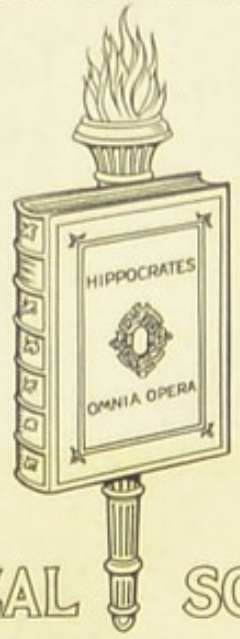
Materia medica : a manual for the use of students / by Isambard Owen.

MATERIA MEDICA

A MANUAL FOR STUDENTS

ISAMBARD OWEN



MATERIA MEDICA.

A MANUAL

FOR THE USE OF STUDENTS.

BY

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PREFACE.

THIS little book has no pretensions to be considered an original or complete treatise on Materia Medica. It is simply intended to aid Students, by placing the outlines of the subject before them in such a manner that they may be clearly grasped, and readily committed to memory. It is to be regarded rather as a supplement to, than as a substitute for, the systematic works.

The contents of the former "Tables of Materia Medica", of which five editions were called for in eight years, are incorporated, in a revised form, in the present Manual.

I have great pleasure in thanking Dr. Frederick J. Hicks, of the Brompton Hospital, for his material assistance in revising the sheets of Section III; and Mr. A. F. Damon, of St. George's Hospital, for much valuable information on Pharmaceutical points.

41, GLOUCESTER GARDENS, W.

May 1st, 1883.

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ERRATA.

Page 7, eighteenth line from the bottom :—*for* $\frac{1}{10}$ *read* $\frac{1}{10}$.

Page 127, fourteenth line :—omit *

MATERIA MEDICA.

THE PHARMACOPŒIA.

THE BRITISH PHARMACOPŒIA of 1867, with the additions of 1874, defines 393 drugs, and prescribes 530 preparations, under Latin and English names.*

It prescribes the mode of production of a large number of the manufactured articles included among the drugs.

It specifies the physical properties and the chemical tests by which the drugs may be recognised and their purity certified.

It lays down tables of weights and measures.

It authorises a scale of doses for all the drugs and preparations intended for internal administration.

THE DRUGS.

Of the 393 drugs, 19 are furnished directly by the animal kingdom, and 197 by the vegetable kingdom, of nature. The remaining 177 are native minerals and products of industrial or chemical manufacture.

The following twenty-nine of the drugs are not themselves used in medicine, but are defined in the Pharmacopœia as being the source of other officinal drugs, or as required for some of the processes prescribed :—

(*Minerals and Manufactured Products.*)

Natural Water	or	*Aqua.*
Chalk *(unpurified)*	,,	*Creta.*
Marble (source of Carbonic Acid)	,,	*Marmor Album.*
Iron	,,	*Ferrum.*
Copper	,,	*Cuprum.*
Bismuth	,,	*Bismuthum.*
Purified Bismuth	,,	*Bism. Purificatum.*
Zinc	,,	*Zincum.*
Granulated Zinc	,,	*Zincum Granulatum.*
Purified Silver	,,	*Argentum Purificatum.*
Black Oxide of Manganese	,,	*Manganesii Oxidum Nigrum.*
Black Antimony	,,	*Antimonium Nigrum.*
Nitrate of Ammonia	,,	*Ammoniæ Nitras.*
Nitrate of Soda	,,	*Sodæ Nitras.*
Nitrate of Lead	,,	*Plumbi Nitras.*

* Drugs and preparations contained in the Pharmacopœia are termed "Officinal" or "Official". Throughout this book, the use of **Clarendon type**, or of the Latin language, in the absence of any statement to the contrary, signifies the officinal character.

Sulphate of Mercury . . .	or	*Mercurii Sulphas.*
Acetate of Soda	,,	*Sodæ Acetas.*
Bichromate of Potash . . .	,,	*Potassæ Bichromas.*
Ferrocyanide of Potassium . .	,,	*Potassæ Prussias Flava.*
Bone-Black*	,,	*Carbo Animalis.*
Bone-Ash	,,	*Os Ustum.*
Amylic Alcohol *(Fusel Oil)* . .	,,	*Alcohol Amylicum.*

(*Vegetables.*)

Bebeeru Bark (source of Sulphate of Beberia)	or	*Nectandræ Cortex.*
Cevadilla (source of Veratria) . . .	,,	*Sabadilla.*
Podophyllum Root (source of Podophyllin)	,,	*Podophylli Radix.*
Scammony Root (source of Scammony Resin)	,,	*Scammoniæ Radix.*
Squirting Cucumber (source of Elaterium) .	,,	*Ecbalii Fructus.*
"Worm Seed" (source of Santonin) . .	,,	*Santonica.*

(*Animal Products.*)

Unclarified Honey . . .	or	*Mel.*

The following thirty-one are used merely as vehicles:—

(*Animal Kingdom.*)

Milk	or	*Lac.*
Clarified Honey	,,	*Mel Depuratum.*
Sugar of Milk	,,	*Saccharum Lactis.*
Lard	,,	*Adeps Præparatus,*
Clarified Mutton Suet . . .	,,	*Sevum Præparatum.*
Bees-wax	,,	*Cera Flava.*
White-wax	,,	*Cera Alba.*

(*Vegetable Kingdom.*)

Wheat-flour	or	*Farina Tritici.*
Linseed-meal	,,	*Lini Farina.*
Starch	,,	*Amylum.*
Loaf-sugar	,,	*Saccharum Purificatum.*
Gum Arabic	,,	*Acaciæ Gummi.*
Tragacanth	,,	*Tragacantha.*
Almond Oil	,,	*Oleum Amygdalæ.*
Olive Oil	,,	*Oleum Olivæ.*
Hips	,,	*Rosæ Caninæ Fructus.*
Cocoa-butter	,,	*Oleum Theobromæ.*
Canada Balsam	,,	*Terebinthina Canadensis.*
Gutta-percha	,,	*Gutta-percha.*

(*Minerals and Manufactured Products.*)

Distilled Water	or	*Aqua Destillata.*
Proof Spirit	,,	*Spiritus Tenuior.*
Rectified Spirit	,,	*Spiritus Rectificatus.*
Sherry	,,	*Vinum Xericum.*
Orange Wine	,,	*Vinum Aurantii.*
Crude Ether†	,,	*Æther.*
Glycerine	,,	*Glycerinum.*
Acetic Acid‡	,,	*Acidum Aceticum.*
Treacle	,,	*Theriaca.*
Bread-crumb	,,	*Mica Panis.*
Soft Soap	,,	*Sapo Mollis.*
Curd Soap	,,	*Sapo Animalis.*

Rosin, and Castile Soap (*Resina*, and *Sapo Durus*) are used mainly, but not exclusively, as vehicles.

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* Animal Charcoal *(Carb. An. Purificatus)* is used, but mainly as a pharmaceutical (filtering) agent.

† Washed Ether *(Æther Purus)* is used medicinally.

‡ Glacial Acetic Acid, and Dilute Acetic Acid, are used medicinally.

The following four are colouring agents :—

Cochineal	or	*Coccus.*
Red Sandal-wood . . .	,,	*Pterocarpi Lignum.*
Red Poppy	,,	*Papaver Rhœas.*
Saffron	,,	*Crocus.*

Red-rose petals (*Rosa Gallica*) are used chiefly as a colouring agent, but possess astringent properties also.

The following eight are merely flavouring agents :—

Orange-flower Water . . .	or	*Aqua Aurantii Floris.*
Cabbage-Rose	,,	*Rosa Centifolia.*
Elder flowers	,,	*Sambuci Flores.*
Raisins	,,	*Uvæ.*
Mulberry-juice	,,	*Mori Succus.*
Jordan Almond . . .	,,	*Amygdala Dulcis.*
Liquorice Root	,,	*Glycyrrhizæ Radix.*
Hemidesmus Root . . .	,,	*Hemidesmi Radix.*

The following twenty-four may also be classed as flavouring agents, though the first possesses bitter, the rest stimulant and carminative properties, which make them therapeutically useful as vehicles :—

Bitter Orange Peel, fresh . .	or	*Aurantii Fructus.*
,, ,, dried . .	,,	*Aurantii Cortex.*
Lemon Peel	,,	*Limonis Cortex.*
Caraway	,,	*Carui Fructus.*
Cardamoms	,,	*Cardamomum.*
Cinnamon	,,	*Cinnamomi Cortex.*
Coriander	,,	*Coriandri Fructus.*
Cloves	,,	*Caryophyllum.*
Dill	,,	*Anethi Fructus.*
Nutmeg	,,	*Myristica.*
Pimento	,,	*Pimenta.*

And the Essential Oils of

Anise, Caraway, . . .	or	*Ol. Anisi, Carui,*
Cinnamon, Cloves, . . .	,,	*Cinnamomi, Caryophylli,*
Coriander, Dill, ...	,,	*Coriandri, Anethi,*
Lavender, Lemon, . . .	,,	*Lavandulæ, Limonis,*
Nutmeg, Peppermint, . . .	,,	*Myristicæ, Menthæ Piperitæ,*
Pimento, Rosemary, and . .	,,	*Pimentæ, Rosmarini,*
Spearmint	,,	*Menthæ Viridis.*

The remaining 297 drugs are reputed to possess more or less active medicinal properties.

THE PREPARATIONS.

The preparations prescribed by the Pharmacopœia are of thirty-two different kinds.

Extracts (*Extracta*) consist either (α, β) of the expressed juices of fresh vegetables, clarified and concentrated ; or (γ, δ) of the soluble ingredients of dry drugs, separated by macerating them in various menstrua, and evaporating the strained solution to the desired consistence.

α. The Extracts of Aconite, Belladonna, Hemlock, Henbane, and Lettuce are prepared from fresh plants as follows :—

1. The fresh juice, obtained by bruising in a mortar,
   Heated to 130 deg. F.
   A coagulum of green colouring matter separates, is strained off, and put aside.
2. The strained juice,
   Heated to 200 deg. F.
   A coagulum of albumen separates.

3. The juice filtered from albumen,
Evaporated to a thin syrup;
The green colouring matter returned;
Evaporated at 140 deg. F. to a consistence "suitable for forming pills".

These are termed "Green Extracts".

β. The Extracts of Colchicum and Taraxacum from fresh drugs as follows:—

1. The fresh juice, obtained by crushing and expressing,
Decanted from deposit;
Heated to 212 deg. F.
A coagulum of albumen separates.

2. The filtered liquid,
Evaporated at 160 deg. F. to a similar consistence.

The Acetic Extract of Colchicum is prepared in a similar way, but Acetic Acid is added to the crushed corms before expressing the juice, and evaporation is not carried so far.

γ. In making the extracts of dry drugs, the menstrua used are the following:—

Cold water, for the Extracts of Opium, Calumba, Quassia, Rhatany, and Liquorice.
Also for the Liquid Extracts of Yellow-Bark, Opium, Bael, Liquorice, and Ergot.
Water at 160 deg. F., for the Liquid Extract of Sarsaparilla.
Boiling water, for the Extracts of Chamomile, Aloes, Pareira, Poppy, Logwood, and Gentian.
Also for the Liquid Extract of Pareira.

Diluted Spirit, for the Extract of Rhubarb.
Proof Spirit, for the Extracts of Stramony and Colocynth.
Rectified Spirit, for the Extracts of Nux Vomica, Calabar Bean, and Indian Hemp.

Rectified Spirit first, and cold water afterwards, for the Extract of Jalap.
Rectified Spirit first, and boiling water afterwards, for the Extract of Hop.

Ether, for the Liquid Extract of Fern.

Ext. Mezerei Æthereum is an Ethereal Extract *of a Spirituous Extract of* Mezereon.
Stramony and Ergot are cleared of their oils by ether before making the extracts.

In making the Extract of Poppy, the gummy matters in the solution are precipitated by Rectified Spirit before evaporation.
Extract of Chamomile has the essential oil of Chamomile added to it.
The Extract of Colocynth is a "Compound Extract"; having other drugs added to it during evaporation.

δ. The *Liquid Extracts* (*Extracta Liquida*) are evaporated only so far as to produce a highly concentrated solution; except in the case of the Liquid Extract of Fern, the fluid form of which is given by the oily matters of the drug itself, the ether being all distilled off. To the rest a little spirit is added to prevent decomposition.

Ext. Opii. Liq. is simply an infusion of the Extract, with a little spirit.

Extracts of Nux Vomica, Calabar-bean, Mezereon, and Indian Hemp are left in a softer state than the others, which are evaporated to a consistence "suitable for forming pills"; except the Extracts of Rhatany, Logwood, and Aloes, which are evaporated to dryness.

Juices (*Succi*)* are the expressed juices of fresh vegetables preserved by the addition of one-third of their volume of Rectified Spirit, and strained after standing for a week.

The Pharmacopœia prescribes five, of

Belladonna, Hemlock, Henbane, Dandelion, and Broom.

Essences (*Essentiæ*) are solutions of Essential (volatile) Oils in four times their volume of Rectified Spirit.

The Pharmacopœia prescribes two only, of

Anise and Peppermint.

Infusions (*Infusa*) are extractive solutions of such ingredients of vegetables as are soluble in water, made by pouring boiling water on the broken-up drug, macerating for periods varying from a quarter of an hour to four hours, and straining clear. The Pharmacopœia prescribes twenty-eight.

The infusions of Cusparia and Chiretta are made with water at 120 deg. F. only.

The infusions of Quassia and Calumba with cold water, so as not to dissolve out the starch that these drugs contain.

Infusion of Kousso is administered unstrained.

Acid Infusion of Roses is made with boiling water acidulated with Sulphuric Acid.

Decoctions (*Decocta*) are similar preparations, made by boiling the drugs in water for periods varying from five to twenty minutes, and straining clear. Some are ordered to be strained *while hot*, as part of their active ingredients is deposited on cooling.

The Pharmacopœia prescribes fourteen.

In preparing Decoction of Pomegranate Root, the liquid is boiled down to half its original bulk.

Tinctures (*Tincturæ*).

The Tinctures of Quinine, Iodine, Iron Salts, and Chloroform are simple solutions in spirit. The Tincture of Indian Hemp is a solution of the extract in spirit.

The rest of the Pharmacopœial Tinctures are extractive solutions prepared by macerating animal or vegetable drugs in spirit, in some cases for two days, in others for seven, and straining or percolating.

It is to these extractive Tinctures, which are generally deeply tinged by the colouring matters of the drug, that the name of *Tincture* properly applies.

The Pharmacopœia prescribes sixty eight tinctures altogether.

Proof Spirit is the menstruum used for most of the Tinctures.

The stronger Rectified Spirit is used in preparing the Tinctures of

Aconite, Arnica, Assafœtida,	Indian Hemp,
Benzoin, Cubebs,	Lavender, Larch,
Capsicum, Castor,	Myrrh, Nux Vomica,
Hellebore, Kino,	Pellitory, Tolu,
Iodine, Iron Salts,	Fresh Orange Peel, and Ginger.

A mixture of Rectified Spirit and Tr. Cardam. Co. for Tr. Chloroformi Co.

Tincture of Orange Peel for Tr. Quiniæ.

Spirit of Ether for Tr. Lobeliæ Ætherea.

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* Mulberry, Lemon, and Buckthorn Juices (*Mori Succus, Limonis Succus, Rhamni Succus*) are natural drugs, and not preparations. The prepared juices are termed, "*Succus Belladonnæ, Succus Conii*", etc.

Sal. Volatile for Tr. Guaiaci Ammoniata.
,, ,, Valerianæ ,,

A mixture of Rectified Spirit with one-fourth of Liq. Amm. Fortior for Tr. Opii Ammoniata.

Proof Spirit for Tr. Quiniæ Ammoniata, Liq. Ammoniæ being added subsequently.

Wines (*Vina*) are similar preparations made with white wines. The Pharmacopœia prescribes nine,

Sherry (*Vin. Xericum*) is prescribed for all but Vinum Quiniæ and Vinum Ferri Citratis, which are made with Orange Wine (*Vin. Aurantii*).

Spirits (*Spiritus*) are solutions of colourless substances in Rectified Spirit. The Pharmacopœial *Spirits* (thirteen in number) are solutions of volatile oils (two being ammoniated), of Camphor, Chloroform, Ether, and Nitrous Ether.

Sp. Armoraciæ Co., Sp. Amm. Aromaticus, and Sp. Amm. Fœtidus are prepared by distillation.

The preparation of Sp. Ætheris Nitrosi is detailed in Section iii.

The rest are prepared by direct solution, in the following proportions:—Oils, 1 in 50; Chloroform, 1 in 20; Camphor, 1 in 10; Ether, 1 in 3.

Spiritus Rectificatus (Rectified Spirit), Sp. Tenuior (Proof Spirit), and Sp. Vini Gallici (French Brandy) are not *preparations*. (See "Alcohol".)

Vinegars (*Aceta*) are extractive solutions in Acetic Acid, prepared by maceration and straining.

The Pharmacopœia prescribes two only.

In making Acetum Cantharidis, a mixture of the glacial with the ordinary acid is used.

For Acetum Scillæ, the Dilute Acid; a little spirit being added after straining, and the whole filtered again.

Solutions (*Liquores*) are properly watery solutions of definite chemical compounds. The menstruum of the Pharmacopœial *Solutions* is not in all cases pure water. (See under "Alkaloids", "Iodine", and "Metallic Compounds".) The Pharmacopœia prescribes forty solutions, including the three following, and the effervescing solutions.

Liquor Epispasticus is an extractive solution prepared from Cantharides with Acetic Acid and Ether.

Liquor Gutta-Percha is a solution of Gutta-Percha in Chloroform.

Collodion is a solution of Gun-Cotton (*Pyroxylin*) in Ether and Rectified Spirit.

The "Effervescing Solutions" (*L. Effervescentes*) are weak solutions of the Bicarbonates of Potash and Soda, and of Carbonate of Lithia, charged with Carbonic Acid under a pressure of seven atmospheres, and corked down,—in short, the "Potash", "Soda", and "Lithia" waters of ordinary use. Liq. Magnesiæ Carbonatis and Liq. Mag. Citratis also contain Carbonic Acid, developed under pressure, and require to be kept corked.

Waters (*Aquæ*) consist of water saturated with essential oils or similar fragrant substances sparingly soluble. The Pharmacopœia prescribes thirteen.

Essential Oils are extracted by distilling the vegetable products containing them with water. From the milky fluid which condenses in the receiver the oil separates, leaving a clear "*distilled water*", which

retains the minute portion of the oil it is capable of dissolving. The Pharmacopœia prescribes processes for distilling these *waters* from vegetable drugs or essential oils, but they are practically procured as above.

Aqua Camphoræ and Aqua Chloroformi are prepared simply by shaking the two drugs up with water.

Syrups (*Syrupi*). The Pharmacopœial syrups are prepared by adding large proportions of sugar or syrup to

the fresh juices of *Lemon*, *Mulberry*, and *Buckthorn* fruit;

Solutions of *Chloral*, of *Phosphate*, and of *Iodide, of Iron*;

Specially made infusions of *Hemidesmus*, *Poppy*, *Red Poppy*, *Red Rose*, and *Senna*;

A special decoction of *Tolu*;

A special tincture of *Rhubarb*;

The officinal Tinctures of *Orange Peel* and *Ginger*;

,, ,, Vinegar of *Squill*;

,, ,, *Orange Flower* Water.

To some a little spirit is added for preservation.

Simple Syrup (*Syrupus*) is prepared by dissolving sugar in half its weight of water, the product giving 6 parts of sugar in 7.

Mucilages (*Mucilagines*) are solutions of colloid substances in water. The Pharmacopœia prescribes three, of

Gum-arabic, Starch, and Tragacanth.

Glycerines (*Glycerina*) are solutions in glycerine. The Pharmacopœia prescribes four such solutions, of

Borax, of Tannic, Gallic, and Carbolic Acids,

each prepared by dissolving 1 part in 4, making $4\frac{1}{2}$.

Also a translucent jelly, *Glycerinum Amyli*, for use as an ointment, prepared by heating 1 part of starch with 8 of glycerine.

Oils (*Olea*) are solutions in fixed oils. The Pharmacopœia prescribes one only, *Oleum Phosphoratum*;—Almond Oil saturated with Phosphorus, containing $\frac{1}{16}$ grain in 10 minims.

Honey (*Mel*).

Mel Boracis is a solution of Borax in 7 parts of Clarified Honey. Oxymel is a mixture of Clarified Honey with an eighth part of Acetic Acid and the same of water.

Oxymel Scillæ is a mixture of Clarified Honey with Vinegar of Squill, evaporated to a thick consistency.

Dilute Acids (*Acida Diluta*) are Acids diluted with water to a strength convenient for dispensing. The Pharmacopœia prescribes

Ac. Sulphuricum Dil.,	containing	$8\frac{1}{3}$ p.c. of the "Acidum".
,, Aceticum Dil.,	,,	$12\frac{1}{2}$ p.c. ,, ,,
,, Nitricum Dil.,	,,	20 p.c. ,, ,,
,, Hydrochloricum Dil.	,,	30 p.c. ,, ,,
,, Phosphoricum Dil.,	,,	13.8 p.c. of Phosphoric Acid, H_3PO_4.
,, Hydrocyanicum Dil.,	,,	2 p.c. of Prussic Acid HCN.

(*The last two are prescribed in the Pharmacopœia in the diluted form only.*)

Also:—Ac. Sulphuricum Aromaticum,—7 p.c. of the "Acidum" in Rectified Spirit, flavoured with Cinnamon and Ginger.

*** The above preparations, it will be noted, simply place the drugs in a convenient form for dispensing. They are for the most part simple, containing but a single drug, or its active part, besides the vehicle. Some are directed to be flavoured and coloured with various ingredients; and a few are compound preparations (see the "Synopsis" later in the book), *i.e.*, they contain the active principles of more than one drug.

*** The following are forms of preparation ready for internal or external administration without further dispensing. Many are compound (see the "Synopsis").

(*For internal use.*)

Compound Powders (*Pulveres Compositæ*) are intimate admixtures of dry drugs, finely powdered.

Confections or electuaries (*Confectiones*) are similar mixtures of dry or pulpy drugs, brought to the consistence of a soft extract with sugar, syrup, or honey.

Pill-masses (*Pilulæ*) are composed of extracts or other tenacious substances, or are directed to be made up with Castile soap, treacle, syrup, confection of roses, or of hips, beeswax, or castor oil.

Some are scented with particular essential oils, as a means of distinguishing them apart.

The Pharmacopœia gives no directions for rolling these masses into pills. As usually rolled, each pill is made by 5 grains of the pill-mass. The more active pills, Pil. Hydrargyri, Pil. Phosphori, Pil. Plumbi c. Opio, Pil. Saponis Co., are rolled in various sizes.

Lozenges (*Trochisci*). The Pharmacopœial lozenges are small tablets, made up with sugar and gum. They are ten in number; of

Bismuth.	Catechu.
Reduced Iron.	Opium.
Chlorate of Potash.	Morphia.
Bicarbonate of Soda.	Morphia and Ipecacuanha.
Tannic Acid.	Ipecacuanha.

Mixtures* (*Misturæ*). Under this title, the Pharmacopœia prescribes modes of suspending or emulsifying certain drugs insoluble in water; also a preparation of Epsom Salts and Senna, and two aromatic bitter infusions, one of which is made to take up a minute quantity of iron. (See the "Synopsis of Compound Preparations".)

Inhalations (*Vapores*). The Pharmacopœia prescribes methods of disengaging for inhalation.

Prussic Acid,—by mixing 10 to 15 min. of Ac. Hydrocyan. Dil., with a drachm of water;

Chlorine.—by moistening 2 oz. of Chlorinated Lime with cold water.

And of volatilizing for the same purpose

Creasote, by mixing 12 min. with 8 oz. of boiling water in an "inhaler" which allows air to be drawn through the fluid;

Iodine, by mixing a drachm of Tr. Iodi with an ounce of water, and heating gently;

Conia, by mixing a drachm of Extract of Hemlock with a fluid drachm of Liq. Potassæ and ten of water, and placing 20 min. of the mixture on a sponge in an "inhaler" which allows the vapour from hot water to be drawn over it.

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* Draughts (*Haustus*) are single doses of mixtures.

Enemas or Clysters (*Enemata*). The Pharmacopœia prescribes methods of preparing for administration *per rectum*

Opium, by mixing 30 min. of Tr. Opii with 2 oz. of Mucilage of Starch,—*Enema Opii*;

Tobacco, by making an infusion of 20 grains in 8 oz. of boiling water,—*Enema Tabaci*.

And the following purgative Clysters :—

Enema Assafœtidæ.—30 grains rubbed into an emulsion with 4 oz. of water.

Enema Aloës.—40 grains rubbed together with half a pint of Mucilage of Starch and 15 grains of Potassic Carbonate.

Enema Terebinthinæ.—An ounce of Ol. Terebinth. mixed with three-fourths of a pint of Mucilage of Starch.

Enema Magnesiæ Sulphatis.—An ounce of Epsom Salts dissolved in three-fourths of a pint of Mucilage of Starch, and an ounce of Olive Oil added.

Suppositories (*Suppositoria*) are small cones of greasy matters with an intimate admixture of active drugs, for administration *per rectum*. The Pharmacopœia prescribes four made with cocoa-butter, lard, and wax, viz.:—

Supp. Morphiæ,—Hydrargyri,—Acidi Tannici,—Plumbi Co. (Opium and Acetate of Lead) ;

And three made with Curd Soap and Starch, viz.:—

Supp. Ac. Carbolici cum Sapone,—Morphiæ c. S.,—Ac. Tannici c. S.

Hypodermic Injections (*Injectiones Hypodermicæ*) are strong solutions in plain water, without spirit or appreciable amounts of free acid, for injection into the areolar tissue under the skin. The Pharmacopœia prescribes but one, *Inject. Morphiæ Hypod.*, containing 5 gr. of the acetate in each drachm, or $\frac{1}{12}$ gr. in each minim.

(For external application.)

Lotions *(Lotiones)* are solutions or suspensions of drugs in water or spirit, for continuous external application. The Pharmacopœia prescribes but two, *Lotio Hydrargyri Nigra*, and *Lotio Hydr. Flava*, containing Mercurous and Mercuric Oxide respectively, suspended in water.

Liniments *(Linimenta)* are either strong tinctures, which can be *painted on* the skin and allowed to dry ; or mixtures containing oily matters, which enable them to be *rubbed into* a part. (See "Synopsis of Compound Preparations.")

Ointments *(Unguenta)* are admixtures of active drugs with greasy matters, preserving a soft but solid consistence, for smearing over or rubbing into the skin. (See "Synopsis of Compound Preparations.")

Unguentum Simplex is a mixture of white wax, lard and almond oil, without any active drug.

Poultices *(Cataplasmata)*. The Pharmacopœia prescribes methods of making

Linseed Poultice (*Cat. Lini*) by mixing 4 oz. of Linseed Meal gradually with half a pint of boiling water, and stirring in half an ounce of olive oil ;

Hemlock Poultice (*Cat. Conii*), by mixing an ounce of powdered Hemlock leaf with 3 of Linseed Meal, and stirring gradually into half a pint of boiling water ;

Mustard Poultice (*Cat. Sinapis*), by mixing 2½ oz. of Linseed Meal with half a pint of boiling water, and stirring in 2½ oz. of mustard ;

Chlorine Poultice (*Cat. Sodæ Chloratæ*), by mixing 4 oz. of Linseed Meal with 8 oz. of boiling water, and adding 2 fl. oz. of Liq. Sod. Chloratæ ;

Charcoal Poultice (*Cat. Carbonis*), by macerating 2 oz. of bread-crumb for 10 minutes in half a pint of boiling water, stirring in 1½ oz. of linseed meal, then ¼ oz. of wood charcoal, and sprinkling a second ¼ oz. of charcoal on the surface ;

Yeast Poultice (*Cat. Fermenti*), by mixing 6 oz. of Yeast with the same amount of water *at* 100° *F.*, stirring in 14 oz. of wheat flour, and setting the mass near a fire till it "rises".

Plasters *(Emplastra).* The Pharmacopœial plasters are all made with resins, wax, Castile soap, or lead-soap, which when gently warmed, soften and become adhesive to the skin. Emplastrum Plumbi consists entirely of lead-soap, and is used for adhesive purposes simply ; the others contain an admixture of more or less active drugs. (See "Synopsis of Compound Preparations.")

The Pharmacopœia gives no directions for *spreading* the plasters. When required for use, they are softened by heat, and evenly spread on thin leather or on any suitable tissue.

Papers *(Chartæ).* *Charta Epispastica* (blistering-paper) is made by coating cartridge paper with a Cantharides plaster, made with white wax, spermaceti, olive oil, and a little rosin and Canada Balsam.

Charta Sinapis (mustard leaf) is cartridge paper coated with mustard by the aid of gutta-percha solution. It requires to be immersed in warm water (see "Sinapis") for use.

*** The nature of *Benzoated* Lard, of *Flexile* Collodion, and of the *distilled, purified, clarified, granulated,* and *dehydrated* drugs, is explained in the body of the work as each occurs.

The Pharmacopœia does not prescribe any of the following :—

Gargles *(Gargarismata).* Mixtures which it is customary to thicken with syrup, gum, or glycerine, for application to the fauces and pharynx.

Eye-washes *(Collyria).* Lotions which should be free from acid or caustic alkali, much spirit, or other irritating substances.

Linctuses *(Linctus).* Mixtures of syrupy, oily, or mucilaginous matters, sometimes medicated with active drugs, intended to be taken in small doses to allay irritation about the throat and larynx.

Medicated Pessaries *(Pessus),* preparations analogous to suppositories, for local application of drugs to the vaginal mucous membrane.

Urethral Suppositories, similar preparations made in the form of bougies for application to the urethra.

The following have been introduced by the leading druggists, but are not officinal :—

Chloroforms *(Chloroforma).* Tinctures made with Chloroform instead of spirit, intended for use in liniments.

Tablets. Single doses of alkaline or metallic salts, moulded by means of strong pressure into concrete masses that are easily swallowed.

Lamels *(Lamellæ)*, made by rolling out a thin sheet of gelatine with an intimate mixture of active drugs, and dividing it into little squares, each of which contains a single dose of the drug. They may be swallowed as they are, or dissolved in water.

Discs *(Disci)*, similar preparations, but of smaller size, containing a single dose of an alkaloid for hypodermic injection. To be dissolved in water when required.

Ophthalmic Discs. Similar discs, medicated with Atropin or Eserin, for insertion under the eyelids.

Capsules *(Capsulæ).* Single doses of drugs which possess nauseous flavours, enclosed in capsules of gelatin, to be swallowed whole.

THE WEIGHTS AND MEASURES.

Weights.		Measures.		
1 grain.		1 minim.		
		60 minims	=	1 fluid drachm.
437½ grains	= 1 ounce.	8 fluid drachms	=	1 fluid ounce.
16 ounces, or 7,000 grains	= 1 pound.	20 fluid ounces	=	1 pint.
		8 pints	=	1 gallon.

The grain in the above system is adopted from the "Troy" scale, the ounce from the "avoirdupois" or Imperial standard. The pint and gallon are the Imperial measures.

1 minim is the measure of		0.91	grains of	water.
1 fluid drachm	„ „	54.68	„	„
1 fluid ounce	„ „	437.5	„	or 1 ounce, of water.
1 pint	„ „	8750.0	„	or 1¼ pound „
1 gallon	„ „	70.000.0	„	or 10 pounds „

In the Metrical System :—

1 gramme	=	15.432 grains.
1 litre	=	1 pint, 15 oz., 2 drms., 11 min.

A litre is the measure of a thousand grammes (1 kilo.) of water.

A millilitre (its thousandth part) is therefore the measure of 1 gramme of water, and is equivalent to 16.93, or practically 17, minims.

A cubic centimetre is equivalent to a millilitre.

SYMBOLS.

The following are customary :—

Gr. (granum), ♏ (minimum), ℥ (drachma), ℥ (uncia), lb. (librum), O (Octarius—pint).

℈ (scrupulum) and ℥ (drachma) are legally used in prescribing solids to denote 20 grains and 60 grains respectively.

SECTION I.

DRUGS FURNISHED DIRECTLY BY THE ANIMAL KINGDOM. 19 OFFICINAL.

DIVIDED INTO THREE GROUPS.

FIRST GROUP.

The following nine well known substances are introduced into the Pharmacopœia, all but the last being used simply as vehicles.

Lac. Fresh cows' milk.

Mel. Honey.

Mel Depuratum. Clarified Honey, *i.e.*, Honey melted over a water bath and strained through flannel.

Adeps Præparatus. Clarified Lard.

Sevum Præparatum. Clarified Mutton Suet.

Cera Flava. Bees-wax (Yellow).

Cera Alba. White-wax, *i.e.*, Bees-wax bleached by exposure to moisture, air, and light.

Albumen Ovi. The Whites of Fowls' Eggs.

Ovi Vitellus. The Yolks ,, ,,

Lard melts at about 100 deg. F.
Mutton-suet ,, 103 ,,
Bees-wax ,, 140 ,,
White-wax ,, 150 ,,

Suet is soluble in boiling Rectified Spirit.
Lard ,, Ether, and Oil of Turpentine.
White-wax ,, Oil of Turpentine.
Bees-wax ,, ,, leaving about a fourth undissolved.
Neither form of wax yields anything to cold Rectified Spirit.

Officinal Preparations.

Oxymel. Clarified Honey, with an eighth part of Ac. Aceticum and the same amount of water.

Adeps Benzoatus. Clarified Lard heated with Gum-Benzoin, of which it takes up about 7 grains to the ounce.

Unguentum Simplex. A mixture of White-wax, Lard, and Almond Oil.

Mistura Spiritus Vini Gallici :—The Yolks of two Eggs, mixed with 4 oz. of Brandy, the same amount of Aq. Cinnamoni, and ½ oz. of sugar.

*** *Ovi Vitellus* is introduced only to make the last-named preparation. *Lac* only for Mistura Scammonii. *Mel Depuratum* furnishes Oxymel, Oxymel Scillæ, and Mel Boracis. *Lard*, *Suet*, and *Wax* are used in preparing Ointments, Plasters, Suppositories, and Papers. No pharmaceutical use for *white of egg* is suggested in the Pharmacopœia.

SECOND GROUP :—ONE LIVING ANIMAL.

Hirudo. The Leech. Two species are defined, Sanguisuga Medicinalis (Speckled Leech) and S. Officinalis (Green Leech).

Both are wrinkled transversely and have olive-green backs with six rusty-red longitudinal stripes. The belly in the latter is olive-green also ; in the former it is greenish-yellow, with black spots.

Leeches are collected in France, Spain, Italy, and Hungary. They are preserved in pans of fresh soft water.

The Leech attaches itself to the skin by muscular sucking-discs, one at each extremity. On the anterior, or smaller, of the two opens the mouth, which is tri-radiate and surrounded by three cartilaginous jaws, each armed with a double row of minute teeth, by means of which the animal saws into the skin.

On an average, a Leech draws 1½ drachm of blood ; at most 4 drachms. When satiated, it usually drops off spontaneously.

Bleeding is generally encouraged afterwards by fomentations. The amount of afterflow varies greatly, according to the region and the individual. If not watched, it may, in some cases, go on indefinitely.

THIRD GROUP :—NINE DRUGS.

The first is merely a colouring agent; the last is chiefly used as a vehicle. The remainder possess more or less valuable medicinal properties. Cantharis, Pepsin, and Cod-liver Oil are important drugs.

Coccus. *Cochineal.* The female Cochineal Insect, *Coccus Cacti,* killed and dried. Mexico and Teneriffe.

Contains *Carmine.*
If collected during pregnancy, coated with a white "bloom", forming *Silver Cochineal.*

Cantharis. *Cantharides.* The Spanish Fly, *Cantharis Vesicatoria,* killed and dried. Hungary.

About .4 p. c. of *Cantharidin,* $C_5\ H_{12}\ O_2$, the active principle.
Cantharidin is soluble in Chloroform, Ether, and strong Acetic Acid.
It sublimes unchanged.

Castoreum. *Castor.* The preputial (sebaceous) follicles of the Beaver, *Castor Fiber,* with their contained secretion. Hudson's Bay.

The secretion contains a *volatile oil.*

Moschus. *Musk.* The secretion of the preputial follicles of the Musk-deer, *Moschus Moschiferus,* dried. Central Asia.

Contains a *volatile oil.*

Fel Bovinum Purificatum. *Ox-gall.* An extract made with Rectified Spirit from fresh Ox-bile.

Contains all the ingredients of the bile but the mucus.
Soluble in water.

Pepsin. The contents of the gastric glands of a pig, sheep, or calf, mixed with some epithelium, dried and powdered. Obtained by scraping the inner surface of the stomach (after washing) with a blunt knife, and drying the scrapings at a low temperature.

Insoluble in water or spirit.
Contains *Pepsin,* the active principle of the Gastric Juice.
The properties of Pepsin are destroyed by a heat over 120 deg. F.

Cetaceum. *Spermaceti.* Nearly pure *Cetin,* $C_{32}H_{64}O_2$, with a little oily matter, separated from the oil contained in a cavity in the head of the Sperm whale, *Physeter Macrocephalus.* Pacific and Indian Oceans.

Crystalline.
Fuses at 112 deg. F.
Soluble in fixed oils.

Oleum Morrhuæ. *Cod-liver Oil.* Oil extracted from the fresh liver of the Cod *(Gadus Morrhua)* at a heat not exceeding 180° F. North Sea.

Pale yellow.
If prepared at higher temperatures, or from livers that have been kept, it has a brown tint, deeper according to the degree of temperature and the staleness of the livers. The pale yellow is the only officinal oil, and is generally preferred in medicine.
Contains 80 p. c. of *Olein,* 15 p. c. of *Margarin,* some biliary principles, and traces of Iodine and Bromide.
Other species of *Gadus* yield the same oil, but in less amount.

Saccharum Lactis. *Milk Sugar.* On evaporating whey, the sugar separates and crystallizes on pieces of cord or wood placed in the fluid.

Hard crystals of pure *Lactose*, $C_{12} H_{24} O_{12}$.
Soluble in 6 parts of water, not in Rectified Spirit.

*** Besides the above nineteen officinal drugs, the Animal Kingdom furnishes none that can be said to be commonly used in medicine. *Pancreatin*, the active agent of the Pancreatic secretion, is used in preparing fatty matters as aliments. *Dugong Oil* has been used as a substitute for Cod-liver Oil. *Bone Ash* **(Os Ustum)**, the source of Phosphorus and Phosphates, and *Bone Black* **(Carbo Animalis)**, the source of purified Animal Charcoal, are considered in Section III of this book.

