PRACTICAL PHARMACY

for

Pharmacists and Physicians

A Text Book for
Students in Medicine
and Pharmacy

By
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Authority to use for comment the Pharmacopoeia of the United States of America, Eighth Decennial Revision, in this volume, has been granted by the Board of Trustees of the United States Pharmacopoeial Convention, which Board of Trustees is in no way responsible for the accuracy of any translations of the official weights and measures or for any statements as to strength of official preparations.

Preface

Of complete works on pharmacy the pharmacist, physician and student is well supplied; but the author has for years felt that there was need of a condensed work; something that would provide the essentials of pharmacy; complete as far as possible, yet condensed to meet requirements in such a work.

As a student, the author would have found this book of almost incalculable value. Then he frequently found himself at sea as he attempted to master the voluminous works before him. He did not then know how to pick out the necessary things to learn, he did not at that time know what was essential. In the preparation of this work he has endeavored to supply just what he wanted when he was a student and what he feels is essential.

This work is not intended to replace the larger and more complete works but to afford the student a course of study by which he may master the subject in an elementary way and prepare himself for a better understanding of the higher branches as taught by Remington, Caspari and Arny.

The author trusts that drug clerks who wish to prepare themselves for examination by boards of pharmacy will find in this book what they require in a form that is readily understood, yet no student in pharmacy

should feel that though he has mastered this work his knowledge of pharmacy is sufficient. The successful pharmacist is always a student and supplies himself with the best works obtainable and consults them frequently.

Perhaps for the physician this work will be of greatest service. It is a well known fact that medical students are, as a rule, deficient in pharmacy, and that many physicians in active practice are unfamiliar with the Pharmacopoeia and the simplest pharmaceutical processes. It is believed that physicians and medical students in particular will find in this book all of the necessary knowledge of pharmacy in a form that will be readily understood without explanation by a teacher. If the publication of this book will be the means of a better understanding of pharmacy by physicians the author will be amply repaid for his work.

While the author has no apologies to offer he appreciates the fact that improvements can be made and, should another edition be required, changes will be made which may be found desirable.

The author especially desires to acknowledge his indebtedness to Prof. J. H. Beal, who kindly consented to read a portion of the proofs, to Mr. Fred Dahl, who also read proofs, and to Whitall Tatum Co., for the use of cuts.

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Practical Pharmacy

PART I.

Pharmaceutic Operations

CHAPTER I.

PHARMACY.

Pharmacy is the science which treats of the compounding and dispensing of medicines. It is divided into two classes—**theoretical** and **practical**. Theoretical pharmacy treats of the substances employed and includes a study of botany, chemistry, materia medica, physics, pharmacognosy (a study of crude drugs), bacteriology, mineralogy, toxicology and microscopy, while practical pharmacy deals with the methods used in preparing the substances for use.

Official Pharmacy. The term "official," as applied to pharmacy, has reference to the fact that the substance, process or method of application is by authority of the United States Pharmacopoeia.

Magistral Pharmacy treats of the extemporaneous preparation of drugs.

Galenical Pharmacy refers to preparations made in advance of requirements from authorized or recognized formulas, such as syrups, tinctures, fluid extracts, etc.

Practical Pharmacy

PART I.

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The Purity Rubic. Owing to the fact that it is impossible or unnecessary to secure chemicals or chemical compounds that are absolutely pure a statement follows the official definition showing the percentage of purity required. This is termed the purity rubic.

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PHARMACEUTIC LITERATURE.

A thorough knowledge of pharmacy cannot be obtained without suitable books upon pharmacy and allied subjects.

A few books are very necessary while various works of reference are desirable.

The United States Pharmacopoeia, upon which all pharmaceutic literature is based, is very essential. The Pharmacopoeia, though not issued by the government, is recognized as the legal standard and all substances, when sold under a pharmacopoeial title, must conform with its requirements.

The Pharmacopoeia was originally issued in 1820, and is revised every ten years by a revision committee appointed by the U. S. Pharmacopoeial Convention which meets at the end of each decade in Washington.

No physician, druggist or student should be without the latest edition of the Pharmacopoeia.

The Dispensatories. Dispensatories are commentaries on the Pharmacopoeia. They include, in detail, the history, description, preparation, action, uses, etc., of all drugs and chemicals which are official, together with all which are in use to a greater or less extent but which are not official. There are three dispensatories: The U. S. Dispensatory, The National Dispensatory and the American Dispensatory.

The National Formulary is issued by the American Pharmaceutical Association and contains formulas not admitted into the Pharmacopoeia, but which have general use. All preparations of the National Formulary are recognized as standard by the Pure Food and Drugs Act and are designated by the letters N. F.

Treatises on Pharmacy. There are three voluminous works on pharmacy. Remington's "Practice of Pharmacy," Caspari's "Treatise on Pharmacy," and Arny's "Principles of Pharmacy," all of which are recognized as text books by colleges of pharmacy.

Pharmaceutical Chemistry. Several books on chemistry have been prepared especially for students in pharmacy, among them may be mentioned Simon's "Manual of Chemistry," Sadtler and Trimble's "Pharmaceutical and Medical Chemistry," Oldberg's "Inorganic Chemistry" and Stanislaus and Kimberly's "Pharmaceutic Chemistry."

Dispensing. The principal works on dispensing are Beal's "Prescription Practice and General Dispensing" and Scoville's "Art of Compounding."

Materia Medica and Pharmacognosy. In addition to the dispensatories may be mentioned Sayre's "Organic Materia Medica;" Shoemaker's "Materia Medica and Therapeutics;" Potter's "Materia Medica, Pharmacy and Therapeutics" and Sollman's "Text Book of Pharmacognosy."

Chemical Analysis. Among the works on chemi-

cal analysis are Muter's "Chemical Analysis," Prescott's "Qualitative Analysis" and "Organic Analysis" and Coblentz "Volumetic Analysis."

Chemical and Pharmaceutical Arithmetic. There are several excellent works explaining the various pharmaceutical problems including, Beal's "Chemical and Pharmaceutical Arithmetic," Strumer's "Chemical and Pharmaceutical Arithmetic," Oldberg's "Pharmaceutical Arithmetic" and Steven's "Arithmetic of Pharmacy."

Incompatibility. This important subject is very completely covered by Ruddiman's "Incompatibilities."

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PHARMACEUTICAL JOURNALS.

Among the leading pharmaceutical journals may be mentioned:

The "Americal Journal of Pharmacy," Philadelphia. "The Druggists Circular," "The American Druggist," "The Pharmaceutical Era," "Merck's Report," and "Practical Druggist," New York. "The Apothecary" and "The Spatula," Boston. "The Midland Druggist," Columbus, Ohio. "The Bulletin of Pharmacy," Detroit, Mich. "The Western Druggist," Chicago. "The National Druggist," St. Louis.

"Physicians Drug News," a journal of pharmacy for physicians, is published at Newark, N. J.

CHAPTER II.

METROLOGY.

Metrology is the science which treats of weights and measures.

Weights and Measures.

A correct knowledge of weights and measures is of first importance.

There are three systems in general use. The **Avoirdupois**, the **Troy** or **Apothecaries**, and the **Metric** for weights; and the **Apothecaries or Wine Measure** for measures.

In the United States products are sold by avoirdupois weight. The table is as follows:

Avoirdupois Weight.

Pound	Ounces	Grains
1	16	7000
	1	437.5

Prescriptions are written in apothecaries (or Troy) weight according to the following table:

Apothecaries or Troy Weight.

Pound	Ounces	Drachms	Scruples	Grains
1	12	96	288	5760
	℥1	8	24	480
		31	3	60
			℈1	20

The use of the avoirdupois and apothecaries systems is confusing and many errors result from an imperfect understanding of them.

It should be noted that only in the grain do they agree.

It should also be noted that the avoirdupois pound contains 7,000 grains and the apothecaries pound 5,760 grains, while the avoirdupois ounce contains only 437.5 grains and the apothecaries ounce 480 grains.

As stated before, products are bought and sold by avoirdupois weight. An ounce of morphine therefore, will weigh 437.5 grains and not 480 grains as many think it should. This difference makes many mistakes possible and should be clearly fixed in the mind of the student. To make the danger of error a little clearer let us take, for example, the following prescription which is to be prepared:

Senna, powd.	℥ii
Glycyrrhiza powd.	℥iv
Sulphur, precip.	℥ii
Sacch. lact.	℈i

For use in weighing there is a set of avoirdupois weights; there is also a set of apothecaries weights from 1 gr. to ℥ii (this is a set of weights usually supplied with prescription scales.)

If the weight marked ℥ii is used for the senna and the licorice and the 1 ounce avoirdupois weight used for the milk sugar there is a shortage of 42.5 grains in the milk sugar, which is the difference between the apothecaries and the avoirdupois ounce.

In a great many drug stores, probably the great majority, there are two sets of scales. A prescription scale with weights from 1 gr. to 2 dr. and a set of counter scales with weights graded from 1 ounce to 1 lb. It is the custom of druggists using these scales to use the weights, indiscriminately, the avoirdupois

weight for quantities over the ounce and the apothecaries weights for quantities under the ounce.

As balances are in constant use in weighing drugs, accurate balances are of first importance.

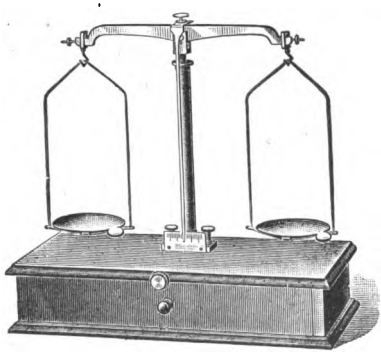
* * * *

BALANCES.

Scales, or **Balances** as they are more scientifically called, are of first importance and, as **accuracy** is essential, care should be exercised in the purchase and use of them.

Two sets will be required. One that will accurately weigh from 1 to 120 grains, and known as prescription scales, and another that will accurately weigh from ¼ oz. to 2 lb., and known as counter scales.

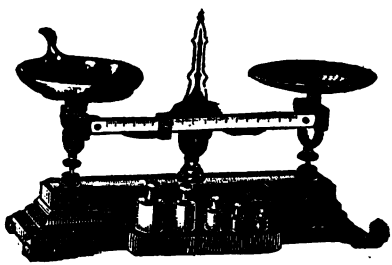
For a small scale, what is known as the "Army"



"ARMY" PRESCRIPTION SCALE.

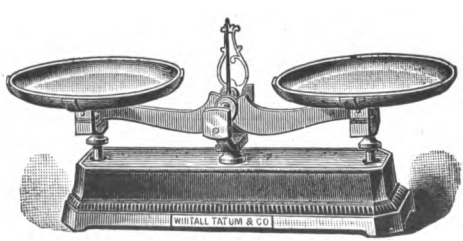
prescription scale with a set of weights from ½ gr. to 120 grs., can be procured from any wholesale druggist and is not expensive. A case should be provided for it to protect it from dust and dirt. Cases can be pro-

cured from dealers or can be made by any handy man at a small cost. It should have a glass door in front or, preferably, double doors.



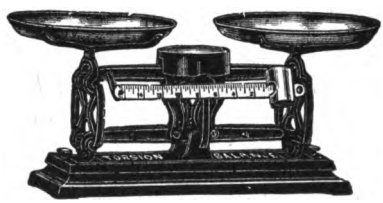
For a scale that will accurately weigh up to four ounces, one like the cut here shown is the simplest, of greatest accuracy and convenience, and least expensive. The beam is provided with a parallel, graduated bar, and a sliding weight graduated for both apothecaries and metric weights. A shelf projecting from the base provides a receptacle for the weights. This scale is very useful for weighing liquids, the tare of the bottle being taken by the sliding poise.

If it is desired to weigh up to one pound or more, the Robervahl scale is one of the most convenient.

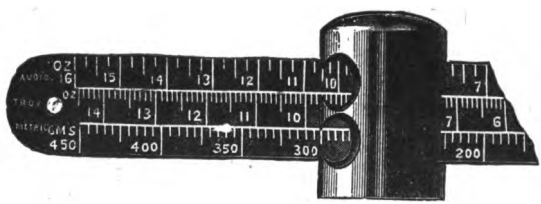


ROBERVAHL SCALE.

A balance is made by the Torsion Balance Co., with a capacity of 20 lbs., yet sensitive to 10 grains, that is provided with a triple beam with metric, Troy and avoirdupois scale upon it.



TORSION BALANCE.



TRIPLE SCALE BEAM.

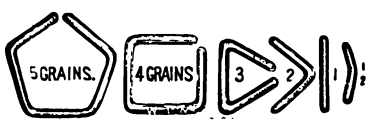
WEIGHTS.

Weights. There will be required one set of apothecaries weights from ½ grain to 120 grains (these are supplied with the scale), one set of avoirdupois weights from ¼ ounce to 2 pounds (supplied with scale), and, for convenience, a set of metric weights from 1 centigram to 10 grams, which come in a box like cut, may be procured for about $2.50, and will save a great deal

of time and avoid possible errors in converting metric quantities into avoirdupois.

GRAIN WEIGHTS IN BOX.

BLOCK WEIGHTS.



ALUMINUM WIRE WEIGHTS.

ALUMINUM SQUARE WEIGHTS.

MEASURES.

Apothecaries or Wine Measure.

Gallon	Pints	Fl. Oz.	Fl. Dr.	Minims.
Cong. 1	8	128	1024	61440
	O. 1	16	128	7680
		f.℥ 1	8	480
			f.ʒ 1	M 60

As the above is the only scale of measures, aside from the metric system, there is no danger of error or confusion as in weights, but a few erroneous impressions should be corrected.

A minim is not a grain and the old saw, "a pint's a pound the world 'round," is simply not so. Sixty minims of water weigh 56.9 grains. A fluidounce of water weighs 454.6 grains at 25° C. and a pint of water weighs 7,291.2 grains, of course liquids of greater specific gravity than water will weigh more, and liquids of less specific gravity will weigh less.

A drop is not a minim. The size of a drop depends upon the nature of the liquid, the container from which it is poured, and the quantity in a container. The number of drops in a fluidram will vary from as low as 40 to as high as 250.

Table showing the wide variation in the size of drops of various liquids:

Number of Drops in a Fluidrachm.

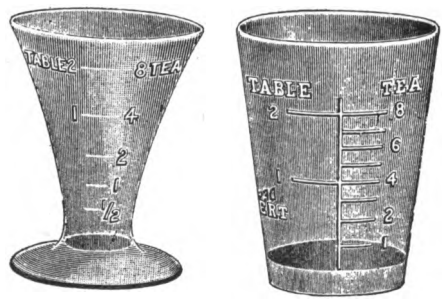
Syrup of acacia	44
Aqua	60
Simple syrup	65
Glycerin	67
Diluted acetic acid	68

Syrup of squill	75
Nitrohydrochloric acid	76
Castor oil	77
Acetic acid	108
Phenol	111
Oil of anise	119
Creosote	122
Sulphuric acid	128
Oil of cloves	130
Oil of turpentine	136
Tincture of aconite	146
Alcohol	146
Aromatic sulphuric acid	146
Spirit of nitrous ether	146
Fluidextract belladonna	156
Ether	176
Chloroform	250

Again, the common supposition that a fluidram is a teaspoonful is erroneous. In the days of our grandmothers silver was dear and teaspoons smaller than they are today; probably then a teaspoon did contain a fluidram and no more; now the average may be said to be **6 teaspoons to a fluidounce,** which means that a patient who is supposed to be getting a fluidram actually gets 33 1-3 per cent. more when given teaspoonful doses.

It is hard to distinguish between a dessertspoon and a tablespoon, though the tablespoon is intended to hold four fluidrams and the dessertspoon only two. There is danger of contamination. There is danger of spilling; many a spoonful of medicine is spilled every day.

Physicians should use graduated medicine glasses which are marked 1 teaspoonful, 1 dessertspoonful, and



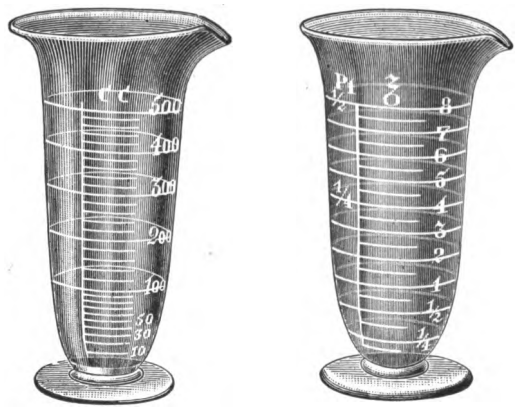
MEDICINE GLASSES.

1 tablespoonful; then the patient gets 1, 2 or 4 fluidrams.

GRADUATED MEDICINE SPOON.

Graduated Measures, or "graduates" as they are commonly termed, are necessary, in the following sizes: 60 minim, 1 ounce, 2 ounce, 4 ounce, 8 ounce and 16 ounce (1 pint); provide two of each size, with the possible exception of the 16 ounce. Conical graduates are preferred because, having smaller diameter, liquids may be more accurately measured.

One or more metric graduates should be provided, say one 15 c.c. (about ½ ounce) and one 120 c.c. (about 4 ounces), and perhaps another 500 c.c., (about 1 pint).



GRADUATED MEASURES.

Graduates may be procured with apothecaries fluid measure on one side and metric measure on the other side.

Imperial Measure. The English imperial measure, employed in Great Britain, contains 437.5 grains distilled water in each fluidounce, **the imperial pint contains 20 fluidounces.** This fact is mentioned here simply because formulas are seen occasionally written in the imperial measure.

The Metric System.

The metric system of weights and measures is in use in all foreign countries and is the only official system of the United States Pharmacopoeia. Its universal adoption is recommended because of its advantages over other systems and because of greater facility in foreign commerce.

The metric system is based upon the meter which is the 1-40 millionth part of the earth's circumference through the poles.

The **Meter** (French metre) is the unit of length and equals 39.37 inches.

The **Gram** (French gramme) is the unit of weight and equals 15.432 grains.

The **Liter** (French litre) is the unit of capacity and equals 2.113 pints.

Take a box that will exactly hold a cube 1-10 of a meter (about 4 inches), fill it with water at 39.2 F., and it will measure 1,000 cubic centimeters (1 liter) and weigh 1,000 grams (1 kilogram). If filled with a liquid heavier than water the specific gravity represents the weight; for instance, the specific gravity of glycerin is 1246, hence a liter of glycerin weighs 1246 grams. If filled with a liquid lighter than water, for instance aqua ammonia fortior, the specific gravity of which is 897 at 77 degrees F., then the weight of 1,000 Cc. would be 897 grams. In other words, if it was possible to make a block of water at 39.2 degrees Fahr., 1-10 of a meter on each side of its six sides, that block of water would measure one liter and weigh 1 kilogram.

Metric Tables.

Measures of Length.

1 Myriameter,	Mm. =	10000.0	M.
1 Kilometer,	Km. =	1000.0	M.
1 Hectometer,	Hm. =	100.0	M.
1 Dekameter,	Dm. =	10.0	M.
1 Meter,	M. =	1.0	M.
1 Decimeter,	dm. =	0.1	M.
1 Centimeter,	cm. =	0.01	M.
1 Millimeter,	mm. =	0.001	M.

Measures of Capacity.

1 Myrialiter,	Ml. =	10000.0	L.
1 Kiloliter,	Kl. =	1000.0	L.
1 Hectoliter,	Hl. =	100.0	L.
1 Deckaliter,	Dl. =	10.0	L.
1 Liter,	L. =	1.0	L.
1 Deciliter,	dl. =	0.1	L.
1 Centiliter,	cl. =	0.01	L.
1 Milliliter,	ml. =	0.001	L.
1 Cu. centimeter,	ccm. =	0.001	L.

Measures of Weight.

1 Myriagramme,	Mg. =	10000.0	Gm.
1 Kilogramme,	Kg. =	1000.0	Gm.
1 Hectogramme	Hg. =	100.0	Gm.
1 Dekagramme,	Dg. =	10.0	Gm.
1 Gramme,	Gm. =	1.0	Gm.
1 Decigramme,	dg. =	0.1	Gm.
1 Centigramme,	cg. =	0.01	Gm.
1 Milligramme,	mg. =	0.001	Gm.

TABLES OF EQUIVALENTS.

(Approximate.)

Measures of Length.

1 Myriameter	6.213	miles.
1 Kilometer	3281.	feet.
1 Hectometer	328.1	feet.
1 Dekameter	32.81	feet.
1 Meter	39.37	inches.
1 Decimeter	3.937	inches.
1 Centimeter	.3937	inches.
1 Millimeter	.0393	inches.

Measures of Volume.

Cubic Centimeters.		Equivalent.
1	Cc.	16¼ minims.
5	Cc.	81 minims..
10	Cc.	162 minims.
15	Cc.	4 fluidrams.
20	Cc.	5½ fluidrams.
29.573	Cc.	1 fluidounce.
30	Cc.	1⅛ fluidounces.
50	Cc.	13½ fluidrams.
59.147	Cc.	2 fluidounces.
60	Cc.	16¼ fluidrams.
88.721	Cc.	3 fluidounces.
100	Cc.	27 fluidrams.
118.3	Cc.	4 fluidounces.
250	Cc.	8 fl. oz., 3½ fl. dr.
500	Cc.	16 fl. oz., 7¼ fl. dr.
946.358	Cc.	32 fluidounces.
1000	Cc. (1 Liter)	33 fl. oz., 6½ fl. dr.

Weights.

Grams.		Equivalent.
.0084	Gm.	1/8 grain.
.0324	Gm.	1/2 grain.
.065	Gm.	1 grain.
0.5	Gm.	7 7-10 grains.
1.	Gm.	15.437 grains.
2.	Gm.	31 grains
3.	Gm.	46 1-3 grains.
4.	Gm.	61.7 grains.
10.	Gm.	154.3 grains.
15.	Gm.	231 1/2 grains.
28.35	Gm.	437½gr. (1 av. oz.)
30.	Gm.	463 grains.
31.1	Gm.	480 gr., (1 Troy oz.)
100	Gm.	3 oz., 103 gr. Troy.
100	Gm.	3 oz., 230 gr. avoir.
1000	Gm. (1 Kilo.)	2 lb., 3 1/4 oz. avoir.

If the following points are firmly impressed upon the mind there will be no difficulty in clearly understanding the metric system.

Of the measures of length the millimeter (mm) and centimeter (cm) are used by the U. S. Pharmacopoeia to describe drugs.

Of the measures of capacity the term mililiter (ml) is almost invariably replaced by cubic centimeter (Cc). The terms **cubic centimeter** and **liter** are, in fact, the only ones usually employed.

The cubic centimeter (capacity) is the equivalent of the gram (weight). The liter (capacity) contains 1,000 Cc. and is the equivalent of the Kilo (weight).

CHAPTER III.

SPECIFIC GRAVITY.

Specific Gravity is the relation of weight to volume; it may be said to be the weight of one body compared with the weight of an equal bulk or volume of another body, the standard being distilled water at 25 degrees C. (77 degrees Fahr.) whenever no special temperature is mentioned.

The Pharmacopoeia states that "the unit of expression for specific gravities is in any case the specific weight of water of the same temperature. When the specific gravity of any liquid is stated without mentioning the temperature, it is to be understood that the statement refers to the specific gravity which the liquid has at 25 degrees C. (77 degrees Fahr.), referring to water at the same temperatures the unit of expression. When specific gravities are experimentally determined, it is recommended that the Mohr-Westphal balance or a pycnometer be employed, and that the determination be made at 25 degrees C. (77 degrees Fahr.)."

Specific gravity of liquids is most conveniently determined by means of the hydrometer. Hydrometers for specific purposes are provided and are given names indicating their special uses as, for instance, the urinometer for determining the specific gravity of the urine, the alcoholmeter for alcohol and the lactometer for milk.

In the absence of a hydrometer, a bottle may be used. Specific gravity bottles (pycnometers) holding 100 and 1,000 grains may be conveniently used; they

are supplied with a metal counterpoise and when filled with liquid the weight indicates the specific gravity. For example: If the 100 grain bottle holds 123.5 grains of a liquid the specific gravity of that liquid is 1.235.

In the absence of other means of obtaining the specific gravity of a liquid it may be obtained by the use of any bottle by first weighing the bottle and filling it with water. By subtracting the weight of the bottle from the total, the weight of the water may be obtained. The bottle is now filled with the liquid the specific gravity of which is desired, again weighed and the weight of the bottle again subtracted. We now have the weight of a certain volume of water and an equal volume of the other liquid, to obtain the specific gravity of the liquid divide the weight of the liquid by the weight of the water. For example: A vial weighs 410 grains; when filled with water the total weight is 740 grains. 740 grains minus 410 grains equal 330 grains, the weight of the water. The vial is now filled with glycerin and the total weight is 821 grains minus 410 grains, the weight of the vial, equals 411 grains, the weight of the glycerin; 410 divided by 330 equals 1.2455, which is the specific gravity of the glycerin.

Specific Gravity of Solids. The druggist or physician will seldom have occasion to take the specific gravity of a solid, yet its principles and the methods employed to obtain it should be understood.

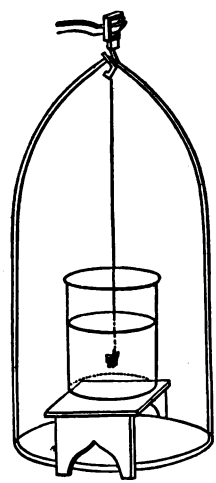
The specific gravity of a solid is based upon what is known as the law of Archimedes, i.e., **a body immersed in a liquid lost as much weight as its own bulk of that liquid weighed,** and the rule is to divide the

weight of the body by the weight of water displaced to obtain the specific gravity of the body.

The methods employed are considered as follows:

1. For solids insoluble in, but heavier than water.
2. For solids insoluble in, but lighter than water.
3. For solids soluble in water.

To obtain the specific gravity of the first class take the substance, weigh carefully and tie a silk thread around it, attach the other end of the thread to a prescription balance as shown in cut.



A glass of water is placed over the pan, but kept free from it by means of an improvised bench, at such a height that the substance is completely immersed; it is now weighed and the loss of weight represents the amount of water displaced. By dividing the weight of the substance by the loss of weight in water the spe-

cific gravity is obtained. For example: A substance, insoluble in water, weighs 342 grains; when weighed in water it is found to weigh 292 grains, the loss of weight is, therefore, 50 grains. By dividing 342 by 50 we ascertain the specific gravity to be 6.840.

To obtain the specific gravity of a solid insoluble in, but lighter than water, a heavier insoluble substance must be attached. When this is necessary simply deduct the loss of weight of the heavier substance when taken alone to obtain the loss of weight of the lighter substance and apply the rule as before.

To obtain the specific gravity of a solid soluble in water a liquid is used in which the substance is insoluble in place of water. In this case the specific gravity of the liquid must also be obtained by the rule, "as the specific gravity of the liquid used is to water so is the loss of weight in the liquid to the loss of weight in water." For example: A lump of nitrate potassium weighs 250 grains in air; when immersed in oil of turpentine it weighs 125 grains; the specific gravity of the oil of turpentine is found to be 0.860, hence

0.860 : 1000 : : 125 : 1.454

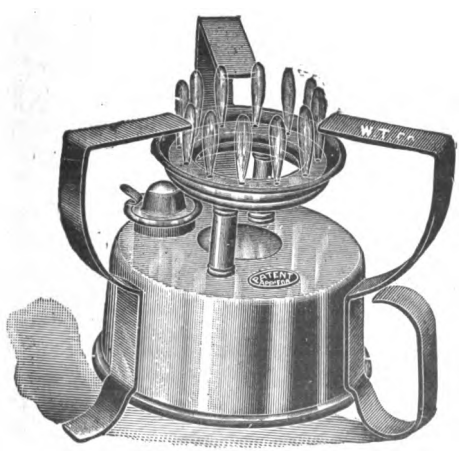
To ascertain the specific gravity of powders of a solid substance soluble in and lighter than water use a specific gravity bottle the same as for the liquids, using a definite weight of the powder and placing it in the flask, then fill the flask with some liquid in which it is insoluble, then apply the rule as before.

CHAPTER IV.

HEAT.

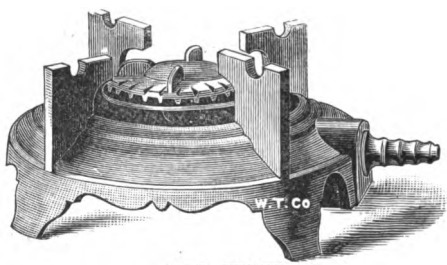
Heat is described as molecular motion or energy and is produced by the motion of the molecules of a body, varying in quantity as the body is solid, liquid or gaseous. The principal sources of heat are the sun, combustion and other chemical change, friction, electricity, etc.

Heat is extensively employed in pharmacy. The most suitable source of heat for small operations is the gas stove if gas is available. The second choice is the alcohol stove which burns denatured alcohol and the third choice is the common kerosene stove which is everywhere available.

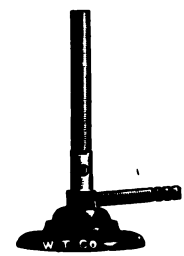


ALCOHOL GAS STOVE.

If but a small amount of heat is desired the familiar Bunsen burner is almost a necessity if gas is available, if gas is not available then the small alcohol lamp will answer very nicely.



GAS STOVE.



BUNSEN BURNER.

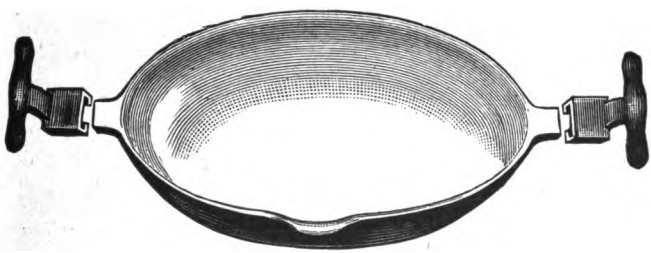
VAPORIZATION.

Among the processes in which heat is used, the most important is known as vaporization, which is the separation of volatile from fixed bodies. It is called **evaporation** when the volatile body is allowed to escape into the air; **distillation** when the volatile body is again condensed and saved; **dessication, exsiccation** or **granulation** when a liquid is separated from a solid and **sublimation** when a volatile solid is separated from another solid.

Evaporation is simply the removal of a desired quantity of volatile liquid by heat, no attempt being made to save the evaporated substance, but the amount of heat applied and the method used is an important factor. Evaporation will take place in a volatile liquid at any temperature, but it increases upon the application of heat until it reaches its maximum when boiling.

The rapidity of evaporation also depends upon the amount of surface exposure to air and heat.

Evaporating Dishes. One or two evaporating dishes are required. The iron dish, porcelain lined, with detachable handle, is preferred; they are supplied in the following sizes: 7 in., 8 in., 10 in., 13 in., 16 in., and 18 in., and hold from 1½ pints to three gallons. The 7 in. and the 10 in. may be all that is necessary.



EVAPORATING DISH.

There is a great difference in the boiling points of liquids; the more volatile they are the lower the boiling point. The following table shows the wide variation, the Fahrenheit standard of temperature being used:

The Boiling Point of a liquid is that at which it vaporizes.

Evaporation may be conducted by the direct application of heat to the pan containing the liquid to be evaporated, or by indirect application of heat as in the **water bath, steam bath** or **sand bath.**

Boiling Point of Liquids.

Ethyl chloride	55
Ether	96
Benzine	115
Carbon bisulphide	115
Chloroform	141
Spirits nitre	149
Alcohol	172
Water	212
Acetic acid, glaciale	243
Nitric acid	249
Oil turpentine	317
Glycerine	329
Phenol	370
Camphor	400
Oil wintergreen	425
Sulphuric acid	640
Quicksilver	675

WATER BATH.

The **water bath** is a capsule or vessel containing water in which is placed another capsule containing the substance to be evaporated, heat being applied to the outer capsule which keeps the inner capsule at a

uniform temperature, but always below the boiling point. It is preferred for all operations in which heat below that of boiling water may be employed.

The **Steam bath** is employed in laboratories where large quantities of liquids are evaporated and usually consists of a copper kettle within a jacket around which steam, under pressure, is driven.

The sand bath is usually an iron vessel containing sand in which the vessel to be heated is imbedded, the sand being heated to the necessary temperature.

Evaporation in vacuum is extensively practiced. As is well known, the lower the air pressure the lower the boiling point of a liquid; at an elevation of 12,000 feet water will boil at 185 degrees F. This fact is taken advantage of and liquids evaporated in apparatus from which the air is exhausted.

Distillation is evaporation in which the volatile substance is condensed and saved. This is done in a still, the vapor passing through a tube (or worm) which is surrounded by cold water, which causes the vapor to condense and liquefy.

Fractional distillation is the separation of volatile liquids at different boiling points. When mixed liquids are distilled the one of lowest boiling point is first to become vaporized. The best illustration of fractional distillation is in the distillation of coal oil; the gases are first volatilized, followed by naptha, gasoline, benzine and kerosene in the order given.

Sublimation is the distillation of solid substances, the product being known as a sublimate. This operation cannot be successfully conducted except upon a large scale.

Dessication and **exsiccation,** is the process by which solid substances are deprived of their moisture. When the product sought is a small granule, it is termed **granulation.**

Latent Heat. When water at 212 degrees F. is converted into steam at 212 degrees F., heat is absorbed. This is called latent heat. When the steam again condenses this latent heat reappears. "When a liquid assumes the gaseous state a certain amount of heat disappears; and, conversely, when a gas or vapor becomes a liquid, heat to a corresponding extent is evolved" is a fully established physical law. This law also applies when water at 32 degrees F. passes into ice at 32 degrees F.

The processes which call for a high heat will be touched upon very briefly.

Fusion is the liquefaction and union of solid bodies through the medium of heat.

Calcination is the separation of volatile substances from fixed inorganic matter; its principal use in pharmacy is the expulsion of carbon dioxide from the carbonates of magnesium, lime, etc.

Carbonization is the process by which organic substances are deprived of their volatile products by heating **away from the air,** as in the manufacture of charcoal.

Torrefaction (or roasting) is the same as carbonization, except that it is not carried to the point of carbonization.

Incineration is the process of heating organic substances, **with access of air**, until the carbon is consumed, the ashes being the object sought.

Ignition is the process of strongly heating solids or semi-solid substances, the residue being the object sought.

Deflagration is the process of heating one inorganic substance with another capable of yielding oxygen. Decomposition results with sudden and sometimes violent and noisy combustion.

* * * *

THERMOMETERS.

Thermometers are exclusively used to measure heat. There are 3 scales—**Centigrade, Fahrenheit** and **Reaumur**, the latter being seldom used in the United States. The Centigrade is the scale now almost universally employed and is used exclusively in the U. S. P., but it is not as well known in the United States as the Fahrenheit scale.

In the Centigrade scale the freezing point of water is zero (0) and the boiling point 100 degrees.

In the Farenheit scale the freezing point is 32 degrees and the boiling point 212 degrees.

In the Reaumur scale the freezing point is zero (0) and the boiling point is 80 degrees.

To convert Centigrade degrees into Farenheit—Multiply by 1.8 and add 32.

To convert Farenheit degrees into Centigrade—subtract 32 and divide by 1.8.

The melting point of a substance is the temperature at which it melts. It is often noted in testing a substance to determine its purity or to assist in identifying it.

TABLE OF THERMOMETRIC EQUIVALENTS.

Centigrade and Fahrenheit Scales.

°Centi grade.	°Fahr- enheit.	°Centi grade.	°Fahr- enheit.	°Centi grade.	°Fahr- enheit.	°Centi grade.	°Fahr- enheit.
		29	84.2	59	138.2	89	192.2
0	32	30	86	60	140	90	194
1	33.8	31	87.8	61	141.8	91	195.8
2	35.6	32	89.6	62	143.6	92	197.6
3	37.4	33	91.4	63	145.4	93	199.4
4	39.2	34	93.2	64	147.2	94	201.2
5	41	35	95	65	149	95	203.
6	42.8	36	96.8	66	150.8	96	204.8
7	44.6	37	98.6	67	152.6	97	206.6
8	46.4	38	100.4	68	154.4	98	208.4
9	48.2	39	102.2	69	156.2	99	210.2
10	50	40	104	70	158	100	212
11	51.8	41	105.8	71	159.8	101	213.8
12	53.6	42	107.6	72	161.6	102	215.6
13	55.4	43	109.4	73	163.4	103	217.4
14	57.2	44	111.2	74	165.2	104	219.2
15	59	45	113	75	167	105	221
16	60.8	46	114.8	76	168.8	106	222.8
17	62.6	47	116.6	77	170.6	107	224.6
18	64.4	48	118.4	78	172.4	108	226.4
19	66.2	49	120.2	79	174.2	109	228.2
20	68	50	122	80	176	110	230
21	69.8	51	123.8	81	177.8	111	231.8
22	71.6	52	125.6	82	179.6	112	233.6
23	73.4	53	127.4	83	181.4	113	235.4
24	75.2	54	129.2	84	183.2	114	237.2
25	77	55	131	85	185	115	239
26	78.8	56	132.8	86	186.8	116	240.8
27	80.6	57	134.6	87	188.6	117	242.6
28	82.4	58	136.4	88	190.4	118	244.4

CRYSTALLIZATION.

Crystallization is the process by which the molecules of a substance arrange themselves in geometric forms, or crystals, when passing from a geometric or a liquid to a solid state.

A substance is said to be **amorphous** when not of crystalline form and structure, for example, starch; **dimorphous** or **trimorphous** when it occurs in two or three distinct crystalline forms (example sulphur), or **polymorphous,** if many forms. **Isomorphous** designates different substances which crystallize in the same form; isomorphous substances resemble each other in chemical composition and readily exchange constituents.

Cleavage is the tendency of a crystal to divide in certain directions.

Crystalline forms are divided into two main groups called the **orthometric** and the **clinometric** groups, which are again subdivided into six systems; the orthometric group includes the **regular** (also known as the monometric, cubic, octahedral, or tessular system), the **quadratic** (also known as the dimetric, square, prismatic, or tetragonal system), the **rhombic** (also known as the trimetric or right prismatic system) and the **hexagonal** or rhombohedral system; the clinometric group includes the **monoclinic** (also known as the monosymmetric, clinorhombic or oblique prismatic system) and the **triclinic** (also known as the asymmetric, clino-rhombohedral, or doubly oblique prismatic system.)

Nearly all salts crystallize with a small amount of water remaining within the crystals. This is known as **water of crystallization.**

Efflorescence is the term used to describe the loss of water of crystallization. The substance loses its crystalline appearance, an opaque, dry powder being formed.

Deliquescence and **Hygroscopicity** are terms used to describe the absorption of moisture from the atmosphere; acetate of potassium being a good example.

* * * *

SEPARATION.

Under this general title is grouped the various processes employed in the separation of fluids from solids and of immiscible fluids from each other. The various operations are noted in the order of their importance under the sub titles **filtration, colation** or **straining, expression, decantation, clarification** and **decoloration** while, for convenience, we will include the process of dialysis.

* * * *

FILTRATION.

Filtration is the process of separating liquids from solids, the object being to free the liquid from insoluble matter from which it is desired to separate it and obtain the liquid in a transparent condition.

The means employed is usually the paper filter supplied for that purpose and which may be obtained in various sizes as may be required.

This process is so well known to the student that description is unnecessary yet some hints will be found useful by all but the most experienced.

1st. A ribbed funnel is preferred for rapid work. This funnel contains corrugations which permit the rapid flow of the fluid and insures free circulation of air between the funnel and the vessel into which the liquid is conveyed.

2nd. The paper should be wet with water or alacohol or a mixture of water and alcohol (according to the nature of the liquid) before the liquid is poured into it.

3rd. Pour the liquid down the side of the funnel to prevent breaking the paper.

4th. If the solution does not run clear at first return the first portions to the filter.

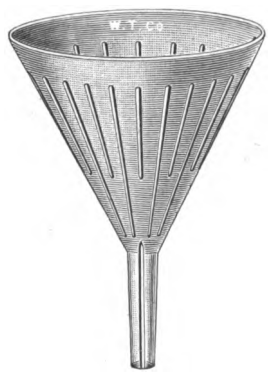
5th. If the solution still remains turbid pour a few ounces into a graduate and stir in a small quantity of talcum or, if not acid, magnesium carbonate or precipitated chalk and add to the filter.

6th. Cover the funnel with a rubber cover (they are provided for that purpose) or with a sheet of glass a trifle larger than the top of the funnel to prevent evaporation.

7th. Do not allow the paper to reach to the rim of the funnel. This prevents loss of material and permits covering the funnel.

8th. To secure a continuous flow of liquid invert a bottle containing the liquid over the funnel so that the neck of the bottle will be below the top of the funnel (using a retort stand for the purpose).

Funnels. For rapid filtration the pressed glass funnel is recommended. The objection to it is the occasional difficulty in cleaning because of the ribs,



RIBBED FUNNEL.

PLAIN FUNNEL.

but the advantages more than balance this occasional fault. One 2 ounce and one 4 ounce plain funnel and one each 8 ounce, 16 ounce and 32 ounce ribbed funnels should be provided.

* * * *

COLATION OR STRAINING.

Colation or **Straining** is the process of separating a liquid from a solid by placing the substance upon a piece of cloth, allowing the liquid to drain through. Gauze, muslin, canton flannel and wool felt are employed, the one selected being determined by the density of the liquid and the fineness of the particles to be removed.

A simple method of straining small quantities of liquid is the insertion of a pellet of cotton in the neck of a funnel and then passing the liquid through it.

Expression is the term employed when force is employed in the process of straining. This may be done by wringing the straining cloth or bag in the hands or by means of a small tincture press.

Decantation is the process employed in pouring a clear liquid from the solid substance which has become deposited at the bottom of the vessel. This is best accomplished by means of the syphon. The syphon may be a small rubber tube or a glass tube may be bent by heating at the place it is desired to bend it when it may be bent to the desired angle. Of course it will be remembered that the end of the tube out of the liquid must reach lower than the surface of the liquid to secure a continuous flow.

Clarification is the process of rendering turbid liquids clear without the use of filters or strainers. This may be effected by the application of heat or by the addition of white of egg, gelatine or milk or by subsidence through long standing. It is seldom employed.

Decoloration is the removal of color from liquids. The agent usually employed is animal charcoal either by digesting it with the liquid or by allowing the liquid to percolate slowly through it.

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DIALYSIS.

Dialysis is the process of separating crystallizable from non-crystallizable substances by placing a solution containing both on a porous diaphragm, the under side of which is in contact with water. Osmosis being established certain substances pass through the diaphragm into solution in the water while others remain on the diaphragm.

PRECIPITATION.

Precipitation is the separation of solids from a solution. It may be caused by heat, light or chemical change or by the addition of another substance to the solution. The substance thrown out of solution is called the **precipitate** while the substance which caused the precipitation is termed the **precipitant.**

Precipitation is sometimes employed as a means of purification and as a convenience in obtaining many insoluble substances; this result is usually obtained by chemical change.

Precipitation may be **simple, physical, or chemical.** It may be produced in many ways and is always annoying when unintentional and sometimes dangerous.

A common cause of physical precipitation is the mixture of solutions containing varying proportions of alcohol.

Changes in temperature will often produce a precipitate. Nearly all drugs are more soluble in warm than in cold solutions.

Chemical solutions will precipitate through changes in chemical combinations, but of this we treat under the head "Incompatibility."

Precipitates may be produced in the following ways:

1st. Precipitation of alkaloids by alkalies or alkaline salts.

2nd. Production of an insoluble salt from reaction between two solutions of soluble salts.

3rd. Insoluble hydroxides from the action of a soluble salt upon a carbonate or hydroxide.

4th. The displacement of a weak acid or base by a strong one.

5th. Decomposition of a salt in solution by a stronger acid resulting in double decomposition.

* * * *

CHAPTER V.

PERCOLATION.

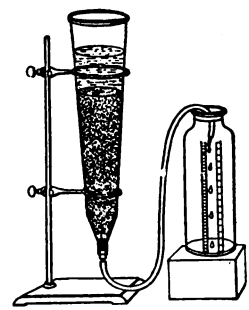
The process of percolation is employed with greater frequency than any other in the manufacture of pharmaceutical preparations, and is considered first in importance.

There is no better illustration of the process than the "leach" which every thrifty woman living in the country sets up every spring. A barrel with a few holes bored in the bottom and covered with straw is filled with wood ashes, through which water is percolated until the ashes is exhausted of its potash, then the "lye" is mixed with "soap grease" and boiled. The "soft" soap which results—but that is another story.

Percolation is now employed almost exclusively in extracting the soluble constituents of vegetable drugs. As described in the Pharmacopoeia, it "consists in subjecting a substance or a mixture of substances, in a powder, contained in a vessel called a percolator, to the solvent action of successive portions of a certain menstruum in such a manner that the liquid, as it traverses

the powder in its descent to the receiver, shall be charged with the soluble portion of it, and pass from the percolator free from insoluble matter."

OFFICIAL PERCOLATOR



OFFICIAL PERCOLATION

Percolators. For small operations only the three forms of glass percolators which have been found by experience to be the best will be considered; the **conical** percolator, the **ordinary** percolator and the **narrow** percolator.

The conical percolator, which is nothing more or less than an ordinary glass funnel, may be employed where the quantity of drug is small and the quantity of menstruum relatively large, the ordinary percolator for a tincture containing 10 per cent. or 20 per cent. of a drug and a narrow percolator for a more concentrated tincture.

It is better to use the narrow percolator as much as possible because of the fact that the menstruum passes through a greater quantity of drug with less menstruum and less loss of menstruum. The only objection to the

narrow percolator is the danger of packing the drug so tight that the liquid, as it passes down, will become so saturated that it will be unable to pass out. This difficulty will be overcome when a drug containing considerable "gummy" extracts like rhubarb, or one which is likely to swell, like squill, is loosely packed, or a broad percolator employed.

The size of the percolator to use of course depends upon the quantity of drug. A percolator should be selected that will leave a space of 4 to 6 inches above the drug.

Probably there is no better way to fully describe the process than to take up a few formulas and explain them. Let us take as the first example tincture aconite root. The formula is as follows:

Tinctura Aconiti U. S. P.

Aconite root in No. 60 powder ..... 100 gm.
Alcohol, Water, of each, q.s.

To make .....1,000 cc.

Mix alcohol and water in the proportion of 350 cc. of alcohol to 150 cc. of water. Moisten the aconite with 20 cc. of this menstrum, transfer it to a percolator, and, without pressing the powder, allow it to stand well covered for six hours; then pack it very firmly and pour on enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight

hours. Then allow the percolation to proceed slowly, gradually adding menstruum until 1000 cc. are obtained.

In tincture aconite the menstruum is 70 per cent. alcohol and the drug contains little resinous or mucilagenous substances, hence it is very easy to manipulate. The drug is placed in any convenient dish and the menstruum required to moisten it added and thoroughly mixed with the drug; the quantity of menstrum is intended to be sufficient to moisten the drug so that when squeezed in the hand it will hold together when the hand is opened, yet not contain sufficient menstruum to wet the hand. When ready for the percolator it is advisable to run the drug through a coarse sieve onto a sheet of paper to break up any lumps that may have formed. Fit a pellet of cotton loosely in the neck of the percolator to prevent the powder from dropping through and moisten with the menstruum, then pour in the drug. The percolator is now ready to be placed in position for percolation. This may conveniently be through a round hole in a shelf large enough to touch the percolator about one-third the distance from the top. The drug should then be allowed to stand for a few hours tightly covered; this is for the purpose of permeating the drug and thus facilitate percolation, on the same principle that a pellet of dampened absorbent cotton will fill with water quicker than dry cotton. After standing a sufficient length of time, press the drug firmly and evenly, cut a sheet of filter paper so that it will cover the drug, and on this lay a glass percolator weight to hold the drug in place. Now add the menstruum, being careful not to disturb the powder in pouring it on; this may be done by pouring from a

graduate down a glass rod or through a glass funnel. When the menstruum begins to drop, cork the lower orifice, cover the percolator tightly with a sheet of window glass (provided, of course, rubber percolator covers are not at hand), and allow to stand 48 hours to macerate. At the expiration of 48 hours remove the cork and allow the percolation to proceed. If the percolate runs faster than 20 drops a minute insert a notched cork to retard the flow. Continue the percolation by adding sufficient menstruum until 1 pint of tincture has been obtained.

If the drug is properly packed, the menstruum will pass through evenly as shown by a straight line around the percolator. If improperly (unevenly) packed, the menstruum will run faster on one side than the other. If the directions given here are carefully followed, the last portions will be colorless and devoid of strength.

After sufficient menstruum has been added to complete the quantity required and allow about 10 per cent. for loss, the balance may be forced through with water alone; but this is not recommended to the inexperienced, because of the danger of the water passing through into the finished tincture.

When the quantity of menstruum is large it may be placed in a bottle and the bottle inverted over the percolator; then as the menstruum passes into the drug it will flow from the bottle until the bottle is empty. **It is important that the drug be kept constantly covered with menstruum** from the time the menstruum is first added in the percolator until the product is finished. If this is not done the powder will crack, fissures will form and portions of the drug remain unacted upon.

It is important that the drug be packed in the percolator evenly. Menstruum will seek the point of least resistance; if unevenly packed the flow will be uneven and result in imperfect exhaustion of the drug.

A drug to be percolated with a strongly alcoholic menstruum may be packed tighter than one to be percolated with a menstruum containing a large per cent. of water, but it is better to pack too loosely than too tightly; if too tight it may be impossible for the menstruum to get through at all; but if evenly packed though moderately loose, the flow may be regulated so that there is no danger that the drug will not be exhausted. The danger lies in packing unevenly or too tight, or both uneven and tight.

* * * *

FINENESS OF POWDER.

The number of a powder refers to the number of meshes to the inch of the sieve through which the powder should pass, the numbers being known as follows:

A very fine powder	No. 80
A fine powder	No. 60
A moderately fine powder	No. 50
A moderately coarse powder	No. 40
A coarse powder	No. 20

Hence a No. 60 powder should pass through a No. 60 sieve. In buying sieves simply order by number. A set of sieves is a valuable addition to the laboratory outfit, but not necessary. Drugs "ground for percolation" can now be obtained from all wholesale druggists.

The next preparation we will take up for consideration will be tincture of rhubarb aromatic for which the Pharmacopoeia gives the following formula and directions for preparation:

Tinctura Rhei Aromatica U. S. P.

Rhubarb	200 gm.
Saigon cinnamon	40 gm.
Cloves	40 gm.
Myristica	20 gm.
Glycerin	100 cc.
Alcohol, Water, each, q.s.	
To make	1,000 cc.

Mix the glycerin with 500 cc. of alcohol and 400 cc. of water. Reduce the rhubarb, Saigon cinnamon, cloves and myristica to a No. 40 powder, and moisten this powder with 99 cc. of the menstruum; transfer it to a percolator, and, without pressing the powder, allow it to stand for twelve hours; then pack it moderately and pour on enough menstrum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice and, having closely covered the percolator, macerate for twenty-four hours. Then allow the percolation to proceed slowly, pouring on, first, the remainder of the menstruum, and then sufficient of a mixture of alcohol and water, made in the same proportions as before, to obtain 1000 cc. of tincture.

(The glycerin in this and other tinctures is employed, both as a solvent and to prevent precipitation.)

Here we have a formula containing three times the quantity of drug and a menstruum considerably weaker in alcohol, and, as rhubarb contains a large amount of soluble principles, some difficulty may be experienced in making the tincture through the menstruum becoming so charged with soluble matter that it cannot pass out of the percolator. Therefore, about 25 per cent. of the tincture should be run off as rapidly as possible after maceration, then reduce the flow to the normal rate.

Further examples are not necessary, but a few important facts must be remembered in order to be successful.

1st. The drug should be thoroughly moistened before it goes into the percolator, but not wet enough to be the least bit sticky.

2nd. It should not be packed in a percolator until it has macerated at least 6 hours.

3rd. The kind of percolator should be governed by the quantity of menstruum and the strength of the tincture, bearing in mind that a narrow percolator is preferred because more menstruum comes in contact with the drug; also that if the drug contains considerable soluble matter the menstruum may become so saturated that it will not flow.

4th. That the size of the percolator should be large enough to leave a space of say 6 inches above the drug to provide for the menstruum.

5th. That the drug must be packed evenly to secure an even flow of menstruum and insure complete exhaustion of the drug.

6th. That the nature of the drug must determine whether it be packed moderately or firmly.

7th. That the drug be covered with a sheet of filter paper, cut to fit, and this held in place by a weight of some kind.

8th. That the menstruum be added carefully, so the drug will not be disturbed and that it be kept constantly covered until the operation is concluded.

9th. That as soon as the liquid begins to drop from the percolator, it be corked for 24 hours to give the menstruum time to become saturated with the soluble principles of the drug, **except** where the drug contains an excessive amount of extractive matter, in which case the first portions should be run off to prevent total stoppage of the flow.

10th. That the flow should not exceed 20 drops a minute, if a weak tincture, and 5 to 10 drops a minute if a strong tincture; the flow to be regulated by a notched cork.

If an assayed drug is used and these suggestions followed, there will be no difficulty in making a tincture that will answer the requirements of the Pharmacopoeia.

A Percolator Jar (graduated) should be provided, a large wide mouth bottle with the graduations marked upon it will answer.

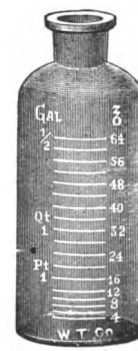
Covers should be provided for funnels and percolators. These may be sheets of soft rubber or thin glass.

Glass Stirring Rods are inexpensive and exceedingly useful. They should be supplied.

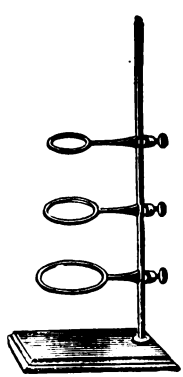
Sieves. A set of four brass sieves is necessary, numbers 20 to 80; these may be had nested if desired.

A Retort Stand (see cut) is very convenient but a wood frame may be provided that will answer the purpose.

BRASS SIEVE.



PERCOLATOR JAR.



RETORT STAND

TIN PERCOLATOR. WITH STOP COCK

CHAPTER VI.

SOLUTION.

Solution, as commonly understood, is the absorption of a solid by a liquid. The process, however, includes the absorption of gaseous substances by liquids; the liquefaction of one solid by another, as camphor and chloral; and the perfect blending of two or more liquids as, for example, glycerin in alcohol.

Solutions may be **simple, compound** or **chemical.**

Simple solutions lower the temperature; chemical solutions raise the temperature.

In **Simple Solutions** there is no change in the dissolved body and it may be returned to its original form by evaporation of the solvent; a good example of a simple solution is simple syrup.

A **Compound Solution** is a mixture of simple solutions or the solution of more than one solid, the constituents of the solution retaining their individuality.

Chemical Solutions are solutions in which a chemical change takes place and results in the formation of new compounds; for example, the mixture of seidlitz powders.

Saturated Solutions. A solution is said to be saturated when it contains all the soluble matter that is possible to hold in solution at normal temperature.

Supersaturated Solutions are ones in which the solvent has taken up more of the soluble matter than it can retain under normal conditions.

Percentage Solutions contain a definite amount of soluble matter in 100 parts.

Solvents in the order of their importance are water, alcohol, glycerin, ether, chloroform and petroleum benzin, fixed and volatile oils. The use of the last five being very small compared with the first three. Acids and alkalies are also occasionally employed, the former principally to facilitate the solution of alkaloids and other active principles in drugs such as squill, nux vomica, chinchona, blood root, ergot, etc.

The Official Solutions, or liquids, 25 in number, are aqueous solutions of chemical substances of which 10 are simple and 15 chemical. They will be referred to under their title.

PART II.

Galenic Preparations

CHAPTER VII.

AQUAE. WATERS.

Medicated Waters. The medicated waters (aquae) of the Pharmacopoeia are aqueous solutions of volatile substances.

The distinction between aquae (waters) and liquores (liquors) is somewhat arbitrary and several that are classified under the head of aquae might just as properly be termed liquores.

All of the official waters are prepared by one of four methods, with the exception of solution of hydrogen dioxide.

1st. **By passing gas through water** (aqua ammonia fortior).

2d. **By distillation** (distilled water, hamamelis water or so called extract witch hazel, stronger orange flower water and stronger rose water).

3d. **By agitating the medicinal substance with water** (bitter almond water, chloroform water, creosote water, orange flower water and rose water) the latter two by simply diluting the stronger water with an equal volume of distilled water.

4th. **By triturating a volatile oil with talc,** mixing with water and filtering. Making practically a saturated solution of the oil in water.

The official waters, including distilled and common water as well as the ones known as medicated waters, number 21 as follows:

AQUA. Water. H_2O.

Potable water in its purest obtainable state.

AQUA AMMONIAE. Ammonia Water.

An aqueous solution of ammonia (NH_3) containing 10 per cent., by weight, of gaseous ammonia; the Pharmacopoeia directs that it must not be dispensed if it contains less than the above percentage. It is extremely volatile and should be kept well stoppered.

Uses: Rubefacient, vesicant, application to insect bites, in syncope and asphyxia by inhalation, and internally as antacid.

Average dose: 1 Cc. (15 minims) largely diluted.

AQUA AMMONIAE FORTIOR. Stronger Ammonia Water.

This differs from the common ammonia water in that it contains 28 per cent., by weight, of the gaseous ammonia.

It deteriorates very rapidly and should be kept in only partially filled bottles and handled with great care.

Caution should be used in mixing ammonia water with compounds liberating chlorine, iodine, etc., as dangerously explosive compounds often form and with a number of strong acids fire and explosions are often produced upon mixing.

AQUA AMYGDALAE AMARAE. Bitter Almond Water

Preparation. Dissolve 1 Cc. oil of bitter almond in 999 Cc. distilled water by agitation.

It is an unreliable preparation and is little used.

Average dose: 4 Cc. (1 fluidrachm).

AQUA ANISI. Anise Water.

A saturated solution of oil of anise in water.

Preparation. Triturate 2 Cc. oil of anise with 15 Gm. of talc and 1000 Cc. water; filter, returning the first portions to the filter until it runs clear.

Used principally for its pleasant flavor.

Average dose: 16 Cc. (4 fluidrachms).

AQUA AURANTII FLORUM. Orange Flower Water.

Obtained by mixing equal parts stronger orange flower water and distilled water. The Pharmacopoeia directs that they be mixed immediately before use.

A constituent of syrup lactophosphate calcium.

Used as flavor.

AQUA AURANTII FLORUM FORTIOR. Stronger Orange Flower Water.

Water saturated with the volatile oil of fresh

orange flowers, obtained as a by-product in the distillation of oil of orange flowers.

Should be kept in bottles loosely stoppered with a pledget of purified cotton and in a dark place.

Average dose: 8 Cc. (2 fluidrachms).

AQUA CAMPHORAE. Camphor Water.

Preparation. Dissolve 8 Gm. camphor in 8 Cc. of alcohol and triturate the solution with 15 Gm. purified talc. Allow to stand until the greater part of the alcohol has evaporated spontaneously, then continue the trituration with 1000 Gm. water, gradually added. Pour the mixture upon a well wetted filter, returning the first portions until it runs clear.

Uses: Antispasmodic, sedative.

Average dose: 18 Cc. (2 fluidrachms).

AQUA CHLOROFORMI. Chloroform Water.

Preparation. Made by adding enough chloroform to a convenient quantity of distilled water, contained in a dark amber-colored bottle, to maintain a slight excess of the former after the contents have been repeatedly and thoroughly agitated.

When chloroform water is required for use pour off the needed quantity of the solution, refill the bottle with distilled water and saturate it by thorough agitation, taking care that there be always an excess of chloroform present.

Uses: Sedative, adjuvant, preservative.

Average dose: 16 Cc. (4 fluidrachms).

AQUA CINNAMOMI. Cinnamon Water.

A saturated solution of oil of cinnamon in water.

Preparation. Same as anise water.

Used mainly as vehicle. Slightly carminative.

Great care should be used in selecting the oil and keeping it fresh.

AQUA CREOSOTI. Creosote Water.

Preparation. Made by agitating 10 Cc. creosote vigorously with 990 Cc. distilled water and filtering. Should be freshly prepared when wanted.

Used in nausea, in tuberculosis.

Average dose: 8 Cc. (2 fluidrachms).

AQUA DESTILLATA. Distilled Water.

Water distilled in any suitable apparatus, rejecting the first and last portions, preserving the balance in glass stoppered bottles which have been rinsed with hot distilled water immediately before being filled.

AQUA FOENICULI. Fennel Water.

A saturated solution of oil of fennel in water.

Made same as anise water.

Used as a vehicle.

AQUA HAMAMELIDIS. Hamamelis Water.

(Extract Witch Hazel.)

A saturated solution of the volatile principles of witch hazel bark, obtained by distillation with water to which is added 15 per cent. alcohol.

Uses: A mild external application of much less value than commonly attributed to it by the laity.

AQUA HYDROGENII DIOXIDI. Solution of Hydrogen Dioxide.

(Peroxide of Hydrogen.)

A saturated solution of H_2O_2 in water.

Contains when fresh about 3 per cent of absolute

hydrogen dioxide, corresponding to about 10 volumes of available oxygen. Should be only slightly acid.

Deterioration is retarded by replacing the stopper by a pledget of cotton.

Uses: Antiseptic, deodorant; as injection, douche, spray, etc.

AQUA MENTHAE PIPERITAE. Peppermint Water.

A saturated solution of oil of peppermint in distilled water.

Preparation. Same as anise water.

Used as a vehicle; slightly carminative.

AQUA MENTHAE VIRIDIS. Spearmint Water.

A saturated solution of oil of spearmint in water.

Preparation. Same as anise water.

Used as a vehicle; slightly carminative.

AQUA ROSAE. Rose Water.

Preparation. Mix equal parts stronger rose water and distilled water. They should be mixed immediately before use.

Rose water may also be prepared (unofficially) by triturating 10 drops oil of rose with ½ ounce talc and 32 ounces of water and then filtering in accordance with general directions.

AQUA ROSAE FORTIOR. Stronger Rose Water.

Water saturated with volatile oil of rose petals, obtained by distillation.

It may be called a by-product in the production of oil of rose.

The Pharmacopoeia directs that it should be kept in dark bottles loosely stoppered with a pledget of cotton.

CHAPTER VIII.

LIQUORES (SOLUTIONS).

Liquors are solutions of chemical substances in a menstruum consisting chiefly or wholly of water. The U. S. P., 1900, recognizes 25 liquors.

Liquors should not be confused with medicated waters (aquae) which are simple solutions in which water has been impregnated with some volatile substance. Most medicated waters have for their chief active constituent some volatile oil, while liquors in most cases consist of a solution of some chemical salt.

In the preparation of liquors various processes are employed. Some are prepared by direct solution, others by the intervention of some substance, the presence of which is necessary, to effect solution of the chemical required; example: liquor iodi compositus, where the potassium iodide is used to effect a solution of the iodine. Others are made by a definite chemical reaction; example: liquor magnesii citratis, where the citric acid reacts with the magnesium carbonate and forms magnesium citrate.

Twenty-five liquors are official, 10 being simple solutions (without chemical change) and 15 chemical solutions.

SIMPLE SOLUTIONS.

In simple solutions the active constituent is added to water.

LIQUOR ACIDI ARSENOSI. Solution of Arsenous Acid.

Should contain arsenous acid corresponding in amount to 1 per cent. arsenic trioxide (same as Fowler's solution).

Preparation. Dissolve 10 Gm. arsenic trioxide in a mixture of 50 Gm. diluted hydrochloric acid and 250 Gm. of water, by the aid of heat, and then add water sufficient to make 1000 Gm.

Uses: Same as Fowler's solution.

Average dose: 0.2 Cc. (2 minims).

LIQUOR ANTISEPTICUS. Antiseptic Solution.

Contains 2 per cent. boric acid with antiseptic volatile oils.

Uses: A mild antiseptic lotion and mouth wash.

Average dose: 4 Cc. (1 fluidrachm).

LIQUOR ARSENI ET HYDRARGYRI IODIDI. Solution of Arsenous and Mercuric Iodide.

(Donovan's Solution.)

Should contain not less than 1 per cent. each arsenous iodide and mercuric iodide.

Preparation. Rub 10 Gm. each arsenous iodide and red mercuric iodide together in a mortar; add 150 Cc. water and continue the trituration until solution is effected; then filter and pass sufficient water through to make the product weigh 1000 Gm.

This solution should be of a light straw color; if

darker free iodine is probably present and it should be discarded.

Uses: Alterative, antisyphilitic.

Average dose: 0.1 Cc. (1½ minims).

LIQUOR CALCIS. Solution of Calcium Hydroxide.

(Lime Water. Aqua Calcis.)

A saturated solution of pure calcium hydroxide.

Preparation. Made unofficially by taking a piece of unslaked lime of any convenient size; slack by the gradual addition of water (about 30 parts to 1 part lime); agitate occasionally for half an hour, allow the lime to settle and pour off the water and throw it away. Then add to the lime as much water as before, shake occasionally and it is ready for use. As the lime water is poured off it may be replaced by fresh water.

If common or "hard" water is used scales of carbonate of lime will form on the solution and the sides of the bottle.

Uses: Antacid.

Average dose: 16 Cc. (4 fluidrachms).

LIQUOR IODI COMPOSITUS. Compound Solution of Iodine.

(Lugol's Solution).

Preparation. Dissolve 5 Gm. iodine and 10 Gm. potassium iodide in a sufficient quantity of distilled water to make the product weigh 100 Gm.

