treated with 3 drops of diluted hydrochloric acid, by the addition of 5 drops of barium chloride T.S. (*sulfate*).

An aqueous solution of Glycerin meets the requirements of the test for *heavy metals*, page 447, and of the test for *arsenic*, page 436.

A mixture of 5 cc. of Glycerin and 5 cc. of an aqueous solution of potassium hydroxide (1 in 10) does not become yellow when kept for five minutes at 60° C. (*acrolein, glucose*) nor does it have an odor of ammonia (*ammonium compounds*).

Storage—Preserve Glycerin in well-closed containers.

AVERAGE DOSE—Metric, 4 cc.—Apothecaries, 1 fluidrachm.

HYDRARGYRUM CUM CRETA

Mercury with Chalk

Hydrarg. c. Cret.—Gray Powder

Mercury with Chalk contains not less than 36 per cent and not more than 40 per cent of Hg.

MERCURY	38 Gm.
HONEY	10 Gm.
PREPARED CHALK	57 Gm.
DISTILLED WATER, a sufficient quantity, To make	100 Gm.

Weigh the mercury and honey successively into a strong bottle of the capacity of 100 cc., and add 2 cc. of distilled water. Stopper the bottle, and shake it for about half an hour at a time until the aggregate

time of shaking reaches ten 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. Rub the prepared chalk with distilled water in a mortar to a thick, creamy paste, and, having added the contents of the bottle, wash out the last portions with a little distilled water, and triturate the mixture until uniform. Finally dry the mixture, first between ample layers of bibulous paper, and afterwards in a dish at the ordinary temperature until it weighs 100 Gm. Then reduce it to a uniform powder without trituration.

Description and physical properties—A light gray, rather damp powder, free from grittiness. It is odorless, and has a slightly sweet taste.

Test for identity—Digest 0.1 Gm. of the powder with 20 cc. of warm acetic acid: the chalk dissolves with effervescence, and a residue of finely divided mercury remains.

Tests for purity—Filter the mixture obtained in the preceding test: the filtrate becomes not more than slightly opalescent on the addition of a few drops of hydrochloric acid (*mercurous oxide*).

Digest 0.1 Gm. of the powder with 20 cc. of diluted hydrochloric acid at 40° C. for fifteen minutes, and filter: the filtrate is not rendered more than slightly brown by hydrogen sulfide T.S. (*mercuric oxide*).

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 50 cc. of distilled water and 2 cc. of ferric ammonium sulfate T.S., and titrate the solution with tenth-normal ammonium thiocyanate. Each cc. of tenth-normal ammonium thiocyanate is equivalent to 0.01003 Gm. of Hg.

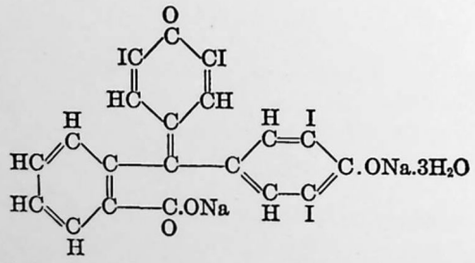
Storage—Preserve Mercury with Chalk in well-closed containers and protected from light.

AVERAGE DOSE—Laxative, Metric, 0.25 Gm.—Apothecaries, 4 grains.

IODOPHTHALEINUM SOLUBILE

Soluble Iodophthalein

Sol. Iodophthal.—Tetraiodophenolphthalein Sodium, Tetraiodophthalein Sodium, Tetiothalein Sodium



$C_{20}H_8O_4I_4Na_2.3H_2O$ Mol. wt. 919.78

The disodium salt of tetraiodophenolphthalein. It contains not less than 85 per cent of tetraiodophenolphthalein. The separated tetraiodophenolphthalein contains not less than 60 per cent and not more than 63 per cent of I.

Description and physical properties—A pale blue to blue-violet, odorless, crystalline powder, having a saline and astringent taste. On exposure to air it gradually decomposes with the liberation of the free phthalein.

One Gm. of Soluble Iodophthalein is soluble in 7 cc. of water; it is slightly soluble in alcohol.

Tests for identity and purity—When heated, Soluble Iodophthalein darkens in color and evolves vapors of iodine.

One Gm. of Soluble Iodophthalein dissolves completely in 50 cc. of recently boiled and cooled distilled water, producing a clear, deep-blue solution (*free phthalein*). On standing in contact with air, such a solution may absorb carbon dioxide and develop a precipitate of *free phthalein*.

To 10 cc. of the solution described above add diluted hydrochloric acid, drop by drop, until its reaction becomes acid: the mixture develops a cream-colored precipitate.

Assay for tetraiodophenolphthalein—Weigh accurately about 0.5 Gm. of Soluble Iodophthalein in a stoppered weighing-bottle, and transfer it completely to a beaker with about 50 cc. of distilled water. When solution is complete add, with stirring, 20 cc. of diluted hydrochloric acid, and allow to stand for one half hour. Filter through a tared Gooch crucible, prepared with a disk of filter paper. Wash the precipitate with 50 cc. of a mixture of equal volumes of diluted hydrochloric acid and hot distilled water, using small portions at a time. Remove the excess of liquid by the use of suction, and dry the precipitate of tetraiodophenolphthalein to constant weight at 110° C. The weight of the precipitate is not less than 85 per cent of the weight of the salt taken for the assay.

Assay for iodine—Mix about 0.3 Gm., accurately weighed, of the tetraiodophenolphthalein obtained in the assay described above, with 2 Gm. of anhydrous sodium carbonate; place the mixture in a small crucible, and completely fill the crucible with anhydrous sodium carbonate well pressed down; invert the crucible and contents in a larger crucible, and add sufficient anhydrous sodium carbonate to seal the junction of the two crucibles. Heat rapidly and strongly, and maintain the crucibles and mass at dull redness for twenty minutes. Allow the crucibles and contents to cool, and dissolve the residue in 100 cc. of hot distilled 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 distilled water. Allow the filtrate and washings to cool, and add hydrochloric acid cautiously until effervescence ceases, then add an equal volume of hydrochloric acid, and titrate with twentieth-molar potassium iodate, shaking vigorously, until the dark brown solution which is formed becomes light brown; add 5 cc. of chloroform and continue the titration until the chloroform becomes colorless and the supernatant liquid is clear yellow. One cc. of twentieth-molar potassium iodate is equivalent to 0.01269 Gm. of I.

Storage—Preserve Soluble Iodophthalein in well-closed containers.

AVERAGE DOSE (For each 10 kilograms of body weight)—

	Metric	Apothecaries
Oral,	0.5 Gm.	—8 grains.
Intravenous,	0.3 Gm.	—5 grains.

LINIMENTUM CHLOROFORMI

Chloroform Liniment

Lin. Chlorof.

Chloroform Liniment contains, at 25° C., in each 100 cc., not less than 35 Gm. and not more than 45 Gm. of $CHCl_3$.

Chloroform	300 cc.
Camphor and Soap Liniment	700 cc.
To make	1000 cc.

Mix them by agitation.

Caution—Chloroform Liniment deteriorates with age.

Assay—Place 50 cc. of alcohol in a 100-cc. volumetric flask, and measure exactly 10 cc. of Chloroform Liniment at 25° C. into the flask by means of a pipette, placing the tip of the pipette just beneath the surface of the alcohol. Make up to a volume of 100 cc. at 25° C. with alcohol, and mix thoroughly. By means of the same pipette transfer 10 cc. of the alcoholic solution to a hard glass test tube of 25 mm. by 200 mm. internal dimensions and containing a cooled mixture of 20 cc. of distilled water and 5 cc. of sulfuric acid. Connect the tube by means of a tin-foil-covered stopper with a well-cooled condenser, the delivery tube of which dips beneath the surface of 50 cc. of an alcoholic solution of potassium hydroxide (3 in 10) contained in a 300-cc. flask surrounded by cracked ice, and heat gently until about 10 cc. of distillate has been received. Then withdraw the delivery tube, rinse it with 5 cc. of alcohol, and proceed as directed in the assay under *Spiritus Chloroformi*, page 354, beginning with the words "Connect the flask by means of a tin-foil-covered stopper," in the third line of the assay. Each cc. of tenth-normal silver nitrate is equivalent to 0.00398 Gm. of $CHCl_3$.

Alcohol content—From 43 to 47 per cent, by volume, of C_2H_5OH.

Storage—Preserve Chloroform Liniment in well-closed containers.

LIQUOR AMMONII ACETATIS

Solution of Ammonium Acetate

Liq. Ammon. Acet.

Solution of Ammonium Acetate contains, in each 100 cc., not less than 6.5 Gm. and not more than 7.5 Gm. of $CH_3.COO.NH_4$, with small amounts of acetic and carbonic acids.

Caution—Only a recently prepared Solution of Ammonium Acetate should be dispensed.

Ammonium Carbonate, in hard, translucent pieces	5 Gm.
Diluted Acetic Acid, a sufficient quantity,	
To make	100 cc.

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

Solution of Ammonium Acetate may also be prepared as follows:

Solution No. 1

Ammonium Carbonate, in hard, translucent pieces	50 Gm.
Distilled Water, a sufficient quantity,	
To make	500 cc.

Solution No. 2

Acetic Acid	160 cc.
Distilled Water, a sufficient quantity,	
To make	500 cc.

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

Description and physical properties—A clear, colorless liquid, free from empyreumatic odor. It has a mildly saline, acidulous taste, and an acid reaction to litmus paper.

Tests for identity—Solution of Ammonium Acetate responds to the tests for *ammonium*, page 448, and for *acetate*, page 448.

Tests for purity—Not more than 0.003 Gm. of ash remains on evaporating 20 cc. of the Solution and igniting the residue.

Assay—Transfer 25 cc. of Solution of Ammonium Acetate 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 under the surface of 50 cc. of normal sulfuric acid contained in a flask. Titrate the excess of acid with normal sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of normal sulfuric acid is equivalent to 0.07706 Gm. of $CH_3.COO.NH_4$.

Average dose—Metric, 15 cc.—Apothecaries, 4 fluidrachms.

LIQUOR PITUITARII POSTERIORIS

Solution of Posterior Pituitary

Liq. Pituitar. Post.—Liquor Pituitarii U. S. P. X, Solution of Pituitary

Solution of Posterior Pituitary contains the water-soluble principle or principles from the fresh posterior lobe of the pituitary body of healthy domesticated animals used for food by man. The pituitary body must have been removed from the animal immediately after slaughtering, and then extracted at once or kept frozen until extracted. One cc. of Solution of Posterior Pituitary produces an activity upon the isolated uterus of the virgin guinea pig, corresponding to not less than 80 per cent

and not more than 120 per cent of that produced by 0.005 Gm. of the Standard Powdered Posterior Pituitary prepared as herein directed. The solution must be sterile.

Description and physical properties—A transparent liquid, colorless, or nearly so, having a faint, characteristic odor.

Assay—Prepare a solution as follows: Carefully weigh a suitable amount of the dried Standard Powdered Posterior Pituitary, place this weighed powder in a small agate mortar and moisten with a few drops of distilled water containing 0.25 per cent of acetic acid. Triturate the moistened powder thoroughly until the whole is of an impalpable frothy consistence. Add a few cc. of the 0.25 per cent acetic acid solution and stir the mixture thoroughly. Transfer to a hard glass test tube or beaker; rinse the small agate mortar with the acetic acid solution and add the rinsings to the pituitary mixture; then add enough 0.25 per cent acetic acid to make the final volume of the mixture of the same number of cc. as the number of milligrams of dried pituitary powder originally taken. Heat this mixture to the boiling point for not more than one minute and filter. The filtrate contains in each cc. the active principle of 0.001 Gm. of the dried standard powder. Place this solution in hard glass ampuls and sterilize by fractional sterilization for twenty minutes on three successive days at a temperature not exceeding 100° C. Preserve in a cool place (from 5° to 20° C.). This standard solution should not be kept more than six months.

The apparatus used for making the test may be any modification of the general type for studying the activity of the isolated smooth muscle of mammals. It must be provided with an accurate temperature-regulating device. The chamber in which the uterus is suspended should have a capacity of not less than 100 cc.

Use healthy guinea pigs weighing between 175 Gm. and 350 Gm. They should not have been pregnant and should not be in heat. It is recommended that young female pigs be segregated at the time of weaning and kept thereafter out of sight and smell of the males.

Kill a guinea pig by a blow on the head, or by decapitation, and immediately remove the entire uterus from the body. Suspend a part or all of one horn of the uterus in a chamber containing oxygenated Locke-Ringer solution (page 553), one end of the uterus being attached to a muscle lever which is weighted as necessary. The temperature of the bath should be between 37° and 38° C. but should not vary more than one-tenth of a degree throughout the whole assay. When the uterus is completely relaxed, which is generally in from fifteen to thirty minutes, it is ready to begin the test. This is done by adding alternately varying doses of the standard extract and of the solution to be tested to the bath in the muscle chamber until quantities of the two solutions are found which give equal, sub-maximal contractions in at least two successive pairs of contractions. The strengths of the two solutions are in inverse ratio to the quantities necessary to produce these equal contractions.

STANDARD POWDERED POSTERIOR PITUITARY

Select a number, not less than 25, of fresh posterior lobes of the pituitary body of cattle, removed within thirty minutes of the death of the animal and carefully free them from all extraneous tissue immediately after their removal. As soon as they are so prepared, drop them into a flask containing a quantity of acetone corresponding to not less than 4 cc. of acetone for each pituitary body. Allow them to remain in the acetone for three hours, and then remove them and immediately cut them into small pieces with scissors and place the material in fresh acetone equal in quantity to that first employed. Leave the material in the acetone over night, and then remove it and dry it in a vacuum desiccator over calcium chloride, at a temperature not above 50° C., for five hours. At the end of this time remove the material and grind it in a mortar until it will pass through a No. 40 sieve. Dry this powder for at least twelve hours in a vacuum desiccator over calcium chloride at a temperature not over 50° C. Extract this dried powder in a small Soxhlet continuous extraction apparatus with acetone for three hours and again dry it in a desiccator over calcium chloride for twelve hours. This dried powder should be preserved in a cool, dark place, in sealed ampuls *in vacuo*, or in vacuum desiccators over calcium chloride until used for the preparation of the standard solution.

NOTE—A suitable preservative may be added to Solution of Posterior Pituitary (see *Preservation of Solutions for Parenteral Use*, page 7).

Storage—Preserve Solution of Posterior Pituitary in small, well-filled, amber-colored containers or in ampuls.

AVERAGE DOSE—By hypodermic injection, Metric, 1 cc.—Apothecaries, 15 minims.

LIQUOR SODII HYPOCHLORITIS
Solution of Sodium Hypochlorite

Liq. Sod. Hypochlor.

Solution of Sodium Hypochlorite contains not less than 4 per cent and not more than 6 per cent of NaOCl.

Caution—This Solution is not suitable for application to wounds.

Description and physical properties—A clear, pale, greenish-yellow liquid, having a slight odor of chlorine.

Tests for identity—The Solution at first colors red litmus paper blue and then bleaches it.

The addition of diluted hydrochloric acid to the Solution causes an evolution of chlorine.

Assay—Weigh accurately, in a glass-stoppered flask, about 3 cc. of Solution of Sodium Hypochlorite and dilute it with 50 cc. of distilled water. Add 2 Gm. of potassium iodide and 10 cc. of acetic acid, and titrate the liberated iodine with tenth-normal sodium thiosulfate, using starch T.S. as the indicator. Each cc. of tenth-normal sodium thiosulfate is equivalent to 0.003723 Gm. of NaOCl.

Storage—Preserve Solution of Sodium Hypochlorite in well-stoppered bottles, in a cool place and protected from light.

Preparation—Liquor Sodii Hypochloritis Dilutus.

LIQUOR SODII HYPOCHLORITIS DILUTUS
Diluted Solution of Sodium Hypochlorite

Liq. Sod. Hypochlor. Dil.—Liquor Sodæ Chlorinatæ Chirurgicalis U. S. P. X, Modified Dakin's Solution

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 Solution of Sodium Hypochlorite may be prepared as follows:

Solution of Sodium Hypochlorite	1000 cc
Sodium Bicarbonate	
Distilled Water, of each, a sufficient quantity.	

Dilute the solution of sodium hypochlorite 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 0.02 Gm. of powdered phenolphthalein, and shake it gently for two 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 and physical properties—A colorless or faintly yellow liquid having a slight odor suggesting chlorine.

Tests for identity and purity—Specific gravity: not more than 1.025 at 25° C.

Add 5 drops of sulfuric acid to 10 cc. of Diluted Solution of Sodium Hypochlorite, evaporate to dryness on a water bath, and ignite the residue gently to constant weight: the final residue does not exceed 0.300 Gm. (limit of *soluble substances*).

Add about 0.02 Gm. of powdered phenolphthalein to 20 cc. of Diluted Solution of Sodium Hypochlorite: no red color is produced in the mixture when agitated (maximum of *alkalinity*).

Add about 0.5 cc. of phenolphthalein T.S. to 5 cc. of the Solution contained in a test tube: a flash of red color is produced (*minimum alkalinity*).

Assay—Measure accurately 15 cc. of the 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 tenth-normal sodium thiosulfate, using starch T.S. as the indicator. Each cc. of tenth-normal sodium thiosulfate is equivalent to 0.003723 Gm. of NaOCl.

Storage—Preserve Diluted Solution of Sodium Hypochlorite in well-stoppered bottles, in a cool place and protected from light.

MAGMA MAGNESIÆ

Magnesia Magma

Magma Mag.—Milk of Magnesia

Magnesia Magma is an aqueous suspension of magnesium hydroxide containing not less than 7 per cent and not more than 8.5 per cent of $Mg(OH)_2$. For purposes of minimizing the action of the glass container on Magnesia Magma, 0.1 per cent of citric acid may be added.

Note—One-half cc. of a volatile oil or a blend of volatile oils, suitable for flavoring purposes, may be added to each 1000 cc. of Magnesia Magma.

Description and physical properties—A white, opaque, more or less viscous suspension from which varying amounts of water usually separate on standing.

Tests for identity—Magnesia Magma is alkaline to litmus and to phenolphthalein T.S.

A solution of 1 cc. of Magnesia Magma in 2 cc. of diluted hydrochloric acid responds to the tests for magnesium, page 451.

Tests for purity—The addition of 2 cc. of diluted hydrochloric acid to 1 cc. of Magnesia Magma causes not more than a slight effervescence (*carbonate*) and the resulting solution is not more than slightly turbid.

Transfer about 25 cc. of Magnesia Magma to a filter and reject the first 5 cc. of filtrate. Dilute 5 cc. of the clear filtrate which follows with 40 cc. of distilled water. Add 1 drop of methyl red T.S. and titrate the solution with tenth-normal sulfuric acid to the production of a permanent pink color: not more than 0.4 cc. of acid is required (*soluble alkalies*).

To 5 cc. of the clear filtrate from Magnesia Magma add 3 drops of sulfuric acid and evaporate to dryness on a water bath: the residue when gently ignited to constant weight does not exceed 0.008 Gm. (*soluble salts*).

Add, in small portions, 25 cc. of a mixture of 5 cc. of sulfuric acid and 25 cc. of distilled water to 10 cc. of Magnesia Magma. Allow to cool, add 70 cc. of alcohol, and allow the mixture to stand over night. If crystals of magnesium sulfate separate, warm the mixture at about 50° C. to dissolve them. Prepare a Gooch crucible, wash with diluted sulfuric acid, ignite at dull red heat, and weigh. Transfer the precipitate to the crucible, wash several times with a mixture of 2 volumes of alcohol and 1 volume of diluted sulfuric acid. Dry and ignite the crucible and contents at a dull red heat to constant weight. The weight of the residue does not exceed 0.026 Gm. (limit of *calcium*).

To 5 cc. of Magnesia Magma add 10 cc. of diluted hydrochloric acid and 10 cc. of distilled water, mix thoroughly, and filter if necessary. Warm the solution to 50° C., add 25 cc. of freshly prepared hydrogen sulfide T.S., and allow the mixture to stand at room temperature for ten minutes. When viewed in a Nessler tube, looking downward through the column of liquid above a white surface, the solution does not show a deeper coloration than that produced by a solution composed of 0.5 cc. of lead nitrate solution (containing 0.1599 Gm. of lead nitrate in 1000 cc. of distilled water), and 24.5 cc. of distilled water, the solution heated to 50° C., mixed with 25 cc. of freshly prepared hydrogen sulfide T.S. and allowed to stand at room temperature for ten minutes (*heavy metals*).

To 5 cc. of Magnesia Magma add diluted sulfuric acid until the magnesium hydroxide is dissolved. One-half of this solution, representing 2.5 cc. of Magnesia Magma, meets the requirements of the test for *arsenic*, page 436.

Assay—After thorough agitation, place about 5 Gm. of Magnesia Magma in a tared flask, stopper, and weigh accurately, add 25 cc. of normal sulfuric acid, and after solution is complete, titrate the excess of acid with normal sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of normal sulfuric acid is equivalent to 0.02917 Gm. of $Mg(OH)_2$.

Storage—It is recommended that Magnesia Magma be stored at temperatures not exceeding 35° C. It should not be permitted to freeze.

	Metric	Apothecaries
Average dose—Antacid,	4 cc.	1 fluidrachm.
Laxative,	15 cc.	4 fluidrachms.

MASSA HYDRARGYRI

Mass of Mercury

Mass. Hydrarg.—Blue Mass, Blue Pill

Mass of Mercury contains not less than 31 per cent and not more than 35 per cent of Hg.