Officinal Preparations.

Tinctura Cocci.
Contains Carmine.

Tinctura Castorei.
Red colour.

Tinctura Cantharidis. Strength, 1 in 80.

Acetum Cantharidis. An extractive solution in Acetic Acid, strengthened by addition of the Glacial Acid, made at a temperature of 200° F. 1 in 10.

Liquor Epispasticus. *Blistering Fluid.* An extractive solution of Cantharides in Acetic Acid and Ether. 1 in $2\frac{1}{2}$.

Emplastrum Cantharidis. 1 in 3.

Emplastrum Calefaciens. 1 of Cantharides in 25.

Charta Epispastica. *Blistering Paper.* Cartridge paper coated with a plaster of Cantharides. 1 in 9.

Unguentum Cantharidis. 1 in 7.

Unguentum Cetacei.

The constituents of the various Ointments, Plasters, etc., will be found in the "Synopsis of Compound Preparations".

*** Milk Sugar is little used, except as a vehicle for Powders, as in the officinal Pulvis Elaterii Co.

SECTION II.

DRUGS FURNISHED DIRECTLY BY THE VEGETABLE KINGDOM. 197 OFFICINAL.

First	Group . . .	Fungi and Lichens, 3.
Second	,, . . .	Plants Entire, 3.
Third	,, . . .	Green Tops, 2 ; Twigs, 1.
Fourth	,, . . .	Flowerings Tops, 2 ; Strobile, 1.
Fifth	,, . . .	Flowers 7.
Sixth	,, . . .	Buds, 2.
Seventh	,, . . .	Woods, 4.
Eighth	,, . . .	Barks, 13.
Ninth	,, . . .	Leaves, 13.
Tenth	,, . . .	Roots and Rhizomes, 25 ; Corm., 1 ; Bulb, 1 ; Tubers, 1.
Eleventh	,, . . .	Fruits, 26 ; Glands from Fruit, 1.
Twelfth	,, . . .	Seeds, 14 ; Gossypium.
Thirteenth	,, . . .	Fixed Oils, 7.
Fourteenth	,, . . .	Volatile Oils, 23.
Fifteenth	,, . . .	Resins, 7.
Sixteenth	,, . . .	Oleo-Resins, 4.
Seventeenth	,, . . .	Balsams, 4.
Eighteenth	,, . . .	Gums, 2.
Nineteenth	,, . . .	Gum-Resins, 6.
Twentieth	,, . . .	Concrete Juices, 8 ; Excrescence, 1.
Twenty-first	,, . . .	Active Principles of Definite Composition (Carbohydrates, Acids, Neutral Principles, Alkaloids), 14.

The Officinal Preparations are described at the end of each group.

Pharmacopœial Prescriptions for the extraction of Alkaloids and Active Principles.

Botanical Synopsis of the Natural Orders and Plants furnishing the Officinal Drugs, with their Geographical Sources and Preparations.

The Chief Non-officinal Drugs furnished by the Vegetable Kingdom.

FIRST GROUP:—FUNGI AND LICHENS. 3.

Ergot is the only important drug in this group.

Ergota. *Ergot of Rye.* (*Spurred Rye,* or Secale Cornutum.)

The compact mycelium (sclerotium) forming a stage in the life-history of the fungus, *Claviceps Purpurea.*

The fungus is parasitic on the ovary of Secale Cereale (common rye). The sclerotium grows from beneath the ovary, and replaces the grain within the paleæ.

Contains 10 p.c. of *Ergotin*, a brown bitter extract of doubtful composition, and 35 p.c. of a *fixed oil.*

Ergotin is soluble in water and alcohol.

Cerevisiæ Fermentum. *Yeast.*

Consists almost entirely of round or oval cells, forming the fungus *Torula Cerevisiæ.* During the fermentation of malt infusion they multiply actively, being the immediate cause of the conversion of sugar into alcohol.

Cetraria. *Iceland Moss.* Cetraria Islandica, a lichen, forming a foliaceous thallus.

Contains 80 p.c. of *starchy* matters, and a bitter principle, *Cetraric Acid,* only slightly soluble in water.

Officinal Preparations.

Extractum Ergotæ Liquidum (see p. 4).

Contains the ergotin, but no oil. 1 fl. oz. corresponds to 1 oz. of Ergot. The preparation ordinarily used.

Infusum Ergotæ.

One-fortieth the strength of the Liquid Extract.

Tinctura Ergotæ.

One-fourth the strength of the Liquid Extract.

Decoctum Cetrariæ.

A pint corresponds to an ounce of the moss. Contains the starches, but not much of the bitter.

Cataplasma Fermenti.

Made with 14 oz. of flour, and six fluid ounces of yeast mixed with the same of water at 100° F. Placed near a fire to "rise".

SECOND GROUP :—PLANTS ENTIRE. 3.

Lobelia is the only important drug in this group.

Chirata. *Chiretta* (Ophelia Chirata. *Ord.* Gentianaceæ).
Stems, roots, small flowers and capsules.
Contains a *bitter* principle, soluble in water and alcohol.

Lactuca. *Wild Lettuce* (Lactuca Virosa. *Ord.* Compositæ).
Collected while flowering.
Contains *Lactucin*, a crystalline principle resembling mannite, soluble in water, and other unimportant principles.

Lobelia. *Indian Tobacco* (Lobelia Inflata. *Ord.* Lobeliaceæ).
Stem, root, leaves, flowers and capsules.
Contains a liquid alkaloid, *Lobelina*, and a *volatile oil*.

Officinal Preparations.

Extractum Lactucæ (p. 3).

Infusum Chiratæ.

Tinctura Chiratæ.

Tinctura Lobeliæ.
Tinctura Lobeliæ Ætherea (p. 5). } Same strength.

THIRD GROUP :—GREEN TOPS, 2. TWIGS, 1.

Sabina. *Savin Tops.* From Juniperus Sabina (Coniferæ).
Young branches enveloped in imbricated leaves, dried.
Contains **Oleum Sabinæ** (see "Volatile Oils", Fourteenth Group), *Gallic Acid*, and a *resin*.

Scoparium. *Broom Tops.* From Sarothamnus Scoparius (Leguminosæ).
Young branches, green and dried.
Contains *Scoparin*, a neutral principle, and *Sparteia*, a volatile *bitter* liquid alkaloid, both soluble in water and alcohol.

Dulcamara. *Bitter Sweet, Woody Nightshade.* From Solanum Dulcamara (Solanaceæ).
Young twigs, after leaf-fall, dried.
Contains an alkaloid, *Solania*, and a bitter-sweet glucoside, *Dulcamarin*.

Officinal Preparations.

Succus Scoparii.
Decoctum Scoparii.
Tinctura Sabinæ.
Unguentum Sabinæ.
Infusum Dulcamaræ.

FOURTH GROUP :—FLOWERING TOPS, 2. STROBILE, 1.

The first two are important.

Cannabis Indica. *Indian Hemp, Bhang, Gunjah, Hashish.* From Cannabis Sativa (Cannabinaceæ).

Twigs, leaves, remains of flowers, and a few ripe fruits, compressed.

The plant is ordinary Hemp, grown in India. Grown in Europe, it has not the same medicinal properties. The Indian is alone officinal.

Contains a *resin* ("*Cannabin*"), soluble in Rectified Spirit, not in water; and a little *volatile oil*. The former is the active principle.

Cusso. *Kousso.* From Brayera Anthelmintica (Rosaceæ).

Twigs, flowers, and unripe fruits.

Contains a *volatile oil*, an acrid *resin*, *Tannic Acid*, and *Koussin*, a crystallizable principle soluble in water.

Officinal Preparations.

Extractum Cannabis Indicæ. Contains the resin (p. 4).

Tinctura Cannabis Indicæ. A solution of the extract in Rectified spirit, 2¾ gr. in the drachm.

The resin is precipitated on dilution with water.

Infusum Cusso. Unstrained, containing the powdered drug suspended.

(STROBILE.)

Lupulus. *Hop.* From Humulus Lupulus (Cannabinaceæ).

Bracts and achenes, and minute glands forming a yellow powder, "*Lupulin*," which amounts to about a sixth of the whole.

Lupulin contains 2 p. c. of *volatile oil*, and 10 p. c. of a bitter principle, *Humulin*, soluble in water and alcohol.

The bracts contain *Tannic Acid*.

Officinal Preparations.

Extractum Lupuli (See p. 4).

Infusum Lupuli.

Tinctura Lupuli.

FIFTH GROUP :—FLOWERS. 7.

Chamomile is the only drug of any importance in this group. Red-rose is used medicinally in the Acid Infusion. The remainder are colouring and flavouring agents.

Anthemis. *Chamomile.* From Anthemis Nobilis (Compositæ).
Both single and double flower-heads.

Contains **Oleum Anthemidis** (see "Volatile Oils", Fourteenth Group), and a *bitter* principle. The former is chiefly in the disk, therefore most abundant in the "single" flowers.

Aqua Aurantii Floris. *Orange-flower Water.* From Citrus Aurantium and Bigaradia, *Sweet* and *bitter Orange.* (Aurantiaceæ).
Distilled in France.

Contains a *volatile oil*, and some free *Acetic Acid*.

Crocus. *Saffron.* From Crocus Sativus (Iridaceæ).
The stigmata, with part of the styles, only.

Contains orange-red colouring matter, *Polycroite*, soluble in water and alcohol.

Rhæas. *Red Poppy.* From Papaver Rhæas (Papaveraceæ).
The petals.

Contains a red colouring matter, soluble in water and alcohol.

Rosa Centifolia. *Cabbage Rose.* From Rosa Centifolia. (Rosaceæ.)
The petals, fresh.

Contains a volatile oil, "*Attar of Roses*", soluble in alcohol, slightly in water.

Rosa Gallica. *Red Rose.* From Rosa Gallica.
The petals.

Contains *Tannic* and *Gallic Acids*, red *colouring matter*, a trace of *volatile oil*.

Sambucus. *Elder Flower.* From Sambucus Nigra (Caprifoliaceæ).
The fresh flowers.

Contains a *volatile oil*.

Officinal Preparations.

Extractum Anthemidis. Strengthened with Ol. Anthemidis.

Aqua Aurantii Floris.
Aqua Rosæ (from Rosa Centifolia). Colourless.
Aqua Sambuci.

Infusum Anthemidis.
Infusum Rosæ Acidum. Made from Rosa Gallica, with 6 min. of Ac. Sulphuricum Dil. in the ounce.

Tinctura Croci. Orange red.

Syrupus Aurantii Floris. Aq. Aur. Flor. sweetened.
Syrupus Rosæ Gallicæ.
Syrupus Rhæados. Red.

Confectio Rosæ Gallicæ.

SIXTH GROUP :—BUDS. 2.

Santonica is the source of Santonin. Clove is little more than a flavouring agent.

Caryophyllum. *Cloves.* From Caryophyllus Aromaticus (Myrtaceæ).
Contains **Oleum Caryophylli** (see "Volatile Oils", Fourteenth Group).

Santonica. *Worm Seed.* From Artemisia Pauciflora (Compositæ).
Unexpanded flower-heads.
Contains *Santonin* (**Santoninum,** see Twenty-first Group), and a *volatile oil.*

Officinal Preparation.

Infusum Caryophylli.

SEVENTH GROUP :—WOODS. 4.

Sandal Wood is merely a colouring agent. The others are important.

Guaiacum. *Lignum Vitæ.* From Guaiacum Officinale (Zygophyllaceæ).

Contains a *resin* (**Guaiaci Resina,** see Fifteenth Group), soluble in Rectified Spirit, ether, and alkaline solutions, not in water.

Hæmatoxylon. *Logwood.* From Hæm. Campechianum (Leguminosæ).

Contains a red crystalline colouring matter, *Hæmatoxylin*, soluble in alcohol, slightly in water : and *Tannic Acid.*

Pterocarpus. *Red Sandal Wood.* From Pterocarpus Santalinus (Leguminosæ).

Contains a red crystalline colouring matter, *Santalin*, soluble in alcohol, alkaline solutions, and Acetic Acid, not in water ; and *Gallic Acid.*

Quassia. From Picræna Excelsa (Simarubaceæ).

Contains a crystalline neutral bitter principle, *Quassin.* Some Starch. No Tannin.

Officinal Preparations.

Extractum Hæmatoxyli.
Extractum Quassiæ.

Infusum Quassiæ. Made with cold water, on account of the starch in the wood.

Tinctura Quassiæ.

Decoctum Hæmatoxyli. Flavoured with cinnamon.

*** Pterocarpus is used to colour Tr. Lavandulæ Co. There are no preparations of Guaiac *Wood* ; of the *Resin*, a mixture and an ammoniated tincture (See Fifteenth Group). Guaiac Wood is used in preparing Dec. Sarsæ Co.

EIGHTH GROUP :—BARKS. 13.

The Cinchona Barks and Bebeeru Bark are of high importance. Canella is merely a flavouring agent. The rest are of minor importance.

Canella Alba. From Canella Alba (Canellaceæ).

Contains a *volatile oil* and a *bitter* principle.

Cascarilla. From Croton Eluteria (Euphorbiaceæ).

Contains a *volatile oil* and a *bitter* principle.

Cinchona Flava. *Yellow Bark.* From Cinch. Calisaya (Rubiaceæ).

Two kinds :—quilled and flat.

Contains the alkaloids—*Quinia*, *Cinchonin*, *Quinidin*, *Cinchonidin*; *Quinic*, *Quinovic*, and *Quino-tannic Acids*.

The active principles, as found in the bark, are soluble in alcohol, and sparingly in water.

Quino-tannic Acid gives a green precipitate with Ferric Salts.

The Sulphate of Quinia is officinal, as **Quiniæ Sulphas** (see "Alkaloids", in the Twenty-first Group).

Yellow Bark yields from 2.2 to 3.8 p. c. of Quinia, and a similar amount of other alkaloids.

Cinchona Pallida. *Pale Bark.* From Cinchona Condaminea.

Quills only.

The same active principles, but in small amount. Yields .6 to 1.4 p. c. of alkaloids, chiefly *Cinchonin*.

Cinchona Rubra. *Red Bark.* From Cinchona Succirubra.

Both quills and flat pieces.

The same active principles, in variable amount. The best bark yields 2.6 p. c. of *Quinia*, and 4 p. c. of other alkaloids (about as much Cinchonin as Quinia).

Cinnamomum. *Cinnamon.* From Cinnam. Zeylanicum (Lauraceæ).

Contains **Oleum Cinnamomi** (see "Volatile Oils", Fourteenth Group) and *Tannic Acid*.

Cusparia. *Angustura Bark.* From Galipea Cusparia (Rutaceæ).

Contains a *volatile oil*, and a bitter principle, *Angusturin*, soluble in alcohol, less so in water, precipitated by Tannic Acid.

Distinguished from Nux Vomica Bark, the chief *adulteration*, by the blood-red colour the Brucia in the latter strikes with Nitric Acid.

Granati Radix. *Pomegranate Bark.* From Punica Granatum (Myrtaceæ).

The bark of the root.

Contains 20 p. c. of *Tannic Acid*.

Larix. *Larch Bark.* From Larix Europæa (Coniferæ.)

Contains *resin*, *Tannic Acid*, and *Larixinic Acid*, crystalline and volatile, soluble in alcohol, sparingly in water.

Mezereon. From Daphne Mezereon (Thymelaceæ).

Contains an acrid *resin* and an acrid *volatile oil*, the former soluble in alcohol and ether.

Nectandra. *Bebeeru Bark.* From Nectandra Rodiæi (Lauraceæ).
Contains about 2½ p. c. of the alkaloid *Beberia.*
Beberiæ Sulphas is officinal (see Twenty-first Group).

Quercus. *Oak Bark.* From Quercus Pedunculata (Cupuliferæ).
From the small branches and young stems only.
Contains about 6 p. c. of *Tannic Acid.*

Ulmus. *Elm Bark.* From Ulmus Campestris (Ulmaceæ).
The liber only.
Contains about 3 p. c. of *Tannic Acid,* and a large amount of *mucilage.*

Officinal Preparations.

Extractum Mezerei Æthereum (See p. 4).

Pulvis Cinnamomi Co. Equal parts of cinnamon, cardamoms, and ginger.

Aqua Cinnamomi.

Infusum Cascarillæ.

Infusum Cuspariæ. Made with water at 120° F., not to disperse the volatile oil.

Decoctum Granati Radicis (See p. 5).

Decoctum Quercus.

Decoctum Ulmi. Mucilaginous.

*** Decoctions of Pomegranate and Oak Bark are practically solutions of Tannic Acid.

Tinctura Cascarillæ.

Tinctura Cinnamomi.

Tinctura Laricis.

(Of Cinchona Flava.)

Extractum Cinchonæ Flavæ Liquidum. 1 fl. oz. corresponds to 4 oz. of the bark.

Infusum Cinchonæ Flavæ. } Made with similar proportions
Decoctum Cinchonæ Flavæ. } of bark.

Tinctura Cinchonæ Flavæ.

(Of Cinchona Pallida.)

Tinctura Cinchonæ Co. With Serpentary; flavoured with orange peel, coloured with saffron and cochineal. A much weaker preparation than Tr. Cinchonæ Flavæ; contains very little Quinia.

*** Of *Cinchona Rubra,* no preparations are officinal. It is used as a source of Quinine. *Nectandra* is used only as a source of Beberia. *Canella Alba* is used to flavour Vin. Rhei.

NINTH GROUP :—LEAVES. 13.

Nearly all highly important drugs.

Aconiti Folia. *Aconite Leaves.* From Aconitum Napellus, *Monkshood* (Ranunculaceæ).

Contain the alkaloid **Aconitia** (see Twenty-first Group), but in less amount than the root **Aconiti Radix** (see Tenth Group).

Belladonnæ Folia. *Belladonna Leaves.* From Atropa Belladonna, *Deadly Nightshade* (Solanaceæ).

Contain the alkaloid **Atropia** (see Twenty-first Group).
Belladonnæ Radix is also officinal (see Tenth Group).

Buchu. *Bucco.* From Barosma Betulina, Crenulata, and Serratifolia (Rutaceæ).

Three kinds of leaf.

Contain a *volatile oil*, and a *bitter principle* soluble in water, not in alcohol.

Conii Folia. *Hemlock Leaves.* From Conium Maculatum (Umbelliferæ).

Contain the liquid volatile alkaloid *Conia*, $C_8 H_{15} N$., but in less amount than the fruit, **Conii Fructus** (see Eleventh Group).
Also a *volatile oil*, and a variable amount of *Methyl-Conia*, $CH_3 . C_8 H_{14} N$.
Conia is separated from its combination by adding Caustic Alkali to any part of the plant. It has an odour of *mice*. It is officinal in the form of an Inhalation (see pages 8 and 27).

Digitalis. From Digitalis Purpurea, *Foxglove* (Scrophulariaceæ).

Contain the neutral principle *Digitalin* (**Digitalinum,** see Twenty-first Group), soluble in alcohol, sparingly in water.

Hyoscyamus. *Henbane.* From Hyoscyamus Niger (Solanaceæ).

Contain an alkaloid *Hyoscyamia.*

Laurocerasus. *Cherry Laurel.* From Prunus Laurocerasus (Rosaceæ).

Contain the glucoside *Amygdalin*, which yields a *volatile oil*, and a small amount of *Prussic Acid*, on distillation.

Matica. *Matico.* From Artanthe Elongata (Piperaceæ).

A thick down on the under surface.

Contain a *volatile oil*, and a bitter principle, *Artanthic Acid*, soluble in water and alcohol.

Senna Alexandrina. *Alexandrian Senna.* From Cassia Lanceolata and Obovata (Leguminosæ).

Two kinds of leaf.

Contain a yellowish-red neutral principle, *Cathartin*, of bitter and nauseous taste, soluble in water and alcohol. Also a *volatile oil* of nauseous odour and taste.

Cathartin is precipitated by Tannic Acid.

Senna Indica. *Tinnevelly Senna.* From Cassia Elongata.

The same constituents.

Stramonii Folia. *Stramony Leaves.* From Datura Stramonium (Solanaceæ).

Contain an alkaloid, *Daturia*, which appears to be identical with *Atropia*. The proportion of alkaloid is much less than in Belladonna.

Stramonii Semina are also officinal (see Twelfth Group).

Tabacum. *Tobacco.* From Nicotiana Tabacum (Solanaceæ).

Unmanufactured tobacco.

Contain a liquid alkaloid, *Nicotia*, C_{10} H_{14} N_2, of acrid odour and taste.

Uva Ursi. *Bearberry.* From Arctostaphylos Uva Ursi (Ericaceæ).

Contain about 36 p. c. of *Tannic Acid* and 1.5 of *Gallic Acid*, and a little *volatile oil*.

Officinal Preparations.

Extractum Aconiti (p. 3).
Extractum Belladonnæ.
Extractum Conii.
Extractum Hyoscyami.

The remaining preparations of Aconite, the *Tincture* and *Liniment*, as well as the Alkaloid *Aconitia*, are prepared from the Root (see Tenth Group).

Succus Belladonnæ.
Succus Conii.
Succus Hyoscyami.

Belladonna *Liniment* and the Alkaloid *Atropia* are prepared from Belladonna Root (see Tenth Group).

Infusum Buchu.
Infusum Digitalis.
Infusum Maticæ.
Infusum Sennæ.
Infusum Uvæ Ursi.

Tincture of Hemlock is prepared from the fruit (see Eleventh Group).

The preparations of Stramony, the *Extract* and *Tincture*, are made from the seeds (see Twelfth Group).

Stramony leaves are only used in the form of cigarettes.

Tinctura Belladonnæ.

Tinctura Buchu.

Tinctura Digitalis.

Tinctura Hyoscyami.

Tinctura Sennæ. Flavoured with raisins, caraway, and coriander.

The three kinds of Senna leaves are used indifferently.

Syrupus Sennæ. Flavoured with oil of coriander.

Confectio Sennæ. With coriander seed, figs, tamarinds, cassia, prunes, extract of liquorice, sugar and water.

Mistura Sennæ Co. A solution of Epsom Salts (*Magnesiæ Sulphas*) in Infusion of Senna, flavoured with Tincture of Senna, Extract of Liquorice, and Tr. Cardam. Co. One-fifth of an ounce of the salt in each fluid ounce.

Pil Conii Co. With Ipecacuanha and Treacle.

Cataplasma Conii. An ounce of Hemlock leaves in a poultice made with three ounces of Linseed (p. 9).

Vapor Coniæ. A drachm of Extract of Hemlock, a drachm of Liq. Potassæ, and ten of water, mixed. Twenty minims to be placed on a sponge over hot water, and the steam inhaled.

Unguentum Belladonnæ. One part of the extract in five.

Emplastrum Belladonnæ. Equal parts of the extract and resin plaster.

Aqua Laurocerasi.

Enema Tabaci. An infusion of 20 grains in 8 fluid ounces of water.

*** Aqua Laurocerasi is, practically, a solution of Hydrocyanic Acid, of very uncertain strength.

*** The strength of the preparations of Hemlock is very variable, as Conia is not only volatile, but is liable to decomposition in presence of air. Succus Conii is the most trustworthy. Tr. Conii, according to Dr. John Harley, is almost inert.

TENTH GROUP :—ROOTS AND RHIZOMES. 25.

CORM, 1. BULB, 1. TUBERS, 1.

Liquorice and Hemidesmus are merely flavouring agents ; Horse-radish, Arnica, Pellitory, Sassafras, Serpentary, and Sumbul are of small importance. The remainder are important drugs, and some of high importance.

Aconiti Radix. *Aconite Root.* From Aconitum Napellus, *Monkshood* (Ranunculaceæ). Root.

Contains **Aconitia** (see Twenty-first Group) in greater amount than the leaves **Aconiti Folia** (p. 25).

Armoracia. *Horse-radish.* From Cochlearia Armoracia (Cruciferæ). Root.

Contains, or developes on being scraped, an acrid *volatile oil*, apparently identical with oil of mustard.

Arnica. From Arnica Montana (Compositæ). Rhizome and rootlets.

Contains a *volatile oil*, and an acrid *resin* soluble in alcohol.

Belladonnæ Radix. From Atropa Belladonna, *Deadly Nightshade* (Solanaceæ). Root.

Contains **Atropia** (see Twenty-first Group).
Belladonnæ Folia are officinal (see p. 25).

Calumba. From Jateorrhiza Calumba (Menispermaceæ). Root.

Contains a bitter alkaloid, *Berberia*, and a neutral bitter principle, *Calumbin*, slightly soluble in water and alcohol. Also *Starch*.

Colchicum. From Colchicum Autumnale, *Meadow Saffron* (Melanthaceæ). Corms, fresh and dried.

Contains an alkaloid, *Colchicia*.
Colchici Semina are officinal (see Twelfth Group).

Filix Mas. *Male Fern.* From Aspidium Filix Mas (Filices). Rhizome with rootlets and bases of petioles.

Contains a *fixed oil*, a *volatile oil*, and a *resin*, all soluble in ether.

Gentiana. *Gentian.* From Gentiana Lutea (Gentianaceæ). Root.

Contains a bitter principle *Gentianite*, soluble in water ; also *sugar*, *pectin*, and *gum*.

Glycyrrhiza. *Liquorice.* From Glycyrrhiza Glabra (Leguminosæ). Rhizome.

Contains a sweet glucoside, *Glycyrrhizin*, soluble in water and alcohol, precipitated by acids.

Hemidesmus. From Hemidesmus Indicus (Asclepiadaceæ). Root.

Ipecacuanha. From Cephaëlis Ipecacuanha (Rubiaceæ). Root.

Contains an alkaloid, *Emetia*, and an astringent acid, *Cephaëlic Acid*, which strikes green with Ferric Salts.

Jalapa. *Jalap.* From Exogonium Purga (Convolvulaceæ). Tubers.

Contains 18 p.c. of **Resina Jalapæ** (see Fifteenth Group.)

Krameria. Rhatany. From Krameria Triandra (Polygalaceæ). Root.

Contains 40 p.c. of *Tannic Acid*, and a red astringent matter, soluble in water and alcohol.

Pareira. From Cissampelos Pareira (Menispermaceæ). Root.

Contains a bitter alkaloid *Pelosia*, possibly identical with Beberia.

Podophyllum. From Podoph. Peltatum (Ranunculaceæ). Rhizome.

Contains **Podophylli Resina** (see Fifteenth Group).

Pyrethrum. *Pellitory.* From Anacyclus Pyrethrum (Compositæ). Root

Contains *acrid oils* and *resins*, and some *Tannic Acid*.

Rheum. *Rhubarb.* From undetermined species of Rheum (Polygonaceæ). Root, deprived of its outer coat.

Three kinds, *Russian* or "*Turkey*", *East Indian*, and *Dutch-Trimmed*, or *Batavian*, all from China and Central Asia.

Contains* *Chrysophanic Acid* as yellow granules, sparingly soluble in cold water or alcohol, more so in hot, yielding red soluble chrysophanates with alkaline solutions; insoluble chrysophanates with lime-water, magnesia, and various metallic solutions.

Several *resins*, soluble in alcohol, not in water; and possibly a volatile oil.

Tannic and *Gallic Acids* and some *bitter* principle.

Calcic Oxalate, in masses of acicular crystals (*raphides*) :—35 p.c. in Russian Rhubarb.

Sarsa. *Jamaica Sarsaparilla.* From Smilax Officinalis (Smilaceæ). Roots, folded in bundles.

Contains a *volatile oil*, and a crystalline principle, *Smilacin*, soluble in alcohol, not in water. No starch.†

Sassafras. From Sassafras Officinale (Lauraceæ). Root.

Contains a *volatile oil*.

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* The purgative principle of Rhubarb has not yet been isolated.

† Other varieties of Sarsaparilla contain Starch.

Scammoniæ Radix. *Scammony Root.* From Convolvulus Scammonia (Convolvulaceæ). Root.

Contains **Scammoniæ Resina** (see Fifteenth Group).

Scammonium, the *gum-resin* obtained from the root during life, is officinal (see Nineteenth Group).

Scilla. *Squill.* From Scilla Maritima (Liliaceæ). Bulb, sliced.

Contains an acrid *resin*, and a *bitter* principle, soluble in water, alcohol, and acetic acid. (Composition practically unknown.)

Senega. From Polygala Senega (Polygalaceæ). Root-stock and roots.

Contains a glucoside, *Senegin* or *Polygalic Acid*, soluble in water or alcohol; also a little *Tannic Acid*.

Serpentaria. *Serpentary.* From Aristolochia Serpentaria (Aristolochiaceæ). Rhizome and rootlets.

Contains a *volatile oil* and a *bitter principle*, soluble in water and alcohol.

Sumbul. From Euryangium Sumbul (Umbelliferæ). Root.

Contains a *volatile oil*, two *balsamic resins*, one soluble in ether, one in alcohol, *starch* and *sumbulic acid*.

Taraxacum. *Dandelion.* From Taraxacum Dens Leonis (Compositæ). Root.

Yields a milky juice, which contains *caoutchouc*, *gum*, *albumen*, *sugar*, and a bitter crystalline substance, *Taraxacin*, soluble in alcohol, sparingly in water.

Valeriana. *Valerian.* From Valeriana Officinalis (Valerianaceæ). Rhizome and rootlets, smelling of Valerianic Acid.

Contains a hydrocarbon, *Borneene*, $C_{10}H_{18}$, and *Valerol*, $C_6H_{10}O$.
On exposure to air, valerol is oxidized to form *Valerianic Acid*, $C_5H_{10}O_2$.*
On distilling the root with water, a *volatile oil*, consisting of Borneene, Valerol, Valerianic Acid, and probably other substances, is obtained.
The above principles are soluble in alcohol, sparingly in water. They are all volatile.

Veratrum Viride. *Green Hellebore.* From Veratrum Viride (Melanthaceæ). Rhizome and rootlets.

Contains two active alkaloids, *Viridia* and *Veratroidea*, combined with *Gallic Acid*.

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* In making the officinal Valerianates, the acid is produced by oxidizing Fusel-oil (amylic alcohol). See Sodæ Valerianas, in Section III.

Zingiber. *Ginger.* From Zingiber Officinale (Zingiberaceæ). Rhizome, scraped.

Contains a *volatile oil*, a pungent *resin*, soluble in alcohol, not in water, and a great deal of *starch*.

Officinal Preparations.

Extractum Calumbæ.
„ **Colchici** (see p. 4).
„ **Colchici Aceticum** (see p. 4).
„ **Gentianæ.**
„ **Glycyrrhizæ.**
„ **Jalapæ.**
„ **Krameriæ.**
„ **Pareiræ.**
„ **Rhei.**
„ **Taraxaci** (see p. 4).

Extractum Filicis Liquidum (p. 4).
„ **Glycyrrhizæ Liquidum.**
„ **Pareiræ Liquidum.**
„ **Sarsæ Liquidum.**

Succus Taraxaci.

Infusum Calumbæ, made with *cold* water, on account of the starch.
„ **Gentianæ Co.,** flavoured with orange and lemon peels.
„ **Krameriæ.**
„ **Rhei.**
„ **Senegæ.**
„ **Serpentariæ.**
„ **Valerianæ.**

Decoctum Pareiræ.
„ **Sarsæ.**
„ **Sarsæ Co.,** made with Sassafras, Guaiac Wood, Mezereon, and Liquorice-root.
„ **Taraxaci.**

Tinctura Aconiti.
„ **Arnicæ.**
„ **Calumbæ.**
„ **Gentianæ Co.,** flavoured with orange peel and cardamoms.
„ **Jalapæ.**
„ **Krameriæ.**
„ **Pyrethri.**
„ **Rhei,** flavoured with cardamoms and coriander, and coloured with saffron.
„ **Scillæ.**
„ **Senegæ.**
„ **Serpentariæ.**
„ **Sumbul.**
„ **Valerianæ.**
„ **Valerianæ Ammoniata** (see p. 6).
„ **Veratri Viridis.**
„ **Zingiberis.**
„ **Zingiberis Fortior,** four times the strength of Tr. Zingib.

Acetum Scillæ, a "Tincture" made with dilute Acetic Acid (p. 6); about the same strength as Tr. Scillæ.

Spiritus Armoraciæ Co. (p. 6).

Vinum Colchici.
„ **Ipecacuanhæ,** nearly 1 gr. in the drachm.
„ **Rhei,** flavoured with Canella Alba.

Syrupus Hemidesmi.
„ **Rhei,** flavoured with Coriander.
„ **Scillæ,** made with Vinegar of Squill.
„ **Zingiberis,** made with Tr. Zingib. Fort.

Oxymel Scillæ. A mixture of Honey and Vinegar of Squill, concentrated.

Pulvis Glycyrrhizæ Co. Equal parts of Senna and Liquorice-root, with three times the amount of Sugar.

Pulvis Ipecacuanhæ Co. *Dover's Powder.* Equal parts of Opium and Ipecacuanha, with four times the amount of Potassæ Sulphas.

Pulvis Rhei Co. *Gregory's Powder.* Rhubarb, with thrice the amount of Light Magnesia and half the amount of Ginger.

Pulvis Jalapæ Co. Five parts of Jalap, one of Ginger, nine of Cream of Tartar.

Trochisci Ipecacuanhæ. ¼ gr. in each.

Trochisci Morphiæ c. Ip. 1-12th gr. of Ipecacuanha in each, with 1-36th of Morphiæ Hydrochloras.

Pil. Ipecacuanhæ cum Scilla. Dover's Powder, with Squill and Ammoniac, made up with Treacle. 1 of Opium in 23½.

Pil. Rhei Co. Rhubarb, Aloes, and Myrrh, with Soap and Treacle; scented with Oil of Peppermint.

Pil. Scillæ Co. Squill, Ammoniac, Ginger, Soap, and Treacle.

Mistura Gentianæ. A diluted Tincture, flavoured with Orange Peel and Coriander.

Linimentum Aconiti. A strong Tincture, about ten times the strength of Tr. Aconiti, with Camphor.

Linimentum Belladonnæ. A very strong Tincture, about *four times the strength of the Extract*, with Camphor.

*** Aconite *Extract*, Belladonna *Extract*, *Juice*, and *Tincture*, are prepared from the leaves (see p. 26). Belladonna *Ointment* and *Plaster* from the extract.

Aconitia and Atropia (see Twenty-first Group) are extracted from the roots, not from the leaves.

*** Podophyllum is only used as a source of Podophyllin.

Scammony-root ,, ,, Scammony Resin.

Sassafras is contained in Dec. Sarsæ Co. There is no other officinal preparation of it.

ELEVENTH GROUP:—FRUITS, 26. GLANDS FROM FRUIT, 1.

α. The following twelve and their preparations are of minor importance, being little more than vehicles and flavouring agents (see p. 3).

Anethum. *Dill.* From Anethum Graveoleus (Umbelliferæ).
Achenes.
Contains **Oleum Anethi** (see "Volatile Oils", Fourteenth Group).

Aurantii Fructus. *Bitter Orange.* From Citrus Bigaradia (Aurantiaceæ)
Fresh fruit. The peel only is used (see p. 35).
The outer part of the peel contains a *volatile oil*, the inner a *bitter* principle and a little *Gallic Acid*.

Aurantii Cortex. *Bitter Orange Peel.*
The outer part of the peel of the same, dried.
Aqua Aurantii Floris is officinal (see p. 20).

Caruum. *Caraway.* From Carum Carui (Umbelliferæ).
Achenes.
Contain **Oleum Carui** (see "Volatile Oils", Fourteenth Group).

Coriandrum. *Coriander.* From Coriandrum Sativum (Umbelliferæ).
Adhering Mericarps.
Contains **Oleum Coriandri** (see "Volatile Oils", Fourteenth Group).

Fœniculum. *Fennel.* From Fœniculum Dulce (Umbelliferæ).
Achenes.
Contains a *volatile oil*.

Limonis Succus. *Lemon-juice.* From Citrus Limonum (Aurantiaceæ).
The fresh juice
Contains *Citric Acid*, about 4 gr. in the drachm, some *Malic Acid*, and a little *bitter* principle; also some acid salts of Potassium.

Limonis Cortex. *Lemon-peel.*
The outer part of the same, fresh.
Contains **Oleum Limonis** (see "Volatile Oils", Fourteenth Group), a *bitter* principle, and some *Gallic Acid*.

Mori Succus. *Mulberry-juice.* From Morus Nigra (Moraceæ)
Contains *Tartaric Acid*, *sugar*, and red colouring matter.

Pimenta. *Pimento*, or *All-Spice.* From Eugenia Pimenta (Myrtaceæ), Unripe berries, dried.

Contains **Oleum Pimentæ** (see "Volatile Oils", Fourteenth Group) and *Tannic Acid.*

Rosa Canina. *Hips.* From Rosa Canina, *Dog-rose* (Rosaceæ).

Contains *Citric* and *Malic Acids* and their *salts*, *sugar*, and a little *Tannin.* The hairy achenes are irritating to the bowels.

Uvæ. *Raisins.* From Vitis Vinifera (Vitaceæ).
Spanish Raisins only.

Contain *glucose* and *Acid Potassic Tartrate*

Officinal Preparations.

Aqua Anethi.
„ **Carui.**
„ **Fœniculi.**
„ **Pimentæ.**

Infusum Aurantii. From the dried peel.
„ **Aurantii Co.** Ditto; flavoured with Lemon-peel and Cloves.

Tinctura Aurantii. From the dried peel.
„ **Aurantii Recentis.** From the outer part of the peel of the fresh fruit.
„ **Limonis.** From the peel.

Syrupus Aurantii. Syrup, flavoured with Tr. Aurantii.
„ **Limonis.** Made with the fresh juice.
„ **Mori.** Ditto. Violet red.

Confectio Rosæ Caninæ. The "seeds" (achenes) are excluded. Liable to candy on keeping.

*** Coriander is used to flavour several preparations.
Raisins to flavour Tr. Cardam. Co., and Tr. Sennæ.
Conf. Ros. Caninæ is the basis of Pil. Quiniæ.
Lemon-juice is often used as a solution of Citric Acid in making effervescent draughts. The juice of Lemons is the source of **Acidum Citricum** (see Section III).
Vinum Aurantii (see "Alcohol", Section III) is not a Pharmacopœial preparation, but the "*Orange Wine*" of the Grocers' shops.

β. The remainder are used for their medicinal properties, but are of variable importance.