The solution should be kept in glass stoppered bottles.

Uses: Alterative.

Average dose: 0.2 Cc. (3 minims).

LIQUOR PLUMBI SUBACETATIS DILUTUS. Diluted Solution Subacetate Lead.

(Lead Water.)

Preparation. Mix 40 Gm. solution of subacetate of lead with distilled water, previously boiled and cooled, sufficient to make the product weigh 1000 Gm.

The solution becomes opalescent due to the formation of carbonate of lead. A few drops acetic acid clears the solution.

Uses: Astringent, antiseptic.

LIQUOR POTASSII HYDROXIDI. Solution of Potassium Hydroxide.

(Liquor Potassae U. S. P., 1890).

Should contain about 5 per cent. potassium hydroxide (KOH).

Should be kept in green bottles with glass stoppers coated with paraffin.

Average dose: 1 Cc. (15 minims) largely diluted.

Seldom employed internally.

LIQUOR SODII HYDROXIDI. Solution of Sodium Hydroxide.

(Liquor Sodae U. S. P., 1890).

Same strength and similar properties as liquor potassii.

Used principally as reagent.

LIQUOR SODII ARSENATIS. Solution of Sodium Arsenate.

Contains 1 per cent. dried sodium arsenate in water.

Uses: Alterative, antiperiodic.

Average dose: 0.2 Cc. (3 minims).

CHEMICAL SOLUTIONS.

LIQUOR AMMONII ACETATIS. Solution of Ammonium Acetate.

(Spirit of Mindererus).

An aqueous solution which should contain not less than 7 per cent. ammonium acetate.

Preparation. Dissolve 5 Gm. ammonium carbonate in 100 Cc. diluted acetic acid.

The ammonium carbonate must be in translucent pieces free from white, pulverulent bicarbonate.

This preparation should be freshly made when wanted.

Uses: Diaphoretic, diuretic.

Average dose: 16 Cc. (4 fluidrachms).

LIQUOR CHLORI COMPOSITUS. Compound Solution of Chlorine.

(Chlorine Water).

Replaces aqua chlori U. S. P., 1890.

An aqueous solution containing, when freshly prepared, about 0.4 per cent. of chlorine with some oxides of chlorine and potassium chloride.

Used principally as disinfectant.

Average dose: 4 Cc. (1 fluidrachm).

LIQUOR CRESOLIS COMPOSITUS. Compound Solution of Cresol.

Similar to Lysol and other preparations.

Contains cresol 500 Gm., linseed oil 350 Gm., potassium hydroxide 80 Gm., water, q. s. 1000 Gm.

Uses: Antiseptic, deodorant, disinfectant.

LIQUOR FERRI CHLORIDI. Solution of Ferric Chloride.

An aqueous solution of ferric chloride containing not less than 29 per cent. of the anhydrous salt ($Fe Cl_3$) corresponding to 10 per cent. metallic iron.

Used principally for the preparation of tincture ferric chloride.

LIQUOR FERRI ET AMMONII ACETATIS. Solution of Iron and Ammonium Acetate.

(Bashams Mixture).

Preparation.. To 500 Cc. solution of ammonium acetate (which should not be alkaline) add 60 Cc. diluted acetic acid, 40 Cc. tincture of ferric chloride, 120 Cc. aromatic elixir, 120 Cc. glycerine and, lastly, water sufficient to make 1000 Cc.

The present formula is about twice the strength of the formula of 1890.

The preparation should be freshly made when wanted.

Uses: Hematinic, refrigerant.

Average dose: 16 Cc. (4 fluidrachms).

LIQUOR FERRI SUBSULPHATIS. Solution of Ferric Subsulphate.

(Monsells Solution).

An aqueous solution of variable chemical composition, containing an amount of basic ferric sulphate corresponding to not less than 13.75 per cent. metallic iron.

Uses: As a styptic.

Average dose: 0.2 Cc. (3 minims).

LIQUOR FERRI TERSULPHATIS. Solution Ferric Sulphate.

An aqueous solution of normal ferric sulphate containing about 36 per cent. of the salt and representing not less than 10 per cent. metallic iron.

This liquor is employed in the preparation of the antidote for arsenic, also for preparing other iron preparations.

Uses: For preparing ferric hydroxide (antidote for arsenic).

LIQUOR FORMALDEHYDI. Solution of Formaldehyde.

(Formalin).

A product of the partial oxidation of methyl (wood) alcohol, containing not less than 37 per cent. in weight of absolute formaldehyde.

Should be kept in dark, well stoppered bottles in a cool place.

Uses: A powerful antiseptic. When heated it is converted into a gas which is used to disinfect rooms exposed to contagion.

LIQUOR HYDRARGYRI NITRATIS. Solution of Mercuric Nitrate.

A liquid containing about 60 per cent. mercuric nitrate and about 11 per cent. free nitric acid.

Preparation. Mix 45 Gm. nitric acid with 15 Gm. distilled water and dissolve 40 Gm. red mercuric oxide in the mixture.

Must be kept in glass stoppered bottle.

Uses: Employed locally as caustic.

LIQUOR MAGNESII CITRATIS. Solution of Magnesium Citrate.

Preparation. Dissolve 33 Gm. citric acid in 120 Cc. water and add 15 Gm. magnesium carbonate; when dissolved filter into a bottle holding 360 Cc. containing 60 Cc. syrup of citric acid; adding enough water to nearly fill bottle. Drop in 2.5 Gm. potassium bicarbonate. At once stopper bottle securely and shake until dissolved.

Should be freshly prepared when wanted for use.

Uses: Laxative, refrigerant.

Average dose: 360 Cc. (12 fluidounces).

LIQUOR PLUMBI SUBACETATIS. Solution of Lead Subacetate.

(Goulards Extract).

An aqueous liquid containing not less than 25 per cent. of lead subacetate.

The "subacetate" is not a definite salt, but as found in the official solution is a mixture of oxacetates, produced by boiling the normal acetate in water in contact with the oxide.

The solution should be kept in well stoppered bottles.

Uses: To prepare liquor plumbi subacetatis dilutus and ceratum plumbi subacetatis.

LIQUOR POTASSI ARSENITIS. Solution of Potassium Arsenite.

(Fowler's Solution).

An aqueous solution which should contain potassium arsenite corresponding to 1 per cent. arsenic trioxide.

Preparation. Boil 10 Gm. arsenic trioxide (arsenous acid U. S. P., 1890) and 20 Gm. potassium bicarbonate with 100 Gm. distilled water until dissolved; when cool add sufficient water to make 970 Gm., lastly add 30 Gm. compound tincture of lavender.

The object of the lavender is to give it color and taste to prevent its being mistaken for water.

Uses: Alterative, antiperiodic.

Average dose: 0.2 Cc. (3 minims).

LIQUOR POTASSI CITRATIS. Solution of Potassium Citrate.

An aqueous liquid containing in solution not less than 8 per cent. of anhydrous potassium citrate with small amounts of citric and carbonic acids.

Preparation. Dissolve 8 Gm. potassium bicarbonate and 6 Gm. citric acid, each separately, in 40 Cc. water. Filter the solutions and mix; bottle when effervescence has nearly ceased.

This preparation is also known as neutral mixture and saline mixture. A similar preparation was included in the U. S. P., 1880, under the name "Mistura Potassi Citratis."

Uses: Diaphoretic, refrigerant.

Average dose: 16 Cc. (4 fluidrachms).

LIQUOR SODAE CHLORINATAE. Solution of Chlorinated Soda.

(Labarraques Solution).

An aqueous solution of several chlorine compounds of sodium containing at least 2.4 per cent. by weight of available chlorine.

Uses: Disinfectant and deodorant. Seldom employed internally.

Average dose: 1 Cc. (15 minims).

LIQUOR SODII PHOSPHATIS COMPOSITUS. Compound Solution of Sodium Phosphate.

Preparation. Triturate 1000 Gm. sodium phosphate and 40 Gm. sodium nitrate with 130 Gm. citric acid until liquefied and add water sufficient to make 1000 Cc.

Keep the solution in well stoppered bottles in a moderately warm place.

It is important that clear (uneffloresced) crystals of sodium phosphate be employed to secure perfect liquefaction.

Uses: Laxative.

Average dose: 8 Cc. (2 fluidrachms).

LIQUOR ZINCI CHLORIDI. Solution of Zinc Chloride.

An aqueous solution containing about 50 per cent. by weight, of zinc chloride. ($Zn\ Cl_2$).

A colorless and inodorous liquid employed for disinfecting, etc., and preserving anatomical specimens. A substitute for Burnett's disinfecting fluid.

CHAPTER IX.

Infusions and Decoctions

INFUSA. (Infusions).

Infusions are aqueous solutions of the soluble principals of drugs, obtained by maceration in hot or cold

water. They differ from decoctions in that a lower degree of heat is used in their preparation as they are usually prepared from drugs containing some volatile substance which would be injured by heat.

For hot infusions the drug should be in a cut or bruised condition; for the cold process where percolation is used, in a coarse powder.

When not otherwise directed the following general method may be used:

Drug	5 Gm.
Boiling water	100 Cc.
Water, enough to make	100 Cc.

The boiling water is poured upon the drug, (do not employ a metallic container) and left covered for about half an hour in a warm place. The drug is then expressed or squeezed in the strainer and water enough added to make up the required volume.

Infusions should never be made from fluidextracts, as different principals are obtained from an aqueous extraction than with alcohol. (Example: Infusion of digitalis, principally diuretic; if the tincture or fluidextract is added to water, it is chiefly a heart stimulant; precipitation also occurs.

With potent drugs the strength of infusions should be specified by the prescriber.

Infusions are incompatible with the salts of the heavy metals, like iron, silver and mercury.

There are 3 official infusions.

INFUSUM DIGITALIS. Infusion of Digitalis.

Preparation. Upon 15 Gm. of digitalis pour 1000 Cc. of boiling water and allow to macerate one hour.

Strain, add 100 Cc. alcohol, 150 Cc. cinnamon water and cold water sufficient to make 1000 Cc.

Uses: Diuretic.

Average dose: 8 Cc. (2 fluidrachms).

INFUSUM PRUNI VIRGINIANAE. Infusion of Wild Cherry.

Preparation. Moisten 40 Gm. wild cherry in No. 20 powder with 60 Cc. water and allow to macerate one hour, then pack firmly in a conical percolator. Place 50 Cc. glycerin in a receiving bottle, pour water upon the drug and percolate into the bottle containing the glycerin until 1000 Cc. is obtained.

Uses: Tonic, sedative.

Average dose: 60 Cc. (2 fluidounces).

INFUSUM SENNAE COMPOSITUM. Compound Infusion of Senna.

(Black Draught).

Preparation. Pour 800 Cc. boiling water upon 60 Gm. senna, 120 Gm. manna, and 20 Gm. fennel; macerate ½ hour. Strain with expression; dissolve 120 Gm. magnesium sulphate in the infusion and again strain. Lastly add water enough to make 1000 Cc.

Uses: Purgative.

Average dose: 120 Cc. (4 fluidounces).

DECOCTA. (Decoctions).

Decoctions are aqueous solutions of the soluble matter of drugs obtained by boiling the drug with water, and prepared from drugs whose active princi-

ples are not injured by heat, also where cold or warm water does not readily extract what is required.

Where the strength is not specified the following general formula can be employed:

Drug, 1 part; boiling water, 20 parts. Place the drug in a covered vessel and pour the cold water upon it and boil for 15 minutes, cooling, expressing and straining, lastly adding cold water sufficient to make up that lost by evaporation.

Decoctions and infusions are remedies of the past. In years gone by when the country was new and medicines scarce they were used extensively but with the growth of the country and perfection in the preparation of organic drugs their use has constantly diminished until now we have but three official infusions and no official decoctions.

CHAPTER X.

MISTURA. (Mixtures).

Mixtures are liquid preparations of insoluble, suspended, active substances, or solutions containing more than one liquid of therapeutical activity. The mixture is generally flavored and is for internal administration.

There are four official mixtures. They are prone to ferment and should not be kept on hand any great length of time.

MISTURA CRETAE. Chalk Mixture.

Preparation. Mix 20 Gm. compound chalk powder

with 40 Cc. cinnamon water, and add water enough to make 100 Cc.

Uses: Antacid, astringent.

Average dose: 16 Cc. (4 fluidrachms).

Make freshly when wanted.

MISTURA FERRI COMPOSITA. Compound Iron Mixture.

(Griffith's Mixture).

Preparation. Rub 18 Gm. myrrh, 18 Gm. sugar and 8 Gm. potassium carbonate together in a mortar with 700 Cc. rose water, at first gradually added, so that a uniform mixture may result. Transfer this mixture to a graduated vessel; add 60 Cc. spirit of lavender, then add 6 Gm. ferrous sulphate (in clear crystals) previously dissolved in about 50 Cc. rose water. Lastly add rose water sufficient to make 1000 Cc.

Should be freshly made when wanted.

Uses: Chalybeate tonic, hematinic.

Average dose: 16 Cc. (4 fluidrachms).

MISTURA GLYCYRRHIZAE COMPOSITA. Compound Mixture of Glycyrrhiza.

(Brown Mixture).

Preparation. Acacia and extract of glycyrrhiza of each 3 Gm. camphorated tincture of opium 12 Cc.; wine of antimony 6 Cc.; spirit of nitrous ether 3 Cc.; syrup 5 Cc.; water enough to make 100 Cc. Rub the extract of glycyrrhiza and acacia with water enough to dissolve them, then add the other ingredients.

Uses: Demulcent, expectorant, diuretic, vehicle for ammonium chloride.

Average dose: 8 Cc. (2 fluidrachms).

MISTURA RHEI ET SODAE. Mixture of Rhubarb and Soda.

Preparation. Dissolve 35 Gm. sodium bicarbonate in 400 Cc. of water. Add 15 Cc. fluidextract of rhubarb, 3 Cc. fluidextract of ipecac, 350 Cc. glycerin, 35 Cc. spirit of peppermint and, lastly, water sufficient to make 1000 Cc.

Uses: Antacid, stomachic, neutralizing agent.

Average dose: 4 Cc. (1 fluidrachm).

CHAPTER XI.

SYRUPI. (Syrups).

Syrups are dense saccharine solutions, generally medicated or flavored. Twenty-nine syrups are official.

Simple syrup is a dense solution of sugar in water and is the largest constituent by volume in most of the preparations under this class. Where the syrup is not employed, sugar is used direct and the syrup results while the preparation itself is being prepared.

Due to their strong preservative qualities, syrup and sugar are used in preparing medicines of aqueous extracts of plants, which would otherwise ferment. (Example: syrup of wild cherry.) There are also syrups of chemical substances, the chemical being dissolved in the syrup, the syrup in this case acting as a vehicle.

Methods of preparation depend largely upon the nature of the substance employed. However there are

two chief processes, the hot and cold, with two subdivisions under each making four general methods.

Hot Process. Employed where the drug will not be injured by heat. (Example: Compound syrup of sarsaparilla, which contains no delicate drugs or chemicals).

The following with description, etc., are generally prepared under the hot process.

Method 1. Dissolve the sugar in the medicated liquid by means of gentle heat.

SYRUPUS ACACIAE. Syrup of Acacia.

Preparation. Dissolve 100 Gm. acacia in 430 Cc. of water and add 800 Gm. of sugar. Place in a porcelain dish on water bath, stir until sugar is dissolved, strain if necessary and add water sufficient to make 1000 Cc.

Keep in cool place in small bottles to prevent quick fermentation.

Uses: Addition to resinous liquids. Incompatible with alcohol.

SYRUPUS PICIS LIQUIDAE. Syrup of Tar.

Preparation. Rub 5 Gm. tar with about 10 Gm. of clean white sand and 100 Gm. of water. When kneaded pour water off. Dissolve the tar in 50 Cc. of alcohol, add 10 Gm. of magnesium carbonate, and 50 Gm. of sugar. Triturate, adding 400 Cc. of water. Let stand a few hours, stirring occasionally, and filter. Then dissolve in the liquid 800 Gm. more sugar, heating gently; strain and add water sufficient to make 1000 Cc.

Uses: For coughs and in catarrhal affections.

Average dose: 4 Cc. (1 fluidrachm).

SYRUPUS SARSAPARILLA COMPOSITUS. Compound Syrup of Sarsaparilla.

Preparation. Mix 200 Cc. fluidextract sarsaparilla, 15 Cc. fluidextract of glycyrrhiza and 15 Cc. fluidextract of senna. Add 0.2 Cc. (about 4 drops) each, oils of sassafras, anise and gaultheria and shake thoroughly. Set the mixture aside for one hour, then filter it. Dissolve 650 Gm. sugar in the filtrate with the aid of a gentle heat; strain when cool and add sufficient water through the strainer to make 1000 Cc.

Uses: Alterative, vehicle for iodides.

Average dose: 16 Cc. (4 fluidrachms).

SYRUPUS SCILLAE. Syrup of Squill.

Preparation. Dissolve 800 Gm. of sugar in 450 Cc. vinegar of squill by aid of gentle heat; strain and add water enough to make 1000 Cc.

Uses: Expectorant, emetic, diaphoretic.

Average dose: 2 Cc. (30 minims).

SYRUPUS TOLUTANUS. Syrup of Tolu.

Preparation. In a mortar rub 50 Cc. of tincture of tolu with 10 Gm. of magnesium carbonate and 60 Gm. of sugar. Add 450 Cc. of water and filter. Heat gently and dissolve 740 Gm. more sugar, strain while hot and add water sufficient to make 1000 Cc.

Uses: Expectorant, anticatarrhal. Medicinal value very slight.

Average dose: 16 Cc. (4 fluidrachms).

SYRUPUS ZINGIBERIS. Syrup of Ginger.

Contains 3 Cc. fluidextract of ginger in 100 Cc.

Preparation. Mix 30 Cc. fluidextract of ginger

with 20 Cc. alcohol; triturate this mixture in a mortar with 10 Gm. magnesium carbonate and 60 Gm. of sugar. Gradually add 450 Cc. water, stirring constantly, and filter. Dissolve 760 Gm. sugar in the clear filtrate, with the aid of a gentle heat, strain while hot and add water sufficient to make 1000 Cc.

Uses: Aromatic, carminative, vehicle.

Average dose: 16 Cc. (4 fluidrachms).

Method 2. Dissolve the sugar in the fluid with gentle heat and then raise mixture to boiling point.

SYRUPUS. (Simple Syrup).

Dissolve 850 Gm. of sugar in 450 Cc. of distilled water, by aid of gentle heat, raising the temperature gradually to the boiling point. Strain, add enough water to make product measure 1000 Cc.

Percolation Method. The Pharmacopoeia permits the manufacture of syrup by percolation as follows: Place a small pledget of cotton in the neck of the percolator, enough to almost fill the neck. Introduce the sugar but do not pack it. Return the percolate until it runs clear, and finally enough water in portions until sugar is all dissolved and the product of the measure desired. This method is employed also in the preparation of several other syrups.

Simple syrup may be extemporaneously prepared by taking a bottle of any convenient size, fill with clean granulated sugar, then fill with water. Shake occasionally or lay bottle on side and change position occasionally until dissolved.

Uses: As a base for other syrups where it is simply mixed with the medicated solution, acting as a vehicle.

SYRUPUS CALCIS. Syrup of Lime.

(Syrup of Calcium Hydroxide).

Contains about 1 per cent. of calcium saccharate.

Preparation. Slack 65 Gm. of lime in 35 Cc. of water, with aid of gentle heat, and subsequently add 350 Gm. of sugar. Triturate the mass in a mortar to a fine powder and then transfer it to a clean copper or tinned-iron vessel containing 500 Cc. boiling water; boil for five minutes, stirring constantly. Dilute the mixture with enough water to measure 950 Cc. and filter through white paper, keeping funnel covered. Wash filter with water enough to make the product measure 1000 Cc.

Keep well stoppered, is decomposed by contact with air.

Sugar largely increases the solubility of lime in water. The larger the proportion of sugar used the larger the amount of lime that will be taken up.

For instance, 100 parts of sugar in 250 parts aqueous solution will absorb 26.5 parts of lime while 100 parts of sugar in 2000 parts of solution takes up only 18 parts of lime.

Uses: Antacid, antidote for oxalic acid.

Average dose 2 Cc. (30 minims).

SYRUPUS FERRI IODIDI. Syrup of Ferrous Iodide.

(Syrup of Iodine of Iron.)

Contains nearly 7 Gm. of ferrous iodide in 100 Cc.

Has a pale green color, if brownish it contains free iodine, (producing a blue color with starch). Exposure to direct sunlight will bring back the color and quality if decomposed.

The U. S. P. 1890 syrup, contained 10 per cent or twice as much ferrous iodide as the present syrup.

Uses: Alterative, hematinic.

Average dose: 1 Cc. (15 minims).

Cold Process. For syrups containing volatile substances or chemicals liable to decomposition by heat. Example: Syrup of hypophosphites.

Method 3. Dissolve the sugar by agitation or percolation with the cold medicated solution .

SYRUPUS AURANTII. Syrup of Orange.

(Syrup of Orange Peel).

Preparation. Take 50 Cc. tincture of sweet orange peel and rub it in a mortar with 10 Gm. of magnesium carbonate and 400 Cc. of water and filter; use enough water to make the filtrate measure 450 Cc. Dissolve in the filtrate 820 Gm. sugar and 5 Gm. of citric acid. Do not heat but agitate and add enough water to make 1000 Cc.

Syrup of orange should never be made from the fluid extract as the latter is made from the dried peel with alcoholic menstruum and is bitter and free from the delicate orange flavor.

Uses: As a flavoring.

SYRUPUS AURANTII FLORUM. Syrup of Orange Flowers.

Preparation. Dissolve 850 Gm. of sugar in sufficient orange flower water to make 1000 Cc. either by agitation or by percolation as described under syrupus.

Uses: Flavoring agent.

SYRUPUS CALCII LACTOPHOSPHATIS. Syrup of Calcium Lactophosphate.

Miscalled Syrup of Lactophosphate of Lime.

Preparation. Dissolve 25 Gm. of precipitated calcium carbonate in 60 Cc. of lactic acid mixed with 100 Cc. of water, in a mortar, stirring until dissolved. Then add 36 Cc. of phosphoric acid mixed with 50 Cc. of water and stir until precipitate is dissolved. Add 100 Cc. more water and filter, rinsing the mortar with 50 Cc. of water and passing the rinsings through the fitler. Add 50 Cc. of orange flower water and dissolve 725 Gm. of sugar in the liquid, finally strain and add water sufficient to make 1000 Cc.

May become discolored with age.

Uses: Nerve food and nutrient.

Average dose: 8 Cc. (2 fluidrachms).

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SYRUPUS HYPOPHOSPHITUM. Syrup of Hypophosphites.

Preparation. Dissolve 45 Gm. calcium hypophosphite, 15 Gm. potassium hypophosphite and 15 Gm. sodium hypophosphite in 450 Cc. of water. Add 5 Cc. tincture of fresh lemon peel and 2 Gm. diluted hypophosphorus acid and filter the liquid. In the filtrate dissolve 650 Gm. sugar by agitation and add water, through the filter, sufficient to make 1000 Cc. Strain if necessary.

It may also be made by percolation as described under syrupus.

Uses: Reconstructive, nerve nutrient, alterative.

Average dose 8 Cc. (2 fluidrachms).

SYRUPUS HYPOPHOSPHITUM COMPOSITUS. Compound Syrup of Hypophosphites.

Preparation. Rub 2.25 Gm. ferric hypophosphite and 2.25 Gm. manganese hypophosphite with 3.75 Gm. sodium citrate, add 30 Cc. water and warm the mixture until a clear greenish solution is obtained. Dissolve 35 Gm. calcium hypophosphite 17.50 Gm. potassium hypophosphite and 17.50 Gm. sodium hypophosphite in 450 Cc. of water to which 5 Cc. diluted hypophosphorus acid has previously been added. Mix the solutions. Dissolve 775 Gm. sugar in the mixed solutions by agitation. Strain if necessary and add water, through the strainer, sufficient to make the product measure 1000 Cc.

Uses: Reconstructive, nerve nutrient, hematinic.

Average dose: 8 Cc. (2 fluidrachms).

SYRUPUS IPECACUANNAE. Syrup of Ipecac.

Preparation. This syrup can be made either by percolation as described under syrupus, or in the following manner: Mix 300 Cc. of water with 10 Cc. of acetic acid and add 70 Cc. of fluidextract of ipecac. Set in a cool place for 24 hours. Filter, adding enough water to obtain 450 Cc., then add 100 Cc. of glycerin and dissolve in the liquid 700 Gm. of sugar, finally adding water to make 1000 Cc.

Uses and doses: As expectorant 1 Cc.; emetic 15 Cc.

Method 4. Add the ready prepared syrup to the concentrated medicated liquid.

SYRUPUS ACIDI CITRICI. Syrup of Citric Acid.

Substitute for syrup of lemon, which has only poor keeping qualities.

Preparation. Dissolve 10 Gm. citric acid in 10 Cc. of water and add 500 Cc. syrup and 10 Cc. of tincture of fresh lemon peel, finally add syrup to make 1000 Cc.

If preserved for some time it acquires the terebinthinate odor and taste particularly susceptible in oil of lemon, hence it should be freshly prepared.

Uses: Chiefly a vehicle.

SYRUPUS ACIDI HYDRIODICI. Syrup of Hydriodic Acid.

Preparation. Mix diluted hydriodic acid 100 Gm.; water 300 Gm.; syrup 600 Gm.

Should be made as wanted and kept well corked and away from light. If discolored should not be dispensed.

Uses: Substitute for alkali iodides. Alterative.

Average dose: 4 Cc. (1 fluidrachm) diluted.

SYRUPUS AMYGDALAE. Syrup of Almond.

Preparation. Mix 10 Cc. spirit of bitter almond and 100 Cc. of orange flower water with enough syrup to make 1000 Cc.

Uses: Vehicle.

Average dose: 4 Cc. (1 fluidrachm).

This syrup is radically different from the syrup of the former Pharmacopoeia which was made from almonds direct and formed a milky mixture.

SYRUPUS FERRI, QUININAE ET STRYCHNINAE PHOSPHATUM. Syrup of the Phosphates of Iron, Quinine and Strychnine.

Preparation. Mix 250 Cc. of glycerite of the phosphates of iron, quinine and strychnine with enough syrup to make 1000 Cc. Strain.

This syrup is intended to be made as wanted. If preserved for some time it becomes discolored.

Uses: Nerve tonic, hematinic.

Average dose: 4 Cc. (1 fluidrachm) containing 1-80 grain of strychnine.

SYRUPUS KRAMERIAE. Syrup of Krameria.

(Syrup of Rhatany).

Preparation. Mix 450 Cc. fluidextract of krameria with syrup enough to make 1000 Cc.

Uses: Antidiarrheal, astringent.

Average dose: 4 Cc. (1 fluidrachm).

May be readily prepared extemporaneously.

SYRUPUS LACTUCARII. Syrup of Lactucarium.

Preparation. Mix 100 Cc. tincture of lactucarium with 200 Cc. of glycerin; add 50 Cc. orange flower water in which 1 Gm.. of citric acid has been dissolved, then add enough syrup to make 1000 Cc.

Uses: Nerve and cough sedative.

Average dose: 8 Cc. (2 fluidrachms).

SYRUPUS RHEI. Syrup of Rhubarb.

Preparation. Mix 100 Cc. fluidextract of rhubarb with 4 Cc. spirit of cinnamon and add 10 Gm. potas-

sium carbonate, previously dissolved in 50 Cc. water. Lastly add syrup sufficient to make 1000 Cc.

The potassium carbonate is added to prevent the separation of resinous matter.

Uses: Laxative.

Average dose: 8 Cc. (2 fluidrachms).

SYRUPUS RHEI AROMATICUS. Aromatic Syrup of Rhubarb.

(Spiced Syrup of Rhubarb).

Preparation. Dissolve 1 Gm. potassium carbonate in 150 Cc. aromatic tincture of rhubarb. Filter if necessary and add syrup sufficient to make the product measure 1000 Cc. Mix thoroughly.

Uses: Laxative, astringent, antidiarrheal.

Average dose: 8 Cc. (2 fluidrachms).

SYRUPUS RUBI. Syrup of Rubus.

(Syrup of Blackberry Root).

Preparation. Mix 250 Cc. fluidextract of rubus with 750 Cc. of syrup.

Uses: Astringent.

Average dose: 4 Cc. (1 fluidrachm).

SYRUPUS PRUNI VIRGINIANAE. Syrup of Wild Cherry.

Preparation. Made by macerating 150 Gm. wild cherry bark in No. 20 powder with sufficient water for 24 hours and then percolating with water into a graduated bottle containing 150 Cc. glycerin (shaking the mixture occasionally) until the liquid measures 450 Cc.

In this dissolve 700 Gm. sugar without heat, strain and pass enough water through the strainer to make 1000 Cc.

The object of macerating 24 hours is to develop the hydrocyanic acid and volatile oil. The glycerin is added as a preservative. Heat should not be employed because the hydrocyanic acid and volatile oil are lost. The amount of hydrocyanic acid present is indefinite because of its extremely volatile nature.

This syrup should not be preserved for long periods.

Uses: Cough sedative.

Of little medicinal value, but it has a pleasant flavor, and a good color, making it a good vehicle.

Dose: 4 Cc. (1 fluidrachm).

SYRUPUS ROSAE. Syrup of Rose.

Preparation. Mix 125 Cc. fluidextract of rose and 10 Cc. diluted sulphuric acid with 300 Cc. of water; allow the mixture to stand 2 hours; filter and dissolve in the filtrate 750 Gm. sugar. Finally add water sufficient to make 1000 Cc.

Uses: Vehicle.

The sulphuric acid is added to develop a pleasant acidulous taste.

SYRUPUS SCILLAE COMPOSITUS. Compound Syrup of Squills.

(Hive Syrup.)

Preparation. Mix 80 Cc. fluidextract of squill with 80 Cc. fluidextract of senega and evaporate, in a tared dish, on a water bath, to 100 Gm. and mix with

350 Cc. of water. When cold mix thoroughly with 20 Gm. purified talc, filter and pass sufficient water through the filter to obtain 400 Cc. of clear filtrate. Add 2 Gm. antimony and potassium tartrate (tartar emetic) dissolved in 25 Cc. of hot water. Dissolve 750 Gm. of sugar in the liquid by agitation, without heat, strain and add sufficient water through the strainer to make 1000 Cc.

Uses: Emetic, diaphoretic, expectorant.

Average dose: 2 Cc. (30 minims).

SYRUPUS SENEGAE. Syrup of Senega.

Preparation. Mix 200 Cc. fluidextract of senega with 800 Cc. syrup.

Uses: Expectorant.

Average dose: 4 Cc. (1 fluidrachm).

SYRUPUS SENNAE.. Syrup of Senna.

Preparation. Mix 250 Cc. fluidextract of senna with 5 Cc. oil of coriander; add syrup sufficient to make 1000 Cc. and mix thoroughly.

Uses: Laxative.

Average dose: 4 Cc. (1 fluidrachm).

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CHAPTER XII.

Vinegars

ACETA. Vinegars.

These are solutions of medicinal principles in diluted acetic acid. This solvent extracts some alkaloids and glucosides not soluble in water alone.

Fermentation of these products is often prevented by the addition of a little alcohol.

The official vinegars (two) are both of 10 per cent. strength. They are made by maceration.

ACETUM OPII. Vinegar of Opium.

(Black Drop.)

Contains 10 per cent. of powdered opium.
Uses: Sedative.
Average dose: 0.5 Cc. (8 minims).

ACETUM SCILLAE. Vinegar of Squill.

Contains 10 per cent. of squill.
Uses: Expectorant.
Average dose: 1 Cc. (15 minims). Seldom employed alone.

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CHAPTER XIII.

Mucilages, Glycerites, Honeys

MUCILAGINES. (Mucilages).

Mucilages are aqueous solutions of mucilaginous drugs, or solutions of gums in water. Some are made by dissolving the substance in cold water while others require the addition of heat. The following are official.

MUCILAGO ACACIAE. Mucilage of Acacia.

Preparation. Take 340 Gm. acacia in small pieces, wash with cold water and allow to drain. Add 330 Gm.

lime water and then add water sufficient to make the mixture weigh 1000 Gm. Agitate occasionally and strain.

Keep bottles well stoppered and completely filled.

Uses: Demulcent.

MUCILAGO SASSAFRAS MEDULLAE. Mucilage of Sassafras Pith.

Preparation. Macerate 2 Gm. sassafras pith in 100 Cc. water for 3 hours and strain without expression.

Make fresh when wanted.

Uses: Vehicle.

Average dose: 16 Cc. (4 fluidrachms).

MUCILAGO TRAGACANTHAE. Mucilage of Tragacanth.

Preparation. Mix 18 Gm. glycerin with 75 Cc. water in a tared vessel, heat to boiling; add 6 Gm. tragacanth and macerate for 24 hours. Then add sufficient water to make the mixture weigh 100 Gm.; beat it until it is uniform and strain forcibly.

Uses: As pill excipient.

Average dose: 16 Cc. (4 fluidrachms). Seldom employed internally.

MUCILAGO ULMI. Mucilage of Elm.

Preparation. Digest 6 Gm. elm with 100 Cc. water, on a water bath, in a covered vessel for 1 hour and strain.

Prepare fresh when wanted.

Uses: Demulcent.

Average dose: 16 Cc. (4 fluidrachms).

GLYCERITA. Glycerites.

Glycerites are solutions of medical substances in glycerin.

There are six official glycerites.

The advantage of glycerin over syrup and, in many preparations, alcohol, as a base, is so great that the list of glycerites should be largely increased.

GLYCERITUM ACIDI TANNICI. Glycerite of Tannic Acid.

Preparation. Triturate 20 Gm. tannic acid with 80 Gm. glycerin to a smooth paste, transfer to porcelain dish and heat on water bath until solution is effected.

Do not employ metallic utensils.

Uses: Antiseptic, astringent.

Average dose: 2 Cc. (30 minims).

GLYCERITUM AMYLI. Glycerite of Starch.

(Glycerin Ointment).

Preparation. Triturate 10 Gm. starch with 10 Cc. water until smooth. Gradually add this mixture to 80 Gm. glycerin in a porcelain dish and heat to about 284 degrees F., continue the heat until a translucent jelly is formed.

Keep in jars well covered.

Uses: Emollient, excipient.

GLYCERITUM BOROGLYCERINI. Glycerite of Boroglycerin.

A solution of 310 Gm. boric acid in glycerin sufficient to make 1000 Gm.

Uses: Antiseptic, in injections, and suppository base.

GLYCERITUM FERRI, QUININAE ET STRYCHNINAE PHOSPHATUM. Glycerite of the Phosphates of Iron, Quinine and Strychnine.

Preparation. Heat 80 Gm. soluble ferric phosphate with 200 Cc. water in a porcelain dish (the temperature not exceeding 158 degrees F.) until dissolved. Then add 200 Cc. phosphoric acid, 0.8 Gm. strychnine, 104 Gm. quinine and water sufficient to make 500 Cc. Stir until solution is effected and add 500 Cc. glycerin and filter if necessary.

GLYCERITUM HYDRASTIS. Glycerite of Hydrastis.

(Fluidextractum Hydrastis Aquosum).

Each 1000 Cc. represents 1000 Gm. hydrastis.

Uses: Astringent, antiphlogistic, tonic; in 10 per cent. to 20 per cent. solutions used as a lotion, injection, etc.

Average dose: 2 Cc. (30 minims).

GLYCERITUM PHENOLIS. Glycerite of Phenol.

(Glyceritum Acidi Carbolici Phar. 1890).

Preparation. Add 20 Cc. liquefied phenol to 80 Cc. glycerin and stir until well mixed.

Uses: As it is freely miscible in water in all proportions it is an excellent method for the internal administration of phenol. Also useful for external applications.

Average dose: 0.3 Cc. (5 minims).

MELITA. (Honeys).

The official honeys are a class of thick or semi-liquid sweet medicated preparations differing from syrups in that honey is employed as the vehicle instead of simple syrup.

Mel Depuratum (Clarified Honey) and **Mel Rosae** (Honey of Rose) constitute the only official honeys, and these are employed simply as bases or vehicles for the administration of other remedies.

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CHAPTER XIV.

EMULSIONS.

Emulsions are mixtures of a milky appearance. The ingredients usually consist of oils, fats or resinous substances suspended in water by the intervention of viscid or mucilaginous bodies.

The oil or fat is broken into minute particles each of which is coated with the emulsifying agent, preventing them from reuniting, and an emulsion is perfect when the oil gloubles are invisible to the naked eye. Milk is a good example.

Substances are emulsified as a rule to disguise the taste, or to form a more even mixture and dose of some substance with another, when they do not mix well when brought together in their usual pharmaceutical state. While it is common to regard emulsions as mixtures which are uniform in appearance, it must be remembered that upon standing some may separate into layers, without being imperfect. Milk is a good

example of this class, in which the true emulsion portion separates as cream; however, no free oil or fat must diffuse from the mixture.

Emulsions are classified as Natural, Gum-Resin and Seed, and Oil or Artificial.

Examples of each are:

Natural, milk, yolk of egg.

Gum-Resin and **Seed,** myrrh, asafoetida, when triturated with water, also almonds, hemp and poppy, when rubbed with water.

Oil or Artificial, fixed or volatile oils when triturated with a gummy substance and water.

Before entering upon the subjects of processes employed, material used, etc., it is well to first consider manipulations, physical obstacles and other principles and rules governing emulsions.

Upon agitating an oil with water, a mixture is obtained which presents an opaque appearance. It quickly separates upon standing into its constituent parts; due to the lack of adhesion between the globules of oil and water and difference in specific gravity. To overcome the difference in specific gravity and prevent the globules from coalescing, some other substance must be added, then upon triturating the mixture the oil is subdivided into globules and coated. The mixture now retains its uniformity and can be diluted as desired.

A point also of vital importance in preparing an emulsion is to use the proper materials and proportions of each to begin with to form a nucleus. Upon this primary base or foundation depends the permanency and appearance of the finished article.

Method will be the first subject considered, as that deals with the formation of the base.

THE CONTINENTAL METHOD.

This method rarely fails to produce complete emulsification; the substances are each weighed out in proper proportions to start the nucleus, nāmely: Oil, 4 parts; acacia (granulated), 2 parts, for volatile oils, and only 1 part for the thick oils; water, 3 to 4 parts. The operation may be accomplished in three ways, as follows:

(1) Stir the oil with the acacia in a dry, deep mortar, then add the water at once, and stir rapidly but lightly with a pestle until a thick creamy emulsion results; this can be diluted as desired. Do not let the oil and acacia remain in contact for more than an instant. The water must be added almost instantaneously. (Uncertain.)

(2) Triturate the acacia with the water until a uniform paste results, all the oil is then added and the whole stirred rapidly as before.

(3) Place the acacia in a dry mortar, in a flask shake the mixture of oil and water, then pour this over the acacia triturating the mixture very rapidly until emulsified. (Uncertain.)

A nucleus formed by any of the above operations should present a uniform, creamy appearance; if pearly, more gum and water should be added at once; if this is not done it will "crack" within a very limited time.

THE ENGLISH METHOD.

This method is applied chiefly to uncertain combinations. A smooth mucilage of gum and water is first prepared in a mortar, add to this alternatingly, in very small portions at a time, with rapid stirring the

oil and water. Be careful to get the paste thick in the beginning.

When any salts or solid extracts, or small amounts of alcoholic solutions, etc., are to be added mix them with the last portions of water or syrup before stirring them in with the emulsion.

EMULSIFYING AGENTS.

The number of these are great, but the more important are:

Tragacanth. An excellent one, requires only a small quantity to produce most emulsions. General rule: for fatty oils, tragacanth 1 part, oil 20 parts, water 20 parts. For volatile oils, oil 8 parts, tragacanth 1 part, water 15 parts. Volatile oils are generally prepared directly in the bottle. First pour in the oil, then tragacanth; shake vigorously, then add the water, shaking until all the oil has been taken up. The flavorings may then be added.

Acacia. About the same as tragacanth; use nearly twice the amount as employed of the former. It is important that the powdered acacia be pure.

Mucilage of Irish Moss. Sometimes employed as substitute for the above two. It is an excellent agent for resinous bodies, but very apt to ferment; an ounce of alcohol to the pint of emulsion will keep the preparation sweet for some time.

Quillaja Bark. Very unsatisfactory, causes expectoration, but is a powerful emulsifier. The tincture is used, about 1 ounce of tincture to 8 ounces of oil. Its emulsions can hardly be destroyed by the common incompatibles of emulsions.

THE OFFICIAL EMULSIONS.

There are six official emulsions, each of which is given below with formula and method of preparation.

EMULSUM AMYGDALAE. Emulsion of Almond.

(Milk of Almond).

Preparation. Sweet almond 60 Gm.; blanch the almond, add 10 Gm. acacia and 30 Gm. sugar and beat them in a mortar until thoroughly mixed. Then rub the mass with 900 Cc. of water, at first very gradually added; strain and add enough water to make the product measure 1000 Cc. and mix thoroughly.

Uses: As a vehicle.

Average dose: 120 Cc. (4 fluidounces).

EMULSUM ASAFOETIDAE. Emulsion of Asafetida.

(Milk of Asafetida).

Preparation. Asafetida, in selected tears, 40 Gm.; rub in a warm mortar with 900 Cc. of water at first very gradually added, until a uniform product results. Strain the mixture and wash mortar with water until the product measures 1000 Cc.

Uses: Antispasmodic, expectorant.

Average dose 16 Cc. (4 fluidrachms).

EMULSUM CHLOROFORMI. Emulsion of Chloroform.

Preparation. Place 10 Gm. tragacanth in a dry bottle, add 40 Cc. chloroform and shake thoroughly. Then add 250 Cc. of water, shake very thoroughly. Now add 60 Cc. expressed oil of almond, in several portions, shaking after each addition. When of a uniform appearance add water gradually in portions, shaking the

whole thoroughly upon each addition, sufficient to make 1000 Cc.

Average dose: 8 Cc. (2 fluidrachms).

EMULSUM OLEI MORRHUAE. Emulsion of Cod Liver Oil.

Preparation. Rub 125 Gm. acacia with 500 Cc. cod liver oil in a dry mortar until uniformly mixed. Then add at once 250 Cc. of water and triturate lightly and rapidly until a thick homogeneous emulsion is produced. To this add 4 Cc. oil of gaultheria and 100 Cc. of syrup, with water enough to make the product measure 1000 Cc. and mix thoroughly.

Note.—Oil of gaultheria may be replaced if desired by a suitable quantity of oil of bitter almonds or other suitable flavoring.

Average dose: 8 Cc. (2 fluidrachms).

EMULSUM OLEI MORRHUAE CUM HYPOPHOSPHITIBUS. Emulsion of Cod Liver Oil with Hypophosphites.

Preparation. Rub 125 Gm. acacia with 500 Cc. cod liver oil in a dry mortar until uniformly mixed, then add at once 250 Cc. of water and triturate lightly and rapidly until a thick homogenous emulsion is produced; add 4 Cc. oil of gaultheria and incorporate thoroughly. Dissolve 10 Gm. calcium hypophosphite, 5 Gm. sodium hypophosphite and 5 Gm. potassium hypophosphite in 100 Cc. of water; mix the solution with 100 Cc. syrup and add the liquid gradually to the emulsion with continued trituration. Lastly add enough water to make the product measure 1000 Cc. and mix thoroughly.

Note.—Oil of gaultheria may be replaced if desired

by a suitable quantity of oil of bitter almonds or other suitable flavoring.

Average dose: 8 Cc. (2 fluidrachms).

EMULSUM OLEI TEREBINTHINAE. Emulsion of Oil of Turpentine.

Preparation. Introduce 15 Gm. finely powdered acacia into a perfectly dry bottle of sufficient capacity, add 15 Cc. rectified oil of turpentine and 5 Cc. expressed oil of almond and shake the bottle thoroughly. Then add about 30 Cc. water and incorporate it by vigorous shaking. When the oil has been completely emulsified add 25 Cc. syrup, in several portions, shaking after each addition, and then water, in divided portions, shaking after each addition, to make the product measure 100 Cc.

Uses: In all cases where oil of turpentine is employed internally.

Average dose: 4 Cc. (1 fluidrachm).

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CHAPTER XV.

ALCOHOLIC SOLUTIONS.

SPIRITUS. Spirits.

Spirits, or "essences" as they are sometimes called, are alcoholic solutions of volatile substances, mostly of volatile oils, and are used chiefly as flavors, adjuvants, aromatic stimulants and stomachic tonics.

The official spirits, according to manner of preparation, may be divided into three classes. First, **By Solution in Alcohol**; Second, **By Chemical Reaction and Solution**; Third, **By Distillation.**

Spirits should be kept in well stoppered bottles in a cool place.

First. Spirits made by dissolving or macerating the substance or substances directly in alcohol.

SPIRITUS AETHERIS. Spirit of Ether.

Preparation. Made by mixing 325 Cc. ether and 675 Cc. alcohol.

Uses: Analgesic, antispasmodic, stimulant.

Average dose: 4 Cc. (1 fluidrachm).

SPIRITUS AETHERIS COMPOSITUS. Compound Spirit of Ether.

(Hoffman's Anodyne).

Preparation. Same as spirit of ether with addition of 25 Cc. ethereal oil and corresponding reduction in amount of alcohol.

Commercial Hoffman's Anodyne is an uncertain article. It is a by-product obtained from the manufacture of ether and is not uniform; contains varying proportions of ether, light and heavy oil of wine, alcohol and water.

Uses: Similar to above, chiefly anodyne.

Average dose: 4 Cc. (1 fluidrachm).

SPIRITUS AMMONIAE. Spirit of Ammonia.

Contains 10 per cent. by weight of ammonia gas in pure alcohol, recently distilled, and preserved in glass.

Recently distilled alcohol is ordered to avoid the slight discoloration resulting from a mixture of ammonia with alcohol which has stood in a barrel and which contains a trace of organic matter.

Uses: Stimulant.

Average dose: 1 Cc. (15 minims).

SPIRITUS AMMONIAE AROMATICUS. Aromatic Spirit of Ammonia.

A solution of ammonium carbonate and ammonia water with oils of lemon, lavender and nutmeg. The object of the ammonia water is to convert the carbonate into the normal salt.

Uses: Stimulant, anti-spasmodic, carminative.

Average dose: 2 Cc. (30 minims) diluted.

SPIRITUS AMYGDALAE AMARAE. Spirit of Bitter Almond.

Preparation. Oil of bitter almond 10 Cc., alcohol 800 Cc., water enough to make 1000 Cc.

Uses: Flavoring agent.

Average dose: 0.5 Cc. (8 minims).

SPIRITUS ANISI. Spirit of Anise.

Preparation. A mixture of oil of anise 100 Cc. and alcohol 900 Cc.

Uses: Flavoring agent.

Average dose: 4 Cc. (1 fluidrachm).

SPIRITUS CINNAMOMI. Spirit of Cinnamon.

Preparation. Same as spirit of anise.

Oil of cassia is very frequently used under the erroneous supposition that it is the same as oil of cinnamon. The oil of cinnamon costs nearly as much per ounce as oil of cassia does per pound; is a much more delicate flavor and should always be employed.

Uses: Stimulant. Flavoring agent.

Average dose: 2 Cc. (30 minims).

SPIRITUS AURANTII COMPOSITUS. Compound Spirit of Orange.

Preparation. Oil of orange peel 200 Cc., oil of lem-

on 50 Cc., oil of coriander 20 Cc., oil of anise 5 Cc., alcohol 725 Cc.

The oils must be fresh.

Keep the product in completely filled bottles, well stoppered in a cool dark place.

Uses: Flavoring agent. A constituent of aromatic elixir.

SPIRITUS CAMPHORAE. Spirit of Camphor.

Preparation. Camphor, 100 Gm. Alcohol, q. s. 1000 Cc.

Uses: Anodyne, anti-spasmodic, stimulant.

Average dose: 1 Cc. (15 minims).

SPIRITUS CHLOROFORMI. Spirit of Chloroform.

Preparation. Chloroform 60 Cc., alcohol 940 Cc.

Uses: Anodyne, analgesic, sedative. Valuable as addition to liquid cough mixtures.

Average dose: 2 Cc. (30 minims).

SPIRITUS GAULTHERIAE. Spirit of Gaultheria.

Preparation. Same as spirit of anise.

Uses: Flavoring agent.

SPIRITUS GLYCERYLIS NITRATIS. Spirit of Nitroglycerin. Spirit of Glyceryl Trinitrate.

(Spiritus Glonoini, U. S. P., 1890).

Contains 1 per cent. by weight of glyceryl trinitrate in alcohol.

Should be very carefully handled because of liability of explosion and fire. If spilled throw on solution of caustic potash.

Uses: Epilepsy, asthma, syncope, cardiac stimulant.

Average dose: 0.5 Cc. (1 minim).

SPIRITUS JUNIPERI. Spirit of Juniper.

Preparation. Oil of juniper 50 Cc., alcohol 950 Cc.

Uses. Diuretic.

Average dose: 2 Cc. (30 minims).

SPIRITUS JUNIPERI COMPOSITUS. Compound Spirit of Juniper.

Preparation. Made by dissolving 8 Cc. oil of juniper, 1 Cc. of each of oil of caraway and oil of fennel in 1400 Cc. of alcohol; then add enough water to make 2000 Cc.

Uses: Diuretic.

Average dose: 8 Cc. (2 fluidrachms).

SPIRITUS LAVANDULAE. Spirit of Lavender.

Preparation. Same as spirit of juniper.

Uses: Flavoring agent.

SPIRITUS MENTHAE PIPERITAE. Spirit of Peppermint.

Preparation. Same as spirit of anise, with addition of 10 Gm. peppermint herb to color.

Uses: Carminative, flavoring.

Average dose: 2 Cc. (30 minims).

SPIRITUS MENTHAE VIRIDIS. Spirit of Spearmint.

Preparation. Same as spirit of anise with addition of 10 Gm. spearmint herb to color.

Uses: Carminative, stimulant, rubefacient.

Average dose: 2 Cc. (30 minims).

Second. Spirits prepared by chemical action and solution.

SPIRITUS AETHERIS NITROSI. Spirit of Nitrous Ether.

Preparation. An alcoholic solution of ethyl ni-

trite, prepared by the reaction of nitrous acid on alcohol, which is preserved by solution in alcohol.

Should contain not less than 4 per cent. of ethyl nitrite.

Should be kept away from lights and fire, in small amber colored bottles in dark places.

This preparation is very liable to deteriorate.

When freshly prepared it is neutral, but becomes acid upon standing. This may be prevented by adding a few crystals potassium bicarbonate to the solution, but decomposition will continue.

Uses: Diuretic, diaphoretic, anti-spasmodic.

Average dose: 2 Cc. (30 minims).

Incompatibles: Potassium iodide, morphine, antipyrine, acetanilide.

Third. Spirits prepared by distillation.

Besides the two given below some of those in class one may be prepared also by distillation. The process yielding a more delicate odor and flavor.

SPIRITUS FRUMENTI. Whisky.

An alcoholic liquid obtained by the distillation of fermented mash of grain, corn, rye, wheat and barley, or their mixtures, being employed for the purpose.

Contains alcohol in amount of 44 per cent. to 55 per cent. by volume. Should be at least four years old.

SPIRITUS VINI GALLICI. Brandy.

An alcoholic liquid obtained by the distillation of the fermented, unmodified juice of fresh grapes.

Alcohol, content by volume, 46 per cent. to 55 per cent., should be at least four years old.

TINCTURES.

Tinctures are alcoholic solutions of non-volatile organic medicinal drugs (with the exception of tincture of iodine and tincture ferric chloride).

They are made by percolation, maceration, solution or dilution.

The usual menstruum used is alcohol in various proportions with water and, sometimes, glycerin.

The plan of the Pharmacopoeia is to use just sufficient alcohol to exhaust the drug without extracting more of the inert principles than necessary, and secure permanent preparations.

Glycerin is used to prevent precipitations of principles that would otherwise precipitate within a short time.

In olden times tinctures were made exclusively by maceration, now this process is used principally for resins, balsams, gums, soaps, etc. It has given place to percolation, which saves time, material and labor and produces a more efficient preparation.

The last revision of the Pharmacopoeia materially changed the strength of tinctures in an endeavor to make them nearer uniform. The most of them are either 10 per cent. for potent drugs or 20 per cent. for less active drugs.

A number of assay processes for tinctures containing alkaloids were introduced, and it is practical to make assays of these tinctures to determine their exact strength. Processes for assaying the following tinctures are now official.

ASSAYED TINCTURES.

Aconite	Belladonna Leaf
Cinchona	Colchicum Seed
Hydrastis	Hyoscyamus
Nux Vomica	Opium
Opium Deodorized	Physostigma
	Stramonium.

OFFICIAL TINCTURES.

TINCTURA ACONITI. Tincture of Aconite.

Preparation. Aconite in No. 60 powder, 100 Gm. Menstrum, alcohol 7 volumes, water 3 volumes, sufficient to make 1000 Cc. Made by percolation.

The strength of this tincture has been reduced from 35 Gm. of aconite in 100 Cc. (U. S. P., 1890) to 10 Gm. of aconite in 100 Cc.

When assayed should be found to contain 0.045 Gm. aconitine in 100 Cc.

The official tincture has a yellowish brown color. If less alcohol is used in the menstruum the color is much darker.

Uses: Diaphoretic, cardiac, sedative.

Average dose: 0.6 Cc. (10 minims).

TINCTURA ALOES. Tincture of Aloes.

Preparation. Purified aloes in No. 40 powder 100 Gm. glycyrrhiza in No. 40 powder 200 Gm. Menstrum, diluted alcohol sufficient to make 1000 Cc. Made by maceration for 7 days.

Uses: Laxative. Locally for ulcers and sores.

Average dose: 2 Cc. (30 minims).

TINCTURA ALOES ET MYRRHAE. Tincture of Aloes and Myrrh.

Preparation. Purified aloes, in No. 40 powder, 100 Gm.; myrrh, in No. 40 powder, 100 Gm., glycerrhiza, in No. 40 powder, 100 Gm. Menstruum, alcohol 750 Cc. Water 250 Cc., sufficient to make 1000 Cc. Made by maceration for 7 days.

Uses: Amenorrhoea with constipation.

Average dose: 2 Cc. (30 minims).

TINCTURA ARNICAE. Tincture of Arnica.

(Tinctura Arnicae-Florum, U. S. P., 1890).

Preparation. Arnica in No. 20 powder, 200 Gm. Menstruum, diluted alcohol sufficient to make 1000 Cc. Made by maceration for 3 days and expression.

Uses: Locally for cuts, bruises, etc. A popular family remedy the value of which is probably overestimated.

Average dose: 1 Cc. (15 minims). Seldom employed internally.

TINCTURA ASAFOETIDAE. Tincture of Asafetida.

Preparation. Asafetida, well bruised, 200 Gm. Menstruum, alcohol sufficient to make 1000 Cc. Made by maceration for 7 days.

Uses: Hysteria. Seldom employed.

Average dose: 1 Cc. (15 minims).

TINCTURA AURANTII AMARI. Tincture of Bitter Orange Peel.

Preparation. Bitter orange peel, in No. 40 powder, 200 Gm. Menstruum, alcohol 6 parts, water 4 parts, sufficient to make 1000 Cc. Made by percolation.

Uses: Chiefly as a flavoring.

Average dose: 4 Cc. (1 fluidrachm).

TINCTURA AURANTII DULCIS. Tincture of Sweet Orange Peel.

Preparation. Sweet orange peel, from the fresh fruit, 500 Gm. Menstruum, alcohol sufficient to make 1000 Cc. Made by maceration.

Uses: Flavoring agent.

Average dose: 4 Cc. (1 fluidrachm).

TINCTURA BELLADONNAE FOLIORUM. Tincture of Belladonna Leaves.

Preparation. Belladonna leaves, in No. 60 powder (containing not less than 0.35 per cent. of alkaloids) 100 Gm. Menstruum, diluted alcohol sufficient to make 1000 Cc. Made by percolation.

Uses: All purposes where belladonna is indicated.

Average dose: 0.5 Cc. (8 minims).

TINCTURA BENZOINI. Tincture of Benzoin.

Preparation. Benzoin, in No. 40 powder, 200 Gm. menstruum, alcohol sufficient to make 1000 Cc. Made by maceration.

Uses: Expectorant, astringent. Locally as a protective.

Average dose: 1 Cc. (15 minims).

TINCTURA BENZOINI COMPOSITA. Compound Tincture of Benzoin.

Preparation. Benzoin, in No. 40 powder, 100 Gm., purified aloes, in No. 40 powder, 20 Gm., storax 80 Gm., balsam of tolu 40 Gm. Menstruum, alcohol sufficient to make 1000 Cc. Made by maceration.

Uses: Expectorant, astringent. Also applied locally.

Average dose: 2 Cc. (30 minims).

TINCTURA CALENDULAE. Tincture of Calendula.

Preparation. Calendula, in No. 20 powder, 200 Gm. Menstruum, alcohol sufficient to make 1000 Cc. Made by percolation.

Uses: Externally for sprains and bruises.

TINCTURA CALUMBAE. Tincture of Calumba.

Preparation. Calumba, in No. 20 powder, 200 Gm. Menstruum, alcohol 600 Cc., water 400 Cc. sufficient to make 1000 Cc. Made by percolation.

Uses: Bitter tonic.

Average dose: 4 Cc. (1 fluidrachm).

TINCTURA CANNABIS INDICAE. Tincture of Indian Cannabis.

Preparation. Indian cannabis, in No. 40 powder, 100 Gm. Menstruum, alcohol sufficient to make 1000 Cc. Made by percolation.

Uses: Analgesic, aphrodisiac, narcotic, sedative.

Average dose: 0.6 Cc. (10 minims).

TINCTURA CANTHARIDIS. Tincture of Cantharides.

Preparation. Cantharides, in No. 60 powder, 100 Gm. Menstruum, alcohol, sufficient to make 1000 Cc. Made by percolation.

Uses: Aphrodisiac, diuretic, irritant. Externally in liniments.

Average dose: 0.3 Cc. (5 minims).

TINCTURA CAPSICI. Tincture of Capsicum.

Preparation. Capsicum, in No. 50 powder, 100 Gm. Menstruum, alcohol 950 Cc., water 50 Cc., sufficient to 1000 Cc. Made by percolation.

Uses: Carminative, stimulant. Externally in liniments and ointments.

Average dose: 0.5 Cc. (8 minims).

TINCTURA CARDAMOMI. Tincture of Cardamom.

Preparation. Cardamom, in No. 30 powder, 200 Gm. Menstruum, alcohol sufficient to make 1000 Cc. Cc. Made by percolation.

Uses: Carminative, flavoring.

Average dose: 4 Cc. (1 fluidrachm).

TINCTURA CARDAMOMI COMPOSITA. Compound Tincture of Cardamom.

Preparation. Cardamom 25 Gm., saigon cinnamon, 25 Gm., caraway 12 Gm., cochineal 5 Gm., all in No. 40 powder. Menstrum, glycerin 50 Cc., diluted alcohol 950 Cc., sufficient to make 1000 Cc. Made by maceration.

Uses: Carminative, tonic, flavoring.

Average dose: 4 Cc. (1 fluidrachm).

TINCTURA CIMICIFUGAE. Tincture of Cimicifuga.

Preparation. Cimicifuga, in No. 40 powder, 200 Gm. Menstrum, alcohol sufficient to make 1000 Cc. Made by percolation.

Uses: Alterative, tonic, flavoring.

TINCTURA CINCHONAE. Tincture of Cinchona.

Preparation. Cinchona, in No. 60 powder (yielding not less than 4 per cent. of anhydrous ether-soluble alkaloids) 200 Gm. Menstruum, glycerin 75 Cc., alcohol 675 Cc., water 250 Cc., sufficient to make 1000 Cc. Made by percolation.

Uses: Antiperiodic, bitter tonic.

Average dose: 4 Cc. (1 fluidrachm).

TINCTURA CINCHONAE COMPOSITA. Compound Tincture of Cinchona.

Preparation. Red cinchona (yielding not less than 5 per cent. of anhydrous cinchona alkaloids) 100 Gm. bitter orange peel, 80 Gm. serpentaria, 20 Gm. in No. 40 powder. Menstruum, glycerin 75 Cc., alcohol 675 Cc., water 250 Cc., sufficient to make 1000 Cc. Made by percolation.

Uses: Tonic, stimulant.

Average dose: 4 Cc. (1 fluidrachm).

TINCTURA CINNAMOMI. Tincture of Cinnamon.

Preparation. Saigon cinnamon, in No. 50 powder, 200 Gm. Menstruum, glycerin 75 Cc., alcohol 675 Cc., water 250 Cc., sufficient to make 1000 Cc. Made by percolation.

Uses: Astringent, carminative, flavoring.

Average dose: 2 Cc. (30 minims).

TINCTURA COLCHICI SEMINIS. Tincture of Colchicum Seed.

Preparation. Colchicum seed, in No. 50 powder (containing not less than 0.55 per cent. of colchicine) 100 Gm. Menstruum, alcohol 600 Cc., water 400 Cc., sufficient to make 1000 Cc. Made by percolation.

Uses: Analgesic, antirheumatic, anti-neuralgic, alterative.

Average dose: 2 Cc. (30 minims).

TINCTURA DIGITALIS. Tincture of Digitalis.

Preparation. Digitalis, in No. 60 powder, 100 Gm. Menstruum, diluted alcohol sufficient to make 1000 Cc. Made by percolation.

Uses: Cardiac tonic, diuretic.

Average dose: 1 Cc. (15 minims).

TINCTURA FERRI CHLORIDI. Tincture of Ferric Chloride.

(Tincture of Iron).

Preparation. Solution of ferric chloride 350 Cc. with alcohol sufficient to make 1000 Cc.

Uses: Anemia, debility, to arrest hemorrhages. Locally as a caustic.

Average dose: 0.5 Cc. (8 minims).

TINCTURA GALLAE. Tincture of Nutgall.

Preparation. Nutgall, in No. 40 powder, 200 Gm. Menstruum, glycerin 100 Cc., alcohol 900 Cc., sufficient to make 1000 Cc. Made by percolation.

Uses: Astringent. Seldom given internally.

Avarage dose: 4 Cc. (1 fluidrachm).

TINCTURA GAMBIR COMPOSITA. Compound Tincture of Gambir.

(Replaces Tincture Catechu Comp. U. S. P. 1890.)

Preparation. Gambir, 50 Gm., saigon cinnamon 25 Gm., in No. 50 powder. Menstruum, diluted alcohol sufficient to make 1000 Cc. Made by maceration.

Uses: Astringent in diarrhoea.

Average dose: 4 Cc. (1 fluidrachm).

TINCTURA GELSEMII. Tincture of Gelsemium.

Preparation. Gelsemium, in No. 60 powder, 100 Gm. Menstruum, alcohol 650 Cc., water 350 Cc., sufficient to make 1000 Cc. Made by percolation.

Uses: Antispasmodic, anti-neuralgic, cardiac.

Average dose: 0.5 Cc. (8 minims).

TINCTURA GENTIANAE COMPOSITA. Compound Tincture of Gentian.

Preparation. Gentian 100 Gm., bitter orange peel 40 Gm., cardamom 10 Gm., in No. 40 powder. Men-

struum, alcohol 600 Cc., water 400 Cc., sufficient to make 1000 Cc. Made by percolation.

Uses: Bitter tonic.

Average dose: 4 Cc. (1 fluidrachm).

TINCTURA GUAIACI. Tincture of Guaiac.

Preparation. Guaiac, in No. 40 powder 200 Gm. Menstruum, alcohol sufficient to make 1000 Cc. Made by maceration.

Uses: Amenorrhoea, gout, rheumatism. Externally as astringent.

Average dose: 4 Cc. (1 fluidrachm).

TINCTURA GUAIACI AMMONIATA. Ammoniated Tincture of Guaiac.

Preparation. Guaiac, in No. 40 powder, 200 Gm. Menstruum, aromatic spirit of ammonia sufficient to make 1000 Cc. Made by maceration.

Uses: Same as tincture guaiac.

Average dose: 2 Cc. (30 minims).

TINCTURA HYDRASTIS. Tincture of Hydrastis.

Preparation. Hydrastis, in No. 60 powder (containing not less than 2.5 per cent. of hydrastine) 200 Gm. Menstruum, alcohol 650 Cc., water 350 Cc., sufficient to make 1000 Cc. Made by percolation.

Uses: Alterative, astringent, cholagogue, hemostatic.

Average dose: 4 Cc. (1 fluidrachm).

TINCTURA HYOSCYAMI. Tincture of Hyoscyamus.

Preparation. Hyoscyamus, in No. 60 powder, containing not less than 0.08 per cent. of mydriatic alka-

loids) 100 Gm. Menstruum, diluted alcohol sufficient to make 1000 Cc. Made by percolation.

Uses: Anodyne, anti-spasmodic, sedative.

Average dose: 2 Cc. (30 minims).

TINCTURA IODI. Tincture of Iodine.

Preparation. Iodine 70 Gm., potassium iodide 50 Gm. Menstruum, alcohol, sufficient to make 1000 Cc. Made by solution.

Uses: Alterative, externally antiseptic, vesicant. Seldom given internally.

Average dose: 0.1 Cc. (1½ minims).

TINCTURA IPECACUANHAE ET OPII. Tincture of Ipecac and Opium.