MERCURY	33 Gm.
OLEATE OF MERCURY	1 Gm.
GLYCYRRHIZA, in very fine powder	10 Gm.
ALTHEA, in very fine powder	15 Gm.
GLYCERIN	9 Gm.
HONEY	32 Gm.
To make	100 Gm.

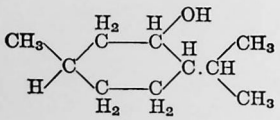
Triturate the oleate of mercury in a mortar, gradually add the mercury, then a small amount of honey, and triturate the mixture until globules of mercury are no longer visible under a lens magnifying ten diameters. Incorporate the remainder of the honey and the glycerin, gradually add the glycyrrhiza and althea, and continue the trituration until the mass is homogeneous.

Assay—Place about 0.5 Gm. of Mass of Mercury, rolled into one or two pills and accurately weighed, in a Kjeldahl flask of about 300-cc. capacity. Add 10 cc. of sulfuric acid, and heat on a water bath for ten 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., add 3 cc. of nitric acid and 2 cc. of ferric ammonium sulfate T.S., and titrate with tenth-normal ammonium thiocyanate. Each cc. of tenth-normal ammonium thiocyanate is equivalent to 0.01003 Gm. of Hg.

AVERAGE DOSE—Metric, 0.2 Gm.—Apothecaries, 3 grains

MENTHOL

Menthol



$C_{10}H_{20}O$ Mol. wt. 156.16

An alcohol obtained from oil of peppermint or other mint oils or prepared synthetically.

Description and physical properties—Colorless, hexagonal crystals, usually needle-like, having a strong, peppermint-like odor.

Menthol is slightly soluble in water; very freely soluble in alcohol, in chloroform, in ether, and in petroleum benzin. It is freely soluble in glacial acetic acid, in liquid petrolatum, and in fixed or volatile oils.

When Menthol is triturated with about an equal weight of camphor, chloral hydrate, phenol or thymol, the mixture liquefies.

Tests for identity and purity—Menthol melts between 41° and 43° C., page 455.

An alcoholic solution of Menthol is lævorotatory, page 459.

Heat 2 Gm. of Menthol in an open dish on a water bath: it gradually volatilizes without leaving more than 0.05 per cent of residue (*wax*, *paraffin*, or *inorganic substances*).

Dissolve about 0.1 Gm. of Menthol in 1 cc. of glacial acetic acid, and add 3 drops of sulfuric acid and 1 drop of nitric acid: the mixture does not become green (*thymol*).

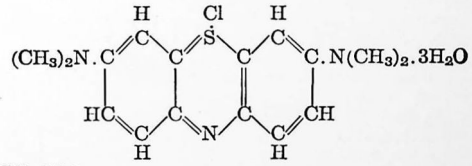
Storage—Preserve Menthol in well-closed containers, in a cool place and protected from light.

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

METHYLTHIONINÆ CHLORIDUM

Methylthionine Chloride

Methylthionin. Chlor.—Methylene Blue



$C_{16}H_{18}N_3ClS.3H_2O$ Mol. wt. 373.73

Methylthionine Chloride, when dried to constant weight at 110° C., contains not less than 98.5 per cent of $C_{16}H_{18}N_3ClS$.

Description and physical properties—Dark green crystals or a crystalline powder, having a bronze-like luster. It is odorless, and is stable in the air.

Methylthionine Chloride is freely soluble in water and in alcohol; it is soluble in chloroform. Solutions of Methylthionine Chloride have a deep blue color.

Tests for identity—The addition of hydrochloric acid to an aqueous solution of Methylthionine Chloride changes the color to a lighter shade of blue. The addition of sodium hydroxide T.S. changes the color to a purplish shade, and, if added in excess, produces, on standing, a precipitate having a dull violet color.

A solution of Methylthionine Chloride in diluted sulfuric acid is gradually decolorized upon the addition of zinc dust.

Tests for purity—Methylthionine Chloride, dried to constant weight at 110° C., loses not more than 16 per cent of its weight (*moisture*).

Ash: not more than 1 per cent, page 439.

Intimately mix 0.2 Gm. of Methylthionine Chloride with about 0.5 Gm. each of powdered potassium nitrate and anhydrous sodium carbonate, and heat the mixture in a crucible until the organic matter is completely oxidized. Dissolve the cooled residue in 15 cc. of diluted sulfuric acid, and evaporate the solution over a flame until the vapors of sulfuric acid begin to evolve: the residue so obtained meets the requirements of the test for *arsenic*, page 436.

Heat 0.5 Gm. of Methylthionine Chloride at a temperature below a red heat until it is completely carbonized, boil the powdered residue with 10 cc. of diluted nitric acid for five minutes, filter, and wash the residue with 10 cc. of distilled water. Boil the combined filtrate and washings with 1 cc. of nitric acid, add an excess of ammonia T.S. and filter if necessary: the liquid remains clear upon the addition of an equal volume of hydrogen sulfide T.S. (*copper* or *zinc*).

Assay—Place about 0.12 Gm. of Methylthionine Chloride, dried to constant weight at 110° C. and accurately weighed, in a 500-cc. volumetric flask and dissolve it in 100 cc. of distilled water. Add 50 cc. of sodium acetate solution (1 in 10) and mix thoroughly, then add from a burette 50 cc. of tenth-normal iodine, keeping the mixture in constant rotation. Stopper the flask and allow the mixture to stand for fifty minutes, shaking it vigorously at intervals of ten minutes. Add distilled water to make the mixture measure 500 cc., mix thoroughly, allow to stand for ten minutes, and filter through a filter that has not been previously moistened. Reject the first 30 cc. of filtrate. Determine the excess of iodine by titration of 100 cc. of the subsequent filtrate with tenth-normal sodium thiosulfate. Each cc. of tenth-normal iodine is equivalent to 0.005328 Gm. of $C_{16}H_{16}N_3ClS$.

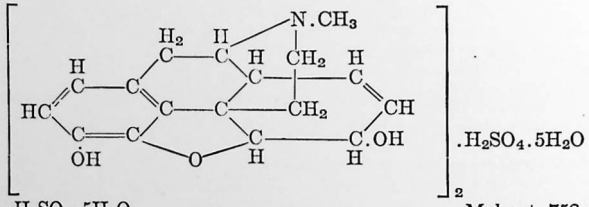
Storage—Preserve Methylthionine Chloride in well-closed containers.

AVERAGE DOSE—Metric, 0.15 Gm.—Apothecaries, 2½ grains.

MORPHINÆ SULFAS

Morphine Sulfate

Morph. Sulf.



$(C_{17}H_{19}O_3N)_2.H_2SO_4.5H_2O$ Mol. wt. 758.47

The sulfate of the alkaloid morphine.

Description and physical properties—White, feathery, silky crystals, or cubical masses of crystals, or a white, crystalline powder. It is odorless, and when exposed to the air it gradually loses water of crystallization.

One Gm. of Morphine Sulfate is soluble in 15.5 cc. of water and in 565 cc. of alcohol, at 25° C. One Gm. is soluble in 0.7 cc. of water at 80° C. and in 240 cc. of alcohol at 60° C. It is insoluble in chloroform and in ether.

Tests for identity—Add a few drops of ammonia T.S. to 5 cc. of an aqueous solution of Morphine Sulfate (1 in 30), and gently shake the mixture: a white precipitate is formed, which dissolves upon the subsequent addition of a few cc. of sodium hydroxide T.S.

Sulfuric acid containing 0.005 Gm. of selenous acid in each cc. gives with Morphine Sulfate a blue color, changing to green and then to brown. (*Codeine* yields a green color, changing to blue and afterward to grass-green.)

Sulfuric acid containing 0.005 Gm. of molybdic acid in each cc. gives with Morphine Sulfate a purple color, changing to blue.

Sulfuric acid containing in each cc. one drop of formaldehyde T.S. yields an intensely purple color with Morphine Sulfate.

With nitric acid Morphine Sulfate produces an orange-red color, fading to yellow.

The addition of a few drops of freshly prepared ferric chloride T.S. to an aqueous solution of Morphine Sulfate (1 in 100) produces a blue color, which is destroyed by acids, by alcohol, or by heating.

Add potassium ferricyanide T.S., containing 1 drop of ferric chloride T.S. in each cc., to an aqueous solution of Morphine Sulfate (1 in 100): a deep blue color is produced at once (difference from *codeine*).

Barium chloride T.S. produces in an aqueous solution of Morphine Sulfate a white precipitate, insoluble in hydrochloric acid.

Tests for purity—The ash from 0.5 Gm. of Morphine Sulfate is negligible, page 439.

A solution of 0.5 Gm. of Morphine Sulfate in 15 cc. of distilled water requires not more than 0.5 cc. of fiftieth-normal sodium hydroxide for neutralization, using 1 drop of methyl red T.S. as the indicator.

Dried to constant weight at 130° C., Morphine Sulfate loses not more than 12 per cent of its weight (*water*).

Warm 0.2 Gm. of Morphine Sulfate with 5 cc. of sodium hydroxide T.S.: the mixture does not evolve a noticeable odor of ammonia (*ammonium salt*).

Add a few drops of ferric chloride T.S. to 5 cc. of an aqueous solution of Morphine Sulfate (1 in 30), previously mixed with 5 cc. of diluted hydrochloric acid: no red color is produced (*meconate*).

Dissolve 1 Gm. of Morphine Sulfate in 10 cc. of sodium hydroxide T.S. in a separator, and shake the solution with three successive portions of 15, 10, and 10 cc. of chloroform, passing the chloroformic solutions through a small filter previously moistened with chloroform. Shake the combined chloroformic 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 fiftieth-normal sulfuric acid, heat gently until dissolved, cool, add 2 drops of methyl red T.S., and titrate the excess of acid with fiftieth-normal sodium hydroxide: not less than 7.5 cc. of the sodium hydroxide solution is required (*foreign alkaloids*).

Storage—Preserve Morphine Sulfate in well-closed containers, and protected from light.

AVERAGE DOSE—Metric, 0.008 Gm.—Apothecaries, ⅛ grain.

NITROGENII MONOXIDUM

Nitrogen Monoxide

Nitrogen. Monoxid.—Nitrous Oxide

N_2O Mol. wt. 44.02

Nitrogen Monoxide contains not less than 95 per cent by volume of N_2O. For convenience it is usually supplied in compressed form in metallic cylinders.

Description and physical properties—A colorless gas, having a slight, characteristic odor and in aqueous solution a somewhat sweetish taste. It supports the

combustion of many substances. At a pressure of one atmosphere and at 0° C., 1000 cc. of Nitrogen Monoxide weighs 1.977 Gm.

Nitrogen Monoxide is soluble in cold water; one volume of the gas dissolves in about 1.5 volumes of water under normal pressure and at 20° C. It is more freely soluble in alcohol than in water.

Test for identity—A saturated, aqueous solution of the gas possesses a distinctly sweetish taste (distinction from *oxygen*).

Tests for purity—Pass 2000 cc. of Nitrogen Monoxide, measured under atmospheric pressure at about 25° C., through 100 cc. of barium hydroxide T.S. (which must be devoid of turbidity prior to the test) at such a rate that the test will require about thirty minutes, all air being excluded. The turbidity produced, if any, does not exceed that produced when 1 cc. of a solution, prepared by dissolving 0.2 Gm. of sodium bicarbonate in 100 cc. of freshly boiled and cooled distilled water, is added to another portion of barium hydroxide T.S. under the prescribed conditions (*carbon dioxide*).

Pass 2000 cc. of Nitrogen Monoxide, under the conditions described in the preceding paragraph, through a mixture of 100 cc. of distilled water and 1 cc. of silver nitrate T.S. The liquid shows no greater degree of opalescence than does a mixture of 100 cc. of distilled water and 1 cc. of silver nitrate T.S., prepared at the same time as that through which the gas passes, making the observation in 100-cc., low form Nessler tubes which are closely similar in all respects (*halogens*).

Dilute 0.3 cc. of methyl red T.S. with 400 cc. of boiling distilled water and boil the solution for five minutes. Pour 100 cc. of the boiling solution into each of three color comparator tubes of clear glass. Add 0.05 cc. of fiftieth-normal sodium hydroxide to tube 1 and 0.1 cc. of fiftieth-normal hydrochloric acid to tube 2 and also to tube 3. Stopper the tubes and cool them to room temperature. Pass 2000 cc. of Nitrogen Monoxide through the solution in tube 2 and at a rate requiring about thirty minutes for the passage of the gas. The color of the solution in tube 2 should show no deeper shade of yellow than that in tube 1 and no deeper shade of red than the solution in tube 3 (*acids* or *alkalies*).

Pass 2000 cc. of Nitrogen Monoxide, under the conditions described previously, through a solution of 0.2 cc. of tenth-normal potassium permanganate in 100 cc. of distilled water: neither the color nor the intensity of color of the liquid is changed (*reducing substances*).

Pass 2000 cc. of Nitrogen Monoxide, under the conditions described previously, through 15 cc. of freshly prepared starch-potassium iodide T.S. to which has been added 1 drop of glacial acetic acid. The color of the test solution is not altered by the passage of the Nitrogen Monoxide, as shown by comparing it with another portion of the acidified starch-iodide T.S. through which the gas has not passed (*oxidizing substances*).

Assay—Place a sufficient quantity of mercury in a 50-cc. to 100-cc. nitrometer or gas burette, with a two-way stop-cock and two-way outlet, and properly connected with a balancing tube. Connect one of the intake tubes of the nitrometer with a gas pipette of about 150-cc. capacity. Boil a sufficient quantity of distilled water to fill the gas pipette, allowing a libera supply for replenishing. Draw the water into the pipette while still hot, avoiding contact with air as far as possible. Place the pipette in an ice bath at 0° C. When the temperature of the water in the pipette reaches 0° C., reduce the pressure in the nitrometer tube and open the stop-cock controlling the connection with the gas pipette. Draw the water (free from air bubbles) through the capillary opening connection and stop-cock opening in the nitrometer. Close the stop-cock. Having completely filled the nitrometer, the second stop-cock opening and intake tube with mercury, draw into the nitrometer, by reducing the pressure in the tube, exactly 50 cc. of Nitrogen Monoxide, measured at

atmospheric pressure and at 25° C., from the full cylinder which must be in an upright position and at 25° C. Close the stop-cock. Increase the pressure of the Nitrogen Monoxide in the nitrometer tube and open the stop-cock controlling the connection with the gas pipette, and force the entire volume of gas into the pipette. Close the stop-cock, maintain the pipette at 0° C., and rock rapidly, shaking the water in contact with the gas as far as possible. Keep the pressure bulb of the gas pipette completely filled with boiled distilled water, reduced to 0° C. After about thirty minutes most of the gas will be dissolved by the water. At this time, to facilitate the solution of the last portion of the gas, draw some of the liquid into the nitrometer tube and force the residual gas back upon the surface of the liquid in the pipette. Continue agitation until the volume of gas which remains does not change in volume after three consecutive agitations of at least two minutes each. Draw the residual gas, if any, into the nitrometer tube and measure its volume immediately at atmospheric pressure and at 25° C.

The volume of gas remaining undissolved should not exceed 2.5 cc., indicating not less than 95 per cent by volume of N_2O in the gas tested.

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 yields not less than 1.15 per cent of strychnine.

Description and physical properties—Seed orbicular, nearly flat, occasionally somewhat bent, from 10 to 30 mm. in diameter, and from 3 to 5 mm. in thickness; externally grayish or greenish-gray, covered with appressed hairs, giving it a silky luster; hilum indicated by a circular scar at the center of one of the flattened sides, and connected with the micropyle by a ridge; very hard when dry; internally showing a thin and hairy seed-coat and a large grayish-white endosperm at one end of which is embedded a small embryo with two broadly ovate, 5- to 7-nerved cotyledons; inodorous; taste intensely and persistently bitter.

Powdered Nux Vomica—Light gray; consisting chiefly of thick-walled endosperm cells containing globules of a fixed oil and a few small aleurone grains; fragments of strongly lignified, non-glandular hairs, the walls of the latter possessing large, circular, or long, slit-like pores. In the tissues of the adhering pulp occur a few small, nearly spherical starch grains.

Assay—Place 15 Gm. of Nux Vomica, in coarse powder, in a flask or bottle, add 150 cc. of a mixture of 3 volumes of ether and 1 volume of chloroform, agitate the mixture, and allow it to stand for about two minutes. Then add 10 cc. of stronger ammonia T.S., agitate thoroughly, stopper the container securely and shake frequently, but gently, during one hour. Now allow the mixture to stand for twelve hours or over night in a cool place. At the expiration of this period, shake the container gently for fifteen minutes, and then allow the liquids to separate. Decant 100 cc. of the liquid (representing 10 Gm. of Nux Vomica), and transfer it to a separator, rinsing the container with a little chloroform and adding the rinsings to the separator. Now add about 40 cc. of approximately normal sulfuric acid to the separator and shake the mixture gently for five minutes, then allow the liquids to separate, and draw off the acid layer into another separator and repeat with successive portions of the acid, until the ethereal liquid is completely extracted. (Test for the complete extraction of the alkaloids as directed on page 464.)

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 ten minutes, and allow the liquids to separate. Draw off the chloroform into a container and repeat, with additional portions of chloroform, until all of the alkaloid is extracted. Extract the combined chloroformic solution with successive portions of acidulated water until it is completely extracted. Now add ammonia T.S. until the combined acid solutions are alkaline and then completely extract the alkaloids with successive portions of chloroform.

Carefully evaporate the combined chloroformic extracts to dryness on a water bath, dissolve the residue by warming with 15 cc. of approximately 3 per cent sulfuric acid, cool, and then add 3 cc. of a mixture of equal parts of nitric acid and a 5 per cent solution of sodium nitrite in distilled water, stir well, and allow to stand for exactly ten minutes at room temperature. At the expiration of this period, pour the red solution into a separator containing 50 cc. of chloroform, rinse the flask with distilled water, and add the rinsings to the separator. Now immediately add sufficient 10 per cent sodium hydroxide solution to the contents of the separator to render it distinctly alkaline to litmus paper, and then add a few cc. more of the hydroxide solution. Shake the mixture gently for ten minutes and allow the liquids to separate. Draw off the chloroformic layer into another separator and repeat the shaking out with additional portions of chloroform until the alkaloid is completely extracted. Add 10 cc. of distilled water to the combined chloroformic 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 it also to the container. Now shake out the combined water extract with 5 cc. of chloroform and draw off all of the chloroform through a chloroform-moistened filter paper as before.

Evaporate the combined chloroform very carefully on a water bath nearly, but not quite, to dryness. Add to the moist residue 6 cc. of tenth-normal sulfuric acid and follow by 30 cc. of distilled water. 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 of acid with fiftieth-normal sodium hydroxide, using 1 drop of methyl red T.S. as the indicator. Each cc. of tenth-normal sulfuric acid is equivalent to 0.03342 Gm. of strychnine.

Preparations—Extractum Nucis Vomicæ, Tinctura Nucis Vomicæ.

AVERAGE DOSE—Metric, 0.1 Gm.—Apothecaries, 1½ grains.

OLEUM MORRHUÆ

Cod Liver Oil

Ol. Morrh.

The partially destearinated fixed oil obtained from fresh livers of

Gadus morrhua Linné and other species of the Family *Gadidæ*. *Cod Liver Oil may be flavored by the addition of not more than 1 per cent of any one or any mixture of flavoring substances recognized in this Pharmacopœia.* Cod Liver Oil contains in each Gm. at least 600 U. S. P. Units of Vitamin A and at least 85 U. S. P. Units of Vitamin D.*

The Vitamin A potency and Vitamin D potency of Cod Liver Oil when designated shall be expressed in "United States Pharmacopœia Units" per gram of oil and may be referred to as "U. S. P. Units."

Description and physical properties—A thin, oily liquid, having a peculiar, slightly fishy, but not a rancid odor, and a fishy taste.

Cod Liver Oil is slightly soluble in alcohol, but is freely soluble in ether, in chloroform, in carbon disulfide, and in ethyl acetate.

Tests for identity and purity—Specific gravity 0.918 to 0.927 at 25° C.

A solution of 1 drop of Cod Liver Oil in 1 cc. of chloroform, when shaken with 1 drop of sulfuric acid, acquires a violet-red tint, gradually changing to reddish-brown.

When viewed transversely in a tall, cylindrical, standard oil-sample bottle of colorless glass of about 120 cc. capacity, the color of Cod Liver Oil shall not be more intense than that of a mixture of 11 cc. of cobaltous chloride C.S., page 557, 76 cc. of ferric chloride C.S., page 558, and 33 cc. of distilled water, in a similar bottle of the same internal diameter.

Dissolve 2 Gm. of Cod Liver Oil, accurately weighed, in 30 cc. of a mixture of equal volumes of alcohol and ether, the mixture having been previously neutralized with tenth-normal sodium hydroxide, using 5 drops of phenolphthalein T.S. as the indicator, and boil the oil solution gently under a reflux condenser for ten minutes. Cool and titrate the mixture with tenth-normal sodium hydroxide to the production of a pink color which persists after shaking for thirty seconds. Not more than 1 cc. of tenth-normal sodium hydroxide is required (*free acid*).

Unsaponifiable matter: not more than 1.3 per cent, page 446.