Bela. *Bael-fruit.* From Œgle Marmalos (Aurantiaceæ).
Half ripe fruit, dried.
Contains an *astringent principle*, supposed to be allied to Tannic Acid, but as yet incompletely studied.

Capsicum.* From Capsicum Fastigiatum (Solanaceæ).
Membranous pods, varying much in size.
Contains a red acrid *oil*, volatilizable by heat, soluble in alcohol, sparingly in water.

Cassia. From Cassia Fistula (Leguminosæ).
The pulp from the pods.
Contains *sugar*, *mucilage*, and *pectin*. The active principle has not been isolated.

Colocynthis. *Colocynth.* From Citrullus Colocynthis (Cucurbitaceæ).
The fruit, freed from rind and seeds, dried.
Contains a bitter purgative principle, viz., the glucoside *Colocynthin*, soluble in water and alcohol.

Conii Fructus. *Hemlock Fruit.* From Conium Maculatum (Umbelliferæ).
Unripe fruit, dried.
Contains *Conia* and *Methyl-Conia* (see **Conii Folia**, p. 25).

Cubeba. *Cubebs.* From Cubeba officinalis (Piperaceæ).
Contains about 10 p.c. of **Oleum Cubebæ** (see "Volatile Oils", Fourteenth Group) a principle *Cubebin*, allied to Piperin, soluble in alcohol, and resins.

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* Cayenne Pepper consists of powdered Capsicums. Capsicum is the chief ingredient of Curry-powders.

Ecbalium. *Squirting Cucumber.* From Ecb. Officinarum (Cucurbitaceæ).
A pepo, which, when ripe, separates from its stalk, and expels, through the aperture left at the insertion of the stalk, the seeds and the juice surrounding them.
Gathered before complete ripeness and separation from the stalk.

The sediment strained from the juice is alone used, under the name of **Elaterium** (see Twentieth Group).

Ficus. *Figs.* From Ficus Carica (Moraceæ).
Dried Figs.

The numerous achenes ("seeds") contained in the pulp are a mechanical stimulant to the intestines.

Kamala. *Wurrus.* From Rottleria Tinctoria (Euphorbiaceæ).
Minute superficial glands from the Capsules, forming a red powder.

Contains 80 p.c. of *resins* soluble in alcohol, a trace of *volatile oil* and of *tannin*.

Papaver. *Poppy Capsules.* From Papaver Somniferum (Papaveraceæ).
Nearly ripe, dried. A star-like stigma at the apex. Variable in size.

The capsule contains a minute quantity of the active principles found in Opium.
The seeds contain a fixed oil, *Poppy Oil*, which has no medicinal properties.
The same capsules in an unripe state, yield **Opium** (see Twentieth Group).

Piper. *Black Pepper.* From Piper Nigrum (Piperaceæ).
Berries ("Peppercorns").
"White Pepper" consists of decorticated peppercorns.

Contains a *volatile oil*, an acrid *resin*, and a tasteless nitrogenised principle, *Piperin*, $C_{17}H_{19}NO_3$, which is colourless when quite free from the oil.

Prunum. *Prunes.* From Prunus Domestica (Rosaceæ).
Dried Plums.

Contains an undetermined purgative principle, *sugar*, and *malic acid*.

Rhamni Succus. *Buckthorn Juice.* From Rhamnus Catharticus (Rhamnaceæ).
The juice of the berries.

Contains a *purgative principle*, not yet accurately determined, and a *green colouring matter*.

Sabadilla. *Cevadilla.* From Asagræa Officinalis (Melanthaceæ).
Follicles, dried.

Contains **Veratria** (see "Alkaloids" in Twenty-first Group) and *Gallic Acid*.

Tamarindus. *Tamarind.* From Tamarindus Indica (Leguminosæ). Pulp preserved in sugar. The West Indian is alone officinal.

Contains free *Acids:—Citric, Tartaric,* and *Malic; Acid Potassic Tartrate, sugar,* and *pectin.*

Officinal Preparations.

Extractum Belæ Liquidum.

Extractum Colocynthidis Co. A spirituous extract, mixed, before evaporation, with extract of Socotrine Aloes, Scammony resin, and hard soap; flavoured with powdered Cardamoms.

Extractum Papaveris. Of the Capsules alone, without the seeds.

Decoctum Papaveris. Of the seeds as well as the Capsules; contains mucilage and oil.

Syrupus Papaveris. Of the capsules only (p. 6).

Syrupus Rhamni. Flavoured with Ginger and Pimento (p. 6).

Tinctura Capsici.

Tinctura Conii. The only preparation of Hemlock fruit, the *extract* and *juice* being made from the leaves, the *Pill-mass* and *Inhalation* of Conia from the extract.

*** Said by Dr. John Harley to be an almost inert preparation.

Tinctura Cubebæ.

Confectio Piperis. Made with Honey, flavoured with Caraway.

Pil. Colocynthidis Co. Made of Colocynth with twice the amount of Barbadoes Aloes and of Scammony, mixed with a little Sulphate of Potash, and scented with Oil of Cloves.

Pil. Col. cum Hyoscyamo. The same, with half as much of Extract of Henbane.

*** Cassia, Figs, Prunes, and Tamarind form part of Confection of Senna.

Cevadilla is used only as a source of Veratria, Ecbalium as a source of Elaterium (see Twentieth Group).

TWELFTH GROUP:—SEEDS. 14. GOSSYPIUM.

Nux Vomica, Physostigma, and Stramonium, are important and active drugs. The remainder are of minor importance as medicinal drugs, though some are in extensive use as vehicles.

Amygdala Dulcis. *Sweet*, or *Jordan, Almond.* From Amygdala Communis (Rosaceæ).

Large and long, easily distinguished from the Bitter Almond.

Contains **Oleum Amygdalæ** (see "Fixed Oils", Thirteenth Group), an albuminoid *Emulsin*, soluble in cold water, precipitated by boiling or by alcohol, *sugar* and *gum*.

Amygdala Amara. *Bitter Almond.* From the same species, var. Amara.

Smaller and more ovate.

Contains, besides the above, a white crystalline glucoside, *Amygdalin*, $C_{20}H_{27}NO_{11}$, soluble in water and alcohol, slightly bitter. When water is added to the almond, the Amygdalin decomposes in the presence of the Emulsin, furnishing *glucose*, *Hydrocyanic Acid*, and volatile *Oil of Bitter Almonds* (Benzoyl Hydride,) C_7H_6O.*

Areca. *Betel nut.* From Areca Catechu (Palmaceæ).

Contains *Tannic* and *Gallic Acids*, with a *red* colouring matter, soluble in alkaline solutions and boiling water.

Cardamomum. *Cardamoms.* From Elettaria Cardamomum (Zingiberaceæ).

Usually kept in the pericarps, but the seeds alone are officinal.

Contains a *volatile oil*, about 4½ p.c., and *colouring matter*.

Colchici Semina. *Colchicum Seeds.* From Colch. Autumnale (Melanthaceæ).

Contain an alkaloid, *Colchicia*, resembling Veratria in properties.

The *Corm* also is officinal (see p. 28).

Farina Tritici. *Wheat-flour.* From Triticum Vulgare (Graminaceæ).

Contains 52–75 p.c. of *starch* (see Twenty-first Group), 10-23 p.c. of *gluten* and *albuminoids*, 6–13 p.c. of *dextrin* and *glucose*, with Potassium and other *salts*.

Hordeum Decorticatum. *Pearl Barley.* From Hordeum Distichon (Graminaceæ).

Barley, husked in a mill, the grains polished.

Contains on an average 68 p.c. of *starch*, 14 of *gluten*, *albuminoids*, etc., 2 of *fatty* matter, 2 of *saline* matter.

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* $C_{20}H_{27}NO_{11} + 2H_2O = 2C_6H_{12}O_6 + HCN + C_7H_6O$. Commercial Oil of Bitter Almonds retains the Hydrocyanic Acid, to the extent of 4—8 p.c. The oil itself is not poisonous, and may be obtained in a pure state.

Lini Semina. *Linseed.* From Linum Usitatissimum, *Flax* (Linaceæ).

Contains 20 p.c. of **Oleum Lini** (see "Fixed Oils", Thirteenth Group) in the kernel. The seed-coats contain *mucilage.*

Lini Farina. *Linseed-meal.* The "Oil-cake" or residue of Linseed after the expression of the oil, ground to powder.

Contains the *mucilage.*

Crushed Linseed, with the oil in it, grows rancid on keeping. The meal, from which the oil has been expressed, keeps well.

Myristica. *Nutmeg.* From Myristica Officinalis (Myristicaceæ).

The kernel invested with the closely adherent inner seed coat (dark brown), which dips down into the substance of the nutmeg, producing a veined appearance on section.

The "Arillode" of the nutmeg constitutes *Mace.*

Contains the concrete fixed oil **Oleum Myristicæ Expressum** (see Thirteenth Group) and the volatile oil **Oleum Myristicæ** (see Fourteenth Group).

Nux Vomica. From Strychnos Nux Vomica (Loganiaceæ).

Contains the alkaloids **Strychnia** (see Twenty-first Group) and *Brucia,* with *Strychnic* or *Igasuric Acid.*

The red colour which Brucia strikes with Nitric Acid is a test for parts of the Nux Vomica plant. See Cusparia Bark, p. 23.

Physostigma. *Calabar Bean. Eseré.* From Physostigma Venenosum (Leguminosæ).

Contains an alkaloid, *Eserin* (see "Non-officinal Drugs").

Sinapis. *Mustard.* From Sinapis Alba and Nigra. (Cruciferæ.)

The seeds of both plants, powdered.

Both white and black seeds contain about 28 p.c. of a mild *fixed oil,* and an albuminoid substance, *Myrosin,* resembling Emulsin (see "Amygdala Amara" above).

White mustard seeds contain a glucoside, *Sinalbin,* which yields glucose and an acrid *fixed oil* in presence of Myrosin and water.

Black mustard-seeds contain the glucoside *Myronic Acid,* as Potassium Myronate, $KC_{10}H_{18}NS_2O_{10}$. In presence of water at about 120 deg. F., Myrosin determines decomposition of the Myronate, forming glucose, Hydric-Potassic Sulphate, and an acrid volatile oil, **Oleum Sinapis** (see Fourteenth Group).

Stramonii Semina. *Stramony.* From Datura Stramonium (Atropaceæ).

Contain an alkaloid, *Daturia,* which appears to be identical with Atropia; and a *fixed oil.*

Stramonii Folia are also officinal (see p. 26).

Gossypium. *Cotton Wool.* From various species of Gossypium (Malvaceæ).

Fine hairs, formed of cells placed end to end;* attached to the seed-coat.

Nearly pure *Cellulose.* Soluble in strong alkaline solutions. See *Pyroxylin* in Sec. III.

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* Flax-fibres are formed of cells with tapering ends, overlapping.

Officinal Preparations.

Extractum Nucis Vomicæ.
Extractum Physostigmatis.
Extractum Stramonii (p. 4).

Infusum Lini. Flavoured with Liquorice Root. Contains Mucilage, holding some of the oil.

Decoctum Hordei. (*Barley-water*) 2 oz. in a pint and a half.

Tinctura Cardamomi Co. A tincture of Cardamom, Caraway, Raisins, and Cinnamon, coloured with Cochineal.
Tinctura Colchici Seminum.
Tinctura Nucis Vomicæ.
Tinctura Stramonii.

Pulvis Amygdalæ Co. Sweet Almonds, powdered, with Sugar and Gum.
Mistura Amygdalæ. An emulsion made by rubbing Pulv. Amyg. Co. with water, strained through muslin. 2½ oz. of the powder to the pint.

Cataplasma Lini. A poultice made with 4 oz. of Linseed-meal, half an ounce of olive oil being added when it is made.
Cataplasma Sinapis. A poultice made with 2½ oz. each of Linseed-meal and mustard.

Charta Sinapis. Cartridge paper coated with *Black* Mustard by means of Liq. Gutta-percha.

*** Nux Vomica Seeds are softened by steaming before being powdered for use.

The other Colchicum preparations, the *Extract*, *Acetic Extract*, and *Wine*, are made from the *Corm* (pp. 30, 31).

Nutmeg enters into several compound preparations. (See the "Synopsis".)

Spirit of Nutmeg is made with the Volatile Oil (see Fourteenth Group).

Both Sweet and Bitter Almonds yield Ol. Amygdalæ (pp. 39, 42); the former only is used for the Compound Powder and the Mixture.

Wheat-flour is used to make Yeast-poultice (p. 17).

Pyroxylin (*Gun-cotton*) is prepared from Cotton wool. (See Section III.)

THIRTEENTH GROUP:—FIXED OILS. 7.

Croton and Castor Oils are important drugs; Nutmeg-butter is used for external application; the rest are vehicles.

Fixed oils are composed of Glyceric Salts of Acids of the Acetic or the Oleic Series. They cannot be distilled unchanged. With caustic alkalies, and some metallic oxides, they yield the corresponding alkaline or metallic salts, and glycerine. (See Glycerinum; Sapo Mollis, under "Potassium"; Sapo Durus and Animalis, under "Sodium"; Emplastrum Plumbi, under "Lead"; in Section III.)

They are extracted by expression, and in the case of the liquid oils, are of finest quality when expressed without the aid of heat. Heat either produces partial decomposition, or causes them to be contaminated with other constituents of the plant. Cold expression is expressly demanded by the Pharmacopœia in the case of Linseed oil.

The concrete oils, which are solid at ordinary temperatures, require the aid of heat in expression.

Oleum Amygdalæ. *Almond Oil.* From the seeds (Almonds) of Amygdalus Communis, sweet and bitter varieties (Rosaceæ) see p. 39.

Chiefly *Glyceric Oleate (Olein)*.

Ol. Crotonis. *Croton Oil.* From the seeds of Croton Tiglium (Euphorbiaceæ).

Composition undetermined. *Crotonic Acid* has been isolated.

Ol. Lini. *Linseed Oil.* From the seeds of Linum Usitatissimum (Linaceæ) (p. 40).

Chiefly *Glyceric Lin-oleate* and *Margarate*.

Ol. Myristicæ Expressum. *Nutmeg-butter.* From the kernels of Myristica Officinalis (Myristicaceæ) p. 40.

A concrete oil: contains a little volatile Oil of Nutmeg.

Myristic Acid has been isolated.

Ol. Olivæ. *Olive, or Sweet, Oil.* From the fleshy fruit of Olea Europæa (Oleaceæ).

28 p.c. *glyceric Margarate* (Margarin), 72 p.c. *glyceric Oleate* (Olein).

Ol. Ricini. *Castor Oil.* From the seed of Ricinus Communis (Euphorbiaceæ).

Glyceric *Ricinate, Ricin-oleate and Ricin-stearate*, with some acrid *resin*.

Ol. Theobromæ. *Cocoa-butter.* From the seeds of Theobroma Cacao. (Byttneriaceæ).

A concrete oil. Melts at 122° F.

The above oils are all soluble in ether, and insoluble in water.

The liquid oils are miscible one with the other in all proportions.

Castor oil mixes with absolute alcohol in all proportions, and is soluble in twice its volume of Rectified Spirit.

Croton oil, when freshly expressed without the aid of heat, is soluble in equal parts of alcohol, but by keeping loses its solubility.

The other fixed oils are only slightly soluble in alcohol. Admixture of any one with Castor Oil renders it more soluble in alcohol than the oil alone.

By prolonged exposure to air the fluid oils partly decompose, forming acrid products, and "becoming rancid."

Olive oil is the least liable to such decomposition.

Linseed and Castor oils become solid by prolonged exposure. They are therefore "drying oils."

At a temperature of 36° F., the margarin in Olive and Linseed oils solidifies and separates.

Officinal Preparations.

Linimentum Crotonis. A solution in equal parts of Oil of Cajeput and Rectified Spirit, 1 in 8.

*** Almond Oil is used in forming various ointments (see "Compound Preparations") and is the basis of Oleum Phosphoratum.

Olive Oil is used in forming various ointments, liniments, and plasters; also Charta Epispastica, Cataplasma Lini, and Enema Magnesiæ Sulphatis.

Castor Oil enters into Flexile Collodion, Compound Calomel Pill, and Lin. Sinapis Co.

Nutmeg-butter into Empl. Calefaciens and Empl. Picis.

Cocoa-butter is used as a basis for Suppositories (see p. 9).

FOURTEENTH GROUP :—VOLATILE OILS. 23.

The volatile oils of plants consist of Hydrocarbons, or of mixtures of Hydrocarbons with oxygenated derivatives, or of the oxygenated compounds alone.

Either a *Terpene*, $C_{10}H_{16}$, or a hydrocarbon of the composition $C_{15}H_{24}$, enters into the constitution of nearly all.

Oils of Turpentine, Savin, and Copaiba consist purely of Terpenes.

Oil of Juniper is a mixture of a Terpene with a $C_{15}H_{24}$—hydrocarbon.

Oil of Cubebs is almost entirely $C_{15}H_{24}$—hydrocarbons, with a little Terpene.

Oils of Lemon, Nutmeg, and Rosemary are Terpenes with a little oxygenated compound; the second contains also *Cymene* $C_{10}H_{14}$.

Oils of Caraway, Cajeput, Chamomile, Lavender, Spearmint, Peppermint, and Rue are mixtures of Terpenes with oxygenated compounds.

Oils of Dill, Anise, Cinnamon, and Pimento contain hardly any Hydrocarbon.

Oil of Coriander contains none; but only oxygenated compounds.

Oil of Cloves is almost entirely oxygenated, but contains a little $C_{15}H_{24}$—hydrocarbon.

(*Oxygenated Compounds.*)

Camphor possesses the composition $C_{10}H_{16}O$. It is usually described as a concrete volatile oil, and for pharmaceutical purposes may be so considered. Its precise chemical position is not determined.

Oils of Lavender and Rosemary in cold weather deposit a solid substance of the same composition as, and supposed to be identical with, Camphor. It is also said to be contained in Oil of Cloves.

A liquid body of similar composition enters into the constitution of Oils of Spearmint, Caraway, Dill, and Nutmeg, and is variously known as *Menthol*, *Carvol*, and *Myristicol*. It is regarded as an alcohol.

The term *Menthol* is also applied to "*Peppermint Camphor*" (*Menthylic Alcohol*, $C_{10}H_{20}O$), which is sometimes deposited by Oil of Peppermint in the cold. It is obtained abundantly from the Oil of Mentha Javanica (see "Non-Officinal Drugs").

Amongst other oxygenated constituents that have been investigated, may be mentioned *Anethol*, $C_{10}H_{12}O$, which forms the bulk of Oil of Anise; *Cinnamic Aldehyde*, C_9H_8O, which largely enters into Oil of Cinnamon; *Angelic Aldehyde*, which is found in Oil of Chamomile; and *Eudic Aldehyde*, $C_{11}H_{22}O$, in Oil of Rue.

Oil of Mustard differs widely from all the rest, being *Allylic Sulphocyanide*, C_3H_5CNS. It is not a naturally existing oil, but in a sense an artificial product (see p. 40).

All the volatile oils are soluble in alcohol and fixed oils, and to a slight extent in water.

They can be distilled without decomposition, and volatilize at ordinary temperatures, their vapours being powerfully odorous.

They are obtained by distillation. (See p. 6.)

This group may be divided into two divisions; the first containing thirteen oils used little more than as flavouring agents, the second containing ten which possess active medicinal properties.

(*1st division, unimportant.*)

Oleum Anethi. *Oil of Dill.* From the fruit (p. 34) of Anethum Graveolens (Umbelliferæ).

Ol. Anisi. *Oil of Anise.* From the fruit of Pimpinella Anisum, *Anise,* (Umbelliferæ), and Illicium Anisatum, *Star Anise,* (Magnoliaceæ).

Ol. Carui. *Oil of Caraway.* From the fruit (p. 34) of Carum Carui (Umbelliferæ).

Ol. Caryophylli. *Oil of Cloves.* From the sun-dried buds (p. 21) of Caryophyllus Aromaticus (Myrtaceæ).

Ol. Cinnamomi. *Oil of Cinnamon.* From the inner bark (p. 23) of the shoots of Cinnamomum Zeylanicum (Myrtaceæ).

Ol. Coriandri. *Oil of Coriander.* From the dried fruit (p. 34) of Coriandrum Sativum (Umbelliferæ).

Ol. Lavandulæ. *Oil of Lavender.* From the flowers of Lavandula Vera (Labiatæ).

Ol. Limonis. *Oil of Lemons.* From the fresh peel (p. 34) of the fruit of Citrus Limonum (Aurantiaceæ).

Ol. Menthæ Piperitæ. *Oil of Peppermint.* From the fresh-flowering plant of Mentha Piperita (Labiatæ).

Ol. Menthæ Viridis. *Oil of Spearmint.* From the fresh-flowering plant of Mentha Viridis (Labiatæ).

Ol. Myristicæ. *Oil of Nutmeg.* From the kernel of the fruit (p. 40) of Myristica Officinalis (Myristicaceæ).

Ol. Pimentæ. *Oil of Pimento.* From the unripe fruit (p. 35) of Eugenia Pimenta (Myrtaceæ).

Ol. Rosmarini. *Oil of Rosemary.* From the flowering tops of Rosmarinus Officinalis (Labiatæ).

OFFICINAL PREPARATIONS.

Aqua Menthæ Piperitæ.
Aqua Menthæ Viridis.

Essentia Anisi.
Essentia Menthæ Piperitæ.

Tinct. Lavandulæ Co. A weak tincture of Cinnamon, Nutmeg, and Red Sandal Wood, with a little oil of Lavender, and a trace of Oil of Rosemary.

Spiritus Lavandulæ.
Spiritus Menthæ Pip.
Spiritus Myristicæ.
Spiritus Rosmarini.
} All 1 volume of oil in 50.

*** The other flavouring waters, Aq. Anethi, Aq. Aurant. Floris, Aq. Carui, Aq. Cinnamomi, Aq. Fœniculi, Aq. Pimentæ, Aq. Rosæ, Aq. Sambuci, are also preparations of volatile oils, but are ordered to be distilled directly from the raw drugs, and not from the oils. (See p. 6.)

Ol. Anthemidis forms part of Extractum Anthemidis.

(*2nd division, important.*)

Camphora. *Camphor.* Sublimed from the wood of Camphora Officinarum (Lauraceæ).
Solid and crystalline.

Oleum Anthemidis. *Oil of Chamomile.* From the flowers (p. 20) of Anthemis Nobilis (Compositæ).

Ol. Cajuputi. *Oil of Cajeput.* From the leaves of Melaleuca Minor (Myrtaceæ).

Ol. Copaibæ. *Oil of Copaiva.* From Copaiva. (See "Oleo-resins," Sixteenth Group.)

Ol. Cubebæ. *Oil of Cubebs.* From the unripe fruit (p. 36) of Cubeba Officinalis (Piperaceæ).

Ol. Juniperi. *Oil of Juniper.* From the unripe fruit of Juniperus Communis (Coniferæ).

Ol. Rutæ. *Oil of Rue.* From the leaves and unripe fruit of Ruta Graveolens (Rutaceæ).

Ol. Sabinæ. *Oil of Savin.* From the fresh tops (p. 18) of Juniperus Sabina (Coniferæ).

Ol. Sinapis. *Oil of Mustard.* From the seeds (p. 40) of Sinapis Nigra (Cruciferæ), after the expression of the fixed oil.

Formed in the process of distillation by the action of Myrosin on Myronic Acid (see p. 40).

Ol. Terebinthinæ. *Oil of Turpentine.* From the Oleo-Resin (*Turpentine*) exuding from the cut trunks of Pinus Palustris, Tæda, and Pinaster. (See "**Resina**" in Fourteenth Group.)

Officinal Preparations.

Aq. Camphoræ. Water saturated with Camphor.

Tinctura Camphoræ Co. A preparation of Opium. (See Twentieth Group.)

Spiritus Camphoræ. 5½ gr. in the drachm.
Spiritus Cajuputi. 1 part of oil in 50.
Spiritus Juniperi. Do.

Linimentum Camphoræ. A strong solution in Olive Oil.

Linimentum Camphoræ Co. A solution of Camphor and Ammonia in spirit, scented with Oil of Lavender.

Linimentum Sinapis Co. A solution of Oil of Mustard, Castor Oil, Camphor, and Ethereal Extract of Mezereon, in Rectified Spirit.

Linimentum Terebinthinæ. Camphor and Soft Soap dissolved in Oil of Turpentine.

Linimentum Tereb. Aceticum. Equal parts of Oil of Turpentine, Acetic Acid, and Camphor Liniment.

Unguentum Terebinthinæ. Half oil of Turpentine.

Confectio Terebinthinæ. With Honey and Liquorice-root; 1 in 4.

Enema Terebinthinæ. An ounce of the oil in 15 of Starch-Mucilage.

FIFTEENTH GROUP:—RESINS. 7.

All important except Mastic, which is rarely used. Rosin is chiefly important as a vehicle.

The composition and chemical nature of resins are as yet incompletely investigated. They are oxygenated compounds; amorphous, solid and brittle at ordinary temperatures, softening and fusing by heat. They possess acid properties, forming soluble salts ("resin soaps") with alkalies, and insoluble salts with some metallic oxides.

They are for the most part soluble in alcohol and ether, insoluble in water. *From solution in alcohol they are precipitated in fine division by water; from solution in alkali by acids.*

The "Resins" obtained from plants are combinations of several resinous substances.

Guaiaci Resina. *Guaiacum Resin.* From the stem of Guaiacum Officinale (Zygophyllaceæ).

In "tears" or lumps. Exudes naturally, or from artificial incisions in the living trunk; but ordinarily melted out of billets of Guaiac wood (p. 22).

Soluble in spirit and ether, and in solutions of caustic alkalies.

Yields a little extractive matter to water. Discoloured green, then blue and brown, by nitric acid, ozone, chlorine, Ferric and Cupric chlorides; blue by gluten.

Jalapæ Resina. *Jalap Resin.* From **Jalapa** (p. 29).

Extracted by Rectified Spirit. Water is added before distilling off the spirit, to retain and wash away the gummy matters, &c.

Soluble in Rectified Spirit and alkaline solutions, partially in ether.

Mastiche. *Mastic.* From the stem of Pistachia Lentiscus (Anacardiaceæ). Exudes from artificial incisions.

Contains a little volatile oil.
90 p.c. is soluble in Rectified Spirit.

Pix Burgundica. *Burgundy Pitch.* From the stem of Abies Excelsa, *Spruce Fir.* (Coniferæ.)

The resinous portion of the oleo-resin (Turpentine) from the above tree, separated by melting and straining.

Still contains a little volatile oil, giving it its odour.
Almost entirely soluble in Rectified Spirit, and in twice its weight of Glacial Acetic Acid.

The genuine article is seldom found.

Resina. *Rosin.* From the oleo-resin (ordinary Turpentine) collected from the stem of Pinus Palustris, Pinus Tæda, and Pinus Pinaster. The residue left after the distillation of **Ol. Terebinthinæ** (p. 47).

Consists of Pinic Acid, soluble in cold Rectified Spirit.
Sylvic ,, ,, warm ,,
Pimaric ,, ,, boiling ,,
All of the formula $C_{20}H_{30}O_2$.
All soluble in ether and volatile oils; uniting by fusion with wax and fixed oils; forming greasy salts (*resin-soaps*) with caustic alkalies.
Contains also a little water and volatile oil.

Podophylli Resina. *Podophylline.* From **Podophylli Radix** (p. 30). Procured in fine powder by making a strong liquid extract from the rhizome with Rectified Spirit, and pouring it into water acidulated with Hydrochloric Acid.

Soluble in Rectified Spirit and solutions of Ammonia.

Scammoniæ Resina. *Scammony Resin.* From **Scammoniæ Radix** (p. 29) or **Scammonium** (see "Gum-Resins," Nineteenth Group). Procured in the same way as Jalap Resin.

Soluble in alcohol and ether.

Officinal Preparations.

Tinctura Guaiaci Ammoniata. A solution of the Resin in Sp. Amm. Aromaticus.

Mistura Guaiaci. The resin suspended (an emulsion) by Gum Arabic in sweetened Cinnamon water.

Mistura Scammonii. The resin similarly suspended in milk.

Unguentum Resinæ. See "Synopsis of Comp. Prep."

Emplastrum Resinæ. ,, ,,

Emplastrum Picis. ,, ,,

Pilula Scammonii Co. 1½ grain each of Scammony Resin and Jalap Resin in 5 grains, with Ginger; on a basis of curd soap.

SIXTEENTH GROUP :—OLEO-RESINS. 4.

Copaiba is the only one of any great importance.

Oleo-resins are exudations formed by a combination of resins with volatile oils.

Copaiba. *Copaiva.* From the trunk of Copaifera Multijuga (Leguminosæ). Exudes from artificial incisions.

Contains 40 p.c. of **Ol. Copaibæ** (p. 46); the rest chiefly the resin *Copaivic Acid* $C_{20}H_{30}O_2$.
Soluble in Rectified Spirit, ether, fixed and volatile oils.

Elemi. Said to be from Canarium Commune (Amyridaceæ). Source not exactly known.

Neither the oily nor the resinous portion have been accurately examined.
Almost entirely soluble in Rectified Spirit.

Terebinthina Canadensis. *Canada Balsam.* From the stem of Abies Balsamea (Coniferæ).
Exudes from artificial incisions.

Nearly the same as ordinary Turpentine, containing *resin* and an *oil* resembling Ol. Terebinthinæ (p. 47).
Solidifies with Magnesia, resinous salts of Magnesia being formed, which absorb the volatile oil.
On exposure to air, the oil passes off, leaving the resin as a transparent varnish.

Thus Americanum. *Frankincense.* From Pinus Palustris and Tæda (Coniferæ).
Concrete American Turpentine; a natural exudation. Solid.

Much the same composition as ordinary Turpentine, which is collected in artificial hollows made in the trunk, and is semi-fluid, as it contains more oil.

Officinal Preparations.

Unguentum Elemi.

*** Canada Balsam enters into Charta Epispastica and Collodium Flexile; Frankincense is used in making Pitch Plaster, to improve its colour and consistence.

SEVENTEENTH GROUP :—BALSAMS. 4.

Balsams are resinous or oleo-resinous exudations, containing one or other of the volatile Aromatic Acids, *Benzoic*, $C_7 H_6 O_2$, or *Cinnamic*, $C_9 H_8 O_2$.

Of the four officinal Balsams, Benzoin contains the former, the others the latter, acid.
In Benzoin, the remaining constituents are resinous simply; in the others they comprise both resinous and oily matters, and a neutral principle, *Styracin*.

Tolu and Tr. Benzoini Co. are in frequent use.

Balsamum Peruvianum. *Peruvian Balsam.* From the trunk of Myroxylon Pereiræ (Leguminosæ).
Exudes after removal of the Bark.
Soluble in Rectified Spirit.

Balsamum Tolutanum. *Tolu.* From the trunk of Myroxylon Toluifera (Leguminosæ).
Exudes after incising the bark. Soft when fresh; hardens on keeping, by decomposition of the oil into resin and Cinnamic Acid.
Soluble in Rectified Spirit.
Yields Cinnamic Acid to water.

Benzoinum. *Benzoin.* From the trunk of Styrax Benzoin (Styracaceæ).
Exudes after incising the bark.
See **Acidum Benzoicum** (Twenty-first Group).
Soluble in Rectified Spirit and solutions of caustic alkalies.

Styrax Præparatus. Purified *Storax.* From the inner bark of Liquidambar Orientale (Liquidambaraceæ).
Extracted by hot water and pressure; purified by melting or solution in Rectified Spirit, and straining.
Soluble in Rectified Spirit.
The volatile oil, *Styrol*, C_8H_8, has aromatic properties.

Officinal Preparations.

Tinctura Tolutana. Prepared from Tolu.

Tinctura Benzoini Co. *Friar's Balsam.* A tincture of Benzoin, Storax, Socotrine Aloes, and Tolu.

Syrupus Tolutanus. Prepared from Tolu; practically a Syrup of Cinnamic Acid (p. 7).

*** Storax enters only into Tr. Benzoini Co.

For Adeps Benzoatus, see p. 13.

EIGHTEENTH GROUP:—GUMS. 2.

Important as vehicles.

Gums are carbo-hydrates, *i.e.* substances whose molecules are formed of six, or some simple multiple of six, atoms of Carbon, with Hydrogen and Oxygen in the proportions of H_2, O.

Acaciæ Gummi. *Gum Arabic.* From the stems of undetermined species of Acacia (Leguminosæ).

A natural exudation.

Consists almost entirely of the carbohydrate *Arabin*, C_{12} H_{22} O_{11}.
Soluble in equal parts of water, hot or cold; precipitated from solution by alcohol in excess. Insoluble in spirit, ether, or oils.
The solution forms an opaque white jelly with Plumbic Subacetate.

Tragacantha. *Tragacanth.* From the stem of Astragalus Verus (Leguminosæ).

Exudes naturally, or from artificial incisions in the bark.

Consists of *Arabin*, and its modification *Metarabin*, which is insoluble in water, but absorbs it and swells up.
Metarabin is soluble in Rectified Spirit.

Officinal Preparations.

Mucilago Acaciæ. 4 oz. of gum in 6 fl. oz. of water. A thick solution, used to suspend insoluble powders, oils, etc., in mixtures.

"Oils require about three-fourths their weight, balsams and spermaceti equal parts, resins two parts, and musk 5 times its weight" (Pereira).
The preparation develops Acetic Acid on being kept.

Mucilago Tragacanthæ. 60 grains of Tragacanth in half a pint of water. A similar preparation.

Pulvis Tragacanthæ Co. Equal parts of Tragacanth, Gum, and Starch, with three parts of sugar.

A vehicle for heavy powders.

NINETEENTH GROUP :—GUM-RESINS. 6.

All important drugs except Galbanum.

Gum-resins consist of Resins and Gums, with, in most cases, a volatile oil.

The resins generally form 65-80 p.c. of the whole, the gum 20-25 p.c., the oil about 4 p.c. In Scammony the resin is from 80 to 90 p.c., the gum from 6 to 20 p.c.

Of the pharmacopœial gum-resins, Gamboge and Scammony contain no oil.

They form perfect emulsions when rubbed with water, the resin and oil being suspended by the gum.

Ammoniacum. *Ammoniac.* From all parts of Dorema Ammoniacum (Umbelliferæ).

Oozes from the punctures of insects as a milky juice, which hardens in the air. In two forms, "tears" and lumps.

Assafœtida. From the root of Narthex Assafœtida (Umbelliferæ).

Oozes as a milky juice, which hardens in the sun, from incisions in the top of the root, producing "tears"; or from the surface of the root, cut off transversely, producing lumps.

The volatile oil contains sulphur, being *Allylic Sulphide* $(C_3 H_5)_2 S$.

Cambogia. *Gamboge.* From Garcinia Morella, var. Pedicellata (Guttiferæ). Exudes from the broken twigs or pedicels ; generally run into hollow bamboo sticks to harden.

The resin is *Gambogic Acid.*

Galbanum. From Ferula Galbaniflua (Umbelliferæ).

Mode of collection not known. In "tears" or lumps.

Myrrha. *Myrrh.* From the stem of Balsamodendron Myrrha (Amyridaceæ). Exudes naturally from the bark. In "tears" or lumps.

The resin and oil are soluble in Rectified Spirit.

Scammonium. *Scammony.* From the root of Convolvulus Scammonia (Convolvulaceæ). Exudes from artificial excisions.

The resin is **Scammoniæ Resina** (p. 49).

Scammoniæ Radix is officinal (p. 30).

Officinal Preparations.

Pulvis Scammonii Co. Scammony, with three-fourths its amount of Jalap, one-fourth of Ginger.

Confectio Scammonii. Scammony and Ginger, with Syrup and Honey, flavoured with Oils of Caraway and Cloves.

Pil. Assafœtidæ Co. Equal parts of Assafœtida, Galbanum, and Myrrh. Made up with Treacle.

Pil. Aloes et Assafœtidæ, see next page.

Pil. Cambogiæ Co. Equal parts of Gamboge, Barbadoes Aloes, and Pulv. Cinnamomi Co., with 2 parts of hard soap and a little syrup.

Pil. Aloes et Myrrhæ, see next page.

Tinctura Myrrhæ.

Tinctura Assafœtidæ. 1 in 8.

Spiritus Ammoniæ Fœtidus. A weaker preparation of Assafœtida, 1 in 13, a tenth part of the fluid being Liq. Ammon. Fortior.

Mistura Ammoniaci. An emulsion made by rubbing the gum-resin with water, strained.

Enema Assafœtidæ. An emulsion formed by rubbing 30 gr. of the gum-resin in 4 oz. of water.

Emplastrum Galbani. Contains an equal amount of Ammoniacum.

Emplastrum Ammoniaci cum Hydrargyro. (See "Mercury", in Section III).

TWENTIETH GROUP:—CONCRETE JUICES. 8. EXCRESCENCE. 1.

Manna is now seldom used; Gutta-percha is used as a vehicle; the others are highly important.

a

Aloe Barbadensis. *Barbadoes Aloes.* From the fleshy leaf of Aloe Vulgaris (Liliaceæ).

The juice flowing from the cut leaves, concentrated by boiling, and solidified. Inferior kinds are extracted from the leaves by pressure or boiling.

Contains a crystalline principle *Aloïn*, $C_{16}H_{18}O_7$, orange yellow, soluble in Rect. Spirit and boiling water, slightly in cold water; *Aloetic Acid*, which strikes olive-brown with ferric salts; a *resin*, which is soluble in boiling water, as well as in spirit; and about 60 p.c. of *bitter* matters, not yet accurately examined.

Aloe Socotrina. *Socotrine Aloes.* From the leaves of Aloe Perryi. The juice from the cut leaves dried in the sun.

Composition similar.

Officinal Preparations.

Extractum Aloes Barbadensis.
Extractum Aloes Socotrinæ.

Decoctum Aloes Co. A decoction from the Extract of Socotrine Aloes, the Extract of Liquorice, and Myrrh, with Potassic Carbonate; coloured with Saffron, and flavoured with Tr. Cardam. Co.

Tinctura Aloes. A Tincture of Socotrine Aloes and Extract of Liquorice.

Vinum Aloes. From Socotrine Aloes, Ginger, and Cardamoms.

Pilula Aloes Barbadensis. 2 gr. in 5, with hard soap and Confection of Roses, scented with Oil of Caraway.

Pilula Aloes et Ferri. ¾ gr. of Ferri Sulphas and 1 gr. of Barbadoes Aloes in 5; with Pulv. Cinn. Co. and Confection of Roses.