Preparation. Tincture of deodorized opium 1000 Cc., fluidextract of ipecac 100 Cc., diluted alcohol sufficient to make 1000 Cc. Evaporate the tincture of deodorized opium on a water bath to 800 Gm. Add the fluidextract of ipecac, filter and add through the filter enough diluted alcohol to make 1000 Cc.

Uses: Anodyne, diaphoretic, expectorant, sedative.

Average dose: 0.5 Cc. (8 minims).

TINCTURA KINO. Tincture of Kino.

Preparation. Kino 50 Gm., purified talc 10 Gm. Menstruum, glycerin 150 Cc., alcohol 650 Cc., water 200 Cc. Made by maceration.

Uses: Astringent.

Average dose: 4 Cc. (1 fluidrachm).

TINCTURA KRAMERIAE. Tincture of Krameria.

Preparation. Krameria, in No. 40 powder 200 Gm. Menstruum, diluted alcohol sufficient to make 1000 Cc. Made by percolation.

Uses: Astringent, hemostatic.

Average dose: 4 Cc. (1 fluidrachm).

TINCTURA LACTUCARII. Tincture of Lactucarium.

Preparation. Lactucarium 500 Gm. Menstruum, glycerin 250 Cc., alcohol 500 Cc., water 200 Cc., diluted alcohol sufficient to make 1000 Cc. Made by percolation.

The lactucarium is first washed with purified petroleum benzin to remove the inert substances.

Uses: Very mild anodyne and sedative. Seldom employed.

Average dose: 2 Cc. (30 minims).

TINCTURA LAVANDULAE COMPOSITA. Compound Tincture of Lavender.

Preparation. Oil of lavender flowers 8 Cc., oil of rosemary 2 Cc., saigon cinnamon, 20 Gm., cloves 5 Gm., myristica 10 Gm., red saunders 10 Gm., reduced to a No. 50 powder. Menstruum alcohol 750 Cc., water 250 Cc., sufficient to make 1000 Cc. Made by maceration.

Uses: Aromatic, carminative, flavoring.

Average dose: 2 Cc. (30 minims).

TINCTURA LIMONIS CORTICIS. Tincture of Lemon Peel.

Preparation. Lemon peel, from the fresh fruit, in thin shavings and cut into narrow shreds, 500 Gm. Menstruum alcohol sufficient to make 1000 Cc. Made by maceration.

Uses: Flavoring.

TINCTURA LOBELIAE. Tincture of Lobelia.

Preparation. Lobelia, in No. 50 powder, 100 Gm. Menstruum, diluted alcohol sufficient to make 1000 Cc. Made by percolation.

Uses: Diuretic, emetic expectorant.

Average dose: Expectorant 1 Cc. (15 minims), emetic, 4 Cc. (1 fluidrachm).

TINCTURA MOSCHI. Tincture of Musk.

Preparation. Musk 5 Gm. Menstruum, alcohol 45 Cc., water 45 Cc., diluted alcohol sufficient to make 100 Cc. Made by maceration.

Uses: Antispasmodic, stimulant.

Average dose: 4 Cc. (1 fluidrachm).

TINCTURA MYRRHAE. Tincture of Myrrh.

Preparation. Myrrh, in moderately coarse powder, 200 Gm. Menstruum, alcohol sufficient to make 1000 Cc. Made by maceration.

Uses: Astringent, carminative, emmenagogue.

Average dose: 1 Cc. (15 minims).

TINCTURA NUCIS VOMICAE. Tincture of Nux Vomica.

Preparation. Extract of nux vomica (containing 5 per cent. of strychnine) 20 Gm. Menstrum, alcohol 750 Cc., water 250 Cc., sufficient to make 1000 Cc.

Uses: Stimulant, tonic.

Average dose: 0.6 Cc. (10 minims).

TINCTURA OPII. Tincture of Opium.

(Laudanum).

Preparation. Granulated opium (containing 12 to 12.5 per cent. of crystallizable morphine) 100 Gm. Menstruum, alcohol 400 Cc., water 400 Cc., diluted alcohol sufficient to make 1000 Cc. Made by maceration.

Uses: Anodyne, antispasmodic, hypnotic.

Average dose: 0.5 Cc. (8 minims).

TINCTURA OPII CAMPHORATA. Camphorated Tincture of Opium.

(Paregoric).

Preparation. Powdered opium 4 Gm., benzoic acid 4 Gm., camphor 4 Gm., oil of anise 4 Cc. Menstruum, glycerin 40 Cc., diluted alcohol 950 Cc., sufficient to make 1000 Cc. Made by maceration.

Uses: Anodyne, carminative.

Average dose: 8 Cc. (2 fluidrachms).

TINCTURA OPII DEODORATI. Tincture of Deodorized Opium.

Preparation. Granulated opium (containing 12 to 12.5 per cent. of crystallizable morphine) 100 Gm., purified petroleum benzin 75 Ccc. Menstruum, alcohol 200 Cc., water sufficient to make 1000 Cc. Made by percolation.

Uses: Same as tincture opium; less apt to cause nausea.

Average dose: 0.5 Cc. (8 minims).

TINCTURA PHYSOSTIGMATIS. Tincture of Physostigma.

Preparation. Physostigma, in No. 50 powder (containing 0.15 per cent. of ether-soluble alkaloids) 100 Gm. Menstruum, alcohol sufficient to make 1000 Cc. Made by percolation.

Uses: Antitetanic, antineuralgia, peristaltic.

Average dose: 1 Cc. (15 minims).

TINCTURA PYRETHRI. Tincture of Pyrethrum.

Preparation. Pyrethrum, in No. 50 powder, 200 Gm. Menstruum, alcohol sufficient to make 1000 Cc. Made by percolation.

Uses: Externally as stimulant.

TINCTURA QUASSIAE. Tincture of Quassia.

Preparation. Quassia, in No. 50 powder, 200 Gm. Menstruum, alcohol 350 Cc., water 650 Cc., sufficient to make 1000 Cc. Made by percolation.

Uses: Bitter tonic.

Average dose: 2 Cc. (30 minims).

TINCTURA QUILLAJAE. Tincture of Quillaja.

Preparation. Quillaja, in No. 20 powder, 200 Gm. is boiled in a covered vessel with 800 Cc. of water for 15 minutes, strained while hot and the residue, on the strainer, washed wth 200 Cc. of boiling water. The strained liquid is evaporated to 600 Cc. and allowed to cool. 350 Cc. alcohol is added and the solution set aside for 12 hours, filtered and sufficient water added to make 1000 Cc.

Uses: Externally as a detergent.

TINCTURA RHEI. Tincture of Rhubarb.

Preparation.. Rhubarb 200 Gm., cardamom 40 Gm. in No. 40 powder. Menstrum, glycerin 100 Cc., alcohol 500 Cc., water 400 Cc. Made by percolation.

Uses: Bitter tonic, cathartic, stomachic.

Average dose 4 Cc. (1 fluidrachm.)

TINCTURA RHEI AROMATICA. Aromatic Tincture of Rhubarb.

Preparation. Rhubarb 200 Gm., saigon cinnamon 40 Gm., cloves 40 Gm., myristica 20 Gm. in No. 40 powder. Menstruum, glycerin 100Cc., alcohol 500 Cc., water 400 Cc. Made by percolation.

Uses: Astringent, antidiarrheal, laxative.

Average dose: 2 Cc. (30 minims).

TINCTURA SANGUINARIAE. Tincture of Sanguinaria.

Preparation. Sanguinaria, in No. 60 powder, 100 Gm., acetic acid 20 Cc. Menstruum, alcohol 600 Cc., water 400 Cc. Made by percolation.

Uses: Emetic, expectorant, errhine.

Average dose: 1 Cc. (15 minims).

TINCTURA SCILLAE. Tincture of Squill.

Preparation. Squill, in No. 20 powder, 100 Gm. Menstruum, alcohol 750 Cc., water 250 Cc. Made by maceration.

Uses: Expectorant, diuretic.

Average dose: 1 Cc. (15 minims).

TINCTURA SERPENTARIAE. Tincture of Serpentaria.

Preparation. Serpentaria, in No. 50 powder, 200 Gm. Menstruum, alcohol 650 Cc., water 350 Cc., sufficient to make 1000 Cc. Made by percolation.

Uses: Stimulant, diaphoretic, tonic, vehicle for other drugs.

Average dose: 4 Cc. (1 fluidrachm).

TINCTURA STRAMONII. Tincture of Stramonium.

Preparation. Stramonium, in No. 60 powder (containing not less than 0.35 per cent. of mydriatic alkaloids) 100 Gm. Menstruum, diluted alcohol sufficient to make 1000 Cc. Made by percolation.

Uses: Anodyne, analgesic, antispasmodic.

Average dose: 0.5 Cc. (8 minims).

TINCTURA STROPHANTHI. Tincture of Strophanthus.

Preparation. Strophanthus, in No. 60 powder, 100

Gm. Menstruum, alcohol 650 Cc., water 350 Cc., sufficient to make 1000 Cc. Made by percolation.

Uses: Cardiac tonic and stimulant.

Average dose: 0.5 Cc. (8 minims).

TINCTURA TOLUTANA. Tincture of Tolu.

Preparation. Balsam of tolu 200 Gm. Menstruum, alcohol sufficient to make 1000 Cc. Made by maceration.

Uses: Flavoring. Decomposed by aqueous solutions.

Average dose: 2 Cc. (30 minims).

TINCTURA VALERIANAE. Tincture of Valerian.

Preparation. Valerian, in No. 60 powder, 200 Gm. Menstruum, alcohol 750 Cc., water 250 Cc., sufficient to make 1000 Cc. Made by percolation.

Uses: Antispasmodic, sedative.

Average dose: 4 Cc. (1 fluidrachm).

TINCTURA VALERIANAE AMMONIATA. Ammoniated Tincture of Valerian.

Preparation Valerian in No. 60 powder, 200 Gm. Menstruum, aromatic spirit of ammonia sufficient to make 1000 Cc. Made by percolation.

Uses: Same as tincture valerian, especially valuable in hysteria.

Average dose: 2 Cc. (30 minims).

TINCTURA VANILLAE. Tincture of Vanilla.

Preparation. Vanilla, cut into small pieces and bruised, 100 Gm. sugar, in coarse powder, 200 Gm. Menstruum, alcohol 650 Cc., water 350 Cc., sufficient to make 1000 Cc. Made by percolation.

Uses: Flavoring.

TINCTURA VERATRI. Tincture of Veratrum.

(Tinctura Veratri Viridis, Phar. 1890).

Note.—The strength of this tincture has been reduced from 40 Gm. of veratrum viride in 100 Cc. to 10 Gm. of veratrum in 100 Cc.

Preparation. Veratrum, in No. 60 powder, 100 Gm. Menstruum, alcohol sufficient to make 1000 Cc. Made by percolation.

Uses: Cardiac depressant, diaphoretic, diuretic.

Average dose: 1 Cc. (15 minims).

TINCTURA ZINGIBERIS. Tincture of Ginger.

Preparation. Ginger in No. 50 powder, 200 Gm. Menstruum, alcohol sufficient to make 1000 Cc. Made by percolation.

Uses: Carminative, flavoring.

Average dose: 2 Cc. (30 minims).

FLUIDEXTRACTS.

Fluidextracts are concentrated alcoholic solutions of vegetable drugs.

Each cubic centimeter represents one gram of the drug (approximately 1 pint of fluidextract from 1 pound of the drug).

There are eighty-five official fluidextracts all of which are directed to be made by percolation.

The following is a complete list of official fluidextracts arranged according to the menstruum required. Parts by volume.

Menstruum Pure Alcohol.

Aromatic powder, cannabis indica, capsicum, cimicifuga, cubeb, gelsemium, ginger, lupulin, savin, veratrum.

Menstruum Alcohol and Water.

Alcohol 4 parts, water 1 part.

Belladonna root, eriodictyon, euonymus, mezereum, podophyllum, rhubarb, scopola, serpentaria, staves-acre.

Alcohol 3 parts, water 1 part.

Aconite, buchu, calamus, eucalyptus, grindelia, ipecac, leptandra, matico, nux vomica (with acetic acid 5 per cent.), sumbul, valerian, xanthoxylum.

Alcohol 7 parts, water 3 parts.

Calumba.

Alcohol 2 parts, water 1 part.

Bitter orange peel, colchicum seed, hyoscyamus, stramonium, viburnum opulus, viburnum prunifolium.

Alcohol 6½ parts, water 3½ parts.

Convallaria.

Alcohol 1 part, water 1 part (diluted alcohol).

Berberis, chimaphila, chirata, coca, conium (with acetic acid), cypripedium, digitalis, ergot (with acetic acid 2 per cent.), eupatorium, gentian, guarana, krameria, lappa, phytolacca, pilocarpus, quillaja, rubus, scutellaria, senna, spigelia, stillingia, taraxacum.

Alcohol 5 parts, water 8 parts.

Frangula.

Alcohol 4 parts, water 6 parts.

Cascara sagrada.

Alcohol 1 part, water 2 parts.

Quassia,, sarsaparilla.

Menstruum Alcohol, Water and Glycerin.

Alcohol 8 parts, glycerin 1 part, water 1 part.

Cinchona.

Alcohol 6 parts, water 3 parts, glycerin 1 part.

Hydrastis.

Alcohol 6 parts, water 3 parts, glycerin 1 part.

Apocynum, geranium, pareira.

Diluted alcohol 9 parts, glycerin 1 part.

Pomegranate, quercus, rhus glabra, rose, sarsaparilla (compound fluidextract).

Alcohol 3 parts, water 6 parts, glycerin 1 part.

Hamamelis.

Alcohol 2 parts, water 5 parts, glycerin 3 parts.

Uva ursi.

Alcohol 2 parts, water 6 parts, glycerin 2 parts.

Wild cherry.

Alcohol 6 parts, water 3 parts, solution of potassium hydroxide 0.3 parts.

Senega.

Alcohol 2 parts, glycerin 1 part, water 1 part.

Aromatic cascara sagrada.

Menstruum Acetic Acid 10 Per Cent.

Lobelia, sanguinaria, squill.

Menstruum Boiling Water.

Glycyrrhiza, triticum.

Finished product contains about 35 per cent. of alcohol (to preserve), and in the case of glycyrrhiza also 25 per cent. of glycerin and 5 per cent. of ammonia water.

Fluidextracts cannot be economically made by a physician or druggist without suitable apparatus, owing to loss of alcohol.

The following formula is given so that the process may be understood.

FLUIDEXTRACT OF ACONITE.

Aconite, in No. 60 powder..... 1000 Gm.
Alcohol,
Water, each, q. s. ..... 1000 Cc.

Mix 750 Cc. of alcohol with 250 Cc. of water, and, having moistened the powder with 400 Cc. of the mixture, pack it firmly in a cylindrical percolator; then

add enough menstrum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed slowly, gradually adding menstrum, using the same proportions of alcohol and water as before, until the aconite is exhausted. Reserve the first 800 Cc. of the percolate and evaporate the remainder, in a porcelain dish, at a temperature not exceeding 50 degrees C. (122 degrees F.), to a soft extract; dissolve this in the reserved portion, mixing thoroughly.

Assay 10 Cc. of this liquid by the process given below; from the results thus obtained ascertain by calculation the amount of aconitine in the remainder of the liquid, add to this enough menstruum to make each 100 Cc. of the finished fluidextract contain 0.4 Gm. of aconitine.

ASSAYED FLUIDEXTRACTS.

The Pharmacopoeia requires fourteen fluidextracts to be standardized, as follows:

Fluidextractum:

Aconitii, 100 Cc. equals 0.40 Gm. Aconitine.

Belladonnae Radicis, 100 Cc. equals 0.40 Gm. Mydriatic alkaloids.

Cinchonae, 100 Cc. equals 4.00 Gm. Anhydrous ether-soluble alkaloids.

Cocae, 100 Cc. equal 0.50 Gm. Anhydrous ether soluble alkaloids.

Colchici Seminis, 100 Cc. equal 0.50 Gm. Colchicine.

Conii, 100 Cc. equals 0.45 Gm. Coniine.

Guaranae, 100 Cc. equal 3.50 Gm. Alkaloids.
Hydrastis, 100 Cc. equal 2.00 Gm. Hydrastine.
Hyoscyami, 100 Cc. equal 0.075 Gm. Alkaloids.
Ipecacuanhae, 100 Cc. equal 1.75 Gm. Alkaloids.
Nucis Vomicae, 100 Cc. equal 1.00 Gm. Strychnine.
Pilocarpi, 100 Cc. equal 0.40 Gm. Alkaloids.
Scopolae, 100 Cc. equal 0.50 Gm. Mydratic alkaloids.
Stramonii, 100 Cc. equal 0.25 Gm. Mydriatic alkaloids.

* * * *

ELIXIRA. Elixirs.

Elixirs are sweetened, aromatic, alcoholic liquids intended generally to disguise the taste of bitter or nauseous drugs.

There are but three official elixirs.

ELIXIR ADJUVANS. Adjuvant Elixir.

Preparation. A mixture of 120 Cc. fluidextract licorice and 880 Cc. aromatic elixir.

ELIXIR AROMATICUM. Aromatic Elixir.

(Simple Elixir).

Preparation. Contains 12 Cc. compound spirit of orange, about 250 Cc. alcohol and 375 Cc. syrup in each 1000 Cc.

In the manufacture of this elixir the greatest care must be exercised in the quality of the compound spirit of orange which should be made from fresh oils free from terebinthanate odor and taste.

An unofficial formula for simple elixir, which is easily prepared and which gives excellent results is prepared as follows:

Orange peel, fresh, outer yellow rind only	1 av. oz.
Lemon peel, fresh, outer yellow rind only	¼ av. oz.
Coriander seed, crushed	¼ av oz.
Anise seed, ground	¼ av. oz.
Alcohol	8 fl. oz.
Water	1 pint.
Sugar	12 av. oz.
Talc	4 oz.
Simple syrup, q. s.	1 qt.

Add the lemon and orange peel (cut fine) and the coriander and anise to the alcohol and let stand for two or three days with an occasional shaking. Then put the talc (magnesium carbonate or precipitated chalk will do) into a mortar and add the alcolholic solution, then add the water, gradually, with constant stirring. Filter through a wetted filter returning the first portions until it runs clear. Dissolve the sugar in the filtrate and lastly, enough syrup to make a quart. It is advisable to add a small amount of alcohol (say ½ ounce) to the finished product to replace the alcohol lost in filtering.

When filtered before the sugar is added, the process of filtration is much easier accomplished.

ELIXIR FERRI, QUININAE ET STRYCHNINAE PHOSPHATUM. Elixir of the Phosphates of Iron, Quinine and Strychnine.

Uses: Hematinic, nervine.

Average dose: 4 Cc. (1 fluidrachm) containing 1-60 grain of strychnine.

Why this elixir is made official, though there are a large number in more extensive use, we are unable to explain.

Because of the popularity of elixirs, a large number have become semi-official through incorporation in the National Formulary.

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VINA MEDICATA. Medicated Wines.

Medicated wines are a class of preparations similar to tinctures only differing as to menstruum, which is (with the exception of wine of coca) a dry white wine or a mixture of white wine and alcohol. White wine is used because it contains less tannin than red wine, which would discolor with compounds of iron and precipitate alkaloids and some salts.

VINUM ALBUM. White Wine.

An alcoholic liquid (8.5 to 15 per cent. alcohol) pale straw colored.

Made by fermenting the juice of fresh grapes free from the seeds, stems and skins.

VINUM RUBRUM. Red Wine.

Same strength as above.

Made by fermenting juice of fresh red colored grapes in presence of their skins. Color, deep red.

Medicated wines may be made by three processes, 1, Direct Solution; 2 Maceration; 3 Percolation. Though the Pharmacopoeia only directs the use of the first two processes.

Process One. Direct Solution.

VINUM ANTIMONII. Wine of Antimony.

Preparation. Made by dissolving 4 Gm. antimony and potassium tartrate (tartar emetic) in 65 Cc. of boiling distilled water. When cool add the solution to a mixture of 175 Cc. of alcohol and 725 Cc. white wine and filter, adding white wine sufficient to produce 1000 Cc. of product.

Uses: Emetic, diaphoretic, expectorant.

Average dose: 1 Cc. (15 minims) which contains about .004 Gm. (1-16 grain) tartar emetic.

VINUM COCAE. Wine of Coca.

Preparation. Fluidextract of coca 65 Cc.; alcohol 75 Cc., sugar 65 Gm. The sugar is dissolved in 500 Cc. of red wine and the other ingredients added, together with enough red wine to make 1000 Cc. After macerating two days filter through paper in a covered funnel.

Uses: Nerve stimulant, invigorator.

Average dose: 16 Cc. (4 fluidrachms) representing about 1 Gm. (15 grains) of coca.

The three following are prepared by simply mixing the ingredients, letting the mixture stand for 48 hours and filtering through paper in a well-covered funnel.

VINUM COLCHICI SEMINIS. Wine of Colchicum Seed.

Strength 10 per cent. (was 15 per cent. in Phar. 1890).

Preparation. Fluidextract of colchicum seed 100 Cc., alcohol 150 Cc., white wine 750 Cc.

Uses: Alterative, diuretic, antirheumatic.

Average dose: 2 Cc. (30 minims).

VINUM ERGOTAE. Wine of Ergot.

Preparation. Fluidextract of ergot 200 Cc., alcohol 50 Cc., white wine 750 Cc.

Uses: Emmenagogue, hemostatic, oxytocic.

Average dose: 8 Cc. (2 fluidrachms) representing 1.5 Gm. (24 grains) of ergot.

VINUM IPECACUANHAE. Wine of Ipecac.

Preparation. Fluidextract of ipecac and alcohol, of each, 100 Cc., white wine 800 Cc.

Uses: Expectorant, emetic.

Average dose: 1 Cc. (15 minims).

VINUM FERRI. Wine of Iron.

(Vinum Ferri Citratis, Phar. 1890).

Preparation. Iron and ammonium citrate 40 Gm., tincture of sweet orange peel 60 Cc., syrup 100 Cc., white wine 800 Cc.

The iron salt is first dissolved in most of the white wine and the other ingredients added with the balance of the wine. After standing 48 hours filter through paper, covering the funnel.

Uses: Mild hematinic.

Average dose: 8 Cc. (2 fluidrachms) containing 0.4 Gm. (5 grains) of iron ammonium citrate.

VINUM FERRI AMARUM. Bitter Wine of Iron.

Preparation. Dissolve 50 Gm. of soluble iron and quinine citrate in 500 Cc. of white wine and add 60 Cc. of tincture of sweet orange peel and 300 Cc. of syrup;

finally white wine enough to make 1000 Cc. After mixture has stood for two days filter in the usual manner.

Uses: Chalybeate tonic.

Average dose: 8 Cc. (2 fluidrachms) containing about 0.4 Gm. (5 grains) of soluble iron quinine citrate.

Process Two. Maceration.

VINUM OPII. Wine of Opium.

Preparation. Macerate granulated opium 100 Gm., saigon cinnamon in No. 60 powder, and cloves, in No. 30 powder, of each, 10 Gm. in a mixture of 150 Cc. alcohol and 850 Cc. white wine for seven days. Filter through purified cotton, passing enough of the menstrum through until the product measures 1000 Cc.

Uses: Anodyne, antispasmodic, cerebrospinal depressant.

Average dose: 0.5 Cc. (8 minims) representing 0.05 Gm. (¾ grain) of opium.

COLLODIA. Collodions.

Collodions are solutions in ether-alcohol of pyroxylin or soluble gun-cotton, with medicinal agents; for external application. They form a skin-like pellicle which is impervious to water when applied to surfaces, owing to the very volatile character of the solvent.

Collodion is made the vehicle for the application of various remedies, such as iodine, cantharides, corrosive sublimate, etc.

Because of the volatile nature of ether they should be kept in well-stoppered vials in a cool place and because of the extremely inflammable nature of

both the pyroxylin and the ether-alcohol, they should never be applied in proximity to lights or fires.

COLLIDIUM. Collodion.

Preparation. Pyroxylin 4 Gm., ether 75 Cc., alcohol 25 Cc.

The ether is poured on the pyroxylin contained in a bottle and the mixture allowed to stand for about 15 minutes. Then add the alcohol and shake until the pyroxylin is dissolved. Cork and wait until liquid is clear. Lastly pour off the clear solution into small bottles which should be corked and sealed.

Keep in cool place away from lights or fires.

COLLODIUM CANTHARIDATUM. Cantharidal Collodion.

Contains 60 per cent. of cantharides, the active principals of which are exhausted by chloroform and incorporated with flexible collodion.

COLLODIUM FLEXILE. Flexible Collodion.

Preparation. Introduce into a tared bottle the following substances, each by weight, and mix then thoroughly: Collodion 92 parts, Canada turpentine 5 parts, castor oil 3 parts.

Keep in cork-stoppered bottles.

Keep away from lights and fires.

COLLODIUM STYPTICUM. Styptic Collodion.

Preparation. 20 Gm. of tannic acid is introduced into a graduated bottle and shaken with 5 Cc. of alcohol and 25 Cc. of ether. Enough collodion is then added to make the product measure 100 Cc., shaking occasionally until the tannic acid is completely dissolved.

CHAPTER XVI.

LINIMENTA. Liniments.

Liniments are solutions or mixtures of various medicinal substances with alcohol or oleaginous fluids or liquid soap, and are intended for external application.

With the exception of soap liniment and camphor liniment, they are usually prepared extemporaneously although they keep well. There are eight liniments official as follows:

LINIMENTUM AMMONIAE. Ammonia Liniment.

Preparation. Mix, by agitation in a bottle, ammonia water 350 Cc., alcohol 50 Cc., cotton seed oil 570 Cc., and oleic acid 30 Cc.

To secure a good preparation the ammonia water must be U. S. P.

This liniment should be freshly prepared.

Uses: Rubefacient, stimulant. Usually applied by rubbing.

LINIMENTUM BELLADONNAE. Belladonna Liniment.

Preparation. Dissolve 50 Gm. camphor in sufficient fluidextract belladonna root to make 1000 Cc.

Uses: Rheumatism and neuralgia.

LINIMENTUM CALCIS. Lime Liniment.

(Carron Oil).

Preparation. Mix linseed oil and lime water, equal parts, by volume.

Only "raw" linseed oil should be employed.

Uses: Burns and scalds. Applied by spreading thickly upon cotton; should be frequently renewed.

LINIMENTUM CAMPHORAE. Camphor Liniment.

Preparation. A solution of 20 Gm. camphor (gum) in 80 Gm. cotton seed oil.

Uses: Anodyne, rubefacient.

LINIMENTUM CHLOROFORMI. Chloroform Liniment.

Preparation. Mix 30 Cc. chloroform with 70 Cc. soap liniment.

Uses: Anodyne.

LINIMENTUM SAPONIS. Soap Liniment.

Preparation. Soap, dried and granulated, 60 Gm., camphor, in small pieces, 45 Gm., oil of rosemary 10 Cc., alcohol 725 Cc., water sufficient to make 1000 Cc.

Uses: Mildly anodyne, generally used as a base for other remedies.

LINIMENTUM SAPONIS MOLLIS. Liniment of Soft Soap.

Preparation. Obtained by mixing 20 Cc. oil of lavender flowers with 300 Cc. alcohol in which dissolve 650 Gm. soft soap by agitation. Set aside for 24 hours and filter, adding sufficient alcohol to make 1000 Cc.

Uses: Chronic skin diseases.

LINIMENTUM TEREBENTHANAE. Turpentine Liniment.

Preparation. Made by dissolving 65 Gm. rosin cerate, previously melted, in 35 Gm. oil of turpentine.

Uses: Counter irritant, rubefacient.

UNGUENTA. (Ointments).

Ointments are semi-solid mixtures of fats and oils, sometimes wax, lanolin and petrolatum, with medicinal agents usually intimately incorporated, for external use; being applied to the skin by inunction. They should readily melt at the temperature of the body and the character of the vehicle is determined by the general therapeutic purpose whether absorption of the medicinal agent or only protective effect is desired.

Of the various vehicles employed, petrolatum does not penetrate the skin, while lanolin will convey the medicinal agent through the skin. Between these two extremes are the various vegetable and animal fats and oils which penetrate into the skin to a greater or less degree. Lard is not so readily absorbed by the skin as wool fat, it is, however, the most popular vehicle and hardly ever becomes rancid if properly purified and benzoinated.

Ointments, according to the method of preparation, are made either: 1. By fusion; 2, by mechanical admixture: 3. By chemical reaction.

1. By fusion—Melt the substances having the higher melting point first, add the balance of the fats, strain if necessary and incorporate the medicinal substances, stirring while cooling. Do melting on a water-bath.

2. By mechanical admixture—The admixture may be accomplished either by trituration in a mortar or

by working the materials on an ointment slab. When solids are to be incorporated into an ointment they should first be reduced into a fine powder. Solid extracts are reduced to a smooth thick paste (employ water or alcohol) before they are incorporated with the vehicle.

3 By chemical reaction—There is only one official example of this class, namely ointment of mercuric nitrate. The salt being formed during manufacture by the action of nitric acid upon mercury.

The following are the official ointments:

UNGUENTUM. Ointment.

(Simple Ointment).

Preparation. Made by melting 20 Gm. white wax to which is added 80 Gm. benzoinated lard; the mixture is heated gently until liquefied and then stirred until it congeals.

Uses: Principally as a base for other ointments.

UNGUENTUM ACIDI BORICI. Ointment of Boric Acid.

Preparation. Made by melting 10 Gm. paraffin and then adding 80 Gm. white petrolatum, heating gently for 10 minutes; the hot liquid is gradually added to 10 Gm. boric acid in a warm mortar, triturating thoroughly until it congeals.

Uses: Antiseptic in burns, abrasions, etc.

UNGUENTUM ACIDI TANNICI. Ointment of Tannic Acid.

Preparation. Made by dissolving 20 Gm. tannic acid in 20 Gm. glycerin with the aid of a gentle heat

and mixing the solution with 60 Gm. simple ointment. Iron utensils must be avoided.

Uses: Astringent .

UNGUENTUM AQUAE ROSAE. Ointment of Rose Water.

(Cold Cream).

Preparation. Reduce 125 Gm. spermaceti and 120 Gm. white wax to fine shavings and melt at a moderate heat, add 560 Gm. expressed oil of almonds, stir and continue the heat until the mixture is uniform; then gradually add 190 Gm. stronger rose water, previously warmed, in which 5 Gm. sodium borate has been dissolved. Stir the mixture until it congeals.

UNGUENTUM BELLADONNAE. Belladonna Ointment.

Preparation. Obtained by triturating 10 Gm. extract of belladonna leaves with 5 Cc. diluted alcohol until perfectly smooth, then add 20 Gm. hydrous wool fat and 65 Gm. benzoinated lard and mix all thoroughly together.

Uses: Anodyne, analgesic, sedative.

UNGUENTUM CHRYSAROBINI. Chrysarobin Ointment.

Preparation. Obtained by mixing 6 Gm. chrysarobin with 94 Gm. benzoinated lard, previously melted; the mixture is heated on a water bath for 20 minutes, with occasional stirring, then strained and stirred until congealed.

Uses: Antiparasitic. Used principally in psoriasis and other chronic affections of the skin.

UNGUENTUM DIACHYLON. Diachylon Ointment.

Preparation. Obtained by melting 50 Gm. lead

plaster, by applying a gentle heat, to which is added 49 Gm. olive oil; after the mixture cools add 1 Gm. oil of lavender flowers and stir until the ointment congeals. The oil of lavender is used simply for its pleasant odor. This ointment should be made as wanted.

Uses: Eczema, also for sweating feet and hands.

UNGUENTUM GALLAE. Nutgall Ointment.

Preparation. Obtained by thoroughly mixing 20 Gm. finely powdered nutgall with 80 Gm. simple ointment, avoiding the use of metallic utensils.

Uses: Astringent. Same as tannic acid ointment.

UNGUENTUM HYDRARGYRI. Mercurial Ointment.

Contains 50 per cent. of mercury (quicksilver).

Uses: Antiseptic, antiparasitic, antisyphilitic, discutient.

UNGUENTUM HYDRARGYRI AMMONIATI. Ointment of Ammoniated Mercury.

(Ointment of White Precipitate).

Contains 10 per cent. of ammoniated mercury.

Preparation. Obtained by rubbing 10 Gm. ammoniated mercury with 10 Gm. melted white petrolatum, then adding 40 Gm. more of the melted white petrolatum and 40 Gm. hydrous wool fat, mixing thoroughly until cold.

Uses: Antiparasitic, antisyphilitic.

UNGUENTUM HYDRARGYRI DILUTUM. Blue Ointment.

Contains 33 per cent. mercury.

Preparation. Obtained by mixing thoroughly 67 Gm. mercurial ointment with 33 Gm. petrolatum.

Uses: Same as mercurial ointment.

UNGUENTUM HYDRARGYRI NITRATIS. Ointment of Mercuric Nitrate.

Contains 10 per cent. mercuric nitrate.

Uses: Stimulant, alterative. Useful in parasitic skin diseases and indolent syphilitic and scrofulous ulcers. Sometimes causes salivation. Usually requires dilution.

UNGUENTUM HYDRARGYRI OXIDI FLAVI. Ointment of Yellow Mercuric Oxide.

Contains 10 per cent. yellow mercuric oxide.

Preparation. Triturate 10 Gm. yellow mercuric oxide (in very fine powder) with 10 Gm. water until perfectly smooth, then add 40 Gm. hydrous wool fat, in divided portions, and 40 Gm. petrolatum; mix thoroughly, avoiding the use of metallic utensils.

Uses: Alterative, stimulant, resolvent. Preferred to the red oxide in conjunctivitis. Should be diluted with 5 to 10 times its weight of a mixture of petrolatum and hydrous wool fat before use.

UNGUENTUM HYDRARDYRI OXIDI RUBRI. Ointment of Red Mercuric Oxide.

(Red Precipitate Ointment).

Contains 10 per cent. red mercuric oxide.

Preparation and uses same as ointment of yellow mercuric oxide.

UNGUENTUM IODI. Iodine Ointment.

Preparation. Obtained by triturating 4 Gm. iodine and 4 Gm. iodide of potassium in a glass mortar with 12 Gm. glycerin until dissolved; then gradually add 80 Gm. benzoinated lard and mix thoroughly. Do not use metal spatula.

Should be freshly prepared.

Uses: Absorbent, alterative, discutient.

UNGUENTUM IODOFORMI. Iodoform Ointment.

Contains 10 per cent. iodoform.

Preparation. Obtained by rubbing 10 Gm. finely powdered iodoform with 90 Gm. lard until they are well mixed.

Uses: For the application of iodoform.

UNGUENTUM PHENOLIS. Ointment of Phenol.

(Unguentum Acidi Carbolici U. S. P. 1890).

Preparation. Obtained by melting 97 Gm. white petrolatum to which is added 3 Gm. phenol; the mixture is then stirred until congealed.

The present official ointment is only 60 per cent. as strong as that of 1890.

Uses: Antiseptic application for burns, wounds, sores, etc.

UNGUENTUM PICIS LIQUIDAE. Tar Ointment.

Preparation. Obtained by melting together 150 Gm. yellow wax and 350 Gm. lard, to which is added 500 Gm. tar, previously warmed; the mixture is then strained through muslin and stirred until cold.

Uses: Antiparasitic.

UNGUENTUM POTASSII IODIDI. Ointment of Potassium Iodide.

Preparation. Dissolve 10 Gm. potassium iodide and 0.6 Gm. potassium carbonate in 10 Gm. of water in a mortar by trituration; when dissolved add 80 Gm. benzoinated lard and incorporate thoroughly.

This ointment should be prepared extemporaneously.

Uses: Absorbent, alterative, discutient.

UNGUENTUM STRAMONII. Stramonium Ointment.

Preparation. Triturate 10 Gm. extract of stramonium with 5 Cc. diluted alcohol until smooth; then add 20 Gm. hydrous wool fat and, lastly, 65 Gm. benzoinated lard and mix thoroughly.

Uses: Local anodyne and analgesic.

UNGUENTUM SULPHURIS. Sulphur Ointment.

Preparation. Rub 15 Gm. washed sulphur with 85 Gm. benzoinated lard, gradually added, until well mixed.

Uses: Antiparasitic.

UNGUENTUM VERATRINAE. Veratrine Ointment.

Preparation. Rub 4 Gm. veratrine with 6 Gm. expressed oil of almond, then gradually add 90 Gm. benzoinated lard and mix thoroughly.

Uses: Anodyne, counter-irritant.

UNGUENTUM ZINCI OXIDI. Ointment of Zinc Oxide.

Preparation. Obtained by rubbing 20 Gm. zinc oxide (which must be in very fine powder) with 20 Gm. of melted benzoinated lard, after they are thoroughly mixed add 60 Gm. more of the benzoinated lard and after it is well mixed strain while still warm and stir constantly until the ointment congeals.

Uses: Mildly astringent, antiseptic and stimulant.

UNGUENTUM ZINCI STEARATIS. Ointment of Zinc Stearate.

Preparation. Melt 50 Gm. white petrolatum on a water bath and add 50 Gm. zinc stearate; the heat

should be continued until the mixture becomes smooth; then allow to cool, stirring until it congeals.

Uses: Same as ointment of zinc oxide.

OLEATA. Oleates.

True oleates are chemical combinations of metallic oxides or alkaloids with oleic acid but the official oleates contain an excess of oleic acid hence they may be said to be true oleates dissolved in an excess of oleic acid.

In preparing oleates of the alkaloids it must be remembered that only the free alkaloid should be employed and not the salt.

There are five official oleates.

OLEATUM ATROPINAE. Oleate of Atropine.

Preparation. Triturate 2 Gm. atropine in a tared mortar with 2 Cc. alcohol; 5 Gm. oleic acid is then added and the mortar warmed and the mixture stirred until the alcohol has evaporated; 45 Gm. oleic acid is then added and the mixture stirred until the atropine is dissolved; sufficient olive oil is then added to make the product weigh 100 Gm.

Uses: Anodyne, antispasmodic.

OLEATUM COCAINAE. Oleate of Cocaine.

Preparation. Triturate 5 Gm. cocaine in a tared mortar with 5 Cc. alcohol; then add 10 Gm. oleic acid. After warming mortar stir until alcohol is evaporated and add 40 Gm. oleic acid, stirring until the cocaine is dissolved. Then add sufficient olive oil to make the product weigh 100 Gm.

Uses: Local anesthetic.

OLEATUM HYDRARGYRI. Oleate of Mercury.

Preparation. Triturate 25 Gm. yellow mercuric oxide with 25 Cc. distilled water in a tared mortar; add 70 Gm. oleic acid and mix thoroughly. Warm the mortar to a temperature not exceeding 50 degrees C. (122°F.) Stir occasionally until the water is evaporated, then add, if necessary, oleic acid to make 100 Gm. and mix thoroughly.

Avoid contact with metallic utensils.

Preserve the oleate in tightly stoppered bottles.

Uses: Alterative, antisyphilitic.

OLEATUM QUININAE. Oleate of Quinine.

Preparation. Triturate 25 Gm. quinine in a warm mortar with 25 Gm. oleic acid to a smooth paste; then add 50 Gm. oleic acid previously warmed and stir frequently until quinine is dissolved.

Uses: Antiperiodic, antiseptic.

OLEATUM VERATRINE. Oleate of Veratrine.

Preparation. Triturate 2 Gm. veratrine in a tared mortar with 5 Cc. of Olive Oil; after warming the mortar add 50 Gm. oleic acid and continue stirring until the veratrine is dissolved. Then add sufficient olive oil to make the product weigh 100 Gm.

Uses: Anodyne, rubefacient.

CERATA. (Cerates).

Cerates are a class of preparations similar to ointments, but of a firmer consistence due to the presence of considerable proportions of wax, and frequently also of resin or oleoresinous substances. They are made by

mixing oil or lard with wax, or some other substance having a higher melting point, imparting to them a consistency between that of an ointment and plaster. When applied to the skin they do not melt like ointments, but retain their soft consistence. The oil or lard should be free from all traces of rancidity. The wax or materials of higher fusing point should be first melted on a water-bath then the oil or lard added in portions and the liquified mass stirred to a uniform consistence while congealing. Cerates should be kept in a cool place in well-covered jars. Those made with white wax do not keep as well as those containing yellow wax, the latter remaining unaltered. Cerates are employed chiefly as dressings for inflamed surfaces.

There are six official cerates.

CERATUM. Cerate.

(Simple Cerate).

Preparation. Made by melting 30 Gm. white wax to which is added 20 Gm. white petrolatum and then 50 Gm. benzoinated lard. The heat should be continued until the mixture is liquefied and it should then be stirred until it congeals.

Uses: As a base.

CERATUM CAMPHORAE. Camphor Cerate.

Preparation. Prepared by melting 35 Gm. white wax, then adding 15 Gm. white petrolatum, and 40 Gm. benzoinated lard, continuing the heat until the mixture is liquefied. While the mixture is cooling add 10 Gm. camphor liniment and incorporate thoroughly by stirring until it congeals.

Uses: Antiseptic, emolient.

CERATUM CANTHARIDIS. Cantharides Cerate.

(Blistering Cerate).

Preparation. Contains 320 Gm. powdered cantharides which is mixed with 150 Gm. liquid petrolatum. The mixture is set aside and well covered in a warm place for 48 hours; then to it is added 180 Gm. rosin, 180 Gm. yellow wax and 170 Gm. lard previously melted and strained through muslin.

The mixture is kept in a liquid condition by means of a water bath, stirring occasionally for 1 hour; it should then be removed from the bath and stirred until it begins to congeal.

Uses: Vesiccant, for which purpose it is spread upon cloth or adhesive plaster.

CERATUM PLUMBI SUBACETATIS. Cerate of Lead Subacetate.

(Goulard's Cerate).

Preparation. Obtained by melting 20 Gm. wool fat in a warm mortar to which is gradually added 20 Gm. solution lead subacetate and incorporated by slow trituration. To the mixture is then added 38 Gm. white petrolatum and 20 Gm. paraffin, previously melted, and in which 2 Gm. camphor has been dissolved. The mixture is then stirred until homogeneous.

Uses: Astringent, antiseptic. Application to blisters, ulcers, burns, chilblains and inflammatory eruptions.

CERATUM RESINAE. Rosin Cerate.

Preparation. Obtained by melting 350 Gm. rosin. To the melted rosin is added 150 Gm. yellow wax and 500 Gm. lard, and the heat continued until liquefied.

Then the mixture is strained through muslin and allowed to cool with occasional stirring.

In cold weather 530 Gm. of lard and 120 Gm. of yellow wax may be used.

Uses: As a base, also to reduce inflammation.

CERATUM RESINAE COMPOSITUM. Compound Rosin Cerate.

(Deshler's Salve).

Preparation. Melt 225 Gm. rosin, 225 Gm. yellow wax, 300 Gm. prepared suet, and 115 Gm. turpentine. When melted add 135 Gm. linseed oil and continue the heat until the mixture is liquefied, then strain through coarse muslin and stir until it begins to congeal.

Uses: Same as rosin cerate, also when a more stimulating effect is desired.

* * * *

EMPLASTRA. Plasters.

Plasters are compounds of various fusible solids of a melting point higher than that of the human body, being friable when cold but rendered adhesive by the warmth of the body.

The official plasters are all mixtures of lead plaster, rendered pliable by rubber and petrolatum and usually incorporated with medicinal agents.

The official plasters are easily prepared and may be spread on cloth as desired by a hot spatula, the particular size is 4x6 inches (10x15 cm.) After preparation they are usually rolled or moulded into sticks.

Perforated plasters, now almost in universal use, have a rubber spread on base muslin or leather. The perforation is done to permit the exhalations from the skin.

Official Plasters.

EMPLASTRUM ADHESIVUM Adhesive Plaster.
(Emp. Resinae, Phar. 1890).

Contains 1 part each of rubber and petrolatum with 48 parts of lead plaster, all by weight.

EMPLASTRUM BELLADONNAE. Belladonna Plaster.

Should contain 0.38 to 0.42 per cent. of mydriatic alkaloids.

Uses: Anodyne, analgesic; in neuralgia.

EMPLASTRUM CAPSICI. Capsicum Plaster.

Prepared by applying oleoresin of capsicum by means of a brush to adhesive plaster, 0.25 Gm. being required for each 15 centimeters square of surface.

EMPLASTRUM HYDRARGYRI. Mercurial Plaster.

Consists of mercury 30 Gm. and oleate of mercury 1 Gm., with lead plaster 59 Gm. and lanolin 10 Gm. The metallic mercury is incorporated into the mass by the means of trituration with oleate of mercury.

Uses: Alterative, antisyphilitic.

EMPLASTRUM OPII. Opium Plaster.

Contains 6 per cent. of opium mixed with adhesive plaster.

Uses: Anodyne.

EMPLASTRUM PLUMBI. Lead Plaster.
(Diachylon Plaster).

This plaster is simply lead oleate obtained by the reaction of lead acetate on sodium oleate (castile soap).

Uses: For the preparation of diachylon ointment and soap plaster.

EMPLASTRUM SAPONIS. Soap Plaster.

Prepared by mixing 10 Gm. of dried and coarsely powdered soap with water sufficient to form a semi-liquid; then mix it with 90 Gm. lead plaster, previously melted, and evaporated to the proper consistence.

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CHAPTER XVII.

Extracts

EXTRACTA. Extracts.

Extracts are soft, solid or dry preparations made by evaporating solutions of vegetable drugs.

The strength of extracts varies with the menstrum used in exhausting a drug and the consistency of the extract. A drug exhausted with an aqueous or weakly alcoholic menstruum will produce a solution rich in extractive * but practically inert. If the same drug be exhausted with a menstruum that will dissolve the active constituents, the resulting extract will be much smaller in quantity but greater in activity. This fact is particularly noticeable in extracts of aconite,

*Extractive is an inert substance, existing in all vegetable drugs, that is soluable in both alcohol and water. Every solution of vegetable drugs contains it to a greater or less extent. It has the peculiar property of changing in color from a yellowish green to a dark brown. Though it is dissolved out of vegetable drugs it again becomes insoluble from exposure to the air and changes of temperature.

belladonna, digitalis, henbane, etc. Take aconite for instance; it is found, by experience, that a menstrum consisting of three-fourths alcohol and one-fourth water is best adapted to dissolve the active constituents; if a menstrum weaker in alcohol is used the resultant extract will be larger in quantity but decidedly weaker in medicinal value.

The strength of an extract also varies with the amount of moisture that it contains. The Pharmacopoeia directs that some extracts shall be evaporated to "a pilular consistence." Such an extract may still contain 25 per cent. of moisture.

Powdered extracts are simply solid extracts from which the moisture has all been taken out and a sufficient quantity of powdered licorice added to bring the extract up to the desired weight. As many powdered extracts are not official the strength is not uniform. While the average weight may be said to be 25 per cent. of the weight of the drug used (in which case 1 grain of extract represents 4 grains of drug) some represent double this quantity (1 to 8), while others represent no more than one-half or 1 to 2.

Powdered extracts are more uniform in strength than extracts and are rapidly superseding extracts.

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OFFICIAL EXTRACTS.

There are 27 official extracts of which 18 are made from the drug by percolation while 9 are made by evaporation of official fluidextracts. The list is as follows:

Extract of Aloes. Obtained by maceration with boiling water and subsequent evaporation to dryness.

Average dose: 0.125 Gm. (2 grains).

Extract of Belladonna Leaves. Obtained by percolation with diluted alcohol and subsequent evaporation to a soft extract.

Average dose: 0.010 Gm. (1-5 grain).

Extract of Indian Cannabis. Obtained by percolation with alcohol and subsequent evaporation to a soft extract.

Average dose: 0.010 Gm. (1-5 grain).

Extract of Cimicifuga. Obtained by evaporation of the fluidextract to complete dryness and adding sufficient powdered licorice to make the product weigh 25 per cent.

Average dose: 0.250 Gm. (4 grains).

Extract of Colchicum Corm. Obtained by percolation with a mixture of 35 Cc. acetic acid and 150 Cc. water and subsequent evaporation of the percolate to a pilular consistence.

Average dose: 0.065 Gm. (1 grain).

Extract of Colocynth. Obtained, first by maceration, then by percolation of the residue with diluted alcohol and subsequent evaporation of the expressed liquid and the percolate to a dry powder.

Average dose: 0.030 Gm. (½ grain).

Compound Extract of Colocynth. Obtained by heating 500 Gm. purified aloes in a suitable vessel on a water bath, until melted; then add 100 Cc. alcohol, 140 Gm. dried and coarsely powdered soap and 160 Gm. extract of colocynth and 140 Gm. resin of scammony and heat the mixture at a temperature not exceeding 120 degrees C until it is perfectly homogeneous and a thread, taken from the mass, becomes brittle when

cool. Then withdraw the heat, thoroughly incorporate 60 Gm. cardamom, in No. 60 powder, with the mixture. When cold reduce the product to a fine powder.

Average dose: 0.500 Gm. (7½ grains).

Extract of Digitalis. Obtained by evaporation of the fluidextract to a pilular consistence.

Average dose: 0.010 Gm. (1-5 grain).

Extract of Ergot. Obtained by exhaustion of ergot by percolation and subsequent purification.

Each 12½ grains of extract represents 100 grains of drug.

Average dose: 0.250 Gm. (4 grains).

Extract of Euonymus. Obtained by evaporation of the fluidextract to complete dryness and the addition of sufficient powdered licorice to make the extract weigh 25 Gm. for each 100 Cc. of fluidextract employed.

Average dose: 0.125 Gm. (2 grains).

Extract of Gentian. Obtained by maceration and percolation with water; the liquid is subsequently evaporated to a pilular consistence.

Average dose: 0.250 Gm. (4 grains).

Extract of Glycyrrhiza (extract of licorice). This is the commercial extract obtained in sticks. Not less than 60 per cent. should be soluble in water.

Average dose 1 Gm. (15 grains).

Pure Extract of Glycyrrhiza. Obtained by percolation of the drug with water to which ammonia water has been added (150 Cc. ammonia water for each 1000 Gm. of drug being employed) when the drug has been exhausted the liquid is evaporated to a pilular consist-

ence and 5 per cent. of its weight of glycerin incorporated with it.

Average dose: 1 Gm. (15 grains).

Extract of Hematoxylon. (Extract of logwood). Obtained by maceration and subsequent evaporation to dryness.

Average dose: 1 Gm. (15 grains).

Extract of Hyoscyamus. Obtained by evaporation of the fluidextract to a pilular consistence.

When assayed the extract should contain 0.3 per cent. of mydriatic alkaloids. If found to contain more, sufficient powdered sugar of milk should be added to reduce it to the standard.

Average dose: 0.065 (1 grain).

Extract of Krameria. (Extract of Rhatany). Obtained by percolation of the drug with water and subsequent evaporation to dryness.

Average dose: 0.500 Gm. (7½ grains).

Extract of Leptandra. (Extract of Culver's Root). Obtained by evaporation of the fluidextract to dryness. The product is reduced to fine powder and enough powdered licorice added to make the finished extract weigh 25 Gm. for each 100 Cc. of fluidextract employed.

Average dose 0.250 Gm. (4 grains).

Extract of Malt. Obtained from malt by maceration in warm water and subsequent evaporation of the liquid to the consistence of thick honey.

Average dose 16 Cc. (4 fluidrachms).

Extract of Nux Vomica. Obtained by percolation of the drug, first with a mixture of acetic acid and

water and then with water until the drug is exhausted. The first portion of the drug is reserved and the balance evaporated to a soft extract which is mixed with the portion reserved. Alcohol is now added (3 Cc. for each 1 Gm. of drug) and the mixture, after standing for 24 hours, is filtered. The liquid is evaporated to dryness and the percentage of strychnine determined; sufficient sugar of milk is added to bring the quantity of strychnine in the finished extract to 5 per cent. of the total weight.

Average dose: 0.015 Gm. (¼ grain).

Extract of Opium. Obtained by maceration of powdered opium with water and subsequent evaporation, sufficient sugar of milk being added to bring the quantity of morphine in the final dry extract to 20 per cent.

Average dose: 0.030 Gm. (½ grain).

Extract of Physostigma. (Extract of Calabar Bean). Obtained by percolation of the drug with alcohol and subsequent evaporation of the percolate to dryness. The extract is then assayed and sufficient powdered licorice added to bring the quantity of alkaloids in the finished extract to 2 per cent.

Average dose: 0.008 Gm. (⅛ grain).

Extract of Quassia. Obtained by percolation of the drug with water until exhausted and the liquid subsequently evaporated to dryness; sufficient sugar of milk is then added to make 10 grains of the product represent 100 grains of drug.

Average dose: 0.065 Gm. (1 grain).

Extract of Cascara Sagrada. Obtained by percolation of the drug with a mixture of alcohol 12½ per cent. and water 87½ per cent. until the drug is exhausted. The percolate is subsequently evaporated to dryness and sufficient powdered licorice added to make the product weigh 25 grains for each 100 grains of drug employed.

Average dose: 0.250 Gm. (4 grains).

Extract of Rhubarb. Obtained by evaporation of the fluidextract to a pilular consistence.

Average dose: 0.250 Gm. (4 grains).

Extract of Scopola. Obtained by evaporation of the fluidextract to a pilular consistence.

When assayed this extract should contain 2 per cent. of mydratic alkaloids, if it contains more sufficient powdered sugar of milk should be added to reduce it to the standard.

Average dose: 0.010 Gm. (1-5 grain).

Extract of Stramonium. Obtained by evaporation of the fluidextract to a pilular consistence.

When assayed this extract should contain 1.4 per cent. of mydratic alkaloids; if it contains more then sufficient sugar of milk should be added to reduce it to the standard.

Average dose: 0.010 Gm. (1-5 grain).

Extract of Sumbul. Obtained by evaporation of the fluidextract to a pilular consistence.

Average dose: 0.250 Gm. (4 grains).

Extract of Taraxacum. Obtained by percolation with 12½ per cent. alcohol, until the drug is exhausted, and subsequent evaporation of the percolate to a pilular consistence.

Average dose: 1 Gm. (15 grains).

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CHAPTER XVIII.

PULVERES. Powders.

Powders are mixtures of medicinal substances, sometimes with a diluent, such as sugar of milk, triturated to an impalpable powder. Various degrees of fineness are recognized, but the 9 official powders are of the highest degree of subdivision.

According to their use they are divided into two classes.

(1). Powders for External Use. Called Dusting or Insufflation powders. As a rule they should not be triturated, as this renders them too compact. When containing more than one constituent, each should be powdered separately and sifted, then finally mixed with a spatula and dispensed in a dry vial. (Example of dusting powder. Lycopodium 90 parts; salicylic acid 1 part; orris root 9 parts).

(2) Powders for Internal Use. These may be triturated in a mortar as lightness is not an essential feature. Compound powders should always be thoroughly and uniformly mixed. They are usually prescribed in some dosage form and are divided into the prescribed

doses either enwrapped in paper, enclosed in capsules, or formed into tablets or in cachets or wafers; the character of the powder determining the method of administration. Powders should not be divided into doses except by weighing. Paraffin paper should be used for powders that dry out and those that become moist upon contact with the atmosphere.

PULVIS ACETANILIDI COMPOSITUS.. Compound Acetanilide Powder.

Preparation. Made by triturating together 70 Gm. acetanilide, 10 Gm. caffeine and 20 Gm. sodium bicarbonate to a fine powder.

Uses: Antipyretic, analgesic, anodyne.

Average dose: 0.5 Gm. (7½ grains).

PULVIS AROMATICUS. Aromatic Powder.

Preparation. Saigon cinnamon, in No. 60 powder, 35 Gm., ginger, in No. 60 powder, 35 Gm., cardamom, deprived of pericarps and crushed, 15 Gm., myristica, in No. 20 powder, 15 Gm.

Triturate the cardamom and myristica with a portion of the saigon cinnamon, until they are reduced to a fine powder; then add the remainder of the saigon cinnamon and the ginger, and rub them together until they are thoroughly mixed.

Uses: Carminative, generally employed as an adjunct to other drugs.

Average dose: 1 Gm. (15 grains).

PULVIS CRETAE COMPOSITUS. Compound Chalk Powder.

Preparation. Prepared chalk 30 Gm., acacia, pow-

dered, 20 Gm., sugar, powdered, 50 Gm. Mix thoroughly.

Uses: Preparing compound chalk mixture.

Average dose: 2 Gm. (30 grains).

PULVIS EFFERVESCENS. Compound Effervescing Powder.

(Seidlitz Powders).

The well known seidlitz powders consists of two powders, one wrapped in a blue paper and one in a white paper.

Preparation. To prepare the powder for the blue paper take 31 Gm. sodium bicarbonate and 93 Gm. potassium and sodium tartrate; mix them thoroughly and divide the mixture into 12 equal parts, wrapping each part in a separate blue paper.

The powder to be wrapped in the white paper is tartaric acid 27 Gm. divided into 12 parts.

Average dose: 1 set of two powders.

PULVIS GLYCYRRHIZAE COMPOSITUS. Compound Powder of Glycyrrhiza.

(Compound Licorice Powder.)

Preparation. Mix 4 Gm. oil of fennel with 250 Gm. powdered sugar; then add 250 Gm. more powdered sugar and 180 Gm. powdered senna, 236 Gm. powdered glycyrrhiza, 80 Gm. washed sulphur. Mix all well together and pass through a No. 80 sieve.

Uses: Laxative.

Average dose: 4 Gm. (60 grains).

PULVIS IPECACUANHAE ET OPII. Powder of Ipecac and Opium.

(Dovers Powder.)

Preparation. Mix 10 Gm. powdered ipecac, 10 Gm. powdered opium, 80 Gm. coarsely powdered sugar of milk. Triturate thoroughly and reduce to a very fine powder.

Uses: Anodyne, antispasmodic.

Average dose: 0.5 Gm. (7½ grains).

PULVIS JALAPAE COMPOSITUS. Compound Powder of Jalap.

Preparation. Mix 35 Gm. powdered jalap and 65 Gm. bitartrate potassium and rub them together until they are thoroughly mixed.

Uses: Cathartic.

Average dose: 2 Gm. (30 grains).

PULVIS MORPHINAE COMPOSITUS. Compound Powder of Morphine.

(Tully's Powder).

Preparation. Rub 1.5 Gm. morphine sulphate with 33.5 Gm. precipitated calcium carbonate, added in portions of about 5 Gm. each, until it is thoroughly mixed; then rub 32 Gm. camphor with a little alcohol until it is reduced to a powder; mix it thoroughly with 33 Gm. powdered glycyrrhiza; add this mixture to the other and mix all thoroughly together. Finally pass the powder through a No. 40 sieve; pulverize the residue if any should be left on the sieve, add to the sifted powder and mix thoroughly.

It is important that the powder be thoroughly triturated to insure an even distribution of the morphine.

Calcium carbonate is added to this powder to secure uniform distribution of morphine.

Uses: Anodyne, antispasmodic, nerve sedative.

Average dose: 0.5 Gm. (7½ grains).

PULVIS RHEI COMPOSITUS. Compound Powder of Rhubarb.

(Gregory's Powder).

Preparation. Rub 25 Gm. powdered rhubarb with 10 Gm. powdered ginger and mix thoroughly; then gradually add 65 Gm. magnesium oxide, stirring until they are thoroughly mixed.

Uses: Antacid, laxative.

Average dose: 2 Gm. (30 grains).

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MASSAE. Masses.

The preparations under this head are usually employed as constituents of other pill masses. They are permanent and are conveniently kept in stock.

MASSA FERRI CARBONATIS. Mass of Ferrous Carbonate.

(Vallet's Mass).

Preparation. Ferrous carbonate made into a mass with sugar and honey by reaction between ferrous sulphate and monohydrated sodium carbonate.

Uses: Non astringent, hematinic.

Average dose: 0.25 Gm. (4 grains).

MASSA HYDRARGYRI. Mass of Mercury.

(Blue Pill or Blue Mass).

Preparation. Contains 33 per cent. metallic mercury, in honey of rose, with glycerin, glycyrrhiza and althea.

Should be kept well covered to prevent oxidation.
Uses: Cathartic, alterative.
Average dose: 0.25 Gm. (4 grains).

PILULAE. (Pills).

Pills are round, oval or ovoid forms of medicinal substances, massed by the aid of judiciously selected excipients, and weighing not less than 1 grain (0.06 Gm.) nor more than eight grains (0.5 Gm.). If they weigh less than 1 grain (0.06 Gm.) and more than one-third of a grain (0.02 Gm.) they are known as '**Granules**;" if below the latter in weight, they are usually designated as "**Parvules.**" A very large pill is known as a "**Bolus.**"

The pill-mass consists essentially of two parts, viz: the active ingredients, whether solid or liquid, and the excipient, which imparts the proper degree of consistency and tenacity.

Excipients are divided into two classes, fluid and solid. There are a great number of each kind, besides specially prepared formulas which are combinations of the simple substances.

A few in each class are as follows:

Fluid.—Water, syrup, mucilage or syrup of acacia, glycerin, glucose, honey, castor oil.

Solid.—Acacia, tragacanth, powdered soap, powdered althea, ext. of liquorice, petrolatum, confection of rose. In their simplest form, pills are prepared as required, and dispensed with sufficient dusting powder to prevent them from adhering while moist; but if they are prepared for stock, or if it is desirable to mask their taste, or for other reasons, they may be coated with

some suitable substance that will readily dissolve or disintegrate in the juices of the stomach (sugar, gelatin, chocolate, tolu, silver). Sometimes it is desirable to coat the pills with a material which, while insoluble in the acid contents of the stomach, dissolves easily in the alkaline fluids of the intestines. Such pills are coated with salol or keratin, and are known as "**Enteric Pills.**"

There are fourteen pills official in the U. S. P. and all are stable and can be prepared for stock.

With the exception of pills of ferrous iodide and pills of phosphorus they are uncoated, the above two being coated with balsam of tolu to prevent oxidation of the active ingredients.

PILULAE ALOES. Pills of Aloes.

One hundred pills contain 13 Gm. purified aloes.

Uses: Constipation.

Average dose: 2 pills.

PILULAE ALOES ET FERRI. Pills of Aloes and Iron.

One hundred pills contain 7 Gm. each purified aloes and dried ferrous sulphate.

Uses: Amenorrhoea and anemia with constipation.

Average dose: 2 pills.

PILULAE ALOES ET MASTICHES. Pills of Aloes and Mastic.

(Lady Webster Pills).

One hundred pills contain 13 Gm. purified aloes and 4 Gm. mastic.

Uses: To increase the action of aloes in the large intestine.

Average dose: 2 pills.

PILULAE ALOES ET MYRRHAE. Pills of Aloes and Myrrh.

Each hundred pills contain 13 Gm. purified aloes and 6 Gm. myrrh.

Uses: Constipation with flatulence.

Average dose: 2 pills.

PILULAE ASAFOETIDAE. Pills of Asafetida.

Each hundred pills contain 20 Gm. asafetida.

Uses: Hysteria, nervousness.

Average dose: 2 pills.

PILULAE CATHARTICAE COMPOSITAE. Compound Cathartic Pills.

Preparation. Compound extract of colocynth 80 Gm., mild mercurous chloride 60 Gm., resin of jalap, in fine powder, 20 Gm., gamboge, in fine powder, 20 Gm., diluted alcohol, q. s. Mix the powders intimately, then incorporate a sufficient quantity of diluted alcohol to form a mass, and divide it into one thousand pills.

Average dose: 2 pills.

PILULAE CATHARTICAE VEGETABILES. Vegetable Cathartic Pills.

Preparation. Compound extract of colocynth 60 Gm., extract of hyoscyamus 30 Gm., resin of jalap, in fine powder, 20 Gm., extract of leptandra 15 Gm., resin of podophyllum 15 Gm., oil of peppermint 8 Cc., diluted alcohol, q. s.

Mix the compound extract of colocynth intimately with the resin of podophyllum, resin of jalap, and extract of leptandra, and then add the oil of peppermint. Rub the extract of hyoscyamus with enough diluted alcohol to render it plastic, then incorporate it with the

mixure first prepared, using a sufficient quantity of diluted alcohol to form a mass, and divide it into one thousand pills.

Average dose: 2 pills.

PILULAE FERRI CARBONATIS. Pills of Ferrous Carbonate.

Each hundred pills contain 16 Gm. granulated ferrous carbonate and 8 Gm. potassium carbonate.

Uses: Anaemia.

Average dose: 2 pills.

PILULAE FERRI IODIDI. Pills of Ferrous Iodide.

Each hundred pills contain 4 Gm. reduced iron and 5 Gm. iodine in chemical combination.

Should be devoid of the smell of iodine.

Uses: Alterative, hematinic.

Average dose: 2 pills.

PILULAE LAXATIVAE COMPOSITAE. Compound Laxative Pills.

Each hundred pills contain 1.30 Gm. aloin, 0.05 Gm. strychnine, 0.80 Gm. extract of belladonna leaves and 0.40 Gm. powdered ipecac.

Average dose: 2 pills.

PILULAE OPII. Pills of Opium.

Each hundred pills contain 6.5 Gm. powdered opium.

Uses: Anodyne, antispasmodic, hypnotic.

Average dose: 1 pill.

PILULAE PHOSPHORI. Pills of Phosphorous.

Each hundred pills contain 0.06 Gm. phosphorous.

Uses: Nerve stimulant and tonic.

Average dose: 1 pill.

PILULAE PODOPHYLLI BELLADONNAE ET CAPSICI. Pills of Podophyllum, Belladonna and Capsicum.

Each hundred pills contain resin of podophyllum 1.6 Gm., extract of belladonna leaves 0.8 Gm. and capsicum 3.2 Gm.