Fill a tall, cylindrical, standard oil-sample bottle of about 120 cc. capacity with Cod Liver Oil, at a temperature between 23° and 28° C., stopper, and immerse the bottle in a mixture of ice and distilled water for five hours. The oil remains fluid and does not deposit stearin (*undestearinated cod liver oil*).

Saponification value: not less than 180 and not more than 192, page 445. When carbon dioxide has been used as a preservative, the oil must be exposed in a shallow dish in a vacuum desiccator for twenty-four hours before weighing the sample for determination of the saponification value.

Iodine value: not less than 145 and not more than 180, page 445.

Assay—Proceed as directed under *Assays for Vitamins A and D in Cod Liver Oil*, page 478.

Storage—Preserve Cod Liver Oil in a cool place, in well-closed containers which have been thoroughly dried before filling. Cod Liver Oil may be bottled or packaged in a vacuum or in the presence of an inert gas.

Preparation—Emulsum Olei Morrhuæ.

* One "United States Pharmacopœia Unit of Vitamin A" is equal, in growth promoting and antiophthalmic activities for the rat, to one International Unit of Vitamin A as defined and adopted by the Conference of Vitamin Standards of the Permanent Commission on Biological Standardization of the League of Nations in June of 1931; one "United States Pharmacopœia Unit of Vitamin D" is equal, in antirachitic potency for the rat, to one International Unit of Vitamin D as defined and adopted by the Conference of Vitamin Standards of the Permanent Commission on Biological Standardization of the League of Nations in June of 1931.

AVERAGE DAILY DOSE—Infants and adults,

Metric	Apothecaries
8 cc.	2 fluidrachms.

Note—Cod Liver Oil containing more than the minimum U. S. P. requirements for both vitamin A and vitamin D may be administered in proportionally lower doses.

OPIUM

Opium

Gum Opium

Opium is the air-dried, milky exudation obtained by incising the unripe capsules of *Papaver somniferum* Linné or its variety *album* De Candolle (Fam. *Papaveraceæ*).

Opium in its normal, air-dried condition yields not less than 9.5 per cent of anhydrous morphine.

Description and physical properties—In more or less rounded, somewhat flattened, masses, usually about 8 to 15 cm. in diameter; externally dark brown, covered with fragments of poppy leaves and at times with fruits of a species of rumex adhering from the packing; more or less plastic when fresh, becoming hard and brittle or tough on keeping; internally, coarsely granular or nearly smooth, dark brown, frequently interspersed with lighter areas, somewhat lustrous; odor characteristic, narcotic; taste very bitter, characteristic.

Assay—Triturate in a mortar 6 Gm. of the Opium to be assayed which, if fresh, should be in very small pieces, and if dry, in fine powder, with about 40 cc. of distilled water for fifteen minutes. Transfer the mixture completely to a flask with the aid of 30 cc. of warm distilled water, stopper the flask, and shake it every ten minutes, or continuously in a mechanical agitator, during one hour. Pour the contents as evenly as possible upon a wetted filter of from 10 to 11 cm. in diameter or, preferably, upon a sintered glass funnel attached to a suction flask. When the liquid has drained off, wash the residue with about 20 cc. of distilled water, carefully dropped upon the edges of the filter and its contents. Transfer the moist residue to a mortar, rub it to a smooth paste, then rinse it into the original flask with 40 cc. of distilled water, agitate it thoroughly during ten minutes, and return the entire mixture to the filter. When the liquid has drained off, wash the residue with small portions of distilled water until the washings are nearly colorless. Evaporate the filtrates and washings, in a tared dish, to about 30 Gm. and allow to cool. Now add 3 Gm. of freshly slaked lime, triturate the mixture for fifteen minutes, and transfer it completely to a tared flask with the aid of small portions of distilled water. Then add sufficient distilled water to make the mixture weigh 54 Gm. and mix well. Filter the mixture using a filter from 10 to 11 cm. in diameter, which has not been previously moistened, collecting the filtrate in a dry cylinder or small flask. During the filtration keep the funnel covered with a glass plate and its stem well within the neck of the receiving vessel.

Place 34 Gm. of this filtrate (corresponding to 4 Gm. of Opium) in an Erlenmeyer flask of suitable capacity, add 2 cc. of alcohol and 15 cc. of ether, and, after shaking the mixture, add 1 Gm. of ammonium chloride. Stopper the flask, shake it frequently during ten minutes and set it aside in a cool

(10° C. to 15° C.) place over night. Remove the stopper and brush any adhering crystals back into the flask. Decant the ethereal layer through a small filter paper. Rinse the flask and contents with 15 cc. of ether and pass these washings through the filter, and again wash the filter with an additional small quantity of ether. When all of the ether has passed through the filter, pour the aqueous layer upon the filter without trying to remove the crystals from the flask. Wash the crystals in the flask and the contents of the filter with distilled water, previously saturated with morphine, until the washings are colorless. Then add a few drops of distilled water to displace the morphinated water. Add to the flask containing the crystals about 15 cc. of boiling neutral methanol, agitate to dissolve as much of the morphine as possible, and pour the boiling solution over the morphine on the filter, receiving the filtrate in a suitable dry flask. Repeat this treatment with boiling, neutral methanol from eight to ten times, using from 5 to 7 cc. each time, until all of the morphine has been dissolved. Cool this solution and add exactly 25 cc. of tenth-normal sulfuric acid. Dilute this solution with 75 cc. of distilled water and boil it carefully or evaporate it on a steam bath to a volume of about 50 cc. Cool the liquid, and titrate the excess of acid with tenth-normal sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of tenth-normal acid is equivalent to 0.02852 Gm. of anhydrous morphine.

Preparations—Mistura Opii et Glycyrrhizæ Composita (from Camphorated Tincture of Opium), Opium Granulatum, Opium Pulveratum, Pulvis Ipecacuanhæ et Opii (from Powdered Opium), Tinctura Opii (from Granulated Opium), Tinctura Opii Camphorata (from Opium or Tincture of Opium).

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

OXYGENIUM

Oxygen

Oxygen.

O

At. wt. 16

Oxygen contains not less than 99 per cent by volume of O. For convenience it is usually supplied in compressed form in metallic cylinders.

Description and physical properties—A colorless, odorless, tasteless gas, which supports combustion more energetically than air. A liter of Oxygen at one atmosphere pressure and 0° C. weighs 1.429 Gm.

One volume of Oxygen dissolves in about 32 volumes of water and in about 7 volumes of alcohol at 20° C., and at 760 mm. pressure.

Tests for identity—A glowing splinter of wood held in Oxygen bursts into flame.

Tests for purity—Pass 2000 cc. of Oxygen measured under atmospheric pressure at about 25° C., through 100 cc. of barium hydroxide T.S. (which must be devoid of turbidity prior to the test) at such a rate that the test will require about thirty minutes, all air being excluded. The turbidity produced, if any, does not exceed that produced when 1 cc. of a solution prepared by dissolving 0.2 Gm. of sodium bicarbonate in 100 cc. of freshly boiled, cooled distilled water is added to another 100-cc. portion of barium hydroxide T.S. (*carbon dioxide*).

Pass 2000 cc. of Oxygen, under the conditions described in the preceding test, through a mixture of 100 cc. of distilled water and 1 cc. of silver nitrate T.S. The liquid shows no greater degree of opalescence than does a mixture of 100 cc. of distilled water and 1 cc. of silver nitrate T.S., prepared at the same time as that through which the gas passes, making the observation in 100-cc., low form Nessler tubes which are closely similar in all respects (*halogens*).

Dilute 0.3 cc. of methyl red T.S. with 400 cc. of boiling distilled water and boil the solution for five minutes. Pour 100 cc. of the boiling solution into each of three color-comparator tubes of clear glass. Add 0.05 cc. of fiftieth-normal sodium hydroxide to tube 1, 0.1 cc. of fiftieth-normal hydrochloric acid to tube 2 and also to tube 3. Stopper the tubes and cool them to room temperature. Pass 2000 cc. of Oxygen through the solution in tube 2 at a rate requiring about thirty minutes for the passage of the gas. The color of the solution in tube 2 should show no deeper shade of yellow than tube 1, and no deeper shade of red than the solution in tube 3 (*acids* or *alkalies*).

Pass 2000 cc. of Oxygen, under the conditions previously described, through 15 cc. of freshly prepared starch-iodide T.S. to which has been added 1 drop of glacial acetic acid. The color of the test solution is not altered by the passage of the Oxygen, as shown by comparing it with another portion of the acidified starch-potassium iodide T.S. through which the gas has not been passed (*oxidizing substances*).

Oxygen meets the requirements of the test for *carbon monoxide* in gases, page 441.

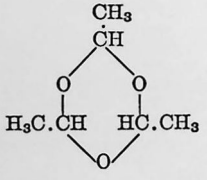
Assay—Place a sufficient quantity of mercury in a 100-cc. calibrated nitrometer, provided with a two-way stop-cock and a two-way outlet, and properly connected with a balancing tube. Connect one of the intake tubes of the nitrometer with a gas pipette of suitable capacity. Place in the pipette a coil of copper wire which extends to the uppermost portion of the bulb, and add about 125 cc. of ammonium chloride–ammonium hydroxide T.S. Draw the liquid (free from air bubbles) through the capillary opening connection and stop-cock opening in the nitrometer by reducing the pressure in the nitrometer tube and opening the stop-cock controlling the connection with the gas pipette. Then close the stop-cock. Having completely filled the nitrometer, the other stop-cock opening and the other intake tube with mercury, draw into the nitrometer exactly 100 cc. of Oxygen measured at atmospheric pressure and 25° C. by reducing the pressure in the tube. Close this stop-cock. Increase the pressure on the Oxygen in the nitrometer tube and open the stop-cock controlling the connection with the gas pipette. Force the entire volume of gas into the pipette. Close the stop-cock and rock the pipette gently, providing frequent contact of the liquid, gas and copper spiral. At the end of fifteen minutes most of the gas will have been absorbed by the liquid. At this time, to facilitate the absorption of the last portion of the gas, draw some of the liquid into the nitrometer tube and force the residual gas back upon the surface of the liquid in the gas pipette. Again rock the pipette until no further diminution in the volume of gas occurs. Draw the residual gas, if any, into the nitrometer tube and measure its volume at atmospheric pressure and 25° C.

The volume of gas remaining undissolved should not exceed 1 cc., indicating not less than 99 per cent by volume of O in the gas tested.

PARALDEHYDUM

Paraldehyde

Paraldehyd.—Paracetaldehyde



$C_6H_{12}O_3$ Mol. wt. 132.09

A polymer $[(CH_3.CHO)_3]$ of acetaldehyde.

Description and physical properties—A colorless, transparent liquid. It has a strong, characteristic, not unpleasant or pungent odor, but a disagreeable taste.

One cc. of Paraldehyde is soluble in about 8 cc. of water at 25° C. One cc. is soluble in 17 cc. of boiling water. It is miscible with alcohol, chloroform, ether, and with volatile oils.

Tests for identity—Specific gravity: about 0.990 at 25° C.

It distils between 120° and 125° C., page 439.

Congealing point: not below 11° C.

When heated with a small quantity of diluted sulfuric acid, Paraldehyde is converted into acetaldehyde, recognizable by its odor.

Tests for purity—Heat 5 cc. of Paraldehyde on a water bath: no disagreeable odor is noticeable as the last portions evaporate (*impurities derived from fusel oil*) and not more than 0.003 Gm. of residue remains.

One cc. of Paraldehyde forms with 10 cc. of distilled water, at 25° C., a clear solution, free from oily drops (*amyl alcohol*). A 5-cc. portion of this solution, acidulated with a drop of hydrochloric acid, yields no turbidity on the addition of 3 drops of barium chloride T.S. (*sulfate*). Another 5-cc. portion, acidulated with 1 drop of nitric acid, yields no opalescence at once on the addition of 3 drops of silver nitrate T.S. (*chloride*).

A mixture of 6 cc. of Paraldehyde and 8 cc. of alcohol with 1 drop of phenolphthalein T.S. acquires a pink color upon the addition of 0.5 cc. of normal sodium hydroxide (*free acid*).

Place 100 cc. of distilled water in a 300-cc. Erlenmeyer flask, add 5 cc. of Paraldehyde, and shake the mixture gently until solution is complete. Add 5 cc. of a solution of hydroxylamine hydrochloride (made by dissolving exactly 3.5 Gm. of hydroxylamine hydrochloride in sufficient distilled water to make 100 cc.). Shake the mixture gently for thirty seconds, add 2 drops of methyl orange T.S., and titrate immediately with half-normal sodium hydroxide. Run a blank with 5 cc. of the same hydroxylamine hydrochloride solution in 100 cc. of distilled water: the difference between the two determinations shall not exceed 1 cc. of half-normal sodium hydroxide solution (*acetaldehyde*).

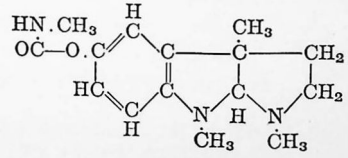
Storage—Preserve Paraldehyde in well-closed containers, in a cool place and protected from light.

AVERAGE DOSE—Metric, 2 cc.—Apothecaries. 30 minims.

PHYSOSTIGMINÆ SALICYLAS

Physostigmine Salicylate

Physostig. Salicyl.—Eserine Salicylate



$C_{15}H_{21}O_2N_3.HC_7H_5O_3$ Mol. wt. 413.23

The salicylate of an alkaloid obtained from the dried ripe seed of *Physostigma venenosum* Balfour (Fam. *Leguminosæ*).

Description and physical properties—Colorless or faintly yellow, shining, odorless crystals. Physostigmine Salicylate acquires a red tint when long exposed to light and air.

Caution—Physostigmine Salicylate is extremely poisonous.

One Gm. of Physostigmine Salicylate is soluble in 75 cc. of water, in 16 cc. of alcohol, in 6 cc. of chloroform, and in 250 cc. of ether, at 25° C. One Gm. is soluble in 16 cc. of water at 80° C., and in 5 cc. of boiling alcohol.

Tests for identity—A cold, saturated aqueous solution of Physostigmine Salicylate is neutral, or only faintly acid to litmus paper. Upon standing, the solution usually acquires a pink color.

Evaporate about 0.005 Gm. of Physostigmine Salicylate on a water bath with a few drops of ammonia T.S.: a blue residue remains which, when dissolved in alcohol, yields a red, fluorescent solution upon the addition of an excess of acetic acid.

Add a few drops of sodium hydroxide T.S. to 5 cc. of a cold, saturated aqueous solution of Physostigmine Salicylate: a pink color rapidly develops.

Ferric chloride T.S. produces a deep violet color in an aqueous solution of Physostigmine Salicylate.

Tests for purity—The ash from 0.1 Gm. of Physostigmine Salicylate is negligible, page 439.

The solution prepared by dissolving 0.1 Gm. of Physostigmine Salicylate in 5 cc. of sulfuric acid, after standing for five minutes, has no more color than matching fluid I, described under the test for *carbonizable substances*, page 441.

Precipitate the salicylic acid from 10 cc. of a cold, saturated aqueous solution of Physostigmine Salicylate with a slight excess of diluted hydrochloric acid, and filter: the filtrate is not rendered turbid at once by the addition of 5 drops of barium chloride T.S. (*sulfate*).

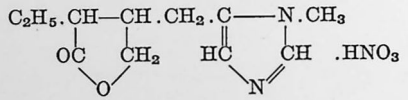
Storage—Preserve Physostigmine Salicylate in air-tight containers and protected from light.

AVERAGE DOSE—Metric, 0.002 Gm.—Apothecaries, 1/30 grain.

PILOCARPINÆ NITRAS

Pilocarpine Nitrate

Pilocarpin. Nitras



$C_{11}H_{16}O_2N_2.HNO_3$ Mol. wt. 271.16

The nitrate of an alkaloid obtained from the dried leaflets of *Pilocarpus Jaborandi* Holmes, or of *Pilocarpus microphyllus* Stapf (Fam. *Rutaceæ*).

Description and physical properties—Shining, colorless crystals. It is stable in the air.

One Gm. of Pilocarpine Nitrate is soluble in 4 cc. of water and in 75 cc. of alcohol, at 25° C. One Gm. is soluble in 21 cc. of alcohol at 60° C. It is insoluble in chloroform or in ether.

Tests for identity—Pilocarpine Nitrate melts between 170° and 173° C., page 455.

An aqueous solution of Pilocarpine Nitrate (1 in 20) is slightly acid to litmus paper.

Dissolve from 0.01 to 0.02 Gm. of Pilocarpine Nitrate 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 3 or 4 drops of a solution of potassium dichromate (1 in 300) and shake the mixture gently: the benzene layer acquires a violet color, while the aqueous layer remains yellow (distinction from *other alkaloids*). (If more than 0.02 Gm. of the salt is used, the benzene turns blue and the reaction is no longer characteristic.)

Mix an aqueous solution of Pilocarpine Nitrate with an equal volume of ferrous sulfate T.S., and superimpose the mixture upon 5 cc. of sulfuric acid, contained in a test tube: the zone of contact becomes brown.

Tests for purity—The ash from 0.1 Gm. of Pilocarpine Nitrate is negligible, page 439.

The solution produced by dissolving 0.1 Gm. of Pilocarpine Nitrate in 5 cc. of sulfuric acid has no more color than matching fluid A, described under the test for *carbonizable substances*, page 441.

Add a few drops of silver nitrate T.S. to 5 cc. of an aqueous solution of Pilocarpine Nitrate (1 in 50), acidulated with nitric acid: the mixture does not at once produce an opalescence (*chloride*).

Add ammonia T.S. or potassium dichromate T.S. to 10 cc. of an aqueous solution of Pilocarpine Nitrate (1 in 100): the mixture is not turbid (*various foreign alkaloids*).

Storage—Preserve Pilocarpine Nitrate in well-closed containers and protected from light.

AVERAGE DOSE—Metric, 0.005 Gm.—Apothecaries, 1/12 grain.

PITUITARIUM POSTERIUS

Posterior Pituitary

Pituitar. Post.—Pituitarium U. S. P. X, Pituitary, Hypophysis Sicca.

The cleaned, dried, and powdered posterior lobe obtained from the pituitary body of domesticated animals which are used for food by man. The pituitary body must be removed from the animal immediately after slaughtering and then dried at once or kept frozen until dried.

Description and physical properties—A yellowish or grayish amorphous powder, having a characteristic odor. It is only partially soluble in water.

Storage—Preserve Posterior Pituitary in well-closed containers, in a cool place.

Preparation—Liquor Pituitarii Posterioris (from fresh posterior lobe).

POTASSII CITRAS

Potassium Citrate

Pot. Cit.

$K_3C_6H_5O_7.H_2O$ Mol. wt. 324.34

Potassium Citrate [$C_3H_4.OH.(COOK)_3.H_2O$], when rendered anhydrous by drying at 180° C., contains not less than 99 per cent of $C_3H_4.OH.(COOK)_3$. It contains not less than 3 per cent and not more than 6 per cent of water.

Description and physical properties—Transparent crystals, or a white, granular powder. It is odorless, and has a cooling, saline taste, and is deliquescent when exposed to moist air.

One Gm. of Potassium Citrate is soluble in about 1 cc. of water at 25° C. It is almost insoluble in alcohol and is freely soluble in glycerin.

Tests for identity—An aqueous solution of Potassium Citrate (1 in 10) responds to the tests for potassium, page 452, and for citrate, page 449.

Tests for purity—An aqueous solution of Potassium Citrate (1 in 20) is alkaline to litmus paper, but a 10-cc. portion of the solution does not become red when treated with 1 drop of phenolphthalein T.S.

A solution of 1 Gm. of Potassium Citrate in 1 cc. of distilled water does not deposit a crystalline precipitate on the addition of 1 cc. of acetic acid (*tartrate*).

An aqueous solution of the salt meets the requirements of the test for *heavy metals*, page 447.

An aqueous solution of the salt meets the requirements of the test for *arsenic*, page 436.

Dissolve 10 Gm. of Potassium Citrate in 20 cc. of distilled water, add 2 cc. of sulfurous acid, and boil the mixture until it is almost free of the odor of sulfur dioxide. Cool the solution, mix it with 1 cc. of sodium cyanide T.S. and immediately add enough stronger ammonia T.S. to give the mixture a slight odor of ammonia. Transfer the solution to a 50-cc. graduated, glass-stoppered cylinder, dilute it with sufficient distilled water to make the mixture measure 50 cc., and add 3 drops of sodium sulfide T.S. Agitate the mixture and view it downward against a white surface. Its color, if any, is not more intense than the similarly observed color of a control solution prepared as follows: dissolve 2 Gm. of reagent ammonium chloride in 20 cc. of distilled water, add 2 cc. of a solution containing 0.08 Gm. of lead nitrate in 1000 cc. of distilled water, and then 1 cc. of diluted hydrochloric acid. Treat this solution with the same quantities of sulfurous acid, sodium cyanide T.S. and stronger ammonia T.S., as were used in the test mixture, transfer it to another 50-cc., glass-stoppered cylinder, then dilute it with sufficient distilled water to make the mixture measure 50 cc., and add 3 drops of sodium sulfide T.S. Before the addition of the sodium sulfide T.S. the liquid must possess a distinct odor of ammonia, and the two cylinders used must be matched, be of practically colorless glass, and have equal internal diameters (*lead*).

Weigh accurately about 2.5 Gm. of the salt and dry it to constant weight at 180 °C. The loss in weight is not less than 3 per cent and not more than 6 per cent (*water*).