Pilula Aloes et Assafœtidæ. 1¼ gr. of Socotrine Aloes and of Assafœtida in 5; with Hard Soap and Confection of Roses.

Pilula Aloes et Myrrhæ. 1⅔ gr. of Socotrine Aloes, and half as much Myrrh, in 5; with Saffron and Confection of Roses.

Pilula Aloes Socotrinæ. Similar to Pil. Aloes Barb.; scented with Oil of Nutmeg.

Enema Aloes. 40 gr. of either variety rubbed with 15 of Potassic Carbonate in half a pint of Mucilage of Starch.

β

Catechu Pallidum. *Pale Catechu.* From the leaves and young shoots of Uncaria Gambir (Rubiaceæ).

An extract made in Singapore and the Eastern Archipelago by boiling the leaves and shoots and evaporating to dryness.

Contains about 49 p.c. of a modification of *Tannic Acid*, which gives a green precipitate with Ferric salts, and becomes insoluble and dark red on exposure to air and moisture; and a crystalline principle, *Catechin*, soluble in boiling water, very slightly in cold.

Galla. *Galls.* From Quercus Tinctoria, *Dyer's Oak* (Cupuliferæ).

Excrescences on the small twigs, formed around the ova of the insect Diplopis Gallæ Tinctoriæ, which it deposits in a puncture made in the bark.

Parenchymatous in structure, with a few vascular bundles.

Two kinds, "blue" and "white", the latter perforated by the aperture of the insect's escape.

Yields 35 p.c. of *Tannic Acid*, 5 p.c. of *Gallic Acid* (see Tannic and Gallic Acids in Section III).

Kino. From the trunk of Pterocarpus Marsupium (Leguminosæ).

Similar composition to Catechu, but contains less matter insoluble in cold water.

Officinal Preparations.

Pulvis Catechu Co. Catechu, Kino, Rhatany, Cinnamon, and Nutmeg.

Pulvis Kino Co. Kino, with a little Cinnamon and 1 gr. of Opium in the scruple.

Infusum Catechu.

Tinctura Catechu, flavoured with Cinnamon.

Tinctura Gallæ.

Tinctura Kino.

Trochisci Catechu. 1 gr. in each.

Unguentum Gallæ.

Unguentum Gallæ cum Opio. 4 gr. of Opium in the drachm.

γ

Manna. From the stem of Fraxinus Ornus and Rotundifolia (Oleaceæ). Exudes from artificial incisions.

Contains 60–80 p.c. of *Mannite*, or Manna-Sugar, $C_6 H_{14} O_6$, with a little *resin*, and some *bitter extractive* matter, in which the active properties probably lie.

Elaterium. From the fruit of Ecbalium Officinarum (Cucurbitaceæ). A sediment from the juice surrounding the seeds (see **Ecbalii Fructus,** p. 37) brought into the market directly, though the Pharmacopœia prescribes a mode of preparing it.

Contains 20 to 30 p.c. of *Elaterin* or *Momordicin* $C_{10} H_{14} O_2$, and some *resin*.

Officinal Preparation.

Pulvis Elaterii Co. 1 gr. in 10, with Sugar of Milk.

δ

Gutta-percha. From Isonandra Gutta (Sapotaceæ). Collected from the felled trees. Coagulates spontaneously in air. Sliced and cleansed in England.

80 p.c. of the hydrocarbon $C_{20} H_{32}$, a milk white solid; the rest resins, formed by its oxidation.

Soluble in chloroform and Oil of Turpentine, sparingly in absolute alcohol; unaffected by dilute acetic, hydrochloric or hydrofluoric acids, or alkaline solutions.

Softens with heat.

Officinal Preparation.

Liquor Gutta-percha. A solution in Chloroform, purified from the insoluble matters that contaminate commercial Gutta, by shaking with Carbonate of Lead, which carries them to the bottom.

Opium. From the unripe capsules of Papaver Somniferum (Papaveraceæ). Exudes from artificial incisions and inspissates spontaneously, forming "tears", which are collected and pressed into masses.

The Pharmacopœia prescribes Opium obtained in Asia Minor only. Of this there are two kinds.

1. *Smyrna* (*Turkey* or *Levant*) *Opium.*—Irregular round or flattened lumps, from ¼ lb. to 2 lbs. in weight; usually covered with the fruits of a species of rumex. On fracture, they are seen to be made up of agglutinated "tears".

2. *Constantinople Opium.*—Either large flattened cakes, or small lenticular masses, from ¼ lb. to ½ lb. in weight, enclosed in a poppy leaf, and marked with its midrib.

No. 2 is unequal in quality, and usually contains less morphia than No. 1. Its odour is less powerful.

Egyptian, *Persian*, *English*, and *East Indian* Opium are not officinal, and are usually inferior to the Asia Minor Opium.

From Opium have been isolated some fourteen alkaloids, of which the most important are *Morphia*, *Codeia*, *Papaverin*, *Cryptopia*, *Thebaia*, and *Narcotin*: two neutral crystalline bodies, *Narceia* and *Meconin*; and two acids:—*Meconic* $C_7 H_4 O_7$, and *Thebolactic* (probably the same as *lactic*).

Resins, *gums*, and *extractive* matters, with some *caoutchouc*, *volatile oil*, *fatty* matters and *salts* form the basis.

The best Opium should yield about 12 p.c. of Morphia, 8 p.c. of Meconic Acid, and the same of Narcotin. None of the other definite principles above mentioned form as much as 1 per cent.

Morphia is officinal in the forms of the *Acetate* and *Hydrochlorate* (see Twenty-first Group.) For *Codeia* see "non-officinal drugs".

Officinal Preparations.

Extractum Opii.

Extractum Opii Liquidum (see p. 4).

Tinctura Opii.

Tinctura Opii Ammoniata. A tincture of Opium and Benzoic Acid, made with a menstruum 4 parts Rectified Spirit, 1 part Liq. Ammon. Fort.; flavoured with Oil of Anise, and coloured with Saffron.

Tinctura Camphoræ Co. A weaker Tincture of Opium, Benzoic Acid, and Camphor; made with proof spirit, and flavoured with oil of Anise.

Vinum Opii. Made from the Extract of Opium with Sherry; flavoured with Cinnamon and Cloves

Pulvis Cretæ Aromaticus cum Opio. Pulv. Cretæ Aromat. (see Sect. III) with 1 grain of Opium in 40.

Pulvis Opii Co. Opium with Black Pepper, Ginger, and Caraway; and a little Tragacanth.

Confectio Opii. 192 grains of the above Powder mixed with a fluid ounce of Syrup.

Pil. Saponis Co. Opium in Castile Soap. 1 grain in 6.

Pil. Plumbi cum Opio. Acetate of Lead and Opium, with Confection of Roses.

Trochisci Opii. Made with the Extract; flavoured with Tr. of Tolu.

Enema Opii. Half a drachm of Tr. Opii in 2 ounces of Starch Mucilage.

Suppositoria Plumbi Co. Made with Acetate of Lead and Opium.

Linimentum Opii. Equal parts of Tr. Opii and Lin. Saponis Co.

Ung. Gallæ cum Opio. See p. 56.

Emplastrum Opii. On a basis of Resin Plaster.

*** *Opium is contained in three other Officinal Preparations. They are printed in italics in the subjoined table.*

Officinal Preparations containing Opium. Amount of preparation containing, or corresponding to, 1 grain of solid Opium.

Extr. Opii	½ gr.
Pulv. Opii Co. / *Pulv. Ipecac. Co.* (p. 32)	10 gr.
Pulv. Kino Co. (p. 56)	20 gr.
Pulv. Cretæ Arom. c. Op. / Confect. Opii.	40 gr.
Lozenges	Five.
Pil. Saponis Co.	6 gr.
Pil. Pb. c. Opio	8 gr.
Pil. Ipecac. c. Scillâ (p. 33)	23 gr.
Ext. Opii Liq. / Vinum Opii	11 min.
Tinct. Opii	14½ min.
Tr. Op. Ammon.	96 min.
Tr. Camph. Co.	½ oz.
Enema Opii	1 oz.
Lin. Opii	½ drm.
Empl. Opii	10 gr.
Ung. Gallæ c. Opio	15 gr.
Suppos. Pb. Co.	One suppository.

TWENTY-FIRST GROUP:—ACTIVE PRINCIPLES OF DEFINITE CHEMICAL COMPOSITION. 14.

All important.

a. *Two Carbohydrates, used as vehicles.*

Amylum. *Starch.* $C_6 H_{10} O_5 + 2 H_2 O$.

On exposing wheat-flour in contact with water for a week or two, fermentation takes place, and Acetic Acid is formed, which disaggregates and partly dissolves the gluten. The gluten, sugar, gum, acid, etc., being washed away, starch remains, nearly pure, containing only some mineral salts. It is moulded and dried. Wheat-starch alone is officinal.

Rendered anhydrous at 230 deg. F. in dry air. Converted into dextrin and sugar at 320 deg. F. in closed vessels.
Insoluble in cold water, alcohol, and ether. Forms a mucilage with water at 195 deg. F.
Converted into dextrin and sugar by prolonged boiling in water, by saliva, malt extract, and mineral acids.

Saccharum Purificatum. *Loaf-sugar.* $C_{12} H_{22} O_{11}$.

Contained in the sap of the *Sugar-cane.* Saccharum Officinarum (Graminaceæ), and of the *Beet-root,* Beta Vulgaris (Chenopodiaceæ).

The expressed sap of the sugar-cane, being freed from albuminoids by heating with lime and drawing off from the scum, and concentrated by boiling, yields impure crystalline sugar (*raw* or *brown sugar*) and an uncrystallizable modification, *Molasses* or *Golden Syrup.*

The crystalline sugar being redissolved, the solution filtered through cotton, then through animal charcoal, and concentrated, it crystallizes out in a pure form. The mother syrup yields a less pure sugar, and an uncrystallizable modification, known as *Treacle.*

Beet-root sugar is refined at once, the "raw" sugar having so unpleasant a taste as to be uneatable.

Both beet and cane sugar occur commercially in masses or "loaves" of minute crystals. Larger crystals are exceptionally produced.

The Pharmacopœia prescribes "cane sugar", but beet sugar, which has largely supplanted it, is precisely the same compound.

Soluble in less than half its weight of water: in 100 of parts Rectified Spirit.

(**Theriaca.** The Treacle referred to above is included in Section III as a manufactured product.)

OFFICINAL PREPARATIONS.

Syrupus. A strong solution of sugar, containing 6 parts in 7, made by dissolving sugar in half its weight of water.

Mucilago Amyli. A solution (? suspension) formed by boiling 2 drms. of starch in half a pint of water.

Used as a vehicle for enemata, and for stiffening bandages.

Glycerinum Amyli. A translucent jelly, formed by heating starch with 8 parts of glycerine to 240 deg. F.

Intended as an ointment.

β. One Acid.

Acidum Benzoicum. *Benzoic Acid.* $C_7 H_6 O_2$.
Sublimed from **Benzoinum** (p. 51).

Silky plates or needles.
Soluble in 4 parts of Rectified Spirit, 12 parts of boiling water, 400 parts of cold water.
Sublimes at 462 deg. F.

γ. Two Neutral Principles.

Digitalinum. *Amorphous Digitalin.*
From **Digitalis Folia** (p. 25), by a method of extraction detailed below.

Yellowish scales or porous masses.
Soluble in Rectified Spirit and in acid solutions, very slightly in water.*

Santoninum. *Santonin.* $C_{15} H_{18} O_3$.
From **Santonica** (p. 21), by a method detailed below.

Flat rhombic prisms, becoming yellow in sunlight.
Freely soluble in chloroform and fixed oils, in 50 parts of Rectified Spirit, very slightly in water.
It acts as an acid in presence of alkalies.
Sodic Santonate is soluble in water.

---

* The Infusion of Digitalis contains, however, sufficient of this powerful drug to possess active properties in moderate doses.

δ. *Nine Alkaloids and Alkaloidal Salts.*

Aconitia. $C_{30}\ H_{47}\ NO_7$.
From **Aconiti Radix** (p. 28), by a method detailed below.

Amorphous powder.
Soluble in 150 parts of cold water, 50 of hot, more freely in spirit.
Fusible.

Atropia. *Atropin.* $C_{17}\ H_{23}\ NO_3$.
From **Belladonnæ Radix** (p. 28), by a method detailed below.

Acicular crystals.
Soluble in 8 parts of Rect. Spirit, 500 of water.

Atropiæ Sulphas. Produced by neutralizing a solution of Atropin with Sulphuric Acid, and evaporating to dryness.

Amorphous powder.
Soluble in 4 parts of water.

Beberiæ Sulphas. $C_{35}\ H_{40}\ N_2\ O_6 .\ H_2\ SO_4$.
From **Nectandræ Cortex** (p. 24), by a method detailed below.

Translucent scales, dark brown.
Soluble in 80 parts of water, slightly in spirit.

Morphiæ Hydrochloras. $C_{17}\ H_{19}\ NO_3 .\ HCl .\ 3H_2O$.
From **Opium** (p. 58), by a method detailed below.

Silky acicular prisms.
Soluble in 20 parts of water, 90 of Rectified Spirit.

Morphiæ Acetas. $C_{17}\ H_{19}\ NO_3 .\ C_2\ H_4\ O_2$.
From **Opium** (p. 58), by a method detailed below.

Amorphous Powder.
Soluble in 6 parts of water, 100 of Rectified Spirit.

Quiniæ Sulphas. *Quinine.* $(C_{20}\ H_{24}\ N_2\ O_2)_2\ H_2\ SO_4 .\ _7H_2\ O$.
From **Cinchona Flava** (p. 23), and from the bark of *Cinchona Lancifolia*, by a method detailed below.

Feathery crystals.
Soluble in 40 parts of Rectified Spirit, 1000 of water.
With 1 minim of Ac. Sulphuric. Dil., Ac. Phosphor. Dil., or less of Ac. Nitric. Dil. to each grain, it is soluble in 8 parts of water.

Strychnia. *Strychnine.* $C_{21}\ H_{22}\ N_2\ O_2$.
From **Nux Vomica** (p. 40), by a method detailed below.

Prisms or octahedra.
Soluble in 6,000 parts of water, not in cold absolute alcohol.

Veratria. $C_{32}\ H_{52}\ N_2\ O_8$ (*not quite pure*).
From **Sabadilla** (p. 37), by a method detailed below.

Amorphous masses; pale grey.
Soluble in 11 parts of Rectified Spirit; insoluble in cold water.

Officinal Preparations.

Liquor Atropiæ.

Liquor Atropiæ Sulphatis.

Liquor Strychniæ.

Liquor Morphiæ Acetatis.

Liquor Morphiæ Hydrochloratis.

All contain $\frac{1}{60}$ of a grain in 2 minims, or $\frac{1}{2}$ grain in a drachm.

Liquor Atropiæ Sulphatis, which is intended for application to the eyes, is a solution in plain water.

The menstrua of the other liquors contain alcohol, one-eighth being rectified spirit in the case of Liq. Atropiæ, one-third in the case of the others. This is necessary to procure solution in the first case, to preserve the alkaloids from decomposition in the others.

A little dilute Hydrochloric Acid is added to procure solution of the Strychnia, which enters into a hydrochlorate.

A little dilute Acetic, and dilute Hydrochloric, Acids are added in making Liq. Morph. Acetatis and Liq. Morph. Hydrochloratis respectively, to supply the place of the acid which is sometimes lost in drying the prepared salts. Morphia by itself is insoluble in water.

Injectio Morphiæ Hypodermica. A solution of Acetate of Morphia in water, with a very slight excess of Acetic Acid. Contains 1-12th grain in each minim.

The solution is not made from Morphiæ Acetas, which, as stated above, is liable to partial decomposition. Morphia is freshly precipitated by Ammonia from Morph. Hydrochloras, carefully dissolved in acetic acid, and diluted.

Tinctura Quiniæ. A solution of Quiniæ Sulphas in Tinct. Aurantii, 1 grain in each drachm ; strained from Gallate of Quinia (see p. 34).

Tinctura Quiniæ Ammoniata. A solution in proof spirit, with the same amount of Quinia as the plain tincture, and 7½ min. of Liq. Ammoniæ in the drachm.

Vinum Quiniæ. A solution in orange wine, acidulated with citric acid ; 1 gr. in each fluid ounce.

Pil. Quiniæ. 2 grains in 3, with confection of Hips.

Suppositoria Morphiæ. ½ gr. of the Hydrochlorate in each suppository.

Suppositoria Morphiæ cum Sapone. The same amount of Morphia.

Trochisci Morphiæ. 1-36th gr. of the Hydrochlorate in each: flavoured with Tolu.

Trochisci Morphiæ et Ipecacuanhæ. The same, with 1-12th gr. of Ipecacuanha.

Unguentum Aconitiæ.
Unguentum Atropiæ.
Unguentum Veratriæ.
} With 8 gr. of the Alkaloid in the ounce.

*** Quinia is also officinal in the form of **Ferri et Quiniæ Citras.** See Sect. III.

The Pharmacopœia prescribes or describes the following processes for the extraction of the Alkaloids and neutral principles.

Aconitia.

1.—Powdered Aconite Root (p. 28).
An extract made with Rectified Spirit.
The extract exhausted by boiling distilled water.
An infusion containing salts of Aconitia.

2.—The Infusion filtered.
Liquor Ammoniæ added in slight excess, and the whole heated over a water bath.
Impure Aconitia precipitated.

3.—The precipitate collected, dried, and powdered.
An extract made of it by means of ether.
Contains little but pure Aconitia.
The extract dissolved in warm water, acidulated with sulphuric acid.
A solution of Sulphate of Aconitia.

4.—Liquor Ammoniæ, diluted with four times its bulk of water, added cautiously.
Aconitia *precipitated.*
Washed and dried.

Atropia.

1.—Powdered Belladonna Root (p. 28).
Exhausted with Rectified Spirit.
A Tincture containing salts of Atropia, with colouring and resinous matters etc.

2.—Lime added, and the tincture shaken.
Colouring matters precipitated.
The solution filtered.
The excess of Lime neutralised by Dilute Sulphuric Acid in slight excess.
The tincture now contains salts of Atropia, resins, free Sulphuric Acid, and Calcic Sulphate.

3.—Three-fourths of the alcohol distilled off (to avoid waste).
Water added, and the solution gently heated, till the rest of the alcohol has passed off.
A watery solution of the above substances.
A solution of Potassic Carbonate added nearly to neutrality.
Allowed to stand six hours.
Resins precipitated.
The same added to alkalinity.
Atropia precipitated.

4.—The liquid and precipitate shaken up with chloroform.
A chloroformic tincture of Atropia. *A solution of Calcic and Potassic Salts.*

5.—The Chloroformic Tincture allowed to subside, and drawn off.
The chloroform distilled off.
The residue of Atropia re-dissolved in Rectified Spirit.
Digested with Purified Animal Charcoal.
Decolorized.
The solution filtered.
On evaporation, **Atropia** *crystallizes out.*

Atropiæ Sulphas is prepared by diffusing Atropia in water, dissolving it in dilute sulphuric acid, and evaporating to dryness at 100 deg. F.

Beberiæ Sulphas.

1.—Powdered Bebeeru Bark (p. 24).
Exhausted with diluted Sulphuric Acid (1 in 320).
A solution of Sulphate of Beberia, colouring matters, etc.

2.—Concentrated, and cooled.
Milk of Lime added, but *not* to neutrality.
Allowed to stand for two hours.
Colouring matters precipitated.

3.—The solution filtered, the precipitate being washed.
Liquor Ammoniæ added to alkalinity.
Beberia precipitated in an impure state.

4.—The precipitate collected, washed, squeezed, dried, and powdered
Exhausted by boiling in Rectified Spirit.
A tincture of nearly pure Beberia.

5.—Water added and the spirit distilled off (to avoid waste).
A watery solution of nearly pure Beberia.
Dilute Sulphuric Acid added to slight acidity.
A solution of nearly pure Sulphate of Beberia.

6.—Evaporated to dryness, and powdered.
Dissolved in cold water.
Filtered.
A solution of pure Sulphate of Beberia.
Evaporated to the consistence of a syrup.
Dried at 140 deg. F. on glass plates.
Beberiæ Sulphas, in garnet-coloured scales.

Morphiæ Hydrochloras.

1.—Opium (p. 58).
Exhausted by prolonged maceration in cold water.
An infusion containing Morphia and Codeia as Meconates and Sulphates, with resins, extractive matter, etc.

2.—Concentrated till each pint represents a pound of Opium, and strained.
A solution of Calcic Chloride added.

Hydrochlorates of Morphia and Codeia formed, and remain dissolved.	*Calcic Meconate and Sulphate formed and precipitated, with the resins.*

3.—The whole evaporated till it solidifies on cooling.
The solid mass wrapped in calico and subjected to powerful pressure.
Dark liquid exudes, containing colouring matter, etc., with a small amount of alkaloid.

4.—The mass exhausted with boiling water, and the resulting solution filtered.
A solution of the Hydrochlorates of Morphia and Codeia, with colouring matter, etc.

5.—The solution evaporated till it solidifies on cooling.
Compressed as before.
More dark liquid exudes.

6.—Exhausted again.

7.—Processes Nos. 5 and 6 repeated till a nearly colourless solution is obtained.
The solution digested with Purified Animal Charcoal for 20 minutes.
Filtered, the charcoal being washed on the filter with boiling water.
A decolorised solution.
Liquor Ammoniæ added.

Codeia remains in solution.	*Morphia precipitated.* Collected. Washed free from Codeia, *i.e.*, till the washings cease to precipitate with a solution of nitrate of silver acidulated by nitric acid. Diffused in boiling water. Hydrochloric Acid carefully added till all is dissolved. *A solution of pure Hydrochlorate of Morphia.* On cooling, **Morphiæ Hydrochloras** *crystallizes out.* More obtained on concentrating the mother liquor.

Morphiæ Acetas.

Morphia, precipitated from **Morphiæ Hydrochloras** by Liquor Ammoniæ; collected, washed, and dissolved in dilute Acetic Acid. Evaporated over a water bath till it concretes on cooling. Dried at a gentle heat, and powdered.

Quiniæ Sulphas.

1.—Yellow Cinchona Bark, or the Bark of Cinch. Lancifolia (pp. 23, 77).
Exhausted with dilute Hydrochloric Acid (1 in 70).
A solution of Hydrochlorates of Quinia and other Alkaloids, with colouring matter, etc.

2.—Liquor Sodæ added, with agitation.
Quinia precipitated.

3.—The precipitate collected and washed from colouring matter.
Diffused in water.
Heated to 212 deg. Fahr.
Dilute Sulphuric Acid added till all is dissolved.
A solution of Sulphate of Quinia.

4.—On concentrating and cooling, **Quiniæ Sulphas** *crystallizes out.*
Dried.

Strychnia.

1.—Nux Vomica seeds (p. 40) softened by steaming, and ground.
Exhausted by prolonged digestion with Rectified Spirit, diluted with half its bulk of water.
A tincture of Salts of Strychnia and Brucia, with colouring matter, etc.

2.—The spirit distilled off (to avoid waste).
The remaining watery solution concentrated, and filtered when cold.
A solution of Plumbic Acetate added, as long as a precipitate is formed.
Colouring matter, etc., precipitated.

3.—The solution filtered, the filter being washed.
Concentrated.
Liquor Ammoniæ added, with stirring.
Allowed to stand for twelve hours.
Strychnia and Brucia precipitated, with other matters.

4.—The precipitate collected, washed, and dried.
Exhausted by boiling with Rectified Spirit, as long as any bitter matter is yielded.
Most of the spirit distilled off.
The remainder concentrated and cooled.

Brucia remains in the mother liquor. | *Strychnia, and a little Brucia, crystallize out as a white crust.*

5.—The crust washed on a filter with Rectified Spirit diluted with half its bulk of water, as long as Brucia is yielded, *i.e.*, as long as the washings redden with Nitric Acid.
The residue dissolved in boiling Rectified Spirit.
On cooling, **Strychnia** *crystallizes out.*
More procured by evaporating the mother liquor.

Veratria.

1.—Cevadilla Seeds (p. 37) husked and ground.
Exhausted with Rectified Spirit.
A tincture containing Gallate of Veratria, resins etc.

2.—Concentrated as long as no deposit forms.
Poured into cold water.
Resins precipitated.

3.—Filtered, the precipitate being washed.
Liquor Ammoniæ added in slight excess.

Gallate of Ammonia remains in solution. | *Veratria precipitated, with impurities.*

4.—The precipitate collected and washed.
Diffused in water.
Hydrochloric acid added till all is dissolved.
A solution of impure Hydrochlorate of Veratria.

5.—Digested with Purified Animal Charcoal at a gentle heat.
Decolorised.
Filtered and cooled.
Liquor Ammoniæ added.
Purer Veratria precipitated.

6.—The precipitate washed till the washings cease to precipitate with a solution of Argentic Nitrate acidulated with Nitric Acid.
Dried at a gentle heat,—**Veratria.**

Digitalinum.

1.—Digitalis Leaves (p. 25).
An extract made with Rectified Spirit, by macerating at 120 deg. F.
Contains Digitaline, colouring and extractive matters.

2.—The extract exhausted with water acidulated with a tenth of Acetic Acid.
A solution containing Digitaline and colouring matter, with free Acetic Acid.

3.—Digested with Animal Charcoal.
Nearly decolorised.
Filtered and diluted.
Nearly neutralised with Liquor Ammoniæ.
A solution of Tannic Acid added.
Impure Digitaline precipitated.

4.—The precipitate collected and washed.
Rubbed with Litharge in Rectified Spirit.
Traces of Tannic Acid removed as an insoluble Plumbic Tannate.
Dissolved in Rectified Spirit, at 160 deg. F.
Digested with animal charcoal.
Traces of colouring matter removed.
The solution filtered off.
Evaporated to dryness at 212 deg. F.
Digitaline and a little oily matter remain.

5.—Washed with ether.
The oily matters removed.
Digitalinum *remains in an amorphous state.*

Santoninum.

1.—Santonica (p. 21).
Boiled with Lime; the fluid strained and expressed.
A solution containing Santonin and oily matters in combination with Lime.

2.—Concentrated.
While hot, Hydrochloric acid added, with stirring, to acidity.
Allowed to stand five days.
Oil separates on the surface of the fluid. *Santonin precipitated.*

The oil skimmed off,
and the fluid decanted.

2.—The precipitate collected, and washed from acid and colouring matter.
Washed with diluted Liq. Ammoniæ.
Washed again with water till free from colouring matter.
Expressed and dried.

3.—Re-dissolved in boiling Rectified Spirit.
Digested with Animal Charcoal.
Filtered.
Allowed to stand two days in a cool dark place.
Santoninum *crystallizes out.*
Purified by recrystallization.
Dried in the dark and kept from light.

BOTANICAL SYNOPSIS OF THE NATURAL ORDERS AND PLANTS FURNISHING OFFICINAL DRUGS.

WITH THEIR GEOGRAPHICAL SOURCES, AND THEIR PREPARATIONS.

DICOTYLEDONES.

(THALAMIFLORÆ.)

RANUNCULACEÆ.

1. Aconitum Napellus. *Monkshood.* Native.
   Aconiti Folia (p. 25). Ext.
   Aconiti Radix (p. 28). Tr., Lin.
   Aconitia (p. 62). Ung.
2. Podophyllum Peltatum.* *American May Apple.* United States.
   Podophylli Radix (p. 29).
   Podophylli Resina (p. 49).

MAGNOLIACEÆ.

3. Illicium Anisatum. *Star Anise.* China.
   Oleum Anisi (p. 45. See No. 60). Ess.

MENISPERMACEÆ.

4. Jateorrhiza Calumba. *Calumba.* E. Africa.
   Calumbæ Radix (p. 28). Ext., Inf., Tr.
5. Cissampelos Pareira. *Velvet Leaf.* Brazil.
   Pareiræ Radix (p. 29). Ext., Ext. Liq., Dec.

PAPAVERACEÆ.

6. Papaver Somniferum. *Garden Poppy.* α. Native. β. Asia Minor.
   α. **Papaveris Capsulæ** (p. 37). Ext., Dec., Syr.
   β. **Opium.** See p. 58.
   Morphiæ Acetas (p. 62). Liq., Inj. M. Hypod.
   Morphiæ Hydrochloras (p. 62). Liq., Troch., Troch. M. c. Ipec. Supp.
7. Papaver Rhœas. *Red Poppy.* Native.
   Rhœados Petala (p. 20). Syr.

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* Placed by Bentley in Order *Berberidaceæ*.

CRUCIFERÆ.

8. Cochlearia Armoracia. *Horse Radish.* Native.
   Armoraciæ Radix (p. 28). Sp. Co.
9. Sinapis Nigra and Alba. *Mustard.* Native.
   Sinapis (p. 40). Cat., Chart. (from S. Nigra).
   Oleum Sinapis (p. 47). Lin. Co.

POLYGALACEÆ.

10. Krameria Triandra. *Rhatany.* Peru and Chili.
    Krameriæ Radix (p. 29). Ext., Inf., Tr.
11. Polygala Senega. *Senega.* United States.
    Senegæ Radix (p. 30). Inf., Tr.

LINACEÆ.

12. Linum Usitatissimum. *Flax.* Native.
    Lini Semina (p. 40). Inf.
    Lini Farina (p. 40). Cat.
    Oleum Lini (p. 42).

MALVACEÆ.

13. Gossypium :—various species. *Cotton.* N. America ; India.
    Gossypium, *Cotton Wool* (p. 40). See Pyroxylin, in Sect. III.

BYTTNERIACEÆ.

14. Theobroma Cacao.
    Oleum Theobromæ, *Cocoa Butter* (p. 43).

AURANTIACEÆ.

15. Citrus Bigaradia. *Bitter Orange.* S. Europe.
    Aqua Aurantii Floris. From Citrus Aurantium as well (p. 20). Syr., Inf.
    Aurantii Cortex (peel. p. 34). Inf., Inf. Co., Tr., Syr.
    Aurantii Fructus (p. 34). Tr. Aur. Rec.
16. Citrus Limonum. *Lemon.* S. Europe.
    Limonis Succus (p. 34). Syr. See Acidum Citricum in Sect. III.
    Limonis Cortex (p. 34). Tr.
    Oleum Limonis (p. 45).
17. Œgle Marmelos. *Bael.* Malabar.
    Belæ Fructus (p. 36). Ext. Liq.

CANELLACEÆ.

18. Canella Alba. W. Indies.
    Canellæ Albæ Cortex (p. 23).

GUTTIFERÆ.

19. Garcinia Morella. *Gamboge.* Siam.
    Cambogia (p. 53). Pil. Co.

VITACEÆ.

20. Vitis Vinifera. *Vine.* Spain.
    Uvæ, *raisins* (p. 35 .
    See Alcohol, Pot. Tart. Acid., Ac. Tartaricum, in Sect. III.

ZYGOPHYLLACEÆ.

21. Guaiacum Officinale. *Lignum Vitæ.* W. Indies.
Guaiaci Lignum (p. 22).
Guaiaci Resina (p. 48). Mist., Tr. Amm.

RUTACEÆ.

22. Barosma Betulina
„ Crenulata } *Bucco.* Cape.
„ Serratifolia
Buchu Folia (p. 25). Inf., Tr.

23. Galipea Cusparia. *Angustura Bark Tree.* S. America.
Cuspariæ Cortex (p. 23). Inf.

24. Ruta Graveolens. *Rue.* Native.
Oleum Rutæ (p. 46).

SIMARUBACEÆ.

25. Picræna Excelsa. *Quassia.* Jamaica.
Quassiæ Lignum (p. 46). Ext., Inf., Tr.

(CALYCIFLORÆ.)

RHAMNACEÆ.

26. Rhamnus Catharticus. *Buckthorn.* Native.
Rhamni Succus (p. 37). Syr.

ANACARDIACEÆ.

27. Pistacia Lentiscus. *Mastic.* Levant.
Mastiche (p. 48).

AMYRIDACEÆ.

28. Canarium Commune. Manilla.
Elemi (p. 50). Ung.

29. Balsamodendron Myrrha. *Myrrh.* Arabia.
Myrrha (p. 53). Tr., Pil. Aloes et M.

LEGUMINOSÆ.

30. Acacia Vera. E. Africa.
Acaciæ Gummi (p. 52). Muc.

31. Myroxylon Pereiræ. C. America.
Balsamum Peruvianum (p. 51).

32. Myroxylon Toluifera. C. America.
Balsamum Tolutanum (p. 51). Syr., Tr.

33. Cassia Fistula. *Pudding-pipe Tree.* E. & W. Indies.
Cassiæ Pulpa (p. 36).

34. Copaifera ;—several species. *Copaiva Trees.* C. & S. America.
Copaiba (p. 50).
Oleum Copaibæ (p. 46).

35. Glycyrrhiza Glabra. *Liquorice.* Native.
Glycyrrhizæ Radix (p. 28). Ext., Ext. Liq., Pulv. Co.

36. Hæmatoxylon Campechianum. *Logwood.* E. & W. Indies.
Hæmatoxyli Lignum (p. 22). Ext., Dec.

37. Pterocarpus Marsupium. *Kino Tree.* Malabar.
Kino (p. 56). Pulv. Co., Tr.

38. Physostigma Venenosum. *Calabar Bean.* W. Africa.
Physostigmatis Faba (p. 40). Ext.

39. Pterocarpus Santalinus. *Red Sandal Wood Tree.* Ceylon ; Coromandel.
Pterocarpi Lignum (p. 22).

40. Sarothamnus Scoparius. *Broom.* Native.
Scoparii Cacumina (p. 18). Succ., Dec.

41. Cassia Lanceolata, Cassia Obovata } *Alexandrian Senna.* Source uncertain.
Senna Alexandrina (p. 26). Inf., Tr., Mist., Syr., Conf.
Cassia Elongata. *Tinnevelly Senna.* India.
Senna Indica (p. 26). Same preparations.

42. Tamarindus Indica. *Tamarind.* E. & W. Indies.
Tamarindus (p. 38).

43. Astragalus Verus. *Milk Vetch.* Asia Minor.
Tragacantha (p. 52). Pulv. Co., Muc.

ROSACEÆ.

44. Amygdalus Communis
var. Amara. *Bitter Almond.* Morocco.
Amygdala Amara (p. 39).
Oleum Amygdalæ (p. 42).
var. Dulcis. *Sweet or Jordan Almond.* South Europe ; Syria.
Amygdala Dulcis (p. 39). Pulv. Co., Mist.
Oleum Amygdalæ (p. 42).

45. Brayera Anthelmintica. *Kousso.* Abyssinia.
Cusso (p. 19). Inf.

46. Prunus Lauro-cerasus. *Cherry Laurel.* Native.
Lauro-cerasi Folia (p. 25). Aq.

47. Prunus Domestica. *Plum-tree.* Europe.
Prunum (p. 37).

48. Rosa Canina. Dog Rose. Native.
Rosæ Caninæ Fructus. *Hips.* (P. 35.) Conf.

49. Rosa Centifolia. *Cabbage Rose.* Native.
Rosæ Centifoliæ Petala (p. 20). Aq.

50. Rosa Gallica. *Red Rose.* Native.
Rosæ Gallicæ Petala (p. 20). Inf. Ac., Syr., Conf.

MYRTACEÆ.

51. Melaleuca Minor. *Cajeput.* Moluccas.
Oleum Cajeputi (p. 46). Sp.

52. Caryophyllus Aromaticus. *Clove.* E. Indian Islands.
Caryophyllum (p. 21). Inf.
Oleum Caryophylli (p. 45).

53. Punica Granatum. *Pomegranate.* Mediterranean Coast.
Punicæ Granati Cortex (p. 23). Dec.

54. Eugenia Pimenta. *All-spice.* W. Indies.
Pimenta (p. 35). Aq.
Oleum Pimentæ (p. 45).

CUCURBITACEÆ.

55. Citrullus Colocynthis. *Colocynth.* India ; Levant.
Colocynthidis Pulpa (p. 36). Ext. Co., Pil. Co., Pil. C. et Hyosc.

56. Ecbalium Officinarum. *Squirting Cucumber.* S. Europe.
Ecbalii Fructus (p. 37).
Elaterium (p. 57). Pulv. Co.

UMBELLIFERÆ.

57. Dorema Ammoniacum. Punjaub & Persia.
Ammoniacum (p. 53). Mist., Emp. A. c. Hydrarg.

58. Anethum Graveolens. *Dill.* Native.
Anethi Fructus (p. 34). Aq.
Oleum Anethi (p. 45).

59. Pimpinella Anisum. *Anise.* China.
Oleum Anisi (p. 45, see No. 3). Ess.

60. Narthex Assafœtida.* Punjaub and Persia.
Assafœtida (p. 53). Tr., Pil. Co., En., Sp. Amm. Fœtidus., Pil Al. et Ass.

61. Carum Carui. *Caraway.* Native.
Carui Fructus (p. 35). Aq.
Oleum Carui (p. 45).

62. Conium Maculatum. *Hemlock.* Native.
Conii Folia (p. 25). Ext., Pil., Succ., Vap., Cat.
Conii Fructus (p. 36). Tr.

63. Coriandrum Sativum. *Coriander.* Native.
Coriandri Fructus (p. 34).
Oleum Coriandri (p. 45).

64. Fœniculum Dulce. *Fennel.* Europe.
Fœniculi Fructus (p. 35). Aq.

65. Ferula Galbaniflua. India ; Levant.
Galbanum (p. 53). Emp.

66. Euryangium Sumbul.† *Musk Root.* Central Asia
Sumbul Radix (p. 30). Tr.

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* Ferula Narthex (*Bentley*).

† Ferula Sumbul (*Bentley*).

(COROLLIFLORÆ).

CAPRIFOLIACEÆ.

67. Sambucus Nigra. *Elder.* Native.
Sambuci Flores (p. 20.) Aq.

RUBIACEÆ.*

68. Uncaria Gambir. Singapore.
Catechu Pallidum (p. 56). Pulv. Co., Inf., Tr., Troch.

69. Cinchona Succirubra. *Red Cinchona.* Chimborazo.
Cinchonæ Rubræ Cortex (p. 23).

70. Cinchona Condaminea. *Pale Cinchona.* Ecuador.
Cinchonæ Pallidæ Cortex (p. 23). Tr. Co.

71. Cinchona Calisaya. *Yellow Cinchona.* Bolivia ; Peru.
Cinchonæ Flavæ Cortex (p. 23). Ext. Liq., Inf., Dec., Tr.
Quiniæ Sulphas (p. 62). Pil., Tr., Tr. Amm., Vin.