Uses: Laxative.

Average dose: 1 pill.

PILULAE RHEI COMPOSITAE. Compound Pills of Rhubarb.

Each hundred pills contain 13 Gm. rhubarb, 10 Gm. purified aloes, 6 Gm. myrrh and 0.5 Cc. oil of peppermint.

Uses: Chronic constipation with flatulence.

Average dose: 2 pills.

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TRITURATIONES. (Triturations).

Triturations are a class of powders which contain active substances in a minute state of subdivision, obtained by trituration with sugar of milk. By means of these the doses of powerful substances can be accurately regulated. Small crystals or coarsely powdered sugar of milk should be employed, as during the operation the active substance is itself finely subdivided and uniformly distributed throughout the powder. This form of preparation is chiefly adapted to insoluble or sparingly soluble substances, such as calomel and alkaloids and their salts, intended for internal administration, whose efficiency is thereby enhanced.

Unless otherwise directed triturations contain 10 per cent. of the medicinal substance, and are prepared according to the general formula:

The substance, 10 Gm.

Sugar of Milk 90 Gm.

Mix them thoroughly by trituration, reducing to a fine powder.

There is but one official triturate.

Trituratio Elaterini. Trituration of Elaterin.

Preparation. Elaterin 10 parts, Sugar of Milk 90 parts. Mix thoroughly by trituration.

Uses: Hydragogue cathartic.

Average dose: 0.03 Gm. (½ grain.)

Triturations may easily be prepared in dosage form by making a soft mass with alcohol and pressing it into moulds.

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TROCHISCI. Troches.

Troches (lozenges) are round or oval, solid, flattened masses, consisting of medicinal substances combined with sugar and mucilage. This form of preparation is chiefly adapted to astringent, antacid, antiseptic and demulcent drugs of which local continued effect is desired in the mouth and throat.

Troches generally very in weight from ½ Gm. (7 grains) to 1 Gm. (15 grains) and according to their method of preparation may be divided into two classes,

(1) Made by Compression. In this case the medicinal constituents are mixed with powdered sugar, then moistened with some kind of mucilage, granulated and compressed into tablet form, with a plunger machine.

(2) Made by moulding. A mass is prepared and after rolling it out to the desired thickness the lozenges or troches are cut out by means of a mould. After being moulded or cut they are placed on trays and allowed to dry in a moderately heated room. Aside from sugar and tragacanth, extract of licorice is often employed as a base. This can be medicated as desired and owing to its plasticity, can be readily formed into a variety of shapes.

When the mass is rolled into a thin cylindrical rod and cut into pieces about one-half inch (10 to 12 Mm.) in length and one-eighth inch (3 to 4 Mm.) in thickness, they are designated as "bacilli" or "stricklets." Certain forms are also known as "pastilli" (pastiles).

Dose of Troches: From one to two, usually three or four times a day.

There are nine official troches as follows with their uses and active constituents:

TROCHISCI ACIDI TANNICI. Troches of Tannic Acid.

Tannic acid 0.06 Gm. (1 grain).

Uses: Astringent.

TROCHISCI AMMONII CHLORIDI. Troches of Ammonium Chloride.

Ammonium chloride 0.1 Gm. (1½ grains), extract glycyrrhizae 0.2 Gm. (3 grains).

Uses: Antiseptic, demulcent, expectorant.

TROCHISCI CUBEBAE. Troches of Cubeb.

Oleoresin cubeb 0.02 Gm. (1-3 grain), oil of sassafras 0.01 Cc. (1-6 minim), extract glycyrrhiza 0.25 Gm. (4 grains).

Uses: Bronchial stimulant, expectorant.

TROCHISCI GAMBIR. Troches of Gambir.

(Troches of Catechu, Phar. 1890).

Gambir 0.06 Gm. (1 grain).

Uses: Astringent, antiseptic.

TROCHISCI GLYCYRRHIZAE ET OPII. Troches of Glycyrrhiza and Opium.

Powdered opium 0.005 Gm. (1-32 grain), extract glycyrrhiza 0.15 Gm. (2½ grains).

Uses: Anodyne, demulcent, expectorant.

TROCHISCI KRAMERIAE. Troches of Krameria.

Extract krameria 0.06 Gm. (1 grain).

Uses: Astringent.

TROCHISCI POTASSII CHLORATIS. Troches of Potassium Chlorate.

Potassium chlorate 0.15 Gm. (2½ grains).

Uses: Antiseptic, astringent, (in aphthae).

TROCHISCI SANTONINI. Troches of Santonin.

Santonin 0.03 Gm. (½ grain).

Uses: Anthelmintic, vermifuge.

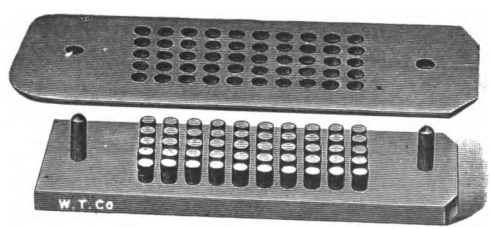
TROCHISCI SODII BICARBONATIS. Troches of Sodium Bicarbonate.

Sodium bicarbonate 0.18 Gm. (3 grains), myristica 0.01 Gm. (1-6 grain).

Uses: Antacid.

TABLETTAE. Tablet Triturates.

Tablet Triturates consist of the medicine, which, if dry solid, has been triturated with sugar of milk until a thorough and complete division and distribution of it has been made. In the case of pasty or fluid bodies, these are mixed in a wet state with sugar of milk, the whole dried, and then finally subdivided by trituration. The powder in either case is then formed into a pasty mass with varying proportions of alcohol, and water, or other suitable menstrum, and afterwards moulded into tablets of uniform size and weight. The formula for each separate combination is arrived at in the following way:



TABLET TRITURATE MOULD.

The mould is filled with finely powdered sugar of milk, which has been wetted to a pasty mass with diluted alcohol. The tablets are then pressed from the mould, dried and the mass weighed. Deduct from the sugar of milk the weight of the medicinal substance which is to be used. (The rubber tablet triturate moulds now on the market are mostly standard size, and the weight of fifty tablets is generally 65 grains or about 1 1-3 grain for each tablet. It will therefore take 130 grains of material to make 100 tablets.)

It is important that all the ingredients and the mix-

ture of powders ready for moulding, should be in the finest state of subdivision; if they are coarse the tablets will not show a smooth, finished appearance. The tablets should never be left in the moulds over ten minutes because they cannot be removed without crumbling. Dry them on the push pins of the machine, or on a sheet of paper.

For **hypodermic tablets**, sugar of milk is well adapted, and the rules to follow for their preparation are exactly similar to those for the tablet triturates. The mould of course is smaller, usually making a tablet that weighs about three-quarters of a grain. The menstrum used for most combinations is three volumes of alcohol and one volume of water. In some of the higher strength morphine tablets it is necessary to use diluted alochol.

When solid extracts are to be combined into tablets, the mass should be moistened with a menstruum composed of a mixture of alcohol three volumes and chloroform one volume.

There are no tablet triturates official in the Pharmacopoeia.

COMPRESSED TABLETS.

Compressed tablets consist of some medicinal substance, or a mixture of substances, compressed to the form of a disc. The substance or mixture which is to be compressed must be either in its original granular condition, or prepared in a granular state by aid of a medium, such as cane sugar, or gum arabic, with the aid of water.

In the preparation of compressed tablets it is important that the ingredients be brought first to a very

fine state of subdivision by means of trituration, before they are granulated.

The granulation is accomplished by adding one-tenth of its weight of cane sugar and one-twentieth of its weight of acacia, thoroughly mixing and moistening the mass with a little water. Use enough water to make it of such consistence that it can readily be forced through a No. 12 sieve without sticking to it or clogging it. Various substances require somewhat special processes for compressing, sometimes chalk is used and special machinery for their manufacture is almost unlimited in designs and operation. The common type employed consists simply of a plunger worked into a mould by pressure.

* * * *

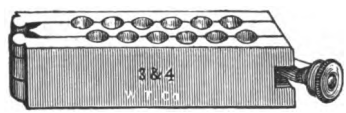
SUPPOSITORIA. Suppositories.

Suppositories are suitably-shaped masses of medicinal substances and a vehicle of solid consistence but quickly melting when introduced in any of the orifices of the human body for which they are intended. The vehicle may consist of fat oil, theobroma (cacao butter) or soap, as in the only official suppositories (glycerin) when intended for rectal use, and glycerinated gelatin when desired for urethral and vaginal use.

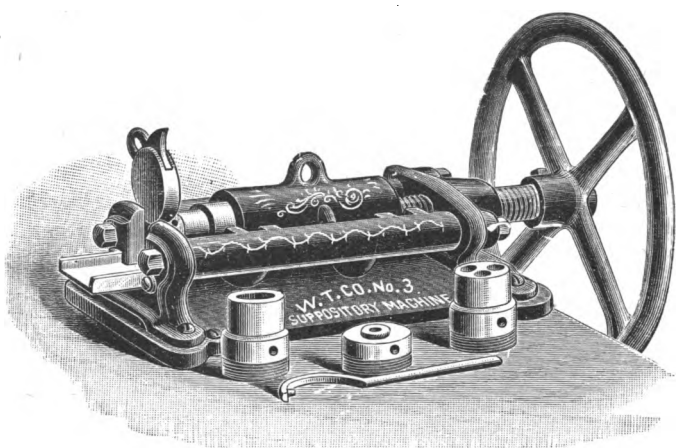
According to their size and shape there are these forms, namely the **Rectal** (cone shaped) which weigh about 2 Gm. (30 grains); the **Urethral** (pencil shaped) also called **Bougies,** pointed at one end and either short: 2 4-5 inches (7 cm.) in length weighing about 2 Gm. (30 grains); or long, which are twice the size and weight of the short when made with glycerinated gelatin.

If prepared with oil of theobroma they should be about one-half the weights given above.

Vaginal (globular or cone shaped) should weigh about 10 Gm. (150 grains) if made with glycerinated gelatin and about 4 Gm. (60 grains) if oil of theobroma is employed.



SUPPOSITORY MOULD.



SUPPOSITORY MACHINES.

Suppositories of cacao butter are prepared according to the following formula:

The medicinal substance, the prescribed quantity. Oil of theobroma, grated, a sufficient quantity. The quantity of cacao butter is determined by the desired weight wanted in each suppository: Example: If the

weight desired in each suppository is 2 Gm. (30 grains) and it contains 7 grains of medicinal substance then the difference 1½ Gm. (23 grains) is cacao butter.

Suppositories may be moulded by hand in a manner similar to that in preparing pill masses, being rolled out and cut in desired lengths. The more satisfactory way however, is to melt the mixture and pour in into cooled moulds, or they may be pressed into shape by suitable presses.

In preparing suppositories containing softening substances like phenol and chloral, about 10 per cent. of spermaceti may be added to the mass.

Suppositories made with glycerinated gelatin are generally prepared according to the following formula:

The medicinal substances, the prescribed quantity. Glycerinated gelatin, a sufficient quantity. Mix the medicinal substance with glycerin enough to make it weigh one-half that of the finished mass. Then incorporate it with an equal weight of melted glycerinated gelatin, pouring the whole mass into cooled moulds. The amount of glycerinated gelatin is calculated the same as in the case of cacao butter except that only one-half of the total weight of the suppositories is required.

There is only one official suppository.

SUPPOSITORIA GLYCERINI. Suppositories of Glycerin.

Each suppository contains 3 Gm. of glycerin.

GRANULAR EFFERVESCENT SALTS.

The terms **Granular** and **Granular Effervescent** salts should not be confused, for aside from the terms,

they have really nothing in common. The object of the granular effervescent salt is to afford a convenient and pleasant method of administering many medicinal substances, by combining them with a mixture containing an organic acid and sodium bicarbonate, and formed into coarse granules, so that when it is thrown into water effervescence ensues.

They are prepared by thoroughly mixing the dry medicated powder with dry and powdered citric or tartaric acid and sodium bicarbonate, then heating the mixture to a moist consistence at a temperature generally between 199 to 219 degrees F. (93 and 104 degrees C.) The moist mass is then forced through a tinned-iron sieve by means of a wooden spatula and the granules dried at about 129 degrees F. (54 degrees C.) The heating is performed in an oven.

Keep the salts in well-stoppered bottles.

There are five official effervescent salts.

CAFFEINA CITRATA EFFERVESCENS. Effervescent Citrated Caffeine.

Contains about 4 per cent. citrated caffeine.

Uses: Cardiac and cerebral stimulant, diuretic, nervous headache, heart failure, cardiac dropsy, neuralgia.

Average dose: 4 Gm. (60 grains).

LITHII CITRAS EFFERVESCENS. Effervescent Lithium Citrate.

Contains 5 per cent. lithium citrate.

Uses: Antilithic, antirheumatic, diuretic.

Average dose: 8 Gm. (120 grains) containing about 0.4 Gm. (6 grains) lithium citrate.

MAGNESII SULPHAS EFFERVESCENS. Effervescent Magnesium Sulphate.

Contains 50 per cent. magnesium sulphate.

Uses: Refrigerant, cathartic.

Average dose: 16 Gm. (240 grains), containing 8 Gm. (120 grains) of magnesium sulphate.

POTASSI CITRAS EFFERVESCENS. Effervescent Potassium Citrate.

Contains 20 per cent. potassium citrate.

Uses: Diaphoretic, refrigerant.

Average dose: 4 Gm. (60 grains) containing about 0.8 Gm. (12 grains) potassium citrate.

SODII PHOSPHAS EFFERVESCENS. Effervescent Sodium Phosphate.

Contains about 20 per cent. dried sodium phosphate.

Uses: Antilithic, cholagogue, laxative.

Average dose: 8 Gm. (120 grains).

CATAPLASMA. Cataplasms.

Cataplasms are mixtures of elutriated anhydrous kaolin with various antiseptic or soothing substances such as boric acid, glycerin, etc., and are designed for use in the form of thick applications to inflamed surfaces.

There is but one official cataplasm.

CATAPLASMA KAOLINI. Cataplasm of Kaolin.

(Antiseptic Clay Paste).

Each 100 Gm. contains 57.7 Gm. of kaolin, 37.5 Gm. of glycerin, 4.5 Gm. of boric acid, 2 Gm. of methyl salicylate, and .05 Gm. each of oil of peppermint and thymol.

Uses: Antiseptic, antiphlogistic, analgesic; applied hot, to inflamed surfaces, etc.

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CONFECTIONES. Confections.

Flavored medicated masses of sugar. They are usually prepared by incorporating the drug or drugs in paste or powder form with some saccharine liquid. There are two official.

CONFECTIO ROSAE. Confection of Rose.

Containing red rose 8 per cent.

Uses: Vehicle for pill masses.

CONFECTIO SENNAE. Confection of Senna.

(Electuari Senna).

Mixture of the pulps of cassia fistula, prune, tamarind and fig, with 10 per cent. senna, flavored with oil of coriander.

Uses: Lenitive, laxative for infants.

Average dose: 4 Gm. (60 grains).

PART THREE

CHAPTER XIX.

ACIDS.

The term acid in its broadest sense, may be defined as a compound of hydrogen with an electro-negative element or group of elements. They all contain hydrogen, which, when replaced by a metal, forms a salt with the remaining elements of the acid. An acid may also be defined as the opposite of a base or the negative of a hydrate. There are numerous variations or classes of acids, as for instance **ortho-acids, meta-acids, binary acids** and **ternary acids**, all denoting a certain form.

Characteristics of acids. Acids are sour to the taste, redden blue litmus paper, neutralize alkalies and nearly all corrode metals with the liberation of hydrogen.

It is important to remember that official acids are not absolute; for instance, U.S.P. hydrochloric acid actually contains but 31.9 per cent. absolute hydrochloric acid, nitric acid contains 68 per cent. absolute nitric acid, etc

From long custom acids are divided into two types **Inorganic** and **Organic.**

INORGANIC ACIDS.

Combinations of hydrogen, as well as of hydrogen and oxygen, with other non-metallic elements, yield a class of compounds called **inorganic acids.**

The atoms composing an acid may be directly united, and as there are only two kinds of elements in such a case, this class is called **binary**, as hydrogen and chlorine, forming hydrochloric acid; or the atoms may be indirectly united to each other, and as such will contain three or more kinds of atoms or elements they are called **ternary**; as hydrogen, oxygen and sulphur, forming sulphuric acid, the hydrogen being linked to the sulphur by means of the oxygen.

The strength of official diluted inorganic acids is 10 per cent. of absolute acid with the single exception of diluted nitro-hydrochloric acid.

With the exception of boric acid, all official inorganic acids are liquid.

Thus we can consider acids from the standpoint of binary and ternary.

Binary Acids.

Binary acids contain but two kinds of atoms, as in the case of hydrochloric acid, which contains an atom of hydrogen and an atom of chlorine which join and form a molecule of hydrogen chloride, or as it is called, hydrochloric acid. Binary acids, as well as binary compounds, are named by placing the name of the positive element first, followed by the negative element, as will be noticed in the example given above.

These acids form neutral compounds with metals, that is, all the hydrogen is replaced by the metal and a salt is formed which is called a **normal** salt because the acid has all been neutralized. The binary acids are, therefore, said to be **mono-basic** because they have only one atom of hydrogen that can be replaced.

OFFICIAL BINARY ACIDS.

Acidum Hydriodicum Dilutum. Diluted Hydriodic Acid.

A solution of hydriodic acid (HI) containing not less than 10 per cent. by weight of the absolute acid and about 90 per cent. of water

It is prepared by the reaction between potassium iodide, tartaric acid and potassium hypophosphite.

It is a clear, colorless liquid, odorless, having an acid taste, and can be mixed with water and alcohol in all proportions.

It should be kept in amber-colored, glass-stoppered bottles, protected from light.

The salts of hydriodic acid are called **iodides** and these are nearly all soluble in water. The acid and its salts are detected by adding to the solutions a little chlorine water and starch solution when a deep blue color is formed which disappears upon heating and reappears upon cooling. The color is destroyed by an excess of chlorine water.

Uses: Alterative, as a substitute for potassium iodide and other alkali iodides, and for preparing syrupus acidi hydriodici.

Average Dose: 0.5 Cc. (8 minims).

Acidum Hydrobromicum Dilutum.—Diluted Hydrobromic Acid.

Contains 10 per cent. by weight of absolute hydrobromic acid (HBr) and 90 per cent. of water.

Clear, colorless and odorless; has a strong acid taste and reaction; miscible with water and alcohol.

It forms a yellowish-white precipitate with silver nitrate which is insoluble in nitric acid. It also forms the yellow starch bromide by the addition of chlorine water and starch solution. It should be kept with care similar to hydriodic acid.

The salts formed are called **bromides**, and potassium, sodium, lithium and ammonium bromides are extensively used in medicine.

Uses: Sedative, same as the bromides.
Average dose: 4 Cc. (1 fluidrachm.)

Acidum Hydrochloricum. .Hydrochloric Acid, (Muriatic Acid.)

Contains 31.9 per cent. absolute hydrochloric acid HCl). Specific gravity 1.158. A fuming, corrosive and colorless liquid, miscible in all proportions with water and alcohol. Keep in glass-stoppered bottles.

Heated with manganese dioxide it gives off chlorine, and yields a white curdy precipitate with silver nitrate; the precipitate is insoluble in nitric acid but soluble in ammonia water. The salts are called **chlorides** and nearly all are soluble in water. Both the acid and its salts are extensively used in medicine.

Uses: Chiefly to prepare the diluted acid and other acids. Poisonous. Antidote, weak alkali solutions, soap water.

Acidum Hydrochloricum Dilutum. Diluted Hydrochloric Acid.

Contains 10 per cent. absolute hydrochloric acid.

Obtained by mixing 100 Gm. hydrochloric acid with 219 Gm. water.

It does not fume in the air, but corresponds otherwise to the taste and properties of the stronger acid.

Uses: Acid tonic.

Average Dose: 1 Cc. (15 minims) largely diluted.

TERNARY ACIDS.

It has been stated that the acid is changed into a salt by the replacement of its hydrogen atoms by a metal. In the case of binary acids there was only one hydrogen atom to be replaced and this formed **neutral** or **normal** salts. In the ternary acids there are one or more atoms of replaceable hydrogen; these hydrogen atoms are linked to the electro-negative element or group of elements by the aid of oxygen, and they are therefore often called **oxy-acids.** The hydrogen is linked to the oxygen and forms what is called **a hydroxyl** (OH) group and the number of these in an acid determines the amount of metal that can be introduced into the acid. This is termed the **basicity** of an acid, which means the base neutralizing power of the acid. There are acids containing one, two and three groups of hydroxyl, and they are accordingly called mono, di and tri basic, respectively. Therefore, we can distinguish three classes of salts from these acids, namely, normal or neutral salts, in which the hydrogen of the acid and the metal exactly counterbalance each other; acid salts, in which the hydrogen of the acid is not completely replaced by metal; and basic salts, in which the hydrogen of the base is not completely replaced by the acid-forming groups. Thus Na_2SO_4 is neutral sodium sulphate, while $NaHSO_4$ is acid sodium sulphate; Ca (OH) No_3 is basic calcium nitrate.

OFFICIAL TERNARY ACIDS.

Acidum Boricum. Boric acid. (Boracic Acid.) H_3BO_3.

Should contain 99.8 per cent pure boric acid.

It is generally found in whitish scales of a very fine powder; soluble in 18 parts of water, (3 parts of boiling water,) 15 parts of alcohol and about 5 parts of glycerin.

When heated with glycerin it forms boro-glycerin, which is official under the title of Glyceritum Boroglycerini.

It forms a number of complex salts, and is tribasic. The most common of these salts is borax. Its salts are known as **borates.**

The test for the detection of the acid is to heat a platinum wire, which has been dipped into an alcoholic solution of the acid, in a Bunsen flame, to which it imparts a green color.

Uses: Antiseptic. In liquor antisepticus, U. S. P.

Dose: 0.5 Gm. (7½ grains.)

Acidum Hypophosphorosum. Hypophosphorous Acid.

Composed of 30 per cent. of absolute hypophosphorus acid (PO. H_2) (OH) and 70 per cent. water. Specific gravity 1.130. It is colorless and is without odor.

Its salts are called **hypophosphites.**

Uses: For the preparation of the dilute acid.

Acidum Hypophosphorosum Dilutum. Diluted Hypophosphorous Acid.

Contains 10 per cent. of absolute acid.

Obtained by mixing 1 part, by weight, of hypophosphorus acid, which is a 30 per cent. solution, with 2 parts, by weight, of water.

Uses: Same as the salts and as an addition to their preparations; also as a preservative in chemical solutions susceptible to oxidation, syrup ferrous iodide for example, because of its powerful reducing properties.

Dose: 0.5 Cc. (8 minims).

Acidum Nitricum. Nitric Acid. (Aqua Fortis.)

Contains 68 per cent. absolute nitric acid (HNO_3) and 32 per cent. water. Specific gravity 1.403.

Nitric acid is a colorless, fuming liquid; it dissolves copper, producing a blue solution, it also dissolves mercury, silver and other metals, with the evolution of red fumes, by which it can readily be detected. It stains tissue a bright yellow. Many organic bodies are inflamed at once when coming into contact with it, and with a number of substances like cotton and cellulose, gun cotton is formed, and with glycerin there is formed nitroglycerin.

Its salts are called **nitrates**, nearly all of which are soluble in water.

Uses: As a caustic. Poisonous. Antidote: Weak alkali solutions, bland oils.

Acidum Nitricum Dilutum. Diluted Nitric Acid.

Obtained by mixing 10 parts nitric acid, by weight, with 58 parts of water.

Contains 10 per cent. by weight of absolute nitric acid.

Uses: Hepatic stimulant.

Dose: 2 Cc. (30 minims).

Acidum Phosphoricum. Phosphoric Acid. (Orthophosphoric Acid).

This is a syrupy liquid composed of 85 per cent. by weight of absolute orthophosphoric acid (H_3 PO_4) and 15 per cent. of water. Specific gravity 1.707.

It is miscible in all proportions with water or alcohol, which solutions give a strong acid reaction. With silver nitrate it gives a yellow precipitate which is soluble in both nitric acid and ammonia.

Its salts are called **phosphates** and the salts of the alkali metals are soluable in water, but other salts are not. It is tribasic, and forms three classes of salts.

Uses: In preparation of phosphates.

Acidum Phosphoricum Dilutum. Diluted Phosphoric Acid.

Obtained by mixing of 100 Gm. phosphoric acid with 750 Gm. water. Contains 10 per cent. of the absolute acid.

Uses: Tonic and refrigerant.

Average dose: 2 Cc. (30 minims).

Acidum Sulphuricum. Sulphuric Acid. (Oil of Vitriol).

Composed of 92.5 per cent., by weight of absolute sulphuric acid (H_2 SO_4). Specific gravity 1.826.

It is a heavy, oily liquid; can be mixed in all proportions with alcohol and water, which generates considerable heat. (In diluting, the acid should be added to the water or other diluent, and not the reverse.)

Sulphuric acid forms two series of salts, the neutral or normal, in which both of the hydrogen atoms are replaced; and the acid salt where only one atom of hydrogen is displaced; it is therefore, dibasic. Its salts are called **sulphates,** and most of these are solu-

ble in water. The sulphates of sodium, ammonium, iron, and a number of alkaloids have extensive use in medicine.

Uses: Very extensive. Poison. Antidote: Alkalies and bland oils.

Acidum Sulphuricum Aromaticum. Aromatic Sulphuric Acid. (Elixir of Vitriol.)

Contains about 20 per cent., by weight, of sulphuric acid or about 10 per cent. by volume.

Part of the sulphuric acid is converted into ethlysulphuric acid, and the product contains several aromatic substances. It might simply be termed a solution of sulphuric acid in alcohol with aromatics.

Preparation: Gradually add 111 Cc. sulphuric acid to 700 Cc. alcohol and allow the mixture to cool. Then add 50 Cc. tincture of ginger and 1 Cc. oil of cinnamon and sufficient alcohol to make the product measuse 1000 Cc.

Uses: Tonic, astringent; in night sweats of phthisis.

Average dose: 1 Cc. (15 minims) diluted.

Acidum Sulphuricum Dilutum. Diluted Sulphuric Acid. Contains 10 per cent. by weight, of absolute sulphuric acid.

Preparation: Gradually pour 100 Gm. sulphuric acid into 825 Gm. distilled water, with constant stirring.

Properties: Similar to sulphuric acid, in lesser degree.

Uses: Tonic, astringent and refrigerant; to dissolve quinine and other alkaloids.

Average dose: 2 Cc. (30 minims), highly diluted.

Acidum Sulphurosum. Sulphurous Acid.

Contains 6 per cent. by weight, of sulphur dioxide in water.

It is a colorless liquid of a sulphurous odor and taste. The salts are called **sulphites**, several of which are used in medicine, instead of the acid itself.

Heat decomposes most sulphites into oxide and sulphur dioxide which can easily be detected by its odor.

Sulphurous acid deteriorates rapidly and should be frequently assayed and discarded if it fails to conform to U. S. P. requirements. When used should preferably be fresh.

Uses: Disinfectant, germicide; rarely used internally, the sulphites being preferred.

Dose: 2 Cc. (30 minims).

Acidum Nitrohydrochloricum. Nitrohydrochloric Acid. (Nitro-Muriatic Acid. Aqua Regia.)

Obtained by mixing nitric acid, 18 volumes, with hydrochloric acid, 82 volumes.

Must be mixed in a large open vessel and not confined until effervescence has ceased. Keep in amber-colored, glass-stoppered bottles not over half filled.

Contains free chlorine and introsyl chloride, NOCl. It may be described as a golden yellow fuming liquid with the odor of chlorine. It will dissolve gold, (hence the name aqua regia.) Very corrosive on practically all substances and care should be exercised that none comes in contact with tissue.

Acidum Nitrohydrochloricum Dilutum. .Diluted Nitrohydrochloric Acid. (Diluted Nitro-Muriatic Acid.)

About one-tenth as strong as the undiluted form.

Preparation: Mix 40 Cc. nitric acid with 182 Cc. hydrochloric acid in a capacious glass vessel. When effervescence ceases add 778 Cc. distilled water.

Properties: Similar to the stronger acid but in lesser degree.

Uses: Hepatic stimulant, largely diluted, also as an addition to bitter tonics.

Dose: 1 Cc. (15 minims).

ORGANIC ACIDS.

All organic acids contain the three elements, **hydrogen, oxygen** and **carbon**. Because of the presence of the latter element they are classed under the so-called compounds of carbon, or organic compounds as they are usually named. Instead of the hydroxyl group of inorganic acids, organic acids contain the carboxyl group, and may vary in basicity as one, two or three carboxyl groups may have been taken up from the alcohol or other compound from which the acid was formed. Similarly to the inorganic acids they have one, two or three atoms of hydrogen or groups which may be replaced by metals. The organic compounds are often arranged in two great classes, viz: the **methane** derivatives, sometimes called the fatty bodies, and the **benzene** derivatives, often called the aromatic compounds. Of the official organic acids some belong to one, some to the other of the above series, depending upon their composition. They all have an acid taste and reaction more or less distinct.

OFFICIAL ORGANIC ACIDS.

Acidum Aceticum. Acetic Acid. A liquid containing 36 per cent., by weight, of absolute acetic acid ($HC_2 H_3 O_2$) and 64 per cent. of water. Obtained by

the oxidation of ethyl alcohol or the destructive distillation of wood. The crude product obtained by the destructive distillation of wood is known as **pyroligneous acid** and contains chiefly acetic acid and methyl alcohol (wood alcohol). There is great variation in the strength of commercial acetic acid, an acid known as "No. 8," which is 20 per cent. under official requirements, being frequently supplied; only U. S. P. acid should be used. Salts of acetic acid are known as **acetates** and nearly all are soluble in water. Both the acid and its salts are extensively employed.

Acidum Aceticum Dilutum. Diluted Acetic Acid. Contains 6 per cent., by weight, of absolute acid.

Preparation: Mix 100 Gm. acetic acid with 500 Gm. distilled water.

Uses: Refrigerant; in preparing acetates, and as a menstruum.

Average dose: 2 Cc. (30 minims).

Acidum Aceticum Glaciale. Glacial Acetic Acid. Contains 99 per cent. absolute acetic acid.

A crystalline solid below 59 degrees F. (15° C.) At a higher temperature it becomes a clear, colorless liquid.

Used as a solvent for oils, resins and fats.

Acidum Benzoicum. Benzoic Acid.

An organic acid ($HC_7 H_5 O_2$) consisting of white or yellowish-white scales or needles.

Obtained from benzoin by sublimation or prepared synthetically, both are official. It is soluble in 281 parts of water, 1.3 parts of alcohol and in ether, chloroform, fixed and volatile oils. Should be kept in dark amber-colored, well-stoppered bottles.

Uses: Diuretic, antiseptic. Internally chiefly as

soluble compounds with the alkalies (benzoates); externally in solutions. A preservative for food products.

Average dose: 0.5 Gm. (7½ grains).

Acidum Camphoricum. Camphoric Acid.

A diabasic organic acid (H_2 C_{10} H_{14} O_4). Obtained by the oxidation of camphor, forming colorless and odorless crystals or flakes, soluble in 125 parts of water and readily soluble in alcohol and the fatty oils.

Uses: Internally to combat the night sweat of phthisis; externally in saturated aqueous solutions for pharyngitis and laryngitis.

Dose: 1 Gm. (15 grains).

Acidum Citricum. Citric Acid.

A tribasic organic acid (H_3 C_6 H_5 O_7). Usually obtained from the juice of limes or lemons, may also be made synthetically from grape sugar. Should contain 99.5 per cent. pure citric acid.

Uses: Refrigerant and substitute for lemon juice. Also extensively used to form citrates with the alkalies and alkaline earths, in official solutions and effervescent salts—as liquor potassii citratis, liquor magnesii citratis, magnesii sulphas effervescence, etc.; with ammonia and other alkalies and alkaloids to form soluble double compounds generally known as "scale salts," besides a number of crystalline salts with the metals as potassium citrate, etc.

Average Dose: 0.5 Gm. (7½ grains.)

Acidum Gallicum. Gallic Acid. $HC_7H_5O_5+H_2O$.

Obtained from nutgall or tannic acid. It occurs in yellowish-white, silky needles somewhat bitter but with an acid taste; soluble in 83.7 parts of water and 4 parts of alcohol.

Uses: Astringent, haemostatic. Also several salts used, as the subgallate.

Average Dose: 1 Gm. (15 grains.)

Acidum Hydrocyanicum Dilutum. Dilute Hydrocyanic Acid. (Prussic Acid.)

An aqueous solution of gaseous hydrocyanic acid (HCN). Should contain 2 per cent. of absolute acid.

It has the odor of bitter almonds, is easily decomposed and should be carefully kept in small dark amber-colored, cork-stoppered bottles away from heat and light.

It is prepared by the decomposition of silver cyanide by hydrochloric acid.

Uses: Sedative; a frequent addition to cough mixtures.

Average Dose: 0.1 Cc. (1½ minims.)

Caution: Hydrocyanic acid is a deadly poison and should be handled with great care. Antidote: Ferric chloride, inhalation of ammonia.

Acidum Lacticum. Lactic Acid.

A syrupy acid liquid, miscible in all proportions with water, alcohol and ether, insoluble in chloroform.

Should contain not less than 75 per cent. by weight, of absolute acid.

A constituent of sour milk, also obtained by fermentation of glucose under certain conditions.

Uses: For the preparation of lactates and syrup calcium lactophosphate.

Average Dose: 2 Cc. (30 minims.)

Acidum Oleicum. Oleic Acid.

A monobasic organic acid (C_{18} H_{34} O_2) prepared by cooling fats.

The crude oil (known as red oil) is obtained as a by-product in the manufacture of candles. When newly made the pure oil is odorless, colorless and tasteless, but as usually supplied it is an oily, yellowish liquid with a lard like odor. Insoluble in water, but soluble in alcohol, chloroform and various oils.

Uses: To prepare oleates of alkalies, metals and alkaloids, as atropine, cocaine, etc. (see oleates.)

Acidum Salicylicum. Salicylic Acid.

A monobasic organic acid ($HC_7 H_5 O_3$).

Fine, white needles, or a crystalline powder, soluble in 308 parts of water, 2 parts of alcohol; also soluble in ether, chloroform and fixed oils. It is prepared, artificially from phenol, or obtained from the natural ester oil of gaultheria.

Uses: Anti-rheumatic, antiseptic and germicide.

Its salts with the alkalies are very soluble in water and are often used as substitutes for the acid, but these are said to be less effective than the acid itself. Often the natural ester of the acid is used, called **methyl salicylate** (artificial oil of gaultheria). Another ester of the acid is also official; namely, phenyl salicylate or **salol.**

Average Dose: 0.5 Gm. (7½ grains.)

Acidum Stearicum. Stearic Acid.

Obtained from fat as a by-product in the manufacture of glycerin, chiefly from tallow. A white solid insoluble in water but soluble in alcohol, distinction from stearin.

Uses: Forms compounds with the metals called stearates, as stearate of zinc.

Acidum Tannicum. Tannic Acid. (Tannin).

Obtained from nutgall. Light, yellowish crusts or

powder or scales with a very astringent taste. Very soluble in water and alcohol and in about 3 parts of glycerin.

Incompatible with alkalies, lime solutions, alkaloids, albumen, gelatin; metals like iron, mercury and copper, the iodides, chlorides and bromides, permanganates, chlorates, nitrites and other oxidizing agents. Due to its forming insoluble compounds with the alkaloids it has been used as an antidote in general cases of poisoning.

Uses: Astringent, styptic, hemostatic. Used also in ointments, collodions and troches.

Average Dose: 0.5 Gm. (7½ grains.)

Acidum Tartaricum. Tartaric Acid.

A solid dibasic acid $H_2C_4H_4O_6$.

A white powder or colorless, translucent crystals, obtained from argol (the sediment in wine casks.)

Soluble in water and alcohol but not in ether (distinction from citric acid which dissolves in ether).

Uses: Refrigerant, laxative; as pulvis effervescence compositus U. S. P.; to form tartrates and with ammonia and the alkalies to form soluble iron compounds.

Average Dose: 0.5 Gm. (7½ grains).

Acidum Trichloraceticum. Trichloracetic Acid.

A monobasic organic acid ($H C_2 Cl_3 O_2$) usually obtained by the oxidation of hydrated chloral with nitric acid.

It is a white, deliquescent crystalline compound; very soluble in water, alcohol and ether; should be kept in dark bottles, well stoppered.

Uses: Chiefly as chemical agent. Medical properties; astringent, escharotic, hemostatic.

CHAPTER XX.

THE ALKALIES AND THEIR COMPOUNDS.

The alkali group of metals consists of **Potassium, Sodium, Lithium, Rubidium** and **Caesium**; the atomic group **Ammonium** (NH_4) is also included, owing to its properties being so closely common with the above named metals or elements. The compounds of all bear a close resemblance to one another; the metals all energetically decomposing water evolving hydrogen, and forming hydrates in solution which have a strongly alkaline reaction, turning red litmus paper blue. The salts are nearly all soluble in water, the chief exceptions being the phosphate and carbonate of lithium. Their hydrates, that is their compounds with water, are of a caustic nature.

POTASSIUM.—Kalium.—K.

Potassium is of a waxy consistence and when freshly cut has the bright metallic lustre. It cannot be kept in the air as it combines at once with the oxygen, due to atmospheric moisture, and burns with a violet color. It is preserved in kerosene. Many compounds of potassium are used in medicine and its uses in the arts are almost unlimited.

Potassii Hydroxidum. Potassium Hydroxide. (Potassa. (Caustic Potash.) K O H.

Should contain not less than 85 per cent. of pure anhydrous potassium hydroxide.

It is in dry white flakes, fused masses or pencils. It is very deliquescent, and very soluble in both water and alcohol. Great caution should be taken when it is brought into contact with organic tissue, which it destroys rapidly. It gives an intensely alkaline reaction with red litmus paper.

Uses: As a caustic; in liquor potassii hydroxidi. Rarely used internally.

Potassii Acetas. Potassium Acetate. $KC_2 H_3 O_2$.

Should contain, when well dried, 98 per cent. of pure potassium acetate. Very deliquescent, should be kept in well stoppered bottles.

A white powder or in crystalline masses. Alkaline to litmus paper. Soluble in 0.4 parts of water and in 2 parts of alcohol.

Uses: Alterative, diuretic, refrigerant.

Average Dose: 2 Gm. (30 grains) in solution only, largely diluted.

Potassii Bicarbonas. Potassium Bicarbonate $KHCO_3$.

Should contain not less than 99 per cent. pure potassium bicarbonate. Transparent prisms or granular powder. Soluble in about 3 parts of water, but almost insoluble in alcohol.

Uses: Antacid (mild), antilithic, diuretic. It is used in the preparation of liquor potassii arsenitis, liquor magnesii citratis and liquor potassii citratis.

Average Dose: 2 Gm. (30 grains).

Potassii Bitartras. Potassium Bitartrate. (Cream of Tartar) $KHC_4 H_4 O_6$.

White crystalline powder, soluble in 200 parts of water and only slightly soluble in alcohol.

It is obtained from crude tartar or argol, a natural deposit in wine, during the process of fermentation.

Should be 99 per cent. pure and free from alum and phosphates. It has an acid reaction on blue litmus paper.

Uses: Diuretic, aperient, refrigerant, saline laxative; a constituent of pulvis jalapae compositus.

Average Dose: 2 Gm. (30 grains) diuretic and refrigerant; 2 to 15 Gm. (½ to 4 dr.) as purgative.

Potassii Bromidum. Potassium Bromide. KBr.

Should contain not less than 97 per cent. pure potassium bromide.

White cubical crystals or granular powder, soluble in 1.5 parts of water and in 180 parts alcohol, also soluble in glycerin.

Uses: Antispasmotic, nerve sedative.

Average Dose: 1 Gm. (15 grains).

Potassii Carbonas. Potassium Carbonate. (Salt of Tartar.) $K_2 CO_3$.

When thoroughly dried should contain not less than 98 per cent. pure potassium carbonate. Very deliquescent; should be kept in well-stoppered bottles.

A white granular powder, soluble in 0.91 parts water, insoluble in alcohol. It is strongly alkaline in solutions and effervesces with acids.

Uses: Rarely internally but chiefly as a caustic

and a reagent. In syrupus rhei and syrupus rhei aromaticus, to hold the resinous matter in solution.

Average Dose: 1 Gm. (15 grains) largely diluted.

Potassii Chloras. Potassium Chlorate. $KClO_3$.

Colorless plates or white granular powder. Should be 99 per cent pure. Soluble in 16 parts of water, very soluble in hot water but insoluble in alcohol.

Caution must be used in triturating it as contusion often produces explosions; it should not be triturated with organic substances such as sugar, tannic acid, carbon or with sulphur, antimony, phosphorous or any easily oxidizable material; mixture should be effected by means of a spatula without use of a mortar.

Uses: Alterative, antiseptic, astringent. In liquor chlori compositus, trochisci potassii chloratis.

Average Dose: 0.25 Gm. (4 grains).

Potassii Nitras. Potassium Nitrate (Saltpeter.) KNO_3.

Should be 99 per cent. pure and kept in well-stoppered bottles. Colorless prisms or white crystalline powder; soluble in 3.6 parts of water and sparingly soluble in alcohol.

Uses: Antiseptic, diuretic, diaphoretic, refrigerant; in the preparation of argenti nitras mitigatus.

Average Dose: 0.5 Gm. (7½ grains) largely diluted.

Potassii Citras. Potassium Citrate. $K_3\ C_6\ H_5\ O_7 + H_2O$.

Prismatic crystals or white granular powder. Soluble in 0.5 parts water, slightly soluble in alcohol.

Should contain 99 per cent. of pure potassium citrate and be kept in stoppered bottles as it is very deliquescent.

It gives an alkaline reaction in solution to red litmus paper.

Uses: Diaphoretic, refrigerant. In liquor potassii citratis.

Average Dose: 1 Gm. (15 grains).

Potassii Citras Effervescens. Effervescent Potassium Citrate.

An effervescing mixture of potassium citrate, sodium bicarbonate and tartaric and citric acids. Contains about 20 per cent. of potassium citrate.

Uses: Refrigerant, diaphoretic, diuretic. A pleasant method of administering potassium citrate.

Average Dose: 4 Gm. (60 grains).

Potassii Cyanidum. Potassium Cyanide. KCN.

Should be 95 per cent. pure and kept in well-stoppered bottles.

White opaque pieces, or white granular powder; very deliquescent. Soluble in about 2 parts of water, but only sparingly in alcohol. Has the odor of hydrocyanic acid (bitter almond odor) and should be handled with great care due to its intensely poisonous character to all forms of life.

Antidote: Ferri hydroxidum cum magnesii oxido, artificial respiration, evacuation of stomach. Cobalt nitrate is the chemical antagonist.

Uses: Antispasmotic, cough sedative.

Average Dose: 0.010 Gm. (1-5 grain) in dilute solution, water or syrup.

Potassii Dichromas. Potassium Dichromate. (Potassium Bichromate.) $K_2 Cr_2 O_7$.

Should be 99 per cent. pure and kept in well-stoppered bottles.

Large orange-red transparent prisms or tabular crystals. Soluble in 9 parts of water, insoluble in alcohol. Readily oxidizes organic matters forming explosive compounds.

Uses: Alterative, astringent, caustic; in moderate doses, emetic; rarely employed.

Average Dose: 0.010 Gm. (1-5 grain).

Potassii Et Sodii Tartras. Potassium and Sodium Tartrate. (Rochelle Salt. Tartrated Soda).

Soluble in 1.2 parts of water, almost insoluble in alcohol.

Should be 99 per cent. pure and kept in well-stoppered bottles.

Colorless prisms or white odorless powder with cooling saline taste.

Made by neutralizing the free acid in potassium bitartrate with sodium carbonate.

Uses: Refrigerant, saline purgative, exerting painless laxative effect, especially in habitual constipation; a constituent of seidlitz powders.

Average Dose: 8 Gm. (120 grains).

Potassii Ferrocyanidum. Potassium Ferrocyanide.

Should be 99 per cent. pure and kept in well-stoppered bottles.

Large, transparent yellow, four-sided tabular crystals, soluble in about 4 parts of water, insoluble in alcohol.

Uses: Sedative, antihydrotic; rarely employed.

Average Dose: 0.5 Gm. (7½ grains.)

Potassii Hypophosphis. Potassium Hypophosphite. KPH_2O_2.

Should be at least 98 per cent. pure and be kept in well-stoppered bottles.

White plates or crystalline masses or a granular powder having a pungent saline taste. Soluble in about 0.5 parts water and in 7 parts of alcohol; insoluble in ether.

Caution: In dispensing this salt as well as other hypophosphites explosion is liable to occur when it is triturated with nitrates, chlorates, or other oxidizing agents.

Uses: Nerve tonic, reconstructive; a constituent of emulsion of cod liver oil with hypophosphites, syrup of hypophosphites and syrupus hypophosphitum compositus.

Average Dose: 0.5 Gm. (7½ grains).

Potassi Iodidum. Potassium Iodide. KI.

Should be 99 per cent. pure and kept in well-stoppered bottles.

White crystals or white granular powder at least 99 per cent. pure.

Soluble in 0.7 parts of water, 12 parts of alcohol, 2.5 parts of glycerin.

Incompatible with alkaloids, alkaloidal salts, tannic acid, salts of mercury, chloral hydrate, potassium chlorate, acids in general which liberate iodine, bismuth subnitrate, sweet spirit of nitre, liquorice and preparations containing starch.

Uses: Alterative, resolvent. In liquor iodi compositus, unguentum potassii iodidi, in preparing hydriodic acid, etc.

Average Dose: 0.5 Gm. (7½ grains) only in solution, largely diluted.

Potassii Permanganas. Potassium Permanganate. $KMnO_4$.

Should contain not less than 99 per cent. pure potassium permanganate and be kept in glass stoppered bottles protected from light.

Prisms of a dark purple color, soluble in 15 parts of water. Decomposed by alcohol. Has a taste at first sweet but soon becomes disagreeable and astringent.

Incompatible with organic substances or readily oxidizable substances; for pills should be massed with petrolatum and triturated with kaolin or paraffin or an explosion might occur.

Uses: Deodorant, disinfectant, emmenagogue; antidote for morphine poisoning.

Average Dose: 0.065 Gm. (1 grain).

Potassii Sulphas. Potassium Sulphate. $K_2 SO_4$.

Prisms or white powder, soluble in 9 parts of water, insoluble in alcohol. Should be 99 per cent pure. Has a bitter, saline taste.

Uses: Cathartic, diuretic; seldom employed.

Average Dose: 2 Gm. (30 grains).

SODIUM.—Natrium.—Na.

Sodium has a metal like appearance but does not occur uncombined in nature. It has most of the characters of potassium but is not generally so violent in its chemical action. It is kept in kerosene.

Uses: In laboratory work, while its salts form the greatest number of official compounds of any element, these series of compounds or salts being also analogous to those of the other alkali metals, potassium, lithium and ammonium. Its salts give a lasting yellow color to a Bunsen flame, which is a characteristic test in iden-

tifying them. In the arts its use is also unlimited. The sodium compounds are all very soluble in water, the borate (borax) being the least, requiring 20 parts for solution. None absorb moisture from the atmosphere.

Except for the bromide, iodide and salicylate, which are fairly soluble in alcohol they are insoluble in this and other liquids. The hydroxide, carbonate and bicarbonate are alkaline in reaction in strength of order named.

Sodii Acetas. Sodium Acetate. $Na\ C_2\ H_3\ O_2 + 3H_2\ O$.

Should contain, in uneffloresced condition, 99.5 per cent. pure sodium acetate.

Transparent prisms or granular crystalline powder, soluble in 1 part of water and 23 parts of alcohol.

Contains nearly 40 per cent. water of crystallization and is quite stable upon exposure to air (the opposite of potassium acetate).

Uses: Diuretic, in preparing acetic ether.

Average Dose: 1 Gm. (15 grains).

Sodii Arsenas. Sodium Arsenate. $Na_2\ H\ As\ O_4 + 7H_2\ O$.

Colorless prisms; contains over 40 per cent. of water; efflorescent in dry air, somewhat deliquescent in moist air. Should be 98 per cent. pure.

Soluble in 1.2 parts of water, slightly soluble in alcohol.

Uses: Alterative.

Average Dose: 0.005 Gm. (1-10 grain).

Sodii Arsenas Exsiccatus. Exsiccated Sodium Arsenate.

This is sodium arsenate deprived of its water of

crystallization; 60 grains represent 100 grains sodium arsenate. Very poisonous.

Uses: Alterative, antiperiodic. Used in preparing liquor sodii arsenatis.

Average Dose: 0.003 Gm. (1-20 grain).

Sodii Benzoas. Sodium Benzoate. $Na\ C_7\ H_5\ O_2$.

Should be 99 per cent. pure and kept in well-stoppered bottles.

A white amorphous or granular crystalline powder, soluble in 1.6 parts of water and about 43 parts of alcohol.

Uses: Antiseptic, antipyretic, antirheumatic; also extensively as preservative in foods; in liquor antisepticus, U. S. P.

Average Dose: 1 Gm. (15 grains).

Sodii Bicarbonas. Sodium Bicarbonate (Acid Sodium Carbonate. Baking Soda.) $NaHCO_3$.

A white powder, soluble in 12 parts of water but insoluble in alcohol. In solutions above 59 degrees F. (15 degrees C.) it decomposes and the normal carbonate is formed with the evolution of carbon dioxide.

The commercial salt is frequently adulterated with the carbonate, (the Pharmacopoeia requires it 99 per cent. pure) as the carbonate is very soluble in water it may be easily washed out with cold water.

The salt should be kept in a cool place well stoppered as it is decomposed in moist air; it is also decomposed by acids and acid salts, such as bismuth subnitrate.

Uses: Antacid, alterative, antipruritic; to relieve itching, in solution or powder in burns, but most extensively in dyspeptic conditions. Sodium bicarbonate is used officially in mistura rhei et sodae, ferri carbonas

saccharatus, pulvis effervescens compositus, sodii phosphas effervescens, magnesii sulphas effervescens and trochisci sodii bicarbonatis.

Average Dose: 1 Gm. (15 grains).

Sodii Bisulphis. Sodium Bisulphite. (Acid Sodium Sulphite.) $NaH\ SO_3$.

Should contain not less than 90 per cent. pure sodium bisulphite and be kept in a cool place in small, well-stoppered bottles, completely filled.

Opaque crystals or granular powder; soluble in 3.5 parts of water and 70 parts of alcohol.

Uses: To arrest putrefaction and other forms of fermentation. Seldom employed.

Average Dose: 0.500 Gm. (7½ grains).

Sodii Boras. Sodium Borate. (Borax) $Na_2B_4O_7 + 10H_2O$.

Found naturally in California. Should be 99 per cent pure and kept in well-stoppered bottles.

Transparent prisms or white powder soluble in 20 parts of water and 1 part of glycerin, insoluble in alcohol. The solution in glycerin forms boroglyceride with evolution of gas. It is alkaline in reaction.

Uses: Antiseptic, astringent, detergent. Incompatible in solution with alkaloids.

Average Dose: 0.5 Gm. (7½ grains).

Sodii Bromidum. Sodium Bromide. NaBr.

Obtained by treating a solution of sodium hydroxide with bromine.

Should contain, when dried, not less than 97 per cent. of pure sodium bromide, and should be kept in well-stoppered bottles.

Cubical crystals or white granular powder, soluble in about 1.7 parts of water and 12.5 parts of alcohol.

Incompatible with acids, acid and metallic salts which liberate bromine.

Uses: Nerve sedative, cerebral depressant.

Average Dose: 1 Gm. (15 grains).

Sodii Carbonas Monohydratus. Monohydrated Sodium Carbonate. $Na_2 CO_3 + H_2O$.

It contains only one molecule of water of crystallization and is therefore nearly twice as strong as the ordinary sodium carbonate which is no longer official.

It is made by simply crystallizing ordinary sodium carbonate. It is a white crystalline or granular powder, very soluble in water and glycerin but insoluble in alcohol.

Uses: To prepare liquor sodae chlorinatae, massa ferri caronatis and suppositoria glycerini.

Average Dose: 0.25 Gm. (4 grains). Seldom employed alone.

Sodii Chloras. Sodium Chlorate. $Na ClO_3$.

Colorless crystals or crystalline powder, soluble in about 1 part of water, 100 parts of alcohol and about 5 parts of glycerin. Should be 99 per cent. pure.

It is dangerously explosive as potassium chlorate.

Uses: Antiseptic, gastric, cancer, similar to potassium chlorate, over which it has the advantage of being more soluble in water.

Average Dose: 0.25 Gm. (4 grains).

Sodii Chloridum. Sodium Chloride. (Common Salt.) Na Cl.

White crystalline powder soluble in about 3 parts of water, but almost insoluble in alcohol. Should be 99 per cent. pure.

Uses: Locally it is of service in affections of the mucous membrane. Internally as an emetic, also in

dyspeptic conditions, administered in carbon dioxide water or in form of natural mineral water. Antidote for silver nitrate poisoning.

Average Dose: As an emetic 16 Gm. (240 grains).

Sodii Citras. Sodium Citrate. $2Na_3\ C_6\ H_5\ O_7 + 11\ H_2\ O$.

White, granular powder, soluble in 1.1 parts of water, slightly soluble in alcohol. Should be 97 per cent. pure and kept in well-stoppered bottles.

Uses: Antilithic, diuretic, refrigerant, pleasant laxative.

Dose: 1 Gm. (15 grains).

Sodii Hydroxidum. Sodium Hydroxide. (Soda, U. S. P., 1890. Caustic Soda. Sodium Hydrate.) NaOH.

Should contain not less than 90 per cent. of pure anhydrous sodium hydroxide, and not more than 2 per cent. of other inorganic substances with the exception of water. Should be kept in well-stoppered bottles made of hard glass. Usually seen in masses or pencils; absorbs moisture from atmosphere very rapidly and should be kept well-stoppered. Soluble in about 1 part of water and very soluble in alcohol.

A caustic poison; antidote, bland fixed oil, soap solution, mustard emetic.

Used in liquor sodii hydroxidi, (liquor sodae, 1890) which contains about 5 per cent. of sodium hydroxide. Action about the same as potassium hydroxide and but little employed, the potassium hydroxide being almost always preferred.

Sodii Hypophosphis. Sodium Hypophosphite. $NaPH_2O_2 + H_2O$.

Small plates of pearly lustre or white granular

powder, deliquescent, soluble in about 1 part of water and 25 parts of alcohol.

Should be 98 per cent pure and kept in well-stoppered bottles. Should not be triturated or heated with nitrates, chlorate or other oxidizing agents because of danger of explosion.

Uses: Reconstructive tonic; a constituent of syrupus hypophosphitum and syrupus hypophosphitum compositus, U. S. P.

Average Dose 1 Gm. (15 grains.)

Sodii Iodidum. Sodium Iodide. Na I.

Cubical crystals or white crystalline powder made by adding iodine to solution sodium hydroxide.

Soluble in 0.5 parts of water and 3 of alcohol. Should be 98 per cent. pure and kept in well-stoppered bottles.

Uses: Irritant, absorbent, alterative, resolvent; same as potassium iodide. Incompatible with acids. Not so extensively used as potassium iodide.

Average Dose: 0.5 Gm. (7½ grains).

Sodii Nitras. Sodium Nitrate. (Chili Saltpeter.) $Na\ NO_3$.

Should be at least 99 per cent pure and kept in well-stoppered bottles.

Colorless, odorless, transparent crystals, with a saline and slightly bitter taste. Soluble in 1.1 parts of water. Almost insoluble in alcohol.

Uses: Mild diaphoretic, active diuretic; not depressant to heart or respiration like the potassium salt, used in preparing sodium arsenate. Rarely used in medicine, but extensively employed in manufacture of potassium nitrate and nitric acid.

Average Dose: 1 Gm. (15 grains).

Sodii Nitris. Sodium Nitrite. Na NO_2.

Should contain not less than 90 per cent. pure sodium nitrite and be kept in well-stoppered bottles.

White, opaque, fused masses or pencils. Odorless, with slightly saline taste. Soluble in 1.4 parts of water, but slightly soluble in alcohol.

Uses: To prepare spirit of nitrous ether; occasionally used to produce effects similar to those of amyl nitrite but it is both absorbed and eliminated more slowly than either this or nitroglycerin. Gastro-intestinal irritation often results from use due to formation of nitric acid.

Average Dose: 0.065 Gm. (1 grain).

Sodii Phenolsulphonas. Sodium Phenolsulphonate. (Sodii Sulphocarbolas. Phar. 1890. Sodium-Para-phenolsulphonate.)

Colorless prisms, soluble in 4.8 parts of water and about 130 parts of alcohol. Should be 99 per cent pure and kept in well-stoppered bottles in a cool place. Action similar to phenol (carbolic acid) but less irritant and poisonous and also probably less antiseptic.

Uses: Antiseptic, antizymotic, disinfectant.

Average Dose: 0.25 Gm. (4 grains).

Sodii Phosphas. Sodium Phosphate. (Di-sodium-ortho-phosphate.) $Na_2 HPO_4 + 12H_2O$.

Large colorless prisms or a granular crystalline salt, soluble in 5.5 parts of water; insoluble in alcohol.

Contains 60 per cent of water of crystallization. Should be 99 per cent. pure in uneffloresced crystals and kept in well-stoppered bottles in a cool place.

Uses: Antilithic, cholagogue, laxative; often a constituent of laxative mineral waters, etc., used in

preparing soluble ferric phosphate, effervescent sodium phosphate, exsiccated sodium phosphate and liquor sodii phosphatis compositus, U. S. P.

Average Dose: 2 Gm. (30 grains).

Sodii Phosphas Exsiccatus. Exsiccated Sodium Phosphate. (Dried Sodium Phosphate.)

Should contain at least 99 per cent. pure anhydrous salt and be kept in well-stoppered bottles.

A white powder, soluble in water but insoluble in alcohol, with action similar to sodium phosphate; it is about twice the strength of the undried salt due to its loss of water of crystallization.

Uses: Principally in making effervescent sodium phosphate.

Average Dose: 1 Gm. (15 grains).

Sodii Phosphas Effervescens. Effervescent Sodium Phosphate.

Granular effervescent salt, containing about 20 per cent. of dried sodium phosphate.

Preparation. Powder 162 Gm. of citric acid and mix intimately with 200 Gm. exisiccated sodium phosphate and 252 Gm. of tartaric acid; then incorporate 477 Gm. of sodium bicarbonate. Place the mixed powders on a plate of glass or in a suitable dish in an oven heated to about 217 degrees F. (102 degrees C.), and heat until moist, when it is rubbed through a tinned-iron sieve. The granules are dried at a temperature of 129 degrees F. (54 degrees C.)

Uses: Same as sodium phosphate, of which it is a palatable form.

Average Dose: 8 Gm. (120 grains).

Sodii Pyrophosphas. Sodium Pyrophosphate. $Na_4P_2O_7 + 10H_2O$.

Colorless prisms or crystalline powder. Odorless, cooling and slightly saline taste.

Should contain, in an uneffloresced condition, not less than 99 per cent. pure sodium pyrophosphate and be kept in well-stoppered bottles.

Soluble in 11.5 parts of water, insoluble in alcohol.

Uses: Same as sodium phosphate; principally for the preparation of ferri pyrophosphas solubilis.

Average Dose: 2 Gm. (30 grains).

Sodii Salicylas. Sodium Salicylate. $Na\ C_7\ H_5\ O_3$.

White crystalline or an amorphous powder obtained easily by mixing 16.5 parts salicylic acid and 10 parts sodium bicarbonate with 10 parts water and evaporating the solution.

Soluble in 0.8 parts of water, in 5.5 alcohol, also soluble in glycerin.

Should be 99.5 per cent pure and kept in well-stoppered bottles protected from heat and light.

Impurties sometimes impart a faint pink tinge to the salt.

Incompatible with hydrobromic acid, (precipitation of salicylic acid), spirit of nitrous ether, ferric salts, mineral acids, quinine salts in solution, lime water, lead acetate, silver nitrate (in solution), and sodium phosphate (in powder).

Uses: Antiseptic, antirheumatic, antineuralgic.

Average Dose: 1 Gm. (15 grains).

Sodii Sulphas. Sodium Sulphate (Glauber Salt.) $Na_2\ SO_4 + 10H_2O$.

Large colorless bitter tasting crystals, soluble in

2.8 parts of water and in glycerin but insoluble in alcohol.

Should contain, in uneffloresced condition, not less than 99 per cent. pure sodium sulphate, and should be kept in well-closed vessels in a cool place. Obtained as by-product in manufacture of nitric and hydrochloric acids. Contains 55.9 per cent. water of crystallization. Effloresces rapidly and the crystals become white and soft.

Uses: Purgative, but rarely used alone because of its nauseous taste; is extensively employed in proprietary effervescent hepatic salts.

Average Dose: 16 Gm. (240 grains).

Sodii Sulphis. Sodium Sulphite. $Na_2 SO_3 + 7H_2O$.

Should contain, in uneffloresced and air dried condition, not less than 96 per cent. pure sodium sulphite and kept in well-stoppered bottles in a cool place.

Colorless, transparent prisms. Contains, in uneffloresced condition, 50 per cent. of water of crystallization. When exposed to the air it effloresces and is slowly oxidized to sulphate.

Soluble in 2 parts of water, sparingly soluble in alcohol.

Uses: Antiferment.

Average Dose: 1 Gm. (15 grains).

Sodii Thiosulphas. Sodium Thiosulphate. (Sodii Hyposulphis, Phar. 1890. Sodium Hyposulphite.) $Na_2 S_2 O_3 + 5H_2O$.

Should be 98 per cent. pure and kept in well-stoppered bottles.

Soluble in about 0.35 parts of water, insoluble in alcohol.

Colorless, odorless, transparent prisms, with a cooling, then bitter, taste. Neutral or faintly alkaline.

Uses: Principally in the arts and for test solutions.

Average Dose: 1 Gm. (15 grains).

AMMONIUM (NH_4.)

The present theory concerning ammonium and ammonium salts is that the compound NH_4 is a metal-like body which combines with the acids in the same manner that sodium and potassium do. The ammonium salts are widely distributed. The chief inorganic source is from the native carbonate in the guano deposits of South America, while the organic source is supplied from gas-liquor, a by-product of coke-ovens.

Aqua Ammoniae. (See Aquae).

Aqua Ammoniae Fortior (See Aquae).

Ammonii Benzoas. Ammonium Benzoate. $NH_4 C_7 H_5 O_2$.

Should be 98 per cent. pure and kept in well-stoppered bottles.

Thin white crystals or a crystalline powder; soluble in 10.5 parts of water and 25 parts of alcohol. Incompatible with ferric salts, acids and solutions of potassium hydroxide.

Uses: Antirheumatic, diuretic.

Average Dose: 1 Gm. (15 grains).

Ammonii Bromidum. Ammonium Bromide. NH_4Br.

Should be 97 per cent. pure and kept in well-stoppered bottles.

Made by neutralizing hydrobromic acid with ammonia or ammonium carbonate, evaporating and crystallizing.

Colorless crystals or a white crystalline powder, soluble in 1.2 parts of water and 12.5 parts of alcohol.

Incompatible with acids, acid salts and spirit of nitrous ether, which causes liberation of free bromine, turning the mixture brown.

Uses: Hypnotic, sedative.

Average Dose: 1 Gm. (15 grains).

Ammonii Carbonas. Ammonium Carbonate.

A mixture of acid ammonium carbonate and ammonium carbamate.

Occurs in white, hard, translucent masses having a strong odor of ammonia.

On exposure to the air it loses both ammonia and carbon dioxide, becoming opaque and is finally converted into friable porous lumps or a white powder. Only the translucent portions should be used for dispensing purposes.

It is soluble in 5 parts of water, but rather slowly. Alcohol dissolves the carbamate and leaves the acid carbonate (ammonium bicarbonate). It is decomposed by heat and should be kept in a cool place well stoppered.

Uses: As a gastric, cardiac and general stimulant. A constituent of aromatic spirit of ammonia, solution of ammonium acetate and elixir iron, quinine and strychnine phosphates.

Average Dose: 0.250 Gm. (4 grains).

Ammonii Chloridum. Ammonium Chloride. (Sal Ammoniac, Muriate of Ammonia.) NH_4Cl.

A white crystalline powder, which should be 99.5 per cent. pure, soluble in 2 parts of water, 50 parts of alcohol and 5 parts of glycerin.

Uses: Stimulant, cholagogue, expectorant. A con-

stituent of mistura glycyrrhizae comp., and trochisci ammonii chloridi.

Average Dose: 0.5 Gm. (8 grains).

Ammonii Iodidum. Ammonium Iodide. NH_4I.

Should be 97 per cent. pure and kept in small amber-colored bottles. Should not be dispensed if deeply colored.

Colorless, small crystals or white crystalline powder, very deliquescent, and on exposure to air rapidly coloring and acquiring an iodine odor.

Soluble in 0.6 parts of water and 9 parts of alcohol.

Uses: Alterative; similar to the other alkali iodides.

Average Dose: 0.25 Gm. (4 grains).

Ammonii Salicylas. Ammonium Salicylate.

Should be 98 per cent. pure and kept in well-stoppered bottles.

Colorless plates or a white crystalline powder, soluble in 0.9 parts of water and 2.3 parts of alcohol.

Obtained by neutralizing salicylic acid with ammonium carbonate, filtering and crystallizing.