Assay—Weigh accurately about 2 Gm. of the dried salt obtained in the preceding test and proceed as directed under the *assay for alkali salts of organic acids*, page 439. Each cc. of half-normal sulfuric acid is equivalent to 0.05106 Gm. of $C_3H_4.OH.(COOK)_3$.

Storage—Preserve Potassium Citrate in air-tight containers.

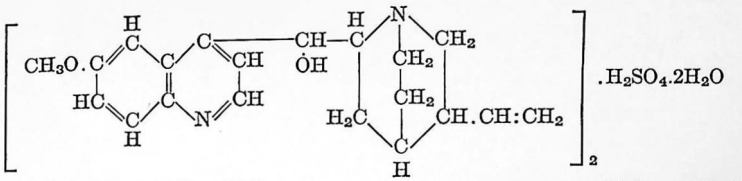
Preparation—Potassii Citras Effervescens.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

QUINIDINÆ SULFAS

Quinidine Sulfate

Quinidin. Sulf.



$(C_{20}H_{24}O_2N_2)_2.H_2SO_4.2H_2O$ Mol. wt. 782.51

The sulfate of an alkaloid obtained from cinchona.

Description and physical properties—Fine, needle-like, white crystals, frequently cohering in masses. The salt is odorless, has a very bitter taste, and darkens on exposure to light.

One Gm. of Quinidine Sulfate is soluble in about 90 cc. of water, and in 10 cc. of alcohol, at 25° C. One Gm. is soluble in about 15 cc. of boiling water. It is soluble in chloroform, but almost insoluble in ether.

Tests for identity—An aqueous solution of Quinidine Sulfate (1 in 100) is neutral or slightly alkaline to litmus paper, and is dextrorotatory (quinine sulfate is lævorotatory).

An aqueous solution of Quinidine Sulfate acidulated with diluted sulfuric acid exhibits a vivid blue fluorescence.

Add 1 or 2 drops of bromine T.S. to 5 cc. of an aqueous solution of Quinidine Sulfate (1 in 1000) and follow with 1 cc. of ammonia T.S.: the liquid acquires an emerald-green color due to the formation of thalleioquin.

To 5 cc. of an aqueous solution of Quinidine Sulfate (1 in 100) add 1 cc. of silver nitrate T.S., and stir the mixture with a glass rod: a white precipitate appears after a short interval (difference from *many other alkaloids*).

Barium chloride T.S. produces in an aqueous solution of Quinidine Sulfate, a white precipitate which is insoluble in hydrochloric acid.

Tests for purity—Dry Quinidine Sulfate to constant weight at 120° C.: the loss in weight does not exceed 5 per cent (*water*).

Ash: not more than 0.1 per cent, page 439.

The solution produced by dissolving 0.2 Gm. of Quinidine Sulfate in 5 cc. of sulfuric acid has no more color than matching fluid M, described under the test for *carbonizable substances*, page 441.

One Gm. of Quinidine Sulfate dissolves in 5 cc. of a warm mixture of 2 volumes of chloroform and 1 volume of dehydrated alcohol with not more than a slight turbidity (*ammonium* or *other inorganic salts*).

Dissolve 0.5 Gm. of Quinidine Sulfate in 15 cc. of boiling distilled water, and add a solution of 0.5 Gm. of potassium iodide in 5 cc. of distilled water, which, if necessary, has previously been neutralized to litmus paper with tenth-normal sulfuric acid: a white precipitate appears. Mix well, cool the mixture to 15° C., and keep it at this temperature for one hour with frequent agitation. Filter, and add 2 drops of ammonia T.S. to the filtrate: the mixture does not become turbid within one minute (*other cinchona alkaloids*).

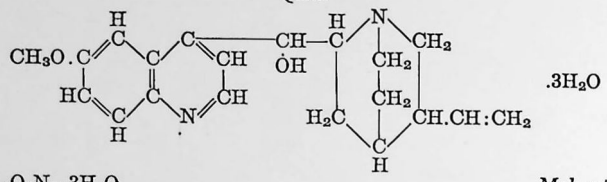
Storage—Preserve Quinidine Sulfate in well-closed containers and protected from light.

AVERAGE DOSE—Metric, 0.2 Gm.—Apothecaries, 3 grains, four times a day.

QUININA

Quinine

Quin.



$C_{20}H_{24}O_2N_2.3H_2O$ Mol. wt. 378.25

An alkaloid obtained from cinchona.

Description and physical properties—A white, micro-crystalline powder. Quinine is odorless, and has a bitter taste, which is intense and persistent. It is efflorescent in dry air.

One Gm. of Quinine is soluble in 1560 cc. of water, in 0.8 cc. of alcohol, in 1.1 cc. of chloroform, in 1.9 cc. of ether, and in 1890 cc. of ammonia water, at 25° C. One Gm. is soluble in 800 cc. of boiling water.

Tests for identity—An alcoholic solution of Quinine (1 in 10) is alkaline to litmus paper, and is lævorotatory.

A solution of Quinine in diluted sulfuric acid shows a vivid blue fluorescence.

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 an emerald-green color due to the formation of thalleioquin.

Tests for purity—Dry Quinine to constant weight at 100° C.: the loss in weight does not exceed 15 per cent (*water*).

Ash: not more than 0.1 per cent, page 439.

The solution produced by dissolving 0.2 Gm. of Quinine in 5 cc. of sulfuric acid has no more color than matching fluid M, described under the test for *carbonizable substances*, page 441.

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 (*ammonium salts*).

Dry Quinine to constant weight at 100° C., dissolve 1.5 Gm. of the dried Quinine in 25 cc. of alcohol, dilute the solution with 50 cc. of hot distilled water, add normal 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 normal 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 complete the test for *other cinchona alkaloids* as directed under *Quininæ Sulfas*, page 318.

Storage—Preserve Quinine in well-closed containers and protected from light.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

QUININÆ BISULFAS

Quinine Bisulfate

Quin. Bisulf.—Quinine Acid Sulfate

$C_{20}H_{24}O_2N_2.H_2SO_4.7H_2O$ Mol. wt. 548.39

Description and physical properties—White or colorless crystals, usually needle-like, or a white, crystalline powder. It is odorless, and has a very bitter taste. It effloresces on exposure to dry air, and turns yellow on exposure to light.

One Gm. of Quinine Bisulfate is soluble in 9 cc. of water, in 23 cc. of alcohol, in 15 cc. of glycerin, in 625 cc. of chloroform, and in 2500 cc. of ether, at 25° C. One Gm. is soluble in 0.7 cc. of boiling water and in 0.7 cc. of alcohol at 60° C.

Tests for identity—An aqueous solution of Quinine Bisulfate (1 in 20) is strongly acid to litmus paper, and has a blue fluorescence.

Add 2 or 3 drops of bromine T.S. to 5 cc. of an aqueous solution of Quinine Bisulfate (1 in 1000), and follow with 1 cc. of ammonia T.S.: the liquid acquires an emerald-green color due to the formation of thalleioquin.

Barium chloride T.S. produces in an aqueous solution of Quinine Bisulfate a white precipitate, which is insoluble in hydrochloric acid.

Its solution is strongly lævorotatory, page 459.

Tests for purity—Dry Quinine Bisulfate to constant weight at 100° C.: the loss in weight does not exceed 24 per cent (*water*).

Ash: not more than 0.05 per cent, page 439.

The solution produced by dissolving 0.2 Gm. of Quinine Bisulfate in 5 cc. of sulfuric acid has no more color than matching fluid M, described under the test for *carbonizable substances*, page 441.

Heat 0 3 Gm. of Quinine Bisulfate with 3 cc. of sodium hydroxide T.S. on a water bath: the mixture does not at once evolve the odor of ammonia (*ammonium salts*).

Dissolve 2.52 Gm. of Quinine Bisulfate in a mixture of 20 cc. of alcohol and 50 cc. of hot distilled water, and neutralize the solution with normal sodium hydroxide, using 2 drops of methyl red T.S. as the indicator. Evaporate the solution to dryness on a water bath, powder the residue, mix it in a test tube with 20 cc. of distilled water, and complete the test for *other cinchona alkaloids* as directed under *Quininæ Sulfas*, page 318.

Storage—Preserve Quinine Bisulfate in well-closed containers and protected from light.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

QUININÆ DIHYDROCHLORIDUM

Quinine Dihydrochloride

Quin. Dihydrochlor.

$C_{20}H_{24}O_2N_2.2HCl$ Mol. wt. 397.13

Description and physical properties—A white, odorless powder, having a very bitter taste.

One Gm. of Quinine Dihydrochloride is soluble in about 0.6 cc. of water and in 12 cc. of alcohol, at 25° C. It is slightly soluble in chloroform and very slightly soluble in ether.

Tests for identity—An aqueous solution of Quinine Dihydrochloride is strongly acid to litmus paper.

Add 2 or 3 drops of bromine T.S. to 5 cc. of an aqueous solution of Quinine Dihydrochloride (1 in 1000), and follow with 1 cc. of ammonia T.S.: the liquid acquires an emerald-green color due to the formation of thalleioquin.

Silver nitrate T.S. added to an aqueous solution of Quinine Dihydrochloride (1 in 20) produces a white precipitate, which is insoluble in nitric acid but, which after filtration is soluble in ammonia T.S.

Tests for purity—Dry Quinine Dihydrochloride to constant weight at 100° C.: the loss in weight does not exceed 3 per cent (*water*).

Ash: not more than 0.05 per cent, page 439.

The solution produced by dissolving 0.2 Gm. of Quinine Dihydrochloride in 5 cc. of sulfuric acid has no more color than matching fluid M, described under the test for *carbonizable substances*, page 441.

Add a few drops of diluted sulfuric acid to 10 cc. of an aqueous solution of Quinine Dihydrochloride (1 in 20): the mixture does not become turbid (*barium*).

One Gm. of Quinine Dihydrochloride shows no more *sulfate* than corresponds to 0.5 cc. of fiftieth-normal sulfuric acid, page 471.

Dissolve 1.8 Gm. of Quinine Dihydrochloride in 10 cc. of distilled water, add a slight excess of ammonia T.S., extract the mixture successively with 20, 10, and 10 cc. of chloroform, and evaporate the combined chloroformic solutions to dryness on a water bath. Dissolve the residue in 25 cc. of alcohol, dilute the solution with 50 cc. of hot distilled water, add normal 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 normal 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 complete the test for *other cinchona alkaloids* as directed under *Quininæ Sulfas*, page 318.

Storage—Preserve Quinine Dihydrochloride in well-closed containers and protected from light.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

QUININÆ ET UREÆ HYDROCHLORIDUM

Quinine and Urea Hydrochloride

Quin. et Urea. Hydrochlor.

$C_{20}H_{24}O_2N_2.HCl.CO(NH_2)_2.HCl.5H_2O$ Mol. wt. 547.26

Quinine and Urea Hydrochloride contains not less than 58 per cent and not more than 65 per cent of anhydrous quinine [$C_{20}H_{24}O_2N_2$].

Description and physical properties—Colorless, translucent prisms, white granules, or a white powder. It is odorless, and has a very bitter taste.

One Gm. of Quinine and Urea Hydrochloride is soluble in 0.9 cc. of water and in 2.4 cc. of alcohol, at 25° C.

Tests for identity—An aqueous solution of Quinine and Urea Hydrochloride (1 in 20) is strongly acid to litmus paper.

A solution of Quinine and Urea Hydrochloride in diluted sulfuric acid (1 in 1000) shows a blue fluorescence.

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 an emerald-green color due to the formation of thalleioquin.

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. to only a slightly acid reaction, produces a white precipitate.

Silver nitrate T.S. produces in an aqueous solution of Quinine and Urea Hydrochloride (1 in 20) a white precipitate, which is insoluble in nitric acid but which, after filtration, is soluble in ammonia T.S.

Tests for purity—Ash: not more than 0.05 per cent, page 439.

The solution produced by dissolving 0.2 Gm. of Quinine and Urea Hydrochloride in 5 cc. of sulfuric acid has no more color than matching fluid M, described under the test for *carbonizable substances*, page 441.

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° C.: the mixture does not at once evolve the odor of ammonia (*ammonium compounds*).

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 chloroformic 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 normal 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 normal 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 complete the test for *other cinchona alkaloids* as directed under *Quininæ Sulfas*, page 318.

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 chloroformic solutions on a water bath, dissolve the residue in 10 cc. of ether, evaporate the solution to dryness, and dry the residue, consisting of anhydrous quinine, to constant weight at 100° C.

Storage—Preserve Quinine and Urea Hydrochloride in well-closed containers and protected from light.

AVERAGE DOSE—Hypodermic (one dose daily)—Metric, 1 Gm.—Apothecaries, 15 grains.

QUININÆ SULFAS

Quinine Sulfate

Quin. Sulf.

$(C_{20}H_{24}O_2N_2)_2.H_2SO_4.2H_2O$ Mol. wt. 782.51

Description and physical properties—White, fine, needle-like crystals, usually lusterless, making a light and readily compressible mass. It is odorless, and has a persistent, very bitter taste. When exposed to light, Quinine Sulfate acquires a brown tint.

One Gm. of Quinine Sulfate is soluble in 810 cc. of water, and in 120 cc. of alcohol, at 25° C. One Gm. is soluble in 32 cc. of water at 100° C. and in 10 cc. of alcohol at 78° C. It is slightly soluble in chloroform or in ether, but is freely soluble in a mixture of 2 volumes of chloroform and 1 volume of dehydrated alcohol.

Tests for identity—A saturated, aqueous solution of Quinine Sulfate when acidulated with diluted sulfuric acid develops a vivid blue fluorescence.

Add 1 or 2 drops of bromine T.S. to 5 cc. of an aqueous solution of Quinine Sulfate (1 in 1000) and follow with 1 cc. of ammonia T.S.: the liquid acquires an emerald-green color due to the formation of thalleioquin.

Barium chloride T.S. produces in an aqueous solution of Quinine Sulfate a white precipitate, which is insoluble in hydrochloric acid.

A solution of Quinine Sulfate (1 in 50) in normal sulfuric acid is lævorotatory, page 459.

Tests for purity—A saturated, aqueous solution of Quinine Sulfate is neutral or not more than slightly alkaline to litmus paper.

Dry Quinine Sulfate to constant weight at 100° C.: the loss in weight does not exceed 5 per cent (*water*).

Ash: not more than 0.05 per cent, page 439.

The solution produced by dissolving 0.2 Gm. of Quinine Sulfate in 5 cc. of sulfuric acid has no more color than matching fluid M, described under the test for *carbonizable substances*, page 441.

Heat 1 Gm. of Quinine Sulfate to 50° C. with 7 cc. of a mixture of 2 volumes of chloroform and 1 volume of dehydrated alcohol: it dissolves completely and the solution remains clear on cooling (*inorganic salts*).

Dry Quinine Sulfate (which must be neutral or slightly alkaline to litmus paper) at 50° C. for two hours, and then agitate 1.8 Gm. of the dried salt with 20 cc. of distilled water at 65° C. for half an hour. Allow the mixture to cool to 15° C., macerate it at this temperature for two hours with occasional shaking, and then filter it through a filter paper of a diameter of from 8 to 10 cm. Transfer 5 cc. of this filtrate, at a temperature of 15° C., 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° C., and be added at once: a clear liquid is produced (*other cinchona alkaloids*).

Storage—Preserve Quinine Sulfate in well-closed containers and protected from light.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

RESINA
Rosin
Colophony

Rosin is a solid resin obtained from *Pinus palustris* Miller, and from other species of *Pinus* (Fam. *Pinaceæ*).

Description and physical properties—Sharply angular, translucent, amber-colored fragments, frequently covered with a yellow dust; fracture brittle at ordinary temperatures, shiny and shallow-conchoidal. The odor and taste are slightly terebinthinate.

Rosin is freely soluble 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.

Tests for identity and purity—Specific gravity: 1.07 to 1.09 at 25° C.

Ash: not more than 0.05 per cent, page 439.

An alcoholic solution of Rosin is acid to litmus paper.

Rosin is easily fusible and burns with a dense, yellowish smoke.

Acid Value: not less than 150, page 444, using about 1 Gm. of the Rosin, accurately weighed.

Preparation—Ceratum Resinæ.

RHEUM
Rhubarb

Rhubarb consists of the dried rhizome and roots of *Rheum officinale* Baillon or of *Rheum palmatum* Linné (Fam. *Polygonaceæ*) or of other species (excepting *Rheum rhaponticum*) or of hybrids of *Rheum*, grown in China and Tibet, deprived of periderm tissues.

Rhubarb yields not less than 30 per cent of diluted alcohol-soluble extractive.

Description and physical properties—

Unground Rhubarb—In subcylindrical or flattened pieces, frequently showing a large perforation; from 5 to 17 cm. in length and from 4 to 10 cm. in diameter; outer surface yellowish-brown with lighter colored striations and occasional small patches of brown cork; more or less covered with yellowish-brown powder; hard; fracture uneven, the rhizome portions showing stellate vascular bundles and a granular, yellowish or pinkish-brown mottled surface; odor aromatic, agreeable; taste bitter and astringent.

Structure—Occasional patches of thin-walled cork cells; medullary rays wavy, 2 to 4 cells in width, cells often with reddish-brown contents, compound vascular bundles in the rhizome portions with internal sieve and external xylem and cambium; parenchyma cells containing either starch or large aggregate crystals of calcium oxalate.

Powdered Rhubarb—Yellowish-brown to reddish-brown; rosette aggregates of calcium oxalate up to 0.15 mm. in diameter; starch grains from 0.004 to 0.025 mm. in diameter, spheroidal, single and 2- to 3-compound, with central cleft hilum; tracheæ few, reticulate and spiral.

Tests for identity and purity—Rhubarb becomes red upon the addition of alkalies.

Boil 0.1 Gm. of powdered Rhubarb with 10 cc. of an aqueous solution of potassium hydroxide (1 in 100), allow it to cool, filter, acidulate the filtrate with hydrochloric acid, and shake it with 10 cc. of ether: the ethereal layer becomes yellow as it stands. Shake this ethereal solution with 5 cc. of ammonia T.S.: the latter is colored cherry-red (presence of *emodin*) and the ethereal layer remains yellow (presence of *chrysophanic acid*).

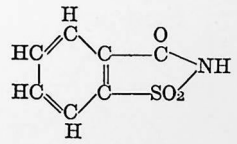
Assay—Proceed as directed under *diluted alcohol-soluble extractive*, page 475.

Preparations—Extractum Rhei, Syrupus Rhei Aromaticus (from Aromatic Tincture), Tinctura Rhei Aromatica.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

SACCHARINUM
Saccharin

Saccharin.—Glusidum U. S. P. X, Gluside, Benzosulfinidum



$C_7H_5O_3NS$ Mol. wt. 183.11

Ortho-sulfo-benzimide.

Description and physical properties—White crystals, or a white, crystalline powder. It is odorless or has a faint, aromatic odor. Saccharin in dilute aqueous solution is from 300 to 500 times as sweet as sucrose.

One Gm. of Saccharin is soluble in 290 cc. of water and in 31 cc. of alcohol, at 25° C. One Gm. of it is soluble in about 25 cc. of boiling water. It is slightly soluble in chloroform and in ether, and is readily dissolved by ammonia water, by solutions of alkali hydroxides, and by solutions of alkali bicarbonates with the evolution of carbon dioxide.

Tests for identity—The melting point of Saccharin is not below 222° C., page 455.

A saturated, aqueous solution of Saccharin is acid to litmus paper.

Dissolve about 0.1 Gm. of Saccharin in 5 cc. of an aqueous solution of sodium hydroxide (1 in 20), evaporate the solution to dryness, and gently fuse the residue over a small flame until it no longer evolves ammonia. Allow the residue to cool, dissolve it in 20 cc. of distilled water, neutralize the solution with diluted hydrochloric acid, and filter it: the addition of a drop of ferric chloride T.S. to the filtrate produces a violet color in the solution.

Mix about 0.02 Gm. of Saccharin with about twice its weight of resorcinol, add 10 drops of sulfuric acid, and heat the mixture over a small flame until it acquires a dark green color. Allow it to cool, add 10 cc. of distilled water, and an excess of sodium hydroxide T.S.: a fluorescent green liquid results.

Tests for purity—Ash: not more than 0.5 per cent, page 439.

A solution prepared by dissolving 0.2 Gm. of Saccharin in 5 cc. of sulfuric acid, and kept at a temperature of from 48° to 50° C. for ten minutes, develops no more color than matching fluid A, described under the test for *carbonizable substances*, page 441.

A solution of 0.2 Gm. of Saccharin in 5 cc. of sodium hydroxide T.S. is clear, and, when mixed with 5 cc. of alkaline cupric tartrate T.S., does not deposit cuprous oxide on heating (*glucose, lactose*).

Add ferric chloride T.S., drop by drop, to 10 cc. of a hot, saturated, aqueous solution of Saccharin; no precipitate or violet color appears in the liquid (*benzoic* or *salicylic acid*).

Warm a mixture of 0.5 Gm. of Saccharin, 1 Gm. of magnesium oxide, and 10 cc. of distilled water: no odor of ammonia is evolved (*ammonium compounds*).

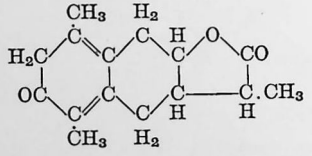
AVERAGE DOSE—Saccharin is used as a sweetening agent in the proportion of about 1 to 10,000 (Metric, 0.1 Gm. per liter—Apothecaries, 1/20 grain per fluidounce), or in place of an ordinary "lump" of sucrose (Metric, 0.03 Gm.—Apothecaries, 1/2 grain).