72. Cinchona Lancifolia. New Granada.
Quiniæ Sulphas.

73. Cephaëlis Ipecacuanha. *Ipecacuanha.* Brazil.
Ipecacuanha (p. 29). Pulv. Co., Pil. Ip. c. Sc., Vin., Troch.

VALERIANACEÆ.

74. Valeriana Officinalis. *Valerian.* Native.
Valerianæ Radix (p. 30). Inf., Tr., Tr. Amm.

COMPOSITÆ.

75. Anthemis Nobilis. *Chamomile.* Native.
Anthemidis Flores (p. 20). Ext., Inf.
Oleum Anthemidis (p. 46).

76. Arnica Montana. Europe.
Arnicæ Radix (p. 28). Tr.

77. Lactuca Virosa. *Wild Lettuce.* Native.
Lactuca (p. 18). Ext.

78. Anacyclus Pyrethrum. *Pellitory.* Morocco ; Spain ; Levant.
Pyrethri Radix (p. 29). Tr.

79. Artemisia :—species uncertain. Russia.
Santonica (p. 21).
Santoninum (p. 60).

80. Taraxacum Dens Leonis. *Dandelion.* Native.
Taraxaci Radix (p. 30). Ext., Succ., Dec.

LOBELIACEÆ.

81. Lobelia Inflata. *Indian Tobacco.* United States.
Lobelia (p. 18). Tr., Tr. Ætherea

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* Nos. 68-73 fall in the separate order *Cinchonaceæ* made by some botanists.

ERICACEÆ.

82. Arctostaphylos Uva Ursi. *Bearberry.* Europe.
Uvæ Ursi Folia (p. 26). Inf.

SAPOTACEÆ.

83. Isonandra Gutta-Percha. *Gutta Percha Tree.* Eastern Archipelago.
Gutta-Percha (p. 57). Liq.

STYRACACEÆ.

84. Styrax Benzoin. *Benjamin Tree.* Eastern Archipelago.
Benzoinum (p. 51). Tr. Co.
Acidum Benzoicum (p. 61).

OLEACEÆ.

85. Olea Europæa. *Olive.* S. Europe.
Oleum Olivæ (p. 42).

86. Fraxinus Ornus and Rotundifolia. Sicily.
Manna (p. 57).

ASCLEPIADACEÆ.

87. Hemidesmus Indicus. *Indian Sarsaparilla.* India.
Hemidesmi Radix (p. 29). Syr.

LOGANIACEÆ.

88. Strychnos Nux Vomica. *Koochla Tree.* India.
Nux Vomica (p. 40). Ext., Tr.
Strychnia (p. 62). Liq.

GENTIANACEÆ.

89. Ophelia Chirata. *Chiretta.* India.
Chirata (p. 18). Inf., Tr.

90. Gentiana Lutea. *Gentian.* European Mountain
Gentianæ Radix (p. 28). Ext., Inf. Co., Tr. Co., Mist.

CONVOLVULACEÆ.

91. Exogonium Purga. *Jalap.* Mexico.
Jalapa (p. 29). Ext., Pulv. Co., Tr.
Jalapæ Resina (p. 48).

92. Convolvulus Scammonia. *Scammony.* Asia Minor.
Scammoniæ Radix (p. 30).
Scammoniæ Resina (p. 49). Mist., Pil. Co.
Scammonium (p. 53). Pulv. Co., Conf.

SOLANACEÆ. *Sub-order Solaneæ.*

93. Capsicum Fastigiatum. Zanzibar.
Capsici Fructus (p. 36). Tr.

94. Solanum Dulcamara. *Woody Nightshade.* Native.
Dulcamara (p. 18). Inf.

Sub-order Atropeæ (ATROPACEÆ *of some botanists*).

95. Atropa Belladonna. *Deadly Nightshade.* Native.
Belladonnæ Folia (p. 25). Ext., Succ., Tr., Ung., Emp.
Belladonnæ Radix (p. 28). Lin.
Atropia (p. 62). Liq., Ung.
Atropiæ Sulphas (p. 62). Liq.

96. Hyoscyamus Niger. *Henbane.* Native.
Hyoscyami Folia (p. 25). Ext., Succ., Tr.

97. Datura Stramonium. *Thorn Apple.* Native.
Stramonii Folia (p. 26).
Stramonii Semina (p. 40). Ext., Tr.

98. Nicotiana Tabacum. *Tobacco.* Tropical America.
Tabaci Folia (p. 26). En.

SCROPHULARIACEÆ.

99. Digitalis Purpurea. *Foxglove.* Native.
Digitalis Folia (p. 25). Inf., Tr.
Digitalinum (p. 61).

LABIATÆ.

100. Lavandula Vera. *Lavender.* Native.
Oleum Lavandulæ (p. 45). Sp., Tr. Co.

101. Mentha Piperita. *Peppermint.* Native.
Oleum Menthæ Piperitæ (p. 45). Aq., Ess., Sp.

102. Mentha Viridis. *Spearmint.* Native.
Oleum Menthæ Viridis (p. 45). Aq.

103. Rosmarinus Officinalis. *Rosemary.* S. Europe.
Oleum Rosmarini (p. 45). Sp.

(MONOCHLAMYDEÆ.)

POLYGONACEÆ.

104. Rheum:—species uncertain. *Rhubarb.* Central Asia.
Rhei Radix (p. 29). Ext., Inf., Tr., Vin., Pil. Co., Pulv. Co., Syr

THYMELACEÆ.

105. Daphne Mezereum, or Laureola. *Spurge Laurel.* Native.
Mezerei Cortex (p. 23). Extr. Æther.

MYRISTICACEÆ.

106. Myristica Officinalis. *Nutmeg.* Eastern Archipelago.
Myristica (p. 40).
Oleum Myristicæ (p. 45). Sp.
Oleum Myristicæ Expressum (p. 42).

LAURACEÆ.

107. Camphora Officinarum. *Camphor Plant.* China; Japan.
Camphora (p. 46). Aq., Sp., Tr. Co., Lin., Lin. Co.

108. Cinnamomum Zeylanicum. *Cinnamon.* Ceylon.
Cinnamomi Cortex (p. 23). Pulv. Co., Aq., Tr.
Oleum Cinnamomi (p. 45).

109. Nectandra Rodiæi. *Bebeeru, or Green-heart Tree.* Guiana.
Nectandræ Cortex (p. 24).
Beberiæ Sulphas (p. 62)

110. Sassafras Officinale. N. America.
Sassafras Radix (p. 29).

ARISTOLOCHIACEÆ.

111. Aristolochia Serpentaria. *Serpentary.* Virginia.
Serpentariæ Radix (p. 30). Inf., Tr.

EUPHORBIACEÆ.

112. Croton Eluteria. *Cascarilla.* Bahamas.
Cascarillæ Cortex (p. 23). Inf., Tr.

113. Croton Tiglium. *Croton-oil Plant.* India.
Oleum Crotonis (p. 42). Lin.

114. Rottleria Tinctoria. India.
Kamala (p. 37).

115. Ricinus Communis. *Castor-oil Plant.* India.
Oleum Ricini (p. 42).

PIPERACEÆ.

116. Cubeba Officinalis. *Cubebs.* Java.
Cubeba (p. 36). Tr.
Oleum Cubebæ (p. 46).

117. Artanthe Elongata. *Matico.* Peru.
Matica Foliæ (p. 25). Inf.

118. Piper Nigrum. *Black Pepper.* India.
Piper Nigrum (p. 37). Conf.

MORACEÆ.

119. Morus Nigra. *Mulberry.* Native.
Mori Succus (p. 34). Syr.

120. Ficus Carica. *Fig Tree.* Asia Minor.
Ficus (p. 37).

CANNABINACEÆ.

121. Cannabis Sativa. *Indian Hemp; Bhang.* India.
Cannabis Indica (p. 19). Ext., Tr.

122. Humulus Lupulus. *Hop.* Native.
Lupulus (p. 19). Ext., Inf., Tr.

ULMACEÆ.

123. Ulmus Campestris. *Elm.* Native.
Ulmi Cortex (p. 24). Dec.

CUPULIFERÆ.

124. Quercus Pedunculata. *Oak.* Native.
Quercus Cortex (p. 24). Dec.

125. Quercus Tinctoria. *Gall Oak.* Asia Minor.
Galla (p. 56). Tr., Ung., Ung. G. c. Opio.

LIQUIDAMBARACEÆ.

126. Liquidambar Orientale. Asia Minor.
Styrax Præparatus (p. 51).

(GYMNOSPERMIA.)

CONIFERÆ.

127. Juniperus Communis. *Juniper.* N. Europe.
Oleum Juniperi (p. 46). Sp.

128. Juniperus Sabina. *Savin.* Native.
Sabinæ Cacumina (p. 18). Tr., Ung.
Oleum Sabinæ (p. 47).

129. Larix Europæa. *Larch.* Europe.
Laricis Cortex (p. 23). Tr.

130. Abies Excelsa. Switzerland.
Pix Burgundica (p. 48). Empl. Picis.

131. Abies Balsamea. *Balm of Gilead Fir.* Canada.
Terebinthina Canadensis (p. 50).

132. Pinus Palustris, Tæda, Pinaster. America; France.
Thus Americanum (p. 50).
Oleum Terebinthinæ (p. 47). Conf., En., Ung., Lin., Lin. Acet., Emp.
Resina (p. 49). Ung., Emp.

MONOCOTYLEDONES.

Smilaceæ.

133. Smilax Officinalis. *Sarsaparilla.* Central America.
Sarsæ Radix (p. 29). Ext. Liq., Dec., Dec. Co.

Zingiberaceæ.

134. Elettaria Cardamomum. *Cardamom.* Malabar.
Cardamomum (p. 39). Tr. Co.

135. Zingiber Officinale. *Ginger.* E. & W. Indies.
Zingiber (p. 31). Tr., Tr. Fort., Syr.

Iridaceæ.

136. Crocus Sativus. *Saffron.* S. Europe.
Crocus (p. 20). Tr.

Liliaceæ.

137. Aloe Vulgaris. *Barbadoes Aloes.* Barbadoes.
Aloe Barbadensis (p. 55). Ext., Pil., Pil. A. et Fer., En.

138. Aloe Perryi. Socotra.
Aloe Socotrina (p. 55). Ext., Dec. Co., Tr., Vin., Pil., Pil. A. et Ass., Pil. A. et Myr., En.

139. Urginea Scilla. *Squill.* S. Europe.
Scilla (p. 30). Tr., Acet., Oxym., Syr., Pil. Co., Pil. Ipec. c. Sc.

Melanthaceæ.

140. Colchicum Autumnale. *Meadow Saffron.* Native.
Colchici Cormus (p. 28). Ext., Ext. Acet., Vin.
Colchici Semina (p. 39). Tr.

141. Asagræa Officinalis. *Cevadilla.* Mexico.
Sabadilla (p. 37).
Veratria (p. 62). Ung.

142. Veratrum Viride. *Green Hellebore.* N. America.
Veratri Viridis Radix (p. 30). Tr.

Palmaceæ.

143. Areca Catechu. *Betel Nut.* India.
Areca (p. 39).

GRAMINACEÆ.

144. Triticum Vulgare. *Wheat.*
Farina Tritici (p. 39). Cat. Fermenti.
Amylum (p. 60). Muc., Glyc.

145. Hordeum Distichon. *Barley.* Native.
Hordeum Decorticatum (p. 39). Dec.

146. Saccharum Officinarum. *Sugar Cane.* W. Indies.
Saccharum Purificatum (p. 60). Syrupus.
(**Theriaca.**)

FILICES.

147. Aspidium Filix Mas.* *Male Fern.* Native.
Filix Mas (p. 28). Ext. Liq.

FUNGI.

148. Claviceps Purpurea. *Ergot of Rye.* Native.
Ergota (p. 17). Ext. Liq., Inf., Tr.

149. Torula Cerevisiæ. *Yeast Plant.* Native.
Cerevisiæ Fermentum (p. 17). Cat.

LICHENES.

150. Cetraria Islandica. *Iceland Moss.* Iceland.
Cetraria (p. 17). Dec.

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* Lastrea Filix Mas. (*Bentley*).

NON-OFFICINAL DRUGS FROM THE VEGETABLE KINGDOM.

The following are those that chiefly demand notice.

PLANTS OR PARTS OF PLANTS.

ACTÆA RACEMOSA. The root of Actæa, or Cimicifuga, Racemosa, *Black Snake Root* (Ranunculaceæ). N. America.

An active principle, *Cimicifugin*, has been isolated.

CHIMAPHILA. The dried leaves of Chimaphila Umbellata, *Pipsissewa* or *Winter Green* (Pyrolaceæ). N. America.

Contains a crystalline neutral principle, *Chimaphilin*.

CONVALLARIA. The plant Convallaria Majalis, *Lily of the Valley* (Liliaceæ).

The active principle is a glucoside, *Convallamarin*.

DATURA TATULA. The leaves of Datura Tatula (Solanaceæ). Native.

Probably the same constituents as Stramony (p. 26).

DUBOISIA. The plant Duboisia Myoporoides (Solanaceæ). New S. Wales and Queensland.

Contains an alkaloid, *Duboisin*, probably identical with Atropin (p. 62).

EUCALYPTUS. The leaves of Eucalyptus Globulus, *Blue Gum Tree* (Myrtaceæ) Tasmania, Australia, Algeria.

Studded with glands containing *Eucalyptol* (p. 87).

GELSEMIUM. The root of Gelsemium Sempervirens, *Yellow Jasmine* (Loganiaceæ). Southern States.

The active principle is an alkaloid, *Gelsemin*.

GUARANA. The powdered seeds of Paullinia Sorbilis (Sapindaceæ). Brazil.

Contains *Caffein* (p. 89).

HAMAMELIS. The bark of Hamamelis Virginica, *Witch Hazel* (Hamamelidaceæ). N. America.

Composition not yet satisfactorily investigated.

HYDRASTIS. The rhizome and rootlets of Hydrastis Canadensis, *Yellow Root* or *Golden Seal* (Ranunculaceæ). N. America.

Contains two alkaloids, *Berberia* and *Hydrastin*, the latter said to be the active principle.

IGNATIA. *St. Ignatius' bean*, the seeds of Strychnos Ignatia (Loganiaceæ). Philippine Isles.

Contains *Strychnia*, in larger amount than Nux Vomica (p. 40) and *Brucia*.

RHAMNUS FRANGULA. The bark of Rhamnus Frangula, *Black Alder* (Rhamnaceæ). Native.

SPIGELIA. The root of Spigelia Marilandica, *Carolina Pink* (Loganiaceæ). Southern States.

Contains *Tannic Acid, fixed* and *volatile oils, resin,* and a *bitter* principle.

PREPARATIONS.

The United States Pharmacopœia prescribes—

Extractum Ignatiæ. Dose, $\frac{1}{4}$—$\frac{1}{2}$ grain.

Extractum Cimicifugæ Fluidum. Dose, 20—60 min.
„ *Chimaphilæ Fluidum.* Dose, 1—2 drms.
„ *Gelsemii* „ „ 5—10 min.
„ *Spigeliæ* „ } Dose, 2—4 drms.
„ *Spigeliæ et Sennæ Fluidum.* }

Decoctum Chimapilæ. Dose, 1—2 oz.
Infusum Spigeliæ. „ 2—4 oz.

A *Tincture,* 1 part in 8, *of Gelsemium* is usually prescribed in this country. Dose, 10—30 min.

A saturated *Tincture of Eucalyptus* is sometimes made. It is simply a spirit of Eucalyptol. Dose, $\frac{1}{2}$—2 drms.

Of Convallaria, *extracts* and *tinctures* are made; Hamamelis, Hydrastis, and Rhamnus Frangula are usually prescribed in *tinctures;* which are advertised, with their scales of dose, by the principal manufacturing chemists.

Guarana is administered in the form of powder, Dose, 1—2 drms. Datura Tatula in that of cigarettes.

Ignatia is used mainly as a source of Strychnia.
Duboisia, as a source of Duboisin (? Atropin).

EXUDATIONS AND CONCRETE JUICES.

GUMMI RUBRUM. *Australian Red Gum.* An exudation from the bark of Eucalyptus Rostrata (Myrtaceæ). Australia.

Contains an astringent principle, probably *Tannin*, and *gummy matter*. 90 p.c. soluble in cold water.

CATECHU NIGRUM. *Black Catechu.* A native extract from the heart-wood of Acacia Catechu (Leguminosæ). Pegu.

Similar composition to Pale Catechu (p. 56).

LACTUCARIUM. The juice exuding from incisions in the stem of the Lactuca Virosa (p. 18), and Lactuca Sativa, *Garden Lettuce*, dried.

Contains *Lactucin*, a substance allied to Mannite (p. 57), and 40 p.c. of a crystalline substance, *Lactucone*.

*** The doses of the above are given in the Posological Tables.

PREPARATIONS.

Catechu Nigrum is used for *Catechu Pallidum* (p. 56).

Lactucarium is prescribed in pills.

Squire (*Companion*, 12th ed., p. 157) gives formulæ for

Extractum Gummi Rubri Liquidum.	Dose, ½—1 drm.		
Decoctum	„	„	Dose, 1—2 oz.
Tinctura	„	„	„ 20—40 mins.
Syrupus	„	„	„ ½—1 drm.
Suppositoria	„	„	

*** As Squire's *Companion* is in the possession of most dispensing Chemists, it is sufficient in prescribing to append "(Squire)" to the name of the preparation to ensure the required strength.

OLEO-RESIN.

BALSAMUM DIPTEROCARPI. *Gurjun Oil.* From Dipterocarpus Lævis, Turbinatus, and other species (Dipteraceæ). India.

Closely resembles Copaiba.

*** Used only for external application.

FIXED OIL.

OLEUM GYNOCARDIÆ. *Chaulmoogra Oil.* From the seeds of Gynocardia Odorata (Bixaceæ). India.

*** Used only for external application.

VOLATILE OILS.

OL. CHENOPODII. From the fruit ("seeds") of Chenopodium Anthelminticum (Chenopodiaceæ). United States.

OL. GUALTHERIÆ. *Oil of Winter Green.* From Gualtheria Procumbens, *Partridge-berry* (Ericaceæ). N. America.

Composed of *Methylic Salicylate*, $CH_3 . C_7 H_5 O_3$. The source of the purest Salicylic Acid (see Section III).

OL. EUCALYPTI. *Eucalyptol.* From the leaves of Eucalyptus Globulus (p. 84).

Possesses strong antiseptic properties.

OL. SANTALI FLAVI. *Sandalwood Oil.* From the wood of Santalum Flavum (Santalaceæ). India.

Very fragrant.

OL. STAPHISAGRIÆ. From the seeds of Delphinium Staphisagria (Ranunculaceæ). S. Europe.

*** Ol. Staphisagriæ is used in an ointment (1 in 8) as a *pediculicide* only.

The doses of the rest are given in the Posological Tables.

ACTIVE PRINCIPLES OF DEFINITE COMPOSITION.

CHRYSOPHANIC ACID. $C_{10}\ H_8\ O_3$.

Obtained from Goa Powder (*Araroba*), a product found in the clefts of the wood of a Leguminous tree in the province of Bahia; probably produced by the decomposition of a resinous exudation. 80 p. c. of the powder is Chrysophanic Acid.

Acicular crystals, bright yellow.
Slightly soluble in cold water or spirit.
Forms soluble reddish-brown Chrysophanates with alkaline solutions, and insoluble brownish Chrysophanates with Magnesia and some other metallic oxides (see **Rheum,** p. 29).

MENTHOL. $C_{10}\ H_{20}\ O$, or Peppermint Camphor.

Deposited from Chinese Oil of Peppermint, which is the essential oil of Mentha Javanica (Labiatæ), and consists mainly of Menthol and a liquid isomeride (see p. 44).

Acicular crystals, or a crystalline mass, colourless.
Soluble in spirit, ether, and fixed oils, only slightly in water.
Volatile, with a strong odour of peppermint.

THYMOL. $C_{10}\ H_{14}\ O$. A Phenol.

Deposited from Oil of Thyme (*Thymus Vulgaris*—Labiatæ) and Oil of Ajowan (*Ptychotis Ajowan*,—Umbelliferæ). Egypt and Persia.

Large prisms, colourless.
Fuses at 111 deg. F.
Volatile.
Soluble in ½ part of Rectified Spirit, 200 of Glycerine; very slightly in water. Arrests fermentation.

SALICIN. $C_{13}\ H_{18}\ O_7$. A Glucoside.

From the bark of Salix Caprea, *Willow*, (Salicaceæ). Native.

White scales and silky needles.
Soluble in 28 parts of water; also in alcohol.
Boiled with dilute Sulphuric Acid, or treated with Emulsin, it yields glucose and *Saligenol* $C_7\ H_8\ O_2$.* Oxidized by Potassic Bichromate and Sulphuric Acid, it yields *Salicylol* $C_7\ H_6\ O_2$,† a compound which forms the essential oil of Spiræa Ulmaria (*Meadow Sweet*). (See Salicylic Acid, in Section III.)†

*** The name of *Ergotine* is given to various extracts of Ergot, freed from albumen and gum.
The "*Jalapine*" of the shops is Jalap resin (see p. 48) decolorized by animal charcoal, and precipitated in a finely-divided state.

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* $C_{13}\ H_{18}\ O_7 + H_2\ O = C_6\ H_{12}\ O_6 + C_7\ H_8\ O_2$.
† Salicylol is found in the urine of patients taking Salicin. It strikes a deep purple with Ferric Salts.

(ALKALOIDS.)

CAFFEIN.

From Coffee-berries, the seeds of Caffea Arabica (Rubiaceæ). Ceylon, Java, India, &c. Also from the Kola Nut, the seed of Cola Acuminata (Sterculiaceæ). Africa.* Used either as the alkaloid, or as a citrate.

The alkaloid in silky acicular or feathery crystals soluble in 100 parts of water, 150 of Rect. Spirit.
The citrate, which is commonly used, occurs in similar crystals, similarly soluble.

CINCHONA ALKALOIDS.

CINCHONIN. $C_{20}H_{24}N_2O$.
CINCHONIDIN. ditto.
QUINIDIN. $C_{20}H_{24}N_2O_2.2H_2O$.
From the **Cinchona Barks** (p. 23).
Cinchonin is the most important. It is used in the form of a Sulphate :—

Short oblique prisms.
Soluble in 54 parts of water, freely in spirit.

The others are seldom prescribed alone, but preparations consisting of a mixture of Quinine and Cinchonin with the other Cinchona Alkaloids, are sold.

Cinchonin is distinguished from Quinine by the want of fluorescence of its solutions, and the absence of the green colour which the latter gives with Chlorine and Ammonia.

CODEIA. $C_{18}H_{21}NO_3.H_2O$.

From **Opium** (p. 58). Crystallizes out on evaporating the liquid left after precipitating Morphia (p. 67). Redissolved in ether and crystallized again.

Octahedra.
Soluble in water and alcohol.
Gives *no* red colour with Nitric Acid, or blue colour with Ferric Salts, as Morphia does.

ESERIN. $C_{15}H_{21}N_2O_2$.

From **Physostigma** (p. 40).

Amorphous, yellowish.
The alkaloid itself is soluble in alcohol, sparingly in water.
Its sulphate, which is commonly used, is of reddish colour, and is freely soluble in water.

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* Found also in Tea, in Guarana (p. 84), and in Matè or Paraguay Tea (the leaves of Ilex Paraguayensis).

PILOCARPIN.

From the leaves and bark of Pilocarpus Pinnatifolius, *Jaborandi*, (Rutaceæ). S. America.

Amorphous, yellow, deliquescent.
The Nitrate is commonly used; it crystallizes in white lamellæ, and is permanent in air.
It is soluble in 8 parts of water.

*** APOMORPHIA. $C_{17}H_{19}NO_3$ (*i.e.* Morphia, less one molecule of H_2O.) An artificial alkaloid prepared by heating Morphia to 300° F., with excess of Hydrochloric Acid, in a closed tube, for several hours.

White powder, turning green on exposure to air and moisture.
Soluble in water.

*** Chrysophanic Acid and Menthol are used only as external applications; the former as an *ointment* with Vaseline or Lard (1 in 8—64); the latter in a saturated *solution*, or else rubbed on in the crystalline form. Thymol is used in various *solutions* as an antiseptic, and has been given internally in the form of pill.

*** The doses of the other active principles are given in the Posologica Tables.

SECTION III.

MINERALS AND PRODUCTS OF MANUFACTURE.

SIX GROUPS.

First Group	. . . .	Non-metallic Elements and their compounds.
Second „	. . . .	Mineral Acids.
Third „	. . . .	Alcohol and its derivatives ; Amylic Alcohol and its derivatives.
Fourth „	. . . .	Tars and their derivatives ; Organic Acids.
Fifth „	. . . .	Pyroxylin, Glycerine, their derivatives, and Miscellanea.
Sixth „	. . . . .	Metals and their compounds.

The Officinal Preparations are described with each group.

*** Non-officinal drugs in general use are described with the officinal. The names of the latter are printed in **Clarendon** type, those of the former in ROMAN CAPITALS.

*** An asterisk (*) prefixed to the description of a process of manufacture signifies that it is one prescribed by the Pharmacopœia (see p. 1, second paragraph).

FIRST GROUP.

α. **Aqua.**
Aqua Destillata.
β. **Carbo Ligni.**
Carbo Animalis.
Carbo Animalis Purificatus.
γ. **Sulphur Sublimatum.**
Sulphur Præcipitatum.
Sulphuris Iodidum.
δ. **(Os Ustum.)**
Phosphorus.
ε. **Liquor Chlori.**
Bromum.
Iodum.
ζ. NITROUS OXIDE.

OFFICINAL PREPARATIONS.

α.—**Aqua.** The purest natural water that can be obtained, cleared if necessary by filtration.

* Ten gallons of **Aqua** being distilled from a copper still with a block-tin worm; the first half-gallon that passes over may contain carbonic acid and ammonia. This is rejected. The next eight gallons are almost absolutely pure, and form **Aqua Destillata.** Distillation cannot be carried further without risk of contamination from charred organic matter.

Colourless, odourless, tasteless.

β.—Billets of Wood being heated to dull redness in cast iron cylinders;—water, gaseous, and volatile matters, are driven off, and **Carbo Ligni,** (*Wood-Charcoal*), *Carbon* with about 2 p.c. of alkaline and metallic salts, remains.

Brittle porous masses, black.
Insoluble in any known liquid.
Capable of absorbing and condensing gases within its pores (90 times its own volume of Ammonia, 55 of Sulphuretted Hydrogen).
Also of absorbing organic colouring, odorous, and septic matters, and oxidizing them by means of the condensed atmospheric oxygen contained in its pores.

BONES being similarly treated, yield **Carbo Animalis** (*Bone-black*), a mixture of Calcic Phosphate and Carbonate, with about 20 p. c. of *Carbon*, and a little Iron Carbide. (See *Phosphorus*, and *Calcis Phosphas*.)

Grey powder. Used as a filter in coarse processes.

* On digesting **Carbo Animalis** with dilute Hydrochloric Acid, a solution of Calcic Chloride and Acid Calcic Phosphate, $H_4Ca(PO_4)_2$, is substituted for the insoluble carbonate and neutral phosphate, $Ca_3(PO_4)_2$. On filtering off the solution and washing the residue, **Carbo Animalis Purificatus**, almost pure *Carbon*, remains.

Dried by heating to redness in a covered vessel. Black Powder.
Similar properties to those of wood-charcoal.
Power of decolorizing more marked.
Chiefly used as a filtering agent.

Carbo Animalis Purificatus.

$$Ca\,CO_3 + 2\,H\,Cl = Ca\,Cl_2 + CO_2 + H_2O.$$
$$Ca_3(PO_4)_2 + 4\,H\,Cl = 2\,Ca\,Cl + H_4\,Ca(PO_4)_2.$$

γ.—By distilling native Sulphur from its earthy impurities, or by burning the native sulphides, Iron and Copper Pyrites, is obtained *crude, or rough Sulphur.*

Purified by sublimation, it forms **Sulphur Sublimatum** (*Flowers of Sulphur*).

Gritty powder, pale yellow.
Soluble in Benzene, Carbon Disulphide, and Sulphur Chloride; with heat, in Turpentine and Oils.
Fuses at 236 deg. F., volatilizes at 836 deg. F.
Burns in air, forming *Sulphurous Anhydride*, SO_2.

From **Sulphur Sublimatum** are obtained,—

1.* By boiling in water with slaked lime,—a solution of *Calcic Pentasulphide*, CaS_5, and *Calcic Sulphosulphate*,* CaS_2O_3. On filtering, and adding Hydrochloric Acid,—a deposit of **Sulphur Præcipitatum** (*Milk of Sulphur*), Calcic Chloride remaining in the solution.

Collected, washed, dried.
Pale yellow powder, not gritty.
Same properties as those of Sulphur Sublimatum.

2.* By mixing with four times its weight of Iodine and heating gently, finally fusing—**Sulphuris Iodidum** S_2I_2.

Allowed to solidify. Steel grey mass, crystalline.
Smells of Iodine.
Soluble in 60 parts of Glycerine.
Decomposed by boiling water.

δ.—Bones, or more commonly, Bone Black (p. 92) which has served its purpose as a filtering agent, is burned in the open fire. Carbon is burnt off, and **Os Ustum** (*Bone-ash*), chiefly *neutral Calcic Phosphate*, $Ca_3(PO_4)_2$, with some Calcic Carbonate, remains.

On mixing with Sulphuric Acid,—Calcic Sulphate, and *Acid Calcic Phosphate*, $H_4Ca(PO_4)_2$, are formed. By washing out with water, the latter, which is soluble, is separated from the insoluble sulphate. On evaporating to dryness the solution of *Acid Calcic Phosphate*, and then heating the salt to redness, hydrogen and oxygen are driven off as water, and *Calcic Metaphosphate*, $Ca(PO_3)_2$, remains. On distilling with charcoal,† Carbonic Oxide and **Phosphorus** pass over; and neutral Calcic Phosphate, again formed, remains. The **Phosphorus** is condensed under water.

Wax-like, semi-transparent.
Becomes hard and brittle at low temperatures

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* Or "Hyposulphite".
† In practice, the charcoal is added before evaporation to dryness is quite complete, to ensure thorough admixture.

Sulphur Præcipitatum.

$$S_{12} + 3\,Ca\,H_2O_2 = 2\,Ca\,S_5 + Ca\,S_2O_3 + 3\,H_2O.$$
$$2\,Ca\,S_5 + CaS_2O_3 + 6\,HCl = 3\,CaCl_2 + 3\,H_2O + S_{12}.$$

Phosphorus.

$$Ca_3(PO_4)_2 + 2\,H_2SO_4 = 2\,Ca\,SO_4 + H_4Ca(PO_4)_2.$$
$$H_4Ca(PO_4)_2 = 2\,H_2O + Ca_2PO_3.$$
$$3\,Ca(PO_3)_2 + C_{10} = 10\,CO + P_4 + Ca_3(PO_4)_2.$$

Soluble in Carbon Disulphide, Benzene, Oil of Turpentine, fixed and essential oils. slightly in Ether.
Fuses at 112 deg. F. (may, therefore, be fused under water).
Burns in air, forming phosphoric anhydride, P_2O_5. Burns slowly in air at all temperatures above freezing-point (must, therefore, be preserved under water).

ϵ.* On heating Hydrochloric Acid with Black Oxide of Manganese, *Chlorine Gas* is evolved. Washed and passed into water till a solution is formed containing 2·66 grains in the ounce, it forms **Liquor Chlori.**

Yellowish green, evolving chlorine gas.
Chlorine decomposes many organic substances containing hydrogen by replacing that element; hence is destructive of vegetable colours and of organic odorous or infectious matters. (See Calx Chlorata, Liquor Sodæ Chloratæ.)
Liq. Chlori decomposes in sunlight, yielding Hydrochloric Acid and Oxygen.

The mother liquor of Sea Water, left after evaporation and crystallization of all crystallizable salts, contains *Magnesic Bromide.* On passing Chlorine into it, **Bromine** separates, colouring the fluid yellow. Ether, shaken with the fluid, takes up the **Bromine** alone, and floats on the surface. The ethereal solution being drawn off and shaken with solution of Caustic Potash, the **Bromine** combines with the latter, forming *Potassic Bromide* and *Bromate.* The watery solution being separated from the ether, evaporated to dryness, and ignited so as to decompose the Bromate, *Potassic Bromide* remains. On distillation with Sulphuric Acid and Black Oxide of Manganese, **Bromine (Bromum)** passes over.

Condensed in a receiver. Dark brown liquid, evolving red fumes.
Strong odour.
Volatile. Boils at 139 deg. F. Freezes at —12 deg. F.
Soluble in 30 parts of water. Miscible with Alcohol and Ether in all proportions.
Chemical action similar to that of Chlorine, but less strongly developed.

Kelp, the ashes of burnt seaweed, yields on lixiviation, *Sodic Iodide,* Bromide, Chloride, Sulphide, Sulphosulphate and Carbonate, Potassic Chloride, and Potassic-Sodic Sulphate. On evaporating, the sulphate and chlorides, with most of the carbonate, crystallize out, leaving the other salts in the mother liquor, or *ley.* Mixed with Sulphuric Acid, the *ley* evolves Carbonic and Sulphurous Anhydrides and Sulphuretted Hydrogen, Sulphur is precipitated, and Sodic Sulphate crystallizes out. The *ley,* which now contains *Sodic Iodide,* Bromide, and (a little) Chloride, with excess of Sulphuric Acid, being decanted, and distilled with successive small amounts of Black Oxide of Manganese, **Iodum** (*Iodine*) is liberated and passes over.*

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* *Bromine* passes over *after* the Iodine. The temperature is not allowed to rise high enough to liberate *Chlorine.*

Chlorum.

$$4\,HCl + MnO_2 = Mn\,Cl_2 + 2\,H_2O + Cl_2.$$

Bromum.

$$6\,KHO + Br_6 = 5\,K\,Br + KBrO_3 + 3\,H_2O.$$
$$2\,KBrO_3 = 2\,KBr + 3\,O_2.$$
$$2\,KBr + MnO_2 + 3\,H_2SO_4 = 2\,KHSO_4 + MnSO_4 + 2\,H_2O + Br_2.$$

Condensed in receivers; purified by sublimation.
Bluish-black scales, lustrous.

Soluble in 5,500 parts of water.
" 12 parts of Rect. Sp.
" 4 parts of Ether.
" 4 parts of Chloroform.
Freely soluble in solutions of the Iodides.
Fuses at 236 deg. F.; volatilizes at 347 deg. F.: volatilizes in the steam of hot watery solutions.
Chemical action similar to that of Chlorine and Bromine, but more feebly developed.
Unites readily with many metals.
Strikes a deep blue colour with starch.

ζ.—Ammonic Nitrate, $NH_4 NO_3$, (see Sixth Group) when heated decomposes into watery vapour and NITROUS OXIDE GAS, N_2O.

Condensed in iron bottles, under a pressure of 50 atmospheres, and firmly secured.
Colourless liquid, becoming gaseous on being liberated.

OFFICINAL PREPARATIONS.

Liquor Chlori. (See above.)

" **Iodi.** 2½ gr. in a drachm of solution of Potassic Iodide.

Oleum Phosphoratum. 1-16th gr. in 10 minims of Almond Oil.

Tinctura Iodi. 1⅓ gr. in a drachm of Rectified Spirit, with half the amount of Potassic Iodide.

Confectio Sulphuris. Sublimed Sulphur, Cream of Tartar, and Syrup of Orange, as 4, 1, 4 parts.

Pilula Phosphori. 1-30th gr. in 3 gr. of Tolu and Beeswax.

Linimentum Iodi. 7 gr. in a drachm of Rectified Spirit, with Camphor and a little Potassic Iodide.

Unguentum Sulphuris. 12 gr. in a drachm.

" **Sulphuris Iodidi.** 4 gr. in a drachm.

" **Iodi.** 2 gr. in a drachm.

Vapor Iodi. A drachm of Tinct. Iodi inhaled from an ounce of warm water.

Vapor Chlori. (See **Calx Chlorata.**)

Cataplasma Carbonis. A quarter of an ounce of *Carbo Ligni* in a poultice made of bread 2 oz., Linseed meal 1½ oz. A similar amount of charcoal sprinkled on the surface.

SECOND GROUP. (MINERAL ACIDS.)

α. **Acidum Nitricum.**
Acidum Hydrochloricum.
β. **Acidum Sulphuricum.**
Acidum Sulphurosum.
γ. **Acidum Phosphoricum Dilutum.**
δ. **Acidum Nitrohydrochloricum Dilutum.**

Properties.

Officinal Preparations.

α.* On distilling from a mixture of Potassic (or Sodic) Nitrate with diluted Sulphuric Acid,—Acid Potassic (or Sodic) Nitrate, K (or Na)HSO_4, is formed; and *Nitric Acid* passes over, with water and some Nitrous Acid, forming a liquid of sp. gr. 1.42. On heating to expel Nitrous Acid,—**Acidum Nitricum,** containing 70 p. c. of HNO_3, results.

Colourless liquid, emitting acrid fumes.

* On distilling from a mixture of Sodic Chloride (common salt) with diluted Sulphuric Acid,—Sodic Sulphate is formed, and gaseous *Hydrochloric Acid,* HCl, passes over. Conducted through a wash-bottle into distilled water till the latter has increased in volume by 32 p. c., it forms **Acidum Hydrochloricum,** containing nearly 32 p. c. by weight of H Cl.

Colourless fuming liquid.

β.—The fumes of burning Sulphur or Iron Pyrites, FeS_2, containing *Sulphurous Anhydride,* SO_2, and atmospheric air, are passed into a leaden chamber, where water and watery vapour are introduced. By placing a pot of Sodic Nitrate mixed with Sulphuric Acid in the furnace, vapours of Nitric Acid are passed in also.

The Sulphurous Anhydride, SO_2, is oxidized at the expense of the Nitric Acid to *Sulphuric Anhydride,* SO_3, which unites with water to form *Sulphuric Acid,* H_2SO_4; and Nitric Oxide, NO, is liberated.

The following changes then take place, and continue in rotation:—(1.) Nitric Oxide unites with Atmospheric Oxygen to form Nitric Peroxide, NO_2; (2.) Nitric Peroxide, Sulphurous Anhydride, and a little watery vapour unite to form a compound of uncertain nature; which (3.) in presence of more water, is resolved into *Sulphuric Acid* and Nitric Oxide, NO.