Uses: Rheumatism and gout. Said to be less depressing than other salicylates.

Average Dose: 0.25 Gm. (4 grains).

Ammonii Valeras. Ammonium Valerate. (Ammonii Valerianas, U. S. P. 1890.)

Colorless or opaque plates, very soluble in water and alcohol and also in ether. It is deliquescent, loses ammonia upon exposure to air and emits the odor of valeric acid.

Uses: Antispasmotic, anti-hysteric.

Average Dose: 0.5 Gm. (8 grains).

LITHIUM (Li.)

Lithium is not found in large quantities, but it is distributed, however, in all of the three kingdoms, the mineral, animal and vegetable. It is a constituent of some natural mineral waters. Lithium possesses the silver lustre of sodium and potassium, and floats on kerosene, due to its light specific gravity and is kept under the lightest gasoline, being the lightest of all known solids. Uses: Outside the laboratory the uses of lithium are very limited, but its salts are extensively used in medicine, chiefly because of the power possessed by the carbonate of dissolving uric acid. The bromide is supposed to have some advantages over the other alkali bromides because of the relatively smaller proportion of the base present.

Lithii Benzoas. Lithium Benzoate.

Light, white powder or crystalline scales, soluble in 3 parts of water and 13 of alcohol.

Should be 98.5 per cent. pure and kept in well-stoppered bottles.

Uses: Antilithic, anti-rheumatic.

Average Dose: 1 Gm. (15 grains).

Lithii Bromidum. Lithium Bromide.

A white granular salt, very deliquescent and soluble in 0.6 parts of water; very soluble in alcohol and also in ether. Should be 97 per cent. pure and kept in well-stoppered bottles.

Uses: Similar to other alkali bromides; nerve sedative, antiarthritic.

Average Dose: 1 Gm. (15 grains).

Lithii Carbonas. Lithium Carbonate.

A light, white powder, odorless, with alkaline taste. Soluble in 75 parts of water, insoluble in alcohol, but soluble in dilute acids with effervescence.

Uses: Antilithic, antirheumatic; used principally in preparation of other lithium salts.

Average Dose: 0.5 Gm. (7½ grains).

Lithii Citras. Lithium Citrate.

A white powder of colorless crystals; deliquescent; soluble in about 2 parts of water, but almost insoluble in alcohol and ether.

Uses: Antilithic, antirheumatic, diuretic.

Average Dose: 0.5 Gm. (7½ grains).

Lithii Citras Effervescens. Effervescent Lithium Citrate. (Granular Effervescent Lithium Citrate.)

Preparation. Powder 195 Gm. citric acid and mix with 50 Gm. lithium citrate and 300 Gm. of tartaric acid. The powdered mass is then intimately mixed with 570 Gm. sodium bicarbonate, and the product placed in an oven heated to about 215 degrees F. (103 degrees C.) until moist when it is rubbed through a tinned iron sieve, and the granules dried at 129 degrees F. (54 degrees C.)

Uses: Same as lithium citrate, of which it is a palatable form.

Average Dose: 8 Gm. (120 grains), containing about 6 grains (0.4 Gm.) of lithium citrate.

Lithii Salicylas. Lithium Salicylate.

A white or grayish-white powder, very soluble in water and alcohol.

Should be 98.5 per cent. pure and kept in well-stoppered bottles.

Uses: Antiarthritic, antirheumatic.

Average Dose: 1 Gm. (15 grains).

RUBIDIUM AND CAESIUM.

Both of these metals closely resemble potassium and when exposed to air inflame spontaneously, caesium being the more energetic of the two in its chemical action and the most electro-positive metal known. Their salts have been prepared and found to closely resemble those of potassium. They and their salts are very little, if at all, used in medicine, and none are official.

THE ALKALINE EARTHS METALS.

The Alkaline Earth Metals are **Calcium, Strontium** and **Barium.** They resemble the alkalies in part. The hydrates of this group resemble those of the alkalies, although they are not so soluble in water, but the carbonates, sulphates and phosphates, unlike those salts of the alkalies, are insoluble in water.

The metals of the alkaline earths have a lustre and are of a white or golden-yellow color, and do not change so rapidly when exposed to air as do the metals of the alkali group.

The oxides of these metals are white in color and possess many properties peculiar to earths, as, for instance, not being affected by high temperatures, or reduced by hydrogen or carbon under these circumstances.

The metals are heavier than water and decompose it at ordinary temperatures, but with much less energy than do the alkali metals.

CALCIUM (Ca.)

Calcium occurs abundantly in nature in a combined form, especially with carbon and oxygen, forming the

carbonate in various forms such as chalk, marble and limestone. It is obtained by electrolysis of the fused chloride and used chiefly in the laboratory and in the arts.

Calcii Bromidum. Calcium Bromide. $CaBr_2$.

A white granular salt, very deliquescent. Should be 97 per cent. pure and kept in well-stoppered bottles. Soluble in 0.5 parts of water and 1 part of alcohol.

Uses: Hypnotic.

Average Dose: 1 Gm. (15 grains).

Calcii Carbonas Praecipitatus. Precipitated Calcium Carbonate. (Precipitated Chalk). $CaCO_3$.

A fine, white powder, odorless and tasteless, permanent in the air. Should be 99 per cent. pure.

Nearly insoluble in water, but the solubility is increased by the presence of ammonium salts, and especially carbon dioxide; insoluble in alcohol.

Uses: Antacid; in diarrheal conditions; employed as a dentifrice and dusting powder; both absorbent and protective. Used to prepare pulvis morphinae compositus and syrupus calcii lactophosphatis.

Average Dose: 1 Gm. (15 grains).

Calcii Chloridum. Calcium Chloride. $CaCl_2$.

White, hard fragments which have been rendered anhydrous by fusion. Very deliquescent and should be kept well stoppered.

Soluble in 1.3 parts of water and in 8 parts of alcohol.

Uses: Largely used in the laboratory for drying gases and general drying or desiccating agent.

Average Dose: 0.5 Gm. (7½ grains).

Calcii .Hypophosphis. Calcium Hypophosphite. Ca $(PH_2O_2)_2$.

Pearl-colored scales, or white granules, soluble in 6.5 parts of water, insoluble in alcohol.

Should be 98 per cent. pure and kept in well-stoppered bottles. Caution should be observed in dispensing it, as explosion is liable to occur when it is triturated with nitrates, chlorates, or other oxidizing substances.

Uses: Reconstructive tonic in phthisis and other wasting diseases. Preparations: Syrupus hypophosphitum, syrupus hypophosphitum compositus; emulsum olei morrhuae cum hypophosphitibus.

Average Dose: 0.5 Gm. (7½ grains).

Calcii Phosphas Praecipitatus. Precipitated Calcium Phosphate. (Precipitated Lime Phosphate.) $Ca_3(PO_4)_2$.

A light, white amorphous powder, almost insoluble in water and insoluble in alcohol. Should be 99 per cent. pure.

Uses: Rickets, mollities ossium, tuberculosis, scrofula, and anaemic conditions generally.

Average Dose: 1 Gm. (15 grains).

Calcii Sulphas Exsiccatus. Exsiccated Calcium Sulphate. (Dried Gypsum. Plaster of Paris).

A fine, white powder, forming with an equal weight of water a smooth paste which rapidly hardens.

Uses: For making immovable bandages and also casts of deformities and injuries, jackets, etc.

Creta Praeparata. Prepared Chalk. (Drop Chalk.) Ca CO_3.

Grayish-white, very fine, amorphous powder, usually molded into cones or "drops." Does not differ chemically from precipitated chalk but is preferred for medical preparations because it is softer and more adhesive.

Insoluble in neutral liquids.

Incompatible with acids and sulphates.

Uses: Antacid. Preparations: Pulvis cretae compositus (compound chalk powder,) mistura cretae (chalk mixture), hydrargyrum cum creta (mercury with chalk).

Average Dose: 1 Gm. (15 grains).

Calx. Lime. Calcium Oxide. CaO.

Prepared by heating calcium carbonate, which should be pure so that a pure product can be obtained; the white marble is often used. Heat until a fairly constant weight results when the product has lost all its water, and then transfer to well-stoppered bottles.

It is seen in hard, white masses which disintegrate in the air to a powder, with water it forms calcium hydroxide with the evolution of heat, the process being called "slaking."

It is soluble in 760 parts of cold water and much less in hot water, requiring 1,600 parts. The resulting white powder precipitated by the action of water upon the lime is called calcium hydroxide, and the solution of this powder in water forms the so-called lime water or liquor calcis.

Uses: Antacid, chiefly in the following preparations: liquor calcis, syrupus calcis, and linimentum calcis.

Calx Chlorinata. Chlorinated Lime. Chlorinated

Calcium Oxide. (Calx Chlorata. Phar. 1890. Chloride of Lime).

This product is often improperly called "Chloride of Lime," which is a definite chemical compound with altogether different properties and uses.

Chlorinated lime is not a definite chemical compound but a compound resulting from the action of chlorine gas upon calcium hydroxide.

It should contain not less than 30 per cent. of available chlorine which gives it disinfectant and deodorant properties, for which purposes it is used medicinally and for bleaching commercially.

Uses: Disinfectant, deodorant; also to prepare liquor sodae chlorinatae.

Calx Sulphurata. Sulphurated Lime. (Crude Calcium Sulphide.) Improperly called Calcium Sulphide.

A pale gray powder containing at least 60 per cent. of calcium sulphide together with calcium sulphate and carbon. In the air it gradually decomposes liberating hydrogen sulphide, by the odor of which it can be identified.

It is slightly soluble in cold water and readily soluble in boiling water which partially decomposes it. Insoluble in alcohol.

It can be prepared by heating to redness in a crucible 35 Gm. of exsiccated calcium sulphate, 5 Gm. of charcoal and 1 Gm. of starch, all in fine powder. The resulting product is cooled and reduced to a fine powder which should be kept in tightly stoppered vials.

Uses: Antiseptic, alterative, antipyretic, in preventing suppuration, sores of scrofulous persons, etc.

Externally in weak ointments and washes for local application.

Average Dose: 0.065 Gm. (1 grain).

STRONTIUM. Sr.

Strontium is found in nature in the same combinations which characterize barium and calcium,—namely as carbonate and sulphate. It is a yellow metal and burns in the air if heated and also decomposes water with some violence. The metal and its salts give a red color to the Bunsen flame.

Strontii Bromidum. Strontium Bromide, $Sr\,Br_2 + 6\,H_2\,O$.

Colorless, transparent, hexagonal crystals, very deliquescent, very soluble in water and alcohol but insoluble in ether.

Contains about 30 per cent. of water of crystallization. Should be 97 per cent. pure and kept in glass-stoppered bottles.

Uses: Nerve sedative, gastric tonic, antinephritic; similar to other alkali bromides.

Average Dose: 1 Gm. (15 grains).

Strontii Iodidum. Strontium Iodide. $Sr\,I_2 + 6\,H_2\,O$.

Hexagonal plates, colorless, but becomes yellow and deliquescent upon exposure to air.

Contains about 24 per cent. of water of crystallization. Should be 98 per cent. pure and kept in dark, well-stoppered bottles.

Soluble in 0.5 parts of water, in alcohol and slightly in ether.

Uses: Alterative, similar to other iodides.

Average Dose: 0.5 Gm. (7½ grains).

Strontii Salicylas. Strontium Salicylate.

White crystalline powder, soluble in 18 parts of water and 66 parts of alcohol. Should be 98.5 per cent. pure and kept in well-stoppered bottles, protected from light.

Uses: Antirheumatic, intestinal antiseptic; similar to other salicylates.

Average Dose: 1 Gm. (15 grains).

BARIUM. Ba.

The metal barium greatly resembles sodium in some of its properties, but more closely calcium in the property of its salts. There are no salts of barium official. The barium salts increase the force of the heart's action and cause a rise of blood pressure due to constriction of the blood vessels. The action on muscular tissue resembles that of veratrine. The chloride often used in haemorrhage and the sulphide is extensively used as a depilatory, being considered superior to calcium sulphide.

THE HALOGENS.

The Halogen elements comprise **Chlorine, Iodine, Bromine** and **Fluorine.** Chlorine is a yellowish-green heavy gas, Fluorine a colorless gas, Iodine is a violet-blue crystalline solid, Bromine is a heavy oily yellowish-brown liquid of very suffocating odor. They are very active, readily form compounds with the other elements, and are practically not found in the free state in nature.

CHLORINE. Cl.

Chlorine is found combined abundantly in nature in all of the three kingdoms and as the chloride or common salt in extensive quantities in sea water and large deposits and salt-wells. Its salts are extensively used in the arts, the laboratory and in medicine. It is a powerful disinfectant and bleaching agent, due to its powerful oxidizing properties. A number of its compounds ,both inorganic and organic are official.

BROMINE. Br.

The world's supply of bromine comes from the salt-wells of the United States. It is a dark, reddish-brown, volatile liquid of a suffocating odor and caustic taste. The chemical properties of bromine closely resembles those of chlorine. Uses: For manufacture of bromides which are extensively used in medicine, disinfectants, etc. Has been used internally when largely diluted as an alterative, like iodine, and externally as a caustic and for dissolving gangrene. It should be handled with caution because of its corrosiveness.

IODINE. I.

The world's supply of iodine comes from two sources, sea plants and Chili saltpetre. It is described as heavy bluish-black, dry and friable plates, with a nauseating odor. It is soluble in about 5,000 parts of water, 10 parts of alcohol, in ether, chloroform, carbon disulphide, petroleum; to all of which it imparts a red or violet color. It is also soluble in glycerin and in glacial acetic acid. Its solubility in water is increased by tannic acid and potassium iodide.

In chemical properties it resembles chlorine and bromine. It is incompatible with metallic salts, mineral acids, alkaloids, oil of turpentine and ammonia; with the last two often forming extremely explosive compounds.

Uses: Irritant, disinfectant, absorbent and alterative. Iodine and its salts are extensively used in medicine.

The following preparations are official: Liquor iodi compositus. (compound solution of iodine or Lugol's solution). Tinctura iodi (tincture of iodine). Unguentum iodi (iodine ointment).

Average Dose: 0.005 Gm. (1-10 grain).

FLUORIN. F.

This is the most powerful of all known elements and great care should be exercised whenever it is handled, due to the powerful effects of the gas upon tissue. (It does not, however, attack gold, platinum and a few other of the noble metals.) Its important use is in the etching of glass. It is not used in medicine.

CHAPTER XXI.

CARBON. C.

Carbon exists in the free state in nature in three modifications or forms; crystallized as diamond, as graphite, and amorphous as coal. The various charcoals are of the amorphous form and the three official charcoals are all insoluble in water or alcohol.

Carbo Animalis. Animal Charcoal.

Obtained from bones which have been heated to redness while excluded from air. Generally a dull black powder.

Uses: As a filtering agent to remove color from dark liquids and deodorizer.

Carbo Animalis Purificatus. Purified Animal Charcoal.

The animal charcoal is purified by means of hydrochloric acid and water after which it is heated and dried.

Uses: Similar to animal charcoal but for more delicate purposes.

Carbo Ligni. Charcoal.

Prepared from soft wood, generally willow twigs.

Uses: Deodorant, in flatulence, absorbent and decolorizing agent.

Average Dose: 1 Gm. (15 grains).

SULPHUR. S.

Sulphur is official in three forms and is extensively used in medicine. The principal source is from volcanic deposits It is a lemon-yellow crystalline solid and occurs in various modifications. With hydrogen and oxygen it forms a number of acids, the two chief ones producing sulphides and sulphates. It is extensively used in the arts.

Uses: Irritant, disinfectant, antiparasitic, laxative, diaphoretic, resolvent and alterative.

Sulphur Lotum. Washed Sulphur.

Prepared from sublimed sulphur which is digested with 100 parts of water and 10 parts of ammonia water for several days when the product is strained and further washed with water, and finally drained and dried. Should be 99.5 per cent. pure.

Uses: Similar to sulphur and used to prepare sulphur iodide and ointment of sulphur. Contained in pulvis glycrrhizae compositus.

Average Dose: 4 Gm. (60 grains).

Sulphur Praecipitatum. Precipitated Sulphur. (Milk of Sulphur. Lac Sulphur.)

Prepared by boiling 100 parts of sublimed sulphur with 50 parts of lime in water and adding enough hydrochloric acid to precipitate the sulphur, which is thrown down as a very fine pale yellow powder. Should be 99.5 per cent. pure.

Uses: Similar to sulphur.

Average Dose: 4 Gm. (60 grains).

Sulphur Sublimatum. Sublimed Sulphur. (Flowers of Sulphur.)

This is the form of sulphur supplied under the

simple name "sulphur". A fine yellow powder which should be 99 per cent. pure.

Uses: To prepare the other forms of sulphur and for disinfecting purposes.

Average Dose: 4 Gm. (60 grains).

Sulphuris Iodidum. Sulphur Iodide.

Obtained by heating 20 Gm. washed sulphur with 80 Gm. iodine until liquid, when it is cooled, forming brittle masses.

Soluble in glycerin and carbon disulphide.

Uses: Alterative, antiparasitic (externally).

PHOSPHORUS. P.

Phosphorus is obtained chiefly from bone ash. It is a waxy-like solid which inflames in the air. Should be 99.5 per cent. pure and kept under water in well-stoppered bottles.

It is soluble in chloroform, carbon disulphide and benzol, these solutions igniting spontaneously when spilled. It is also soluble in 350 parts absolute alcohol, almost insoluble in water.

Its most extensive use is in the manufacture of matches and as a poison for vermin.

Its compounds are extensively used in medicine and the pure phosphorous is official in pills.

Uses: Nerve stimulant, reconstructive tonic.

Average Dose: 0.00005 Gm. (1-128 grain).

BORON. B.

The element boron is a constituent of borax and boric or boracic acid. It does not exist free in nature but can be prepared in several modified forms, one of

these being yellowish crystals which are almost as hard as diamonds. It forms various acids in combination with hydrogen and oxygen, and borax is a sodium salt of pyroboric acid. The properties of borax were treated under the sodium salts.

MAGNESIUM. Mg.

The metal magnesium is found combined in a number of minerals and several of the soluble salts as constituents of mineral springs. A number of the salts possess a bitter saline taste which is characteristic, as for instance, the sulphate or Epsom salt. It is silver white in appearance and is valuable in laboratory work. The light rays emitted from it when ignited are chemically active and the powdered metal is used in the preparation of varied colored fires.

Magnesii Carbonas. Magnesium Carbonate. 4 Mg CO_3 + Mg $(OH)_2$ + $5H_2O$.

Either light friable masses, white cubes or a bulky light powder, practically insoluble in water or other neutral liquids, but soluble in dilute acids by which it is decomposed with effervescence.

Upon heating, water and carbon dioxide are given off and the residue that remains is magnesium oxide.

As the chemical formula indicates it is not a true carbonate, but is a compound of the carbonate and hydroxide with water, obtained by the double decomposition of magnesium sulphate or chloride and sodium carbonate.

Both "light" and "heavy" carbonate may be obtained but the Pharmacopoeia recognizes the light only.

Uses: Antacid, laxative; also to prepare liquor magnesii citratis.

Average Dose: 3 Gm. (45 grains).

Magnesii Oxidum. Magnesium Oxide. (Magnesia, U. S. P. 1890. Magnesia. Calcined Magnesia. Light Magnesia.) MgO.

A white, very light and fine powder, having an earthy taste.

Obtained by heating light magnesium carbonate, water and carbon dioxide are driven off, leaving the oxide which consist of about 42 per cent. of the whole.

Absorbs water and carbon dioxide from air.

Practically insoluble in neutral liquids but soluble in dilute acids.

Uses: Antacid, laxative, antilithic; to prepare heavy magnesia; contained in pulvis rhei compositus, and in ferri hydroxidum cum magnesii oxide.

Average Dose: 2 Gm. (30 grains).

Magnesii Oxidum Ponderosum. Heavy Magnesium Oxide. (Heavy Magnesia. Magnesia Ponderosa, Phar. 1890.) MgO.

Obtained from the heavy carbonate in the same manner as the light.

Differs from the previous oxide in not readily uniting with water to form a gelatinous hydroxide.

It is a white, dense and very fine powder, insoluble in neutral liquids and corresponding in characteristics to the light oxide.

Uses: Antacid, laxative, antilithic.

Average Dose: 2 Gm. (30 grains).

Magnesii Sulphas. Magnesium Sulphate. (Epsom Salt.) $Mg\,SO_4 + 7H_2\,O$.

Small prismatic colorless needles, soluble in 0.85 parts of water but insoluble in alcohol.

Contains 51.13 per cent. water of crystallization and slowly effloresces upon exposure to dry air. Should be 99.7 per cent. pure and kept in well-closed vessels.

Appearance very similar to zinc sulphate and oxalic acid.

Incompatible with alkaline carbonates, phosphoric acid, phosphates, lime water, lead acetate, and silver nitrate.

Uses: Refrigerant, cathartic. Is contained in infusum sennae compositum.

Average Dose: 16 Gm. (240 grains).

Magnesii Sulphas Effervescens. Effervescent Magnesium Sulphate. (See Granular Effervescent Salts.)

Represents about 50 per cent. magnesium sulphate.

Uses: Same as magnesium sulphate.

Average Dose: 16 Gm. (240 grains). containing 120 grains (8 Gm.) of magnesium sulphate.

Talcum. Talc. (French Chalk, Soapstone, Steatite.)

This is a native hydrous magnesium silicate. Either white or grayish powder or masses which have a waxy lustre and imparting a feeling of greasiness when rubbed on the skin.

Used extensively for toilet powders and in the laboratory to clarify liquids.

Talcum Purificatum. Purified Talc.

Prepared by boiling 100 parts of talc with 15 parts of hydrochloric acid and sufficient water, decanting and repeated boiling, when the liquid is finally decanted and the powder dried.

Purified talc only should be used in pharmaceutical operations.

CERIUM. Ce.

This element belongs to the rare earths and metals class. Its salts have some use in the arts, mainly in the manufacture of gas mantles which are coated with the oxide which becomes luminous when heated.

Cerii Oxalas. Cerium Oxalate.

A white powder insoluble in neutral solvents. It is a mixture of cerium, didymium and lanthanum oxalates and of other rare earths of the same group.

Uses: Nausea. Gastralgia following debauch.

Average Dose: 0.065 Gm. (1 grain).

ALUMINUM. Al.

Alumina, the oxide of the metal, has long been known and is found as emery, corundum, and gems as the ruby and sapphire. The metal is valuable because of its lightness and resistance of corrosion in the manufacture of utensils for the laboratory and household. It is also used as constituent of many alloys, known as aluminum bronzes. In the form of various silicates it is widely distributed and these salts play an important part in all kinds of earthenware manufacture. Feldspar is a double silicate of aluminum and potassium or sodium.

Alumen. Alum. (Aluminum and Potassium Sulphate. Potassium Alum.) Al. K $(SO_4)_2+12\ H_2\ O$.

This salt is characterized by the large crystals containing 12 molecules water of crystallization which have a very astringent taste. Should be 99.5 per cent. pure.

Soluble in 9 parts of water and in warm glycerin

but insoluble in alcohol. The saturated solution in water contains about 10 per cent. alum.

Incompatible with alkalies, lime, lead, mercury and iron salts, tartrates and tannic acid.

Uses: A valuable astringent.

Average Dose: 0.5 Gm. (8 grains).

Alumen Exsiccatum. Exsiccated Alum. (Dried Alum. Burnt Alum.)

This is simply alum which has been deprived of its water of crystallization by heating it until no aqueous vapors are given off. The resulting product is a white granular powder, soluble in 17 parts of water. It is nearly twice as strong as the crystallized alum.

Uses: Same as alum.

Alumini Hydroxidum. Aluminum Hydroxide. (Alumini Hydras, U. S. P., 1890. Hydrated Aluminia.)

Prepared by pouring a hot solution containing 100 parts of alum into an equal volume of a hot solution containing 43 parts of monohydrated sodium carbonate, and the subsequent washing and draining of the precipitate which is finally dried and powdered.

It is a white, amorphous powder insoluble in water or alcohol.

Uses: Same as alum.

Alumini Sulphas. Aluminum Sulphate.

Whitish powder or colorless crystals with sweetish afterward bitter taste, soluble in 1 part of water, insoluble in alcohol.

Uses: Caustic, astringent.

Kaolinum. Kaolin.

A native aluminum silicate, nearly pure, which has been finely elutriated to a soft white or yellowish white powder, having an earthy taste.

Insoluble in water and dilute acids and alkalies.

Uses: As dusting powder, desiccant, a basis for making pills of substances which would react chemically with the commonly used bases; with glycerin as a substitute for poultices; for clarifying and deodorizing oils, wines, beer, honey, syrups, etc. In cataplasma kaolini.

* * * *

CHAPTER XXII.

FERRUM. (Iron) Fe.

Iron belongs to a group of metals which includes also nickel and cobalt, which are distinguished from the other metals by their magnetic properties.

The purest of the various commercial varieties is wrought-iron which is recognized in the Pharmacopoeia as Ferrum and described as "metallic iron in the form of fine, bright and non-elastic wire." Another form of the metal is also official as Ferrum Reductum, or reduced iron.

The compounds of iron are of two classes, namely the "**Ferrous,**" and the "**Ferric.**" The salts of the first variety are usually greenish in color, while the ferric salts are generally reddish-brown in appearance.

With the exception of the carbonate, the hydroxide or hydrate and the hypophosphite, they are very soluble in water but insoluble in alcohol.

The so-called scale salts are all ferric compounds of phosphoric acid or the organic acids (citric and tartaric) and the salts are also rendered more soluble in combination with the citrates, tartrates and phosphates of the alkalies ammonium, potassium and sodium, and some of these double salts are known as "soluble" salts.

The dose of the scale salts (with the exception of that containing strychnine) is 0.25 Gm. (4 grains).

The Latin titles do not distinguish between the ferric and the ferrous compounds, but they are so distinguished in their English titles.

Ferrum. Iron. Fe.

Fine, bright, and non-elastic wire. Metallic iron is used to prepare liquor ferri chloridi, and syrupus ferri iodidi.

Ferrum Reductum. Reduced Iron. (Quevenne's Iron. Iron by Hydrogen.)

A very fine, grayish-black powder, lustrous and attracted by a magnet. Should contain 90 per cent. of pure iron.

Insoluble in water or alcohol.

Uses: Hematinic, tonic. Is used to make pilulae ferri iodidi.

Dose: 0.065 Gm. (1 grain).

FERROUS SALTS.

The following are ferrous salts, that is, salts of the lower oxide, (FeO.)

Ferri Sulphas. Ferrous Sulphate. (Iron Protosulphate.) $Fe\ SO_4 + 7\ H_2\ O$. In impure state called Copperas and Green Vitriol.

Large, pale bluish-green crystals; contains over 45 per cent. water of crystallization. Should be in clear crystals, 99.5 per cent. pure, and kept in well-stoppered bottles. Soluble in 0.9 parts of water, but insoluble in alcohol.

Uses: Disinfectant, deodorant. Is used to make ferri carbonas saccharatus, liquor ferri subsulphatis, liquor ferri ·tersulphatis, and massa ferri carbonatis (Vallet's Mass).

Average Dose: 0.2 Gm. (3 grains).

Ferri Sulphas Exsiccatus. Exsiccated Ferrous Sulphate. (Dried Sulphate of Iron.)

Prepared by drying crystallized ferrous sulphate until it loses about one-third its weight of water and forms a grayish-white powder.

It is slowly but completely soluble in water and is used in preparing pilulae aloes et ferri.

Ferri Sulphas Granulatus. Granulated Ferrous Sulphate. (Ferri Sulphas Precipitatus U. S. P. 1890).

Crystallized ferrous sulphate, obtained in granular form by dissolving ferrous sulphate in diluted sulphuric acid and distilled water, and precipitating with alcohol. The precipitate is a pale, bluish-green, crystalline powder.

Uses. Astringent, chalybeate tonic. In pilulae ferri carbonatis and in mistura ferri composita (Griffith's Mixture).

Average Dose: 0.20 Gm. (3 grains).

Ferri Carbonas Saccharatus. Saccharated Ferrous Carbonate.

Ferrous carbonate 15 per cent., preserved in sugar. Obtained by double decomposition between ferrous sulphate and sodium bicarbonate.

It is a greenish-brown powder, an unstable compound, easily oxidized. Slightly soluble in water but completely so upon addition of hydrochloric acid.

Uses: Chalybeate tonic.

Average Dose: 0.25 Gm. (4 grains).

FERRIC SALTS.

Ferri Chloridum. Ferric Chloride.

Contains iron, 22 per cent. Orange-yellow crystalline crusts or pieces, very deliquescent with strong styptic taste. Freely soluble in water and alcohol and in a mixture of 1 part of ether and 3 parts of alcohol. Obtained by evaporation of the solution.

Uses: Local haemostatic, astringent, styptic taste reduced by mixing with glycerin.

Average Dose: 0.065 Gm. (1 grain).

Ferri Hydroxidum. Ferric Hydroxide. (Ferric Hydrate. Hydrated Oxide of Iron.) $Fe(OH)_3$.

Prepared by adding aqua ammonia to solution of ferric sulphate and washing the precipitate with water.

A brownish-red magma, insoluble in water but completely soluble in hydrochloric acid.

Should be freshly prepared when wanted for use.

Uses: Antidote for arsenic poisoning.

Ferri Hydroxidum Cum Magnesii Oxido. Ferric Hydroxide with Magnesium Oxide. (Ferri Oxidum Hydratum Cum Magnesia, U. S. P. 1890.)

Preparation: Mix 40 Cc. solution of ferric sulphate with 125 Cc. of water and keep this liquid in a large, well-stoppered bottle. Rub 10 Gm. magnesium oxide with cold water to a smooth and thin mixture and transfer to a bottle of about 1000 Cc. capacity and fill to about three-fourths of its capacity. When the preparation is wanted for use shake the magnesium oxide mixture to a homogeneous, thin magma, add it gradually to the diluted solution of ferric sulphate and shake together until a uniform smooth mixture is obtained.

Uses: Exclusively as an antidote in arsenical poisoning. Should be freshly prepared when wanted.

Average Dose: 120 Cc. (4 fluidounces).

Ferri Et Ammonii Sulphas. Ferric Ammonium Sulphate. (Ammonio-Ferric Alum.)

Should contain 99.5 per cent. pure ferric ammonium sulphate in uneffloresced crystals (not less than 11.5 per cent. metallic iron).

Pale violet crystals, efflorescent upon exposure to air. Soluble in 2.7 parts of water, insoluble in alcohol.

Uses: Astringent, hematinic, styptic.

Average Dose: 0.250 Gm. (4 grains).

Ferri Hypophosphis. Ferric Hypophosphite.

A grayish-white powder, practically insoluble in water, more readily soluble in liquids containing dilute hypophosphorous acid and in concentrated solutions of alkali citrates, forming green solutions. The salt explodes if heated.

Uses: Hematinic, nerve nutrient.

Average Dose: 0.2 Gm. (3 grains).

SCALE SALTS.

The following are the official scale preparations of iron, so called because they are dried on glass to form scales. They are not well defined chemical compounds.

Ferri Citras. Ferric Citrate.

Should contain ferric citrate equivalent to 16 per cent. of metallic iron.

Prepared by evaporating solution of ferric citrate.

Thin, transparent, garnet-red scales. Slowly soluble in cold water, readily soluble in hot water, insoluble in alcohol.

Uses: Chalybeate tonic. Less astringent than many other forms of iron.

Average Dose: 0.250 Gm. (4 grains).

Ferri Et Potassii Tartras. Iron and Potassium Tartrate.

Should contain iron and potassium tartrate equivalent to 15 per cent. metallic iron.

Thin, transparent, red or red-brown scales. Freely soluble in water, insoluble in alcohol.

Uses: Non-astringent hematinic.

Average Dose: 0.250 Gm. (4 grains).

Ferri Pyrophosphas Solubilis. Soluble Ferric Pyrophosphate. (Soluble Pyrophosphate of Iron).

Should contain ferric pyrophosphate equivalent to 10 per cent. of metallic iron.

Must be kept in dark bottles, tightly corked.

Prepared by mixing solutions of citrate of iron and pyrophosphate of sodium and evaporating.

Thin, transparent, apple-green scales. Freely soluble in water, insoluble in alcohol.

Uses: Iron tonic.

Average dose: 0.250 Gm. (4 grains.)

Ferri Et Quininae Citras. Iron and Quinine Citrate. (Citrate of Iron and Quinine).

Should contain not less than 11.5 per cent. of dried quinine and ferric citrate equivalent to 13.5 per cent. of metallic iron.

Prepared by dissolving quinine in solution of ferric citrate and evaporating the solution.

Thin, transparent, reddish-brown scales. Slowly soluble in water, partially soluble in alcohol; its solubility diminishes with age.

Uses: Iron tonic, especially during convalescence.

Average dose: 0.250 Gm. (4 grains.)

Ferri et Quininae Citras Solubilis. Soluble Iron and Quinine Citrate.

Should contain not less than 11.5 per cent. of dried quinine and ferric citrate equivalent to 13.5 per cent. of metallic iron.

Prepared by adding citric acid and quinine to solution of citrate of iron, then sufficient water of ammonia to precipitate and redissolve and then evaporating the solution.

Thin, transparent, greenish or golden-yellow scales. Freely soluble in water, partially soluble in alcohol.

Uses: Same as iron and quinine citrate. A constituent of bitter wine of iron.

Average dose: 0.250 Gm. (4 grains.)

Ferri et Strychninae Citras. Iron and Strychnine Citrate. (Citrate of Iron and Strychnine).

Should contain not less than 0.9 nor more than 1 per cent. of strychnine and ferric citrate equivalent to 16 per cent. of metallic iron.

Prepared by adding citric acid and strychnine to solution of citrate of iron and ammonium.

Thin, transparent, garnet-red to yellowish-brown scales. Freely soluble in water, partially soluble in alcohol.

Uses: Nervous debility and anaemia.

Average dose: 0.125 Gm. (2 grains).

Ferri Phosphas Solubilis. Soluble Ferric Phosphate.

Should contain ferric phosphate equivalent to 12 per cent of metallic iron

Prepared by evaporating a mixture of solutions of citrate of iron and phosphate of soda

Thin, transparent, bright green scales. Freely soluble in water, insoluble in alcohol.

Uses: In the preparation of glycerite of iron, quinine and strychnine phosphates; syrup of iron, quinine and strychnine phosphates; elixir of iron, quinine and strychnine phosphates.

Average dose: 0.250 Gm. (4 grains.)

Ferri et Ammonii Citras. Iron and Ammonium Citrate.

Should contain iron and ammonium citrate equivalent to 16 per cent. metallic iron.

Prepared by mixing aqua ammonia with solution of ferric citrate.

Thin, transparent, red scales. Freely soluble in water, insoluble in alcohol.

Uses: Same as ferric citrate.

Average dose: 0.250 Gm. (4 grains.)

MERCURY (Hydrargyrum) Hg.

Mercury, or quicksilver as it is generally termed, was known to the ancients. It is a heavy silver-white liquid which occurs both native and combined and is used extensively in the arts. It is found chiefly in Spain. Its salts are among the most important of the inorganic chemicals.

Mercury, like iron, forms two series of compounds; **mercurous** salts in which the mercury is univalent and **mercuric** salts in which it is bivalent.

The mercurous salts contain a larger per cent. of the metal, are sparingly soluble, hence less poisonous and less active; the mercuric salts are more readily soluble in water and alcohol, more irritant and more poisonous.

The two classes of salts may be distinguished by the color of the precipitate formed with liquor **calcis** (lime water); the precipitate of mercuric salts is yellow and the precipitate of mercurous salts is black.

Quicksilver is insoluble in ordinary solvents, but dissolves in boiling sulphuric acid and in nitric acid. It is miscible with saccharine substances and fats through which, by trituration, the particles of the metal may be so finely divided as not to be discernable by the naked eye and become exceedingly active medicinally.

The following preparations of the metal are official:

Hydrargyrum Cum Creta. Mercury with Chalk, (Gray Powder.)

A light gray powder containing 38 per cent. of mercury, 10 per cent. of clarified honey and 57 per cent. prepared chalk. Insoluble in neutral liquids.

Uses: Intestinal, antiseptic and cholagogue.

Average Dose: 0.25 Gm. (4 grains).

Massa Hydrargyri. (See Massa.)

Unguentum Hydrargyri. (See Unguenta.)

Unguentum Hydrargyri Dilutum. (See Unguenta.)

Emplastrum Hydrargyri. (See Emplastra.)

MERCUROUS SALTS.

There are but two official mercurous salts, namely:

Hydrargyri Chloridum Mite. Mild Mercurous Chloride. (Calomel. Mild Chloride of Mercury. Subchloride of Mercury. Protochloride of Mercury. Mercurous Chloride.) HgCl.

Should contain 99.5 per cent. of pure mercurous chloride and be kept in dark, well stoppered bottles

A white powder, becoming yellowish when triturated with pressure; insoluble in water, alcohol or ether.

Incompatible with alkalies, iodine, iodides and bromides.

Uses: Intestinal antiseptic, cholagogue, cathartic, alterative, antisyphilitic. Contained in compound cathartic pills, and in the compound pills of antimony, U. S.P., 1890, or Plummer's Pills.

Average Dose: Laxative, 0.125 Gm. (2 grains); alterative, 0.065 Gm. (1 grain).

Hydrargyri Iodidum Flavum. Yellow Mercurous Iodide. (Mercury Protoiodide. Yellow or Green Mercury Iodide. Mercurous Iodide.) HgI.

Should be 99.5 per cent. pure.

A bright yellow amorphous powder, insoluble in water or alcohol.

Uses: Alterative, antisyphilitic.

Average Dose: 0.010 Gm. (1-5 grain).

MERCURIC SALTS.

Hydrargyrum Ammoniatum. Ammoniated Mercury. (White Precipitate) $HgNH_2Cl$.

Should contain 78 per cent. but not over 80 per cent. of metallic mercury.

Prepared by precipitating a solution of mercuric chloride with water of ammonia.

White pulverant pieces or powder, insoluble in water or alcohol. Soluble in acetic acid and solution of ammonium carbonate.

Uses: Externally; antiparasitic, antisyphilitic. In ointment of ammoniated mercury, 10 per cent.

Hydrargyri Chloridum Corrosivum. Corrosive Mercuric Chloride. (Corrosive Sublimate. Mercury Bichloride. Mercuric Chloride.) $HgCl_2$.

Should be 99.5 per cent. pure and kept in well stoppered bottles.

Heavy crystals, or crystalline masses, soluble in 13 parts of water, 3 parts of alcohol and 14 parts of glycerin. Incompatible with alkalies and their carbonates, potassium iodide, lime water, salts of lead, copper and zinc, tartar emetic, albumin, soaps, vegetable preparations containing tannic acid, and in fact most substances.

Uses: Antiseptic, germicidal, alterative.

Average dose: 0.003 Gm. (1-20 grain).

Hydrargyri Iodidum Rubrum. Red Mercuric Iodide.

(Mercury Biniodide. Mercuric Iodide. Red Iodide of Mercury.) HgI_2.

A scarlet-red amorphous powder. Almost insoluble in water; soluble in 116 parts of alcohol, 85 parts of ether and 1340 parts of chloroform; also soluble in solutions of the soluble iodides, sodium thiosulphate etc.

A product of the double decomposition of mercuric chloride and potassium iodide which results in the formation of mercuric iodide and potassium chloride thus: $HgCl_2 + 2KI = H_2I_2 + 2KCl$.

Uses: Alterative, antisyphilitic. Contained in liquor arseni et hydrargyri iodidi, (Donovan's Solution).

Average Dose: 0.003 Gm. (1-20 grain).

Hydrargyri Oxidum Flavum. Yellow Mercuric Oxide. (Yellow Oxide of Mercury). HgO.

A light orange yellow, amorphous, heavy, impalpable powder. Almost insoluble in water and insoluble in alcohol.

It has the same composition as the red oxide, but is more crystalline.

Uses: Externally; alterative, stimulant, parasiticide, in ophthalmia, as ointment from ½ to 2 per cent. Contained in unguentum hydrargyri oxidi flavi, (10 per cent.), and oleatum hydrargyri (25 per cent.)

Hydrargyri Oxidum Rubrum. Red Mercuric Oxide. (Red Precipitate) HgO.

Heavy orange-red scales or crystalline powder; almost insoluble in water, insoluble in alcohol, but soluble in diluted hydrochloric or nitric acid.

Uses: Externally only; alterative, antisyphilitic, parasiticide. Is contained in ointment of red mercuric oxide.

CHAPTER XXIII.

ARSENUM (Arsenic) As.

Arsenic is occasionally found in nature in the free state as crystals but it is usually combined with sulphur or oxygen.

Although classed as a metal it resembles the non-metallic elements and is occasionally spoken of as a metalloid, or metal-like element.

Like iron and mercury arsenic forms two classes of compounds, the **arsenous** and the **arsenic.**

ANTIMONY (Stibium) Sb.

Antimony is a silver-white metal, analogous to phosphorous and arsenic as far as physiological properties are concerned, but much less used. The chief use of the metal is found in the production of alloys or compounds which expand upon cooling and are valuable in printing. There is but one official salt.

Antimonii et Potassii Tartras. Antimony and Potassium Tartrate. (Tartar Emetic) $2K(SbO)C_4H_4O_6 + H_2O$.

Colorless crystals or white granular powder, soluble in 15.5 parts of water, insoluble in alcohol.

Uses: Expectorant; in large doses emetic. Used in vinum antimonii and syrupus scillae compositus.

Average Dose: Expectorant, 0.005 Gm. (1-10 grain). Emetic 0.03 Gm. (½ grain).

Arsenic Oxide (As_2O_5) when dissolved in water (H_2O) forms arsenic acid H_3AsO_4 the salts of which are called arsenates.

Arsenous Oxide (As_2O_3) is now official under the title, arsenic trioxide.

Arseni Trioxidum. Arsenic Trioxide. As_2O_3.

Formerly official as acidum arsenosum and is commonly known as **arsenic** and **arsenous acid.**

It should contain 99.8 per cent. of pure arsenic trioxide.

A white heavy solid, either as opaque powder or in irregular masses of two varieties; one is amorphous, transparent and colorless, the other crystalline, opaque and white.

Soluble in 30 to 100 parts of water, slightly soluble in alcohol; soluble in 5 parts of glycerin and readily soluble in alkalies, alkali carbonate solutions and acids.

Incompatible with lime water, iron salts and magnesia.

Uses: Stimulant to the digestive organs, alterative. Externally, caustic

Poison antidote, see ferri hydroxidum cum magnesii oxido. Preparations: Liquor acidi arsenosi. Liquor arseni et hydrargyri iodidi; liquor potassii arsenitis; liquor sodii arsenitis. The four official solutions are all 1 per cent. strength in conformity with the strength of the arsenical solutions of all the principal pharmacopoeias of the world as adopted by the International Conference for the Unification of Potent Remedies, in 1902.

Average Dose: 0.002 Gm. (1-30 grain).

Arseni Iodidum. Arsenous Iodide. AsI_3.

Should contain 82.7 per cent. iodine and 16.3 per cent. arsenic and be kept in amber-colored bottles in a cool place.

Orange-red, crystalline powder, soluble with partial decomposition in 12 parts of water, 28 parts of alcohol and completely soluble in chloroform, ether and carbon disulphide.

Uses: Alterative. Employed in making liquor arseni et hydrargyri iodidi.

Average Dose: 0.005 Gm. (1-10 grain).

BISMUTHUM. (Bismuth) Bi.

Bismuth is a grayish-white lustrous metal which occurs, principally, in the natural (uncombined) state. Most of the metal comes from mines in Saxony, it being generally associated with nickel, silver and cobalt.

Bismuth is the most diamagnetic of all known bodies.

It is used extensively in the arts for forming compounds and alloys which are useful in the preparation of type metal because of the fact that bismuth expands when congealing.

Bismuth forms both "ous" and "ic" compounds with the valence of 3 and 5 respectively.

The official bismuth salts are as follows:

Bismuthi Citras. Bismuth Citrate. $BiC_6H_5O_7$.

Should yield 58 per cent., but not over 60 per cent. of bismuth oxide.

Prepared by boiling bismuth subnitrate in citric acid, dissolved in sufficient water, washing and drying the precipitate.

It is a white fine crystalline or amorphous powder, insoluble in water and alcohol but soluble in ammonia water and solutions of the alkali citrates.

Uses: To prepare ammonio-citrate of bismuth.

Average Dose: 0.125 Gm. (2 grains).

Bismuthi et Ammonii Citras. Bismuth and Ammonium Citrate. (Ammonio-Bismuth Citrate. Bismuth-Ammonio-Citrate.)

Made by dissolving 100 parts of bismuth citrate in 200 parts of water, making a smooth paste, which is heated on a water-bath; then enough ammonia water is added to secure a faint alkaline reaction, the liquid is filtered and evaporated to a syrup which is spread on plates to dry, forming scales.

The scales are shining, pearly or translucent, very soluble in water but only sparingly soluble in alcohol.

Uses: Astringent.

Average Dose: 0.125 Gm .(2 grains.)

Bismuthi Subnitras. Bismuth Subnitrate. (Bismuthyl Nitrate.) $Bi(OH)_2 NO_3$.

It should yield not less than 80 per cent. of bismuth oxide.

A heavy white powder, insoluble in neutral solvents but soluble in nitric and hydrochloric acids.

Uses: Astringent; internally for affections of the intestinal tract; externally as a dusting powder with starch or in ointments.

Average Dose: 0.5 Gm. (7½ grains).

Bismuthi Subcarbonas. Bismuth Subcarbonate.

Formulas of bismuth compounds doubtful.

It should yield not less than 90 per cent. of pure bismuth oxide.

A white powder insoluble in neutral solvents but soluble in nitric and hydrochloric acids with effervescence.

Should never be massed or formed into pills, as they are liable to form hard, insoluble masses.

Uses: Same as the subnitrate.

Average Dose: 0.5 Gm. (7½ grains).

Bismuthi Subgallas. Bismuth Subgallate. ("Dermatol.")

It should yield 52 per cent. and not more than 57 per cent. of pure bismuth oxide.

Amorphous, bright yellow powder, insoluble in neutral solvents, but soluble with decomposition in acids.

Uses: Absorbent, astringent.

Average Dose: 0.25 Gm. (4 grains).

Bismuthi Subsalicylas. (Bismuth Subsalicylate.) $Bi(OH)_2C_7H_5O_3$.

Representing not less than 62 per cent. nor more than 64 per cent. of bismuth oxide.

Whitish powder, insoluble in neutral solvents.

Uses: Intestinal antiseptic.

Average Dose: 0.25 Gm. (4 grains).

CHAPTER XXIV.

CUPRUM. (Copper) Cu.

Copper, the metal, is extensively used in the arts, especially in its application to electricity. Few of its salts are used in medicine; these can produce acute and chronic poisoning; the treatment for the former being albumin and magnesia; and the latter, diluted phosphoric acid, large quantities of milk, etc. They are corrosive in action and often produce vomiting.

There is but one official salt.

Cupri Sulphas. Copper Sulphate. (Blue Vitriol. Bluestone. Cupric Sulphate.) $CuSO_4+5H_2O$.

Large deep-blue crystals, soluble in 2.2 parts water, 3.5 parts glycerin, practically insoluble in alcohol. Should be 99.5 per cent. pure.

Incompatible with alkalies and their carbonates, lime water, mineral salts (except sulphates) iodides and most vegetable astringents.

Uses: Emetic, astringent, styptic, tonic. Externally somewhat corrosive.

Average Dose: As astringent, 0.01 Gm. (1-5 grain); emetic, 0.25 Gm. (4 grains).

PLUMBUM. (Lead) Pb.

Lead is a bluish-gray metal, very soft and malleable, with a low point of fusion which renders it very

useful in many branches of the arts. The soluble compounds of lead are all poisonous.

Antidote: Any soluble alkali sulphate, preferably magnesium sulphate, which by interaction forms the insoluble lead sulphate; subsequently evacuation by emetic.

Plumbi Acetas. Lead Acetate. (Sugar of Lead.) $Pb(C_2H_3O_2)_2+3H_2O$).

Should contain 99.5 per cent. of pure lead acetate.

Heavy white crystalline masses or granular crystals, soluble in 2 parts of water and 30 parts of alcohol.

Upon exposure to the air it effloresces, hence it should be kept in well-closed vessels.

Incompatible with hard water, (hard water contains carbonate of lime which is decomposed and carbonate of lead is precipitated) mineral acids and salts, alkalies, lime water, potassium iodide, vegetable astringents, preparations of opium and albuminous liquids.

Uses: Styptic, astringent. Slightly anesthetic locally applied in solution to relieve itching in rhus or ivy poisoning. In emplastrum plumbi; liquor plumbi subacetatis.

Average Dose: 0.065 Gm. (1 grain).

Plumbi Nitras. Lead Nitrate. $Pb(NO_3)_2$.

Should contain 99.5 per cent. pure lead nitrate.

Colorless or white opaque crystals, soluble in 1.85 parts water, almost insoluble in alcohol.

Uses: Principally in solution for external application.

Plumbi Iodidum. Lead Iodide. PbI_2.

Should contain 99 per cent. pure lead iodide and be kept well-stoppered and protected from light.

A heavy bright yellow powder soluble in 1300 parts water, slightly soluble in alcohol.

Uses: Alterative, discutient; externally in ointments.

Plumbi Oxidum. Lead Oxide. (Litharge.) PbO.

Should contain 96 per cent. of pure lead oxide and be kept in well-closed vessels.

A heavy, yellowish or reddish-yellow powder, or minute scales.

Almost insoluble in water, giving it a faint alkaline reaction; insoluble in alcohol, but soluble in acetic and nitric acids and in warm solutions of the fixed alkali hydroxides.

Uses: To make liquor plumbi subacetatis. (Goulard's Extract), liquor plumbi subacetatis dilutus, ceratum plumbi subacetatis.

ZINCUM. (Zinc) Zn.

The metal is official and should contain 99 per cent. of pure metallic zinc. It must be free from arsenic, and the gas evolved when it is dissolved in dilute hydrochloric acid, should have no disagreeable odor, indicating freedom from sulphur; or blacken a strip of paper moistened with a solution of silver nitrate, indicating freedom from arsenic.

It is used in pharmacy as a reagent.

All the zinc compounds, except the carbonate and oxide, are very soluble in water and are regarded as poisonous. Antidotes: Alkaline carbonates, tannin, emetics, stimulants.

Zinci Acetas. Zinc Acetate. $Zn(C_2H_3O_2)_2+2HO$.

In uneffloresced condition, contains 99.5 per cent. of pure zinc acetate, and should be kept well stoppered.

Soft white plates, soluble in 2.5 parts of water and 34 parts of alcohol.

Incompatibles same as the sulphate.

Uses: Astringent, antiseptic; externally in solution.

Average Dose: 0.125 Gm. (2 grains) rarely internally.

Zinci Bromidum. Zinc Bromide. $ZnBr_2$

Should be 97 per cent. pure and kept in small well-stoppered bottles.

A white granular powder, readily soluble in water and alcohol, and very deliquescent.

Uses: Hypnotic; similar to other bromides.

Average Dose: 0.125 Gm. (2 grains).

Zinci Carbonas Praecipitatus. Precipitated Zinc Carbonate. (Hydrated Zinc Carbonate.)

Should yield 72 per cent of Zinc Oxide upon ignition.

Impalpable white powder, insoluble in water and alcohol.

Uses: Astringent, antiseptic, styptic; principally in ointments; to make the acetate and oxide.

Zinci Chloridum. Zinc Chloride. $ZnCL_2$.

Should contain at least 99.5 per cent. pure zinc chloride.

A white granular powder, or fused mass. Exceedingly deliquescent; must be preserved in small glass-stoppered bottles.

Soluble in 0.3 parts water, very soluble in alcohol.

Uses: Antiseptic, astringent, escharotic.

Zinci Iodidum. Zinc Iodide. ZnI_2.

Should be 98 per cent. pure and be kept well stoppered, protected from light.

White granular powder, readily soluble in water alcohol and ether. Upon exposure becomes brownish with liberation of free iodine.

Uses: Alterative, antiseptic, astringent, similar to other iodides. (rarely internally.)

Average Dose: 0.065 Gm. (1 grain).

Zinci Oxidum. Zinc Oxide. ZnO.

White, fine amorphous powder, should be 99.5 per cent. pure and free from gritty matter.

Insoluble in water or alcohol, but soluble in solution of ammonium carbonate, ammonia water and dilute acids, with effervescence.

Uses: Antiseptic, astringent, rarely internally. In Unguentum zinc oxidi; also employed as a dusting powder.

Average Dose: 0.25 Gm. (4 grains).

Zinci Phenolsulphonas. Zinc Phenolsulphate. (Zinc Sulphocarbolate.) $Zn(C_6H_5O_4S_2)_2+8H_2O$.

Should be 99.5 per cent. pure, transparent crystals or prisms. Effloresces upon exposure to air and acquires a pink tint.

Soluble in 1.7 parts of water or alcohol.

Uses: Antiseptic, astringent, antizymotic.

Average Dose: 0.125 Gm. (2 grains).

Zinci Stearas. Zinc Stearate.

A very fine, white powder, insoluble in water, alcohol and ether; has a fatty-like odor, and is readily miscible with fats and oils.

Uses: Antiseptic, dusting powder, and in ointment in skin diseases. Contained in unguentum zinc stearatis.

Zinci Sulphas. Zinc Sulphate. (White Vitriol.) $ZnSO_4+7H_2O$.

Should contain at least 99½ per cent, of pure zinc sulphate. Effloresces in dry air and should be kept in well-stoppered bottles.

Transparent crystals or granular crystalline powder, like magnesium sulphate (Epsom salt) but having an astringent, metallic taste.

Soluble in less than its own weight of water (0.53 parts) and about 3 parts of glycerin; insoluble in alcohol.

Incompatible with alkalies and carbonates, lime water, lead acetate, silver nitrate, astringent vegetable infusions or decoctions and milk.

Uses: Emetic, tonic, astringent, antiseptic, styptic, externally in solutions.

Average Dose: Emetic, 1 Gm. (15 grains) rarely internally except as emetic.

Zinci Valeras. Zinc Valerate. (Zinci Valerianas, U. S. P. 1890. Zinc Valerianate). $Zn(C_5H_9O_2)_2+2H_2O$.

Should be 99 per cent. pure and kept in small, well-stoppered bottles.

White pearly scales, soluble in 50 parts of water and 35 parts of alcohol. Loses valeric acid upon exposure to air. Has a valerian odor.

Incompatible with all acids, soluble carbonates, most metallic salts and vegetable astringents.

Uses: Antispasmotic, nervine.

Average Dose: 0.125 Gm. (2 grains).

ARGENTUM. (Silver.) Ag.

Silver is a very important metal of commerce and its salts are extensively used in the arts, particularly in photography and to some extent in medicine. It is a pure white metal capable of taking a high polish. For most purposes it is combined with harder metals, forming an alloy, being then able to resist wear.

Argenti Cyanidum. Silver Cyanide. AgCN.

A white powder, gradually turning brown in the light.

Should be 99.9 per cent. pure and protected from light. Insoluble in water or alcohol, but soluble in ammonia water, sodium thiosulphate solution and potassium cyanide solution.

Uses: To prepare acidum hydrocyanicum dilutum.

Average Dose: 0.002 Gm. (1-30 grain).

Argenti Nitras. Silver Nitrate. $AgNO_3$.

Should be 99.9 per cent. pure and be kept well protected from the light.

Transparent, tabular crystals, soluble in 0.54 parts water, and 24 parts of alcohol.

Becomes grayish-black on exposure to air or contact with organic matter; also forms a white precipitate in the presence of chlorides, for which it is a test.

Incompatible with alkalies and their carbonates, chlorides, acids (except nitric and acetic) potassium iodide, solutions of arsenic and solutions of astringent infusions.

Solutions should be prepared with pure sterile distilled water and kept in glass-stoppered bottles which need not be amber colored if the solution is not exposed to direct sunlight.

Uses: Externally: Caustic, escharotic, germicide; Internally: astringent. Antidote for poisoning by overdose: Sodium chloride (common salt) forming insoluble silver chloride.

Average Dose: 0.01 Gm. (1-5 grain) in pill form only.

Argenti Nitras Fusus. Moulded Silver Nitrate (Fused Silver Nitrate. Lunar Caustic.)

Prepared by melting 100 Gm. silver nitrate with 49 Gm. hydrochloric acid, and cooling in moulds.

A white, hard, solid; generally in shape of pencils, which are less liable to break because they contain about 5 per cent. of silver chloride.

Uses: Externally as a caustic.

Argenti Nitras Mitigatus. Mitigated Silver Nitrate. (Argenti Nitras Dilutus, U. S. P., 1890. Mitigated Caustic. Diluted Silver Nitrate.)

Should contain 33.3 per cent. silver nitrate.

Prepared by fusing together silver nitrate 30 Gm. and potassium nitrate 60 Gm. and pouring the product into moulds, which form pencils or cones.

Uses: Externally when a mildly caustic effect is desired.

Argenti Oxidum. Silver Oxide. Ag_2O.

A heavy dark brown powder, insoluble in neutral liquids.

Incompatible with chlorides and organic substances, especially creosote, for it rapidly oxidizes them and forms explosive compounds, also explosive upon concussion.

Uses: Astringent, internally.

Average Dose: 0.065 Gm. (1 grain) in pill form.

AURUM. Gold. Au.

The metal was known from the earliest times. It is seldom employed in its pure state for any purpose, being usually alloyed with copper to resist wear. It is not attacked readily by other elements, acids or reagents. Nitro-hydrochloric acid and selenic acid dissolve it.

Auri Et Sodii Chloridum. Gold and Sodium Chloride.

A mixture of equal parts by weight of dry gold chloride ($AuCl_3$) and dry sodium chloride (NaCl) containing not less than 30 per cent. of metallic gold.

Keep well stoppered; very deliquescent and very soluble in water; at least one-half of it should be soluble in cold alcohol.

It is an orange-yellow powder or crystals, having a saline metallic taste and a slightly acid reaction.

Uses: Alterative, tonic and stimulant.

Average Dose: 0.005 Gm. (1-10 grain) in pills.

PART IV

CHAPTER XXV.

PRODUCTS OF PLANTS.

Nature supplies pharmacy with an enormous number of important products which it is our purpose now to consider.

We will first consider the large classes known as gums, mucilages, gumresins, oleoresins, balsams, volatile oils, fixed oils and fats.

In many cases drugs are incorrectly classified and it is quite important that when this is discovered a mental note of it be made. For instance drugs known as balsams of fir and copaiba are distinctly oleoresins, while gum benzoin is a balsam; gum mastiche and gum guaiac are resins and gum opium is an inspissated juice.

GUMS.

Gums are amorphous and transparent or translucent exudates from plants, distinguished from the other natural products by being soluble in water. Acacia is the best example.

MUCILAGES.

Mucilages are of the same characteristics as gums but are not wholly soluble in water, though they absorb it freely. Tragacanth is an example.

RESINS.

Resins are solid or semi-solid, usually amorphous, exudations from plants; insoluble in water but freely soluble in alcohol, ether and chloroform, usually in volatile oils, and frequently in fixed oils. Resins are generally transparent, hard and brittle; if they contain water and dirt they become opaque and soft; they are readily fusible and inflammable.

OFFICIAL RESINS.

There are four official resins none of which are natural products (that is natural exudates from plants) they are as follows:

Resina. Rosin.

The residue left after distilling off the volatile oil of turpentine and commonly known as rosin.

Resina Jalapa. Resin of Jalap.

Made by pouring a concentrated alcoholic tincture of jalap into cold water which immediately precipitates the resin. Freely soluble in alcohol; it is also soluble in 5 parts of ammonia water; insoluble in fixed or volatile oils.

Uses: Hydragogue cathartic. A constituent of pil. cathartic comp. U. S. P., seldom employed alone.

Average Dose: 0.125 Gm. (2 grains).

Resina Podophylli. Resin of Podophyllum. (Podophyllin.)

Made by pouring a concentrated alcoholic tincture of podophyllum into cooled water mixed with one per cent. hydrochloric acid.

The Pharmacopoeia requires that at least 99 per cent. of the resin be soluble in alcohol, 65 per cent. in chloroform and not more than 25 per cent. in boiling water; it is practically insoluble in cold water.

A powdered alcoholic extract of podophyllum is sold under the name "podophyllin" which should not be confused with the resin, though undoubtedly the resin is usually intended in prescriptions calling for podophyllin.

Uses: Laxative, hydragogue cathartic; usually in combination with other drugs.

Average Dose: Purgative .015 Gm. (¼ grain); laxative, .005 Gm. (1-10 grain).

Resina Scammonii. Resin of Scammony.

Made by pouring a concentrated alcoholic tincture of scammony into cold water. Freely soluble in alcohol, soluble in volatile oils, ether and chloroform, also soluble in hot alkaline solutions.

Uses: Drastic purgative. A constituent of extract colocynth comp. Seldom employed alone.

Average Dose: 0.2 Gm. (3 grains).

NATURAL RESINS.

In addition to the above but entered in the Pharmacopoeia under separate titles may be named:

Guaiacum. Guaiac. (Resin Guaiac U. S. P. 1890.)

The resin of the wood of Guaiacum officinale, a small tree growing in the West Indies and northern South America.

The Pharmacopoeia requires that at least 85 per cent. of the resin should be soluble in alcohol. Usually employed in the form of tincture.

Uses: Alterative, antirheumatic, diaphoretic, emmenagogue. There are two official tinctures; tincture of guaiac and ammoniated tincture of guaiac.

Average Dose: 1 Gm. (15 grains).

Mastiche. Mastic.

A concrete resinous exudation from Pistacia Lintiscus, a small tree growing near the Mediterranean, and occurs in the form of yellowish, transparent, brittle tears.

Completely soluble in ether and almost completely soluble in alcohol.

Uses: Masticatory, stomachic. The only official preparation is the pills of aloes and mastic.

Average Dose: 2 Gm. (30 grains).

GUM RESINS.

Gum resins, as the name implies, are mixtures of gums and resins. They are obtained from plants in the form of sticky, milky exudations.

The medicinal properties of gum resins are found entirely in the resin, hence solutions of these drugs are made with alcohol which dissolves the resin only. Examples: Tincture asafetida and tincture myrrh. The only official gum resins are as follows:

Asafoetida. Asafetida.

A gumresin obtained from the root of Ferula foetida and other species of Ferula, a plant grown in Asia Minor.

The exudate consists of about 20 to 30 per cent. of gum, 50 to 70 per cent. of resin and 3 to 9 per cent. of

volatile matter, combined with water in the form of a milky emulsion. It dries in the form of masses of white tears imbedded in a brown sticky mass, often including vegetable impurities. Asafoeida forms a milk-white emulsion when triturated with water. It should not require over 2 parts alcohol to dissolve.

Uses: Antispasmotic, cathartic, antiseptic. Employed in the manufacture of emulsion of asafetida, tincture of asafetida and pills of asafetida and aloes and asafetida.

Average Dose: 0.25 Gm. (4 grains).

Myrrha. Myrrh.

A gum resin obtained from Commiphora Myrrha, a shrub grown in the forests of Northern Africa. The gum exudes from the stem and consists of 3 to 4 per cent. volatile oil, (myrrhol) 35 per cent. resin and 60 per cent. gum. It is obtained in masses of irregular shape and size composed of tears, also of various shapes and sizes of a dirty brown color.

Uses: Astringent, carminative, emmenagogue, antiseptic. The official preparations are tincture of myrrh, tincture of aloes and myrrh, pills of aloes and myrrh and compound pills of rhubarb.

Average Dose: 0.5 Gm. (7½ grains).

Cambogia. Gamboge.

A gum resin obtained from Garcinia Hanburii, a tree indigenous to Camboja, Siam and Cochin-China. It is marketed in lumps or cylindrical pieces, usually hollow and in various lengths. Color grayish-brown; taste acrid.

Gamboge contains 73 per cent. of resin (gambogic acid) soluble in alcohol, and 16 to 26 per cent. of gum and 4 per cent. of wax.

Uses: Hydragogue cathartic. Employed officially only in compound cathartic pills.

Average Dose: 0.125 Gm. (2 grains).

Scammonium. Scammony.

A gum resin obtained by incising the living root of Convolvulous Scammonia, a plant similar to our morning glory, grown in Western Asia. It comes in circular or irregular cakes or pieces of various sizes, greenish-gray or brownish-black in color. When powdered it is light gray. Not less than 75 per cent. should be soluble in ether.

Uses: Hydragogue cathartic; seldom employed alone. The only official preparation is the resin of scammony.

Average Dose: 0.25 Gm. (4 grains).

BALSAMS.

Balsams are secretions from plants of the character of resins or oleoresins but dissimilar from both. They are distinguished by the presence of benzoic or cinnamic acid. They are soluble in alcohol, chloroform and ether, and insoluble in water, although the aroma or balsamic principle may be extracted by boiling water. The following balsams are official:

Balsamum Peruvianum. Balsam of Peru.

An oleoresinous balsam obtained from Toluifera Pereirae, a tree growing in the forests of San Salvador.

A thick dark liquid soluble in absolute alcohol, chloroform and glacial acetic acid, soluble in 5 parts alcohol with slight opalescence.

Uses: Antiseptic, stimulant, expectorant, externally in ointments.

Balsamum Tolutanum. Balsam of Tolu.

A resinous balsam obtained from Toluifera balsamum, a large evergreen tree growing in Venezuela and New Granada. It is a yellowish-brown resinous mass, freely soluble in alcohol, chloroform and ether.