SANTONINUM

Santonin

Santonin.

$C_{15}H_{18}O_3$



Mol. wt. 246.14

The inner anhydride of santoninic acid.

Description and physical properties—Colorless crystals, usually tabular, or 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.

Santonin is almost insoluble in cold water, and only slightly soluble in boiling water. One Gm. of Santonin is soluble in 43 cc. of alcohol, and in 1.7 cc. of chloroform, at 25° C. One Gm. is soluble in 6.5 cc. of boiling alcohol.

Tests for identity—Santonin melts between 169° and 171° C., page 455.

A solution of Santonin in alcohol (1 in 50) is neutral to litmus paper.

Solutions of Santonin are lævorotatory, page 459.

Heat about 0.2 Gm. of Santonin with 2 cc. of alcoholic potassium hydroxide T.S.: the mixture develops a red color.

Shake about 0.01 Gm. of Santonin with a cool mixture of 1 cc. each of sulfuric acid and distilled water, heat the solution to 100° C., and add a drop of dilute ferric chloride solution (1 volume of ferric chloride T.S. to 10 volumes of distilled water): the mixture is violet in color.

Tests for purity—Ash: not more than 0.1 per cent, page 439.

The solution produced by dissolving 0.1 Gm. of Santonin in 5 cc. of sulfuric acid has no more color than matching fluid O, described under the test for *carbonizable substances*, page 441.

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 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 three hours (*alkaloids*).

Storage—Preserve Santonin in well-closed containers and protected from light.

AVERAGE DOSE—Metric 0.06 Gm.—Apothecaries, 1 grain.

SPIRITUS AMMONIÆ AROMATICUS

Aromatic Spirit of Ammonia

Sp. Ammon. Arom.

Aromatic Spirit of Ammonia contains, in each 100 cc., not less than 1.7 Gm. and not more than 2.1 Gm. of total NH_3; and ammonium carbonate, corresponding to not less than 3.5 Gm. and not more than 4.5 Gm. as $(NH_4)_2CO_3$.

AMMONIUM CARBONATE, in translucent pieces	34 Gm.
AMMONIA WATER	90 cc.
OIL OF LEMON	10 cc.
OIL OF LAVENDER	1 cc.
OIL OF MYRISTICA	1 cc.
ALCOHOL	700 cc.
DISTILLED WATER, a sufficient quantity,	
To make	1000 cc.

Dissolve the ammonium carbonate in the ammonia water and 140 cc. of distilled water by gentle agitation, and allow the solution to stand for twelve hours. Dissolve the oils in the alcohol, contained in a 1000-cc. volumetric flask or cylinder, gradually add the ammonium carbonate solution, and enough distilled water to make the product

measure 1000 cc. Set it aside in a cool place for twenty-four hours, occasionally agitating the mixture, and then filter, using a covered funnel.

Description and physical properties—A nearly colorless liquid when freshly prepared, but gradually acquiring a yellow color on standing. It has the taste of ammonia, and an aromatic and pungent odor.

Specific gravity: about 0.90 at 25° C.

Assay for total ammonia—Measure accurately 10 cc. of Aromatic Spirit of Ammonia into a 200-cc. Erlenmeyer flask containing about 50 cc. of distilled water. Add 30 cc. of half-normal sulfuric acid, and boil until the solution becomes clear. Cool, and titrate the excess of acid with half-normal sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of half-normal sulfuric acid is equivalent to 0.008515 Gm. of NH_3.

Assay for normal ammonium carbonate—Pour another 10-cc. portion of the Spirit, accurately measured, into a flask of about 300-cc. capacity. Add about 30 cc. of half-normal sodium hydroxide, and boil the mixture, replacing the water lost by evaporation, until the vapors no longer turn moist red litmus paper blue. Cool, dilute with 100 cc. of cold, carbon dioxide-free distilled water, add about 6 drops of phenolphthalein T.S. and then half-normal sulfuric acid until the color of the phenolphthalein is just discharged. Now add about 3 drops of methyl orange T.S., and titrate with half-normal sulfuric acid. Each cc. of half-normal sulfuric acid, consumed in the titration with methyl orange T.S., is equivalent to 0.04804 Gm. of $(NH_4)_2CO_3$.

Storage—Preserve Aromatic Spirit of Ammonia in glass-stoppered bottles or in other kinds of glass bottles closed with stoppers not subject to attack by alkalies. The Spirit may also be preserved in ampuls. Store it in a cool place and protect it from light.

Alcohol content—From 62 to 68 per cent, by volume, of C_2H_5OH.

AVERAGE DOSE—Metric, 2 cc.—Apothecaries, 30 minims.

SPIRITUS CAMPHORÆ

Spirit of Camphor

Sp. Camph.

Spirit of Camphor is an alcoholic solution containing, in each 100 cc., not less than 9.5 Gm. and not more than 10.5 Gm. of camphor, at 25° C.

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.

Tests for purity—Specific gravity: from 0.824 to 0.826 at 25° C.

Add 0.05 Gm. of anhydrous potassium carbonate to 5 cc. of Spirit of Camphor: the potassium carbonate does not liquefy and does not adhere to the bottom of the vessel (*added water*).

Assay—Accurately measure 2 cc. of Spirit of Camphor into a 300-cc. Erlenmeyer flask, and add slowly, with constant shaking, 75 cc. of dinitrophenylhydrazine T.S. Connect the flask with a reflux condenser and heat on a water bath for four hours. Allow the mixture to cool, add 200 cc. of dilute sulfuric acid

(1 in 50), and set the mixture aside for twenty-four hours. Transfer the precipitate to a previously dried and weighed Gooch 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° C. The weight of the precipitate, multiplied by 0.458, equals the weight of camphor in 2 cc. of the Spirit of Camphor taken for the assay.

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

AVERAGE DOSE—Metric, 1 cc.—Apothecaries, 15 minims.

STRYCHNINÆ NITRAS

Strychnine Nitrate

Strych. Nitras

$C_{21}H_{22}O_2N_2.HNO_3$ Mol. wt. 397.20

The nitrate of an alkaloid obtained chiefly from nux vomica.

Description and physical properties—Colorless, glistening needles or a white, crystalline powder. It is odorless and is stable in the air.

Caution—Strychnine Nitrate is extremely poisonous.

One Gm. of Strychnine Nitrate is soluble in 45 cc. of water, in 150 cc. of alcohol, in 50 cc. of glycerin, and in 105 cc. of chloroform, at 25° C. One Gm. of it is soluble in 10 cc. of boiling water, and in 80 cc. of alcohol at 60° C. It is insoluble in ether.

Tests for identity—An aqueous solution of Strychnine Nitrate is lævorotatory, page 459.

Dissolve about 0.05 Gm. 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 chloroformic 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.

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.

Strychnine Nitrate, heated with hydrochloric acid, produces a bright red color.

Tests for purity—A solution of 0.5 Gm. of Strychnine Nitrate in 25 cc. of distilled water requires not more than 0.5 cc. of fiftieth-normal sodium hydroxide for neutralization, using one drop of methyl red T.S. as the indicator.

Ash: not more than 0.1 per cent, page 439.

The addition of 5 drops of silver nitrate T.S. to 20 cc. of an aqueous solution of Strychnine Nitrate (1 in 100), acidulated with 2 drops of diluted nitric acid, does not produce an opalescence at once (*chloride*), and no immediate turbidity is produced in 20 cc. of a similar solution by the addition of 5 drops of barium chloride T.S. (*sulfate*).

The solution produced by dissolving 0.1 Gm. of Strychnine Nitrate in 5 cc. of sulfuric acid has no more color than matching fluid L, described under the test for *carbonizable substances*, page 441.

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 (*brucine*).

Storage—Preserve Strychnine Nitrate in well-closed containers and protected from light.

AVERAGE DOSE—Metric, 0.002 Gm.—Apothecaries, 1/30 grain.

STRYCHNINÆ SULFAS

Strychnine Sulfate

Strych. Sulf.

$(C_{21}H_{22}O_2N_2)_2.H_2SO_4.5H_2O$ Mol. wt. 856.53

The sulfate of an alkaloid obtained chiefly from nux vomica.

Description and physical properties—Colorless or white crystals, or a white, crystalline powder. It is odorless and is efflorescent in dry air.

Caution—Strychnine Sulfate is extremely poisonous.

One Gm. of Strychnine Sulfate is soluble in 35 cc. of water, in 81 cc. of alcohol, and in 220 cc. of chloroform, at 25° C. One Gm. of it is soluble in 7 cc. of boiling water and in 26 cc. of alcohol at 60° C. It is freely soluble in glycerin but insoluble in ether.

Tests for identity—An aqueous solution of Strychnine Sulfate is lævorotatory, page 459.

Add a fragment of potassium dichromate to a solution of 0.1 Gm. of Strychnine Sulfate in 2 cc. of sulfuric acid. The mixture immediately assumes a deep blue color which changes to deep violet, then to purplish-red, cherry-red, and finally to orange or yellow.

Sulfuric Acid containing 1 per cent of ammonium vanadate produces with Strychnine Sulfate a deep violet-blue color, changing to a deep purple and finally to a cherry-red.

Barium chloride T.S. produces in an aqueous solution of Strychnine Sulfate (1 in 50) a white precipitate, which is insoluble in hydrochloric acid.

Tests for purity—A solution of 0.5 Gm. of Strychnine Sulfate in 20 cc. of distilled water requires not more than 0.5 cc. of fiftieth-normal sodium hydroxide for neutralization, using 1 drop of methyl red T.S. as the indicator.

When dried to constant weight at 100° C., Strychnine Sulfate loses not more than 11.5 per cent of its weight (*water*).

Ash: not more than 0.1 per cent, page 439.

The solution produced by dissolving 0.2 Gm. of Strychnine Sulfate in 5 cc. of sulfuric acid has no more color than matching fluid A, described under the test for *carbonizable substances*, page 441.

Add 1 cc. of a mixture of equal volumes of nitric acid and distilled water to about 0.1 Gm. of Strychnine Sulfate: the mixture may be yellow, but not red or reddish in color (*brucine*).

Storage—Preserve Strychnine Sulfate in well-closed containers and protected from light.

AVERAGE DOSE—Metric, 0.002 Gm.—Apothecaries, 1/30 grain.

SULFUR SUBLIMATUM

Sublimed Sulfur

Sulfur Sublim.—Flowers of Sulfur

Sublimed Sulfur, when dried to constant weight over sulfuric acid, contains not less than 99.5 per cent of S.

Description and physical properties—A fine, yellow, crystalline powder having a faint odor and taste.

Sublimed Sulfur is practically insoluble in water, and nearly insoluble in alcohol. One Gm. of it dissolves slowly and usually incompletely in about 2 cc. of carbon disulfide. One Gm. of Sublimed Sulfur is soluble in about 150 cc. of ether, and in 100 cc. of olive oil.

Tests for identity—Sublimed Sulfur burns in the air to sulfur dioxide, which can be recognized by its characteristic odor.

Tests for purity—The residue upon ignition does not exceed 0.5 per cent.

Assay—Dry about 1 Gm. of Sublimed Sulfur to constant weight over sulfuric acid, weigh accurately, and transfer it to a flask containing 50 cc. of an alcoholic solution of potassium hydroxide (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 dilute solution by the addition of solution of hydrogen peroxide in excess (using about 50 cc.), heat on a water bath for thirty minutes, acidulate 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 thirty minutes, collect the resulting precipitate, wash, dry, ignite, and weigh it. Carry out 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 sulfur. Each Gm. of Sublimed Sulfur, previously dried, is equivalent to not less than 7.281 Gm. of $BaSO_4$.

Preparation—Sulfur Lotum.

AVERAGE DOSE—Metric, 4 Gm.—Apothecaries, 1 drachm

SYRUPUS PRUNI VIRGINIANÆ

Syrup of Wild Cherry

Syr. Prun. Virg.

WILD CHERRY, in coarse powder	150 Gm.
SUCROSE	800 Gm.
GLYCERIN	50 cc.
ALCOHOL	20 cc.
DISTILLED WATER, a sufficient quantity, To make	1000 cc.

Mix the glycerin with 200 cc. of distilled water, moisten the wild cherry with 100 cc. of this mixture, pack it in a cylindrical percolator, and pour the remaining 150 cc. of menstruum upon it. When this has disappeared from the surface of the drug, add 200 cc. of distilled water to saturate the powder and leave a water stratum above it. Close the lower orifice, cover the percolator, and macerate the drug for one hour. Place the sucrose in a bottle graduated to 1000 cc., and having a capacity of about 2000 cc., adjust it as the receiving bottle, and after the macera-

tion allow the percolation to proceed rapidly. When all of the liquid has passed through the drug, add the alcohol to the percolate, and then enough additional distilled water through the drug in the percolator to make the combined sucrose and percolate measure 1000 cc. Stopper the bottle, and dissolve the sucrose by agitation without heat. Restore the volume by adding enough distilled water to make the product measure 1000 cc., and strain.

Syrup of Wild Cherry may also be made in the following manner:

Prepare a second percolator as described under *Syrupus*, page 371, place the sucrose in this percolator, arrange it below the percolator containing the drug, and after the drug has macerated, allow the percolate to drop on the sucrose, and collect the syrup in a bottle which has been graduated to 1000 cc., and in which the alcohol has been placed. Add distilled water to the drug, as necessary, to make the finished Syrup measure 1000 cc.

Alcohol content—From 1 to 2 per cent, by volume, of C_2H_5OH.

Storage—Preserve Syrup of Wild Cherry in well-closed containers, in a cool place and protected from light.

AVERAGE DOSE—Metric, 10 cc.—Apothecaries, 2½ fluidrachms.

SYRUPUS SARSAPARILLÆ COMPOSITUS

Compound Syrup of Sarsaparilla

Syr. Sarsap. Co.

FLUIDEXTRACT OF SARSAPARILLA	200	cc.
FLUIDEXTRACT OF GLYCYRRHIZA	15	cc.
OIL OF SASSAFRAS	0.2	cc.
OIL OF ANISE	0.2	cc.
METHYL SALICYLATE	0.2	cc.
ALCOHOL	19.4	cc.
SYRUP	765	cc.
To make about	1000	cc.

Mix the fluidextracts and add the alcohol, in which the methyl salicylate and the oils have been dissolved. Gradually add this solution to the syrup, and mix thoroughly.

Alcohol content—From 8.5 to 11 per cent, by volume, of C_2H_5OH.

AVERAGE DOSE—Metric, 15 cc.—Apothecaries, 4 fluidrachms.

TABELLÆ GLYCERYLIS TRINITRATIS

Tablets of Glyceryl Trinitrate

Tab. Glyceryl. Trinitrat.—Tablets of Nitroglycerin, Trinitrin Tablets

Tablets of Glyceryl Trinitrate contain not less than 80 per cent and not more than 112.5 per cent of the labeled amount of $C_3H_5(NO_3)_3$, including all tolerances.

Assay—Triturate in a mortar to a fine powder with 50 cc. of ether, a number of the Tablets sufficient to yield about 0.05 Gm. of glyceryl trinitrate. Decant the liquid into a stoppered flask and repeat the extraction four times, using 30 cc. of ether each time, then rinse the contents of the mortar into the flask with a stream of ether. Stopper the flask, shake it for fifteen minutes and filter through a filter paper, moistened with ether, into a beaker, washing the flask and filter with 50 cc. of ether. Cautiously evaporate the ether to about 5 cc. and transfer the residual liquid with the aid of a stream of ether into an 800-cc. Kjeldahl flask containing 100 cc. of distilled water. Add a mixture of 30 cc. of normal sodium hydroxide, 60 cc. of distilled water and 10 cc. of a 5 per cent aqueous solution of potassium permanganate, follow with 100 cc. of distilled water, mix well, allow to stand for thirty minutes, then heat on a water bath for thirty minutes. Cool well, add 3 Gm. of powdered Devarda's alloy, immediately stopper the flask with a stopper carrying a scrubber, and connected with a vertical condenser by means of a Kjeldahl connecting bulb and with a suitable receiver containing 50 cc. of fiftieth-normal sulfuric acid. Heat the flask with a low flame as long as hydrogen is evolved, then raise the flame and heat until about two-thirds of the contents of the flask has distilled. Titrate the excess of acid with fiftieth-normal sodium hydroxide, using methyl red T.S. as the indicator. Run a blank with the same quantities of the reagents and make the necessary correction. Each cc. of fiftieth-normal sulfuric acid is equivalent to 0.001514 Gm. of $C_3H_5(NO_3)_3$.

AVERAGE DOSE—An amount corresponding to, Metric, 0.0006 Gm.—Apothecaries, 1/100 grain of glyceryl trinitrate.

THEOBROMINA CUM SODII SALICYLATE

Theobromine with Sodium Salicylate

Theobrom. c. Sod. Salicyl.—Theobrominæ Sodio-Salicylas U. S. P. X, Theobromine Sodio-Salicylate

A mixture of sodium theobromine ($C_7H_7O_2N_4Na$) and sodium salicylate ($NaC_7H_5O_3$) in approximately molecular proportions. It yields, when dried to constant weight at 110° C., not less than 46.5 per cent of theobromine ($C_7H_8O_2N_4$) and not less than 35 per cent of salicylic acid ($HC_7H_5O_3$).

Description and physical properties—A white, odorless powder, having a sweetish, saline, 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.

One Gm. of Theobromine with Sodium Salicylate is soluble in 1 cc. of water, at 25° C. It is slightly soluble in alcohol.

Tests for identity—An aqueous solution of Theobromine with Sodium Salicylate (1 in 20) is strongly alkaline to litmus paper and to phenolphthalein T.S.

When ignited, Theobromine with Sodium Salicylate yields a residue which colors a non-luminous flame intensely yellow. This residue effervesces with acids.

An aqueous solution of Theobromine with Sodium Salicylate (1 in 100), slightly acidulated with acetic acid, is colored violet upon the addition of ferric chloride T.S.

To about 0.05 Gm. 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.

Tests for purity—Dry Theobromine with Sodium Salicylate to constant weight at 110° C.: the loss in weight does not exceed 10 per cent (*water*).

A freshly prepared aqueous solution of Theobromine with Sodium Salicylate (1 in 20) is colorless or nearly colorless and is clear or not more than opalescent.

Dissolve 0.2 Gm. of Theobromine with Sodium Salicylate in 5 cc. of sulfuric acid: no effervescence occurs (*carbonate*) and the solution has no more color than matching fluid A, described under the test for *carbonizable substances*, page 441.

Dissolve 1 Gm. of Theobromine with 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° C.: the weight of the residue so obtained does not exceed 0.005 Gm. (*caffeine*).

Assay for theobromine—Dissolve about 2 Gm. of Theobromine with Sodium Salicylate, previously dried to constant weight at 110° C. and accurately weighed, in 10 cc. of warm distilled water, and titrate the solution with normal hydrochloric acid, using phenolphthalein T.S. as the indicator: not more than 5.5 cc. of normal hydrochloric acid is required to neutralize 2 Gm. of the dried Theobromine with Sodium Salicylate. The solution should now be slightly 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° C. for three hours, stirring occasionally, transfer the precipitate of theobromine to a dried and weighed filter of 9 cm. diameter, wash the precipitate and filter with four successive portions of 5 cc. each of ice-cold distilled water, and dry to constant weight at 100° C. 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 with Sodium Salicylate taken for the assay.

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 four successive portions of 25, 15, 10 and 5 cc. each of chloroform. Pass the chloroformic 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 chloroformic solutions to about 5 cc. at a temperature not exceeding 40° C., add 25 cc. of diluted alcohol, which has been previously neutralized with tenth-normal sodium hydroxide, using 3 drops of phenolphthalein T.S. as the indicator, and titrate with tenth-normal barium hydroxide until the pink color is restored. Each cc. of tenth-normal barium hydroxide is equivalent to 0.01381 Gm. of salicylic acid ($HC_7H_5O_3$).

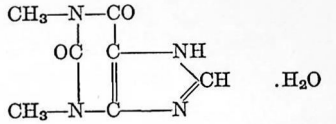
Storage—Preserve Theobromine with Sodium Salicylate in well-closed containers.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

THEOPHYLLINA

Theophylline

Theophyll.



$C_7H_8O_2N_4.H_2O$ Mol. wt. 198.11

Description and physical properties—A white, crystalline powder, without odor and having a bitter taste. It is stable in the air.

One Gm. of Theophylline is soluble in 120 cc. of water and in 80 cc. of alcohol, at 25° C. It is more readily soluble in hot water; sparingly soluble in ether. It is readily soluble in solutions of potassium hydroxide and in ammonia water.

Tests for identity—Theophylline melts between 269° and 272° C., page 455.

To about 0.01 Gm. of Theophylline, contained in a porcelain dish, add 1 cc. of hydrochloric acid and 0.1 Gm. of potassium chlorate, and evaporate to dryness on a water bath: on inverting the dish over a vessel containing a few drops of ammonia T.S., the residue acquires a purple color which is destroyed by fixed alkalies.

An aqueous solution of Theophylline yields with tannic acid T.S. a precipitate which is soluble in an excess of the reagent.

Tests for purity—A saturated, aqueous solution of Theophylline is neutral to litmus paper.

Theophylline loses not more than 9.5 per cent when dried to constant weight at 100° C. (*water*).

The ash from 0.1 Gm. of Theophylline is negligible.