On evaporating the dilute acid thus obtained as long as water alone passes off,—**Acidum Sulphuricum,** containing 96·8 p. c. of H_2SO_4, results.

Oily, colourless liquid.

Acidum Sulphuricum.

1.—$3\,SO_2 + 2\,HNO_3 + 2\,H_2O = 3\,H_2SO_4 + 2\,NO$.
2.—$2\,NO + O_2 = 2\,NO_2$.
3.—$NO_2 + SO_2 + H_2O = H_2SO_4 + NO$.

* On distilling from a mixture of Wood Charcoal with Sulphuric Acid,—Carbonic Anhydride, CO_2, and *Sulphurous Anhydride,* SO_2, pass over. The gases being conducted into water,—the former passes through; the latter is absorbed, uniting with water to form *Sulphurous Acid,* H_2SO_3. On continuing the process till the bubbles of gas pass through the water *undiminished in size,*—**Acidum Sulphurosum**, containing 11.8 p. c. of H_2SO_3, results.

Colourless liquid, evolving Sulphurous Anhydride.

γ. * On heating Phosphorus in diluted Nitric Acid,—*Phosphoric Acid,* H_3PO_4, Phosphorous Acid H_3PO_3, and Nitric Oxide, are formed. On distilling, *Phosphoric,* Phosphorous, and Nitric Acids, Nitric Oxide and water, pass over. Returning the distillate from time to time, and proceeding till the Phosphorus has all disappeared,—a *dilute Phosphoric Acid,* contaminated with Nitric Acid and Nitric oxides, is obtained. On evaporating till water and Nitric fumes cease to pass off,—*glacial Phosphoric Acid,* H_3PO_4, is left. On diluting, while hot, to a stated degree,—**Acidum Phosphoricum Dilutum,** containing 13.8 p. c. of H_3PO_4.

Colourless liquid.

δ. * On mixing 3 parts of **Acidum Nitricum** with 4 of **Acidum Hydrochloricum**, and standing for 24 hours in a partially closed bottle, *Chlorine* and *Nitrosyl Chloride,* NOCl, are formed, and retained in the bottle. On diluting with 25 parts of water, shaking up the bottle as it is added,—the so-called **Acidum Nitrohydrochloricum Dilutum** is produced.

Colourless liquid, evolving Chlorine.

Properties.

Specific Gravity of the Officinal **Acida.**

Ac. Sulphuricum	1.843.
Ac. Nitricum	1.420.
Ac. Hydrochloricum	1.160.
Ac. Sulphurosum	1.040.

Relative Neutralizing Power.

40 gr. of Sodic Hydrate, Na HO, are neutralized by
50.6 gr. of Ac. Sulphuricum.
90 ,, Ac. Nitricum.
114.8 ,, Ac. Hydrochloricum.
347.4 ,, Ac. Sulphurosum.

Acidum Sulphurosum.

$$2H_2SO_4 + C = CO_2 + 2SO_2 + 2H_2O.$$

Acidum Phosphoricum.

$$P + HNO_3 + H_2O = H_3PO_3 + NO.$$
$$3\,P + 5HNO_3 + 2\,H_2O = 3\,H_3PO_4 + 5\,NO.$$
$$3\,H_3PO_3 + 2\,HNO_3 = 3\,H_3PO_4 + 2\,NO + H_2O.$$

Acidum Nitrohydrochloricum.

$$2HNO_3 + 6HCl = 2NOCl + 2Cl_2 + 4H_2O.$$

Corrosive Action.

Nitric Acid is a powerful oxidizing agent, $4HNO_3$ being readily decomposed into $4NO + 2H_2O + 3O_2$ (Nitric Oxide, water, and nascent Oxygen).

Sulphuric Acid has a powerful affinity for water, abstracting not only water from moist bodies and hydrated substances, but the elements of water from combination in organic compounds.

Hydrochloric Acid Gas possesses a similar but less powerful property.

Hence the *corrosive* action of the corresponding Pharmacopœial **Acida** upon organic substances, and the *desiccating* and *charring* actions of **Acidum Sulphuricum**, which is nearly pure Sulphuric Acid.

In the action on metals of Sulphuric or Hydrochloric Acid, the metallic element simply replaces and sets free the Hydrogen of the Acid, or a portion of it. In the action of Nitric Acid on metals, part of the Acid is decomposed, water and Nitrous Acid, or Nitric Oxide, or Nitric Peroxide, or Nitrogen, or several of these, being set free instead of Hydrogen.

Sulphurous Anhydride or Sulphurous Acid, in presence of certain organic substances, (vegetable colours, ferments, odorous and septic matters,) forms fresh combinations. Hence its *bleaching*, *deodorizing*, and *disinfecting* properties, and its power of *arresting fermentation and putrefaction*. From its (colourless) combinations with vegetable colours the latter may be set free by the action of an alkali.

Acidum Nitricum undergoes slow spontaneous decomposition in sunlight, and becomes coloured by Nitrous Acid.

Acidum Sulphurosum undergoes slow spontaneous oxidation, and becomes converted into a solution of Sulphuric Acid.

Acidum Sulphuricum and water, mixed together, undergo contraction in bulk, heat being disengaged in the process.

Officinal Preparations of the Acida.

(Dilute Acids.)

Acidum Nitricum Dilutum. 20 p. c. of the **Acidum** in water.

Acidum Hydrochloricum Dilutum. 30 p. c. of the **Acidum** in water.

Acidum Sulphuricum Dilutum. $8\frac{1}{3}$ p. c. of the **Acidum** in water.

Acidum Sulphuricum Aromaticum. 7 p. c. of the **Acidum** in Rectified Spirit, flavoured by maceration on Cinnamon and Ginger.

Acidum Phosphoricum Dilutum
Acidum Nitrohydrochloricum Dilutum } Officinal only in the diluted form. (See above.)

THIRD GROUP.

ALCOHOLS AND THEIR DERIVATIVES.

α. **Spiritus Rectificatus.**
Spiritus Tenuior.
Absolute Alcohol.
Acetum.

β. **Æther. Æther Purus.**
Æther Aceticus.
Spiritus Ætheris Nitrosi.

γ. **Chloral Hydras.**
Croton-Chloral Hydrate.

δ. **Chloroformum.**
Iodoform.

ε. **Alcohol Amylicum.**
Amyl Nitris.

Properties.
Officinal Preparations.

α.—By the action of Malt-extract on Starch, $C_6 H_{10} O_5$,—*Sugar*, $C_{12} H_{22} O_{11}$, is formed, the elements of water being taken into combination.

By the action of Yeast on Sugar,—*Glucose*, $C_6 H_{12} O_6$; the elements of water being again combined.

By a similar fermentation of Glucose,—*Alcohol*, $C_2 H_6 O$; Carbonic Anhydride, CO_2, being liberated.

By these means weak alcoholic fluids (*Worts*) are obtained from Potatoes or Grain, which contain Starch; from infusions of Malt, which contains a crystallizable form of sugar; from Molasses, or the residue of the Beet Sugar manufacture, which contain uncrystallizable forms; or from Grape-juice, which contains Glucose.

On distilling such *Worts*, the Alcohol passes over in the first portions of the distillate. By stopping the distillation at an early stage, *Spirits*, liquids containing a large proportion of Alcohol, are obtained.

Repetitions of the process (rectification) furnish *Spirits* containing progressively larger proportions of *Alcohol*.

Spirit rectified till only 16 p. c. of water remains (84 p. c. of Alcohol) forms **Spiritus Rectificatus.** It is free from flavouring or colouring matter.

* Diluted with three-fifths of its bulk of water, it forms **Spiritus Tenuior** (*Proof Spirit**), containing 49 p. c. of Alcohol.

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* The old "proof", from which this apparently arbitrary standard was fixed, was to saturate gunpowder with the spirit and ignite it. If "above proof", the alcohol fired the gunpowder; if "below proof", it burned off, and left the powder damp.

Alcohol.

$$2\,C_6H_{10}O_5 + H_2O = C_{12}H_{22}O_{11}.$$
$$C_{12}H_{22}O_{11} + H_2O = 2\,C_6H_{12}O_6.$$
$$C_6H_{12}O_6 = 2\,C_2H_6O + 2\,CO_2.$$

Simple distillation fails to separate Alcohol from a final 10 p. c. of water.

By digesting strong rectified spirit on Quicklime, CaO, this residual water is separated to form Calcic Hydrate, CaH_2O_2; and ABSOLUTE ALCOHOL, C_2H_6O, can be distilled off.

On leaving the Alcoholic *Wort* obtained by fermenting infusion of Malt or unmalted grain exposed to the air, the Alcohol is oxidized (through the agency of a microscopic organism, the *Mycoderma Aceti*) to *Acetic Acid*, $C_2H_4O_2$;—and **Acetum** (*Malt Vinegar*), containing about 5 p. c. of Acetic Acid, results.

Pale brown liquid, evolving Acetic Acid.

β.—From **Spiritus Rectificatus** are prepared: 1. **Æther.** 2. **Æther Aceticus.** 3. **Spiritus Ætheris Nitrosi.**

1. *On distilling **Spiritus Rectificatus** with Sulphuric Acid, the following changes take place. α. *Ethylic Hydric Sulphate*, $C_2H_5.H.SO_4$, and water are formed. β. By reaction of the former with a fresh portion of the Alcohol, *Ethylic Ether*, $(C_2H_5)_2O$, is formed, and Sulphuric Acid set free again.
γ. The *Ether* passes over, with water, alcohol, Sulphurous Acid, Acetic Acid, Ethylic Sulphate, and other substances, which are formed in small quantities at the same time.
δ. The Sulphuric Acid remains, ready to act on a fresh portion of the Spirit, which in practice is supplied continuously to the still, until the Sulphuric Acid is wasted in producing the impurities alluded to above.
On agitating the distillate with slaked Lime and a solution of Calcic Chloride, the impurities are mostly dissolved and separated from the *Ether*, which floats on the surface. On separating the latter, and redistilling,—**Æther**, containing 92 p. c. of Ethylic Ether, the rest being chiefly Alcohol,—is obtained.
On agitating **Æther** with water to remove the Alcohol, then digesting with recently burnt lime and Calcic Chloride, to remove all traces of water, and finally distilling again, **Æther Purus**, pure Ethylic Ether, $(C_2H_5)_2O$.

2* On mixing with Sulphuric Acid, *Ethylic Hydric Sulphate* is formed as before. On adding fused (anhydrous) Sodic Acetate and distilling, **Æther Aceticus** (Ethylic Acetate) $C_2H_5.C_2H_3O_2$, is formed, and passes over, with water and other impurities.

Purified by redistillation from Calcic Chloride.

3* On mixing with Sulphuric Acid,—*Ethylic Hydric Sulphate*, as before. On distilling with Nitric Acid and Copper, *Ethylic Nitrite*, $C_2H_5.NO_2$, is formed, and passes over, with alcohol and water. On dilution with Rectified Spirit to a stated degree,—**Spiritus Ætheris Nitrosi,** containing 2 p. c. of *Ethylic Nitrite*, or *Nitrous Ether*.

All three colourless liquids, with peculiar odours.

Acetic Acid.

$$C_2H_6O + O_2 = C_2H_4O_2 + H_2O.$$

Æther.

$$C_2H_5.HO + H_2SO_4 = C_2H_5.HSO_4 + H_2O.$$
$$C_2H_5.HSO_4 + C_2H_5.HO = (C_2H_5)_2O + H_2SO_4.$$

γ.—On passing dry Chlorine gas through absolute Alcohol,—after a long series of substitution changes,—*Chloral Alcoholate*, $C_2HCl_3O.C_2H_6O$, is formed. Other products of the action of Chlorine on the alcohol are mixed with it. On shaking with Sulphuric Acid,—*Chloral* (Trichloraldehyde), C_2HCl_3O, separates as an oily layer, and is distilled off. By redistillation with quicklime, it is obtained in a still purer state. On adding a small quantity of water,—**Chloral Hydras,** $C_2HCl_3O.H_2O$, is formed; with evolution of heat.

Crystallizes on cooling. Rhomboidal plates.

On passing Chlorine gas into Ethylic Aldehyde (C_2H_4O), *Crotonic Aldehyde*, C_4H_6O, is first formed by the abstraction of the elements of water; and, by a further substitution change,—the so called Croton-Chloral Hydrate (*Trichlorocrotonic Aldehyde*), $C_4H_3Cl_3O$.

Minute shining scales.

δ. * On mixing Bleaching Powder and Slaked Lime with freely-diluted Alcohol, and exposing the mixture to a heat between 100 deg. and 180 deg. F.,—among a variety of products, some of which combine with the lime,—*Chloral Hydrate* is formed; but, in presence of the lime, is immediately decomposed to form Calcic Formate $Ca(CHO_2)_2$ and **Chloroformum** (Trichloromethane) $CHCl_3$. On distillation, **Chloroformum,** water, and a little alcohol pass over.

Washed from alcohol by water, from water with Sulphuric Acid. Finally redistilled from Calcic Chloride and Slaked Lime.
Colourless liquid, ethereal odour.

A solution of alkaline Iodide and Iodate, formed by adding Iodine to one of Caustic Alkali, is mixed with Alcohol and free Alkali. On passing Chlorine into the mixture, *Iodine* is liberated. By a reaction with the Alcohol and Alkali similar to that concerned in the production of Chloroform,—Iodoform (*Tri-iodomethane*), CHI_3, is produced, and deposited from the solution.

Filtered and washed. Yellow scales.

ε.—The Worts produced by fermenting saccharine solutions with yeast (see above, p. 99) contain two forms of *Amylic Alcohol*, $C_5H_{12}O$, boiling at 268 deg. and 270 deg. F. respectively. In distilling crude spirit (p. 99), they pass over. In rectifying the spirit, they are left behind with the water, the Acetic, and other ethers. With the ethers, they separate spontaneously from the water, forming *Oil of Grain*. On fractional distillation, the ethers pass over first, the *Amylic Alcohols*, nearly pure, last; forming **Alcohol Amylicum** (*Fusel Oil*).

Colourless liquid, oppressive odour.

Æther Aceticus.

$$C_2H_5.HSO_4 + NaC_2H_3O_2 = C_2H_5.C_2H_3O_2 + NaHSO_4.$$

Spiritus Ætheris Nitrosi.

$$Cu + 3HNO_3. + C_2H_5.HO = Cu(NO_3)_2 + C_2H_5.NO_2 + 2H_2O.$$

Croton Chloral.

$$2\,C_2H_4O = C_4H_6O + H_2O.$$
$$C_4H_6O + 3\,Cl_2 = C_4H_3Cl_3O + 3\,HCl.$$

Chloroformum.

$$2\,C_2HCl_3O.H_2O + CaH_2O_2 = Ca(CHO_2)_2 + 2\,CHCl_3 + H_2O.$$

From **Alcohol Amylicum**, further purified, is formed,—

a. By passing Nitrous Anhydride into it, **Amyl Nitris**, $C_5 H_{11} NO_2$.

Purified from adhering Acid, by mixing with Caustic Alkali, and redistilling.

Or, *β.* By heating with Nitric Acid;

Or, *γ.* By a process similar to that employed in making Nitrous Ether (see above),—**Amyl Nitris**, with various other products, from which it is almost entirely separated by distilling at a temperature below 212 deg. F.

Purified from acid by mixing with Caustic Alkali; from the remains of the other impurities by distilling at 205 deg. F.

Yellowish fluid, peculiar odour.

*** The preparation of Valerianic Acid from Amylic Alcohol is described under **Sodæ Valerianas**, in the Sixth Group.

Properties.

(Solids.)

Chloral Hydrate is soluble in ⅓ part by weight of water (3 oz. in 1 oz. water gives 2 oz. 5½ drachms of solution.—*Squire*), in less than 1 part of Rectified Spirit.

Iodoform is soluble in 120 parts of Rectified Spirit, in 20 parts of Ether, or Chloroform, freely in Olive Oil (not in water).

Croton-Chloral is soluble in 50 parts of water, in equal parts of Rectified Spirit or glycerine.

Chloral Hydrate is fusible at a gentle heat. Chloral Hydrate, in presence of alkalies, is decomposed, giving Chloroform and a Formate. (See the process for making chloroform.)

A mixture of equal parts of Chloral Hydrate and Camphor liquefies spontaneously, and may be used as a liniment.

(Liquids.)

Specific gravity.

Æther Purus	.720
Æther	.735
Absolute Alcohol	.794
Alcohol Amylicum	.818
Spiritus Rectificatus	.838
Spiritus Ætheris Nitrosi	.845
Amyl Nitris	.877
Æther Aceticus	.900
Spiritus Tenuior	.920
Acetum	1.018
Chloroformum	1.490

Boiling points.

Æther Purus , . .	96 deg. F.
Æther	105 ,,
Chloroformum . . .	142 ,,
Æther Aceticus . . .	166 ,,
Absolute Alcohol . . .	172 ,,
Spiritus Rectificatus . .	180 ,,
Amyl Nitris	205 ,,
Alcohol Amylicum . . .	270 ,,

Ether and Chloroform, and in a less degree Alcohol and Spirits, evaporate rapidly at ordinary temperatures, abstracting heat powerfully from contiguous bodies.

Rectified Spirit mixes with Water, Ether, Acetic Ether, Amylic Alcohol, and Amyl Nitrite, in all proportions.
Ether mixes with Acetic Ether and Amylic Alcohol in all proportions.

Æther purus is soluble in 10 parts by measure of water. It also takes up 1-10th part of water.
Acetic Ether is soluble in 12 parts of water.
Chloroform in 200 parts of water, 1½ part of Ether, 7-10ths part of Rectified Spirit (not in Glycerine).
Amyl Nitrite is insoluble, Fusel Oil hardly soluble, in water.

Eighteen parts of Rectified Spirit mixed with 18 parts of water are contracted to 34 parts. (*Squire*).

Rectified Spirit dissolves balsams, Camphor and volatile oils, Castor Oil, Sugar, Tannic and Gallic Acids, vegetable alkaloids and colouring matters, Iodine and Bromine, Caustic Potash and Soda, Lithia, Ammonia, and many alkaline and metallic salts, chiefly those that are deliquescent.
It partially dissolves wax with heat.

Ether and Chloroform dissolve resins, balsams, Gutta Percha, Camphor, fixed and volatile oils, fats, most vegetable alkaloids, Iodine and Bromine.
They separate the last three from watery solutions.
They dissolve wax partially.
Ether dissolves Corrosive Sublimate and Gun-Cotton.

Ether exposed to air and light is partially decomposed, Acetic Acid being formed.
The vapour of Ether makes an explosive mixture with atmospheric air.

Officinal Preparations of the Alcohols and their Derivatives.

Aq. Chloroformi. Water saturated with *Chloroform.*

Spiritus Chloroformi. *Chloroform,* diluted with 19 parts of Rectified Spirit.

Spiritus Ætheris. *Ether,* diluted with 2 parts of Rectified Spirit.

Spiritus Ætheris Nitrosi (see above). Contains 2 p.c. of Nitrous Ether.

Tinct. Chloroformi Co. *Chloroform,* diluted with 4 parts of Rect. Spirit and 5 parts of Tr. Cardamom. Co. (twice as strong as the *Spiritus*).

Syrupus Chloral. 10 grains in a drachm.

Vin. Aurantii. An alcoholic fluid made by fermenting saccharine solutions flavoured with bitter orange peel ("Orange Wine" of the grocers). Contains about 12 p. c. of Alcohol.

Vin Xericum. Sherry Wine. Contains 17 or 18 p. c. of Alcohol.

Spiritus Vini Gallici. French Brandy. Contains from 48 to 56 p. c. of Alcohol.

Used as vehicles.

Mistura Spiritus Vini Gallici. 4 oz. of French Brandy and the same amount of *Aq. Cinnamomi,* mixed with the yolks of two eggs, and sweetened with half an ounce of sugar.

Linimentum Chloroformi. *Chloroform,* mixed with equal parts of *Lin. Camphoræ.* (Oil is soluble in Chloroform.)

*** **Amyl Nitrite,** which is used as an inhalation, is usually dispensed in thin glass *capsules,* holding three minims, which are readily broken in a handkerchief at the time of use.

FOURTH GROUP.

α. **Pix Liquida.** **Creasotum.**
Oil of Cade.

Officinal Preparations.

β. **Acidum Aceticum.** **Ac. Citricum.**
Ac. Aceticum Glaciale. ε. **Ac. Tannicum.**
γ. **Ac. Carbolicum.** **Ac. Gallicum.**
Salicylic Acid. ζ. Lactic Acid.
δ. **Ac. Tartaricum.** η. **Ac. Hydrocyan. Dil.**

Neutralizing Power.

Officinal Preparations.

*** For **Ac. Benzoicum,** see pp. 51-61.
For Chrysophanic Acid, p. 88.

α.—On destructive distillation of the wood of Pinus Sylvestris and other species of Pines, three classes of products pass over.

1.—Gaseous bodies, chiefly Carbonic Anhydride, Carbonic Oxide, and Hydrogen.

2.—Water, and liquids soluble in water, chiefly Acetic Acid, Methyl, Ethyl, and Allyl alcohols, Methylic Acetate, and Acetone.

3.—Oily liquids insoluble in water, holding in solution solid substances also insoluble in water.

The liquids and solids of Class 3, which include a number of hydrocarbons, paraffins, benzene, etc.; a number of alcohols, chiefly phenols; resinous substances; and various other bodies such as naphthalene and pyrene;—form *Wood-tar* or **Pix Liquida.**

Thick, viscid, brownish-black, with an aromatic odour.

Oleum Cadinum, *Oil of Cade,* consists of the oily matters furnished by the tar distilled from the wood of Juniperus Oxycedrus (Coniferæ) in France and Germany.

Composition similar to other Tar-oils.

The heavier portions of the *Oil* obtained from *Wood tar* contain a variety of alcohols, chiefly *phenols,* with a number of hydrocarbons, some acids, and other compounds. By washing these heavier portions with a solution of Sodic Carbonate, they are freed from acid. On distilling, two oils are obtained, a heavier and a lighter, which separate on mixing with water. The lighter oil, which floats on the water, contains the *alcohols* and some of the hydrocarbons.

On adding a solution of caustic potash to the *lighter oil* the *alcohols* unite with the potash to form soluble compounds. The solution is decanted. On boiling in the open air, some impurities separate. On adding dilute Sulphuric Acid, the *alcohols* are deposited, but not quite in a pure state. By repeating the treatment with alkali and acid alternately, the

impurities (hydrocarbons) are gradually eliminated. By digesting with Calcic Chloride, the adherent water is abstracted; and on distilling, the *Alcohols* pass over;—forming **Creasotum.**

Oily liquid, colourless, strongly refracting, pungent odour, burning taste.

Sp. gr., 1.071. Boiling point about 400 deg. F.
Soluble in 400 parts of water, in equal parts of glacial Acetic Acid. Insoluble in Glycerine.

Separates on diluting its solution in Acetic Acid with water.

Coagulates albumen; preserves animal substances from decay.
Ignites spontaneously with Argentic Oxide.

Officinal Preparations.

Mistura Creasoti. Creasote dissolved in water faintly acidulated with Acetic Acid, sweetened, and flavoured with Juniper. One minim of Creasote in the fluid ounce.

Vapor Creasoti:—12 minims of creasote in 8 oz. of boiling water. Air to be passed *through* the solution.

Unguentum Creasoti. Creasote in Simple Ointment,—1 part in 9.

Unguentum Picis Liquidæ. 5 parts of Tar stirred into 2 of melted Beeswax.

β.—On distilling the *liquid products* of the destructive distillation of wood, Methylic Alcohol and Acetone pass over first.. They are separated. On further distillation, "Pyroligneous Acid", *i.e.*, a dilute and impure *Acetic Acid*, passes over. By mixing "Pyroligneous Acid" with milk of Lime, a solution of impure *Acetate* ("pyrolignite") of Lime is obtained, from which Acetic Acid for manufacturing purposes is prepared.

On mixing the solution of "pyrolignite" with one of Sodic Sulphate, Calcic Sulphate is precipitated, and impure *Sodic Acetate* remains in the solution, which is decanted and evaporated to dryness. On fusing the *Acetate*, tarry matters are burned off; by redissolving and repeatedly crystallizing it, it is completely purified.

On mixing the purified and crystallized *Sodic Acetate*, $Na\,C_2\,H_3\,O_2.3H_2\,O$, with Sulphuric Acid, and distilling,—**Acidum Aceticum**, containing 33 p.c. of Acetic Acid, $C_2H_4O_2$, passes over.

Colourless liquid, pungent odour.

By using fused (*i.e.*, anhydrous) Sodic Acetate, and concentrated **Acidum Sulphuricum,—Acidum Aceticum Glaciale,** containing at least 99 p.c. of $C_2H_4O_2$, is obtained.

Colourless liquid, with a more powerful odour than the **Acidum**; or flat pearly plates.

The strongest Acetic Acid obtainable.

Specific Gravity of
Acidum Aceticum . . 1.044
,, ,, Glaciale . 1.065, increased by adding 10 p. c. of water.

Acidum Aceticum Glaciale crystallizes at 34 deg. F., and remains crystalline till 48 deg. F.

Acetic Acid volatilizes at ordinary temperatures.

Acetic Acid mixes with water, Rectified Spirit, and ether in all proportions.

The Glacial Acid dissolves Resins, Gum-resins, Camphor, volatile oils, and Creasote. They are precipitated on dilution with water.

The Glacial Acid is highly corrosive to organic substances.

Officinal Preparation.

Acidum Aceticum Dilutum. 12½ p.c. of the Acidum in water (*i.e.* it contains about 4 p.c. of Acetic Acid).

γ.—On distilling Coal-Tar, Ammonia and some permanent gases pass over first, then water and Ammoniacal salts. With the water come *oily matters*, at first lighter than water, but gradually increasing in specific gravity. The *lighter oils* that float on the water contain *Phenol* (**Acidum Carbolicum**), C_6H_6O, with Cresol and other homologues; also Naphthalene and other hydrocarbons, and many bodies of undetermined constitution.

On agitating these *lighter oils* with Sulphuric Acid, some of the impurities are deposited as a tarry mass. On treating the remaining oil with solution of Soda, or milk of Lime, *Phenol* and its homologues enter into combination with the base; and a solution of *Phenates*, etc., is obtained, which holds Naphthalene and other substances dissolved. On dilution, much of the Naphthalene is precipitated; on exposure to air, other impurities also. By the cautious addition of Sulphuric Acid, the homologues, which are weaker acids than Phenol, are precipitated, leaving a comparatively pure solution of *Phenate* and Sulphate. On saturating the filtered solution with Sulphuric Acid, *Phenol*, comparatively pure, is precipitated. By repeating the processes of solution in alkali and neutralization with acid, the *Phenol* is further purified. Finally, on fractional distillation, pure **Acidum Carbolicum** passes over at and about 360° F.

Colourless liquid, pungent odour.
Crystallizes on cooling. Long needles, which become pink on keeping.

Soluble in 15 parts of water.
1¼ part of olive oil.
⅓ ,, chloroform.
⅔ ,, glycerine.
¼ ,, ether.
⅕ ,, alcohol. (*Squire.*)
Also in volatile oils.

Fuses at 95 deg. F. When fused it will unite with from 1-8th to 1-4th part of water to form an oily fluid ("*Carbolic Oil*"), which remains liquid at ordinary temperatures.

At and above 95 deg. F., "*Carbolic Oil*" is miscible with water in all proportions; but below that temperature the acid dissolves in water only in the normal proportion, and any excess of the "*oil*" remains separate, in globules which sink to the bottom of the vessel.

Deliquescent in air above 60 deg.

Volatilizes slowly at ordinary temperatures.

Does not redden litmus.

Coagulates albumen.

"Carbolic Oil" destroys animal tissues, coagulating albumen and abstracting water.

Carbolic Acid destroys septic and odorous particles, even in a diluted form.

Carbolic Acid being mixed with Caustic Soda,—*Sodic Phenate*, NaC_6H_5O, is formed. On passing Carbonic Anhydride through *Sodic Phenate*, dried and heated to 220—250 deg. F.,—*Sodic Salicylate*, $NaC_7H_5O_3$, is formed. On decomposing a solution of *Sodic Salicylate* by an acid, Salicylic Acid, $HC_7H_5O_3$, is precipitated.

Washed, and dissolved in boiling water. Crystallizes out on cooling. Shining white needles.

Always contaminated with some other substances when produced by this method.

Or:—

Oil of Winter Green (p. 87) is mainly composed of *Methyl Salicylate*, $CH_3.C_7H_5O_3$. On boiling the oil with a solution of Caustic Potash, *Potassic Salicylate* is formed. By distillation, it is separated from other substances. On adding Hydrochloric Acid to a solution of the distilled salt, **Salicylic Acid** is precipitated.

Redissolved and purified by crystallization, as above.

Obtained nearly pure by this method, which is, however, a costly one.

Soluble in 800 parts of cold water.
10 ,, boiling water.
5 ,, Rectified Spirit.
Also in 8 ,, Lard at 180 deg. F. (*Squire*).

Soluble in 24 parts of cold water with 1 part of Potassæ Acetas, or 2 of Potassæ Citras.

Destroys septic particles. Preserves organic matters from putrefaction.

*** Salicylic Acid is usually prescribed for internal administration in the form of its Sodic or Ammonic Salt.

Sodic Salicylate occurs in minute pearly scales.
It is soluble in equal parts of water; in 4 parts of Rectified Spirit.

Ammonic Salicylate occurs in powder.
It is soluble in equal parts of water.

δ. * On adding Chalk to a solution of Acid Potassic Tartrate (p. 116) in boiling water,—Carbonic Anhydride is given off, *Calcic Tartrate* is precipitated, and neutral *Potassic Tartrate* remains in solution. On adding, further, a solution of Calcic Chloride, the whole of the Tartaric Acid is precipitated as *Calcic Tartrate;* Potassic Chloride remaining in solution. On digesting the *Calcic Tartrate* (collected and washed) with diluted Sulphuric Acid, a solution of **Acidum Tartaricum**, $H_2C_4H_4O_6$, with a little Calcic Sulphate, is obtained; the greater part of the Calcic

Sulphate remaining undissolved. On evaporating the filtered solution to a sp. gr. of 1.21, the sulphate crystallizes out. On further evaporating the mother liquor, **Acidum Tartaricum** crystallizes out.

Purified by recrystallization. Oblique rhombic prisms.

* LEMON JUICE contains *Citric Acid*, $H_3C_6H_5O_7$. On neutralizing with **Creta Præparata**, *Calcic Citrate* is precipitated. From the *Calcic Citrate*, **Acidum Citricum**, $H_3C_6H_5O_7.H_2O$, is prepared precisely as Acidum Tartaricum from Calcic Tartrate.

Rhombic prisms.

Acidum Tartaricum dissolves in—
1½ part of water; 8 parts of Rectified Spirit.
Acidum Citricum in—
⅔ part of water; 1½ part of Rectified Spirit; 2 parts of Glycerine.

ϵ.—In powdered **Galls** (p. 56), which contain a glucoside, *Gallo-tannin*, are formed—

1.* On exposure to air and moisture for three days,—**Acidum Tannicum**, $C_{27}H_{22}O_{17}$.

Extracted by ether and water. The former allowed to evaporate spontaneously, the latter at 212 deg. F.

Scales or amorphous masses; light brown.

2.* On similar treatment for six weeks,—*Gallic Acid*, $H_3C_7H_3O_5$. Extracted by boiling water. On cooling, **Acidum Gallicum**, $H_3C_7H_3O_5.H_2O$, crystallizes out.

Needles; fawn-coloured.

Tannic Acid is soluble in—
Equal parts of water or Rectified Spirit; 3 parts of Glycerine.
Gallic Acid in—
100 parts of cold water; 3 parts of boiling water; 8 parts of Rectified Spirit;* 20 parts of Glycerine.
Both Gallic and Tannic Acids give a black precipitate with Ferric Salts.
Tannic Acid (not Gallic) precipitates albumen, gelatine, and vegetable alkaloids.
Tannic Acid, on boiling with Sulphuric Acid, yields glucose and Gallic Acid.

ζ.—On standing a mixture of 8 parts of Sugar and 1 part of Cheese in 50 parts of water, at a temperature of 70—80 deg. F., for two or three weeks,—*Lactic Acid*, $C_3H_6O_3$, is slowly formed by a process of fermentation. Chalk being added from time to time, crystals of *Calcic Lactate* are formed. They are separated, washed, and purified by dissolving in boiling water, and recrystallizing. On careful addition of Sulphuric or Oxalic Acid, LACTIC ACID separates; Calcic Sulphate or Oxalate remaining.

A syrupy liquid, pale brown.
Miscible in all proportions with water, Rectified Spirit, or Ether.

η.—On heating REFUSE ANIMAL MATTER to dull redness with Potassic Carbonate and Iron filings, the Carbonate loses oxygen, and the Potassium com-

* From this solution the acid is not precipitated by dilution.

Acidum Tartaricum.

$$2\,KHC_4H_4O_6 + CaCO_3 = CaC_4H_4O_6 + K_2C_4H_4O_6 + CO_2 + H_2O.$$

bines with carbon and nitrogen to form *Potassic Cyanide*, KCN, (KCy). On lixiviating the mass in the open air, the Cyanide dissolves, and combines with the iron and with oxygen, forming *Potassic Ferrocyanide* (**Potassæ Prussias Flava**), K_4FeCy_6, and Potassic Hydrate, KHO, both of which remain in solution. On evaporating, the *Ferrocyanide* crystallizes out.

(Truncated pyramids, lemon-yellow.)

* On distilling from a mixture of Sulphuric Acid with solution of Potassic Ferrocyanide,—*Hydrocyanic Acid*, H C N, passes over; Acid Potassic Sulphate and Ferrous Dipotassic Ferrocyanide, FeK_2FeCy_6, remaining. Passed into water, the acid is dissolved. Diluted to a stated degree, it forms **Acidum Hydrocyanicum Dilutum,** containing 2 p. c. of HCN.

Colourless liquid, evolving Hydrocyanic Acid.

Relative Neutralizing Power of the Organic "Acida."

40 grains of Caustic Soda are neutralized by—
- 3 drachms of Acidum Aceticum.
- 1 drachm of Acid. Acet. Glaciale.
- 70 grains of Acidum Citricum.
- 75 grains of Acidum Tartaricum.

Officinal Preparations of the Organic "Acida."

Acidum Aceticum Dilutum. See above, under Acidum Aceticum.

Glycerinum Acidi Carbolici. Nearly 1 gr. in 5 min.; 11½ gr. in 1 drachm.

,, **Acidi Tannici.** 1 gr. in 5 min.; 12 gr. in 1 drachm.

,, **Acidi Gallici.** ditto.

Suppositoria Acidi Tannici. 3 gr. in each, with Cocoa-butter, lard, and wax.

,, **Acidi Tannici cum Sapone.** 3 gr. in each, with curd soap and starch.

,, **Acidi Carbolici cum Sapone.** 1 gr. in each, with curd soap and starch.

Trochisci Acidi Tannici. ½ gr. in each, flavoured with Tolu.

Vapor Acidi Hydrocyanici. 10 to 15 min. of Ac. Hydrocy. Dil., inhaled from a drachm of water.

*** Lactic Acid is usually prescribed diluted with water.

Ac. Hydrocyanicum Dilutum.

$12\,K\,Cy + Fe + 2\,H_2O + O_2 = 2\,K_4Fe\,Cy_6 + 4\,KHO.$

$2\,K_4FeCy_6 + 6\,H_2SO_4 = 6\,KHSO_4 + Fe\,K_2Fe\,Cy_6 + 6\,HCy.$

FIFTH GROUP.

Pyroxylin.
Collodium.
Collodium Flexile.
Glycerinum,
NITROGLYCERIN.
Mica Panis.
Theriaca.

COTTON WOOL (**Gossypium**, p. 40) consists almost entirely of pure *Cellulose*, $C_6H_{10}O_5$. (*) On soaking for three minutes in a mixture of equal parts of **Acidum Sulphuricum** and **Ac. Nitricum**, two Nitrates, $C_{18}H_{22}O_7(NO_3)_8$ and $C_{18}H_{23}O_8(NO_3)_7$, are produced, which form **Pyroxylin** (*Gun-cotton**).

Washed from acid, dried at 212 deg. F.
Indistinguishable in appearance from the original Cotton-wool.
Explosive.
Soluble partly in ether (the second nitrate), and partly in a mixture of ether and alcohol (the first nitrate).

Collodium (*Collodion*) is a solution of Pyroxylin in 36 parts of Ether with 12 of Rectified Spirit.

Colourless.
Dries rapidly, leaving a film impermeable to air, which contracts in drying.
Highly inflammable.

Collodium Flexile is Collodion with 20 grains of Canada Balsam and 10 minims of Castor Oil added to the fluid ounce.

Leaves a film which does not contract.

FIXED OILS and FATS are composed of Glyceric salts of acids of the Acetic or Oleic Series, and yield *Glycerin*, $C_3H_8O_3$, on decomposition with alkalies (see Soaps, pp. 116, 120 ; also Emplastrum Plumbi, under Lead Compounds ; and p. 42).

On placing fat and water in a gently heated still, and passing steam heated to 500 deg. F. into the mixture, the Glyceric Salts are decomposed ; and water, *Glycerin*, and fatty acids pass over. The aqueous solution of *Glycerin* is separated from the insoluble acids. On evaporating till water ceases to be driven off, **Glycerinum** (*Glycerine*), containing 95 p. c. of Glycerin, is left.

A syrupy, colourless fluid ; sweet taste.
Sp. gr., 1.250.
Miscible with water, Rectified Spirit, or chloroform in all proportions. Not miscible with ether or oils.
Absorbs water from the air.
Distils with superheated steam at 500 deg. F. ; cannot be distilled alone at ordinary pressures without decomposition.

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* In preparing gun-cotton for explosive purposes, more concentrated acids are used, and a tri-nitrate $C_6H_7O_2(NO_3)_3$ is produced, which is more explosive than **Pyroxylin**, but is soluble only in Acetic Ether.

Dissolves, amongst other substances, Tannic and Gallic Acids, Carbolic Acid, Borax, Iodine, Bromine, Iodide of Sulphur, Perchloride of Iron, Salicylic Acid, Nitrate of Bismuth, Salts of Morphia, Quinia, Strychnia, Veratria, and Atropia.
Pure, or diluted with 10 parts of water, it preserves animal matters from putrefaction.