Uses: Expectorant and antiseptic. Medicinal value slight.

Benzoinum. Benzoin.

A balsamic resin obtained from Styrax benzoin a large tree found in Sumatra and Java. It reaches the market in the form of masses of various sizes of a resinous character which, when broken, show a mottled surface of smooth, shining white tears.

Soluble in 5 parts alcohol. Contains about 20 per cent. benzoic acid.

Uses: Stimulant, expectorant; externally antiseptic.

Average Dose: 1 Gm. (15 grains).

Styrax. Storax.

An oleoresinous balsam obtained from Liquidamber, a large tree grown in Asia Minor. A semi-liquid, grayish, sticky, opaque mass, from which a heavy brown layer separates on standing. Soluble in alcohol.

Uses: Alterative, antiseptic, expectorant. A constituent of compound tincture of benzoin.

Average Dose: 1 Gm. (15 grains).

OLEORESINS.

Oleoresins have the properties of both resins and volatile oils. They are soluble in alcohol and ether, insoluble in water. The oil and the resin may be sep-

arated by distillation. They occur in nature in both liquids and solids, copaiba an example of the former and white turpentine an example of the latter.

NATURAL OLEORESINS.

Copaiba. (Balsam Copaiba.)

An oleoresin derived from one or more South American species. A thick, brownish yellow liquid, soluble in alcohol, chloroform, ether, petroleum benzin, carbon disulphide and in fixed oils and volatile oils.

Uses: Antiseptic, diuretic, expectorant, stimulant.

Average Dose: 1 Cc. (15 minims).

Terebinthina. Turpentine.

A concrete oleoresin obtained from various species of Southern Pines. Obtained in yellowish, opaque, glossy masses, brittle when cold, sticky when warm. Upon distillation the oleoresin yields oil of turpentine and resin. Used in the official compound resin cerate and in various ointments and plasters.

Terebinthina Canadensis. Canada Turpentine. (Canada Balsam. Balsam of Fir.)

A liquid oleoresin obtained from Abies balsamea, the pines grown in the north. Medicinal properties similar to other turpentines.

OFFICIAL OLEORESINS.

Under the title "Oleoresin" the Phamacopoeia recognizes six. They represent the drug in a more concentrated form than any other class. The Pharmacopoeia now employs acetone in place of ether which

was formerly used, except oleoresin cubeb for which alcohol is the solvent. They are insoluble in water. Their consistence varies from liquid to a soft solid. The Pharmacopoeia directs that 500 Gm. (1 pound av.) of the drug be employed and percolation be carried on in an apparatus suitable for the employment of volatile liquids, until the drug is exhausted. They should be kept in well-stoppered bottles.

Oleoresina Aspidii. Oleoresin of Aspidium. (Oleoresin of Male Fern, Oleoresina filicis, Oleum filicis maris.)

Should be made only from fresh green root.

The active principle, in the form of a granular crystalline substance, is deposited upon standing, which should be mixed with the liquid portion before dispensing.

Uses: Anthelmintic, taenifuge.

Average Dose: 2 Gm. (30 grains) in capsules.

Oleoresina Capsici. Oleoresin of Capsicum.

Uses: Corrective, adjuvant to purgative pills. Rubefacient.

Average Dose: 0.03 Gm. (½ grain).

Oleoresina Cubeae. Oleoresin of Cubeb.

Deposits waxy crystalline matter which should be rejected.

Uses: Expectorant, anti-asthmatic.

Average Dose: 0.5 Gm. (7 grains).

Oleoresine Lupulini. Oleoresin of Lupulin.

Lupulin contains a great amount of resin (about 60 per cent.)

Uses: Sedative, hypnotic.

Average Dose: 0.2 Gm. (3 grains).

Oleoresina Piperis. Oleoresin of Pepper.

It is known commercially as oil of black pepper but this article is obtained as a by-product in the production of piperin, hence the commercial article is nearly, if not quite, free from piperin and does not answer official requirements. Oleoresin of pepper deposits piperin upon standing.

Uses: Stomachic.

Average Dose: 0.03 Gm. (½ grain).

Oleoresina Zingiberis. Oleoresin of Ginger.

Uses: Aromatic, stomachic, carminative.

Average Dose: 0.03 Gm. (½ grain).

CHAPTER XXVI.

CARBOHYDRATES.

The name "carbohydrate" is applied to three important groups of organic chemical compounds which contain only carbon, hydrogen and oxygen, the hydrogen and oxygen being in the same proportion in which they exist in water (H_2O.)

Group One contains starch and cellulose with the chemical formula $C_6H_{10}O_5$.

Group Two contains glucose, grape sugar and fruit sugar with the chemical formula $C_6H_{12}O_6$.

Group Three contains cane sugar (saccharose) milk sugar (lactose) and malt sugar (maltose,) also beet sugar, sorghum sugar, and maple sugar. The chemical formula is $C_{12}H_{22}O_{11}$.

Amylum. Starch. Corn Starch. $C_6H_{10}O_5$.

The official starch is made from corn which contains 55 per cent. of starch but for commercial purposes it is usually made from potatoes. The only official preparation is glycerite of starch.

Starch is a constituent of many plants. It is insoluble in cold water or alcohol, but forms a mucilaginous solution with boiling water.

Starch is the principal source of glucose, whiskey and alcohol.

CELLULOSE AND DERIVATIVES.

Cellulose is the name given to the material of which the growing plant cell is composed; as the cells grow older it is partially transformed into a substance called lignin to which it is closely related. Cellulose is insoluble in the ordinary solvents, and to obtain it in a state of purity it is succesively treated with water, alcohol, ether, dilute alkalies, dilute hydrochloric and hydroflouric acids. The residual fibre is then chemically pure cellulose, of which Swedish filter paper and cotton are examples. It is extensively used in the arts in the manufacture of cloths, paper, lint, etc.

From the action of nitric acid on cellulose there results a number of substances, such as gun cotton, pyroxylin, celluloid and oxalic acid; while by destructive distillation a number of acids, tars and creosotes are produced. The formula usually given is $C_{12}H_{20}O_{10}$. Boiling it with dilute acids converts it into dextrine and dextrose, while concentrated sulphuric acid converts it into amyloid, the last two being closely related to sugars and starches.

Gossypium Purificatum. Purified Cotton. (Absorbent Cotton.)

A pure form of cellulose prepared from the hairs of the seed of various species of cotton plants. The hairs are freed from adhering impurities by physical manipulation and from fatty matters by boiling in weak alkaline solutions. They are white soft filaments, appearing under the microscope as hollow, flattened twisted bands. Purified cotton is soluble in ammoniacal solution of copper oxide from which it is precipitated by acids and salts. When thrown on water it

rapidly absorbs it and sinks; and the water should not become either acid nor alkaline, indicating freedom from fatty matter and also proper purification.

Uses: Pharmaceutical: In preparing pyroxylin; filtering agent; absorbent generally and for remedies locally applied. Medical: In various forms as a covering, protective, support and absorbent.

Acidum Oxalicum. Oxalic Acid. $H_2 C_2 O_4 + 2H_2 O$.

This acid, omitted from the alphabetical list of official substance, may be found in the list of official reagents.

It is made by the action of nitric acid upon cellulose. It is obtained on a commercial scale by the action of caustic potash and caustic soda upon sawdust.

Soluble in 12 parts of water and 7 parts of alcohol.

The acid has no medicinal value but is a valuable reagent; it is extensively used in the arts. It is a powerful, corrosive poison. Oxalic acid combines with bases to form salts called oxalates.

Pyroxylinum. Pyroxylin. (Gun Cotton. Soluble Gun Cotton. Colloxylin.)

Prepared by the action of nitric acid upon cotton or cellulose. Consists chiefly of cellulose tetranitrate. ($C_{12} H_{16} (ONO_2)_4 O_6$). It should be kept in cartons protected from light; when kept in well-closed bottles exposed to light, it is decomposed, with the evolution of nitrous vapors and a carbonaceous mass is deposited.

When properly prepared and kept it is a yellowish-white mass of filaments closely resembling raw cotton, and when unconfined burns with a yellow flame. Complete but slow solution will take place in 25 volumes of a mixture composed of 1 part of alcohol and

3 parts of ether. Great care should be taken in handling as it is exceedingly inflammable.

Uses: To prepare collodions of which there are four official. These were treated under Collodia.

SUGAR AND ITS DERIVATIVES.

The name "sugar" is commonly applied to the one article, saccharose, which is the sweet substance obtained from sugar cane, sugar beet, sugar maple and sorghom, but there are many others which differ both chemically and physically.

Sugars are known chemically as carbohydrates. Carbohydrates contain carbon, hydrogen and oxygen only, the hydrogen and oxygen always being in the same proportion in which they exist in water (H_2O). To illustrate, cane sugar has the formula $C_{12}H_{22}O_{11}$ while glucose has the formula $C_6H_{12}O_6$.

Sugars may be, 1st ,fermentable; 2nd, unfermentable; but as the latter class is small and unimportant we will consider only the fermentable sugars which are divided into two general classes or groups as follows:

Group 1, Saccharoses—$C_{12}H_{22}O_{11}$.

Group 11, Glucoses—$C_6H_{12}O_6$.

The important members of group 1 are cane sugar (saccharose), milk sugar (lactose), and maltose or malt sugar which is obtained by the action of diastase upon starch.

The important members of group 2 are glucose and grape sugar and fruit sugar (levulose) which is the sugar found in fruits and in honey.

Glucose is obtained by the action of sulphuric acid upon starch while grape sugar is obtained by crystallizing glucose.

The official sugars are:

Saccharum. Sugar. (Sucrose) $C_{12}H_{22}O_{11}$. The refined sugar obtained from saccharum officinarum Linne and from the various species or varieties of sorghum, also from one or more varieties of beta vulgaris (sugar beet.)

Saccharum Lactis. Sugar of Milk. (Lactose) $C_{12}H_{22}O_{11}+H_2O$.

A peculiar crystalline sugar obtained from the whey of cows' milk by evaporation, and purified by recrystallization.

Mel. Honey.

A saccharine secretion deposited in the honeycomb by the bee.

Mel Depuratum. Clarified Honey.

Obtained by heating honey with paper pulp, removing the scum, straining and finally adding 5 per cent. of its weight of glycerin.

PRODUCTS OF FERMENTATION.

When sugars are subjected to water, air and heat, in the presence of a ferment, they decompose and new products are formed, the process being called fermentation.

The fermentation may be alcoholic or acetic, though acetic fermentation is but a continuation of alcoholic fermentation, the alcohol being converted into acetic acid through oxidation. An excellent example

is the process by which cider ferments and becomes alcoholic or "hard" and then sours and becomes vinegar.

Alcohol. C_2H_5OH.

A liquid composed of about 92.3 per cent. by weight or 94.9 per cent. by volume of absolute ethyl alcohol.

Alcohol is the most important liquid used in pharmacy, except water. It is made from corn, potatoes, or other substances containing starch or sugar.

If made from starch the starch is first converted into sugar by the use of diastase which is produced by the germination of grain. Diastase will convert 2000 times its weight into maltose (malt sugar) which, in turn, is converted into alcohol through further fermentation and distillation.

The alcohol which conforms with official requirements is known commercially as cologne spirits.

Alcohol Absolutum. Absolute Alcohol.

Ethyl alcohol containing not more than 1 per cent. by weight of water. Must be preserved in well-stoppered bottles in a cool place. Seldom employed in pharmacy.

Alcohol Dilutum. Diluted Alcohol.

Composed of 48.9 per cent. by volume of absolute alcohol and 51.1 per cent. by volume of water.

Obtained by mixing equal parts by volume of alcohol and water.

Spiritus Frumenti. (See spirits).

Spiritus Vini Gallici. (See spirits).

DERIVATIVES OF ALCOHOL.

Aether. Ether. $(C_2H_5)_2O$.

A liquid composed of about 96 per cent. by weight of absolute ether and 4 per cent. of alcohol.

Ether is obtained by the distillation of alcohol in the presence of sulphuric acid. Theoretically the process is continuous as the following reaction shows:

$$\underset{\text{Alchol}}{C_2H_5HO} + \underset{\text{Sulphuric Acid}}{H_2SO_4} = \underset{\text{Ethyl-Sul. Acid}}{C_2H_5HSO_4} + \underset{\text{Water}}{H_2O}$$

$$C_2H_5HSO_4 + C_2H_5HO = (C_2H_5)_2O + H_2SO_4$$

Much of the ether formerly supplied was very impure but there is now no difficulty in procuring the U. S. P. article.

Aether Aceticus. Acetic Ether.

A colorless liquid composed of about 90 per cent. by weight of ethyl acetate and 10 per cent. of alcohol containing a little water. Should be kept well stoppered in a cool, dark place.

Obtained by the distillation of alcohol, sulphuric acid and sodium acetate.

Uses: Anaesthetic, stimulant, antispasmodic; in liniments.

Average dose: 1 Cc. (15 minims).

Aethylis Carbamas. Ethyl Carbamate. $(C_3H_7NO_2)$.

An ester of carbamic acid obtained by the reaction of ethyl alcohol upon urea (carbamide) or one of its salts.

Should be kept in well-stoppered bottles.

Colorless crystals or scales; odorless, with a cooling saline taste.

Soluble in 1 part water, 0.6 part alcohol, 1 part ether, 1.3 parts chloroform and 3 parts glycerin.

Uses: Hypnotic.

Average dose: 1 Gm. (15 grains).

Aethylis Chloridum. Ethyl Chloride.

A haloid derivative prepared by the action of hydrochloric acid gas upon absolute ethyl alcohol.

Must be preserved in hermetically sealed tubes.

Uses: Anaesthetic (local and general).

Bromoformum. Bromoform. ($CH Br_3$).

A heavy, mobile, transparent liquid, with an ethereal odor and a sweet taste, consisting of 99 per cent. by weight of absolute bromoform and 1 per cent. of absolute alcohol.

Should be kept in dark bottles, glass stoppered, in a cool, dark place.

Obtained by the action of bromine on alcohol in the presence of alkalies.

Slightly soluble in water; soluble in all proportions in alcohol, ether, benzene, petroleum benzin and in fixed and volatile oils.

Uses: Antispasmodic, sedative; principally in whooping cough.

Average dose: 0.2 Cc. (3 minims).

Chloroformum. Chloroform. ($CHCl_3$).

A liquid composed of 99 to 99.4 per cent. by weight of absolute chloroform and .06 to 1 per cent. of alcohol.

A heavy, colorless and mobile liquid of a characirstetic odor; specific gravity 1.476. Soluble in 200 volumes of cold water and freely soluble in alcohol, fixed and volatile oils.

Formerly made by distilling alcohol with chlorinated lime and water but now generally made by the reaction between chlorinated lime and acetone.

The official preparations are chloroform water, spirit of chloroform, emulsion of chloroform and liniment of chloroform.

Chloralum Hydratum. Hydrated Chloral. (Chloral Hydrate. Chloral U. S. P., 1890) $C_2HCl_3O+H_2O$.

A crystalline solid composed of trichloraldehyde or chloral with the elements of one molecule of water.

Obtained by passing dry chlorine gas through absolute alcohol.

Soluble in water, alcohol, ether, chloroform, oils.

Uses: Hypnotic, sedative, antispasmodic.

Average dose: 1 Gm. (15 grains).

Chloralformamidum. Chloralformamide. (Chloralamide.)

A crystalline solid made by the direct union of formamide with anhydrous chloral.

Obtained by interaction between anyhydrous chloral and formamide. (Formamide is obtained by the dry distillation of urea and ammonium formate).

Should be kept in amber colored bottles, well stoppered.

Colorless lustrous crystals, without odor, with a somewhat bitter taste.

Soluble in 18.7 parts of water, 1.3 parts of alcohol, readily soluble in ether, glycerin, acetone and acetic ether.

Uses: Hypnotic, sedative, analgesic.

Average dose: 1 Gm. (15 grains).

Hexamethylenamina. Hexamethylenamine Tetramine.

Also known as cystotropin, urotropin, cystogen, formin and by other proprietary names.

A condensation product obtained by the action of ammonia upon formaldehyde.

Should be preserved in well-stoppered bottles.

Colorless and odorless crystals, slightly alkaline.

Soluble in 1.5 parts of water and 10 parts of alcohol.

Uses: Urinary antiseptic, diuretic, antilithic.

Average dose: 0.250 Gm. (4 grains).

Iodoformum. Iodoform. (CHI_3).

Tri iodomethane, usually obtained by the action of iodine upon alcohol in the presence of an alkali or alkali carbonate. Should be kept in well stoppered bottles in a cool, dark place.

A fine lemon-yellow powder or lustrous crystals with a characteristic odor.

Soluble in 9391 parts of water, 46.7 parts of alcohol and 5.2 parts of ether; soluble in chloroform and fixed and volatile oils.

Uses: Principally as an antiseptic dusting powder for wounds.

Average dose: 0.250 Gm. (4 grains).

Iodolum. Iodol. (C_4I_4NH).

Tetraiodopyrrol, a derivative of the base pyrrol, obtained by the direct action of iodine upon the base in the presence of alcohol. Should be preserved in amber colored bottles, protected from light.

A light grayish-brown powder free from odor or taste.

Soluble in 4900 parts of water, 1½ parts of ether 9 parts of alcohol and 105 parts chloroform, also in fixed oils.

Uses and dose same as iodoform.

Oleum Aethereum. Ethereal Oil.

A volatile oil consisting of equal volumes of heavy oil of wine and ether.

Obtained by distilling alcohol with an excess of sulphuric acid at a temperature between 302° and 314.6° F., the heavy oil of wine which results is purified and mixed with an equal volume of ether.

Uses: For the preparation of compound spirit of ether.

Paraldehydum. Paraldehyde. ($C_6H_{12}O_3$).

A polymer of acetaldehyde (aldehyde). Aldehyde (also known as ethyl aldehyde) is alcohol from which two hydrogen atoms have been abstracted.

Paraldehyde is usually obtained by passing gaseous hydrochloric acid into aldehyde and subsequent purification.

A colorless liquid with a strong pungent odor and burning taste. Soluble in 8 parts of water (16.5 parts of boiling water). Miscible in all proportions with alcohol, ether and fixed or volatile oils.

Uses: Hypnotic, antispasmodic.

Average dose: 2 Cc. (30 minims).

* * * *

PRODUCTS OF DESTRUCTIVE DISTILLATION.

When wood is heated in retorts various substances are obtained, depending upon the temperature of the retort and the kind of wood used. When hard woods (oak for instance) are distilled there is obtained: 1st. About 22 per cent. of gases consisting of carbon dioxide, acetylene and others. 2nd. About 53 per cent. of liquids consisting of (a) an aqueous liquid known as

pyroligneous acid or wood vinegar which contains acetic, formic and numerous other related acids, methyl (wood) alcohol and coloring matters and (b) a tarry liquid containing phenol, cresol, guaiacol, toluol, tar camphor (naphthalene) paraffine and numerous other substances. (c) Charcoal, which represents about 25 per cent. of the whole.

Those products of destructive distillation which have not already been referred to under various heads will now be considered.

Acetonum. Acetone. (Acetyl-methylid. Dimethyl-ketone.) ($CH_3CO\ CH_3$.)

A mobile, volatile, transparent, colorless liquid of an etheral characteristic odor and pungent sweetish taste. It is contained in considerable quantities in the product obtained in the distillation of wood, and can be separated from the mixture after the removal of the acetic acid. Miscible with water in all proportions without cloudiness; also miscible with alcohol, ether, chloroform and volatile oils.

It is a dangerous explosive if heated in confined vessels and its vapor ignites. The Pharmacopoeia directs that it be kept in well-closed vessels in a cool place remote from lights and fires.

Uses: Anesthetic, hypnotic, anthelmintic, has also been used in gout. Chief use in pharmacy as a solvent in place of ether, chloroform and alcohol and as a solvent for resins, fats, etc. Also used in the manufacture of chloroform sulphonal, iodoform, etc.

Creosotum. Creosote. (Beech-wood Creosote.)

This is a mixture of phenols and derivatives, mostly guaiacol and cresol, obtained by the distillation from wood-tar, preferably of that derived from the beech.

It is an almost colorless or yellowish (not pinkish) oily liquid with a penetrating smoky odor. Light should not brown its color.

Solution in about 140 parts of water is not absolutely clear but with 120 parts of boiling water a clear solution is formed which upon cooling, separates out small oily globules, distinguishing it from both carbolic acid and coal tar creosote. The filtrate of this solution gives a reddish-brown precipitate with bromine, T. S., while coal tar creosote and carbolic acid yield white precipitates.

It is miscible in all proportions with absolute alcohol, ether, chloroform, carbon disulphide, acetic acid, and fixed and volatile oils. Incompatible with gold, silver, cupric and ferric salts; acacia and albumin. Explodes when mixed with silver oxide.

Uses: In tuberculosis, pneumonia, bronchitis, vomiting, dysentery, typhoid fever, diabetes and for tape worms. Locally for toothache, sore throat, uterine haemorrhage, preservative of animal tissue. Officially for creosote water.

Average Dose: 0.2 Cc. (3 minims).

Guaiacol. (Methyl Pyrocatechin. $C_7 H_8 O_2$.)

One of the chief constituents of creosote. Keep in bottles protected from light.

It is obtained from creosote by collecting and purifying the portion that distills between 392 and 401 degrees F. (200 and 205 degrees C.); or prepared synthetically from either pyrocatechin by methylating or from orthoanisidin by diazotizing and boiling. It can be either a colorless, crystalline solid or a colorless refractive liquid, having an agreeable aromatic odor.

Soluble in 53 parts of water and in all proportions

in alcohol, ether, acetic acid and 1 part of glycerin.

Mixtures of small quantities of guaiacol and ferric chloride give an immediate blue color, changing to an emerald-green which finally becomes yellowish. The above is a test for guaiacol.

Uses: Antituberculous, anodyne, antipyretic.

Average Dose: 0.5 Cc. (8 minims).

Guaiacolis Carbonas. Guaiacol Carbonate. $(C_7H_7O)_2CO_3$.

A derivative of guaiacol obtained by the action of carbonyl chloride upon sodium-guaiacolate.

It is a white, neutral, crystalline powder, almost odorless and tasteless. Insoluble in water; soluble in 48 parts of alcohol, 1.5 parts chloroform, and 13 parts of ether, also slightly soluble in glycerin and fixed oils. It is sometimes contaminated with free guaiacol which can be detected by the addition of a few drops of ferric chloride test solution to an alcoholic solution of the guaiacol carbonate, yielding a bluish-green color.

Uses: Antiseptic, (intestinal) antitubercular.

Average Dose: 1 Gm. (15 grains).

Methylic Alcohol. (Wood Alcohol.) CH_4O.

Employed officially as test solution only. Obtained by distillation of pyroligneous acid. Must not be employed in any official product calling for alcohol. Used extensively in the arts. Should never be used medicinally.

Pix Liquida. Tar. (Pine Tar.)

A product of a very complex composition obtained by the destructive distillation of the wood of pinus palustris or other species of pinus. It is a viscid, semi-fluid, blackish-brown substance, heavier than water. In thin layers it is translucent, becomes granular and

opaque with age. Its odor is very empyreumatic but sometimes resembles that of turpentine. An oil (oil of tar) can be distilled from it; the residue remaining is pitch which melts in boiling water.

It is slightly soluble in water, but freely soluble in alcohol, the fixed and volatile oils or solutions of potassium or sodium hydroxides.

Some of the chief constituents are: Oil of turpentine, creosote, phenols, acetic acid, acetone, methyl alcohol, resins, pyrochatechin.

Uses: Expectorant; externally in skin affections. Preparations, syrupus picis liquidae, unguentum picis liquidae.

Average Dose: 0.5 Gm. (7½ grains).

Sulphonethylmethanum. Sulphonethylmethane (Trional.)

Similar to sulphonal, the acetone being replaced by methylethylketone. Colorless, odorless, crystalline scales which have a bitter taste. Soluble in 195 parts water, readily soluble in alcohol and ether.

Uses: Same as sulphonal.

Average Dose: 1 Gm. (15 grains).

Sulphonmethanum. Sulphonmethane. (Sulphonal.)

A complicated chemical compound obtained from acetone. Colorless, odorless and nearly tasteless prismatic crystals which should be preserved in well-stoppered vials.

Soluble in 360 parts of water, 47 parts of alcohol, 45 parts of ether, 16 parts of chloroform.

Uses: Hypnotic, sedative.

Average Dose: 1 Gm. (15 grains).

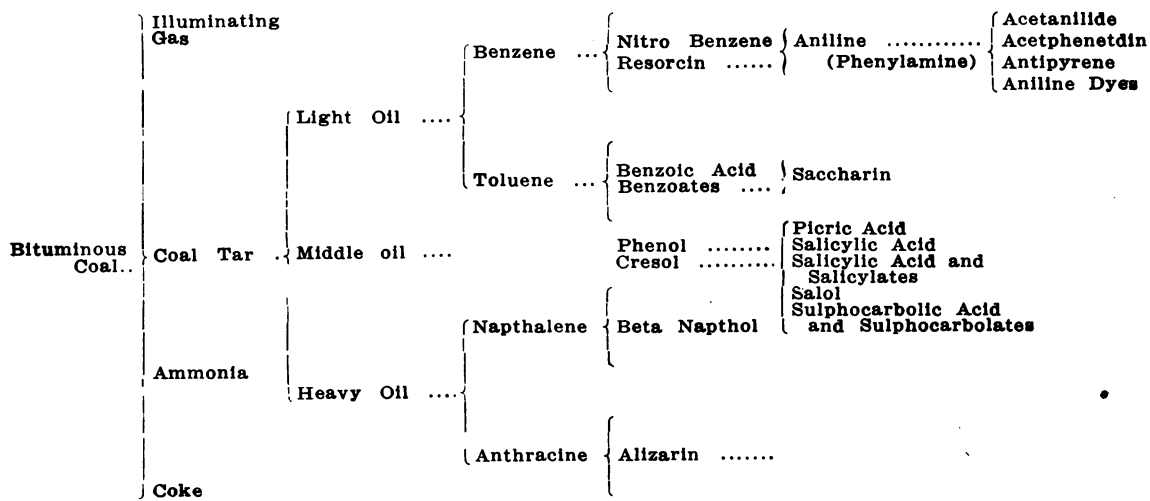
CHAPTER XXVII.

COAL TAR PRODUCTS.

Coal tar is a by-product obtained in the manufacture of illuminating gas, by the destructive distillation of bituminous coal. The coal is distilled in a fire clay or cast iron retort at a red heat, the volatile products being conducted in iron pipes, half filled with water into which the pipes from the retort dip. This is called the hydraulic main. Most of the coal tar and heavy products condense in this main. The gas is conducted into a series of condensers which dip into water, where it is cooled and the ammonia absorbed by the water. The gas passes through a series of purifiers and is ready for use. The ammonia liquor forms the basis of most of the ammonia compounds of commerce, while the tar is redistilled and it is through this process of redistillation that the long series of coal tar products is obtained.

The accompanying diagram will show clearly the source of the various products.

Source of Coal Tar Products



Benzene (C_6H_6) is found in the most volatile portion of coal tar, which is known commercially as "light oil." It is the first member of the long series of hydrocarbons known as the benzene or aromatic hydrocarbons because of their aromatic odor and taste. They also present a large number of isomers.

Benzene or benzol, as it is also known, should not be confounded with benzine, a product of petroleum.

Among the products produced from benzene are aniline or phenylamin ($NH_2C_6H_5$), from which is obtained acetanilide and acetphenetidin (phenacetine).

Aniline or Phenylamin ($NH_2C_6H_5$), is obtained from benzene by converting it into nitrobenzene by the action of a mixture of nitric and sulphuric acids, and subsequent reduction of the nitrobenzene with nascent hydrogen.

Amines are formed by the replacement of hydrogen in ammonia by alcohol radicals, as for example, NH_2 (CH_3) methylamine.

Amides are formed by the replacement of the hydrogen in ammonia by acid radicals. Example, acetamide, $NH_2(C_2H_3O)$.

Ammonia. The chief source of ammonia and ammonium salts is the ammonia liquor produced by the destructive distillation of bituminous coal, in which it is a by-product.

The official coal tar products are as follows:

Acetanilidum. Acetanilide. (Phenylacetamide. Antifebrine.)

The monacetyl derivative of aniline.

Prepared by heating together aniline and glacial acetic acid, and subsequently purifying the product by crystallization and sublimation.

It is a crystalline powder, of a shining, micaceous appearance and a faintly burning taste, but odorless.

Soluble in 179 parts of water, 2.5 of alcohol, 12 parts of ether, and 5 parts of chloroform.

Incompatible with potassium and sodium hydrate and chloroform.

Uses: Analgesic, antipyretic, antiseptic.

Average Dose: 0.25 Gm. (4 grains).

Acetphenetidinum. Phenacetine.

Produced by the acetylization of para-amido phenetol.

White glistening scales, odorless and tasteless. Soluble in 925 parts of water, 12 parts of alcohol, 63 parts of ether, and 20 parts of chloroform.

Uses: Same as acetanilide.

Average Dose: 0.500 Gm. (7½ grains).

Acidum Benzoicum. (See organic acids).

Acidum Salicylicum. (See organic acids).

Antipyrina. Antipyrine.

Phenyldimethylpyrazolon obtained by the condensation of phenylhydrazine with aceto-acetic ether, and menthylation of the product.

A colorless, almost odorless and slightly crystalline powder.

Freely soluble in water and alcohol. Incompatible with many chemicals.

Uses: Analgesic, antipyretic.

Average Dose: 0.25 Gm. (4 grains).

Benzosulphinidum. Saccharin.

The anhydride of ortho-sulphamide-benzoic acid.

A sweet, white, crystalline powder; nearly odorless.

Soluble in 250 parts of water and in 25 parts of

alcohol. Solution in water is facilitated by combining with sodium bicarbonate.

Uses: As a substitute for sugar as a sweetening agent.

Betanaphthol. (Naphtol, U. S. P., 1890.)

A phenol occurring in coal tar but generally prepared artificially from naphthalene.

Colorless or pale buff, shining crystals or scales, or yellowish-white crystalline powder; soluble in 950 parts of water; readily soluble in alcohol, ether, chloroform and alkali hydroxides. Has a faint phenol-like odor and sharp pungent taste.

Uses: Antiseptic.

Average Dose: 0.25 Gm. (4 grains).

Cresol. (C_7H_7OH).

A mixture of the three isomeric cresols obtained from coal tar, freed from phenol, hydrocarbons and water.

Cresol is a constituent of crude carbolic acid, from which it is separated by fractional distillation.

A valuable disinfectant and deodorizer for which purpose it is preferable to phenol; it is more certain than phenol without its poisonous properties.

Cresol is usually employed in combination with alkalies and fats, as in liquor cresolis comp. U. S. P.,

Methylis Salicylas. Methyl Salicylate. Synthetic Oil of Wintergreen.

Made by heating salicylic acid, methyl alcohol and sulphuric acid together.

It is found naturally in many plants, but particularly in the oils of wintergreen and birch.

Methyl salicylate is identical, in medicinal properties, with the oils of wintergreen and betula (birch).

Methylthioninae Hydrochloridum. Methylene Blue.

Produced by the action of hydrogen sulphide upon an oxidation product of para-amido-dimethylaniline.

A dark green crystalline powder or prismatic crystals, readily soluble in water and in alcohol.

Uses: Antiseptic, anodyne, antiperiodic.

Average Dose: 0.250 Gm. (4 grains).

Naphthalenum. Naphthalene (Coal Tar Camphor).

A direct product of the fractional distillation of coal tar.

Colorless, transparent laminae, a strong tar odor and a burning taste. Insoluble in water but soluble in 13 parts of alcohol and freely soluble in ether and chloroform.

Uses: Antiseptic, antifermentive, disinfectant, deodorant; externally in ointments.

Average Dose: 0.125 Gm. (2 grains).

Phenol. (Acidum Carbolicum, U. S. P., 1890.) C_6H_5OH.

This substance is a hydroxybenzene and can be obtained either from coal tar by fractional distillation of the heavy oil, or prepared synthetically.

The Pharmacopoeia directs that it be assayed and should contain not less than 96 per cent. of absolute phenol. It should be kept well stoppered in amber bottles.

Colorless crystals, or sometimes having a pink tint; interlaced or separate and needle-shaped, very hydroscopic and hence soon becoming semi-liquid on exposure.

The addition of about 8 per cent. water effects a permanent solution, which has a faint acid reaction, coagulating albumin and collodion.

The crystals are soluble in 19.6 parts of water, freely in alcohol, ether, benzene, carbon disulphide, glycerin, fats and oils. Phenol readily fuses and is inflammable, and explosive in contact with flame.

Uses: Antiseptic, disinfectant and deodorant. Preparations: Phenol liquefactum.

Average Dose: 0.065 Gm. (1 grain).

Phenol Liquefactum. Liuquefied Phenol.

The Pharmacopoeia directs that the phenol be first liquified by placing the unstoppered container in a water bath and applying a gentle heat until melted, and subsequent addition of one part of water to each nine parts by weight of phenol.

It is a colorless liquid often developing a pinkish tinge upon keeping and with the same general characteristics as phenol.

It contains by weight 86.4 per cent. of absolute phenol, or 90 per cent. of official phenol; 10 parts by weight represent 9 parts phenol, U. S. P. It is a convenient form of phenol for general use.

Uses: Similar to phenol. Preparations: Glyceritum phenolis, U. S. P., 20 per cent., unguentum phenolis, U. S. P., 3 per cent.

Average Dose: 0.05 Cc. (1 minim).

Phenylis Salicylas. Phenyl Salicylate. (Salol, U. S. P., 1890.)

The salicylic ester of phenyl, $C_6H_4(OH)COOC_6H_5$ 1:2., obtained by heating salicylic acid with phenol in the presence of phosphorus pentachloride.

It is a white crystalline powder, soluble in 2333 parts of water, 5 of alcohol and very soluble in ether, chloroform, fixed and volatile oils.

Incompatible with camphor, phenol chloral, naphthalene, thymol and ferric chloride.

Uses: Analgesic, antirheumatic, antiseptic, internally and externally.

Average Dose: 0.5 Gm. (7½ grains).

Resorcinol. Resorcin.

A diatomic phenol usually obtained by the reaction of fused sodium hydroxide upon sodium metabenzenedisulphonate. Should be kept in dark bottles.

Colorless, needle-shaped crystals, freely soluble in water, alcohol, glycerin and ether.

Uses: Antiseptic, antipyretic, antizymotic. Used principally for external applications.

Average Dose: 0.125 Gm. (2 grains).

Sodii Salicylas. (See Sodium Salts).

Sodii Phenolsulphonas. Sodium Phenolsulphonate. (Sodium Sulphocarbolate).

Obtained by the action of sulphuric acid upon phenol. Phenol sulphonic acid is formed which is converted into paraphenolsulphonic acid, this, in turn, is converted into barium paraphenolsulphonate by the addition of barium carbonate to the solution. Finally the solution is decomposed by sodium carbonate and sodium phenolsulphonate if formed.

Colorless, transparent prisms, without odor. Slightly efflorescent and should be kept in well-stoppered bottles.

Soluble in 4.8 parts of water and 130 parts of alcohol.

Uses: Antiseptic, antizymotic, disinfectant.

Average Dose: 0.25 Gm. (4 grains).

Thymol. (See volatile oils).

Thymol Iodide. (See volatile oils).

Zinci Phenolsulphonas. (See Zinc Salts).

CHAPTER XXVIII.

ALKALOIDS.

Alkaloids are by far the most important class of medicines. While the strength of a tincture or an extract may vary an alkaloid is always the same and the dose can be regulated with the greatest accuracy.

Alkaloids are, chemically, vegetable alkalies. They are nitrogenous vegetable compounds of basic character and unite with acids to form salts from which they are again precipitated by alkalies.

Alkaloids represent the active principles of vegetable drugs (but all so-called active principles are not alkaloids) and are now largely prescribed in place of the old-time decoctions and infusions and the more recent tinctures and fluidextracts. Potent tinctures are now standardized by the Pharmacopoeia but, as made by druggists and physicians who do not have either the facilities or time to standardize a small quantity, they are very liable to be above or below the standard.

Since the introduction of compressed tablets the use of alkaloids has been greatly increased. They form a ready means for the exhibition of the alkaloids in an absolutely exact quantity.

All alkaloids contain nitrogen and carbon while in nearly all may be found hydrogen and oxygen. They are found in nearly all plants and all parts of plants; **root, bark, stem, leaf, flower** and seed.

Alkaloids are mostly colorless crystals, almost insoluble in water but freely soluble in alcohol, while the salts (sulphate, muriate, etc.) are usually soluble in water and much less soluble in alcohol.

Pure alkaloids are seldom prescribed because of their insolubility. Morphine, for instance, is soluble only 1 part in 3,330 parts of water, while the sulphate is soluble 1 part in 15 parts of water.

The alkaloids have, as a rule, an exceedingly bitter taste which is greatly developed in the salts because of their great solubility. The so-called "tasteless" quinine is simply the pure alkaloid held in suspension.

* * * *

OFFICIAL ALKALOIDS AND SALTS.

Aconitina. Aconitine.

An alkaloid obtained from aconite root.

The official alkaloid is in the form of small crystals. Amorphous aconitine is frequently used.

It is important to remember that the amorphous aconitine is not official and is only about 5 per cent. as strong as the official akaloid.

Aconitine is soluble in 3200 parts water and 22 parts alcohol.

Uses: Same as aconite; externally in ointments.

Average dose: 0.15 milligramme (1-400 grain).

Apomorphinae Hydrochloridum. Apomorphine Hydrochloride.

The hydrochloride of an artificial alkaloid obtained from morphine or codeine.

Soluble in 39.5 parts water, 38.2 parts alcohol.

Uses: **Expectorant, emetic.**

Average dose: .005 Gm. (1-10 grain); for emetic, .002 Gm. (1-30 grain) expectorant.

Atropina. Atropine.

An alkaloid obtained from atropa belladonna and from other plants of the same family.

Atropine is usually accompanied by a small amount of hyoscyamine.

Soluble in 450 parts of water and 1.46 parts of alcohol.

Uses: Anodyne, mydratic, narcotic. Principally employed for the preparation of the sulphate, also in oleate of atropine.

Average dose: .0004 Gm. (1-160 grain).

Atropinae Sulphas. Atropine Sulphate.

The sulphate of an alkaloid obtained from atropa belladonna and from other plants of the same family.

Obtained by dissolving atropine in a solution of sulphuric acid. A neutral solution must be obtained.

Contains a small amount of hyoscyamine sulphate.

Soluble in 0.38 parts of water and 3.7 parts of alcohol.

Uses: Anodyne, mydriatic, narcotic.

Average dose: .0004 Gm. (1-160 grain).

Caffeina. Caffeine.

A feebly basic substance obtained from tea and coffee.

Soluble in 45.6 parts of water and 53.2 parts of alcohol.

Uses: Cardiac stimulant, diuretic.

Average dose: 0.065 Gm. (1 grain).

Caffeina Citrata. Citrated Caffeine.

A mixture (not a chemical combination) of caffeine and citric acid, equal parts.

Uses: Same as caffeine.

Average dose: 0.125 Gm. (2 grains).

Cinchonidinae Sulphas. Cinchonidine Sulphate.

The neutral sulphate of an alkaloid obtained from cinchona bark.

Cinchonidine is a by-product obtained in the manufacture of quinine and did not come into general use until about 1875, then for a few years it was extensively used as a substitute for quinine. Since the price of quinine has declined the demand for cinchonidine has been greatly curtailed.

Soluble in 63 parts of water and 72 parts of alcohol. Freely soluble in water acidulated with sulphuric acid.

Uses: Antiperiodic, febrifuge.

Average dose: 0.250 Gm. (4 grains).

Cinchoninae Sulphas. Cinchonine Sulphate.

The neutral sulphate of an alkaloid obtained from cinchona.

Obtained by dissolving the alkaloid cinchonine in diluted sulphuric acid and crystallizing.

Soluble in 58 parts of water and 10 parts of alcohol.

Uses: Antiperiodic, febrifuge.

Average dose: 0.250 Gm. (4 grains).

Cocaina. Cocaine.

An alkaloid obtained from several varieties of coca leaves.

Soluble in 600 parts of water and 5 parts of alcohol.

Uses: Principally for the preparation of the hydrochloride which see. Also in oleate of cocaine.

Average dose: 0.030 Gm. (½ grain).

Cocainae Hydrochloridum. Cocaine Hydrochloride.

A neutral hydrochloride obtained by dissolving cocaine in an alcoholic solution of hydrochloric acid.

Uses. Anaesthetic, anodyne, mydriatic, sedative.
Average dose: 0.030 Gm. (½ grain).

Codeina. Codeine.

An alkaloid obtained from opium, which contains from 0.1 to 2 per cent. of codeine or it may be prepared from morphine by menthylation.

Soluble in 88 parts water, 1.6 parts alcohol.

Uses: Analgesic, hypnotic, sedative.

Average dose: 0.030 Gm. (½ grain).

Codeinae Phosphas. Codeine Phosphate.

Contains 70 per cent. of codeine.

Obtained by dissolving codeine in diluted phosphoric acid and precipitating with alcohol.

Soluble in 2.25 parts of water and 261 parts of alcohol.

It will be noted that while codeine is freely soluble in alcohol it requires 88 parts of water to dissolve. On the other hand the phosphate is freely soluble in water and almost insoluble in alcohol.

Uses: Same as codeine. Preferred for solutions on account of being freely soluble in water.

Average dose: 0.030 Gm. (½ grain.)

Codeine Sulphas. Codeine Sulphate.

Contains about 76 per cent. of codeine.

Obtained by dissolving codeine in warm water, neutralizing the solution with diluted sulphuric acid, and recrystallizing.

Soluble in 30 parts water and 1035 parts alcohol.

Uses and dose: Same as codeine.

Colchicina. Colchicine.

An alkaloid obtained from colchicum.

Soluble in 22 parts water. Very soluble in alcohol.

Colchicine is more soluble in water than any other alkaloid.

Uses: Anti-neuralgic, anti-rheumatic.

Average dose: 0.0005 Gm. (1-128 grain).

Homatropinae Hydrobromidum. Homatropine Hydrobromide.

The hydrobromide of an alkaloid obtained by the condensation of tropine and mandelic acid.

Soluble in 5.7 parts of water and 32.5 parts of alcohol.

Uses: Mydratic; usually in one per cent. solutions.

Average dose: 0.0005 Gm. (1-128 grain).

Hydrastina. Hydrastine.

An alkaloid obtained from hydrastis.

Should not be confused with a resinoid sold under the name "hydrastin."

Soluble in 135 parts alcohol; insoluble in water .

Uses: Alterative, tonic, sedative.

Average dose: 0.010 Gm. (1-5 grain).

Hydrastininae Hydrochloridum. Hydrastinine Hydrochloride.

The hydrochloride of an artificial alkaloid derived from hydrastine.

Freely soluble in both water and alcohol.

Uses: Uterine hemostatic.

Average dose: 0.030 Gm. (½ grain.)

Hyoscinae Hydrobromidum. Hyoscine Hydrobromide.

The hydrobromide of an alkaloid, chemically identical with scopolamine, obtained from hyoscyamus and other plants of the solanaceae.

Obtained by dissolving the alkaloid in a slight excess of diluted hydrobromic acid and recrystallizing.

Soluble in 1.5 parts of water and 16 parts of alcohol.

Uses: Hypnotic, sedative.

Average dose: 0.0005 Gm. (1-128 grain.)

Hyoscyaminae Hydrobromidum. Hyoscyamine Hydrobromide.

The hydrobromide of an alkaloid obtained from hyoscyamus.

Obtained by dissolving the alkaloid in diluted hydrobromic acid and again crystallizing.

Freely soluble in water and in 2 parts of alcohol.

Uses: Antispasmodic, hypnotic, sedative.

Average dose: 0.0005 Gm. (1-128 grain.)

Hyoscyaminae Sulphas. Hyoscyamine Sulphate.

The neutral sulphate of an alkaloid obtained from hyoscyamus.

Obtained by dissolving hyoscyamine in diluted sulphuric acid, concentrating the solution, and again crystalizing.

Freely soluble in water, soluble in 6.4 parts alcohol.

Uses and dose: Same as hydrobromide.

Morphina. Morphine.

An alkaloid obtained from opium in which it exists to the extent of 9 to 15 per cent.

Soluble in 3300 parts of water and 168 parts of alcohol.

Uses: To make oleate of morphine and for the preparation of the salts.

Morphinae Acetas. Morphine Acetate.

The acetate of the alkaloid, obtained by dissolving the alkaloid in diluted acetic acid and evaporating the solution to dryness.

Soluble in 2.25 parts of water and 21.6 parts of alcohol.

Uses: Analgesic, anodyne, hypnotic, sedative.

Average dose: 0.015 Gm. (¼ grain.)

Morphinae Hydrochloridum. Morphine hydrochloride.

The hydrochloride of the alkaloid, obtained by dissolving the alkaloid in diluted hydrochloric acid, evaporating the solution and crystallizing.

Soluble in 17.2 parts of water and 42 parts of alcohol.

Uses and dose, same as acetate.

Morphinae Sulphas. Morphine Sulphate.

The sulphate of the alkaloid, obtained by dissolving the alkaloid in diluted sulphuric acid and again crystallizing.

Uses and dose: Same as acetate.

Physostigminae Salicylas. Physostigmine Salicylate. (Eserine Salicylate).

The salicylate of an alkaloid obtained from physistigma (calabar bean.)

Soluble in 72.5 parts water and 12.7 parts alcohol.

Uses: Myotic, peristaltic, spinal depressant.

Average dose: 0.001 Gm. (1-64 grain).

Physostigminae Sulphas. Physostigmine Sulphate. (Eserine Sulphate.)

The sulphate of an alkaloid obtained from physistigma.

Freely soluble in both water and alcohol.

Uses and dose: Same as salicylate.

Pilocarpinae Hydrochloridum. Pilocarpine Hydrochloride.

The hydrochloride of an alkaloid obtained from pilocarpine (jaborandi.)

Soluble in 0.3 parts of water and in 2.3 parts of alcohol.

Uses: Diaphoretic, diuretic, myotic, sialagogue.

Average dose: 0.010 Gm. (1-5 grain.)

Pilocarpinae Nitras. Pilocarpine Nitrate.

The nitrate of an alkaloid obtained from pilocarpus.

Soluble in 4 parts of water and in 60 parts of alcohol.

Differs from the hydrochloride in being permanent in the air and in not becoming black when mixed with calomel.

Uses and dose: Same as hydrochloride.

Quinina. Quinine.

An alkaloid obtained from cinchona bark.

Soluble in 1750 parts of water and in 0.6 parts of alcohol (distinction from cinchonine and cinchonidine which are but slightly soluble in alcohol.)

Uses: Chiefly in making the salts, also in the following official preparations; oleate of quinine, compound syrup of hypophosphites, glycerite of the phosphates of iron, quinine and strychnine, and elixir of iron quinine and strychnine phosphates.

Quininae Bisulphas. Quinine Bisulphate.

The acid sulphate of the alkaloid quinine, obtained by dissolving the sulphate in diluted sulphuric acid and crystallizing.

Contains 23 per cent. of water of crystallization.

Soluble in 8.5 parts of water and 18 parts of alcohol.

Uses and dose: Same as the sulphate.

Quininae Hydrobromidum. Quinine Hydrobromide.

The hydrobromide of the alkaloid quinine, obtained by dissolving the alkaloid in diluted hydrobromic acid and crystallizing.

Soluble in 40 parts of water and 0.67 parts of alcohol.

Uses and dose: Same as the sulphate, with the sedative effect of the bromides.

Quininae Hydrochloridum. Quinine Hydrochloride.

The hydrochloride of the alkaloid quinine, obtained by dissolving the alkaloid in diluted hydrochloric acid and crystallizing.

Soluble in 18 parts water and 0.6 parts alcohol.

Uses and dose: Same as the sulphate.

Quininae Salicylas. Quinine Salicylate.

The salicylate of the alkaloid quinine, obtained by neutralizing and alcoholic solution of quinine with salicylic acid and crystallizing.

Contains but 2 per cent. of water of crystallization.

Soluble in 77 parts of water and 11 parts of alcohol.

Uses: Rheumatism and neuralgia.

Average dose: 0.250 Gm. (4 grains).

Quininae Sulphas. Quinine Sulphate.

The sulphate of the alkaloid quinine. May be obtained by dissolving the alkaloid in diluted sulphuric acid and again crystallizing.

Contains about 16 per cent. of water of crystallizaiton.

Soluble in 720 parts of water and 86 parts of alcohol.

Uses: Antiperiodic, antipyretic, antiseptic, tonic.

Average dose: 0.250 Gm. (4 grains).

Scopolaminae Hydrobromidum. Scopolamine Hydrobromide.

Identical with hyoscine hydrobromide.

Sparteinae Sulphas. Sparteine Sulphate.

The sulphate of an alkaloid obtained from scoparius (turkey corn).

The alkaloid sparteine (not official) is a liquid obtained by extraction from scoparius with acidulated water. The sulphate is formed by the action of diluted sulphuric acid upon the alkaloid from which the crystals are obtained.

Soluble in 1.1 parts of water and in 2.4 parts of alcohol.

Uses: Cardiac stimulant and diuretic.

Average dose: 0.010 Gm. (1-5 grain).

Strychnina. Strychnine.

An alkaloid obtained from nux vomica and other plants of the order Loganiacae, in which it exists as high as 1.8 per cent.

Obtained in both crystals and powder.

Soluble in 110 parts of alcohol, almost insoluble in water (1 in 6400 parts).

Uses: Principally for the preparation of the salts. Officially in compound laxative pill.

Strychninae Nitras. Strychnine Nitrate

The nitrate of the alkaloid strychnine, obtained by dissolving strychnine in diluted nitric acid, concentrating and crystallizing.

Contains about 84 per cent. of strychnine.

Soluble in 42 parts of water and 120 parts of alcohol.

Uses: Principally in dipsomania.

Average dose: 0.001 Gm. (1-64 grain).

Strychninae Sulphas. Strychnine Sulphate.

The sulphate of the alkaloid strychnine, obtained by dissolving the alkaloid in diluted sulphuric acid, concentrating and crystallizing.

Contains 78 per cent. of strychnine.

Soluble in 31 parts of water and 65 parts of alcohol.

Uses: Cardiac stimulant, nerve tonic, stomachic

Official preparations: Elixir of iron quinine and strychnine phosphates, compound syrup of hypophosphites.

Average dose: 0.001 Gm. (1-64 grain).

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ACTIVE PRINCIPLES.

In addition to the alkaloids of the Pharmacopoeia there are a great many other alkaloids together with active principles "resinoids," "glucosides" and "concentrations" that are somewhat misunderstood and lead to dangerous mistakes because of the same name being applied to different products as, for instance, **Gelsemin** the resinoid and **Gelsemine** the alkaloid. As the dose of Gelsemin the resinoid is given as high as 2 grains, while the maximum dose of Gelsemine the alkaloid is one-sixteenth grain, there is no small amount of danger in prescribing these drugs.

Alkaloids, as already stated, are vegetable alkalies; true chemical combinations of basic character which unite with acids to form salts.

Active Principles are understood to include alkaloids and all other forms of active constituents of vegetable drugs, including resinoids and concentrations, which should not be considered true active principles.

Concentrations. Another name for proximate medicinal principles which may be in concentrated powdered form or isolated in the form of a resin.

Glucosides or neutral principles are agents obtained from vegetable drugs that produce glucose ($C_6H_{12}O_6$) when decomposed by diluted acids or ferments. Though glucosides may be active principles of the plants they represent, they are usually associated with resins, oils, alkaloids and bitter principles.

Resinoids are also miscalled active principles. Resinoids are resins obtained by pouring a concentrated alcoholic solution into water, the resin being immediately precipitated, filtered out and dried.

In the following table we give the prominent active principles. There are a vast number not given here because they are little used and it is desired to make the list as brief as possible in order to give greater prominence to the ones in active use:

Name	Nature	Source
Aletrin	Resinoid	Unicorn Root
Apocynin	Resinoid	Bitter Root
Arbutin	Glucoside	Uva Ursi
Asclepidin	Resinoid	Pleurisy Root
Avenin	Resinoid	Oats
Baptisin	Resinoid	Wild Indigo
Barosmin	Resinoid	Buchu
Berberin	Resinoid	Hydrastis
Cascarin	Glucoside	Casc. Sagrada
Caulophyllin	Resinoid	Blue Cohosh
Chimaphilin	Resinoid	Pipsissewa
Cimicifugin	Resinoid	Black Cohosh
Colocynthin	Glucoside	Colocynth

Convallamarin	Glucoside	Lily of Valley
Convallarin	Glucoside	Lily of Valley
Convolvulin	Glucoside	Jalap
Cornin	Resinoid	Dogwood
Corydalin	Resinoid	Turkey Corn
Cypripedin	Resinoid	Ladies-Slipper
Digitalin	Glucoside	Digitalis
Dioscorein	Resinoid	Wild Yam
Euonymin	Resinoid	Wahoo
Eupatorin	Resinoid	Motherwort
Gelsemin	Resinoid	Yel. Jasmine
Glycyrrhizin	Glucoside	Licorice
Hamamelin	Resinoid	Witch Hazel
Helonin	Resinoid	Unicorn
Hydrastin	Resinoid	Golden Seal
Irisin	Resinoid	Blue Flag
Jalapin	Glucoside	Jalap
Juglandin	Resinoid	Butternut
Leptandrin	Resinoid	Culvers Root
Lupulin	Resinoid	Hops
Macrotin	(See Cimicifugin)	
Phytolaccin	Resinoid	Poke Root
Podophyllin	Resinoid	Mandrake
Sanguinarin	Resinoid	Blood Root
Salicin	Glucoside	Willow
Santonin	Glucoside	Wormseed
Scutillarin	Resinoid	Scullcap
Senecin	Resinoid	Life Root
Viburnin	Resinoid	Cramp Bark
Xanthoxyllin	Resinoid	Prickley Ash

It should be understood that some of the above principles are classified by some authors as alkaloids, while others are not recognized as active principles.

GLUCOSIDES OR NEUTRAL PRINCIPLES.

Glucosides are organic compounds, neutral in reaction, which may be split into glucose and another product through the action of an acid or a ferment.

The following neutral principles are official. Of these salicin and strophanthin are true glucosides:

ALOINUM. Aloin.

A neutral principle obtained from aloes, chiefly Curacao aloes.

The amount of aloin obtained from aloin varies between 5 per cent. and 25 per cent.

A fine, light yellow, crystalline powder, soluble in 65 parts of water and 10.75 parts of alcohol.

Uses: Same as aloes with a lesser tendency to gripe. A constituent of the official compound laxative pill.

Average dose: 0.065 Gm. (1 grain).

CHRYSAROBINUM. Chrysarobin.

(Miscalled Chrysophanic Acid).

A neutral principle obtained from goa powder.

Orange yellow crystalline powder soluble in 4812 parts of water, 308 parts of alcohol, 18 parts of chloroform.

Uses: Alterative, antiparasitic. A constituent of chrysarobin ointment.

Average dose: 0.03 Gm. (½ grain).

ELATERINUM. Elaterin.

A neutral principle obtained from elaterium which yields about 25 per cent. of elaterin.

Elatein is in small scales or crystals insoluble in

water, soluble in 262 parts of alcohol and 22 parts of chloroform.

Uses: Purgative, diuretic. Official preparation: Trituration of elaterin.

Average dose: 0.005 Gm. (1-10 grain).

GLYCYRRHIZINUM AMMONIATUM.

Ammoniated Glycyrrhizin.

Glycyrrhizin is the sweet principle of licorice root. It is obtained by percolating licorice root with weak ammonia water; glycyrrhizin is precipitated with sulphuric acid; the precipitate is then redissolved in ammonia water and the solution spread upon glass and dried.

It is obtained in dark brown, odorless, scales, having a very sweet taste. Readily soluble in water and alcohol.

Uses: As a flavor, particularly to disguise the taste of quinine.

SALICINUM. Salicin.

A glucoside obtained from several species of salix, (willow) and populus (poplar), by maceration with milk of lime.

Fine needles, crystals or powder. Soluble in 27 parts of water and 71 parts of alcohol.

Uses: Antirheumatic, antiperiodic, tonic.

Average dose: 1 Gm. (15 grains.)

SANTONINUM . Santonin.

The active principle of santonica (wormseed); chemically the anhydride of santonic acid. Colorless,

shining prisms; almost insoluble in water but soluble in 34 parts of alcohol and 2.5 parts of chloroform.

Uses: Anthelmintic.

Avearge dose: 0.065 Gm. (1 grain).

STROPHANTHINUM. Strophanthin.

A glucoside obtained from strophanthus. White or yellowish crystalline powder with an intensely bitter taste.

Very soluble in water and diluted alcohol.

Uses: Cardiac tonic.

Average dose: 0.0003 Gm. (1-200 grain).

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CHAPTER XXIX

VOLATILE OILS.

Volatile oils, so named because they vaporize, are also called essential oils because, when dissolved in alcohol, they form "essences" or spirits constitute a very important class of products. Many facts in connection with them are little understood or appreciated yet are of almost vital importance as affecting the value of an oil for whatever purpose it may be intended.

Volatile oils are always of vegetable origin.

It is usually to the volatile oil in a plant that the characteristic odor of the plant is due.

Oils may exist in any part of the plant; leaves, bark, root, flower, seeds, fruit, etc. Occasionally different oils are obtained from different parts of the same plant, for example the orange produces three distinct oils, one from the leaf, one from the flower and one from the fruit.

Volatile oils are usually of a lower specific gravity than water.

They are but slightly soluble in cold water, more soluble in hot water (with some separation when cold) but soluble in alcohol, ether, chloroform, and glacial acetic acid, many are soluble in fixed oils.

When pure volatile oils are colorless. When dropped upon paper the stain produced will disappear if the oil is volatile.

Volatile oils are inflammable.

Volatile oils undergo constant change and deteriorate rapidly if not properly preserved. They should always be kept in small, well-stoppered bottles, completely filled, and in a cool place. The oils of lemon and orange will keep better if 5 per cent. of alcohol is added.

Volatile oils may be solid or liquid at ordinary temperature, all are liquid at higher temperatures and all are solids at lower or low temperatures.

Chemically volatile oils are divided into four groups or classes as follows:

Class one. Hydrocarbons or terpenes composed of carbon and hydrogen with the general formula $C_{10}H_{16}$. They are the least soluble in alcohol and water and all have a lower specific gravity than water; oil of turpentine is an example.

Class two. Contain oxygen in addition to carbon and hydrogen, hence are distinguished as oxygenated oils. Are more soluble than class one. This group contains the majority of the aromatic oils including anise, gaultheria, lemon and sassafras.

Class three. A small group containing sulphur

and designated as sulphurated oils. But one is official (volatile oil of mustard.)

Class four. Another small class containing nitrogen and called nitrogenated oils which includes the volatile oil of almond.

Class five. Includes the oil of cade and oil of tar. These are classed as empyreumatic oils.

Volatile oils are obtained from plants in four ways.

1st. By distillation with water.

2nd. By distillation without water.

3rd. By expression.

4th. By solution.

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OFFICIAL VOLATILE OILS.

Oleum Amygdalae Amarae. Oil of Bitter Almond.

Obtained from the seeds of bitter almonds or from other seeds containing amygdalin which yield not less than 85 per cent. of benzaldehyde and not less than 2 per cent., nor more than 4 per cent. hydrocyanic acid.

Soluble in 300 parts of water and equal parts of 70 per cent. alcohol.

The U. S. P. benzaldehyde (called synthetic or artificial oil of almond) is frequently supplied and as it contains no hydrocyanic acid, is generally preferred to the true oil for flavoring purposes. Nitrobenzene, also known as artificial oil of mirbane, strongly resembles, in odor, the volatile oil of bitter almond and is used, but to a lesser extent than formerly.

The official preparations are aqua amygdalae amarae, spiritus amygdalae amarae and syrupus amygdalae.

Uses: Sedative.

Average Dose: 0.03 Cc. (½ minim).

Oleum Anisi. Oil of Anise.

Obtained from anise seed or the fruit of star anise.

Soluble in an equal volume of alcohol and in 5 volumes of 90 per cent. alcohol.

Official preparations: Anise water and spirit of anise; it is also a constituent of compound spirit of orange, compound syrup of sarsaparilla, camphorated tincture of opium and troches of licorice and opium.

Uses: Principally for flavoring.

Oleum Aurantii Corticis. Oil of Orange Peel.

Obtained by expression from the fresh peel of sweet oranges.

The Pharmacopoeia directs that it should be kept in small, well-stoppered, amber-colored bottles, in a cool place, to avoid, as far as possible, the development of a terebinthinate odor; oils that have developed such an odor should not be used.

Is soluble in alcohol and is best preserved by the addition of alcohol.

Official preparation: Compound spirit of orange.

Uses: As flavor.

Oleum Betulae. Oil of Betula. (Oil of Sweet Birch.)

Has essentially the same properties as oil of wintergreen and is usually supplied upon orders for oil of wintergreen.

Consists chiefly of methyl salicylate.

Uses: Same as oil of wintergreen.

Oleum Cadinum. Oil of Cade.

Obtained by the dry distillation of the wood of juniperus oxycedrus, a species of cedar found in Southern France.

Oleum Cajuputi. Oil of Cajuput.

A thin, colorless or greenish colored volatile oil distilled from the fresh leaves and twigs of the melaleuca leucadendron, a tree growing in the East Indies.

The Pharmacopoeia requires that the oil, when assayed, should yield not less than 55 per cent., by volume, of cineol (eucalyptol).

Miscible with alcohol in all proportions and soluble in 1 part 80 per cent. alcohol.

It should be preserved in well-stoppered (amber) bottles in a cool place.

Uses: Alterative, antispasmodic, stimulant. Used chiefly in liniments.

Average Dose: 0.5 Cc. (8 minims).

Oleum Cari. Oil of Caraway.

A thin, colorless or pale yellow oil. Obtained from caraway seeds by distillation with steam.

Soluble in an equal volume of alcohol and in from 3 to 10 volumes of 80 per cent. alcohol.

The only official preparation in which it is used is the compound spirit of juniper.

Average Dose: 0.2 Cc. (3 minims).

Oleum Caryophylli. Oil of Cloves.

A volatile oil distilled from cloves.

Its principal constituent is eugenol, a phenol-like compound of which the Pharmacopoeia directs it shall contain not less than 80 per cent. by volume. The oil is light when fresh but darkens with age.

Soluble in an equal volume of alcohol, the solution being slightly acid, also soluble in about two volumes of 70 per cent. alcohol. The oil should be preserved as directed for other oils.

Uses: Antiseptic, antitubercular, carminative; as

an aromatic and pungent flavor in combination with other oils; in liniments and especially in toothache.

Average Dose: 0.2 Cc. (3 minims).

Oleum Chenopodii. Oil of Chenopodium. (Oil of Wormseed.)

A thin, colorless volatile oil distilled from chenopodium anthelminticum.

Soluble in 5 volumes of 70 per cent. alcohol.

Uses: Anthelmintic, vermifuge.

Average Dose: 0.2 Cc. (3 minims).

Oleum Cinnamomi. Oil of Cinnamon. Oil of Cassia.

A yellowish or brownish volatile oil distilled from cassia cinnamon. The Pharmacopoeia directs that it should contain not less than 75 per cent. cinnamic aldehyde. It has the characteristic odor and taste of cinnamon. Becomes darker and thicker by age and exposure to air and should be carefully preserved in small, colored bottles, well stoppered and in a cool place.

The Chinese oil (usually called oil of cassia) is recognized as official though it does not have the fine flavor of the Ceylon oil.

Oleum Copaibae. Oil of Copaiba.

A volatile oil distilled from copaiba.

A constituent of the oleoresin copaiba and used for the same purposes. Soluble in two volumes of alcohol.

Uses: Same as Copaiba.

Average Dose: 0.5 Cc. (8 minims).

Oleum Coriandri. Oil of Coriander.

A volatile oil distilled from coriander seed.

Soluble in 3 volumes of 70 per cent. alcohol and in all proportions of 80 per cent. alcohol. Used officially

in confection of senna, compound spirit of orange and syrup of senna.

Uses: Aromatic.

Average Dose: 0.2 Cc. (3 minims).

Oleum Cubebae. Oil of Cubeb.

A volatile oil distilled from cubeb.

Soluble in 70 per cent. alcohol.

Uses: Aromatic, stimulant, carminative.

Average Dose: 0.5 Cc. (8 minims).

Oleum Erigerontis. Oil of Erigeron. (Oil of Fleabane).

A volatile oil distilled from the fresh flowering herb of erigeron canadensis.

Soluble in an equal volume of alcohol (distinction from oil of fireweed and oil of turpentine, with which it is adulterated.)

Uses: In uterine hemorrhages, as a haemostatic.

Average Dose: 1 Cc. (15 minims) in capsules.

Oleum Eucalypti. Oil of Eucalyptus.

A volatile oil distilled from the fresh leaves of eucalyptus yielding not less than 50 per cent. eucalyptol.

Soluble in all proportions of alcohol; also in 3 volumes 70 per cent. alcohol.

The value of the oil of eucalyptus depends upon the amount of eucalyptol it contains.

Uses: Antiperiodic, antiseptic, stimulant.

Average Dose: 0.5 Cc. (8 minims) in capsule.

Oleum Foeniculi. Oil of Fennel.