The solution produced by dissolving 0.2 Gm. of Theophylline in 5 cc. of sulfuric acid has no more color than matching fluid A, described under the test for *carbonizable substances*, page 441.

A clear solution is produced when 0.2 Gm. of Theophylline is dissolved in 5 cc. of potassium hydroxide T.S. or in 5 cc. of ammonia T.S. (difference from *caffeine*, *theobromine*, or *paraxanthine*).

Preparations—Theophyllina cum Æthylenediamina, Theophyllina cum Sodii Acetate.

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

THEOPHYLLINA CUM ÆTHYLENEDIAMINA

Theophylline with Ethylene Diamine

Theophyll. c. Æthylenediam.—Aminophylline

Theophylline with Ethylene Diamine contains, when dried over sulfuric acid for forty-eight hours, not less than 75 per cent and not more than 85 per cent of anhydrous theophylline ($C_7H_8O_2N_4$).

Description and physical properties—White or slightly yellowish granules, possessing a slight ammoniacal odor and a bitter taste.

One Gm. of Theophylline with Ethylene Diamine is soluble in about 5 cc. of water, at 25° C.; insoluble in alcohol and in ether.

Tests for identity and purity—An aqueous solution of Theophylline with Ethylene Diamine is distinctly alkaline to litmus paper; on exposure to air it gradually absorbs carbon dioxide with the liberation of theophylline.

Dissolve about 0.5 Gm. of Theophylline with Ethylene Diamine in 25 cc. of distilled water, add with constant stirring 1 cc. of diluted hydrochloric acid, filter and wash the precipitate with small portions of cold distilled water. This precipitate, recrystallized from hot distilled water and dried at 100° C., melts between 269° and 272° C.

Place about 0.01 Gm. of the precipitate from the preceding test in a porcelain dish, add 1 cc. of hydrochloric acid and 0.1 Gm. of potassium chlorate, and evaporate the mixture to dryness on a water bath; on inverting the dish over ammonia T.S., the residue assumes a purple color, which is readily destroyed by fixed alkalies.

Dry about 1 Gm. of Theophylline with Ethylene Diamine, accurately weighed, in a desiccator over sulfuric acid for forty-eight hours; the loss in weight does not exceed 4.5 per cent.

Ash: not more than 0.1 per cent.

Assay for Theophylline—Dry about 2 Gm. of Theophylline with Ethylene Diamine for forty-eight hours over sulfuric acid and weigh accurately. Dissolve it in 25 cc. of distilled water, add a drop of methyl red T.S. and then add sufficient diluted hydrochloric acid, drop by drop, from a burette, with agitation, until the mixture is acid. Stir well and allow the mixture to stand in a refrigerator over night. Collect the precipitated theophylline in a tared Gooch crucible and wash the precipitate with two portions of 5 cc. each of cold distilled water, slightly acidulated with hydrochloric acid. Dry the crucible and contents to constant weight at 100° C. Evaporate the filtrate and washings to a volume of about 10 cc. and transfer to a separator with the aid of a little distilled water. Add 10 cc. of an aqueous solution of sodium hydroxide (1 in 10) and follow with 1 cc. of dimethyl sulfate. Shake the mixture thoroughly and set it aside for one hour with frequent shaking. If necessary add a few drops of sodium hydroxide from time to time, to maintain a distinct alkalinity of the solution. Now add 10 cc. of normal sodium hydroxide and shake the mixture for one minute. Extract the solution immediately with successive portions of 20, 10, 10 and 5 cc. each of chloroform. Collect the chloroformic extracts in a second separator and wash them with two, 10-cc. portions of 1 per cent hydrochloric acid. Evaporate the chloroform, dry the residue of caffeine thus obtained at 100° C. for one hour and weigh. Multiply the weight obtained by 0.9278 and add the product to the weight of theophylline previously obtained.

Storage—Preserve Theophylline with Ethylene Diamine in air-tight containers.

AVERAGE DOSE—Metric, 0.1 Gm.—Apothecaries, 1½ grains.

TINCTURA ACONITI

Tincture of Aconite

Tr. Aconit.—Tinctura Aconiti P.I.

Tincture of Aconite, when assayed by the method directed below, possesses a potency, per cubic centimeter, equivalent to not less than 0.140 milligram and not more than 0.160 milligram of reference aconitine.

ACONITE, in fine powder	100 Gm.
To make about	1000 cc.

Prepare a tincture by Process P as modified for assayed tinctures, page 390, using a mixture of 3 volumes of alcohol and 1 volume of distilled water as the menstruum. Macerate the drug during twenty-four hours, and then percolate it at a moderate rate. Immediately add sufficient hydrochloric acid to this percolate to produce a pH of 3 ± 0.2, page 576. 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 pH of 3 ± 0.2, page 576, so that the finished Tincture will conform to the above biological standard.

Assay—In this assay guinea pigs weighing from 250 Gm. to 350 Gm. may be used but they must be from a colony of guinea pigs kept under identical conditions, and 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 Tincture of Aconite 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 milligrams of the aconitine in each 100 cc., and adjust the pH of the solution, by the addition of hydrochloric acid, to 3 ± 0.2. This alcoholic solution may be preserved in sealed ampuls but such solutions must be checked for potency against freshly prepared solutions at least every six months and discarded if not of standard potency.

Dilute this solution of aconitine in 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 seven and not less than three animals of groups of ten animals, within six hours. If the respective mortalities from the reference standard and the preparation being assayed differ by not more than two animals the doses may be considered equivalent.

Note—Owing to many variable factors in the standardization of aconite, evidence of potency in all aconite assays to within 20 per cent above or 20 per cent below the standards, is acceptable.

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

AVERAGE DOSE—Metric, 0.6 cc.—Apothecaries, 10 minims.

TINCTURA FERRI CHLORIDI

Tincture of Ferric Chloride

Tr. Ferr. Chlor.—Tincture of Iron

A hydro-alcoholic solution containing, in each 100 cc., about 13 Gm. of $FeCl_3$, corresponding to not less than 4.5 Gm. of Fe.

SOLUTION OF FERRIC CHLORIDE	350 cc.
ALCOHOL, a sufficient quantity,	
To make	1000 cc.

Mix the solution with enough alcohol to make 1000 cc.

Description and physical properties—A bright, amber-colored liquid, having a slightly ethereal odor, a very astringent, styptic taste, and an acid reaction. Specific gravity: about 1.00 at 25° C.

Tests for identity—The Tincture responds to the tests for ferric iron, page 450, and for chloride, page 449.

After the Tincture has been exposed to daylight for some time, it yields a greenish or greenish-blue color with potassium ferricyanide T.S. (presence of some *ferrous salt*).

Tests for purity—Dilute 4 cc. of Tincture of Ferric Chloride 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 should not disappear within one minute (*nitrate*).

Assay—Transfer 5 cc. of Tincture of Ferric Chloride, 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. Titrate the solution with tenth-normal sodium thiosulfate, using starch T.S. as the indicator. Each cc. of tenth-normal sodium thiosulfate is equivalent to 0.005584 Gm. of Fe.

Alcohol content—From 58 to 64 per cent, by volume, of C_2H_5OH.

Storage—Preserve Tincture of Ferric Chloride in glass-stoppered bottles, in a cool place and protected from light.

AVERAGE DOSE—Metric, 0.6 cc.—Apothecaries, 10 minims.

TINCTURA NUCIS VOMICÆ

Tincture of Nux Vomica

Tr. Nuc. Vom.—Tinctura Strychni P.I.

Tincture of Nux Vomica yields, from 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.
To make about	1000 cc.

Prepare a tincture by Process P, as modified for assayed tinctures, page 390. Macerate the drug during twenty-four hours in a mixture of 7.5 cc. of hydrochloric acid, 150 cc. of alcohol and 42.5 cc. of distilled water; then percolate slowly, using a mixture of 3 volumes of alcohol and 1 volume of distilled water as the menstruum. Adjust the volume of the finished Tincture by the addition of sufficient of a mixture of 0.75 cc. of hydrochloric acid, 75 cc. of alcohol and 24.25 cc. of distilled water to make each 100 cc. contain 0.115 Gm. of strychnine. Cool the Tincture to a temperature of 5° C. for half an hour, and filter.

Assay—Accurately measure 100 cc. of Tincture of Nux Vomica and evaporate it at a temperature not exceeding 100° C., to a volume of about 20 cc., and transfer this liquid to a separator containing about 30 cc. of chloroform, using about 20 cc. of diluted alcohol to rinse the evaporated tincture from the container. Then add 20 cc. of distilled water and 5 cc. of ammonia T.S. and shake the mixture thoroughly for one minute. Draw off the separated chloroformic solution, and complete the extraction of the alkaloids from the alkaline liquid by shaking it with successive portions of chloroform. Combine the chloroformic solutions and extract the alkaloids completely by shaking it with successive portions of dilute sulfuric acid, using approximately a 10 per cent acid for the first portion and a weaker acid for the subsequent portions. Combine the acid washings, render the mixture alkaline by the addition of a slight excess of stronger ammonia T.S., and extract the alkaloids completely by shaking it with successive portions of chloroform. Complete the assay as directed under the *Assay* for *Nux Vomica* on page 56 of this Supplement, beginning in the first paragraph, with the words "Extract the combined chloroformic solution" etc. Each cc. of tenth-normal sulfuric acid is equivalent to 0.03342 Gm. of strychnine.

Alcohol content—From 67 to 72 per cent, by volume, of C_2H_5OH.

AVERAGE DOSE—Metric, 1 cc.—Apothecaries, 15 minims.

TINCTURA OPII CAMPHORATA

Camphorated Tincture of Opium

Tr. Opii Camph.—Paregoric, Tinctura opii benzoica P.I.

Camphorated Tincture of Opium yields, from each 100 cc., not less than 0.035 Gm. and not more than 0.045 Gm. of anhydrous morphine.

TINCTURE OF OPIUM	40 cc.
OIL OF ANISE	4 cc.
BENZOIC ACID	4 Gm.
CAMPHOR	4 Gm.
To make	1000 cc.

Dissolve the ingredients in 900 cc. of diluted alcohol, add 40 cc. of glycerin, and then sufficient diluted alcohol to make the product measure 1000 cc. Agitate the mixture and filter it.

Camphorated Tincture of Opium may also be prepared as follows:

POWDERED OPIUM	4.3 Gm.
OIL OF ANISE	3.8 cc.
BENZOIC ACID	3.8 Gm.
CAMPHOR	3.8 Gm.
To make	1000 cc.

Macerate the ingredients for five days, with occasional agitation, in a mixture of 900 cc. of diluted alcohol and 38 cc. of glycerin. Then filter and pass enough diluted alcohol through the filter to obtain 950 cc. of total filtrate. Assay a portion of this filtrate as directed below, and dilute the remainder with a sufficient quantity of diluted alcohol containing, in each 100 cc., 0.4 cc. of oil of anise, 0.4 Gm. of benzoic acid, 0.4 Gm. of camphor and 4 cc. of glycerin, to produce a Tincture containing, in each 100 cc., 0.04 Gm. of anhydrous morphine.

Assay—To 100 cc. of the Tincture add 2 cc. of approximately normal sulfuric acid, evaporate the mixture on a water bath to about 10 cc. and transfer the residue to a separator. Wash the evaporating dish with portions of about 10 cc. each of a mixture of equal volumes of normal sulfuric acid and distilled water, and add the washings to the separator. If necessary, wash the dish with several cc. of a mixture of 85 volumes of chloroform and 15 volumes of alcohol, adding these washings to the liquid in the separator. To this mixture add about 9 Gm. of sodium chloride, carefully neutralize to litmus paper by adding stronger ammonia water, and then add several drops of the ammonia water in excess. Now add 30 cc. of a mixture of 85 volumes of chloroform and 15 volumes of alcohol, shake the contents of the separator and allow the mixture to separate completely.

Transfer the immiscible solvent portion to a second separator and extract the remaining aqueous layer with successive portions of the chloroform-alcohol mixture until the last extraction gives a negative test for morphine with sulfuric acid formaldehyde T.S. Collect the extractions in the second separator. If more than four extractions are required, increase the quantities and volumes of all subsequent reagents so as to maintain the proportions here prescribed.

Dissolve 25 Gm. of sodium hydroxide in 1000 cc. of distilled water, saturate the solution with sodium chloride, filter, and add 15 cc. of this alkaline salt solution to the chloroform-alcohol extract just prepared. Remove the morphine by shaking with several successive portions of alkaline salt solution, collecting the latter in a separator. Wash the combined alkaline salt solutions with 10 cc. of chloroform and discard the chloroform. Exactly neutralize the alkaline salt solution to litmus paper by adding sufficient hydrochloric acid, and finally add a slight excess of acid. Cool the solution to 25° C. and shake it with 10 cc. of chloroform. Remove the chloroform to another separator and shake it with 5 cc. of saturated sodium chloride solution, to which a few drops of hydrochloric acid have been added. Discard the chloroform and add the acid salt solution to the combined salt solutions.

Add stronger ammonia T.S. to the combined salt solution until it is neutral to litmus paper, and then add a slight excess of ammonia. Cool the solution to 25° C. and immediately extract the alkaloids with successive portions of the chloroform-alcohol mixture. Filter each extraction into a container through purified cotton, wetted with the chloroform-alcohol mixture, and, when completely extracted, discard the liquid in the separator.

Evaporate the combined chloroformic solutions on a water bath to a volume between 1 cc. and 1.5 cc. Add 10 cc. of alcohol, neutral to methyl red T.S., to the residue, and warm the mixture to dissolve the alkaloids and to remove the last traces of chloroform. Add 1 drop of methyl red T.S. and then fiftieth-normal sulfuric acid until the solution is acid and with a few cc. in excess. *Guard against the presence of undissolved particles.* Cool, and add 15 to 20 cc. of recently boiled and cooled distilled water. Titrate the excess of acid with fiftieth-normal sodium hydroxide which is sufficiently free from carbonate to insure a sharp end point with methyl red T.S. as the indicator.

Each cc. of fiftieth-normal sulfuric acid is equivalent to 0.00570 Gm. of anhydrous morphine.

Alcohol content—From 43 to 46 per cent, by volume, of C_2H_5OH.

Preparation—Mistura Opii et Glycyrrhizæ Composita.

AVERAGE DOSE—Metric, 4 cc.—Apothecaries, 1 fluidrachm.

UNGUENTUM HYDRARGYRI FORTE

Strong Mercurial Ointment

Ung. Hydrarg. Fort.—Unguentum Hydrargyri Fortius U. S. P. X, Unguentum Hydrargyri

Strong Mercurial Ointment contains not less than 47.5 per cent and not more than 52.5 per cent of Hg.

MERCURY	500 Gm.
OLEATE OF MERCURY	20 Gm.
WOOL FAT	300 Gm.
WHITE WAX	50 Gm.
WHITE PETROLATUM	130 Gm.
To make about	1000 Gm.

Triturate the oleate of mercury in a warm mortar, with the mercury added gradually, and when all of the mercury is dispersed set the mixture aside for about fifteen minutes. Melt together the wool fat, white wax, and white petrolatum, allow the mixture to cool partially, add about 25 Gm. of it to the mercurial mixture, and continue the trituration until the globules of mercury are no longer visible under a lens magnifying ten diameters. Then add the remainder of the wool fat, white wax, and white petrolatum mixture, and mix thoroughly.

Assay—Mix about 1 Gm. of Strong Mercurial Ointment, accurately weighed, in a suitable flask with 20 cc. of distilled water and 20 cc. of nitric acid, and warm the mixture gently until red fumes cease to be evolved and the solution is colorless. Cool the mixture, add 100 cc. of distilled water, filter through a filter paper previously moistened with dilute nitric acid, washing the filter with warm distilled water. To the combined filtrate and washings add 2 cc. of ferric ammonium sulfate T.S., and titrate with tenth-normal ammonium thiocyanate. Each cc. of tenth-normal ammonium thiocyanate is equivalent to 0.01003 Gm. of Hg.

Preparation—Unguentum Hydrargyri Mite.

UNGUENTUM HYDRARGYRI MITE

Mild Mercurial Ointment

Ung. Hydrarg. Mit.—Diluted Mercurial Ointment, Blue Ointment, Unguentum hydrargyri P.I.

Mild Mercurial Ointment contains not less than 28 per cent and not more than 32 per cent of Hg.

Strong Mercurial Ointment	600 Gm.
White Wax	20 Gm.
White Petrolatum	380 Gm.
To make about	1000 Gm.

Melt the white wax in a suitable dish on a water bath, add the white petrolatum, and heat the mixture gently until it is liquefied. Discontinue the heat, stir the mixture until it congeals and then uniformly incorporate the strong mercurial ointment.

Assay—Proceed as directed under *Unguentum Hydrargyri Forte*, page 420.

UNGUENTUM IODI

Iodine Ointment

Ung. Iodi

Iodine Ointment contains not less than 6.5 per cent and not more than 7.5 per cent of total I.

Caution—During its manufacture and storage this Ointment must not come in contact with iron utensils or containers.

Iodine	4 Gm.
Potassium Iodide	4 Gm.
Glycerin	12 Gm.
Wool Fat	5 Gm.
Yellow Wax	5 Gm.
Petrolatum	70 Gm.
To make	100 Gm.

Dissolve the iodine and the potassium iodide in the glycerin, preferably in a glass mortar. Melt the yellow wax on a water bath, add the wool fat and the petrolatum, and heat the mixture gently until it is liquefied. Gradually incorporate this warm liquid with the iodine solution.

Assay—Tare a nickel or silver crucible containing about 2 Gm. of anhydrous potassium carbonate, add about 1 Gm. of Iodine Ointment and reweigh. Cover the Ointment with an additional 2 Gm. of potassium carbonate and heat on a water bath until the ointment is fluid. Heat the crucible and contents gently over a Bunsen flame, gradually increasing the temperature, but not exceeding a dull redness, until the ointment is completely carbonized. Extract the residue with boiling distilled water and wash on a filter until the last washing, acidified with nitric acid, yields no precipitate with silver nitrate T.S. Heat the combined filtrate and washings, which measure about 75 cc., on a water bath, and add potassium permanganate solution (1 in 20) until the hot liquid remains permanently pink. Add just enough alcohol to remove the pink tint, cool to 25° C., then add sufficient distilled water to make exactly 100 cc. Filter the mixture through a filter which has not been previously moistened, rejecting the first 25 cc. of filtrate. To 50 cc. of the subsequent clear filtrate add 10 cc. of potassium iodide T.S., acidify with diluted sulfuric acid and titrate with tenth-normal sodium thiosulfate. Each cc. of tenth-normal sodium thiosulfate is equivalent to 0.002115 Gm. of I.

UNGUENTUM ZINCI OXIDI

Zinc Oxide Ointment

Ung. Zinc. Oxid.—Zinc Ointment

Zinc Oxide Ointment contains not less than 18.5 per cent and not more than 21.5 per cent of ZnO.

Zinc Oxide, in very fine powder	20 Gm.
Liquid Petrolatum	10 Gm.
Wool Fat	5 Gm.
White Wax	5 Gm.
White Petrolatum	60 Gm.
To make	100 Gm.

Mix the wool fat and the liquid petrolatum, and thoroughly levigate the zinc oxide with this mixture. Melt together the white wax and white petrolatum, allow the mixture to cool until it becomes a soft mass, and then thoroughly incorporate the zinc oxide mixture.

Assay—Weigh accurately in a tared porcelain crucible about 2 Gm. of Zinc Oxide Ointment, heat it slowly 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 of a constant weight. Allow to cool and weigh: the residue attains a white or grayish-white appearance and the weight of the zinc oxide thus obtained corresponds to not less than 18.5 per cent and to not more than 21.5 per cent of the weight of Ointment taken for the assay.

ZINCI SULFAS

Zinc Sulfate

Zinc. Sulf.

$ZnSO_4.7H_2O$ Mol. wt. 287.55

Zinc Sulfate contains not less than 55.86 per cent and not more than 58.63 per cent of $ZnSO_4$, corresponding to not less than 99.5 per cent of the hydrated salt ($ZnSO_4.7H_2O$).

Description and physical properties—Colorless, transparent, prisms, or small needles. It may occur as a granular, crystalline powder. It is without odor, and has an astringent, metallic taste. It is efflorescent in dry air. One Gm. of Zinc Sulfate is soluble in 0.6 cc. of water and in 2.5 cc. of glycerin, at 25° C. It is insoluble in alcohol.

An aqueous solution of the salt (1 in 10) is acid to litmus paper.

Tests for identity—An aqueous solution of the salt responds to the tests for zinc, page 454, and for sulfate, page 453.

Tests for purity—A 10-cc. portion of an aqueous solution of Zinc Sulfate (1 in 50), acidulated with 1 cc. of diluted hydrochloric acid, meets the requirements of the test for *heavy metals*, page 447.

An aqueous solution of the salt meets the requirements of the test for *arsenic*, page 436.

An aqueous solution of Zinc Sulfate (1 in 20) is not colored pink by methyl orange T.S. (*free acid*).

Dissolve 2 Gm. of Zinc Sulfate 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 filter which has not been previously moistened, rejecting the first portion of the filtrate and collecting 100 cc. of the subsequent filtrate in a dry volumetric flask. Transfer the filtrate to an evaporating dish, add a few drops of sulfuric acid, evaporate to dryness, and ignite. The weight of the residue does not exceed 0.005 Gm. (*alkalies* or *alkali earths*).

Assay—Proceed as directed under *Zinci Acetas*, page 430, using about 1 Gm. of Zinc Sulfate.