On adding Glycerine to concentrated Nitric Acid, cooled by a mixture of ice and salt, and afterwards mixing with concentrated Sulphuric Acid, NITROGLYCERIN, or GLONOIN, (*Glyceric tri-nitrate*), $C_2H_5(NO_3)_3$, separates.

A yellow oil.
Slightly soluble in water, more so in Rectified Spirit.
Highly explosive.

Mica Panis is the *crumb* of ordinary wheaten bread.

Theriaca, *Treacle*, is an uncrystallizable modification of Cane-sugar, formed during the process of refining. (See p. 60.)

Very tenacious.

*** Glycerine is used as a solvent (p. 7); Mica Panis in making Charcoal Poultice (pp. 10, 95); Treacle in making pills.

Nitroglycerin is supplied as a 1 p. c. solution in Rectified Spirit; and is usually administered in the form of a pill.

SIXTH GROUP.

METALS AND METALLIC COMPOUNDS.

Described in the following order.

Potassium Compounds.		Bismuth Compounds	
Sodium	,,	Antimonial	,,
Ammonium	,,	Arsenical	,,
Iron	,,	Magnesium	,,
Mercurial	,,	Alum.	
Calcium	,,	Lithium Compounds	
Zinc	,,	Silver	,,
Lead	,,	Copper, Cadmium, and Cerium Compounds	

Officinal Preparations.

*** *The Properties are described at the end of each division.*

POTASSIUM COMPOUNDS. 17 *Officinal.*

NITRE. { **Potassæ Nitras.**
Acid Potassic Sulphate. .. .. } **Potassæ Sulphas.**

WOOD ASHES.—**Potassæ Carbonas.** { **Potassa.** { **Potassii Iodidum.** / **Potassii Bromidum.** / **Potassæ Permanganas.** / **Sapo Mollis.** } / **Potassæ Bicarbonas.** / **Potassæ Acetas.** / **Potassæ Citras.** / **Potassæ Chloras.** / **Potassa Sulphurata.** / **Potassæ Bichromas.** / **Potassæ Prussias Flava.** }

ARGOL.—**Potassæ Tartras Acida.** .. } **Potassæ Tartras.**

NITRE, or SALTPETRE. Impure *Potassic Nitrate*, formed spontaneously in soils containing the base Potassa, by decomposition of organic matters and oxidization of the resulting Ammonia to form Nitric Acid; found as an efflorescence in the E. Indies, cultivated artificially in Europe. Separated by lixiviation and crystallization.

α. From NITRE are obtained,

1. By solution and recrystallization,—pure **Potassæ Nitras**, KNO_3.

   Six-sided prisms, striated.

2. By heating with diluted Sulphuric Acid,—a solution of *Acid Potassic Sulphate*, $KHSO_4$ (see Acidum Nitricum, p. 96). On neutralizating with Potassic Carbonate,—one of *neutral* **Potassæ Sulphas**, K_2SO_4.

   Crystallizes out on evaporation.
   Six-sided prisms, with pyramidal ends.

WOOD ASHES, obtained by burning wood in heaps or pits, sheltered from the wind, contain *Potassic Carbonate*, the result of ignition of organic salts of Potassium, mixed with other salts, soluble and insoluble, and with organic matter.

β. From WOOD ASHES are obtained, (1) by lixiviation and evaporation,—*Potashes, i.e.*, Potassic Carbonate contaminated with other soluble salts, and with organic matter; (2) on igniting Potashes in a reverberatory furnace so as to burn off the organic impurities,—*Pearlash, i.e.*, Potassic Carbonate contaminated only with other salts, soluble, but less so than itself; (3) on lixiviating Pearlash with *its own weight only* of distilled water, and decanting,—a nearly pure solution of **Potassæ Carbonas**, K_2CO_3.

Evaporated to dryness,—crystalline powder.

γ. From **Potassæ Carbonas** are prepared,

1.* By boiling in distilled water with slaked Lime, CaH_2O_2, decanting, and diluting to a stated degree,—**Liquor Potassæ**; which, (*)on evaporation, leaves **Potassa Caustica**, KHO, in a fused state.

Cooled in moulds,—solid sticks.

2.* By passing Carbonic Anhydride, CO_2, through a strong solution for about a week,—**Potassæ Bicarbonas**, $KHCO_3$.

Deposited in crystals. More crystals separate on evaporating the mother liquor,—rhombic prisms.

3.* By neutralizing with Acetic Acid,—**Potassæ Acetas**, $KC_2H_3O_2$.

Evaporated to dryness, fused and solidified in mass,—foliaceous satiny masses.

4.* By neutralizing with Citric Acid,—**Potassæ Citras**, $K_3C_6H_5O_7$.

Evaporated to dryness, and granulated by stirring during the process; then powdered.

5.* By mixing with slaked Lime, moistening with water, and passing Chlorine gas through the mixture,—Calcic Chloride, Calcic Carbonate, and **Potassæ Chloras**, $KClO_3$.

The Chloride and *Chlorate* are dissolved out by boiling water; the *latter* crystallizes out on cooling.
Purified by recrystallization,—rhomboidal plates.

6.* By treating with half its weight of Sulphur till effervescence (evolution of water and Carbonic Anhydride) ceases, and then fusing,—**Potassa Sulphurata**, a mixture of Potassic Sulphate and Sulphide, with some Sulphite, Sulphosulphate, and other Sulphur compounds.

Solidified in mass,—amorphous; grey.

7. By heating in a reverberatory furnace with Chrome Ironstone, $FeO.Cr_2O_3$, and a little chalk to keep the mass porous and prevent complete fusion,—*Potassic Chromate*, K_2CrO_4. On dissolving out, and supersaturating the solution with Nitric Acid,—**Potassæ Bichromas**, $K_2Cr_2O_7$.

Crystallizes out on evaporation.
Purified by recrystallization. Four-sided tables, orange red.

8. As described on page 110,—**Potassæ Prussias Flava.**

δ. From **Liquor Potassæ** are prepared,

1.* By the addition of Iodine,—a solution containing *Potassic Iodide*, KI, and *Iodate*, KIO_3. On evaporating to dryness and fusing the dried salts with charcoal,—Carbonic Oxide is given off, and **Potassii Iodidum**, KI, remains.

Dissolved out, filtered, and crystallized. Opaque cubes.

Potassæ Chloras.

$$K_2CO_3 + 6\,CaH_2O_2 + Cl_{12} = 2\,KClO_3 + 5\,CaCl_2 + CaCO_3 + 6\,H_2O.$$

Potassæ Bichromas.

$$2\,K_2CrO_4 + H_2SO_4 = K_2SO_4 + K_2Cr_2O_7 + H_2O.$$

2.* By a similar process, using Bromine for Iodine,—**Potassii Bromidum,** KBr.

Cubes.

From **Potassa Caustica** are prepared,

1.* By semifusing with Black Oxide of Manganese, MnO_2, and Potassic Chlorate (as an oxidizing agent),—*Potassic Manganate,* K_2MnO_4, and Chloride. On dissolving out and adding Sulphuric Acid to the solution,—**Potassæ Permanganas,** $K_2Mn_2O_8$, Potassic Sulphate, and Manganic Peroxide, which is precipitated.

The *Permanganate* crystallizes out on evaporation.
Purified by dissolving, filtering through asbestos, and recrystallizing. Dark red needles.

2. By boiling its solution with Olive Oil (p. 42), which consists chiefly of *Olein, i.e.,* Glyceric Oleate, $C_3H_5(C_{18}H_{33}O_2)_3$,—Glycerin, and **Sapo Mollis,** (*Soft Soap*), *i.e.,* impure Potassic Oleate.

Washed from glycerine and water by a strong solution of Caustic Potash.
Soft gelatinous mass. Yellow.

Argol, or Crude Tartar, the crust deposited on the interior of wine casks, consists of *Acid Potassic Tartrate* and Calcic Tartrate, with colouring and extractive matter.

€. From Argol is separated by lixiviation, and decolorized by filtration through charcoal and clay,—a solution of **Potassæ Tartras Acida** (Acid Potassic Tartrate, "*Cream of Tartar*,") $KHC_4H_4O_6$.

Crystallizes out on evaporation,—gritty powder, or cakes crystallized on the surface.

From a solution of **Potassæ Tartras Acida** in boiling water, is prepared, (*)by neutralizing with Potassic Carbonate,—one of **Potassæ Tartras,** $K_2C_4H_4O_6$.

Crystallizes out on evaporation,—four or six-sided prisms.

Properties.

*Solubility.**

	Parts by weight of water, at 60 deg. F.	Of water, at 212 deg. F.	Corresponding parts of Rect. Spirit.
P. Acetas is soluble in	less than one	.. ..	3
Potassa	½	.. ..	½
P. Citras	less than one	.. ..	—
P. Iodidum	,, ,, ,,	.. ..	16
P. Carbonas	,, ,, ,,	.. ..	—
P. Tartras	,, ,, ,,	.. ..	—

* The solubility of these, and of other metallic compounds, is given, for the most part, according to Squire, when his statements differ from those of other chemists.

Potassii Iodidum.

$6\,KHO + I_6 = 5\,KI + KIO_3 + 3\,H_2O.$
$KIO_3 + C_3 = KI + 3\,CO.$

Potassæ Permanganas.

$6\,KHO + 3\,MnO_2 + KClO_3 = 3\,K_2MnO_4 + KCl + 3\,H_2O.$
$3\,K_2MnO_4 + 2\,H_2SO_4 = 2\,K_2SO_4 + MnO_2 + K_2Mn_2O_8 + 2\,H_2O.$

	Parts of water, at 60 deg. F.	Of water at 212 deg. F.	Of Rectified Spirit.
P. Bromidum	2	..	90
P. Bicarbonas	3	..	—
P. Nitras	4	2½	—
P. Sulphas	10	4	—
P. Chloras	16	2	—
P. Permanganas	16	(Decomposes)	(Decomposes)
P. Tartras Acida.	200	18	—

Diffusion Power.

All have a high rate of diffusion power, except

P. Sulphas, P. Tartras, P. Tartras Acida.

The following are *deliquescent.*

Potassa, P. Acetas, P. Carbonas, P. Citras.

Potassa Caustica, and in a less degree P. Carbonas, *corrode* organic matters by reason of their affinity for water or its elements, and their power of dissolving nitrogenous substances.

P. Permanganas *corrodes* by parting with some of its oxygen, and decomposing into Manganate and Manganic Peroxide.*

P. Permanganas is also deoxidized by Sulphurous Acid, by solutions of Sulphides, and by acidulated solutions of Sulphites, Sulpho-sulphates (Hyposulphites), Nitrites, Arsenites, Ferrous and Mercurous Salts.

Potassæ Chloras parts with Oxygen readily at 752 deg. F.; leaving Potassic Chloride and Perchlorate.† It parts with Oxygen to Sulphur or Phosphorus on being rubbed forcibly with it.

Treated with Hydrochloric Acid it evolves Chlorine.‡

P. Sulphas is a very hard substance, and is used to aid in triturating other drugs finely.

The following are *fusible.*

Potassa, P. Nitras, P. Chloras, P. Acetas, P. Iodidum, P. Bromidum.

The following are also *volatilizable.*

Potassa, P. Iodidum, P. Bromidum.

By *heat,*

P. Bicarbonas is reduced to Carbonate.
P. Carbonas ,, Oxide (K_2O).
P. Nitras ,, Nitrite, then to Oxide and Peroxide (K_2O_2).
P. Chloras ,, Chloride and Perchlorate (see above), then to Chloride.
P. Permanganas ,, Manganate and Manganic Peroxide, giving off Oxygen.

P. Acetas, Citras, Tartras, and Tartras Acida, are reduced to Carbonate, blackened by products of incomplete combustion. In the case of the last named salt, the residue is known as "*black flux*".

P. Nitras and P. Chloras *deflagrate* on heating.

*** Potassæ Bichromas is introduced only as an agent in making Sodæ Valerianas.

Potassæ Prussias Flava, as the source of Hydrocyanic Acid.

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* $K_2Mn_2O_8 = K_2MnO_4 + MnO_2 + O_2$

† $2\,KClO_3 = K\,Cl + KClO_4 + O_2$. At a red heat,—$KClO_4$ gives $K\,Cl + 2\,O_2$.

‡ $KClO_3 + 6\,HCl = KCl + 3\,H_2O + Cl_6$.

Sapo Mollis.

$C_3H_5(C_{18}H_{33}O_2)_3 + 3\,KHO = 3\,K\,C_{18}H_{33}O_2 + C_3H_8O_3$ (Glycerin).

SODIUM COMPOUNDS. 18 *Officinal.*

COMMON SALT (**Sodii Chloridum**). .. ..*Crude Sodic Sulphate.*

Sodæ Sulphas

Sodæ Carbonas. —**Sodæ Arsenias. Exsiccata.**
S. Bicarbonas.—**S. Citro-Tartras Effervescens.**
Soda. .. .. ..{**Sapo Durus.** **Sapo Animalis.** **Sodæ Valerianas.**
Sodæ Acetas.
Soda Tartarata.
Sodæ Phosphas.
HYPOSULPHITE OF SODA.
Sodæ Hypophosphis.
Soda Chlorata.

SODA NITRE. —**Sodæ Nitras.**

Borax.

COMMON SALT **(Sodii Chloridum)**, NaCl, found in solution in sea-water and brine-springs, and in solid deposits as rock-salt; separated from other substances contained in the first two by simple evaporation, from those contained in the last by solution and evaporation.

Crystallizes out in minute cubes.

α. From COMMON SALT is prepared, by heating with sulphuric acid,—*Salt cake, i.e.*, crude Sodic Sulphate; Hydrochloric Acid gas (p. 96) being given off.

On dissolving *Salt cake* in water and evaporating,—pure **Sodæ Sulphas**, $Na_2SO_4.10H_2O$, crystallizes out.

Oblique rhombic prisms.

On heating *Salt cake* in a reverberatory furnace with chalk and carbon (coal dust),—(1) the sulphate is deoxidised to sulphide, and carbonic oxide is given off; (2) part of the chalk is reduced to quicklime; (3) the remainder undergoes mutual decomposition with the Sodic Sulphide, and *Ball Soda* is formed; *i.e.*, a mixture of *Sodic Carbonate*, Quicklime and Calcic Sulphide. On lixiviation, a solution of *Sodic Carbonate* is obtained, but impure, as some Caustic Soda, NaHO, is formed by decomposition of the Carbonate with the Lime. On evaporation,—**Sodæ Carbonas**, $Na_2CO_3.10H_2O$, separates.

Rhombic crystals.

β. From **Sodæ Carbonas** are prepared—

1.* By heating till the water of crystallization (63 p. c. by weight) is driven off,—**Sodæ Carbonas Exsiccata**, Na_2CO_3.

Powdered.

Sodæ Carbonas.

$Na_2SO_4 + C_4 = Na_2S + 4\,CO.$
$CaCO_3 + Na_2S = Na_2CO_3 + CaS.$

2.* By mixing with 1½ part of **Sodæ Carbonas Exsiccata**, and passing Carbonic Anhydride into the mixture,—**Sodæ Bicarbonas**, $NaHCO_3$.

Washed from carbonate by half its weight of distilled water, drained and dried.
Powder, or small scales.

3.* By a similar process to that of making Liquor Potassæ and Potassa Caustica,—**Liquor Sodæ** and **Soda Caustica.**

4. By a similar process to that of making Potassæ Acetas,—a solution of *Sodic Acetate*, $NaC_2H_3O_2$. On evaporation,—**Sodæ Acetas**, $NaC_2H_3O_2 . 3H_2O$, crystallizes out.

Oblique rhombic prisms.

5.* By neutralizing with a solution of Potassæ Tartras Acida,—a *double Tartrate*, of Potassium and Sodium. On evaporation, **Soda Tartarata**, $NaK\,C_4H_4O_6 . 4H_2O$, crystallizes out.

Right rhombic prisms.

6.* By neutralizing with a solution of Acid Calcic Phosphate, prepared as in the making of Phosphorus (p. 93), a solution of *Hydric Disodic Phosphate*, Na_2HPO_4. On evaporation,—**Sodæ Phosphas**, $Na_2HPO_4 . 12H_2O$, crystallizes out.

Rhombic prisms.

7. By passing Sulphurous Anhydride, SO_2, into its solution, a solution of *Sodic Sulphite*, Na_2SO_3; Carbonic Anhydride being evolved. On digesting the Sodic Sulphite with Sulphur,—*Sodic Sulpho-sulphate* ("Hyposulphite"), $Na_2S_2O_3$, is formed. On evaporation, Hyposulphite of Soda, $Na_2S_2O_3 . 5H_2O$, crystallizes out.

Striated rhombic prisms.

8. By adding it to a solution of Calcic Hypophosphite,—a solution of **Sodæ Hypophosphis**, $NaPH_2O_2$; and a precipitate of Calcic Carbonate.

The solution filtered, and evaporated to dryness. Granules.

9.* By passing Chlorine into solution of a stated strength,—**Liquor Sodæ Chloratæ**, containing Sodic Chloride, *Sodic Hypochlorite* (NaClO), and Bicarbonate.

Colourless. Odour of chlorine.

γ. From **Sodæ Carbonas Exsiccata** is prepared, (*)by fusing with Arsenious Acid, As_2O_3, and Sodic Nitrate,—*Sodic Pyro-arseniate*, $Na_4As_2O_7$., Carbonic and Nitrous Anhydrides being driven off. On

---

Sodæ Bicarbonas.

$$Na_2CO_3 + H_2O + CO_2 = 2\,NaHCO_3.$$

Soda Tartarata.

$$Na_2CO_3 + 2\,KHC_4H_4O_6 = 2\,KNC_4H_4O_6 + CO_2 + H_2O.$$

Liquor Sodæ Chloratæ.

$$2\,Na_2CO_3 + Cl_2 = NaCl + NaClO + 2\,NaHCO_3.$$

cooling partially, and dissolving in boiling water,—*Hydric Disodic Arseniate*, Na_2HAsO_4, is formed. On filtering and cooling,—**Sodæ Arsenias,** $Na_2HAsO_4.7H_2O$. crystallizes out.

Prisms.

δ. From **Sodæ Bicarbonas** is prepared, (*) by heating 17 parts with 8 of powdered Acidum Tartaricum and 6 of powdered Acidum Citricum, at a temperature of 200 deg. F., until the particles begin to aggregate, then stirring till granules are formed, and finally sifting,—**Sodæ Citro-Tartras Effervescens,** an intimate mixture of the drugs named.

Effervesces when placed in water, forming Sodic Citrate and Tartrate, and Carbonic Anhydride.

ε. From **Soda** are prepared—

1. By a similar process to that of making Sapo Mollis (*Potassic Oleate*),—**Sapo Durus** (Castile Soap), chiefly *Sodic Oleate.*

   Washed from glycerine by a solution of Sodic Chloride.
   Solid mass, greyish white.

2. By a similar process, employing purified tallow, which contains 60 p. c. of Glyceric Stearate,—**Sapo Animalis** (Curd Soap), chiefly *Sodic Stearate*, $NaC_{18}H_{35}O_2$.

   White.

3.* On distilling from a mixture of Amylic Alcohol, $C_5H_{12}O$, (p. 101) with Potassic Bichromate and diluted Sulphuric Acid,—*Valeric Acid*, $C_5H_{10}O_2$, *Amyl Valerate*, $C_5H_{11}.C_5H_9O_2$, and water, pass over. On saturating the distillate with **Liquor Sodæ,** the alkali combines with the Valeric Acid and also decomposes the ethereal salt, forming **Sodæ Valerianas,** $NaC_5H_9O_2$, Amylic Alcohol, and water.

   Cleared from the Amylic Alcohol, which floats on the surface, evaporated to dryness, fused, and cooled.
   Amorphous masses. Odour of Valerian.

Soda-Nitre, a crude Sodic Nitrate, found native in Peru. Purified by solution and crystallization, twice repeated, it forms **Sodæ Nitras,** $NaNO_3$.

Rhombohedra.

Borax (*Sodic Biborate*), $Na_2B_4O_7.10H_2O.$, found native in Thibet and Persia.

Purified by solution and crystallization.
Six sided prisms.

Sodæ Arsenias.

$$As_2O_3 + Na_2CO_3 + 2\,NaNO_3 = Na_4As_2O_7 + CO_2 + N_2O_3.$$
$$Na_4As_2O_7 + H_2O = 2\,Na_2HAsO_4.$$

Sodæ Valerianas.

$$\left\{\begin{array}{l} K_2Cr_2O_7 + 8\,H_2SO_4 = 2\,K_2SO_4.Cr_2(SO_4)_3 + 8\,H_2O + 3\,O_2. \\ C_5H_{12}O + O_2 = C_5H_{10}O_2 + H_2O. \end{array}\right.$$

$$C_5H_{12}O + C_5H_{10}O_2 = C_5H_{11}.C_5H_9O_2 + H_2O.$$

$$\left\{\begin{array}{l} C_5H_{10}O_2 + NaHO = NaC_5H_9O_2 + H_2O. \\ C_5H_{11}.C_5H_9O_2 + NaHO = NaC_5H_9O_2 + C_5H_{12}O. \end{array}\right.$$

Properties.

Solubility.

		Parts of water at 60° F.		Parts of water at 212° F.
Soda Caustica, soluble in	. .	1	..	..
S. Carbonas	,, . .	2	..	..
S. Tartarata	,, . .	2	..	1
S. Arsenias	,, . .	2	..	..
Hyposulphite	,, . .	2	..	..
S. Hypophosphis	,, . .	2	..	..
S. Chloridum	,, . .	$2\frac{3}{4}$	..	..
S. Sulphas	,, . .	3	..	4
S. Phosphas	,, . .	5	..	2
S. Valerianas	,, . .	5	..	..
S. Bicarbonas	,, . .	10	..	..
Borax	,, . .	12	..	2

The following are soluble in Rectified Spirit—

Soda Caustica, S. Valerianas, S. Hypophosphis, Hyposulphite.
Sapo Durus. Sapo Animalis.

Borax is soluble in 1 part of Glycerine.
S. Hypophosphis is soluble in 2 parts of Glycerine.

Two only are *deliquescent.*

Soda Caustica. Sodæ Nitras.

Six are *efflorescent.*

S. Sulphas, S. Carbonas, S. Bicarbonas, S. Phosphas, Borax, S. Tartarata (slightly).

Solutions of S. Phosphas, S. Arsenias, and Borax have an *alkaline reaction.*

Effects of *heat.*

The following lose their water of crystallization—

Borax, S. Carbonas, S. Acetas, S. Phosphas, S. Tartarata, S. Sulphas. S. Arsenias, Hyposulphite of Soda.
The first five undergo "*aqueous fusion*" in so doing, *i.e.*, the salt dissolves in the separated water.
Dehydrated Borax is light and porous, and is known as "*Calcined Borax*".

The following are *fusible*—

Borax, Soda Caustica, S. Acetas, S. Valerianas, S. Chloridum.
The Soaps are softened.

Strongly heated—

S. Nitras deflagrates.
S. Bicarbonas is reduced to (anhydrous) Carbonate*.
S. Acetas, S. Tartarata, S. Valerianas, and the Soaps are reduced to Carbonate, blackened by products of imperfect combustion.
S. Phosphas is reduced to Sodic Pyrophosphate, $Na_4P_2O_7$.
S. Arsenias ,, ,, ,, Pyro-arseniate, $Na_4As_2O_7$.
The Sodic Hypochlorite contained in Liq. Sodæ Chloratæ is decomposed into Chloride and Chlorate†.

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* A solution of S. Bicarbonas loses Carbonic Acid on boiling.
† $3\,NaClO = 2\,Na\,Cl + Na\,ClO_3$.

8 parts of S. Sulphas with 5 of Acidum Hydrochloricum form a freezing mixture.

The properties of Liq. Sodæ Chloratæ are due to the Sodic Hypochlorite, NaClO, which it contains.

In contact with organic matter, the Hypochlorite parts with its oxygen, and becomes a Chloride.

Exposed to air which contains Carbonic Anhydride, Sodic Carbonate is slowly formed and Hypochlorous Acid liberated, which immediately decomposes, giving off free Chlorine.

In presence of a stronger acid, these changes take place rapidly.

S. Caustica, S. Carbonas, and their solutions, act on organic matters in the same way as the corresponding Potassium Compounds.

*** Sodæ Nitras is used only in making Sodæ Arsenias.
Sodæ Acetas ,, ,, ,, Ferri Arsenias and Ferri Phosphas

AMMONIUM COMPOUNDS. 9 *Officinal.*

AMMONIACAL LIQUOR.— **Ammonii Chloridum.** *or Ammonic Sulphate.* { **Ammoniæ Carbonas.** — **Ammoniæ Acetas.** ; **Ammonia.** .. .. { **Ammoniæ Citras.** **Ammoniæ Phosphas.** **Ammoniæ Nitras.** **Ammonii Bromidum.** **Ammoniæ Benzoas.**

AMMONIACAL LIQUOR, a waste product of the manufacture of gas, contains Ammonia in combination with Carbonic and Hydrosulphuric acids.

α. From AMMONIACAL LIQUOR is obtained, by neutralizing with Hydrochloric Acid,—a solution of **Ammonii Chloridum** (*Sal Ammoniac*), NH_4Cl, contaminated with tarry products ; Carbonic Anhydride and Sulphuretted Hydrogen being given off.

Crystallizes out on evaporation.
Purified by sublimation,—tough fibrous masses.

(By a similar process, using Sulphuric Acid,—*Ammonic Sulphate*, $(NH_4)_2SO_4$).

β. From **Ammonii Chloridum**, or *Ammonic Sulphate*, are obtained.

1. On subliming from a mixture of either salt with chalk (Calcic Carbonate),—*Ammonic Carbonate* $(NH_4)_2CO_3$; which is immediately decomposed by the heat necessary for sublimation, forming **Ammoniæ Carbonas**, a mixture of Acid Ammonic Carbonate with Ammonic Carbamate, $2NH_4HCO_3.(NH_3)_2CO_2$; and gaseous Ammonia.

   Condenses in tough masses.

2*. On heating in a retort with slaked Lime,—gaseous *Ammonia*, NH_3, which, carried over and dissolved in water to the point of saturation, forms **Liquor Ammoniæ Fortior.**
Liq. Ammoniæ Fortior,(*) diluted with twice its bulk of water, forms **Liquor Ammoniæ.**

   Colourless liquids, evolving gaseous Ammonia abundantly.

γ. Solutions of *Ammonic Acetate, Citrate, Phosphate, Nitrate, Bromide,** and *Benzoate* are prepared by neutralizing

1. *Acetic Acid .. ... with Ammoniæ Carbonas.
2. *A solution of Citric Acid, 65 gr. to the oz. ... „ Liq. Ammoniæ Fortior.
3. *Ac. Phosphoricum Dil. ... „ „ „ „
4. Ac. Nitricum Dil. ... ... „ Liquor Ammoniæ.
5. Hydrobromic Acid ... „ „ „
6. *Benzoic Acid ... ... „ „ „ (diluted).

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* Solution of the Bromide is also prepared by adding Ammoniæ Carbonas to a solution of Ferrous Bromide, and filtering from the precipitate of Ferrous Carbonate. The solution of Ferrous Bromide is made by digesting Iron and Bromine in water.

The first solution, diluted to a stated degree, forms
Liq. Ammoniæ Acetatis* ($NH_4.C_2H_3O_2$).
The second forms
Liquor Ammoniæ Citratis ($(NH_4)_3.C_6H_5O_7$.)

Colourless liquids.

The fourth, evaporated to dryness, and the residue fused, yields *anhydrous*
Ammoniæ Nitras, NH_4NO_3.

Confused crystalline masses.

From the third, fifth, and sixth, on evaporation, with a slight excess of Ammonia added from time to time—
Ammoniæ Phosphas $(NH_4)_2HPO_4$,—

Prisms.

Ammonii Bromidum NH_4Br,—

Small crystals.

and **Ammoniæ Benzoas** $NH_4.C_7H_5O_2$,—

Laminæ.

—crystallize out.

Properties.

Solubility.

		Parts of Cold Water.		Parts of Rect. Spirit.
Amm. Bromidum, soluble in		1½	..	13
Amm. Phosphas	,,	2	..	—
Amm. Chloridum	,,	4	..	55
Amm. Carbonas	,,	4	..	200
Amm. Benzoas	,,	5	..	18

Amm. Chloridum, Bromidum, Carbonas, Benzoas, *sublime* unchanged. Amm. Phosphas is decomposed by heat.

Amm. Carbonas is decomposed by boiling water or alcohol.

Exposed to the air it loses its carbamate, leaving an opaque residue of *Bicarbonate* ("mild carbonate of Ammonia") NH_4HCO_3.

The evolved Carbamate decomposes into Ammonia and Carbonic Anhydride.

Ammonia in solution exercises an action on organic matters similar to that of Potassa and Soda.

*** Ammoniæ Nitras is used only as a source of Nitrous Oxide. For this reason it is required in the anhydrous form.

*** Ammoniæ Phosphas is a solvent for Urates of Soda and Lime.

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* Contains a little Carbonic Acid in solution.

IRON COMPOUNDS. 18 *Officinal.*

Ferrum.
- **Ferri Iodidum.**
- **Ferri Sulphas.**
  - **F. Sulphas Exsiccata.**
  - **F. Carbonas**
  - **F. Phosphas.**
  - **F. Arsenias.**
  - **F. Persulphas.***
- **F. Pernitras.***
- **F. Perchloridum.***
- **Vinum Ferri.***

F. Acetas.*

IRON ALUM.*

F. Peroxidum.*
- **Ferrum Tartaratum.***
- **F. et Ammoniæ Citras.***
- **F. et Quiniæ Citras.***
- **Ferrum Redactum.**

Ferri Sulphas. + **Ferri Persulphas.** } **Ferri Oxidum Magneticum.**

* Ferric Salts; the rest being Ferrous Salts.

Ferrum. Wrought IRON in the form of wire or nails, *i.e.*, the purest form obtainable.

α. From **Ferrum** are prepared—

1.* By direct union with Iodine in presence of boiling water, a solution of **Ferri Iodidum,** FeI_2.

Filtered, evaporated, the salt fused and solidified in mass.—Crystalline, brownish green.

Or,(*) filtered into syrup to form **Syrupus Ferri Iodidi.**
Or,(*) poured on to liquorice powder and sugar to form **Pilula Ferri Iodidi.** In this last case, union of the iron and iodine is procured by agitating them in a phial with cold water, without the aid of heat.

2.* By dissolving in diluted Sulphuric Acid, boiling towards the end of the process,—a solution of *Ferrous Sulphate,* $FeSO_4$.

α.* On standing, **Ferri Sulphas,** $FeSO_4.7H_2O$, crystallizes out.

Oblique rhombic prisms, bluish green.

β.* On pouring into Rectified Spirit, **Ferri Sulphas Granulata** is precipitated.

Minute crystals, pale bluish green.

3.* By dissolving in diluted Nitric Acid, and reducing the solution to a stated strength,—**Liquor Ferri Pernitratis**($Fe_2(NO_3)_6$).

Reddish brown.

Ferri Pernitras.

$Fe_2 + 8\,HNO_3 = Fe_2(NO_3)_6 + 2NO + 2H_2O$.

4.* By dissolving in diluted Hydrochloric Acid with the aid of heat,—a solution of *Ferrous Chloride*, $FeCl_2$. On further heating with Nitric Acid and additional Hydrochloric,—a solution of *Ferric Chloride*, Fe_2Cl_6, Nitric Oxide being given off.

α. On evaporation to a stated strength,—**Liquor Ferri Perchloridi Fortior.**

β. On diluting Liq. Ferr. Perchl. Fortior, with three times its bulk of distilled water, it forms **Liquor Ferri Perchloridi.**

γ. On diluting similarly with Rectified Spirit,—**Tinctura Ferri Perchloridi.**

All orange brown liquids.

5.* By macerating in Sherry for thirty days, the Iron being not wholly immersed, and the vessel frequently opened and shaken,—**Vinum Ferri,** containing a little *Ferric Tartrate, Malate,* etc.

Filtered. Brown.

β. From Ferri Sulphas are prepared—

1.* By heating until all the separable water of crystallization is driven off,—**Ferri Sulphas Exsiccata,** $FeSO_4.H_2O$.

Powdered. Whitey brown.

2.* By mixing its solution with one of Ammoniæ Carbonas,—a precipitate of *Ferrous Carbonate,* $FeCO_3$, with some *Ferric Oxide.* Collected, mixed with sugar, and dried,—**Ferri Carbonas Saccharata,** containing 37 p. c. of the carbonate.

Small lumps, brownish grey.

3.* By mixing its solution with one of Sodæ Phosphas and Sodæ Acetas,—a precipitate of **Ferri Phosphas,** $Fe_3(PO_4)_2$, some Acetic Acid being set free.

Collected, washed, dried at 120 deg. F.
Amorphous powder, slate blue.

4.* By a similar process, using Sodæ Arsenias instead of Phosphas,—**Ferri Arsenias,** $Fe_3(AsO_4)_2$.

Dried at 100 deg. F. Amorphous powder, pale green.

Ferri Perchloridi.

$Fe + 2\,HCl = FeCl_2 + H_2$.
$6\,FeCl_2 + 6\,HCl + 2\,HNO_3 = 3\,Fe_2Cl_6 + 2NO + 4\,H_2O$.

Ferri Phosphas.

$3\,FeSO_4 + 2\,Na_2HPO_4 + 2\,NaC_2H_3O_2 = Fe_3(PO_4)_2 + 3\,Na_2SO_4 + 2\,HC_2H_3O_2$.

Sodæ Phosphas being an acid salt, and Ferri Phosphas a neutral one, some free acid is produced by the decomposition. The presence of the Sodic Acetate provides that the free acid should be Acetic, and not Sulphuric, in which Ferrous Phosphate is more soluble.

Ferri Arsenias.

$3\,FeSO_4 + 2\,Na_2HSO_4 + 2\,NaC_2H_3O_2 = Fe_3(AsO_4)_2 + 3\,Na_2SO_4 + 2\,HC_2H_3O_2$.

The same applies here.

5.* By mixing its solution with $\frac{1}{11}$ part by weight of Sulphuric, and the same of Nitric, Acid,—a solution of *Ferric Sulphate*, $Fe_2(SO_4)_3$, blackened by Nitric Oxide. On concentration, the Nitric Oxide is suddenly disengaged, and the liquid turns from black to red. Reduced to a stated strength, it forms **Liquor Ferri Persulphatis.**

Brownish red.

γ. From **Liquor Ferri Persulphatis** are prepared—

1.* By mixing with a solution of Potassic Acetate in Rectified Spirit, and shaking together,—a solution of *Ferric Acetate*, $Fe_2(C_2H_3O_2)_6$, Potassic Sulphate being precipitated. Filtered, and reduced to a stated strength, it forms **Tinctura Ferri Acetatis.**

Rose-red.

2.* By mixing with a solution of Potassic Sulphate,—a liquor from which, on evaporation, Iron Alum ("Ferri Aluminas"), *Ferric Potassic Sulphate*, $K_2SO_4.Fe_2(SO_4)_3.24H_2O$, crystallizes out.

Octahedra, pale violet.

3.* By pouring it *into* Liquor Sodæ, a precipitate of *Hydrated Ferric Oxide*, $Fe_2O_3.3H_2O$. Collected, washed, and drained, it forms **Ferri Peroxidum Humidum,** about 46 p. c. of which is water mechanically engaged.

Brownish red.

*Dried at 212 deg. F., and powdered,—**Ferri Peroxidum Hydratum**, $Fe_2O_3.H_2O$.

Dark brown.

δ. From moist Ferric Oxide, precipitated, when required, by Liquor Ammoniæ instead of Liquor Sodæ, are prepared—

1.* By mixing with Potassic Acid Tartrate, standing for twenty-four hours, and heating to 140 deg. F.,—**Ferrum Tartaratum** (*Ferric Potassic Tartrate*), $K_3Fe(C_4H_4O_6)_3$.

Dissolved out, filtered, evaporated at 140 deg. F. to a syrupy consistence, spread on glass and dried at 100 deg.
Thin transparent scales, garnet colour.

2.* By dissolving in a solution of Citric Acid in excess, and neutralizing by Liquor Ammoniæ,—a solution of **Ferri et Ammoniæ Citras.**

Evaporated and dried as above. Similar aspect.

3.* By dissolving in a solution of Citric Acid in excess, then adding Quinia (precipitated from Quiniæ Disulphas by Ammonia), which also dissolves in the acid, and neutralizing by Liquor Ammoniæ,—a solution of **Ferri et Quiniæ Citras.**

Similarly treated. Similar scales, greenish yellow.

Ferri Persulphas.

$6\,FeSO_4+3\,H_2SO_4+2\,HNO_3=3Fe_2(SO_4)_3+2NO+4\,H_2O.$

ϵ. From **Ferri Peroxidum Hydratum** is prepared, (*)by heating to strong redness in a gun barrel, and passing over it dried Hydrogen gas,—**Ferrum Redactum,** *i.e.*, reduced metallic Iron, with a variable amount of Magnetic Oxide.

Dark grey powder, strongly magnetic.

ζ. A precipitate of **Ferri Oxidum Magneticum,** $Fe_3O_4.4H_2O$, is obtained by (*)adding Liquor Sodæ to a mixture of Liq. Ferri Persulphatis with a solution of Ferrous Sulphate.

Washed, dried at 120 deg. F. Brownish black powder, strongly magnetic.

PROPERTIES.

F. et Amm. Citras is *soluble* in	½	part by weight of water.				
,, Quiniæ	,,	,,	½	,,	,,	,,
F. Iodidum	,,	,,	1	,,	,,	,,
Iron Alum	,,	,,	1	,,	,,	,,
F. Sulphas	,,	,,	1½	,,	,,	,,
F. Tartaratum	,,	,,	4	,,	,,	,,

F. Tartaratum is sparingly soluble in Rectified Spirit; the other salts above named are practically insoluble in Rectified Spirit. Ferri Sulphas is insoluble, even in Proof Spirit. (See "F. Sulphas Granulata".)

Ferri Phosphas is soluble in Acids; Ferri Arsenias in Hydrochloric Acid.

Reduced Iron, the Oxides, and the Carbonate are insoluble.

Liq. Ferri Persulphatis, L. F. Pernitratis, L. F. Perchloridi Fortior, are miscible in all proportions with Rectified Spirit.