A volatile oil distilled from fennel. Congeals below 41° F (15° C).

If congealed should be warmed until liquefied and then well shaken before it is dispensed.

Soluble in an equal volume of alcohol and in 10 volumes or less of 80 per cent. alcohol.

Official preparations: Fennel water, spirit of fennel, also in compound licorice powder and compound spirit of juniper.

Average Dose: 0.2 Cc. (3 minims).

Oleum Gaultheriae. Oil of Gaultheria. (Oil of Wintergreen).

A volatile oil distilled from the leaves of gaultheria procumbens.

Contains about 99 per cent. methyl salicylate.

Soluble in 5 volumes 70 per cent. alcohol.

Uses: Antiseptic, antirheumatic; locally as anodyne. Official preparation: Spirit gaultheria.

Average Dose: 1 Cc. (15 minims).

Oleum Hedeomae. Oil of Hedeoma. (Oil of Pennyroyal.)

A volatile oil distilled from the leaves and flowering tops of hedeoma.

Soluble in 2 volumes 70 per cent. alcohol (test for oil of turpentine with which it is frequently adulterated.)

Uses: Emmenagogue. Locally in liniments.

Average Dose: 0.2 Cc. (3 minims).

Oleum Juniperi. Oil of Juniper (Oil of Juniper Berries.)

A volatile oil distilled from the fruit of juniperis communis.

Soluble in 10 volumes 90 per cent. alcohol.

Uses: Diuretic, stimulant. Official preparations: Spirit of juniper, compound spirit of juniper.

Average Dose: 0.2 Cc. (3 minims).

Oleum Lavandulae Florum. Oil of Lavender Flowers.

A volatile oil distilled from the fresh flowering tops of lavendula officinalis.

Soluble in 3 parts 70 per cent. alcohol.

A constituent of aromatic spirit of ammonia, diachylon ointment, liniment of soft soap, also spirit of lavender and compound tincture of lavender.

Average Dose: 0.2 Cc. (3 minims).

Oleum Limonis. Oil of Lemon.

A volatile oil obtained by expression from fresh lemon peel.

Should yield not less than 4 per cent. aldehyde (citral).

Soluble in 3 parts alcohol.

Used in aromatic spirit of ammonia and compound spirit of orange, exclusively for its flavor.

Oleum Menthae Piperitae. Oil of Peppermint.

A volatile oil distilled from the fresh or partly dried leaves and flowering tops of peppermint.

Should yield not less than 8 per cent. of ester (menthyl acetate) and not less than 50 per cent. of total menthol.

Most of the menthol used is obtained from Japanese peppermint which contains as high as 79 per cent. menthol.

Soluble in an equal volume of alcohol and in 4 volumes of 70 per cent. alcohol.

Official preparations: Peppermint water; spirit of peppermint; it is also a constituent of antiseptic solution, cataplasm of kaolin, vegetable cathartic pills, and compound pills of rhubarb.

Uses: Antiseptic, anodyne, carminative.

Average Dose: 0.2 Cc. (3 minims).

Oleum Menthae Viridis. Oil of Spearmint.

A volatile oil distilled from the fresh or partly dried leaves and flowering tops.

Soluble in an equal volume of 80 per cent. alcohol.

Uses: Stimulant, carminative; externally in liniments.

Average Dose: 0.2 Cc. (3 minims).

Oleum Myristicae. Oil of Myristica. (Oil of Nutmeg).

A volatile oil distilled from myristica.

A constituent of aromatic spirit of ammonia.

Average Dose: 0.2 Cc. (3 minims).

Oleum Picis Liquidae. Oil of Tar.

A volatile oil distilled from tar.

Readily soluble in alcohol.

Average Dose: 0.2 Cc. (3 minims).

Oleum Pimentae. Oil of Pimenta. (Oil of Allspice.)

A volatile oil distilled from pimenta. Similar to oil of cloves. Should contain not less than 65 per cent. by volume of eugenol.

Miscible in all proportions with 90 per cent. alcohol; soluble in 2 volumes 70 per cent. alcohol.

Average Dose: 0.2 Cc. (3 minims).

Oleum Rosae. Oil of Rose.

A volatile oil distilled from the fresh flowers of rosa damascena.

Oleum Rosmarini. Oil of Rosemary.

A volatile oil distilled from the fresh flowering tops of rosmarinus officinalis.

Should contain not less than 15 per cent. total borneol.

Soluble in about ½ volume or more of 90 per cent. alcohol and in 2 to 10 volumes 80 per cent. alcohol.

Used in soap liniment and compound tincture of lavender.

Oleum Sabinae. Oil of Savin.

A volatile oil distilled from the fresh tops of savin. Soluble in one-half its volume of 90 per cent. alcohol.

This oil is grossly adulterated, the chief adulterant being oil of turpentine.

Uses: Uterine stimulant; in amenorrhoea, dysmenorrhoea, leucorrhoea.

Average Dose: 0.05 Cc. (1 minim).

Oleum Santali. Oil of Santal. (Oil of Sandalwood.)

A volatile oil distilled from the wood of santalum album.

Should contain not less than 90 per cent. alcohols (santalol.)

Largely adulterated with oil of cedar wood, oil of turpentine and other adulterants.

Soluble in alcohol and in 5 volumes of 70 per cent. alcohol.

Uses: Genito-urinary diseases.

Average Dose: 0.5 Cc. (8 minims) in capsules.

Oleum Sassafras. Oil of Sassafras.

A volatile oil distilled from the root, especially the root bark, of sassafras variifolium.

It consists of safrol, 80 per cent. camphor, 7 per cent. and smaller amounts of eugenol, terpenes, and pinene.

Is very largely adulterated. Artificial oil of sassafras is extensively employed; it consists mainly of safrol which is obtained from Japanese oil of camphor.

Soluble in all proportions in 90 per cent. alcohol.

Uses: Principally as flavoring agent. Employed officially in compound syrup of sarsaparilla and troches of cubeb.

Oleum Sinapis Volatile. Volatile Oil of Mustard.

A volatile oil obtained from black mustard (freed from its fatty oil) by maceration with water and subsequent distillation, yielding not less than 92 per cent. allyliso-thiocyanate.

Mixes freely with alcohol.

An artificial oil of mustard is extensively sold in place of the true oil; it is produced by decomposing allyl iodide with potassium sulphocyanate in alcohol.

Uses: Rubefacient, vesicant.

Average Dose: 0.008 Cc. (⅛ minim) seldom given internally.

Oleum Terebinthinae. Oil of Turpentine. ("Spirits" of Turpentine.)

A volatile oil recently distilled from turpentine.

Soluble in 3 volumes of alcohol.

Uses: Externally in liniments.

Oleum Terebinthinae Rectificatum. (Rectified Oil of Turpentine.)

Obtained by shaking the oil with an equal volume of solution of sodium hydroxide and re-distilling.

The rectified oil only should be dispensed when required for internal use.

Uses: Diuretic, anthelmintic.

Average Dose: 1 Cc. (15 minims).

Oleum Thymi. Oil of Thyme.

A volatile oil distilled from the leaves and flowering tops of thymus vulgaris.

Should contain not less than 20 per cent. of phenols (thymol.)

The commercial oil is known in France as oil of origanum or red oil but it is very largely adulterated with oil of turpentine, in fact much of the oil sold in the past as "origanum" contained no oil of thyme.

Soluble in half its volume of alcohol and in 1 to 2 volumes of 80 per cent. alcohol.

Uses: Antiseptic, carminative; employed extensively in liniments, and, officially, in antiseptic solution.

Average Dose: 0.2 Cc. (3 minims).

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ALLIED PRODUCTS AND DERIVATIVES.

Several products derived from volatile oils or closely allied to them may be conveniently considered here. They are:

Benzaldehydum. Benzaldehyde. C_7H_6O.

An aldehyde usually produced artificially but may be obtained from the natural oil of bitter almond of which it is the chief constituent.

It is also known as artificial or synthetic oil of bitter almond. For flavoring purposes it is preferred because it is free from hydrocyanic acid.

Freely soluble in alcohol, ether, fixed and volatile oils, also in 300 parts water.

Camphora. Camphor. (Gum Camphor.) $C_{10}H_{16}O$.

A ketone obtained from the wood of the camphor trees of Japan and China.

A by-product is obtained known as oil of camphor which is similar to oil of sassafras and used extensively to adulterate it.

Camphor is slightly soluble in water and freely soluble in alcohol, ether, chloroform, and in fixed and volatile oils.

Uses: Antiseptic, analgesic, carminative, diaphoretic, expectorant, stimulant and sedative.

Official preparations: Camphor water, camphor cerate, camphor liniment and spirit of camphor.

Average Dose: 0.125 Gm. (2 grains).

Camphora Monobromata. Monobromated Camphor.

A product of camphor, obtained by heating camphor and bromine together.

Freely soluble in alcohol, ether, chloroform, fixed and volatile oils; almost insoluble in water.

Uses: Sedative.

Average Dose: 0.125 Gm. (2 grains).

Cinnaldehydum. Cinnamic Aldehyde.

An aldehyde obtained from oil of cinnamon or prepared synthetically.

Should contain not less than 95 per cent. pure aldehyde.

Sparingly soluble in water; freely soluble in alcohol, ether, fixed and volatile oils.

Uses: To replace oil of cinnamon as flavoring.

Average Dose: 0.05 Cc. (1 minim).

Eucalyptol. Cineol.

Organic oxide obtained from oil of eucalyptus and other sources.

Uses: Antiseptic, stimulant. A constituent of the official antiseptic solution.

Average Dose: 0.3 Cc. (5 minims).

Eugenol. (Artificial Oil of Cloves.)

An unsaturated, aromatic phenol obtained from oil of cloves and other sources.

Mixes with alcohol in any proportion. Soluble in 2 parts 70 per cent. alcohol.

Uses: To replace oil of cloves.

Average Dose: 0.2 Cc. (3 minims).

Menthol. ($C_{10}H_{19}OH$.)

A secondary alcohol obtained from peppermint oils.

Menthol is the principal constituent of oil of peppermint and is obtained chiefly from the Japanese oil by chilling it.

Slightly soluble in water, freely soluble in alcohol, ether and chloroform.

Uses: Antiseptic, local analgesic, anesthetic and stimulant.

Average Dose: 0.065 Gm. (1 grain).

Methylis Salicylas. Methyl Salicylate. Artificial Oil of Wintergreen.)

An ester produced synthetically.

It is the principal constituent of oil of wintergreen and oil of birch. For flavoring purposes they may be considered as identical products.

Slightly soluble in water, freely soluble in alcohol.

Uses: For flavoring.

Safrolum. Safrol. (Artificial Oil of Sassafras.)

The methylene ether of allyl pyrocatechol, obtained by chilling oil of sassafras, camphor oil and other volatile oils. It is also made synthetically.

Soluble in about an equal volume of alcohol and in 30 parts 70 per cent. alcohol. Mixes freely with ether and chloroform.

Used extensively for flavoring and as a substitute for oil of sassafras.

Average Dose: 0.3 Cc. (5 minims).

Terebenum. Terebene.

A thin, colorless liquid consisting of dipentene and other hydrocarbons.

Made by the action of sulphuric acid on oil of turpentine and rectification with steam.

Slightly soluble in water, freely soluble in 3 volumes of alcohol.

Uses: Expectorant, stimulant.

Average Dose: 0.5 Cc. (8 minims).

Terpini Hydras. Terpin Hydrate.

The hydrate of diatomic alcohol terpin.

Obtained by the action of nitric acid upon a mixture of oil of turpentine and alcohol.

Uses: Bronchitis.

Average Dose: 0.125 Gm. (2 grains).

Thymol.

A phenol found in the volatile oil of thyme and other volatile oils.

Generally prepared synthetically.

Slightly soluble in water, freely soluble in alcohol, ether, chloroform, fixed and volatile oils. Is liquefied if triturated with equal quantity of chloral, menthol or camphor.

Uses: Antiseptic. Officially employed in cataplasm of kaolin and antiseptic solution.

Average Dose: 0.125 Gm. (2 grains).

Thymolis Iodidum. Thymol Iodide. (Aristol.)

Obtained by adding a solution of thymol in sodium hydroxide to a solution of iodine and potassium iodide, the precipitate washed and dried.

Insoluble in water; slightly soluble in alcohol; freely soluble in ether, chloroform, collodion and fixed and volatile oils.

Uses: Antiseptic; substitute for iodoform.

Vanillinum. Vanillin.

A chemical compound which exists naturally in vanilla but is extensively made synthetically.

Soluble in 100 parts of water and freely soluble in alcohol.

Frequently adulterated with benzoic acid.

Uses: For making artificial vanilla flavoring.

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FIXED OILS AND FATS.

Fixed oils and fats are included under the same general title because there is little to distinguish between them.

They are usually designated fixed oils if liquid at ordinary temperature and fats if solid at ordinary temperature.

Fats are further subdivided and are known as tallow, suet and lard if of a firmer consistence and waxes if brittle, though waxes are not true fats.

Fixed oils and fats are obtained from both the vegetable and animal kingdoms.

They decompose upon exposure to warm air and acquire a disagreeable odor and taste and are acid to litmus paper. They are then said to be rancid.

They are non-volatile, greasy to the touch, insoluble in and lighter than water, practically insoluble in alcohol, with the exception of castor oil and croton oil; soluble in chloroform, ether, petroleum benzin and carbon bisulphide.

All fats leave a stain when dropped upon paper which heat will not drive off; a characteristic distinction from volatile oils which, if free from fixed oils, will entirely disappear and leave no stain.

Vegetable oils are obtained from the seed and

fruit, usually by expression, (hence the name "expressed" oils). They are frequently classified under the titles **drying** and **non-drying** oils. The best known drying oil is linseed oil, the best known non-drying oils are olive oil and castor oil. Cotton seed oil comes midway between a drying and non-drying oil.

The animal fats are obtained by melting the tissues over a slow fire and straining while hot.

Chemically, fixed oils and fats are esters, that is, they contain both an alcohol radical and an acid radical.

The important chemical constituents are **Olein, Stearin** and **Palmatin.** Liquid fats, olive oil for example, consist principally of olein, while solid fats (tallow, suet and lard) contain palmatin and stearin principally, with lesser amounts of olein.

All fixed oils and fats yield soaps and glycerine when saponified.

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OFFICIAL FATS AND FIXED OILS.

There are 14 official fats and fixed oils, 7 being of animal origin (lard, lard oil, cod liver oil, suet, wool fat, spermaceti and wax) and 7 of vegetable origin (castor oil, cotton seed oil, croton oil, expressed oil of almond, linseed oil, olive oil and cocoa butter.)

Adeps. Lard.

The prepared internal fat of the abdomen of the hog. Should be kept in well closed vessels, impervious to moisture, in a cool place.

Adeps Benzoinatus. Benzoinated Lard.

Made by adding 2 per cent. benzoin to lard after which the lard is heated in a water bath for two hours and strained. The benzoin is added to prevent the lard

from becoming rancid. The Pharmacopoeia directs that 5 per cent. or more of the lard be replaced by white wax for use in summer.

Adeps Lanae. Wool Fat. (Anhydrous Wool Fat.)

The purified fat of sheeps' wool freed from water.

The only fat that will readily mix with water, of which it will absorb twice its weight.

Used as base for ointments.

It is a complex mixture of fatty acid with cholesterol (an alcohol.) It does not saponify and does not become rancid. Chemically it more closely resembles the waxes than fats. It is freely absorbed by the skin.

Adeps Lanae Hydrosus. Hydrous Wool Fat. (Lanolin.)

Wool fat with the addition of 30 per cent. of water.

Cera Alba. White Wax. (Yellow Wax Bleached.)

Cera Flava. Yellow Wax.

From the honey comb of the bee. Used chiefly to give consistence to cerates and ointments.

Cetaceum. Spermaceti.

Obtained from the head of the sperm whale. More closely related to fats than to wool fat or beeswax. May be saponified.

Used for the same purpose as wax.

Oleum Adipis. Lard Oil.

Obtained by expressing lard at a low temperature. Lard contains about 60 per cent. oil. It was formerly usually adulterated with paraffin oil.

Used principally as a lubricant. The only official product in which it is employed is citrine ointment.

Oleum Amygdalae Expressum. Expressed oil of Almond.

Although commercially known as oil of sweet almond it may be obtained from the seed of both the bitter almond and the sweet almond a small tree cultivated in Southern Europe.

The seeds of the bitter almond contain 45 per cent. of oil, the seeds of the sweet almond contain 50 to 55 per cent of oil.

Oleum Gossypii Seminis. Cotton Seed Oil.

A fixed oil expressed from cotton seed.

It is employed extensively in liniments, etc., in place of olive oil.

Oleum Lini. Linseed Oil.

A fixed oil expressed from linseed. The Pharmacopoeia especially directs that oil which has been "boiled" must not be employed in medicine.

Official preparations containing linseed oil are lime liniment and soft soap.

Oleum Morrhuae. Cod Liver Oil.

A fixed oil obtained from the fresh livers of the cod fish. Should be fresh and preserved in dried bottles well stoppered and in a cool place.

The most easily assimilated fat, usually given in the form of emulsions.

Oleum Olivae. Olive Oil. (Sweet Oil.) A fixed oil obtained by cold expression of ripe olives. Frequently adulterated with cotton seed oil.

Sparingly soluble in alcohol; freely soluble in ether, chloroform, and carbon bisulphide.

Uses: For making cerates, ointments, liniments and plasters. Internally: Laxative, demulcent, emollient.

Average Dose: 30 Cc. (1 fluid ounce).

Oleum Ricini. Castor Oil.

A fixed oil expressed from the seed of the Ricinus communis, better known as the castor bean.

Soluble in an equal volume of alcohol.

It is the only fixed oil soluble in a mixture of 19 parts of alcohol and one part water.

Uses: Cathartic.

Average Dose: 16 Cc. (4 fluid drams).

Oleum Theobromatis. Oil of Theobroma. (Cocoa Butter.)

A fixed oil expressed from the roasted seeds of theobroma cacao.

The only official fixed oil that is solid at ordinary temperature.

It is found to the extent of 40 per cent. to 50 per cent. in the roasted cocoa or chocolate nut, the balance being principally chocolate.

Uses: Principally as a vehicle for suppositories.

Oleum Tiglii. Croton Oil.

A fixed oil expressed from the seeds of the Croton Tiglium, a small tree indigenous to China and cultivated in India; the seeds yield about 55 per cent. of oil.

When fresh the oil is soluble in 55 to 60 parts of alcohol but the solubility increases with age; freely soluble in ether, chloroform, carbon bisulphide and in volatile and fixed oils.

Uses: Drastic cathartic; externally rubefacient.

Average Dose: 0.05 Cc. (1 minim).

Sevum Praeparatum. Prepared Suet. (Sevum U. S. P. 1890.)

The internal fat of the abdomen of the sheep, purified by melting and straining.

Used in making compound rosin cerate and mercurial ointment.

ALLIED PRODUCTS.

Glycerin. Glycerin. A liquid obtained by the decomposition of vegetable or animal fats, or fixed oils, and containing not less than 95 per cent. of absolute glycerol, a triatomic alcohol.

Glycerin is obtained through the saponification of oils and fats or by the decomposition of oils and fats.

It is soluble in all proportions in water and alcohol but insoluble in ether or chloroform.

It is a clear, colorless, odorless, thick liquid with a warm, sweet taste. Specific gravity; not less than 1.246 at 25 degrees C. (77 degrees F.)

Benzinum, Petroleum Benzin. (Petroleum Ether.) A distillate from petroleum. A highly volatile substance obtained in refining petroleum. Specific gravity at 25 degrees C. (77 degrees F.) 0.638 to 0.660. Boiling point 45 degrees to 60 degrees C. (113 degrees to 140 degrees F.) Much of the commercial benzin does not comply with official requirements.

Should not be confused with benzene (benzole) a coal tar product.

Official preparation: Mustard paper.

Benzinum Purificatum. Purified Petroleum Benzin. As the name implies this is simply crude benzin freed from impurities. This is done by agitating the benzin, first with a solution of sulphuric acid and potassium permanganate, and after 24 hours adding a solution of potassium permanganate and sodium hydroxide, after standing a few hours the benzin is decanted and repeatedly washed with water.

Uses: In tincture of luctucarium (to remove the caoutchouc like substance) and in tincture of deodorized opium (to remove the undesirable constituents.)

Petrolatum. (Petrolatum Molle, Petrolatum Spissum, U. S. P. 1890.)

A mixture of hydrocarbons, chiefly of the methane series, obtained by distilling off the lighter and more volatile portions from petroleum, and purifying the residue.

Petrolatum is extensively employed as a base for ointments. It is from yellowish to light amber in color with slight fluorescence, odorless except when heated it gives off a faint petroleum-like odor. It melts between 45 degrees and 48 degrees C. (113 degrees and 118 degrees F.)

The degree of hardness depends upon the amount of paraffin it contains.

Petrolatum Album. White Petrolatum.

A colorless mixture of hydrocarbons chiefly of the methane series, obtained by distilling off the lighter and more volatile portions from petroleum, and purifying the residue.

A white, unctuous mass, of about the consistence of an ointment, transparent in thin layers, completely amorphorus; without odor or taste. In other respects it has the characteristics of and should respond to the tests for petrolatum.

Petrolatum Liquidum. Liquid Petrolatum.

A mixture of hydrocarbons, chiefly of the methane series, obtained by distilling off most of the lighter and more volatile portions from petroleum, and purifying the liquid residue.

Paraffinum. Paraffin.

A mixture of solid hydrocarbons, chiefly of the methane series; usually obtained by chilling and pres-

sing the distillates from petroleum having high boiling points, and purifying the solid press cake so obtained.

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ANIMAL PRODUCTS.

Of the various official products obtained from animals several have received attention under other titles: i. e., Adeps (lard), oleum adipis (lard oil), oleum morrhuae (cod liver oil), adeps lanae, sevum (suet), cetaceum and wax; there remains to be mentioned:

Cantharis. Cantharides. (Spanish Flies).

The beetle, cantharis vesicatoria, thoroughly dried.

Spanish flies are of a copper green color about 1 inch in length, they are found in southern and central Europe but are collected chiefly in Hungary and southern Russia. The beetles frequent trees and shrubs and are obtained in the early morning by spreading blankets under the trees and then shaking the trees and beating with poles.

The official preparations are the cerate, the tincture and collodion.

Uses: Aphrodisiac, diuretic, rubefacient, vesicant.

Average dose: 0.030 Gm. (½ grain).

Coccus. Cochineal.

The dried female insect, psuedococcus cacti. This insect is indegenous to Mexico and Central America where it feeds upon the cactus. The female insect, which is the one official, lives attached to the plant. It is very small, about twice the size of a pin head.

Cochineal is employed entirely for its coloring matter which is a bright red. This coloring matter, when separated from the cochineal is known as carmine (carminic acid).

Fel Bovis. Ox Gall.

The fresh bile of bos taurus. A complicated chemical compound, mainly sodium salts of resinous acids.

Used in making purified ox gall.

Fel Bovis Purificatum. Purified Ox Gall.

Obtained by evaporating ox gall to about one third and macerating with an equal amount of alcohol for three or four days. The clear solution is then decanted and the balance filtered to remove the mucilagenous matter. The alcohol is then distilled off and the residue evaporated to a pilular consistence.

Uses: Laxative, hepatic torpor.

Average dose: 0.5 Gm. (7½ grains).

Gelatinum. Gelatin.

The purified air-dried product of the hydrolysis of certain animal tissues, as skin, ligaments and bones, by treatment with boiling water. A jelly is produced which is cut into thin sheets and dried.

Impure gelatine is called glue.

Uses: In the preparation of various dietetic dishes; in pharmacy for capsules, suppositories and as a pill coating.

Gelatinum Glycerinatum. Glycerinated Gelatine.

Obtained by covering gelatine (100 Gm.) with water and allowing to stand 1 hour; the surplus water is then poured off and 100 grams of glycerin added; the whole is heated upon a water-bath until the gelatine is dissolved. The solution is strained ,while hot, and the heat continued until the product is reduced to 200 grams; it is then allowed to cool and cut into pieces of suitable size.

Uses: As a vehicle for suppositories.

Glandulae Suprarenales Siccae. Desiccated Suprarenal Glands.

The suprarenal glands of the sheep or ox freed from fat and cleaned, dried and powdered.

A light, yellowish-brown amorphous powder with a slight but characteristic odor.

Partially soluble in water.

Uses: Alterative, haemostatic.

Average dose: 0.250 Gm. (4 grains).

Glandulae Thyroideae Siccae. Desiccated Thyroid Glands.

The thyroid glands of the sheep, freed from fat and cleaned, dried and powdered.

A yellow amorphous powder with slight peculiar odor. Partly soluble in water.

Uses: Principally in myxedema.

Average dose: 0.250 Gm. (4 grains).

Moschus. Musk.

The dried secretion from the preputial follicles of Moschus moschiferus.

The musk deer is a small deer found in the mountains of Central Asia. The musk sac is found in the male only; it is about 2 in. long, 1½ in. wide and ½ in. thick. Usually seen in irregular, crumbly, somewhat unctuous grains, dark, reddish-brown, with a peculiar, penetrating and persistent odor and a bitterish taste. About 10 to 12 per cent. soluble in alcohol.

Uses: Antispasmodic, stimulant.

Average dose: 0.250 Gm. (4 grains). It is seldom employed.

Pancreatinum. Pancreatin.

A mixture of enzymes naturally existing in the pancreas of warm-blooded animals. Usually obtained from the fresh pancreas of the hog.

A cream colored amorphous powder with a faint peculiar but not unpleasant odor. Slowly soluble in water.

Uses: Intestinal digestive. Pancreatin digests albuminoids and converts starch into sugar, dextrin or maltose; it exhibits its peculiar activities in neutral, faintly alkaline and faintly acid media.

Average dose: 0.500 Gm. (7½ grains).

Pepsinum. Pepsin.

A proteolytic ferment or enzyme, obtained from the glandular layer of the fresh stomach of the hog and proved to be capable of digesting not less than 3000 times its own weight of freshly coagulated and disintegrated egg albumin.

Marketed in pale yellow scales or crystals or in a fine cream-colored amorphous powder.

Soluble in 50 parts of water with some opalescence, more soluble in water acidulated with hydrochloric acid, but if there is more than ½ per cent, present the proteolytic activity of the pepsin is destroyed; insoluble in alcohol, ether or chloroform.

Pepsin is incompatible with alkalies.

Uses: Digestive.

Average dose: 0.250 Gm. (4 grains).

Serum Antidiphthericum. (Diphtheria Antitoxin).

A fluid separated from the coagulated blood of a horse, immunized through the inoculation of diphtheric toxin.

A yellow transparent or slightly turbid liquid odorless except for the presence of antiseptic used as preservative.

Should be kept in sealed glass containers, in a dark place, at a temperature between 40° and 59° F.

Antidiphtheric serum gradually loses its power, the loss in one year varying between 10 per cent. and 30 per cent.

Each container should be furnished with a label or statement, giving the strength of the antidiphtheric serum, expressed in antitoxic units, the name and percentage by volume of the antiseptic used for the preservation of the liquid (if such be used) the date when the antidiphtheric serum was last tested, and the date beyond which it will not have the strength indicated on the label or statement.

CHAPTER XXX.

VEGETABLE DRUGS.

Official Substances Not Previously Considered.

ACACIA. (Gum Arabic.) A gummy exudation from acacia senegal and other species of acacia; it is a small tree found in Abyssinia and Kordofan.

The gum is seen in roundish and brittle tears, or broken pieces, usually yellowish-white and opaque.

Insoluble in alcohol but freely soluble in water in which it forms a thick mucilage; slightly acid.

The principal constituent is arabic acid combined with calcium, potassium and magnesium.

Official preparations: Mucilage of acacia, syrup of acacia and compound chalk powder.

Uses: Demulcent; in emulsions; as a pill excipent.

ACONITUM. Aconite. (Monkshod.) The dried tuberous root of aconitum napulus. Should be collected in the autumn and yield at least 0.5 per cent. of aconitum.

A plant found in many parts of Europe. It imparts a distinctive sensation to the tongue.

The principal constituent is the alkaloid, aconitum.

Official preparations: Fluidextract and tincture.

Uses: Principally in fevers, externally, irritant and anaesthetic.

ALOE. Aloes.. (Aloe Barbadensis. Aloe Socotrina, Pharm. 1890.) The inspissated juice of the leaves of aloe vera and other species of aloe.

The commercial varieties are **Cape Aloes** (from the Cape of Good Hope) **Socotrine Aloes** (from Socotra) and **Barbadoes aloes** (from the Barbadoes islands).

Aloes is seen in opaque masses, yellowish to blackish-brown in color. When purified it is almost completely soluble in alcohol. It should not contain over 10 per cent. of moisture.

The active constituent is aloin.

Official preparations: Aloin, purified aloes, tincture of aloes, tincture of aloes and myrrh, tincture benzoin comp., extract of colocynth comp., and pills of aloes, aloes and myrrh, aloes and iron, aloes and mastic, cathartic comp. cathartic vegetable, and rhubarb comp.

Uses: Cathartic, emmenagogue.

Average dose: 0.250 Gm. (4gr.)

ALOE PURIFICATA. Purified Aloes. Obtained by melting aloes to which is added alcohol, the mixture is strained and evaporated. Irregular pieces, brittle, of a dull or reddish-brown color. Almost entirely soluble in alcohol.

Uses and dose: Same as aloes.

ALTHAEA. (Marshmallow). The dried root of althae officinalis, collected from plants of the second year's growth and deprived of the periderm.

The althae belongs to the mallow family. The plant grows 2 to 4 feet high and has pale, rose-colored flowers.

Principal constituents: 1 per cent. of asparagin, 25 per cent. of bassorin (a mucilagenous substance) 10 per cent. of pectin and 8 per cent. of sugar.

Officials preparations: Pills of phosphorus and ferrous carbonate and in mass of mercury.

Uses: Demulcent.

AMYGDALA AMARA. Bitter Almond. The ripe seed of prunus amygdalus, var. amara.

The almond is a small tree cultivated in Southern Europe.

Principle constituents. A fixed oil (45 per cent.) and a glucoside, amygdalin, from which is obtained the volatile oil.

No official preparation.

Uses: Slightly sedative.

AMYGDALA DULCIS. Sweet Almond. The ripe seed of prunus amygdalus, var. dulcis.

Similar to amygdala amara but the seed is sweet and is free from amygdalin.

Its principal constituent is a fixed oil of which it contains 50 to 60 per cent.

Official preparation: Emulsion of almond.

Uses: Demulcent, nutrient.

ANSIUM. Anise. The ripe fruit of pimpinella anisum. A plant growing about one foot high; largely cultivated in Europe.

The principal constituent is the volatile oil of which it contains from 1½ to 3½ per cent.

Uses: Aromatic, carminative.

Average dose: 0.500 Gm. (7½ grains.)

ANTHEMIS. (Roman Chamomile. English Chamomile.) The dried flower heads of anthemis nobilis, collected from cultivated plants, principally in Germany and England.

Must not be confused with matricaria (German chamomile.)

The principal constituent is a volatile oil.

Uses: Stimulant, tonic.

Average dose: 2 Gm. (30 grains.)

APOCYNUM. (Canadian Hemp) The dried rhizome of apocynum cannabinum or of closely allied species. Habitat: United States.

The active constituents are apocynein (a glucoside) and apocynin, a bitter resinous extractive.

Official preparation: Fluidextract.

Uses: Diuretic, cardiac tonic, cathartic; in large doses, emetic.

Average dose: I Gm. (15 grains.)

ARNICA. (Arnicae Flores, Pharm. 1890.) The dried flower heads of arnica montana.

Arnica belongs to the composite family and is frequently adulterated with similar flowers as the chamomiles, inula and senecio.

Arnica root is no longer official and the name, arnica, applies to the flowers only.

The principal constituents are a volatile oil, a resin and arnicin.

Official preparation: Tincture.

Uses: Principally externally as a vulneary.

Average dose: I Gm. (15 grains.)

ASPIDIUM. (Male Fern). The dried rhizome of dryopteris filix mas or dryopteris marginalis. Habitat: North America.

Only fresh drug with a bright green color should be employed.

The principal constituent is an oleoresin containing filicic acid.

Official preparation: Oleoresin of aspidium.

Uses: Taeniafuge. Usually the eloresin is employed.

Average dose: 4 Gm. (60 grains.)

AURANTII AMARI CORTEX. Bitter Orange Peel. The dried rind of the unripe fruit of citrus vulgaris. In narrow, thin bands, or in quarters. A fragrant odor and bitter, aromatic, taste.

The principal constituents are a volatile oil and a bitter principle, hesperidin.

Official preparations. Tincture and fluidextract, also in compound tincture of cinchona and compound tincture of gentian.

Uses: Carminative, tonic.

Average dose: 1 Gm. (15 grains.)

AURANTII DULCIS CORTEX. Sweet Orange Peel. The recently separated outer rind of the ripe fruit of citrus aurantium.

Only the thin, yellow outer rind should be employed. Contains numerous oil reservoirs, has a fragrant odor and a pungent, aromatic, taste.

The principal constituent is the volatile oil.

Official preparations: Tincture of sweet orange peel and syrup of orange (from the tincture.)

Uses: For its pleasant flavor.

BELLADONNAE FOLIA. Belladonna Leaves. Deadly Nightshade). The dried leaves of atropa belladonna, yielding, upon assay, not less than 0.35 per cent. of mydratic alkaloids.

The deadly nightshade is a perennial, cultivated in Central Europe, and grows from 3 to 5 feet high.

The principal constituent is atropine; the leaves also contain hyoscyamine and hyoscine.

Official preparations: Extract and tincture; the extract in the ointment and plaster.

Uses: Mydratic, heart stimulant; to modify the action of cathartics; externally anodyne.

Average dose: 0.065 Gm. (1 grain.)

BELLADONNAE RADIX. Belladonna Root. The dried root of atropa belladonna, yielding, upon assay, not less than 0.5 per cent. of mydratic alkaloids.

Constituents and properties same as the leaves but contains a larger per cent. of mydratic alkaloids.

Official preparations: Fluidextract and, from the fluidextract, the official liniment.

Average dose: 0.045 Gm. (¾ grain.)

BERBERIS. (Oregon Grape.) The rhizome and roots of berberis aquifolium and other species of berberis.

Constituents. The principal constituent is the alkaloid berberine; it also contains two other alkaloids, berbamine and oxycanthine.

Official preparation: Fluidextract.

Uses: Tonic, hepatic stimulant, alterative.

Average dose: 2 Gm. (30 grains.)

BUCHU. (Short Buchu.) The dried leaves of barosma betulina, a shrub grown in South Africa.

Long buchu (barosma serratifolia) is no longer official.

The principal constituent is a volatile oil.

Official preparation: Fluidextract.

Uses: Diuretic, stimulant.

Average dose: 2 Gm. (30 grains.)

CALAMUS. (Sweet Flag.) The unpeeled, dried rhizome of acorus calamus.

Principal constituents.: A volatile oil (1 to 2 per cent.), a glucoside (acorin) and an alkaloid (calamine.)

Official preparation: Fluidextract.

Uses: Carminative.

Average dose: 1 Gm. (15 grains.)

CALENDULA. (Marigold) The dried ligulate florets of calendula officinalis. Habitat, Europe.

Calendula belongs to the composite family which includes arnica, the chamomiles, etc.

Constituents: A volatile oil (trace) a resin, a bitter principle and calendulin, said to be inert.

Official preparation: Tincture.

Uses: Principally as vulneary.

Average dose: 1 Gm. (15 grs.)

Calumba. (Calumbo Root.) The dried root of jateoriza palmata. Habitat: Africa and India.

The principal constituents are a neutral principle (columbin) and three alkaloids which resemble berberine (columbamarin, jateorizin and palmitine) it also contains an acid (columbic acid) and 33 per cent. of starch.

Official preparations. Fluidextract and tincture.

Uses: Bitter tonic.

Average dose: 2 Gm. (30 grains.)

CANNABIS INDICA. Indian Cannabis. (Indian Hemp.) The dried flowering tops of the pistillate plants of cannabis sativa, grown in the East Indies and gathered while the fruits are yet undeveloped, and carrying the whole of their natural resin.

Principal constituents: Cannabin (the resin) 15 to 20 per cent. and a volatile oil.

Cannabis Americana (American hemp) sometimes employed in place of the official plant; contains but a slight amount of resin and is of but small value.

Official preparations: Extract, fluidextract and tincture.

Uses: Narcotic, nerve stimulant.

Average dose: 0.065 Gm. (1 grain).

CAPSICUM. (Cayenne Pepper. Red Pepper.) The dried, ripe fruit of capsicum fastigiatum deprived of its calyx. A small shrub cultivated in Africa, Asia and tropical America.

The principal constituent is the oleoresin which contains capsicin and capsicol.

Official preparations: Fluidextract, tincture, oleoresin, plaster (from the oleoresin.)

Uses: Externally rubefacient. Internally stimulant.

Average dose: 0.065 Gm. (1 grain.)

CARDAMOMUM. Cardamom. The dried ripe fruit of elettaria repens. Cultivated in India. The whole fruit is official but the seeds within the pericarp (or hull) only are active.

Principal constituents: A volatile oil (4.6 per cent.) and a fixed oil (10 per cent.)

Official preparations: Tincture and compound, tincture, also in compound tincture of gentian, tincture of rhubarb and aromatic powder.

Uses: Carminative, stomachic.

Average dose: 1 Gm. (15 grains.)

CARUM. Caraway. The dried fruit of carum carvi.

The principal constituent is a volatile oil (about 5 per cent.)

Official preparation: Compound tincture of cardamom.

Uses: Carminative, flavor.

Average dose: 1 Gm. (15 grains.)

CARYOPHYLLUS. Cloves. The dried flower buds of eugenia aromatica. A small evergreen tree grown in the East Indies.

The principal constituent is a volatile oil of which it contains about 18 per cent.

Official preparations: Tincture lavender comp., tincture rhubarb comp. and wine of opium.

Uses: Carminative, synergist.

Average dose: 0.250 Gm. (4 grains.)

CASSIA FISTULA. (Purging Cassia). The dried fruit of cassia fistula. A tree cultivated in Egypt and India and all tropical countries.

Principal constituents: The pulp, which is the part used, contains about 60 per cent, of sugar with pectin and gum.

Official preparation: Confection of senna.

Uses: Laxative.

Average dose: 4 Gm. (60 grains.)

CHIMAPHILA. (Pipsissewa. Princes Pine.) The dried leaves of chimaphila umbellata. A small plant found in dry woods.

This drug is similar to uva ursi.

Principal constituent: Chimaphilin.

Official preparation: Fluidextract.

Uses: Diuretic.

Average dose: 2 Gm. (30 grains.)

CHIRATA. (Chiretta.) The dried plant of swertia chirayita. A plant grown in Northern India.

Principal constituents: Chiratin (a glucoside) and ophelic acid, both intensely bitter.

Official preparations: Fluidextract and tincture.

Uses: Bitter tonic.

Average dose: 1 Gm. (15 grains.)

CHONDRUS. (Irish Moss.) The dried plant of chondrus crispus. A plant found on the rocks on the shores of the Atlantic Ocean.

The principal constituent is mucilage (90 per cent.)

Uses: Demulcent.

Average dose: 15 Gm. (4 drachms) in decoction.

CIMICIFUGA. (Black Cohosh. Black Snake Root.) The dried rhizome and roots of cimicifuga racemosa. The plant grows from 4 to 8 feet high and is found in rich woods in Northern United States.

Principal constituent a resin (3½ per cent.) containing the resinoid known as **cimicifugin** and **macrotin.**

Official preparations: Fluidextract, extract and tincture.

Uses: Principally in rheumatism.

Average dose: 1 Gm. (15 grains.)

CINCHONA. (Calisaya Bark. Peruvian Bark.) The dried bark of cinchona ledgeriana, cinchona calisaya, cinchona officinalis and of hybrids of these with other species of cinchona. Should yield not less than 5 per cent. of total anhydrous cinchona alkaloids and at least 4 per cent. of anhydrous ether-soluble alkaloids upon assay.

CINCHONA RUBRA. (Red Cinchona.) The dried bark of cinchona succiruba or of its hybrids, yielding not less than 5 per cent, of anhydrous cinchona alkaloids.

The original source of cinchona barks is the mountains of South America near the equator but in recent years the trees have been successfully cultivated in the East Indies particularly the island of Java, and most of the barks at present come from these cultivated trees.

The principal constituents of cinchona barks are quinine, cinchonine, cinchonidine and quinidine.

Official preparations: Fluidextract and tincture from cinchona bark and compound tincture from red cinchona bark.

Uses: Febrifuge, tonic, antiseptic.

Average dose (of both barks): 1 Gm. (15 grains.)

CINNAMOMUM SAIGONICUM (Sagion Cinnamon.) The bark of an undetermined species of cinnamomum.

CINNAMOMUM ZEYLANICUM. (Ceylon Cinnamon.) The inner bark of the shoots of cinnamon zeylanicum.

Saigon cinnamon comes in broken pieces while Ceylon cinnamon is in long closely rolled quills composed of eight or more thin layers of bark.

Principal constituent: A volatile oil.

Official preparations: (All from Saigon bark.) Tincture cinnamon, compound tincture of cardamom, compound tincture of gambir, compound tincture of lavender, aromatic tincture of rhubarb and aromatic powder.

Uses: Carminative, flavor.

Average dose: (of both barks) 0.250 Gm. (4 grains.)

COCA. (Erythroxylon.). The dried leaves of erythroxylon coca, known commercially as Huanuco coca or of erythroxylon truxillense, known commercially as Truxillo coca. Must yield, upon assay, 0.5 per cent. of ether-soluble alkaloids.

The coca is a shrub extensively cultivated in Peru and Bolivia.

Principal constituent: The alkaloid cocaine.

Official preparations: Fluidextract and wine.

Uses: Stimulant.

Average dose: 2 Gm. (30 grains.)

COLCHICI CORMUS. Colchicum Corm. (Colchici Radix, Pharm. 1890.) The dried corm of colchicum autumnale yielding, upon assay, not less than 0.35 per cent. of colchicine.

COLCHICI SEMEN. Colchicum Seed. The seed of colchicum autumnale yielding, upon assay, not less than 0.55 per cent. of colchicine.

Colchicum, or meadow saffron, is found principally in Southern Germany. Both the corm (or bulb) and seed are official, the seed yielding the greater amount of alkaloid.

The principal constituent is the alkaloid, colchicine.

Official preparations: From the corm, extract of colchicum; from the seed, fluidextract, tincture and wine.

Uses: Principally in rheumatism and gout.

Average dose: Of the corm, 0.250 Gm. (4 grains); of the seed 0.200 Gm. (3 grains.)

COLOCYNTHIS. Colocynth. (Bitter Apple.) The peeled dried fruit of citrullus colocynthis.

Colocynth belongs to the gourd family; the fruit is about the size of a small apple; upon drying the fruit loses 90 per cent. of water and becomes a light, spongy, yellowish-white pulp; this pulp, deprived of the seeds, is the official drug. It is grown in Europe, Asia and Africa.

Principal constituents: Colocynthin (a glucoside) 2 per cent.

Official preparations: Extract of colocynth, extract of colocynth comp.; the latter is a constituent of compound cathartic pills and vegetable cathartic pills.

Uses: Hydragogue cathartic.

Average dose: 0.065 Gm. (1 grain.)

CONIUM. (Poison Hemlock.) The full grown but unripe fruit of conium maculatum, carefully dried and preserved. Should yield 0.5 per cent. of coniine. Unfit for use after two years.

Conium is similar, in appearance, to anise seed.

The principal constituent is the liquid alkaloid, coniine.

Official preparation: Fluidextract.

Uses: Narcotic, sedative.

Average dose: 0.200 Gm. (3 grains.)

CONVALLARIA. (Lily of the Valley). The dried rhizome and roots of convallaria majalis.

Principal constituents: Convallarin and convallamarin (glucosides.)

Official preparation: Fluidextract.

Uses: Cardiac tonic, diuretic.

Average dose: 0.500 Gm. (7½ grains.)

CORIANDRUM. Coriander. The dried fruit of coriandrum sativum.

The coriander is cultivated principally in Southern Europe.

The principal constituent is a volatile oil (½ to 1 per cent.) containing coriandrol.

No official preparations.

Uses: Carminative, aromatic.

Average dose: 0.500 Gm. (7½ grains.)

CUBEBA. Cubeb. (Cubeb Berries). The dried unripe, but fully grown, fruit of piper cubeba.

This plant is grown principally in coffee plantations; it belongs to the pepper family.

Principal constituents. A volatile oil (5 to 15 per cent.) cubebin and cubebic acid.

Official preparations: Fluidextract, oleoresin, troches (from the oleoresin).

Uses: Diuretic, urinary disinfectant, carminative, stimulant.

Average dose: 1 Gm. (15 grains.)

CUSSO. Kousso. (Brayera). .The dried panicles of the pistillate flowers of hagenia abyssinica.

The kousso is a large, ornamental, tree grown in Abyssinia.

The principal constituent is kosin, a resinous principle.

No official preparations.

Uses: Taenifuge.

Average dose: 16 Gm. (240 grains) in infusion.

CYPRIPEDIUM. (Ladies Slipper). The dried rhizome and roots of cyripedium hirsutum or of cypripedium parviflorum.

This parasitic plant belongs to the orchis family.

The principal constituents are a volatile oil (trace only) and a bitter principle not identified.

Official preparation: Fluidextract.

Uses: Antispasmodic.

Average dose: 1 Gm. (15 grains).

DIGITALIS. (Foxglove). The dried leaves of digitalis purpurea, collected from plants of the second year's growth, at the commencement of flowering.

This important plant is grown principally in Central and Southern Europe, it is cultivated to some extent in the United States.

Principal constituents: Digitalin, (a glucoside) and digitonin (a saponin).

Official preparations: Extract, fluidextract, infusion and tincture.

Uses: Cardiac tonic, diuretic.

Average dose: 0.065 Gm. (1 grain.)

ELASTICA. Rubber. The prepared milk juice of several species of hevea aublet, known in commerce as Para rubber.

Uses: In the preparation of adhesive plaster.

ERGOTA, Ergot. The sclerotium of claviceps purpurea, replacing the grain of rye, secale cereale. Should be moderately dried, and not exposed to a damp atmosphere. Unfit for use if more than a year old.

Ergot is a fungi, replacing the grain of rye. It is produced principally in Russia, also in Austria, Spain, and Germany.

The active constituents of ergot are uncertain. Ergotine is an extract which represents the whole drug.

Official preparations: Extract, fluidextract and wine.

Uses: Ecbolic, parturient, hemostatic.

Average dose: 2 Gm. (30 grains).

ERIODICTYON. (Yerba Santa.) The dried leaves of eriodictyon Californicum.

A low shrub found in California. It belongs to the waterleaf family.

Constituents: Resins, volatile oil, (trace) tannin, and the phenols eryodictol and homo-eryodictol.

Official preparation: Fluidextract.

Uses: Expectorant; as a vehicle for quinine.

Average dose: 1 Gm. (15 grains.)

EUCALYPTUS. The dried leaves of eucalyptus globulus, collected from the older parts of the tree.

The eucalyptus is a large, fast growing tree cultivated extensively in California.

The active constituent is a volatile oil (6 per cent.)

Official preparation: Fluidextract.

Uses: Antiseptic, stimulant, carminative.

Average dose: 2 Gm. (30 grains.)

EUONYMUS. (Wahoo Bark). The dried bark of the root of euonymus atropurpureus.

A tall, ornamental shrub that grows from 6 to 12 feet high in many parts of the United States. It belongs to the staff-tree family.

Principal constituent: Euonymin. (Should not be confused with the eclectic "euonymin" which is a

resinoid obtained by adding a concentrated tincture to water, the resinoid being precipitated and dried.)

Official preparations: Fluidextract and extract (from the fluidextract.)

Uses: Laxative, diuretic, tonic.

Average dose: 0.500 Gm. (7½ grains.)

EUPATORIUM. (Boneset. Thoroughwort.) The dried leaves and flowering tops of eupatorium perfoliatum.

Eupatorium belongs to the composite family which includes taraxacum, the chamomiles, arnica, calendula, etc. It is a large flowering plant and found in damp places throughout the United States.

The principal constituent is a glucoside, eupatorin.

Official preparation: Fluidextract.

Uses: Tonic and stimulant, diaphoretic, in large doses emetic and cathartic.

Average dose: 2 Gm. (30 grains.)

FICUS. Fig. The partially dried fruit of ficus carica.

Constituents: Sugar, gum.

Official preparation: Confection of senna.

Uses: Laxative.

FOENICULUM. Fennel. (Fennel Seed.) The dried, nearly ripe fruit of foeniculum vulgare.

Fennel belongs to the parsley family which includes anise, caraway and coriander. The plant is cultivated principally in Germany.

The principal constituent is a volatile oil (2 to 6 per cent.)

No official preparations.

Uses: Carminative.

Average dose: 1 Gm. (15 grains.)

FRANGULA. (Buckthorn Bark.) .The dried bark of rhamnus frangula, collected at least one year before using.

A small tree found principally in Europe and Asia. It belongs to the same family as cascara (rhamnus purshiana.)

The principal constituent is frangulin, (a glucoside.)

Official preparation: Fluidextract.

Uses: Cathartic.

Average dose: 1 Gm. (15 grains.)

GALLA. Nutgall. An excresence on quercus infectoria, caused by the punctures and deposited ova of cynips tinctoria (an insect.)

Most of the nutgall comes from Asia where the young branches of oak trees are stung by the insect "cynips tinctoria," eggs are laid in the hole and the spot swells, the excrescence becomes the nutgall which should be collected before the insect escapes. Nutgalls are from ¼ inch to ⅝ inch in diameter.

The principal constituents are tannin (50 to 75 per cent.) and gallic acid (3 per cent.)

Official preparations: Tincture and ointment.

Uses: Astringent (locally.)

GAMBIR. (Catechu, U.S.P. 1890.) An extract prepared from the leaves and twigs of ourouparia gambir.

Gambir, or catechu as it is commonly known, if of official quality, consists of irregular masses of a reddish-brown or light brown color (not black.) At least 70 per cent. should be soluble in alcohol.

The principal constituent is catechu-tannic acid, (about 50 per cent.)

Official preparations: Tr. gambir comp. and troches of gambir (troches of catechu U.S.P. 1890.)

Uses: Astringent.

Average dose: 1 Gm. (15 grains.)

GELSEMIUM. (Yellow Jasmine.) The dried rhizome and roots of gelsemium sempervirens. A smooth, climbing plant grown largely in the Southern states.

The principal constituent is gelsemine.

Official preparations: Fluidextract and tincture.

Uses: Antispasmodic, sedative, diaphoretic.

Average dose: 0.065 Gm. (1 grain.)

GENTIANA. Gentian. The dried rhizome and roots of gentiana lutea.

A perennial herb found in the mountainous portions of Central Europe.

Principal constituents: A bitter neutral principle, gentiopictin. Glucose (gentianose) 12 to 15 per cent. The drug is free from starch and tannin, the darkening of its preparations, by iron salts is due to gentisin and gentisic acid which may be removed with ferric hydroxide.

Official preparations: Fluidextract, extract and compound tincture.

Uses: Bitter tonic.

Average dose: 1 Gm. (15 grains.)

GERANIUM. (Cranesbill.) The dried rhizome of geranium maculatum. A flowering herb grown in the United States.

The principal constituents are gallic acid and tannic acid (12 to 37 per cent.)

Official preparation: Fluidextract.

Uses: Astringent.

Average dose: 1 Gm. (15 grains.)

GLYCYRRHIZA. Licorice Root. The dried rhizome and root of glycyrrhiza glabra (Spanish licorice) or glycyrrhiza glandulifera (Russian licorice.) Russian Licorice is in greater supply and is preferred.

The principal constituent is glycyrrhizin which is extracted with ammonia and is official under the title, ammoniated glycyrrhizin.

Official preparations: Fluidextract, extract, pure extract, ammoniated glycyrrhizin and compound licorice powder.

Uses: Demulcent, expectorant. Employed generally to disguise the taste of other drugs.

GOSSYPII CORTEX. Cotton Root Bark. (Gossypii Radicis Cortex Pharm. 1890.) The dried bark of the root of gossypium herbaceum or of other cultivated species of gossipium (cotton.)

The principal constituents are resin, fixed oil, tannin and a yellow substance which becomes red upon exposure to the air.

No official preparation. (Fluidextract official Pharm. 1890.)

Uses: Emmenagogue, oxytocic, uterine stimulant.

Average dose: 2 Gm. (30 grains.)

GRANITUM. Pomegranite. The bark of the stem and root of punica granatum. A small, ornamental, tree cultivated in warm climates.

The active constituent is pelletierine.

Pelletierine tannate, (Official) is a mixture in varying proportions of the tannates of four alkaloids.

Official preparation: Fluidextract.

Uses: Taeniafuge, astringent.

Average dose: Of drug 2 Gm. (30 grains.) Of pelletierine tannate, 0.250 Gm. (4 grains.)

GRINDELIA. The dried leaves and flowering tops of grindelia robusta or grindelia squarrosa. It belongs to the important composite family. A woody herb found in Western America.

The principal constituent is a resinous exudation.

Official preparation: Fluidextract.

Uses: Antispasmodic, sedative, principally in asthma.

Average dose: 2 Gm. (30 grains.)

GUARANA. A dried paste consisting chiefly of the crushed seeds of paullinia cupana yielding, upon assay, not less than 3.5 per cent. of its alkaloidal principles. It is a climbing shrub found in Brazil.

Principal Constituent: Guaranine (identical with caffeine.)

Uses: Stimulant. (Used principally in nervous headache.)

Average dose: 2 Gm. (30 grains.)

HAEMATOXYLON... Hematoxylon. (Logwood.) The heart wood of haematoxylon campechianum, a tree found in Central America.

When the surface of the wood has a greenish metallic lustre, the wood has undergone fermentation and should be rejected.

The principal constituent is haematoxylin, a neutral principle.

Official preparation: Extract.

Uses: Astringent. Employed chiefly in dyeing.

Average dose: (of extract) 1 Gm. (15 grains.)

HAMAMELIDIS CORTEX. Hamamelis Bark, Witch Hazel Bark. The bark and twigs of hamamelis virginiana. The witch hazel is a woody shrub, in height from 5 to 15 feet, grown in the United States.

The principal constituents are tannin, volatile oil (trace) and a bitter principle.

Used principally for the preparation of hamamelis water (extract of witch hazel.)

Average dose: 2 Gm. (30 grains.)

HAMAMELIDIS FOLIA. Hamamelis leaves. (Hamamelis, U.S.P. 1890. Witch Hazel Leaves.) The dried leaves of hamamelis virginiana, collected in autumn.

Official preparation: Fluidextract.

Uses: Astringent.

Average dose: 2 Gm. (30 grains.)

HEDEOMA. (Pennyroyal.). The dried leaves and flowering tops of hedioma pulegioides.

Pennyroyal is a member of the mint family.

The principal constituent is the volatile oil.

No official preparations.

Uses: Emmenagogue, diaphoretic, cathartic. Principally in decoction.

Average dose. 8 Gm. (120 grains.)

HUMULUS. Hops. The carefully dried strobiles of humulus lupulus, bearing their natural glandular trichomes.

The principal constituent is **lupuline.** It also contains a volatile oil, resin, tannin, etc.

Official preparation: Tincture.

Uses: Tonic, slightly narcotic.

Average dose: 2 Gm. (30 grains.)

HYDRASTIS. (Golden Seal. Yellow Puccoon.) The dried rhizome and roots of hydrastis canadensis. Should yield, upon essay, not less than 2.5 per cent. of hydrastine.

Golden seal is a small plant growing in rich woods, principally in the middle West. It is being cultivated with some success.

The active constituents are the two alkaloids **hydrastine** (white) and **berberine** (yellow.)

The resinoid, hydrastin, should not be confused with the alkaloid: it is obtained by precipitating a concentrated alcoholic tincture with acidulated water.

Official preparations: Fluidextract, tincture and glycerite.

Uses: Bitter tonic, in catarrhal affections. Locally, astringent.

Average dose: 2 Gm. (30 grains.)

HYOSCYAMUS. (Henbane.) The dried leaves and flowering tops of hyoscyamus niger, collected from plants of the second year's growth. Should yield 0.08 per cent. of mydratic alkaloids.

Hyoscyamus belongs to the important night shade family which includes belladonna and stramonium. The supply comes principally from Europe and Asia.

The principal constituents are the alkaloids hyoscyamine and hyoscine.

Official preparations: Extract, fluidextract and tincture.

Uses: Hypnotic, anodyne.

Average dose: 0.250 Gm. (4 grains.)

IPECACUANHA. Ipecac. The dried root, to which may be attached a portion of the stem not exceeding 7 Cm. in length, of cephaelis ipecacuanha

(known commercially as Rio, Brazillian or Para ipecac) or the corresponding portion of cephaelis acuminata (known commercially as Carthagena ipecac.) Should yield not less than 2 per cent. of ipecac alkaloids.

The principal constituent is emetine.

Official preparations: Fluidextract, syrup and wine; ipecac is also a constituent of mixture of rhubarb and soda, powder of ipecac and opium (Dover's powder) and compound laxative pills.

Uses: Expectorant, emetic.

Average dose: Emetic, 1 Gm. (15 grains.) Expectorant, 0.065 Gm. (1 grain.)

JALAPA. Jalap. The dried tuberous root of exogonium purga. Should yield 8 per cent. of total resin, but not more than 1.5 per cent. of resin soluble in ether.

Jalap comes from Mexico. It is cultivated in India. The tubers are heavy and hard, in shape similar to the pear, color dark brown.

The principal constituent is the resin which consists of two glucosides, jalapin, which is soluble in ether, and convolvulin, which is insoluble in ether.

Official preparations: Compound jalap powder; from the resin, compound cathartic pills and vegetable cathartic pills.

Uses: Hydragogue cathartic.

Average dose: 1 Gm. (15 grains.)

KINO. The inspissated juice of pterocarpus marsupium.

Kino belongs to the pulse family which includes acacia, catechu and copaiba and many other drugs. It is a tree of medium size found in East Indies.

Principal constituents: Kinotannic acid, kionin, kinoic acid.

Official preparation: Tincture.

Uses: Astringent, in diarrhoea.

Average dose: 0.500 Gm. (7½ grains.)

KRAMERIA. (Rhatany.) The dried root of krameria triandra (Peruvian krameria) or of krameria argentea (Para or Brazillian krameria.)

The principal constituent is kramerotannic acid.

Official preparations: Extract, fluidextract, syrup, tincture and troches.

Uses: Astringent, in diarrhoea.

Average dose: 1 Gm. (15 grains.)

LACTUCARIUM. (Wild Lettuce.) The concrete milk juice of lactuca virosa. An ill smelling biennial herb. Found largely in Prussia, France and Scotland. It belongs to the composite family.

Official preparations: Tincture and syrup (the latter from the tincture.)

Uses: Mildly anodyne and hypnotic.

Average dose: 1 Gm. (15 grains.)

LAPPA. (Burdock.) The dried root of arctium lappa, or of other species of arctium, collected from plants of the first year's growth.

Burdock belongs to the important composite family.

The active constituents are uncertain; like all members of the composite family it contains inulin.

Official preparation: Fluidextract.

Uses: Alterative, diaphoretic, diuretic.

Average dose: 2 Gm. (30 grains.)

LIMONIS CORTEX. Lemon Peel. The recently separated outer rind of the ripe fruit of citrus limonum.

The principal constituents are a volatile oil and a bitter principle, hesperidin.

Official preparation: Tincture.

Uses: As a flavor only.

LIMONIS SUCCUS. Lemon Juice. The freshly expressed juice of the ripe fruit of citrus limonum.

The principal constituent is citric acid, 7 per cent.

Uses: Refrigerant.

Average dose: 30 Cc. (1 fluidounce.)

LINUM. Linseed. Flaxseed. The ripe seed of linum usitatissimum.

The principal constituents are a fixed oil (linseed oil), 35 per cent. and a mucilage, 15 per cent.

The mucilage is contained in the outer cells and is removed by immersion of the seeds in water.

Ground flaxseed is employed largely in poultices.

Since considerable ground flaxseed is sold from which a portion of the oil has been taken the Pharmacopoeia requires that it shall contain at least 30 per cent. of oil

LOBELIA. (Indian Tobacco.) The dried leaves and tops of lobelia inflata, collected after a portion of the capsules have become inflated.

Principal constituents: Lobeline (a poisonous liquid alkaloid) and lobelacrin (said to be an active principle.)

Official preparations: Fluidextract and tincture.

Uses: Emetic, expectorant (in asthma and whooping cough.)

Average dose: 0.5 Gm. (7½ grains.) In large doses poisonous.

LUPULINUM. Lupulin. The glandular trichomes separated from the fruit of humulus lupulus (hops.)

A bright brownish-yellow resinous and granular powder. Not less than 60 per cent. should be soluble in ether. Upon incineration should yield not over 10 per cent. of ash.

Official preparations: Fluidextract and oleoresin.

Uses: Same as hops.

Average dose: 0.500 Gm. (7½ grains.)

LYCOPODIUM. The spores of lycopodium clavetum or other species of lycopodium. A low, moss-like plant found principally in Russia, Germany and Switzerland. The powder is very soft and fine, pale yellow, inodorous and tasteless.

The principal constituent is a fixed oil, about 50 per cent.

Uses: As a dusting powder.

MALTUM. Malt. The grain of barley, partially germinated artificially, and then dried.

Constituents: Maltose and diastase.

Official preparation: Extract.

MANNA. The concrete saccharine exudation of fraxinus ornus. The tree belongs to the olive family which includes the ash and lilac, it grows in Sicily and is about 25 feet high. The juice exudes spontaneously, but the flow is increased by incision.

Commercially, manna is supplied in large and small flakes and "sorts." The flakes only are official.

Official preparation: Compound infusion of senna.

Uses: Laxative.

Average dose: 16 Gm. (240 grains.)

MARRUBIUM (Horehound.) The dried leaves and flowering tops of marrubium vulgare.

Horehound belongs to the mint family and is a common garden herb.

The principal constituents are a volatile oil (trace only), a bitter principle called marrubiin, and a resin.

No official preparations.

Uses: Expectorant, tonic, stimulant.

Average dose: 2 Gm. (30 grains.)

MATICO. The leaves of piper angustifolium. Belongs to the pepper family and is grown in tropical America.

The principal constituents are a volatile oil (2 per cent.) resin and tannin.

Official preparation: Fluidextract.

Uses: Principally as hemostatic and styptic.

Average dose: 4 Gm. (60 grains.)

MATRICARIA.. (German Chamomile.) The dried flower heads of matricaria chamomilla. Belongs to the composite family. The plant is an annual and grows from 1 to 2 feet high. The supply comes from Europe, principally Germany.

The principal constituent is a volatile oil.

No official preparations.

Uses: Stimulant and tonic; usually in infusion.

Average dose: 16 Gm. (240 grains.)

MENTHA PIPERITA. Peppermint. The dried leaves and flowering tops of mentha piperita. A member of the labiatae or mint family. Grown principally in the United States for the oil which is its important constituent.

Official preparation: Spirit.

Uses: Carminative, aromatic.

Average dose: 4 Gm. (60 grains.)

MENTHA VIRIDIS. Spearmint. The dried leaves and flowering tops of mentha spicata.

The principal constituent is a volatile oil.

Official preparation: Spirit.

Uses: Carminative, aromatic.

Average dose: 4 Gm. (60 grains.)

MEZEREUM. (Mezereon Bark.) The dried bark of daphne mezereum and other European species of daphne. A small shrub found principally in the mountains of Europe, also grown in Canada and New England.

The principal constituents are daphnin (a glucoside and mezerein (a resin.)

Official preparations: Fluidextract, fluidextract sarsaparilla compound.

Uses: Alterative.

Average dose: 0.500 Gm. (7½ grains.)

MYRISTICA. (Nutmeg). The kernel of the ripe seed of myristica fragrans. A small tree cultivated in the East Indies.

The principal constituent is the volatile oil (2 to 8 per cent.) It also contains a fixed oil (25 to 30 per cent.) called **nutmeg butter** or **oil of mace.**

Official preparations: Aromatic powder and compound tincture of lavendar.

Uses: Stomachic, aromatic.

Average dose: 0.500 Gm. (7½ grains.)

NUX VOMICA. (Dog Button.) The dried, ripe seed of strychnos nux vomica. Should contain at least 1.25 per cent. of strychnine. A small tree indigenous to the coasts of parts of India, Siam and Burmah. The supply comes principally from Bombay.

The principal constituents are strychnine and brucine. The seed also contains a fixed oil.

Official preparations: Extract, fluidextract and tincture.

Uses: Nerve tonic and stimulant.

Average dose: 0.065 Gm. (1 grain.)

OPIUM. (Gum Opium.) The concrete, milky exudation obtained by incising the unripe capsules of papaver somniferum. Should yield, in normal, moist condition, at least 9 per cent. of crystallized morphine.

The plant producing opium is cultivated extensively in many parts of Asia. The collection of the opium by incising or cutting the capsule containing it is a very slow and hard task, only by employing the cheapest labor can it be made profitable.

Constituents: Opium contains no less than 16 mixed alkaloids. The principal constituents are morphine, codeine, narcotine and narceine, combined with meconic acid.

Official preparations: Powdered opium and granulated opium.

Uses: Narcotic, sedative.

Average dose: 0.100 Gm. (1½ grains.)