The weight of zinc oxide obtained, multiplied by 1.984, indicates its equivalent in $ZnSO_4$. Each Gm. of Zinc Sulfate is equivalent to not less than 0.2815 Gm. and not more than 0.2955 Gm. of ZnO.

Storage—Preserve Zinc Sulfate in well-closed containers.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

GENERAL TESTS, PROCESSES AND APPARATUS

Under **"Reagents,"** page 488 of the U. S. P. XI, replace the article on **Sulfate in Reagents** with the following:

Sulfate in Reagents—A solution of the quantity of the reagent indicated in the test in 25 cc. of distilled water, or a solution prepared as directed in the test, is neutralized, if alkaline, with hydrochloric acid, using litmus paper as the indicator, and 1 cc. of normal hydrochloric acid is added. The solution is filtered, if necessary, through a filter paper previously washed with distilled water, and then 2 cc. of barium chloride T.S. added. After mixing well it is allowed to stand for ten minutes, and the turbidity, if any, is compared with that produced in a control test containing the same quantities of the same reagents used in the test and a quantity of a standard solution of potassium sulfate equivalent to the quantity of sulfate (SO_4) permitted in the test. Both solutions are adjusted to the same volume with distilled water before adding the barium chloride T.S. and the glass cylinders in which the turbidities are compared must match in internal diameter and in all other respects as closely as possible.

The *standard solution of potassium sulfate* is made by dissolving 0.1814 Gm. of potassium sulfate in sufficient distilled water to make 1000 cc. It contains the equivalent of 0.10 mg. of sulfate (SO_4) in each cc.

VITAMINS, ANTI-ANEMIA PRODUCTS, BIOLOGICAL AND OTHER ASSAY REFERENCE STANDARDS

Vitamins A and D Assays for Cod Liver Oil

Definitions—As used herein, unless the context otherwise indicates, the term *assayer* means the individual immediately responsible for the interpretation of the assay; the term *assay group* means a group of rats to which the assay oil shall be administered during the assay period; the term *assay oil* means a Cod Liver Oil under examination for its vitamin potency; the term *assay period for the Vitamin A assay* means the interval in the life of a rat between the last day of the depletion period and the twenty-ninth day thereafter or between the last day of the depletion period and the death of the rat; the term *assay period for the Vitamin D assay* means the interval in the life of a rat between the last day of the depletion period and the eighth day thereafter; the term *assemble* means the procedure by which rats are selected and assigned to groups for the purpose of feeding, care, and observation; the term *control group* means a group of rats receiving no Cod Liver Oil during the assay period; the term *daily*, for the Vitamin A assay, means six days of each week of the assay period; the term *daily*, for the Vitamin D assay, means each of the first six days of the assay period; the term *declining weight* means the condition of a rat when the body weight of the rat on any given day is equal to or less than the body weight of the rat on the seventh day prior to the given day; the term *depletion period* means the interval in the life of a rat between the last day of the preliminary period and the first day of the assay period; the term *dose* means the quantity of the

Reference Oil or of the assay oil to be fed daily to a rat during the assay period; the term *fed* means made readily available to the rat or administered to the rat by mouth; the term *ground gluten* means the clean, sound product made from wheat flour by the almost complete removal of starch, and contains not more than 10 per cent of moisture, and, calculated on the water-free basis, not less than 14.2 per cent of nitrogen, not less than 15 per cent of nitrogen-free extract (using the protein factor 5.7), and not more than 5.5 per cent of starch (as determined by the diastase method*); the term *group for the Vitamin A assays* means six or more rats maintained on the same required dietary regimen during the assay period; the term *group for the Vitamin D assay* means seven or more rats maintained on the same required dietary regimen during the assay period; the term *ophthalmia* means a pathological state of the eye and/or the conjuctiva and/or the tissues anatomically related to the eye, readily discernible macroscopically and usually associated with Vitamin A deficiency; the term *preliminary period* means the interval in the life of a rat between the seventh day after birth and the first day of the depletion period; the term *rachitogenic diet* means a uniform mixture of the food materials, and in the proportions named, in either of the following formulas:

Rachitogenic Diet No. 1		Rachitogenic Diet No. 2	
Whole Yellow Maize, ground	33 per cent	Whole Yellow Maize, ground.	76 per cent
Whole Wheat, ground	33 per cent	Ground Gluten	20 per cent
Ground Gluten	15 per cent	Calcium Carbonate ($CaCO_3$).	3 per cent
Gelatin	15 per cent	Sodium Chloride (NaCl)	1 per cent
Calcium Carbonate ($CaCO_3$)	3 per cent		
Sodium Chloride (NaCl)	1 per cent		

The term *Vitamin A test diet* means a food material consisting of the following proportions of the named ingredients of the quality specified:

Vitamin A Test Diet

Casein	18 per cent
Salt Mixture (see page 479)	4 per cent
Yeast, dried	8 per cent
Starch	65 per cent
Vegetable Oil	5 per cent
Vitamin D, a sufficient amount	

Not less than 3 U. S. P. Units of Vitamin D shall be provided in each gram of diet and this vitamin shall be carried by the yeast or the vegetable oil. The ingredients of the Vitamin A test diet shall be free from Vitamin A or shall have been treated so as to reduce the Vitamin A content to such a degree that when the Vitamin A test diet is fed to the control group two-thirds or more of the rats shall manifest, prior to the eleventh day of the assay period, symptoms of Vitamin A deficiency characterized by both declining weight and ophthalmia. The dried yeast shall carry the Vitamin B complex in such concentration that a daily dose of 0.15 Gm. shall permit an average gain in weight of at least 3 Gm. per week in rats during an interval of four weeks between the twenty-fifth and sixtieth days of age, when the rats are provided ad libitum with a ration which is adequate for optimal growth, except that the ration shall be devoid of the Vitamin B complex.

* Official and Tentative Methods of Analysis Association of Official Agricultural Chemists, fourth edition 1935, page 342, method II; page 483, method 48.

Salt Mixtures

For preparing the salt mixtures the available form of each chemical is taken to furnish the stipulated equivalent of each chemical.

Salt Mixture No. 1

Calcium Carbonate (U. S. P.)	134.8 Gm.
Magnesium Carbonate (U. S. P., 40 per cent MgO)	28.9 Gm.
Sodium Carbonate, anhydrous (U. S. P. Reagent)	34.2 Gm.
Potassium Carbonate (U. S. P., dried at 180° C.)	141.3 Gm.
Phosphoric Acid (U. S. P., 86.5 per cent)	119.3 Gm.
Hydrochloric Acid (U. S. P., 36 per cent)	148.3 Gm.
Sulfuric Acid (U. S. P., 96 per cent)	9.6 Gm.
Citric Acid (U. S. P.)	111.1 Gm.
Ferric Citrate (U. S. P. Reagent, 17.5 per cent Fe)	7.44 Gm.
Potassium Iodide (U. S. P)	0.020 Gm.
Manganese Sulfate (U. S. P. Reagent, $MnSO_4.4H_2O$)	0.117 Gm.
Sodium Fluoride (U. S. P. Reagent)	0.062 Gm.
Potassium Alum (U. S. P.)	0.044 Gm.

Dissolve the citric acid in a sufficient quantity of hot distilled water and add the solution to the mixed carbonates. Then add the potassium iodide, manganese sulfate, sodium fluoride and potassium alum, previously dissolved in distilled water. Then add the ferric citrate dissolved in the hydrochloric acid. Dilute the sulfuric acid with distilled water, add the phosphoric acid and add this acid mixture to the mixture previously prepared and stir until effervescence ceases. Evaporate the final mixture to dryness, in a current of air at from 90° to 100° C. and reduce the resulting product to a fine powder.

Salt Mixture No. 2

Sodium Chloride (U. S. P.)	1.73 Gm.
Magnesium Sulfate (U. S. P.)	5.45 Gm.
Sodium Biphosphate (U. S. P.)	3.47 Gm.
Potassium Phosphate (K_2HPO_4)	9.54 Gm.
Calcium Biphosphate [$CaH_4(PO_4)_2.H_2O$]	5.40 Gm.
Ferric Citrate (U. S. P. Reagent, 17.5 per cent Fe)	1.18 Gm.
Calcium Lactate (U. S. P.)	13 Gm.

Mix the finely powdered salts uniformly.

The assay of Cod Liver Oil for Vitamin A and Vitamin D potency shall be by comparison with the U. S. P. "Reference Cod Liver Oil," by assay procedures conforming in all respects to the following specifications:

Method of Assay for Vitamin A

The Vitamin A assay, comprising the recording of observations of groups of rats throughout specified periods of their lives, while being maintained on specified dietary regimens, and the interpretation of such data, is as follows:

Preliminary period—Throughout the preliminary period each rat shall be raised under the immediate supervision of, or according to directions specified by, the assayer. Throughout the preliminary period the rats shall be maintained on a dietary regimen which shall provide for normal development in all respects, except that the supply of

Vitamin A, or precursors of Vitamin A, shall be limited to such a degree that rats weighing between 40 and 50 Gm. and not exceeding twenty-eight days of age and subsisting on a suitable Vitamin A deficient ration and water for an interval not exceeding forty-five days shall manifest symptoms characteristic of Vitamin A deficiency.

Depletion period—A rat shall be suitable for the depletion period when the age of the rat does not exceed twenty-eight days, and if the body weight of the rat shall exceed 39 Gm., and does not exceed 50 Gm., and if the animal manifests no evidence of injury, or disease, or anatomical abnormality which might hinder growth and development. Throughout the depletion period each rat shall be provided with the Vitamin A test diet and distilled water ad libitum, and during this period no other dietary supplement shall be available to the animal.

Assembling rats into groups for the assay period—Rats which are suitable for the assay period shall be assembled into groups. For each assay oil there shall be one or more assay groups. In the assay of one assay oil there shall be provided at least one control group and at least one reference group, but one control group and one reference group may be used for the concurrent assay of more than one assay oil. The interval of assembling rats into groups shall not exceed sixty days. On any one day during the interval of assembling rats into groups, the total number of rats that shall have been assigned to make up any one group shall not exceed by more than two the number of rats that shall have been assigned to make up any other group. When the assembling of all groups shall have been completed, the total number of rats in each group shall be the same, and the number of rats of one sex in each group shall be the same. Not more than three rats from one litter shall be assigned to one group. When the assembling of all groups shall have been completed, the average weight of the rats in any one group on the day beginning the assay period shall not exceed by more than 10 Gm. the average weight of the rats in any other group on the day beginning the assay period.

Assay period—A rat shall be suitable for the assay period, provided that the depletion period shall have exceeded twenty-four days and shall not have exceeded forty-five days, and provided that a rat shall manifest evidence of Vitamin A deficiency characterized by declining weight and/or ophthalmia. Throughout the assay period each rat of the control, reference, and assay groups shall be kept in an individual cage and shall be provided with the Vitamin A test diet and distilled water, ad libitum. Throughout the assay period each rat in any assay group shall be fed daily a dose of the assay oil, and throughout the assay period each rat in any one reference group shall be fed daily a dose of the reference oil. The reference oil and/or the assay oil may be diluted before feeding with an edible vegetable oil free from Vitamin A. Diluted oil shall be stored in the dark at a temperature not exceeding 50° F. The period of storage shall not exceed seven days. Not more than 0.1 cc. of the diluted oil shall be fed as a daily dose. During the assay period all conditions of environment shall be maintained as uniformly as possible with respect to the assay, reference, and control groups.

Recording of data—On the day beginning the depletion period and at intervals of not more than seven days for the first twenty-one days of that period, there shall be a record made of the body weight of each rat. From the twenty-first day of the depletion period until the end of the assay period a record shall be made of the body weight and eye condition of each rat at intervals not exceeding five days. The eye

condition shall be designated as normal, watery, sensitive to light, swollen, bloody exudate, purulent, opacity of cornea, or any combination of these terms. A record shall be made of the failure of a rat to consume the prescribed daily dose of reference or assay oil.

Vitamin A potency of the assay oil—In determining the Vitamin A potency of the assay oil, the performance of the rats of the assay and reference groups shall be calculated for each group on the basis of the difference between the average weight of the surviving rats and the average weight of the same rats on the day beginning the assay period. The data from the reference group shall be considered valid for establishing the Vitamin A potency of the assay oil only when two-thirds or more of the total number of animals comprising a reference group shall have made individually between the beginning day of the assay period and the twenty-eighth day thereafter an increase in body weight which shall equal or exceed 12 Gm. and shall not exceed 60 Gm., and the data from an assay or reference group shall be considered valid for establishing the Vitamin A potency of the assay oil only when two-thirds or more, but not less than six, of the rats of an assay or reference group have survived twenty-eight days of the assay period. The data from an assay group shall be considered valid for establishing that an assay oil conforms with the U. S. Pharmacopœia standard for Vitamin A in cod liver oil only when two-thirds or more, but not less than six rats, shall have made individually between the beginning day of the assay period and the twenty-eighth day thereafter an increase in body weight which shall equal or exceed 12 grams. The data from a rat shall be considered valid for establishing the average performance of a reference or assay group only on the condition that the rat has consumed the prescribed dose of oil for at least twenty-two days of the assay period. A Vitamin A assay shall not be considered valid unless two-thirds or more of the total number of animals comprising the control group shall, prior to the eleventh day of the assay period, manifest symptoms of Vitamin A deficiency characterized by both declining weight and ophthalmia. The Vitamin A potency of the assay oil is then calculated according to the following procedure:

Let "R" equal the daily dose in milligrams of the reference oil necessary to produce in a reference group an average gain in weight, "G," of not less than 12 Gm. and not more than 60 Gm.

Let "A" equal the daily dose in milligrams of the assay oil that will produce in an assay group an average gain in weight equal to or greater than "G."

If the product of $\left[\frac{R}{A}\right] \times$ [units per gram of Vitamin A contained in the reference oil] is equal to or greater than 600, then the assay oil contains 600 or more units of Vitamin A per gram of oil and complies with the U. S. Pharmacopœial requirement for Vitamin A potency.

Method of Assay for Vitamin D

The Vitamin D assay, comprising the recording of observations of groups of rats, throughout specified periods of their lives, while being maintained on specified dietary regimens, and the interpretation of such data, is as follows:

Preliminary period—Throughout the preliminary period each rat shall be raised under the immediate supervision of, or according to directions specified by, the assayer. Throughout the preliminary period the rats shall be maintained on a dietary regimen

which shall provide for normal development in all respects, except that the supply of Vitamin D shall be limited to such a degree that rats, weighing between 40 and 60 Gm. at an age of twenty-one to twenty-eight days, and subsisting for an interval of three weeks on a suitable rachitogenic diet, shall manifest evidence of severe rickets.

Depletion period—A rat shall be suitable for the depletion period when the age of the rat does not exceed thirty days, and if the body weight of the rat shall exceed 44 Gm., and does not exceed 60 Gm., and if the animal manifests no evidence of injury, or disease, or anatomical abnormality which might hinder growth and development. Throughout the depletion period each rat shall be provided with the rachitogenic diet and distilled water ad libitum, and during this period no other dietary supplement shall be available to the animal.

Assembling rats into groups for the assay period—Rats which are suitable for the assay period shall be assembled into groups. For each assay oil there shall be one or more assay groups. In the assay of one assay oil there shall be provided at least one reference group, but one reference group may be used for the concurrent assay of more than one assay oil. The interval of assembling rats into groups shall not exceed sixty days. On any one day during the interval of assembling rats into groups, the total number of rats that shall have been assigned to make up any one group shall not exceed by more than two the number of rats that shall have been assigned to make up any other group. When the assembling of all groups shall have been completed, the total number of rats in each group shall be the same. Not more than three rats from one litter shall be assigned to the assay group unless an equal number of rats from the same litter are assigned to the reference group. When the assembling of all groups shall have been completed, the average weight of the rats in any one group on the day beginning the assay period shall not exceed by more than 8 Gm. the average weight of the rats in any other group on the day beginning the assay period.

Assay period—A rat shall be suitable for the assay period, provided that the depletion period shall have exceeded eighteen days and shall not have exceeded twenty-five days, and provided that a rat shall manifest evidence of rickets characterized by a distinctive, wabbly, rachitic gait and by enlarged joints. The presence of rickets may also be established by examination of a leg bone of one member of a litter by the "line test" described below. Each rat shall be kept in an individual cage and shall be provided with the rachitogenic diet and distilled water, ad libitum. On any calendar day of the assay period the assay and reference groups shall receive a rachitogenic diet compounded from the same lots of ingredients. Throughout the first six days of the assay period each rat in any one assay group shall be fed daily a dose of the assay oil, and throughout the first six days of the assay period each rat in any one reference group shall be fed daily a dose of the reference oil, except that the following deviation from the daily feeding shall be permissible: that the daily dose may be doubled on the day preceding a one-day holiday falling within the first eight days of the assay period. During the remainder of the assay period neither the assay oil nor the reference oil shall be fed. At the termination of the assay period, each rat shall be killed and one or more leg bones examined for healing of the rachitic metaphysis according to the "line test" described below. The reference oil and/or the assay oil may be diluted before feeding with an edible vegetable oil free from Vitamins A and D. The diluted oil shall be stored in the dark at a temperature not exceeding 50° F. and the duration of this storage shall not exceed thirty days. Not more than 0.1 cc. of the diluted oil shall be fed as a daily dose. During the assay period all conditions of environment (particularly with reference to physiologically active radiations) shall be maintained as uniformly as possible with respect to the assay and reference groups.

Line test—The line test shall be made on the proximal end of a tibia or distal end of a radius or ulna. The end of the desired bone is removed from the animal and cleaned of adhering tissue. A longitudinal median section shall be made through the end of the bone with a clean, sharp blade to expose a plane surface through the junction of the epiphysis and diaphysis. In any one assay the same bone of all the animals must be used and sectioned through the same plane. Both sections of the bone shall be rinsed in distilled water and shall then immediately be immersed in a 2 per cent aqueous solution of silver nitrate for one minute. The sections shall then be rinsed in distilled water and the sectioned surfaces of the bone shall be exposed in water to daylight or other source of actinic light until the calcified areas have developed a clearly defined stain without marked discoloration of the uncalcified areas. Records shall be made immediately of the extent and degree of calcification of the rachitic metaphysis of every section. It shall be permissible to use modifications of the described procedure for staining, provided that such modified procedures clearly differentiate between calcified and uncalcified areas.

Recording of data—On the day beginning the assay period and on the seventh day thereafter, a record shall be made of the body weight of each rat. A record shall be made of the quantity of rachitogenic diet consumed per rat per diem during the assay period. Numerical values shall be assigned to the extent and degree of calcification of the rachitic metaphysis of the bones examined by the line test so that it will be possible to average the performance of each group.

Vitamin D potency of the assay oil—In determining the Vitamin D potency of the assay oil, the average performance of groups with respect to healing of the rachitic metaphysis shall be considered, provided that the average performance of a reference group with respect to calcification of the rachitic metaphysis shall be determined by the data from rats which individually show an extent and degree of calcification in the rachitic metaphysis as determined by the line test equal to or greater than a condition described as a positive macroscopic evidence of calcification, but less than an extent and degree of calcification described as complete healing. The data from a reference group shall be considered valid for establishing the Vitamin D potency of the assay oil only when two-thirds or more, but not less than seven rats, show individually an extent and degree of calcification of the rachitic metaphysis equal to or greater than a condition described as positive macroscopic evidence of calcification, but less than an extent and degree of calcification described as complete healing. The data from an assay group shall be considered valid for establishing that an assay oil conforms with the U. S. Pharmacopœia standard for Vitamin D in cod liver oil only when two-thirds or more, but not less than seven rats, show individually an extent and degree of calcification of the rachitic metaphysis equal to or greater than a condition described as positive macroscopic evidence of calcification. The data from a rat shall be considered valid for establishing the average performance of a

group only on the condition that the weight of the rat at the termination of the assay period, shall equal or exceed the weight of the rat on the beginning day of the assay period and that the rat has consumed 2 Gm. or more of the rachitogenic diet on each day of the assay period and 28 Gm. or more of the rachitogenic diet during the assay period and on the condition that the rat has consumed each prescribed dose of cod liver oil within twenty-four hours from the time it was fed. The Vitamin D potency of the assay oil is then calculated according to the following procedure.

Let "R" equal the daily dose in milligrams of the reference oil necessary to produce in a reference group an average extent and degree of calcification "C" not less than a condition described as a narrow continuous line of calcification but less than an extent and degree of calcification described as complete healing.

Let "A" equal the daily dose in milligrams of the assay oil that will produce in an assay group an average extent and degree of calcification equal to or greater than "C."

If the product of $\left[\frac{R}{A}\right] \times$ [units per gram of Vitamin D, contained in the reference oil] is equal to or greater than 85, then the assay oil contains in each gram 85 or more units of Vitamin D and complies with the U. S. Pharmacopœial requirement for Vitamin D potency.

Under **"Vegetable Drugs, Methods for Sampling and Analysis,"** page 475 of the U. S. P. XI, replace the corresponding tests, xvii and xviii, with the following:

Diluted Alcohol-soluble Extractive.

XVII. Macerate about 2 Gm. of the prepared drug (paragraph VI), accurately weighed, in about 70 cc. of diluted alcohol in a suitable flask. Shake the mixture during eight hours at thirty minute intervals and then allow it to stand for sixteen 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° C. Calculate the percentage of anhydrous extractive from the weight of drug taken.

Water-soluble Extractive.