OPIUM DEODORATUM. Deodorized Opium. Obtained by macerating, in a bottle, powdered opium with sufficient purified petroleum benzin to cover, for 24 hours, with occasional shaking. The liquid is then decanted and the operation repeated with fresh benzin. Again decant and pour the contents of the bottle into a plain filter in a glass funnel which should be well covered; drain, and slowly percolate the residue with the benzin until it passes without color. The powder is then dried in the open air.

Should contain 12 to 12.5 per cent. of crystallized morphine.

OPIUM GRANULATUM. Granulated Opium. Similar to powdered opium except that it is in a coarse (No. 20) powder. So prepared for percolation.

Official preparations: Tincture, deodorized tincture and wine.

Average dose: 0.065 Gm. (1 grain.)

OPII PULVIS. Powdered Opium. Opium dried at a temperature not exceeding 85 degrees C. (185 degrees F.) and reduced to a fine powder.

Should contain 12 to 12.5 per cent. of crystallized morphine. If of higher percentage may be reduced with powdered opium of lower percentage or with powdered sugar of milk.

Official preparations: Deodorized opium, camphorated tincture, extract, pills, vinegar, powder of ipecac and opium. (Dover's powder), troches of glycyrrhiza and opium.

Average dose: 0.065 Gm. (1 grain.)

PARERIA. (Pareira Brava.) The dried root of chondodendron tomentosum. A vine with twining stem found in Brazil.

The principal constituent is cissampeline, (pelosine), an amorphus substance. The drug also contains starch and tannin.

Official preparation: Fluidextract.

Uses: Diuretic, tonic.

Average dose: 2 Gm. (30 grains.)

PEPO. (Pumpkin Seed). The ripe seed of cucurbita pepo. A member of the gourd family.

Constituents: Fixed oil (30 to 50 per cent.) and a resin, said to have taenifuge properties.

No official preparations.

Uses: Taenifuge.

Average dose: 30 Gm. (1 ounce.)

PHYSOSTIGMA (Calabar Bean.) The ripe seed of physostigma venenosum. Should contain not less than 0.15 per cent. of alkaloids soluble in ether. Habitat: Africa. A member of the pulse family.

The principal constituent is the alkaloid physostigmine, or eserine.

Official preparations: Extract and tincture.

Uses: Similar to strychnine. Physostigma contracts the pupil of the eye.

Average dose: 0.100 Gm. (1½ grains.)

PHYTOLACCA. (Poke Root. Phytolacca Radix U, S. P. 1890). The dried root of phytolacca decandra. Habitat: North America.

No principal constituent identified.

Official preparation: Fluidextract.

Uses: Alterative, emetic.

Average dose: Alterative, 0.125 Gm. (2 grains); emetic, 1 Gm. (15 grains.)

PIMENTA. (Allspice). The dried nearly ripe fruit of pimenta officinalis.

Allspice belongs to the myrtaceae family which also includes eucalyptus and cloves. The supply comes principally from the West Indies.

The principal constituent is the volatile oil (10 per cent.); the fruit also contains about 8 per cent. of fixed oil.

No official preparations.

Uses: Carminative, aromatic.

Average dose: 1 Gm. (15 grains.)

PIPER. Pepper. (Black Pepper). The dried, unripe fruit of piper nigrum. Family, piperaceae. Habitat, India.

Principal constituents: An aromatic volatile oil chuvicin (a pungent resin) and piperine (a neutral principle.)

Official preparation: Oleoresin.

Uses: Carminative, stimulant, condiment.

Average dose: 0.500 Gm. (7½ grains.)

PIPERINA. Piperine. a freebly basic substance obtained from pepper and other plants of the piperaceae.

Piperine is obtained from freshly prepared oleoresin. After the piperine has been taken out the oleoresin is known, commercially, as **oil of pepper.**

Piperine is insoluble in water but soluble in 15 parts of alcohol.

Average dose: 0.200 Gm. (3 grains.)

PODOPHYLLUM. (Mandrake. May Apple). The dried rhizome of podophyllum peltatum. A member of the barberry family. Habitat: America.

The principal constituent is the resin (4 to 6 per cent.) official under the title resina podophylli and commonly known as podophyllin.

Official preparations: Fluidextract and resin.

Uses: Hydragogue cathartic.

Average dose: 0.500 Gm. (7½ Grains).

PRUNUM. Prune. The partly dried fruit of prunus domestica. This fruit comes principally from France.

Constituents: Sugar (12 to 25 per cent.) pectin and malic acid.

Official preparation: Confection of senna.

Uses: Laxative, nutrient.

PRUNUS VIRGINIANA. Wild Cherry. The bark of prunus serotina Ehrhart (prunus virginiana Miller) which should be collected in autumn and carefully dried and preserved.

Principal constituents: Volatile oil and hydrocyanic acid which do not pre-exist in the drug but are formed in the presence of water.

Official preparations: Fluidextract, infusion and syrup.

Uses: Mild sedative, tonic.

Average dose: 2 Gm. (30 grains.)

PYRETHRUM. (Pellitory). The root of anacyclus pyrethrum. A member of the important composite family. The drug comes from Algeria.

Principal constituents: Inulin (35 per cent.) an acrid resin, and two acrid oils (pyrethin and pellitorine.

Official preparation: Tincture.

Uses: Sialagogue.

Average dose: 2 Gm. (30 grains.)

QUASSIA. The wood of picrasma excelsa, known commercially as Jamaica quassia or of quassia amara, known commercially as Surinam quassia.

A tree, resembling the ash, found in Jamaica and other West India islands.

Principal constituents: Quassin (from quassia amara) and picrasmin, (from picrasma excelsa) analagous bitter principles.

Official preparations: Extract, fluidextract and tincture.

Uses: Bitter tonic.

Average dose: 0.5 Gm. (7½ grains.)

QUERCUS. White Oak. (Quercus Alba, U. S. P. 1890.) The dried bark of quercus alba, collected from trunks or branches 10 to 25 years of age, and deprived of the periderm (the outer layer of bark.) A large tree found in many parts of the United States.

Principal constituents: Quercittanic acid (6 to 12 per cent.) The young bark contains a greater percentage than the old bark.

Official preparation: Fluidextract.

Uses: Astringent.

Average dose: 1 Gm. (15 grains.)

QUILLAJA. (Soap Bark.) The dried bark of quillaja saponaria, deprived of the periderm. A tree of medium size, found in South America.

Principal constituent: Saponin.

Official preparations: Fluidextract and tincture.

Uses: As an emulsifying agent, soda foam and for cleaning cloth. A splendid emulsifying agent but objectionable because of its irritating properties.

RHAMNUS PURSHIANA. Cascara Sagrada. The dried bark of rhamnus purshiana.

The source of this important drug is a large shrub or small tree found in Northern California, Oregon and Washington.

Extracts from the fresh bark cause griping, hence the Pharmacopoeia directs that the bark should be collected at least one year before being used.

The principal constituents are frangulin, (which is a mixture of frangulic acid and emodin), and a bitter resin; the latter may be modified by magnesium oxide as is done in the aromatic fluidextract.

Official preparations: Fluidextract, aromatic fluidextract, and extract.

Uses: Cathartic.

Average dose: 1 Gm. (15 grains.)

RHEUM. Rhubarb. The dried rhizome of rheum officinale, rheum palmatum and the variety, tanguticum, or probably other species of rheum, grown in China and Thibet, and deprived of most of the bark and carefully dried.

Principal constituents: Cathartic acid chrysophan, (chrysophanic acid), emodin, resins, rheotannic acid, starch, etc.

Official preparations: Extract, fluidextract, syrup and aromatic syrup (the latter from aromatic tincture) tincture and aromatic tincture, compound powder, compound pills, mixture of rhubarb and soda.

Uses: Cathartic and astringent. The cathartic properties are due to cathartic acid (which is also the purgative principle of senna); the astringent properties are due to rheotannic acid.

Average dose: 1 Gm. (15 grains.)

RHUS GLABRA. (Sumac.) The dried fruit of rhus glabra. A member of the cashew family which includes rhus tox (poison ivy) and rhus arom. (sweet sumac.) It is found in many parts of the United States.

The principal constituent is calcium and potassium malate.

Official preparation: Fluidextract.

Uses: Refrigerant, astringent; as a gargle in sore throat.

Average dose: 1 Gm. (15 grains.)

ROSA GALLICA. Red Rose. The dried petals, collected before expanding. This rose bush is cultivated principally in Europe.

The principal constituent is quercetin.

Official preparations: Fluidextract, (from which is prepared the syrup and honey) confection, pills of aloes and mastic.

Uses: Mildly tonic and astringent; chiefly as a vehicle.

RUBUS. (Blackberry Root.) The dried bark of the rhizome of rubus villosus. A member of the rose family; grows wild in many parts of the United States, also cultivated for the fruit.

Tannin is the principal constituent.

Official preparations: Fluidextract, from which is prepared the syrup.

Uses: Astringent, in diarrhœa.

Average dose: 1 Gm. (15 grains.)

SABAL. (Saw Palmetto). The partially dried fruit of serenoa serrulata.

This important member of the palm family grows extensively in Florida. The fruit is of a reddish-brown color and about the size of a pea. It contains a thick, resinous, oily substance.

No official preparation.

Uses: Diuretic.

Average dose: 1 Gm. (15 grains.)

SABINA. Savin. The tops of juniperus sabina. A small bushy shrub found in Southern Europe and Levant.

The principal constituents are a volatile oil, similar to oil of turpentine, and a resin.

Official preparation: Fluidextract.

Uses: Emmenagogue.

Average dose: 0.5 Gm. 7½ grains.)

SALVIA. (Sage.) The dried leaves of salvia officinalis. A member of the labiatae (mint family.)

Principal constituents: A volatile oil, which contains pinene, cineol, salviol, etc.

No official preparations.

Uses: Carminative, tonic, stimulant; principally in infusions.

Average dose: 2 Gm. (30 grains.)

SANGUINARIA. (Blood Root. Red Puccoon Root.) The dried rhizome of sanguinaria canadensis, collected after the death of foliage.

Blood root is a member of the poppy family (which includes opium). It is a low perennial, common to the rich woods of North America.

The principal constituent is the alkaloid sanguinarine. The pure alkaloid is white but the salts are bright red.

Official preparations: Fluidextract and tincture.

Uses: Expectorant, emetic.

Average dose: 0.125 Gm. (2 grains.) For emetic 1 Gm. (15 grains.)

SANTALUM RUBRUM. Red Saunders. The heart wood of pterocarpus santalinus. A member of the pulse family. A large tree grown in Madras.

The principal constituent is the red coloring matter, santalin.

Official preparation: Compound tincture of lavender.

Uses: As a coloring agent.

SANTONICA. (Levant Wormseed.) The dried unexpanded flower-heads of artemisia pauciflora. Family compositae. It is a low shrub and grows in Russia and Persia.

Principal constituent: Santonin.

No official preparations.

Uses: Anthelmintic. Seldom employed except in the form of santonin.

SANTONINUM. Santonin. The inner anhydride or lactone of santonic acid, obtained from santonica. Should be kept in dark bottles.

Santonin is a neutral principle.

Uses: Anthelmintic.

Average dose: 0.065 Gm. (1 grain.)

SARSAPARILLA. The dried root of smilax medica, smilax ornata, smilax papyracea, or a dried root known commercially as Honduras sarsaparilla, which is probably obtained from smilax officinalis. Family liliacae (the lily family.)

Sarsaparilla comes principally from Honduras. The native root does not answer official requirements.

The active constituent is parellin (a glucoside.)

Official preparations: Fluidextract, compound fluidextract and compound syrup.

Uses: Alterative; of little value.

Average dose: 2 Gm. (30 grains.)

SASSAFRAS. The dried bark of the root of sassafras variifolium, collected in early spring and fall and deprived of the periderm. Family lauraceae (laurel family.)

A tree, varying greatly in size, found in many parts of the United States.

The principal constituent is a volatile oil (1 per cent.)

No official preparations.

Uses: Carminative, diaphoretic (in infusion.)

Average dose: 8 Gm. (120 grains.)

SASSAFRAS MEDULLA. Sassafras Pith. The dried pith of sassafras variifolium.

The principal constituent is a mucilage which is not precipitated from aqueous solution upon the addition of alcohol.

Official preparation: Mucilage.

Uses: Demulcent.

SCILLA. Squill. The bulb of urginea maritima deprived of its dry, membranaceous, outer scales, cut into thin slices and carefully dried, the central portions being rejected.

Squill belongs to the lily family (liliaceae). The bulb grows like an onion, partially imbedded in the soil. It has a flowering stem. It grows in dry, sandy, places near the Mediterranean.

The active constituents are scillipicrin, scillitoxin and scillin.

Official preparations: Fluidextract, tincture and vinegar. From the vinegar is made the syrup and from the fluidextract is made the compound syrup.

Uses: Expectorant, diuretic.

Average dose: 0.125 Gm. (2 grains.)

SCOPARIUS. (Broom Tops.) The dried tops of cytisus scoparius. Family leguminosae (pulse family).

This is a small shrub which grows in many parts of Europe and Asia.

The principal constituents are sparteine (a liquid alkaloid) and scoparin (a neutral principle.)

No official preparations.

Uses: Diuretic.

Average dose: 1 Gm. (15 grains.)

SCOPOLA. The dried rhizome of scopola carniolica. Should yield 0.5 per cent. of mydratic alkaloids.

A member of the solanaceae (night shade) family. Found principally in Central Europe.

The principal constituent is scopolamine, an alkaloid identical with hyoscine.

Official preparations: Extract and fluidextract.

Uses: Narcotic, sedative.

Average dose: 0.045 Gm. (¾ grain.)

SCUTELLARIA. (Skull cap.) The dried plant of scutellaria lateriflora.

The principal constituents are a bitter glucoside (scutellarin) and a trace of volatile oil.

Official preparation: Fluidextract.

Uses: Antispasmodic, tonic.

Average dose: 1 Gm. (15 grains.)

SENEGA. (Seneka. Seneka Snake Root). The dried root of polygala senega. Family polygaleae (milkwort family.)

This plant is found in many parts of the United States.

The active constituents are the acrid principles, polygalic acid and senegin.

Official preparations: Fluidextract (from the fluidextract, syrup of senega and compound syrup of squill.)

Uses: Expectorant.

Average dose: 1 Gm. (15 grains.)

SENNA.. The dried leaflets of cassia acutifolia **(Alexandria senna)** or of cassia augustifolia **(India senna.)** Family leguminosae.

The leaf of India senna is much larger than the leaf of Alexandria senna. Cultivated India senna is known as **Tinnevelly senna.**

The principal constituent is cathartic acid (a glucoside) which is soluble in water but insoluble in alcohol. It also contains a bitter, griping, resin, soluble

in alcohol. For this reason the fluidextract is made by percolation with alcohol which is rejected and then with diluted alcohol which extracts the cathartic acid and leaves the resin.

Official preparations: Fluidextract (which is used in the preparation of the syrup), confection, compound infusion and compound licorice powder.

Uses: Cathartic.

Average dose: 4 Gm. (60 grains.)

SERPENTARIA. (Virginia Snake Root.) The dried rhizome and roots of aristolochia serpentaria (Virginia serpentaria) or of aristolochia reticulata (Texas serpentaria.)

The properties of Texas and Virginia snake root are the same but the Texas root is about twice the size of Virginia root.

The principal constituents are a volatile oil (½ per cent.), which is chiefly borneol, and a bitter principle, aristolochine.

Official preparations: Fluidextract, tincture, compound tincture of cinchona.

Uses: Tonic, alterative.

Average dose: 1 Gm. (15 grains.)

SINAPIS ALBA. White Mustard. The seed of sinapis alba.

SINAPIS NIGRA. Black Mustard. The seed of brassica nigra.

The mustard plant is cultivated in Southern Europe and Asia.

The active constituent of both white and black mustard is a pungent volatile oil. This oil does not pre-exist in the mustard but is produced upon the addition of water through the action of a ferment upon

the glucoside. Mustard seed also contains 25 per cent. of fixed oil.

Powdered mustard is sometimes adulterated with starch; the Pharmacopoeia provides a test. It is frequently colored artificially with turmeric, the natural color of powdered mustard is gray to greenish-brown.

Official preparation: Mustard paper (from powdered black mustard).

Uses: Externally; rubefacient and counter-irritant. Internally; emetic.

Average dose: (Emetic) 8 Gm. (120 grains.)

SPIGELIA. (Pink Root). The dried rhizome and roots of spigelia marilandica.

The active constituent is a volatile alkaloid, spigeline.

Official preparation: Fluidextract.

Uses: Vermifuge.

Average dose: 4 Gm. (60 grains.)

STAPHISAGRIA (Stavesacre.) The ripe seed of delphinum staphisagria.

A member of the crowfoot family which includes aconite, cimifuga and hydrastis. It is an herb, grown in many parts of Europe. The plant is similar to our common garden larkspur.

The principal constituent is delphinine, a poisonous alkaloid.

Official preparation: Fluidextract.

Uses: Internally; similar to aconite (seldom employed). Externally; to destroy vermin.

Average dose: 0.065 Gm. (1 grain.)

STILLINGIA. (Queen's Root.) The dried root of stillingia sylvatica. Family, euphorbiaceae, (spurge family.) Found in the Atlantic coast states from Virginia south.

The active constituent not determined. Probably a volatile oil since old roots are almost inert.

Official preparation: Fluidextract.

Uses: Alterative, antisyphilitic.

Average dose: 2 Gm. (30 grains.)

STRAMONIUM. (Thorn Apple. Jimson Weed. Stramonii folia U.S.P. 1890.) The dried leaves of datura stramonium. Must yield 0.35 per cent. of mydratic alkaloids.

Stramonium is a member of the solanaceae or night shade family which also includes belladonna and hyoscyamus. As a weed it is found in many parts in the United States.

The principal constituent is daturine which is a mixture of atropine and hyoscyamine.

Official preparations: Extract, tincture and fluidextract.

Uses: Similar to belladonna; employed chiefly in asthma.

Average dose: 0.065 Gm. (1 grain.)

STROPHANTHUS. The ripe seed of strophanthus kombe deprived of its long awn. Family apocynacea (dogbane.)

"The awn, referred to in the official definition is a feather-like appendage to the seed, intended to aid in transportation of the seed by the wind."—Arny.

Strophanthus is a woody climber, running to the tops of high trees. It is a native of Asia and Africa.

The active constituent is strophanthin, a bitter glucoside.

Official preparation: Tincture.

Uses: Similar to digitalis.

Average dose: 0.065 Gm. (1 grain.)

SUMBUL. (Musk Root.) The dried rhizome and root of an undetermined plant, probably of the family umbelliferae. (Parsley family.)

The plant is a perennial and grows from 8 to 10 feet high, in Europe.

Principal constituents: Sambulic and valerianic acids, two balsamic resins.

Official preparations: Fluidextract and extract, (the extract from the fluidextract.)

Uses: Nerve stimulant.

Average dose: 2 Gm. (30 grains.)

TAMARINDUS. Tamarind. The preserved pulp of the fruit of tamarindus indica. Family leguminosae.

The tamarind or Indian date is a large tree which grows in India and Africa.

The principal constituents are tartaric acid and potassium bitartrate.

Official preparation: Confection of senna.

Uses: Laxative.

Average dose: 16 Gm. (240 grains.)

TARAXACUM. Dandelion. The dried root of taraxacum officinale collected in autumn. Family compositae.

The plant is found in nearly all parts of the United States but most of the roots found in the market are imported.

The principal constituents are taraxacin, taraxacerin, inulin and sugar. Spring dug roots contain considerable sugar and little inulin, but if allowed to remain in the ground until fall most of the sugar is converted into inulin.

Official preparations: Extract and fluidextract.

Uses: Hepatic stimulant.

Average dose: 8 Gm. (120 grains.)

TRITICUM. (Couch Grass.) The dried rhizome of agropyron repens, gathered in the spring. Family gramineae (Grass family.)

The principal constituents are triticin (a mucilagenous substance) glucose, malates, etc.

Official preparation: Fluidextract.

Uses: Diuretic.

Average dose: 8 Gm. (120 grains.)

ULMUS. Elm. (Slippery Elm Bark.) The dried bark of Ulmus fulvia deprived of its periderm. Family ulmaccae.

The slippery elm is found in many Eastern states. The official drug consists of the inner, smooth, bark only. It has a distinct mucilagenous taste.

Mucilage is the principal constituent.

Official preparation: Mucilage of elm.

Uses: The ground bark is used as a poultice, the mucilage as a base for cough remedies.

UVA URSI. (Bearberry.) The dried leaves of arctostaphylos uva-ursi. Family ericaceae (Heath family.)

A shrub which grows in dry soil in Eastern Canada and the United States north of New Jersey.

Principal constituents: Arbutin and ercolin (bitter glucosides) ursone, tannic acid, gallic acids.

Official preparation: Fluidextract.

Uses: Diuretic, astringent, urinary antiseptic.

Average dose: 2 Gm. (30 grains.)

VALERIANA. Valerian. The dried rhizome and roots of valeriana officinalis. Family, valerianeae. Habitat, Europe.

The principal constituent is a complex volatile oil which contains valerianic acid in the form of an ester.

Official preparations: Fluidextract, tincture and ammoniated tincture.

Uses: Antispasmodic, in hysteria.

Average dose: 2 Gm. (30 grains.)

VANILLA.. The cured, full grown, but immature fruit of vanilla planifolia. Family, orchidaceae (orchis.)

A climbing orchis cultivated chiefly in Mexico and Bourbon.

The chief constituent is vanillin.

Official preparation: Tincture.

Uses: Flavoring.

VERATRUM. (Veratrum Viride, U.S.P. 1890.) The dried rhizome and roots of **veratrum viride (American Hellebore)** or **veratrum album (White Helleboroe.)** Family, liliaceae (lily.) Habitat; NorthAmerica (American hellebore) Europe (while hellebore.)

Principal constituents: Of veratrum viride: the alkaloids jervine, pseudojervine, rubijervine and veratroidine with perhaps a small amount of veratrine.

It should be noted that veratrine is not the active principle of veratrum, the source of this alkaloid is cevadilla seed.

Official preparations: Fluidextract and tincture.

Uses: Similar to aconite.

Average dose: 0.25 Gm. (2 grains.)

VIBURNUM OPULUS. (Cramp Bark.) The dried bark of viburnum opulus. Family, capirifoliaceae, (honeysuckle.) A shrub found in many parts of the United States.

VIBURNUM PRUNIFOLIUM. (Black Haw.) The dried bark of the root of viburnum prunifolium or of viburnum lentago. Family, caprifoliaceae.

The principle constituents of both drugs are a bitter resinous principle (viburnin) and valerianic acid.

Official preparations: Fluidextract of viburnum prunifolium.

Uses: Nervine, uterine tonic. Said to have slight medicinal value.

Average dose: (both drugs) 2 Gm. (30 grains.)

XANTHOXYLUM. (Prickly Ash.) The dried bark of xanthoxylum Americanum. (Northern prickly ash) or of fagara clava-herculis (Southern prickly ash.) Family rutaceae (rue). Found in many parts of the United States.

Principal constituent: Xanthoxylin (a bitter principle,) a volatile oil and resin.

Official preparation: Fluidextract.

Uses: Alterative, sialagogue, diuretic.

Average dose: 2 Gm. (30 grains.)

ZEA. (Corn Silk) The fresh styles and stigmas of zea mays (corn.) Family gramineae (grass family.)

The principal constituent is maizenic acid.

No official preparations.

Uses: Mild diuretic.

ZINGIBER. Ginger. The dried rhizome of zingiber officinale. Family zingiberaceae.

Habitat: Africa, cultivated in West Indies. The best quality is grown in Jamaica.

Principal constituents: A volatile oil, a resinous substance and gingerol.

Official preparations: Fluidextract, tincture, syrup (from fluidextract;) oleoresin ,aromatic powder, compound rhubarb powder.

Uses: Stimulant, carminative, aromatic.

Average dose: 1 Gm. (15 grains.)

SUMMARY OF NATURAL ORDERS.

Organic drugs are usually classified according to their natural order or family. The following is a summary of the principal natural orders, with list of official vegetable drugs.

Natural Order.	Official Name.	Common Name.	Part Used.
Anacardiaceae (Cashew family)	Rhus glabra	Sumac	fruit
Apocynaceae (Dogbane family)	Apocynum	Canadian hemp	root
	Strophanthus	Strophanthus	seed
Aristolchiaceae (Bethwort family)	Serpentaria	Virginia snake root	rhizome and roots
Aroideae (Arum family)	Calamus	Sweet flag	rhizome
Berberidaceae (Barberry family)	Berberis	Oregon grape	root
	Podophyllum	Mandrake	rhizome
Campanulaceae (Campanula family)	Lobelia	Indian tobacco	herb
Caprifoliaceae (Honeysuckle family)	Viburnum opulus	Cramp bark	bark
	Viburnum prunifolium	Black haw	Bark of root
Celastrinaceae (Staff-tree family)	Enonymus	Wahoo	bark

Natural Order.	Official Name.	Common Name.	Part Used.
Compositae (Composite family)	Anethemis	Roman chamomile	flowers
	Arnica	Arnica flowers	flowers
	Calendula	Marigold	flowers
	Eupatorium	Boneset	herb
	Grindelia	Grindelia	herb
	Lactucarium	Wild lettuce	milk juice
	Lappa	Burdock	root
	Matricaria	German chamomile	flower heads
	Pyrethrum	Pellitory	root
	Santonica	Levant wormseed	flower heads
	Taraxacum	Dandelion	root
Coniferae (Pine family)	Sabina	Savin	tops
Convolvulaceae (Convolvulus family)	Jalapa	Jalap	tuber
	Scammonium	Scammony	gum-resin
Cruciferae (Mustard family)	Sinapis alba	White mustard	seed
	Sinapis nigra	Black mustard	seed
Cupuliferae (Oak family)	Galla	Nutgall	excrescence
	Quercus	White oak	bark
Cucurbitaceae (Gourd family)	Colocynthis	Bitter apple	fruit
	Pepo	Pumpkin seed	seed
Ericaceae (Heath family)	Chimaphila	Pipsissewa	leaf
	Uva ursi	Bearberry	leaf
Erythroxylaceae (Spurge family)	Elastica	Rubber	juice
	Stillingia	Queen's root	root

Filices (Ferns)	Aspideum	Male fern	rhizome
Gentianeae (Gentian family)	Chirata	Chiretta	herb
	Gentiana	Gentian	root
Geraneaceae (Geranium family)	Geranium	Cranesbill	rhizome
Gramineae (Grass family)	Amylum	Corn starch	starch
	Triticum	Couch grass	rhizome
	Zea	Corn silk	stylis and stigmas
Guttiferae	Cambogia	Gamboge	gum-resin
Hamamelidiceae (Witch Hazel family)	Hamamelidis	Witch Hazel	bark and leaves
	Styrax	Storax	resin
Hydrophyllaceae (Waterleaf family)	Eridictyon	Yerba santa	leaf
Labiatae (Mint family)	Hedeoma	Pennyroyal	herb
	Marrubium	Horehound	herb
	Mentha piperita	Peppermint	herb
	Mentha viridis	Spearmint	herb
	Salvia	Sage	herb
	Scutellaria	Skullcap	herb
Lauriaceae (Laurel family)	Camphora	Camphor	steropten
	Cinnamonium	Cinnamon	bark
	Sassafras	Sassafras	bark of root

Natural Order.	Official Name.	Common Name.	Part Used.
Leguminosae (Pulse family)	Acacia	Gum arabic	exudate
	Balsamum Peruvianum	Balsam Peru	balsam
	Balsamum tolutarium	Balsam tolu	balsam
	Cassia fistula	Purging cassia	fruit
	Copaiba	Balsam copaiba	oleoresin
	Gambir	Catechu	extract from wood
	Glycyrrhiza	Licorice	root
	Haematoxylon	Logwood	wood
	Kino	**Gum kino**	insp. juice
	Physostigma	Calabar bean	fruit
	Santalum	Red saunders	wood
	Senna	Senna	leaf
	Scoparius	**Broom tops**	tops
	Tamarindus	Tamarind	pulp
	Tragacanth	Tragacanth	exudation
Liliaceae (Lily family)	Aloe	Gum aloes	insp. juice
	Colchici	Colchicum	seed
	Convallaria	Lily of valley	rhizome
	Sarsaparilla	Sarsaparilla	root
	Scilla	Squill	bulb
	Veratrum	Hellebore	rhizome
Linaceae (Flax family)	Linum	Flax seed	seed
Loganiaceae (Logania family)	Gelsemium	Yellow jasmine	rhizome
	Nux vomica	Dog button	seed
	Spigelia	Pink root	rhizome

Malvaceae (Mallow family)	Althae	Marshmallow	root
	Gossypii cortex	Cotton root bark	bark
	Gossypium purificatum	Absorbent cotton	
Menispermaceae (Moonseed family)	Calumba	Calumbo	root
	Pareira	Pareira brava	root
Myristicaceae	Myristica	Nutmeg	seed kernel
Myrtaceae	Caryophyllus	Cloves	buds
	Eucalyptus	Eucalyptus	leaf
	Pimento	Allspice	fruit
Oleaceae (Olive family)	Manna	Manna	exudation
Orchidaceae (Orchis family)	Cypripedium	Ladies slipper	rhizome
	Vanilla	Vanilla	fruit
Palmae (Palm family)	Sabul	Saw palmetto	fruit
Papaveraceae (Poppy family)	Opium	Opium	concrete juice
	Sanguinaria	Bloodroot	rhizome
Phytolaccaceae (Poke weed family)	Phytolacca	Poke root	root
Piperaceae (Pepper family)	Cubeb	Cubeb	fruit
	Matico	Matico	leaf
	Piper	Black pepper	fruit
Polygaleae (Milkwort family)	Krameria	Rhatany	root
	Senega	Snake root	root
Polygoneae (Buckwheat family)	Rheum	Rhubarb	root

Natural Order.	Official Name.	Common Name.	Part Used.
Pumicaceae (Pomegranite family)	Granatum	Pomegranite	bark
Ranunculaceae (Crowfoot family)	Aconitum	Aconite	tuber
	Cimicifuga	Black cohosh	rhizome
	Hydrastis	Golden seal	rhizome
	Staphisagria	Stavesacre	seed
Rhamnaceae (Buckthorn family)	Frangula	Buckthorn	bark
	Rhamnus purshiana	Cascara sagrada	bark
Rosaceae (Rose family)	Amygdala amara	Bitter almond	seed
	Amygdala dulcis	Sweet almond	seed
	Cusso	Kousso	flowers
	Prunum	Prune	fruit
	Prunus virginiana	Wild cherry	bark
	Quillaja	Soap bark	bark
	Rose gallica	Red rose	petals
	Rubus	Blackberry	bark of root
Rubiaceae (Madder family)	Cinchona	Peruvian bark	bark
	Ipecacuanha	Ipecac	root
Rutaceae (Rue family)	Aurantii amari	Bitter orange	peel
	Aurantii dulcis	Sweet orange	peel
	Buchu	Buchu	leaf
	Limonis	Lemon	peel and juice
	Pilocarpus	Jaborandi	leaf
	Xanthoxylum	Prickly ash	bark
Sapindaceae (Soapberry family)	Guarana	Guarana	dried paste

Scrophulariaceae (Figwort family)	Digitalis	Fox glove	leaf
	Leptandra	Culvers root	rhizome and root
Simarubaceae (Simaruba family)	Quassia	Quassia	wood
Solanaceae (Night shade family)	Belladonna	Deadly night shade	leaf and root
	Capsicum	Cayenne pepper	fruit
	Hyoscyamus	Henbane	leaf
	Scopola	Scopola	rhizome
	Stramonium	Thorn apple	leaf
Styraceae (Storax family)	Benzoinum	Benzoin	resin
Thymeleaceae (Mezereum family)	Mezereum	Mezereon	bark
Umbelliferae (Parsley family)	Anisum	Anise	fruit
	Asafoetida	Asafetida	gum-resin
	Carum	Caraway	fruit
	Conium	Poison hemlock	fruit
	Coriandrum	Coriander	fruit
	Foeniculum	Fennel	fruit
	Sumbul	Musk root	root
Urticaceae (Nettle family)	Cannabis indica	Indian hemp	tops
	Ficus	Fig	fruit
	Humulus	Hops	strobiles
	Lupulinum	Lupulin	tricomes
	Ulmus	Elm	bark
Valerianeae	Valeriana	Valerian	rhizome and roots
Zingiberaceae	Cardamomum	Cardamom	fruit
	Zingiber	Ginger	rhizome

CHAPTER XXXI.

INCOMPATIBILITY.

Substances are said to be incompatible when they are incapable of mixture without undergoing some chemical or physical change which may impair or destroy the usefulness of a compound or which may produce a poisonous or a dangerous compound.

Incompatibility occurs in both solids and liquids and may be **chemical, physical or therapeutical.**

Substances may be chemically incompatible or physically incompatible yet therapeutically they may be compatible. For example the familiar black wash, a mixture of calomel and lime in solution which is incompatible chemically.

Chemical incompatibility is of greatest importance. It is generally due to the well known tendency of salts in solution to decompose, when in the presence of others, and then form new combinations. The new combinations may contain insoluble salts which will be precipitated, gases may be generated which will cause an explosion if confined, or poisonous compounds may be formed.

Examples of Chemical Incompatibility.

The most important and the most dangerous is the precipitation of alkaloids or alkaloidal salts by alkalies or alkaline salts.

1.

Strychnine sulphate ..... gr. i
Potassium bromide ..... ʒ i
Aqua—q.s. ad ..... ʒ iv
ft. sol.

Strychnine sulphate is soluble in 30 parts of water. If this solution is added to one containing an alkaline salt like bromide of potassium the sulphate of strychnine, is decomposed, and the pure strychnine, being practically insoluble in water, is precipitated. The precipitation does not take effect at once. A clear mixture may be dispensed, from which, after a few hours, the strychnine will begin to precipitate and result in a fatal dose before the contents of the bottle is exhausted.

As strychnine is soluble in alcohol the presence of alcohol in this prescription will prevent the strychnine from precipitating. If one-half the water be replaced by simple elixir no precipitate will result.

Another example of the precipitation of an alkaloid is shown in the following:

2.

Morphine sulphate ..... gr. ii
Potassium bicarbonate ..... ʒ iss
Aqua—q.s. ad ..... ʒ ii

In this prescription the morphine is precipitated by the alkaline carbonate and if the bottle is not shaken the last dose will contain most of the morphine.

3.

Potass. chloras ..... 3 ii
Syr. ferri iodide ..... 3 vi
Vin antimonii ..... 3 ss
Spts. chloroform ..... 3 ii
Aqua carui—q. s. ..... ʒ viii

In this prescription the chlorate frees the iodine; free iodine is very irritating and the prescription forms a dangerous mixture.

4.

Liq. potass. arsen..... ℥ i
Syr. ferri iodide.....℥ iii
Syrupus—q.s. .....℥ iv

Insoluble iodide of arsenic is precipitated.

5.

Hydrarg bichlor.....gr. iii
Potass. iodide ..... ℥ iii
Tr. cinchona comp..... ℥ iv

The alkaloids contained in the tincture will be precipitated.

6.

Sodii salicyl .....gr. xxx
Spts. aeth. nit.....M xxx
Aqua ..... ℥ ii

Spts. nitre if U.S.P. is neutral but it is usually found to be acid. It should be tested with litmus and if acid neutralized with potass, bicarb.

7.

Potass, permang .....℥ i
Glycerin .....℥ ii
Equa—q. s. .....℥ i

Potass. permanganate should not be mixed with any other chemical that is easily oxidized. An explosion may result.

8.

Zinc. sulph.....gr. xl
Liq. plumbi subacet..... ℥ iss
Tr. opium ..... ℥ ss
Aqua—q. s..... ℥ vi

In this prescription all the lead will be precipitated by the sulphate.

9

Sodium biborat ..... gr. xx
Zinc sulph. ..... gr. v
Aq. rosae—q. s. ..... ℥ iii

In this prescription the zinc may be precipitated as borate.

10.

Ferri phosph. scale ..... ʒ ii
Syr. zingib ..... ℥ ss
Acid phosph. dil. ..... ℥ ss
Aqua, q. s. ..... ℥ viii

Insoluble ferric phosphate is produced upon the addition of the phosphoric acid.

11.

Ferri et quinine cit ..... ʒ ii
Potass. iodide ..... ʒ iii
Syrup ..... ʒ vi
Aqua—q. s. ..... ℥ iv

Free iodine is liberated. Iodine in potassium iodide solution precipitates alkaloids. In this prescription a blackish precipitate or periodide of quinine is produced.

Chemically But Not Therapeutically Incompatible.

The following prescriptions are chemically incompatible from the fact that a chemical change takes place yet the prescriptions may not be therapeutically incompatible.

1.

Quinine sulph. ..... grs. xxx
Acid sulph. arom. ..... q. s.
Elixir licorice ad ..... q. s. ..... ℥ iv

The intent is to add the quinine to the elixir and sufficient aromatic sulphuric acid to dissolve the sul-

phate of quinine, but the object is defeated because glycyrrhizin, the sweet principle of licorice, is soluble only in alkaline solutions, hence the elixir is slightly alkaline and this is neutralized by the acid which results in an unsightly precipitate and should not be dispensed without a shake label.

2.

Ammonii carbonatis ..... ℥ i
Syr. scillae .....
Syr. ipecac .....aa..... ℥ i
Syr. tolu .....q. s.....ad.....℥ iv

In this prescription both the syrups of ipecac and squill contain acetic acid which, combined with the ammonium carbonate, causes effervescence. It should be mixed in an open vessel and allowed to stand until effervescence ceases.

Examples of Intentional Incompatibility.

1.

Oil mentha pip. ..... gtt. x
Sat. sol. boracic acid ..... ℥ xii
Sig. Use as gargle.

This should be dispensed with a shake label.

2.

Liq. plumb. subacet ..... mx l
Mucilage acacia ..... ℥ iv
Aqua .... q. s. ..... ℥ iv
ft. lotio.

Intended to form a thin astringent coating upon the skin.

Methods of mixture may produce either physical or chemical incompatibility or both while slight change may overcome it.

Examples: **1.**

Thymol ..... gr xxx
Sodium borate ..... grs. vl
Aqua .... q. s. ..... ℥ ii

If mixed together a mass floats upon the surface but if the thymol is dissolved in a little alcohol and the borax in the water and the two solutions mixed a fairly compatible mixture is obtained.

2.

Resorcin ..... 3 ss
Sodium borate ..... 3 ss
Cocaine hydrochlor ..... gr.xv
Aqua foeniculi ..... ℥ viii
Sig. Eye lotion.

This makes a turbid mixture. If filtered the active constituents will be removed. By simply using boric acid in place of sodium borate a clear solution results.

3.

Sodium nitrate ..... 3 iss
Sparteine sulph. ..... 3 i
Strychnine nit. ..... gr. j
Ext. digitalis .....gr. viii
Codeine ..... gr. x
Aloin ..... gr. v
ft. capsules No. 60.

This prescription, when compounded, evolves nitrogen oxide and turns green. The addition of a small amount of magnesium oxide neutralizes the acidity of the sparteine sulphate.

4.

Cocaine hydrochloride ..... gr. iv
Ol. amygdalae ..... ℥ i
Sol.

Cocaine hydrochloride is insoluble in a fixed oil. Solution may be effected by the use of cocaine alkaloid.

5.

Potass. bromide ..... ℥ iv
Aqua menth. pip. ..... ℥ ii
Sol.

Peppermint water being a saturated solution a portion of the oil is thrown out of solution upon addition of the salt. The difficulty may be overcome by using one half plain water.

6.

Tr. nux vomica .....
Tr. Gentian comp. ..... aa ..... ℥ ss
Tr. cardamon comp. q. s. ..... ℥ viii

A precipitate will form which is due to the difference in the strength of mentrum used for making the tinctures.

7.

Fowlers solution .....
Tr. iodine Churchills ..... aa ..... ℥ ii

This mixture causes slight effervescence. Hydriodic acid is formed by the combination of potass. bicarb (in the Fowlers solution) the difficulty may be overcome by using the official solution of arsenous acid, which is the same strength as the Fowlers solution, in place of Fowlers solution.

8.

Tr. gentian comp. ..... ℥ iv
Fluidext. taraxacum ..... ℥ ss
Fluidext. valerian ..... ℥ iss
Magnesia sulph. ..... ℥ ii
Aqua .....q. s. ..... oss

The amount of alcohol in the tincture and fluid-extracts is sufficient to precipitate the salt. If infusion gentian comp. is used in place of tincture the solution will remain clear.

9.

Tr. guaiac	℥ iv
Vin. colch. rad.	℥ ii
Syr. zingiberis	℥ i
Aqua q. s.	℥ iv

Guaiac is a resin and the tincture is made with alcohol without dilution; hence the resin is precipitated when the tincture is mixed with an aqueous solution. The addition of a small amount of tragacanth will remedy the difficulty.

* * * *

PHYSICAL INCOMPATIBILITY.

Physical incompatibility differs from chemical incompatibility by the absence of chemical action. The common cause is the precipitation or separation from a mixture of two solutions.

Physical incompatibility is caused by the mixture of products which are physically dissimilar and is distinguished by the absence of chemical change, but dissimilar preparations may be mixed and cause a precipitation or separation, yet not be, strictly speaking, incompatible, because the usefulness of the product may not be destroyed, but when the mixture of two solutions causes a precipitation of active constituents it may be said to be physically incompatible and dangerous as well. This condition may be brought about by the admixture of alcoholic with aqueous solutions. If the precipitate be inert simple filtration may suffice to

produce a clear mixture without impairment of medicinal value.

We append a few prescriptions which may be said to be physically incompatible, with explanations of changes that will occur.

1.

Tr. cannabis ind.	1 fluid ounce
Bromide potassium	480 grains
Chloral hydrate	480 grains
Aq. cinnamon q. s.	4 ounces

Tincture cannabis indica is an alcoholic tincture and will throw down a resinous precipitate upon mixture with water.

Alcoholic liquids and bromides are incompatible with chloral, the undesirable and dangerous chloral-alcoholate is liable to be formed.

2.

Magnesium sulphate	4 oz
Tincture ginger	4 oz
Peppermint water	8 oz

The magnesium sulphate may be dissolved in the peppermint water but upon addition of the tincture ginger the magnesium sulphate will be precipitated because it is insoluble in alcohol while the resin of ginger will separate because insoluble in water.

3.

Cocaine hydrochloride	gr. v
Adrenalin, 1 to 1000	℥ ss
Menthol	gr. x
Aqua ad	℥ i

Sig. For external use.

The menthol will not stay in solution.

THERAPEUTIC INCOMPATIBILITY.

Therapeutic incompatibility is the antagonism in the physiological action of drugs, whereby one drug neutralizes or aggravates the effect of another as for example a combination of a stimulant and a sedative, an astringent and a cathartic.

Example:

Elixir pepsin.

Antiseptic sol. alk .....aa..... ℥ ii

Pepsin is only of value in an acid medium, hence elixir of pepsin will be found to be slightly acid. Mixture with an alkaline antiseptic solution neutralizes or makes an alkaline mixture and the pepsin, though it may still remain in solution, becomes inactive.

* * * *

SUMMARY OF INCOMPATIBILITIES.

Acacia. With ferric chloride, alcohol, borax, lead, salts, and ethereal tinctures.

Acetanilide. With spirit of nitrous ether, amyl nitrite, acids.

Acetphenetidin (Phenacetin.) With salicylic acid, iodine, hydrated chloral, phenol, oxidizers.

Acids in general. With alkalies, alkaline fluids, acetates, and metallic oxides.

Acid Arsenous. With lime water, magnesia and oxides of iron.

Acid Benzoic. With lead acetate, ferric salts, acids, corrosive sublimate, solution potassium hydroxide.

Acid Boric. With carbonates, earths, alkaline hydroxides.

Acid Carbolic. With potassium permanganate, iodine,

bromine, caustic alkalies, and iron salts.

Acid Chromic. With glycerin, alcohol, ether, essential oils, and organic matter in general.

Acid Citric. With acetates, mineral acids potassium tartrate, sulphides, alkaline carbonates.

Acid Gallic. With spirits nitrous ether, metallic salts, solutions of lead acetate or opium, iodine, lime water, potassium chlorate or permanganate.

Acid Hydrochloric (Muriatic Acid.) With alkalies, silver salts, chlorates, chromates, oxides, permanganates, tartar emetic, salts of lead.

Acid Hydrocyanic Dilute (Prussic Acid.) With silver nitrate, alkalies, metallic oxides, or carbonates, neutral solutions of morphine salts.

Acid Oleic. With nitric acid.

Acid Oxalic. With ferric salts, calcium salts, alkalies, arsenates.

Acid Phosphoric. With lead acetate, ferric chloride, silver nitrate, solutions iron phosphates.

Acid Picric. With alkaloidal salts, dry acids, iodine, sulphur, and organic salts. (These incompatibilities extend also to the salts of picric acid).

Acid Pyrogallic. With antipyrine, camphor, carbolic acid, iodine, lead acetate, menthol.

Acid Salicylic. With potassium permanganate, iron salts, lime water, potassium iodide, and soap. (These incompatibilities extend also to the salts of salicylic acid.) Alkali salicylates will darken unless an excess of acid be present.

Acid Sulphuric. (Oil of Vitriol.) With silver, mercury and lead salts, alkalies and carbonates, astringent infusions, calcium, barium, hypophosphorus acid.

Acid Tannic. With mucilages, tartar emetic, silver ni-

trate, metallic salts, salts in general, alkaloids and their salts, lime water, potassium chlorate, alkali carbonates and bicarbonates, albumen, gelatin, and chlorine water.

Acid Tartaric. With calcium, mercury, potassium salts vegetable astringents, lead.

Aconite. With hydrogen dioxide, alkaline carbonates, chromates, caustic alkalies, permanganates, benzoates, chlorates, borax, picric and tannic acids, cyanides, iodides, bromides, ichthyol, gold and mercury salts, vegetable astringent. Physiological incompatibilities. Morphine, muscarine, hydrated chloral, aconitine, hydrocyanic acid, physostigmine, phytolacca, quinine, pilocarpine.

Albumen. With mineral acids, alcohol, mercuric chloride, and vegetable astringents.

Alcohol. With acacia, albumin, bromine, chromic acid, permanganates.

Alkaloidal Salts. With borax, tannin, and all vegetable astringents, alkali carbonates, the permanganates, iodides, liquorice, strong mucilages, magnesium carbonate, and alkaline tinctures.

Aloes. With mercury nitrate, silver nitrate.

Alum. With alkalies and alkali carbonates.

Ammonia Aqua. With chlorine water, iodine, alkaloidal salts, acids, etc.

Ammonium Acetate. With mineral acids, alkali carbonates, chlorine, potassium chlorate and dichromate, silver nitrate, mercurous chloride and nitrate.

Ammonium Carbonate. With salts of alkaloids, acids and acid salts or syrups, calomel, tartar emetic.

Ammonium Chloride. With carbonates of the alkalies and earths.

Ammonium Phosphate. With carbonates of the alkalies and earths.

Amyl Nitrite. With alcohol, tinctures in general, alkali carbonates, calomel, lead salts, potassium iodide, the bromides and ferrous salts.

Antimony and Potassium Tartrate (Tartar Emetic). With antipyrine, alkalies, tannic and gallic acids, astringent infusions, lead salts, mercuric chloride.

Antimony Sulphurated. With sodium bicarbonate, potassium bitartrate, bismuth subnitrate and calomel.

Antipyrine. With sodium salicylate (dry), calomel, chloral hydrate, and spirit of nitrous ether if acid.

Apomorphine Hydrochloride. With sodium carbonate and bicarbonate, iodine, tannin and iron salts.

Aristol. With acids, alcohol, ammonia, corrosive sublimate, metallic oxides, starch, alkalies, and alkaline carbonates.

Arsenic Trioxide (Arsenous Acid. Arsenic). With potassium iodide, magnesia, lime water, iron and silver salts, copper, hypophosphorous acid, vegetable astringents.

Atropine. (See Aconite.)

Balsam Peru. With ferric salts, iodoform, hydrogen dioxide.

Barium Chloride. With sulphuric and phosphoric acids and their salts, carbonates, tartrates, vegetable infusions and medicinal wines.

Belladonna. With caustic alkalies, solutions, tannic acid and other vegetable astringents, opium.

Benzoin. With acids, alkalies, water.

Bismuth Subcarbonate. With alkaloidal salts, aluminum, acids, bismuth subnitrate, barium, copper, calcium, lead, iron, silver, manganese, zinc salts, strontium.

Bismuth Subgallate. With acids.

Bismuth Subnitrate. With calomel, tannin, sulphur, and antimony sulphide.

Bromides. With metallic and acid salts, alkaloids, acids, chlorine water, arsenites.

Bromoform. With water, caustic alkalies.

Caffeine. With tannic acid, mercury salts, potassium iodide. Physiological incompatibles; chloral hydrate, physostigmine, morphine.

Calcium Carbonate. With alum, sulphates, acids, ammonium chloride, tartar emetic.

Calcis Liquor (Lime Water.) With mineral, acetic, phosphoric, tartaric and citric acids, muriate of ammonia, alkalies, carbonates, soap, vegetable astringents, alum, ferric and zinc sulphates, magnesia sulphate.

Calcium Chloride. With calomel, sulphates, phosphates, tartrates and carbonates.

Calcium Hypophosphite. With potassium chlorate, iodide, and permanganate; also chlorinated lime. (These incompatibilities extend to all hypophosphites.)

Calomel. (Mercurous Chloride.) With acids, acid salts, alkali carbonates, lime water, ammonium chloride, iodine, potassium iodide, ferrous chloride and iodide, sulphur, bitter almond water, cherry laurel water, antimony sulphide, and antipyrine.

Calumba. (Columbo.) With lead acetate, tartar emetic, mineral acids, silver nitrate, infusion of cinchona or nut galls, ferric salts, ammonia.

Camphor. With beta naphthol, exalgine, menthol, phenol, pyrogallol, resorcin, salol, thymol, chloral hydrate.

Chloral Hydrate. With water (slow decomposition), warm water, alkali carbonates and organic salts, calomel, potassium cyanide, antipyrine, salts of ammonium, mercurous nitrate, permanganates, alcohol, tinctures in general, bromides and iodides.

Chlorine Water. With alkalies and their carbonates, ammonium salts, salts of the organic acids, lead salts, silver nitrate, mucilages, tannin, extracts, tinctures, infusions, emulsions and milk.

Cinchona. With ammonia, lime water, alkalies and their carbonates, gelatin, metallic salts, precipitants of alkaloids, iodine, tannic acid.

Cocaine Hydrochloride. With silver nitrate, mineral acids, mercury salts, alkalies, alkaloidal reagents, menthol, bromides of alkalies, chloroform water. Physiological Incompatibles. Morphine, alcohol, chloral hydrate, amyl nitrite, digitalis, caffeine.

Codeine. With alkalies ,alkaloidal precipitants, alkaline carbonates, cinchona, copper and iron salts, lime water, mercury bichloride, kino, nut gall, silver nitrate, tannic acid.

Colchicum. With tincture of guaiac, iodine, all astringents.

Collodion. With carbolic acid, water.

Copaiba. With mineral acids, aqueous preparations.

Copper Sulphate. With vegetable astringents, arsenical solutions, alkalies and their carbonates, iodides lime water, mineral salts not sulphates, borax, lead acetate, silver nitrate.

Corrosive Sublimate. (Mercuric Chloride.) With lime water, soap, iodine, opium, potassium iodide, organic acids, tannin, and alkali carbonates.

Creosote. With albumin, acacia, silver, gold and iron salts, oxidizers, copper salts.

Creta Praeparata. With tartar emetic, acids, sulphates, ammonium chloride.

Digitalis. With vegetable astringents, acids, lead acetate, alkalies, ferrous sulphate, alkaloidal precipitants. Physiological Incompatibles. Strychnia, aconite, scoparin, cocaine, saponin, hydrated chloral, nitroglycerine, murcarine.

Ergot. With solutions of metallic salts, astringents. caustic alkalies.

Fluidextract Glycyrrhiza. With acids.

Fluidextract Grindelia. With acids, acid salts.

Gelsemium. With caustic alkalies, tannic acid.

Glycerine. With chromic acid, permanganates, nitric acid.

Glycerite Guaiac. With mineral acids, ferric chloride, spirit nitrous ether.

Gold and Sodium Chloride. With vegetable infusions, alkalies, organic substances, arsenites, potassium iodide, hypophosphorous and sulphurous acids, iron and mercurous salts.

Guaiac. With metallic salts, mineral acids, chlorine water, spirit nitrous ether, acacia.

Heroin Hydrochloride. With alkalies.

Hydrastine Hydrochloride. With alkalies, borax, tannic acid.

Hydrogen Peroxide. With alkalies, albumin, ammonia,, arsenous salts, balsam peru, carbolic acid, charcoal, chlorides, chlorine water, citrates of alkalies, ferric salts, glycerine, gold salts, hydrocyanic acid, hypophosphites, iodides, lime water, manganese dioxide, mercurous salts, nitrates, potassium bromide, permanganates, solution chlorinated soda, tartarates, tinctures.

Hyoscyamus. With alkalies, vegetable acids, lead ace tate, silver nitrate.

Ichthyol. With acid and saline solutions, fixed alkalies, their carbonates and iodides, alkaloidal salts, mercuric chloride.

Iodides. With starch, mineral acids, acid salts, bismuth subnitrate, silver nitrate, alkaloids.

Iodine. With ammonia, starch, metallic salts, fatty and volatile oils, emulsions, carbolic acid, chloral hydrate, acacia, tragacanth, magnesium carbonate, sodium thiosulphate (hyposulphite.)

Iodoform. With silver and other nitrates, potassium chlorate, nitrites, and mineral acids. (The modification or destruction of the odor of iodoform by the following substances points to incombatibility, tannin, Peru balsam, tincture of myrrh, naphthalene, cumarin and the volatile oils of anise, bergamont, fennel, peppermint and turpentine.)

Iron Chloride. With sulphites, acacia, thiosulphates, albumin, vegetable decotions, alkalies, sulphides, apomorphine, salicylates, aloin, resorcinol, hydriodic acid, morphine, gallic acid, oil of cloves, cinnamon, pimenta, wintergreen and thyme, tannic acid, guaiac, iodides, guaiacol, hypophosphites. Other iron salts have same incompatibles.

Iron Iodide. With alkalies, lime water, vegetable astringents.

Iron Reduced. With aloes, tannin, infusions, extracts, metallic and alkaloidal salts.

Iron Salts. With alkali carbonates and bicarbonates, mucilages, tannin, infusions, extracts and astringent tinctures.

Kino. With gelatin, mineral acids, carbonates, alkalies, metallic salts.

Krameria. (Rhatany.) With gelatine alkalies, lead and iron salts, lime water.

Lead Acetate, (also Lead Subacetate.) With opium, lime water, ammonium chloride, alum, potassium iodide, iodine, acacia, tragacanth, tannin, carbonates and sulphuric and hydrochloric acid. (Normal lead acetate is compatible with mucilage of acacia, but the basic or subacetate causes precipitates even in minute quantities.)

Lime, Chlorinated. With ammonium chloride, sulphur, tannin, metallic sulphides, glycerine, volatile oils and fatty substances.

Lime Water. With acids, ammonium salts, carbonates, tartrates, metallic salts, tannin, infusions and many tinctures.

Magnesium Sulphate. (Epsom Salt.) With tartrates, alkalies, sulphites, arsenates, silver nitrate, carbonate lead, acetates, phosphoric acid, lime water, phosphates.

Methylene Blue. With potassium iodide and reducing agents.

Morphine Salts. With the salts of iron, manganese and silver, potassium chlorate and permanganate, nitrites and nitrates, carbonates of the alkalies and the earths, amyl nitrite and bitter almond water.

Nut Gall. With spirit nitrous ether, ferric and metallic salts, solutons of opium, iodine, lime water.

Opium. (See codeine.)

Pancreatin. With acids.

Pepsin. With alkaline substances, alcohol and tinctures in general.

Phenacetin. With phenol, naphthol, chloral.

Phenol. (Carbolic Acid.) With thymol, napthol, albumin, terpin hydrate, acetanilide, sodium phosphate, acetphenetidin, resorcinol, antipyrine, pyrogallol, camphor, camphor monobromide, potassium permanganate, collodion, phenyl salicylate, ferric salts, menthol, hydrogen oxide, lead acetate, chloral hydrate, sodium salicylate.

Phosphorus. With hydrochloric acid, potassium permanganate, gold salts.

Physostigmine. (Calabar Bean.) With atropine, chloral, strychnine.

Picrotoxin. With tannic acid, emetics, chloral. hydrated, stimulants.

Pilocarpine Hydrochloride. With alkalies, silver nitrate, iodides, mercuric chloride, tannic acid, calomel, potassium permanganate, gold salts.

Potassium Acetate. With mineral acids.

Potassium Bromide. With mineral acids, chlorine water, and the salts of mercury and silver.

Potassium Carbonate. With acids, metallic salts.

Potassium Chlorate. With mineral acids, tannin, catechu, sulphur, charcoal, calomel, sulphites, ferrous salts, nitrites, hypophosphites, sugar, honey and vegetable powders.

Potassium Nitrate. With silver nitrate, alcohol, potassium permanganate, lead acetate.

Potassium Cyanide. With acids and acid syrups, alkaloids, hydrated chloral, iodine, lead mercurous and silver salts, potassium permanganate, cobalt nitrate.

Potassium Iodide. With acids, and acid salts, alkaloidal salts, silver nitrate, ferric salts, potassium chlorate, spirit of nitrous ether (if acid) and salts of lead and mercury.

Potassium Permanganate. With fatty and volatile oils, alcohol, glycerin, ammonia and ammonia salts, alkaloids, sulphur, charcoal and organic substances in general.

Quinine Sulphate. With ammonia, alkalies, lime water, tannic acid, Donovan's solution, iodine, potassium iodide.

Rosin. (Resin.) With urethane, menthol, thymol, phenyl salicylate, phenol.

Resorcinol. (Resorcin.) With acetanilide, spirit nitrous ether, alkalies, menthol, antipyrine, ferric chloride, camphor, naphthol, phenol.

Salol. With camphor, ferric chloride, phenol, thymol, choral hydrated, napthalene.

Silver Nitrate. With hydrochloric, sulphuric, acetic, and tartaric acids and their salts, hydrocyanic acid, iodine, potassium iodide and bromide, antimony, carbonates of the earths and astringent tinctures.

Sodium Bicarbonate. With acids and acid salts, tannin, metallic and alkaloidal salts.

Sodium Bromide. With acids, alkaloidal and metallic salts in solution.

Sodium Chlorate. With organic matters, substances easily oxidized. Violently explosive when triturated with sulphur or phosphorous.

Sodium Iodide. With alkaloidal salts, hydrated chloral, tartaric acid, calomel, silver nitrate, potassium chlorate, metallic salts, acids.

Sodium Nitrate. With acetanilide, antipyrine, chlorates, chromates, gold chloride, hypophosphites, iodides, mercury salts, permanganates, sulphites, tannic acid, vegetable astringent decoctions or tinctures.

Sodium Phosphate. With alkaloids, antipyrine, carbolic acid, hydrated chloral, lead acetate, pyrocatechin, pyrogallol, resorcinol, salicylic acid, sodium salicylate.

Sodium Salicylate. With ferric salts, lime water, spirit nitrous ether, mineral acids, quinine salts, lead acetate, silver nitrate in solution, sodium phosphate in powder.

Spirit Nitrous Ether. With antipyrine, tannic acid, acetanilide, phenacetin, iodines, fluidextract buchu, tincture of guaiac, morphine salts, carbonates, acacia, ferrous sulphate.

Squill. With all substances containing tannic acid.

Stramonium. With mineral acids, caustic alkalies, metalic salts.

Strontium Bromide. With acids, alkaloids, salts of antimony, bismuth, copper, mercury, silver.

Strontium Iodide. In solution with alkaloidal salts, chloral hydrated, mineral acids, alkalies, metallic salts.

Strontium Salicylate. With ferric salts, mineral acids, quinine salts, silver nitrate, lead salts.

Strophanthus. (Same as digitalis.)

Strychnine. With bromides, alkalies and alkaline carbonates, iodides, ammonium chloride, salicylates, mercuric chloride, ichthyol, gold chloride, bichromates, tannic acid, cyanides, oxalic acid, benzoates, picric acid, piperazine, borax.

Terebene. With iodine, bromine, chlorine.

Turpentine. (See terebene.)

Thymol. With acetanilide, antipyrine, butyl-chloral hydrate, camphor, monobromated camphor, carbolic acid, hydrated chloral, euphorin, menthol, quinine sulphate, salol, urethane, phenol, exalgine, gold salts, spirit nitrous ether.

Uva Ursi. With tartar emetic, iron, alkalies, lead, spirit nitrous ether, silver salts, infusion cinchona, gelatin, opium.

Veratrum. With digitalis, atropine, ether, all cardiac stimulants.

Zinc Acetate. With zinc salts, acacia, alkalies, arsenates, carbonates, cyanides, lime water, oxalates, phosphates, sulphates, sulphides, vegetable astringents in liquid form.

Zinc Bromide. With acids, alkaloids, salts of antimony, bismuth,, copper, lead, mercury, silver.

Zinc Sulphate. With milk, alkalies, sulphates, acacia, sulphides, arsenates, phosphates, cyanides, astringents, vegetable infusions, lime water, silver nitrate, lead acetate.

International Atomic Weights

Aluminum—Al.	27.1	Molybdenum—Mo	96.0
Antimony—Sb	120.2	Neodymium—Nd	144.3
Argon—A	39.9	Neon—Ne	20.0
Arsenic—As	74.96	Nickel—Ni	58.68
Barium—Ba	137.37	Nitrogen—N	14.01
Bismuth—Bi	208.0	Osmium—Os	190.9
Boron—B	11.0	Oxygen—O	16.00
Bromine—Br	79.92	Palladium—Pd	106.7
Cadmium—Cd	112.40	Phosphorus—P	31.0
Caesium—Cs	132.81	Platinum—Pt	195.0
Calcium—Ca	40.09	Potassium—K	39.10
Carbon—C	12.00	Praseodymium—Pr	140.6
Cerium—Ce	140.25	Radium—Ra	226.4
Chlorine—Cl	35.46	Rhodium—Rh	102.9
Chromium—Cr	52.0	Rubidium—Rb	85.45
Cobalt—Co	58.97	Ruthenium—Ru	101.7
Columbium—Cb	93.5	Samarium—Sa	150.4
Copper—Cu	63.57	Scandium—Sc	44.1
Dysprosium—Dy	162.5	Selenium—Se	79.2
Erbium—Er	167.4	Silicon—Si	28.3
Europium—Eu	152.0	Silver—Ag	107.88
Fluorine—F	19.0	Sodium—Na	23.00
Gadolinium—Gd	157.3	Strontium—Sr	87.62
Gallium—Ga	69.9	Sulphur—S	32.07
Germanium—Ge	72.5	Tantalum—Ta	181.0
Glucinum—Gl	9.1	Tellurium—Te	127.5
Gold—Au	197.2	Terbium—Tb	159.2
Helium—He	4.0	Thallium—Tl	204.0
Hydrogen—H	1.008	Thorium—Th	232.42
Indium—In	114.8	Thulium—Tm	168.5
Iodine—I	126.92	Tin—Sn	119.0
Iron—Fe	55.85	Titanium—Ti	48.1
Iridium—Ir	193.1	Tungsten—W	184.0
Krypton—Kr	83.0	Uranium—U	238.5
Lanthanum—La	139.0	Vanadium—V	51.2
Lead—Pb	207.1	Xenon—Xe	130.7
Lithium—Li	7.0	Ytterbium—Yb (Neoytterbium)	172.0
Lutecium—Lu	174.0	Yttrium—Yt	89.0
Magnesium—Mg	24.32	Zinc—Zn	65.37
Manganese—Mn	54.93	Zirconium—Zr	90.6
Mercury—Hg	200.0		

PERCENTAGE SOLUTION TABLE.

WATER	GRAINS OF DRUG TO MAKE A SOLUTION CONTAINING													
Fluid-ounces	1 in 5000	1 in 2000	1 in 1000	1 in 500	1-2%	1%	2%	3%	4%	5%	10%	20%	25%	50%
½	0.046	0.114	0.228	0.456	1.14	2.3	4.6	6.8	9.1	11.4	22.8	45.6	57.	114.
1	0.091	0.228	0.456	0.912	2.28	4.6	9.1	13.7	18.2	22.8	45.6	91.2	114.	228.
2	0.182	0.456	0.912	1.82	4.56	9.2	18.2	27.3	36.5	45.6	91.2	182.4	228.	456.
3	0.273	0.684	1.37	2.73	6.84	13.7	27.4	41.	54.7	68.4	136.8	273.6	322.	684.
4	0.365	0.912	1.82	3.64	9.12	18.2	36.5	54.7	73.	91.2	182.4	364.8	456.	912.
6	0.546	1.37	2.74	5.47	13.68	27.4	54.7	82.	109.5	136.8	273.6	547.	684.	1368.
8	0.729	1.82	3.65	7.30	18.24	36.5	73.	119.4	146.	182.4	364.8	729.	912.	1824.
12	1.094	2.74	5.47	10.94	27.4	55.	109.5	164.4	218.9	273.6	547.2	1094.	1368.	2736.
16	1.46	3.65	7.3	14.6	36.5	73	143.9	218.9	291.8	364.8	729.6	1459.	1824.	3648.

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