XVIII. Proceed as directed under paragraph XVII, using distilled water instead of diluted alcohol.

INDEX

TO THE U.S.P. XI FIRST SUPPLEMENT

	PAGE
Acetate, Ammonium, Solution, Assay	45
Acetophenetidin	13
Acetophenetidinum	13
Acetphenetidinum	13
Acid, Citric	14
Oleic	15
Sulfate, Quinine	66
Acidum Citricum	14
Oleicum	15
Aconite	15
Assay	16
Root	15
Tincture	82
Tincture, Assay	83
Aconiti tuber P. I	15
Aconitum	15
Napellus	15
Acriflavina	16
Acriflavine	16
Base	16
Neutral	16
Activated Charcoal	23
Alcohol-Soluble Extractive, Diluted	98
Aminophylline	81
Ammonia, Aromatic Spirit	73
Aromatic Spirit, Assay	74
Ammonium Acetate Solution	44
Acetate Solution, Assay	45
Analysis and Sampling, Vegetable Drugs	98
Anti-anemia Products	91
Products Advisory Board	8
Apparatus	91
Aqua	17
Destillata	18
Aromatic Spirit Ammonia	73
Spirit Ammonia, Assay	74
Assay, Aconite	16
Aromatic Spirit Ammonia	74
Belladonna, Pilular Extract	33
Belladonna, Powdered Extract	33
Bismuth Subgallate	20
Blue Mass	50
Blue Pill	50
Calcium Bromide	21
Camphorated Tincture Opium	86
Chloramine-T	26
Chloroform Liniment	44
Citric Acid	15
Cod Liver Oil	57, 91
Codeine Phosphate	27
Colchicum Seed	28
Diluted Erythrityl Tetranitrate	32
Diluted Solution Sodium Hypochlorite	48
Ephedrine Sulfate	31
Extract Nux Vomica	35
Flowers Sulfur	77
Gum Opium	58
Hyoscyamus, Pilular Extract	34
Assay, Hyoscyamus, Powdered Extract	34
Iodine Ointment	88
Magnesia Magma	49
Magnesia, Milk	49
Mass, Blue	50
Mass, Mercury	50
Mercury with Chalk	42
Methylene Blue	52
Methylthionine Chloride	52
Mild Mercurial Ointment	88
Milk Magnesia	49
Nitrogen Monoxide	54
Nitrous Oxide	54
Nux Vomica	55
Opium	58
Oxygen	60
Pilular Extract Belladonna	33
Pilular Extract Hyoscyamus	34
Pilular Extract Stramonium	36
Powdered Extract Belladonna	33
Powdered Extract Hyoscyamus	34
Powdered Extract Stramonium	36
Potassium Citrate	64
Precipitated Calcium Carbonate	22
Quinine and Urea Hydrochloride	69
Reference Standards	91
Soluble Iodophthalein	43
Solution Ammonium Acetate	45
Solution Posterior Pituitary	46
Solution Sodium Hypochlorite	47
Spirit Camphor	74
Stramonium, Pilular Extract	36
Stramonium, Powdered Extract	36
Strong Mercurial Ointment	87
Sublimed Sulfur	77
Tablets Glyceryl Trinitrate	79
Theobromine with Sodium Salicylate	80
Theophylline with Ethylene Diamine	82
Tincture Aconite	83
Tincture Ferric Chloride	84
Tincture Nux Vomica	84
Vitamin A, Cod Liver Oil	93
Vitamin D, Cod Liver Oil	95
Zinc Oxide Ointment	89
Zinc Sulfate	90
Assays, Vitamins A and D, Cod Liver Oil	91
Atropinæ Sulfas	18
Atropine Sulfate	18
Auxiliary Commissions, U. S. P	8
Base, Acriflavine	16
Basic Bismuth Gallate	19
Belladonna Extract	33
Extract, Pilular	33
Extract, Pilular, Assay	33
Extract, Powdered	33
Extract, Powdered, Assay	33

	PAGE
Benzosulfinidum	71
Biological Assays Sub-Committee	7
Products and Diagnostic Tests Sub-Committee	7
Standards	91
Bismuth Gallate, Basic	19
Subgallate	19
Subgallate, Assay	20
Bismuthi Subgallas	19
Bisulfate, Quinine	66
Blue Mass	50
Mass, Assay	50
Methylene	51
Methylene, Assay	52
Ointment	87
Pill	50
Pill, Assay	50
Board of Trustees	5
Botany and Pharmacognosy Sub-Committee	7
Bromdiethylacetylurea	25
Bromide, Calcium	20
Calcium, Assay	21
Calcii Bromidum	20
Carbonas Præcipitatus	21
Calcium Bromide	20
Bromide, Assay	21
Carbonate, Precipitated	21
Carbonate, Precipitated, Assay	22
Camphor	22
Natural	22
Spirit	74
Spirit, Assay	74
Synthetic	22
Camphora	22
Camphorated Tincture Opium	85
Tincture Opium, Assay	86
Carbo Activatus	23
Ligni	23
Carbonate, Calcium, Precipitated	21
Carbonate, Precipitated, Assay	22
Carbromal	25
Carbromalum	25
Cerates, Ointments, Miscellaneous Galenicals Sub-Committee	7
Chalk, Mercury with	41
Mercury with, Assay	42
Precipitated	21
Charcoal, Activated	23
Cherry, Wild, Syrup	77
Chloramina	25
Chloramina-T	25
Chloramine	25
Chloramine-T	25
Assay	26
Chloride, Ferric, Tincture	83
Ferric, Tincture, Assay	84
Methylthionine	51
Methylthionine, Assay	52
Chloroform Liniment	44
Liniment, Assay	44
Cinnamomum Camphora	22
Citrate, Potassium	64
Potassium, Assay	64
Citric Acid	14
Citric Acid, Assay	15
Cod Liver Oil	56
Liver Oil, Assay	57, 91
Liver Oil, Vitamins A and D Assays	91
Codeina	26
Codeinæ Phosphas	27
Codeine	26
Phosphate	27
Phosphate, Assay	27
Colchici Semen	28
semen P. I	28
Colchicum autumnale, Seed	28
Seed, Assay	28
Colophony	70
Committee of Revision, Executive	7
of Revision, General	5
Compound Syrup Sarsaparilla	78
Corrections and Supplements	9
Dakin's Solution, Modified	47
Dermatol	19
Deterioration and Storage Committee	8
Dextrose	29
Dextrosum	29
d-Glucose	29
Diamine, Ethylene, with Theophylline	81
Ethylene, with Theophylline, Assay	82
Dihydrochloride, Quinine	67
Diluted Alcohol-Soluble Extractive	98
Erythrityl Tetranitrate	32
Erythrityl Tetranitrate, Assay	32
Erythrol Tetranitrate	32
Mercurial Ointment	87
Solution Sodium Hypochlorite	47
Solution Sodium Hypochlorite, Assay	48
Tetranitrol	32
Distilled Water	11, 18
Divided Percolation	39
Drugs, Vegetable, Sampling and Analysis	98
Emetinæ Hydrochloridum	30
Emetine Hydrochloride	30
Ephedrinæ Sulfas	31
Ephedrine Sulfate	31
Sulfate, Assay	31
Erythrityl Tetranitrate, Diluted	32
Tetranitrate, Diluted, Assay	32
Tetranitrate, Tablets	32
Erythritylis Tetranitras Dilutus	32
Erythrol Tetranitrate, Diluted	32
Eserine Salicylate	61
Ethylene Diamine with Theophylline	81
Diamine with Theophylline, Assay	82
Executive Committee of Revision	7
Extending Pharmacopœial Information, Committee	8
Extract, Belladonna	33
Belladonna, Pilular	33
Belladonna, Pilular, Assay	33
Belladonna, Powdered	33
Belladonna, Powdered, Assay	33
Henbane	34
Hyoscyamus	34

	PAGE
Extract, Hyoscyamus, Pilular	34
Hyoscyamus, Pilular, Assay	34
Hyoscyamus, Powdered	34
Hyoscyamus, Powdered, Assay	35
Nux Vomica	35
Nux Vomica, Assay	35
Nux Vomica, Powdered	36
Stramonium	36
Stramonium, Pilular	36
Stramonium, Pilular, Assay	36
Stramonium, Powdered	36
Stramonium, Powdered, Assay	98
Extractive, Diluted Alcohol-Soluble	98
Water-Soluble	37
Extracts, Fluid	7
Fluidextracts and Tinctures, Sub-Committee	33
Extractum Belladonnæ	33
Belladonnæ Foliorum	33
Belladonnæ P. I	34
Hyoscyami	34
Hyoscyami P. I	35
Nucis Vomicæ	36
Stramonii	35
Strychni P. I	83
Ferric Chloride Tincture	84
Chloride Tincture, Assay	76
Flowers, Sulfur	77
Sulfur, Assay	37
Fluid Extracts	37
Fluidextracta	37
Fluidextracts	37
Process A	38
Process B	39
Process C	40
Process D	40
Storage	39
Fractional Percolation	10
Future Revision	57
Gadus morrhua	19
Gallate, Bismuth, Basic	5
General Committee of Revision	11
Notices	91
Tests	91
Tests, Processes and Apparatus	71
Gluside	71
Glusidum	40
Glycerin	40
Glycerinum	40
Glycerol	79
Glyceryl Trinitrate Tablets	79
Trinitrate Tablets, Assay	41
Gray Powder	58
Gum Opium	58
Opium, Assay	34
Henbane, Extract	41
Hydrargyrum cum Creta	30
Hydrochloride Emetine	68
Quinine and Urea	69
Quinine and Urea, Assay	68
Urea and Quinine	34
Hyoscyamus, Extract	34
Extract, Pilular	34
Extract, Pilular, Assay	34
Extract, Powdered	34
Extract, Powdered, Assay	47
Hypochlorite, Sodium, Solution	47
Sodium, Solution, Assay	47
Sodium, Solution, Diluted	48
Sodium, Solution, Diluted, Assay	63
Hypophysis Sicca	7
Inorganic Chemicals, Sub-Committee	88
Iodine Ointment	88
Ointment, Assay	42
Iodophthalein, Soluble	43
Soluble, Assay	42
Iodophthaleinum Solubile	83
Iron, Tincture	44
Liniment, Chloroform	44
Chloroform, Assay	44
Linimentum Chloroformi	44
Liquor Ammonii Acetatis	45
Pituitarii	45
Pituitarii Posterioris	47
Sodæ Chlorinatæ Chirurgicalis	47
Sodii Hypochloritis	47
Sodii Hypochloritis Dilutus	48
Magma Magnesiæ	49
Magnesia, Assay	48
Magnesia Magma	49
Magma, Assay	48
Milk	50
Mass, Blue	50
Mercury	50
Mercury, Assay	50
Massa Hydrargyri	50
Menthol	87
Mercurial Ointment, Diluted	87
Ointment, Mild	88
Ointment, Mild, Assay	87
Ointment, Strong	87
Ointment, Strong, Assay	50
Mercury, Mass	50
Mass, Assay	41
with Chalk	42
with Chalk, Assay	51
Methylene Blue	52
Blue, Assay	51
Methylthioninæ Chloridum	51
Methylthionine Chloride	52
Chloride, Assay	87
Mild Mercurial Ointment	88
Mercurial Ointment, Assay	48
Milk, Magnesia	49
Magnesia, Assay	47
Modified Dakin's Solution	15
Monkshood	53
Monoxide, Nitrogen	54
Nitrogen, Assay	52
Morphinæ Sulfas	52
Morphine Sulfate	

	PAGE
Natural Camphor	22
Neutral Acriflavine	16
Nitrate, Pilocarpine	62
Strychnine	75
Nitrogen Monoxide	53
Monoxide, Assay	54
Nitrogenii Monoxidum	53
Nitrous Oxide	53
Oxide, Assay	54
Nitroglycerin Tablets	79
Nomenclature Sub-Committee	8
Notices, General	11
Nux Vomica	55
Assay	55
Extract	35
Extract, Assay	35
Extract, Powdered	35
Tincture	84
Tincture, Assay	84
Officers, U. S. P. Convention	5
Oil, Cod Liver	56
Cod Liver, Assay	57, 91
Cod Liver, Vitamins A and D Assays	91
Ointment, Blue	87
Iodine	88
Iodine, Assay	88
Mercurial, Diluted	87
Mercurial, Mild	87
Mercurial, Mild, Assay	88
Mercurial, Strong	87
Mercurial, Strong, Assay	87
Zinc	89
Zinc Oxide	89
Zinc Oxide, Assay	89
Oleic Acid	15
Oleum Morrhuæ	56
Opium	58
Assay	58
Camphorated Tincture	85
Camphorated Tincture, Assay	86
Gum	58
Tincture, Camphorated	85
Organic Chemicals Sub-Committee	7
Ortho-sulfo-benzimide	71
Oxide, Nitrous	53
Nitrous, Assay	54
Zinc, Ointment	89
Zinc, Ointment, Assay	89
Oxygen	59
Assay	60
Oxygenium	59
Page Number References	11
Papaver album	58
somniferum	58
Paraacetaminophenetol	13
Paracetaldehyde	60
Paraldehyde	60
Paraldehydum	60
Paregoric	85
Percolation, Divided	39
Fractional	39
Phenacetin	13
Phosphate, Codeine	27
Phosphate, Codeine, Assay	27
Physico-Chemical Tests, Committee	8
Physostigminæ Salicylas	61
Physostigmine Salicylate	61
Pill, Blue	50
Blue, Assay	50
Pilocarpinæ Nitras	62
Pilocarpine Nitrate	62
Pilocarpus Jaborandi	62
microphyllus	62
Pilular Extract Belladonna	33
Extract Belladona, Assay	33
Extract Hyoscyamus	34
Extract Hyoscyamus, Assay	34
Extract Stramonium	36
Extract Stramonium, Assay	36
Pinus palustris	70
Pituitarium	63
Posterius	63
Pituitary	63
Posterior	63
Posterior, Powdered, Standard	46
Posterior, Solution, Assay	46
Solution	45
Posterior Pituitary	63
Pituitary, Powdered, Standard	46
Pituitary Solution	45
Pituitary Solution, Assay	46
Potassii Citras	64
Potassium Citrate	64
Citrate, Assay	64
Powder, Gray	41
Powdered Extract Belladonna	33
Extract Belladonna, Assay	33
Extract Hyoscyamus	34
Extract Hyoscyamus, Assay	34
Extract Nux Vomica	35
Extract Stramonium	36
Extract Stramonium, Assay	36
Posterior Pituitary, Standard	46
Precipitated Calcium Carbonate	21
Calcium Carbonate, Assay	22
Chalk	21
Preface	9
Process A, Fluidextracts	37
B, Fluidextracts	38
C, Fluidextracts	39
D, Fluidextracts	40
Processes	91
Products Anti-anemia	91
Proximate Assays, Sub-Committee	7
Quinidinæ Sulfas	65
Quinidine Sulfate	65
Quinina	66
Quininæ Bisulfas	66
Dihydrochloridum	67
et Ureæ Hydrochloridum	68
Sulfas	69
Quinine	66
Acid Sulfate	66
and Urea Hydrochloride	68
and Urea Hydrochloride, Assay	69
Bisulfate	66
Dihydrochloride	67
Sulfate	69

	PAGE
Reagents and Test Solutions Sub-Committee	7
Sulfate in	91
Resina	70
Rheum	70
officinale	70
palmatum	70
rhaponticum	70
Rhubarb	70
Root, Aconite	15
Rosin	70
Saccharin	71
Saccharinum	71
Salicylate, Eserine	61
Physostigmine	61
Sodium, with Theobromine	79
Sodium, with Theobromine, Assay	80
Sampling and Analysis, Vegetable Drugs	98
Santonin	72
Santoninum	72
Sarsaparilla Syrup, Compound	78
Scope Sub-Committee (Admissions and Deletions)	7
Seed, Colchicum	28
Colchicum, Assay	28
Sodio-Salicylate, Theobromine	79
Sodium Hypochlorite, Solution	47
Hypochlorite Solution, Assay	47
Hypochlorite Solution, Diluted	47
Hypochlorite Solution, Diluted, Assay	48
Salicylate with Theobromine	79
Salicylate with Theobromine, Assay	80
Tetiothalein	42
Tetraiodophenolphthalein	42
Tetraiodophthalein	42
Soluble Iodophthalein	42
Iodophthalein, Assay	43
Solution Ammonium Acetate	44
Ammonium Acetate, Assay	45
Dakin's, Modified	47
Pituitary	45
Posterior Pituitary	45
Posterior Pituitary, Assay	46
Sodium Hypochlorite	47
Sodium Hypochlorite, Assay	47
Sodium Hypochlorite, Diluted	47
Sodium Hypochlorite, Diluted, Assay	48
Spirit, Ammonia, Aromatic	73
Ammonia, Aromatic, Assay	74
Camphor	74
Camphor, Assay	74
Spiritus Ammoniæ Aromaticus	73
Camphoræ	74
Standard Powdered Posterior Pituitary	46
Standards, Assay Reference	91
Biological	91
Storage, Fluidextracts	40
Stramonium Extract	36
Extract, Pilular	36
Extract, Pilular, Assay	36
Extract, Powdered	36
Extract, Powdered, Assay	36
Strong Mercurial Ointment	87
Mercurial Ointment, Assay	87
Strychni semen P. I	55
Strychninæ Nitras	75
Sulfas	76
Strychnine Nitrate	75
Sulfate	76
Strychnos Nux-vomica	55
Sub-Committee, Biological Assays	7
Biological Products and Diagnostic Tests	7
Botany and Pharmacognosy	7
Cerates, Ointments, Miscellaneous Galenicals	7
Extracts, Fluidextracts and Tinctures	7
Inorganic Chemicals	7
Nomenclature	8
Organic Chemicals	7
Proximate Assays	7
Reagents and Test Solutions	7
Scope (Admissions and Deletions)	8
Tables, Weights and Measures	7
Therapeutics and Pharmacodynamics	7
Volatile Oils	7
Waters, Solutions, Spirits, etc	7
Sub-Committees	19
Subgallate, Bismuth	20
Bismuth, Assay	76
Sublimed Sulfur	77
Sulfur, Assay	18
Sulfate, Atropine	31
Ephedrine	31
Ephedrine, Assay	91
in Reagents	52
Morphine	65
Quinidine	69
Quinine	66
Quinine, Acid	76
Strychnine	89
Zinc	90
Zinc, Assay	76
Sulfur, Flowers	77
Flowers, Assay	76
Sublimatum	76
Sublimed	77
Sublimed, Assay	9
Supplement, 1937	9
Supplements and Corrections	22
Synthetic Camphor	78
Syrup Sarsaparilla, Compound	77
Wild Cherry	77
Syrupus Pruni Virginianæ	78
Sarsaparillæ Compositus	79
Tabellæ Glycerylis Trinitratis	8
Tables, Weights and Measures, Sub-Committee	32
Tablets, Erythrityl Tetranitrate	79
Tablets, Glyceryl Trinitrate	79
Glyceryl Trinitrate, Assay	79
Nitroglycerin	79
Trinitrin	91
Tests, General	42
Tetiothalein Sodium	

	PAGE
Tetraiodophenolphthalein Sodium	42
Tetraiodophthalein Sodium	42
Tetranitrate, Erythrityl, Diluted	32
Erythrityl, Diluted, Assay	32
Erythrol, Diluted	32
Tetranitrol, Diluted	32
Theobromina cum Sodii Salicylate	79
Theobrominæ Sodio-Salicylas	79
Theobromine Sodio-Salicylate	79
with Sodium Salicylate	79
with Sodium Salicylate, Assay	80
Theophyllina	81
cum Ethylenediamina	81
Theophylline	81
with Ethylene Diamine	81
with Ethylene Diamine, Assay	82
Therapeutics and Pharmacodynamics Sub-Committee	7
Tinctura Aconiti	82
Aconiti P. I.	82
Ferri Chloridi	83
Nucis Vomicæ	84
opii benzoica P. I.	85
Opii Camphorata	85
Strychni P. I.	84
Tincture, Aconite	82
Aconite, Assay	83
Ferric Chloride	83
Ferric Chloride, Assay	84
Iron	83
Iron, Assay	84
Nux Vomica	84
Nux Vomica, Assay	84
Opium, Camphorated	85
Opium, Camphorated, Assay	86
Trinitrate, Glyceryl, Tablets	79
Glyceryl, Tablets, Assay	79
Trinitrin Tablets	79
U. S. P. XI, 1937 Supplement	9
Unguentum Hydrargyri	87
Hydrargyri Forte	87
Hydrargyri Fortius	87
Hydrargyri Mite	87
hydrargyri P. I.	87
Iodi	88
Zinci Oxidi	89
Urea and Quinine Hydrochloride	68
and Quinine Hydrochloride, Assay	69
Vegetable Drugs, Sampling and Analyses	98
Vitamin A, Assay, Cod Liver Oil	93
D, Assay, Cod Liver Oil	95
Advisory Board	8
Vitamins	91
A and D Assays, Cod Liver Oil	91
Volatile Oils Sub-Committee	7
Water	17
Distilled	11, 18
for Manufacture	11
-Soluble Extractive	98
Waters, Solutions, Spirits, Syrups, Elixirs Sub-Committee	7
Wild Cherry, Syrup	77
Zinc Ointment	89
Ointment, Assay	89
Oxide Ointment	89
Oxide Ointment, Assay	89
Sulfate	89
Sulfate, Assay	90
Zinci Sulfas	89