Tinct. F. Acetatis in all proportions with water.

Exposed to air—

F. Sulphas becomes coated with a yellow insoluble oxysulphate.

F. Iodidum deliquesces.

In solution it slowly decomposes into Iodine and Ferric Oxide; depositing a rusty sediment and colouring the solution brown. A coil of iron wire extending throughout the vessel prevents this coloration, fresh iodide being continually formed.

Tinct. F. Acetatis deposits a gelatinous basic acetate.

By heat—

Ferri Sulphas is dehydrated.

Ferri Iodidum is decomposed, giving off Iodine and leaving Ferric Oxide.

*** Liquor Ferri Persulphatis is introduced only to prepare the Acetate and Peroxide.

Ferrum Redactum.

$$Fe_2O_3.H_2O + 3H_2 = Fe_2 + 4\,H_2O.$$

Ferri Oxidum Magneticum.

$$FeSO_4 + Fe_2(SO_4)_3 + 8\,NaHO = Fe_3O_4.4\,H_2O + 4\,Na_2SO_4.$$

MERCURIAL COMPOUNDS. 11 *Officinal.*

Hydrargyrum.
- **Hydrargyri Iodidum Viride.** *
- **Hydrargyri Nitras.**
- **Hydrargyri Oxidum Rubrum.**
- **Hydrargyri Sulphas.**
- **Hydrargyri Subchloridum.*** — *Mercurous Oxide.*
- **Hydrargyri Perchloridum.**
  - **Hydrargyri Oxidum Flavum.**
  - **Hydrargyri Iodidum Rubrum.**
  - **Hydrargyrum Ammoniatum.**

* *Mercurous* Salts, the rest being *Mercuric.*

Hydrargyrum,—Metallic Mercury, found native; or extracted from Cinnabar, a native Mercuric Sulphide, by simple roasting, or by distilling with Caustic Lime, which gives Mercury, Calcic Sulphide, and Calcic Sulphate.

Purified, if necessary, by redistillation.

a. From **Hydrargyrum** are prepared,

1.* By trituration with Iodine (moistening with a few drops of spirit to keep the mass cool), — **Hydrargyri Iodidum Viride** (*Mercurous Iodide*), Hg_2I_2.

Dried in the dark. Greenish yellow powder.

2.* By dissolving in excess of diluted Nitric Acid, in stated proportions,—a solution containing *Mercuric Nitrate*, $Hg(NO_3)_2$, and Nitric Acid; Nitric Oxide being given off. On boiling to expel Nitric Oxide, it forms **Liquor Hydrargyri Nitratis Acidus.**

Colourless.

3.* By triturating with dry Mercuric Nitrate (prepared by dissolving Mercury as above and evaporating to dryness), and subsequently heating,—**Hydrargyri Oxidum Rubrum** (crystalline *Mercuric Oxide*), HgO; Nitric Peroxide being evolved.

Crystalline powder, orange red.

Hydrargyri Nitras.

$$3\,Hg. + 8\,HNO_3 = 3\,Hg(NO_3)_2 + 2NO + 4H_2O.$$

Hydrarg. Oxidum Rubrum.

$$Hg(NO_3)_2 + Hg = 2\,HgO + 2\,NO_2.$$

4.* By dissolving in Sulphuric Acid, with the aid of heat,—**Hydrargyri Sulphas,** $HgSO_4$.

Evaporated to dryness. Crystalline powder, nearly white. Turns yellow on adding water.

β. From **Hydrargyri Sulphas** are prepared,

1.* By mixing with Chloride of Sodium and metallic Mercury, and subliming into a large chamber,—**Hydrargyri Subchloridum** (*Mercurous Chloride,* or *Calomel*), Hg_2Cl_2.

Washed from Mercuric Chloride (a little may be formed in the process), and dried at 212 deg. F.
Heavy powder, dull white.

2.* By mixing with Chloride of Sodium and Black Oxide of Manganese,* and subliming,—**Hydrargyri Perchloridum** (*Mercuric Chloride, or Corrosive Sublimate*), $HgCl_2$.

Masses of prismatic crystals.

γ. From **Hydrargyri Subchloridum** is prepared, (*)by adding 60 gr. to a pint of Liquor Calcis,—**Lotio Hydrargyri Nigra** (*Black Wash*), *i.e.*, *Mercurous Oxide,* Hg_2O, suspended in a weak solution of Calcic Chloride.

δ. From **Hydrargyri Perchloridum** are prepared,

1.* By adding 36 gr. to a pint of Liquor Calcis,—**Lotio Hydrargyri Flava** (*Yellow Wash*), a similar suspension of *Mercuric Oxide.*

2.* By pouring its solution into Liquor Sodæ,—a precipitate of **Hydrargyri Oxidum Flavum** (*Mercuric Oxide* in fine powder), HgO.

Separated, washed, dried at 212 deg. F. Fine yellow powder.

3.* By adding its solution to one of Iodide of Potassium,—a precipitate of **Hydrargyri Iodidum Rubrum** (*Mercuric Iodide*), HgI_2.

Washed and dried, as above. Fine powder, brilliant red.

4.* By mixing its solution with Liquor Ammoniæ,—a precipitate of **Hydrargyrum Ammoniatum** (*Mercur-Ammonic Chloride,* or *White Precipitate*), NH_2HgCl; Ammonic Chloride remaining in solution.

Washed and dried as above. White powder.

---

* The Black Oxide sets free a little chlorine, which prevents the accidental formation of Calomel.

Hydrarg. Subchloridum.

$HgSO_4 + Hg + 2\ NaCl = Hg_2Cl_2 + Na_2SO_4$.

Hydrarg. Perchloridum.

$HgSO_4 + 2\ NaCl = HgCl_2 + Na_2SO_4$.

Hydrarg. Ammoniatum.

$HgCl_2 + 2\ NH_4HO = NH_2HgCl + NH_4Cl + 2\ H_2O$.

Properties.

Hydrarg.-Perchloridum (Corrosive Sublimate) is *soluble* in 20 parts of water or 7 parts of Rectified Spirit. Also in ether.
Hydrarg. Iodidum Rubrum is soluble in ether, and slightly in Rectified Spirit. It is soluble in solutions of Corrosive Sublimate, of Iodide of Potassium, or of Chloride of Sodium.

The Oxides, the Green Iodide, the Subchloride (calomel) and White Precipitate, are insoluble in water, alcohol, or ether.
The Sulphate, in presence of water, forms a yellow basic sulphate.

Exposed to *light*,
The Green Iodide blackens.
When *heated* gently,
The Red Iodide turns yellow ;
The Green Iodide is decomposed into metallic Mercury and yellow Mercuric Iodide, which becomes red on cooling.

Metallic Mercury and its compounds are volatilized at a heat below redness. The Oxides and the Green Iodide are decomposed at the same time.
Metallic Mercury volatilizes slowly at ordinary temperatures. It boils at 662° F., and freezes at —39.
Sp. gr. of Metallic Mercury, 13.5.

Solutions of Corrosive Sublimate coagulate albumen, harden and contract animal tissues, and preserve them from putrefaction.

*** Hydrarg. Sulphas is introduced only to prepare the Chlorides.

CALCIUM COMPOUNDS. 11 *Officinal.*

BONE ASH (**Os Ustum**). .. **Calcis Phosphas.**

CHALK (**Creta**). .. .. { **Creta Præparata.** / **Calcii Chloridum.**—**Calcis Carbonas Præcipitata.**

LIMESTONE. .. .. **Calx.**—**Calcis Hydras.** { **Calcis Hypophosphis.** / **Calx Chlorata.**

MARBLE (**Marmor Album**).

BONE ASH (*Os Ustum*), the residue left after burning bones in air, or igniting used animal charcoal, consists of *Tricalcic Phosphate* (**Calcis Phosphas**), $Ca_3(PO_4)_2$, with about 10 per cent. of Calcic Carbonate, both insoluble salts.

α. * On digesting BONE ASH in dilute Hydrochloric Acid, a solution of Calcic Chloride and (soluble) *Calcic Superphosphate*, $CaH_4(PO_4)_2$, is obtained, Carbonic Anhydride being given off. On diluting, and adding Liquor Ammoniæ,—**Calcis Phosphas**, $Ca_3(PO_4)_2$, is precipitated; and Ammonic Chloride with some Calcic Chloride remains in the solution.

Collected, washed, dried at 212 deg. F. Amorphous powder.

β. From CHALK (**Creta**), native friable Calcic Carbonate, contaminated with Ferrous Carbonate, are prepared,

1. By washing out from impurities (Elutriation), and drying,—**Creta Præparata** (Prepared Chalk).

   Amorphous powder, aggregated into cones.

2. By adding it to Hydrochloric Acid, to neutrality,—a solution of **Calcii Chloridum**, $CaCl_2$, contaminated with Ferrous Chloride. On adding a little Chlorinated Lime (Calx Chlorata, see below) and slaked Lime, the Ferrous is converted into a Ferric Salt and precipitated as Ferric Oxide, leaving the solution pure.

   Filtered. Evaporated to solidity, the residue dried at 400 deg. F. Agglutinated masses.

γ. From **Calcii Chloridum** is obtained, (*)on mixing its solution with one of Sodic Carbonate, a precipitate of *Calcic Carbonate*, $CaCO_3$, which, when washed, and dried at 212 deg. F., forms **Calcis Carbonas Præcipitata.**

Crystalline powder.

δ. From LIMESTONE, a native concrete Calcic Carbonate, is prepared, by ignition in a kiln,—**Calx** (Caustic Lime), CaO; Carbonic Anhydride being driven off.

Compact masses.

Calcis Phosphas.

$CaCO_3 + 2\,HCl = CaCl_2 + CO_2 + H_2O.$
$Ca_3(PO_4)_2 + 4\,HCl = 2\,CaCl_2 + CaH_4(PO_4)_2.$
$CaH_4(PO_4)_2 + 2\,CaCl + 2\,(NH_4)_2O = Ca_3(PO_4)_2 + 4\,NH_4Cl + 2\,H_2O.$

From **Calx**, (*)by addition of water ($\frac{1}{2}$ pint to the lb.),—**Calcis Hydras** (Slaked Lime), CaH_2O_2, with evolution of heat.

Sifted. Amorphous powder.

ϵ. From **Calcis Hydras**,

1.* By heating with water and Phosphorus, a solution of **Calcis Hypophosphis**, $Ca(H_2PO_2)_2$; Phosphuretted Hydrogen being evolved.

Filtered. On passing Carbonic Anhydride, uncombined Lime separates as Carbonate.
Crystallizes out on evaporation. Pearly crystals.

2. By exposure to Chlorine Gas as long as it is absorbed,—**Calx Chlorata** (Bleaching Powder), a mixture of *Calcic Chloride* and *Hypochlorite*, $Ca(ClO)_2$, with some unchanged lime.

Dull white powder.

, Os Ustum, and Creta, are introduced merely as materials for preparing other drugs. Marmor Album (Marble) is introduced for the purpose of evolving Carbonic Anhydride.

Properties.

Calcii Chloridum is soluble in 2 parts of water, also in Rectified Spirit.
Calcis Hypophosphis in 8 parts of water; not in Rectified Spirit.
Calcis Hydras in about 900 parts of water: much more freely in syrup; not in Rectified Spirit.

The Carbonate and Phosphate are insoluble; the latter, with acids, yields a soluble Superphosphate (see above).

Exposed to air, Calx absorbs water, forming the Hydrate; Calx and Calcis Hydras and their solutions, absorb Carbonic Anhydride, forming the Carbonate.

Calcii Chloridum is fusible.
Calcis Hypophosphis is decomposed at a red heat.
The properties of Calx Chlorata are similar to those of Soda Chlorata, (see p. 119).

Calcis Hypophosphis.

$$3\,CaH_2O_2 + 8\,P + 6\,H_2O = 3\,Ca(H_2PO_2)_2 + 2\,PH_3.$$

Calx Chlorata.

$$2\,CaH_2O_2 + 2\,Cl_2 = CaCl_2 + Ca(ClO)_2 + 2\,H_2O.$$

ZINC COMPOUNDS. 8 *Officinal.*

Zincum.—Z. Granulatum. . { **Zinci Chloridum.** / **Zinci Sulphas.** { **Z. Valerianas.** / **Z. Carbonas.** { **Z. Oxidum.** / **Z. Acetas.**

α. **Zincum** (commercial zinc) fused and poured into cold water, forms **Zincum Granulatum**, Zinc still contaminated with Iron and Tin.

β. From **Zincum Granulatum** are prepared,

1.* By dissolving in diluted Hydrochloric Acid, with the aid of heat,—a solution of *Zincic Chloride*, $Zn\,Cl_2$, with a little Ferrous and Stannous Chlorides. On adding Chlorine Water, the impurities become Ferric and Stannic Chlorides. On stirring in a little insoluble Zincic Carbonate, they are precipitated as Ferric and Stannic Oxides, and a solution of *Zincic Chloride*, contaminated only by Chlorine, remains.
Filtered. On concentration to a stated strength (the Chlorine driven off),—**Liquor Zinci Chloridi.** Evaporated till only a fused salt remains,—**Zinci Chloridum**, $ZnCl_2$.
Solidified in moulds. Sticks.

2.* By similar processes, using Sulphuric Acid,—a pure solution of *Zincic Sulphate* $Zn\,SO_4$. On evaporation, **Zinci Sulphas**, $ZnSO_4.7H_2O$ crystallises out.
Small slender prisms.

γ. From boiling solutions of **Zinci Sulphas** are prepared,

1.* By mixing with a boiling solution of Sodæ Valerianas,—a solution of **Zinci Valerianas**, $Zn\,(C_5H_9O_2)_2$.
Crystals separate on cooling: more on evaporation at 200 deg. F.
Pearly tables, odour of valerian.

2.* By mixing with a boiling solution of Sodic Carbonate,—a precipitate of **Zinci Carbonas** *(Hydrated basic Zincic Carbonate)*, $ZnCO_3.2ZnO.3H_2O$; Carbonic Anhydride being evolved.
Separated by decantation, washed and dried. White powder.

δ. From **Zinci Carbonas** are prepared,

1.* By exposing to a dull red heat,—**Zinci Oxidum**, ZnO; Carbonic Anhydride and water being driven off.
White powder; becomes yellow on heating.

2.* By adding to diluted Acetic Acid gently heated,—a solution of *Zincic Acetate.* $Zn\,(C_2H_3O_2)_2$. Boiled to expel Carbonic Anhydride, and filtered. On cooling,—**Zinci Acetas**, $Zn(C_2H_3O_2)_2$, $2H_2O$, crystallizes out.
More crystals on evaporation of the mother liquor.
Thin crystalline plates.

Calamine, a native impure Zincic Carbonate, is not officinal.

Zinci Carbonas.

$ZnSO_4 + Na_2CO_3 = ZnCO_3 + Na_2SO_4.$
$3\,ZnCO_3 + 3\,H_2O = ZnCO_3\,2\,ZnO.3H_2O + 2\,CO_2.$

Properties.

Solubility.

	Parts of cold water.	Parts of boiling water.	Parts of Rect. Sp.
Zinci Chloridum soluble in	less than one	,,	—
Zinci Sulphas ,, ,,	2½	less than one	—
Zinci Acetas ,, ,,	2½	,, ,, ,,	—
Zinci Valerianas ,, ,,	120	,, ,, ,,	60

The Oxide and Carbonate are insoluble.

Zinci Chloridum is *deliquescent.*
Zinci Sulphas *effloresces* in dry air.

Heated gently,

Zinci Oxidum turns yellow.

Heated more strongly,

Zinci Sulphas and Acetas are dehydrated; the former undergoing "watery fusion".

Heated strongly,

Zinci Sulphas, Acetas, Valerianas, and Carbonas are decomposed, leaving the Oxide.

Zinci Chloridum forms insoluble compounds with albumen and gelatine. It accordingly preserves organic substances from putrefaction; and applied to living tissues, produces an eschar.

LEAD COMPOUNDS. 6 *Officinal.*

LEAD. { **Plumbi Oxidum.—Plumbi Acetas.—Plumbi Subacetas.—Plumbi Carbonas.**
Plumbi Nitras.—Plumbi Iodidum.

α. From Metallic LEAD are obtained,

1. On heating in a current of air at a temperature sufficient to fuse the product,—**Plumbi Oxidum** (*Litharge*), PbO.

   Heavy scales, brick-red.

2. On dissolving in diluted Nitric Acid,*—a solution of **Plumbi Nitras**, $Pb(NO_3)_2$.

   Crystallizes out on evaporation. Octahedra.

β. From **Plumbi Oxidum** is prepared, (*)by dissolving in diluted Acetic Acid with the aid of heat,—a solution of *Plumbic Acetate*, $Pb(C_2H_3O_2)_2$. On evaporation (keeping slightly acid with Acetic Acid), **Plumbi Acetas** (*Sugar of Lead*), $Pb(C_2H_3O_2)_2.3H_2O$, crystallizes out.

Masses of acicular crystals.

γ. From **Plumbi Acetas**, (*)by boiling in water with Litharge,—a solution of *Basic Plumbic Acetate*, $Pb(C_2H_3O_2)_2.2PbO$. Diluted to a stated strength it forms **Liquor Plumbi Subacetatis**† (Goulard's Extract).

Colourless.

δ. From a solution of *Basic Plumbic Acetate* is obtained, on passing Carbonic Anhydride,‡ a precipitate of **Plumbi Carbonas**, $2PbCO_3.PbH_2O_2$, (White Lead) leaving Plumbic Acetate in the solution.

Heavy white powder.

ε. From **Plumbi Nitras** is obtained, (*)on mixing its solution with one of Iodide of Potassium, a precipitate of **Plumbi Iodidum**, PbI_2.

Washed, dried at a gentle heat. Yellow powder.

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* Litharge may be used instead of Lead.

† Liq. Pb. Subacet. Dilutus (Goulard water) contains 2 drachms of Liq. Pb. Subacetatis in the pint, with an equal amount of Rectified Spirit.

‡ In the "Dutch Process", preferred for making white lead to be used as a pigment, coils of metallic lead are placed in open jars containing weak vinegar, and the jars embedded in spent tan. The tan, putrefying, becomes heated, the acetic acid rises in vapour, the lead becomes oxidised by the air, and the oxide unites with the acetic vapour to form *basic acetate*. Finally, the carbonic anhydride from the putrifying tan precipitates a compact layer of *Carbonate* on the surface of the Lead, leaving Plumbic Acetate free to unite with oxide to form fresh *basic acetate*.

Plumbi Carbonas.

$$3(Pb(C_2H_3O_2)_2.2PbO)+4CO_2+2H_2O=3Pb(C_2H_3O_2)_2+2(2PbCO_3.PbH_2O_2).$$

PROPERTIES.

Plumbi Acetas is soluble in 2½ parts of water, also in Rectified Spirit.
Plumbi Iodidum is soluble in solutions of the Alkaline Iodides, or of Caustic Potash, in Acetic Acid, and slightly in Alcohol.

The Oxide and Carbonate are insoluble.

Plumbi Acetas, in dry air, effloresces, and is superficially decomposed by Carbonic Anhydride.
In solution, the Acetate is only partially decomposed by Carbonic Acid, the Acetic Acid liberated protecting the remainder.

When *heated,* Plumbi Acetas is first dehydrated and then decomposed.
„ „ Plumbi Iodidum is decomposed.

Solution of Plumbic Acetate has an acid reaction, of the Basic Acetate an alkaline one

Plumbic Acetate and Basic Acetate form insoluble compounds with albumen.
The latter forms an opaque jelly with mucilage.

*** Plumbi Nitras is used only to prepare the Iodide.

BISMUTH COMPOUNDS. 6 *Officinal.*

Bismuthum. — **Bismuthum Purificatum.** — *Bismuthous Nitrate.* { **Bismuthi Subnitras.** — **Bismuthi Oxidum.** / **Bismuthi Carbonas.** / **Bismuthi et Ammoniæ Citras.**

α. **Bismuthum,** commercial BISMUTH, which contains Sulphur and Arsenic, being fused with Nitre, which removes the impurities, forms **Bismuthum Purificatum.**

β. From **Bismuthum Purificatum** is prepared, (*)by dissolving in diluted Nitric Acid,—a solution of *Bismuthous Nitrate,* $Bi(NO_3)_3$.

The solution is filtered and concentrated.

1.* On pouring it into cold water, **Bismuthi Subnitras** (*Basic Bismuthous Nitrate,* "Magistery of Bismuth"), $Bi(NO_3)_3.Bi_2O_3$, $3H_2O$,* is precipitated ; an acid salt being left in the solution.

Washed ; dried at 150 deg. F. White powder, minute scales.

2.* On pouring it into a cold solution of Ammoniæ Carbonas, —**Bismuthi Carbonas** (*Basic Bismuthous Carbonate*), $2(Bi_2(CO_3)_3.2Bi_2O_3)3H_2O$,† is precipitated.

Washed ; dried at 150 deg. F. White powder.

3.* On adding a solution of Citric Acid (twice the weight of the Bismuth present), and neutralizing with Liquor Ammoniæ, a solution is obtained, containing a *double Citrate of Bismuth and Ammonia,* and an equivalent amount of Ammonic Nitrate. Diluted to a stated strength, it forms **Liquor Bismuthi et Ammoniæ Citratis.**

γ. * On boiling **Bismuthi Subnitras** with Liquor Sodæ, a residue of **Bismuthi Oxidum,** Bi_2O_3, is left.

Washed ; dried at 212 deg. F. Lemon-yellow powder.

PROPERTIES.

Liq. Bism. et Amm. Citratis mixes with water in all proportions.
The other compounds are insoluble in water or alcohol.
They are blackened in air containing Sulphuretted Hydrogen.
The weight of Bism. Subnitras must be remembered in prescribing. It contains about $\frac{2}{3}$ by weight of Bismuth, the "Carbonas" only about $\frac{1}{5}$.

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* Or $Bi_2O_3.2HNO_3.H_2O$.
† Or $2\,(Bi_2O_3.CO_2).H_2O$.

ANTIMONIAL COMPOUNDS. 5 *Officinal.*

Antimonium Nigrum. ... { **Antimonium Sulphuratum.**
Antimonii Chloridum.—Antimonii Oxidum.—Antimonium Tartaratum.

Antimonium Nigrum (Black Antimony);—a native Antimonious Sulphide, Sb_2S_3, purified from siliceous matter by fusion, and powdered.

Greyish black, crystalline.

α. From **Antimonium Nigrum** are prepared—

1.* By boiling in Liquor Sodæ, a solution containing a soluble *double Sulphide*, and a soluble *double Oxide*, of Sodium and Antimony; Na_3SbS_3, and Na_3SbO_3. On gradual addition of diluted Sulphuric Acid,—*Antimonious Sulphide* in another form is precipitated, mixed with about 12 p.c. of *Antimonious Oxide*, Sb_2O_3, forming **Antimonium Sulphuratum**; and Sodic Sulphate remains in the solution.

Washed; dried at 212 deg. F. Orange red powder.

2.* By heating in excess of Hydrochloric Acid,—an acid solution of *Antimonious Chloride* $SbCl_3$. Filtered and concentrated, it forms **Liquor Antimonii Chloridi.**

Heavy liquid, yellowish red.

β.* On pouring **Liquor Antimonii Chloridi** into water,—*Antimonious Oxychloride*, $SbCl_3.Sb_2O_3$, is precipitated. The precipitate is collected and washed. On treating it with a solution of Sodic Carbonate for half an hour, **Antimonii Oxidum** (*Antimonious Oxide*), Sb_2O_3, remains; Carbonic Anhydride having been evolved and Sodic Chloride retained in the solution.

Washed; dried at 212 deg. F. Greyish-white powder.

γ.* On making **Antimonii Oxidum** into a paste with Acid Potassic Tartrate, $KHC_4H_4O_6$, and leaving it for twenty-four hours, — *Potass-Antimonious Tartrate*, $K(SbO)C_4H_4O_6$, is formed. On dissolving in boiling water, filtering, and evaporating the solution,—**Antimonium Tartaratum** ("Tartar Emetic"), $K(SbO)C_4H_4O_6.H_2O$, crystallizes out.

More crystals on evaporating the mother liquor.
Rhombic octahedra.

Antimonium Sulphuratum.

$$Sb_2S_3 + 6\,NaHO = Na_3SbS_3 + Na_3SbO_3 + 3\,H_2O.$$
$$Na_3SbS_3 + Na_3SbO_3 + H_2SO_4 = Sb_2S_3 + 3\,Na_2SO_4 + 3\,H_2O.$$
$$\left(\begin{array}{l} 2\,Na_3SbO_3 + 3\,H_2SO_4 = Sb_2O_3 + 3\,Na_2SO_4 + 3\,H_2O. \\ 2\,Na_3SbS_3 + 3\,H_2SO_4 = Sb_2S_3 + 3\,Na_2SO_4 + 3\,H_2S. \end{array}\right)$$

The equations in the brackets account for the formation of Antimonious Oxide. A little Sulphuretted Hydrogen is at the same time given off.

Antimonii Oxidum.

$$2\,SbCl_3.Sb_2O_3 + 3\,Na_2CO_3 = 3\,Sb_2O_3 + 6\,NaCl + 3\,CO_2.$$

Antimonium Tartaratum.

$$2\,KHC_4H_4O_6 + Sb_2O_3 = 2\,K(SbO)C_4H_4O_6 + H_2O.$$

The compound (SbO) here plays the part of a monad. Sb_2O_3 *may be considered as* $(SbO)_2O$.

PROPERTIES.

Tartar Emetic is *soluble* in 15 parts of water, insoluble in Rectified Spirit.

Antimonious Chloride is soluble in a small quantity of water, but is precipitated as an Oxychloride on dilution.

It is soluble in Hydrochloric Acid.

The Oxide and Sulphide are insoluble in water or spirit.

The Oxide is *fusible.*

The Sulphide, heated in air, forms Sulphurous Anhydride and Antimonious Oxide.

Tartar Emetic is dehydrated at 212 deg. F.; heated strongly is decomposed.

Liq. Antim. Chloridi has a similar action on organic tissues to that of Zinci Chloridum (p. 134).

ARSENICAL COMPOUNDS. 5 *Officinal.*

MISPICKEL.—**Acidum Arseniosum.** .. { *Potassic Arsenite.* / *Arsenic Trichloride.* / **Sodæ Arsenias.—Ferri Arsenias.**

α. In roasting MISPICKEL, a native Arseni-sulphide of Iron, FeAsS, as a preliminary to the extraction of the iron, Sulphurous Anhydride and *Arsenious Anhydride,* As_2O_3, are formed. The latter is condensed in chambers through which the flues pass. Purified by sublimation, it forms commercial *Arsenious Acid* ("White Arsenic"). Resublimed,—it forms **Acidum Arseniosum.**

Stratified masses, or heavy white powder.

β. From **Acidum Arseniosum** are prepared—

1.* By dissolving in hot water with an equal weight of Potassæ Carbonas,—a solution of *Potassic Arsenite;* which, diluted and flavoured with Tinct. Lavandulæ Co., forms **Liquor Arsenicalis.**

Pink.

2.* By boiling in water with Hydrochloric Acid, a solution of *Arsenic Trichloride,* $AsCl_3$; which, diluted, forms **Liquor Arsenici Hydrochloricus.**

3. **Sodæ Arsenias** (see p. 120).

4. **Ferri Arsenias** (see p. 126).

PROPERTIES.

Acidum Arseniosum is soluble in 100 parts of cold water, in 20 parts of boiling water.

It is freely soluble in glycerine.

It sublimes at 400 deg. F.

Nitric Acid, and Iodine in presence of water, oxidize it to Arsenic Acid ($As_2O_3 + I_4 + 5\,H_2O = 4\,HI + 2\,H_3AsO_4$).

Its solutions preserve organic matters from putrefaction.

MAGNESIUM COMPOUNDS. 5 *Officinal.*

DOLOMITE.
SEA WATER.
ALUM-ORE.
} **Magnesiæ Sulphas.** {
Magnesiæ Carbonas.—Magnesia.
Magnesiæ Carbonas Levis.—Magnesia Levis.

α. DOLOMITE, or Magnesian Limestone, consists chiefly of Magnesic and Calcic Carbonates. On treatment with Sulphuric Acid,—*Magnesic* and Calcic *Sulphates* are formed. On dissolving,—a solution of *Magnesic Sulphate*, $MgSO_4$, with a little Calcic Sulphate. On evaporation, —**Magnesiæ Sulphas** ("Epsom Salts"), $MgSO_4.7H_2O$, crystallizes out.

On evaporating the mother liquor of SEA-WATER, after separation of the Sodic Chloride, **Magnesiæ Sulphas** crystallizes out.

On evaporating the mother liquor of ALUM manufacture (p. 143), **Magnesiæ Sulphas** crystallizes out.

Minute rhombic prisms.

β. From **Magnesiæ Sulphas** are prepared—

1.* By mixing a strong boiling solution with a similar solution of Sodic Carbonate, and evaporating to dryness,—**Magnesiæ Carbonas** (*Basic Magnesic Carbonate*), $3\,MgCO_3.MgO.5H_2O$.

Washed; dried at 212 deg. F. White granular powder.

2.* By mixing weak cold solutions of the same, and boiling for fifteen minutes,—**Magnesiæ Carbonas Levis** (*same composition*).

Washed; dried at 212 deg. F.
White powder, very light, partly amorphous, partly crystalline.

γ. **Magnesiæ Carbonas** and **Magnesiæ Carbonas Levis,**(*) on calcination, yield **Magnesia** and **Magnesia Levis,** MgO, respectively.

White powders, the latter very light.

PROPERTIES.

Magnesiæ Sulphas is *soluble* in equal parts of water, insoluble in Rectified Spirit, precipitated by Rectified Spirit from strong aqueous solutions.

The Carbonate and Oxide are insoluble in water or spirit. The former is *soluble* in solutions of Carbonic Acid.

Magnesiæ Sulphas is *efflorescent.*

By *heat,*

Magnesiæ Sulphas is first dehydrated, undergoing aqueous fusion; then fused.
The Carbonate is reduced to Magnesia (see above).

ALUM.

ALUM ORE contains Iron Pyrites (Ferric Sulphide), FeS_2, and *Alumina*, Al_2O_3. On roasting the ore, or exposing it to the air, the Pyrites yields Ferrous Sulphide, FeS, and *Sulphuric Anhydride*, SO_3. The latter forms, with the Alumina,—*Aluminic Sulphate*, $Al_2(SO_4)_3$; the former is oxidized to form Ferrous Sulphate.

On lixiviating, the two Sulphates dissolve out. On evaporating the solution, the Ferrous salt separates in crystals. On mixing the mother liquor, containing Aluminic Sulphate, with a concentrated solution of Ammonic Sulphate, **Alumen** (*Ammonic Aluminic Sulphate*), $NH_4Al(SO_4)_2.12H_2O$, crystallizes out.

Re-dissolved and re-crystallized. Octahedra.

* On heating **Alumen** till all its water of crystallization is expelled, **Alumen Exsiccatum**, $NH_4Al(SO_4)_2$, remains.

White powder.

PROPERTIES.

Alumen is *soluble* in 18 parts of cold water, in less than its own weight of boiling water. It is insoluble in Rectified or even in Proof Spirit.

Its solutions have a strongly acid reaction, and dissolve zinc or iron with evolution of hydrogen.

Alumen Exsiccatum is insoluble, but on being moistened, it resumes its water of crystallization slowly, with evolution of heat.

Alumen *effloresces* slowly in air.

It undergoes "*aqueous fusion*" when heated. Strongly heated, it loses its acid.

Alum forms insoluble compounds with albumen, fibrin, casein, and gelatin.

Alumen Exsiccatum is used as an escharotic owing to this property, and also to its capacity for abstracting water.

LITHIUM COMPOUNDS. 2 *Officinal.*

α. On adding a solution of Ammoniæ Carbonas to one of Lithic Sulphate or Chloride, a precipitate of **Lithiæ Carbonas,** L_2CO_3, is obtained.

Washed, dried. White powder.

β. * By dissolving **Lithiæ Carbonas** in a solution of Citric Acid, a solution of **Lithiæ Citras,** $L_3C_6H_5O_7$, is prepared.

Evaporated to viscidity. Dried at 240 deg. F., and powdered. Amorphous powder, white.

PROPERTIES.

Lithiæ Citras is soluble in 2½ parts of water; Lithiæ Carbonas in 100 parts; more readily in solutions of Carbonic Acid.

Lithiæ Citras is very deliquescent.

SILVER COMPOUNDS. 3 *Officinal.*

By dissolving **Argentum Purificatum**, pure metallic Silver, in diluted Nitric Acid with the aid of heat, a solution of **Argenti Nitras** ("lunar caustic"), $AgNO_3$, is prepared.

Decanted. Crystallises out on evaporation.
Rhombic tabular prisms; or fused, and moulded into sticks.

On pouring a solution of **Argenti Nitras** into Liquor Calcis, a precipitate of **Argenti Oxidum**, Ag_2O, is obtained.

Washed; dried at 212 deg. F. Olive-brown powder.

Properties.

Argenti Nitras is soluble in half its weight of water, in 15 parts of Rectified Spirit.

Argenti Oxidum is very slightly soluble in water, readily soluble in Liq. Ammoniæ.

Argenti Nitras blackens when exposed to light, or when placed in contact with organic matter. Its solutions blacken under similar circumstances. It is reduced to metallic Silver in presence of Copper or Phosphorus.

Argenti Oxidum is liable to explode in contact with Creasote.

By *heat*, both are reduced to metallic Silver, the Nitrate fusing before reduction.

Argenti Nitras forms insoluble compounds with albumen and albuminoid substances. These compounds, at first white, blacken if exposed to light.

COPPER, CADMIUM, CERIUM.

On roasting **Cuprum**, pure Copper, *Cupric Oxide*, CuO, is formed. On adding Sulphuric Acid,—*Cupric Sulphate*, $CuSO_4$. Dissolved in hot water. On evaporating, **Cupri Sulphas**, $CuSO_4.5H_2O$, crystallizes out.

Oblique Prisms, bright blue.
Soluble in 4 parts of water, insoluble in pure alcohol, slightly in Rectified Spirit.
Dehydrated by heat.
With albumen and albuminoids, its action is similar to that of Arg. Nitras.

Cadmii Iodidum, CdI_2, is prepared by direct union of Cadmium and Iodine in presence of water.

Flat pearly crystals.
Insoluble in water or Rectified Spirit; fused by heat.

CERITE contains Iron, Cerium, and some other metals. On powdering, and mixing with Sulphuric Acid, Ferrous and *Cerous Sulphates* are formed. On roasting in a reverberatory furnace, the former is decomposed. By lixiviation, a solution of *Cerous Sulphate*, $Ce_2(SO_4)_3$, is obtained. On adding a solution of Ammonic Oxalate, **Cerii Oxalas** (*Cerous Oxalate*), $Ce_2(C_2O_4)_3.9H_2O$, is precipitated.

Washed; dried at 212 deg. White Powder.
Insoluble in water or alcohol.
Dehydrated by heat.

Native BLACK OXIDE OF MANGANESE is introduced into the Pharmacopœia, for the purpose of evolving Chlorine from Hydrochloric Acid, as **Manganesii Oxidum Nigrum.**

Heavy black powder.

OFFICINAL PREPARATIONS OF METALS AND METALLIC COMPOUNDS.

Hydrargyrum cum Creta. Mercury triturated with twice its weight of Chalk till globules cease to be visible.
Light grey.

Pulvis Antimonialis. Antimonii Oxidum with twice its weight of Calcis Phosphas.
White.

Pulvis Cretæ Aromaticus. Powdered Cinnamon, Nutmeg, Saffron, Cloves, and Cardamoms, with Sugar and Chalk,—1 part of Chalk in 4.
Yellow.

Pulvis Cretæ Aromat. cum Opio. The same, with one-fortieth part of powdered Opium.

Liquor Ammoniæ Fortior (see p. 123) :—16 grains of gaseous Ammonia in the drachm.

,, **Ammoniæ** :—The above, diluted to one-third the strength.

,, **Ammoniæ Acetatis** (see p. 123). Contains Carbonic Acid in solution, which improves the flavour.

,, **Ammoniæ Citratis** (see p. 123).

Liquor Antimonii Chloridi (see p. 139) :—The terchloride dissolved in Hydrochloric Acid.

Liquor Arsenicalis :—Contains Potassic Arsenite (see p. 141); coloured with Tinct. Lavandulæ Co. (*Fowler's Solution*).
Pink.

,, **Arsenici Hydrochloricus** :—Contains the terchloride (see p. 141), dissolved in Hydrochloric Acid.

Both the above are made with half a grain of Acid. Arseniosum to the drachm.

Liquor Bismuthi et Ammoniæ Citratis (see p. 138) :—3 grains of Oxide of Bismuth in the drachm.

Liquor Calcis :—Saturated;—about $\frac{1}{16}$ grain of Calcis Hydras in the drachm.

,, **Calcis Saccharatus** :—About 1 grain of Calcis Hydras in the drachm, dissolved by the aid of sugar.

,, **Calcis Chloratæ** :—Made with $5\frac{1}{4}$ grains of Calx Chlorata to the drachm. Contains the soluble ingredients, the hypochlorite and chloride.

Liquor Ferri Perchloridi Fortior (see p. 126) :—About 32 grains in the drachm, with some free Hydrochloric Acid.
Dark brown.

,, **Ferri Perchloridi** :—The same, diluted to one-fourth the strength.
Brown.

,, **Ferri Pernitratis** (see p. 125).
Reddish brown.

,, **Ferri Persulphatis** (see p. 127).
Dark brown.

Liquor Hydrargyri Nitratis Acidus (see p. 129):—Strongly acid.

,, **Hydrargyri Perchloridi** :—$\frac{1}{10}$ grain in the drachm, with the same amount of Chloride of Ammonium.

Liquor Magnesiæ Carbonatis (Fluid Magnesia) :—Freshly precipitated Magn. Carbonas dissolved in water impregnated with Carbonic Acid under pressure ; 13 grains in the ounce. (To be kept corked.)

Liquor Plumbi Subacetatis (see p. 136) :—16 grains in the drachm.

,, **Plumbi Subacet. Dilutus** :—The same diluted to one-eightieth the strength, with an equal part of Rectified Spirit :—$\frac{1}{5}$ grain (and $\frac{3}{4}$ min. of Rectified Spirit) in the drachm.

Liquor Potassæ (see p. 115) :—Nearly $3\frac{1}{2}$ grains of Potassic Hydrate in the drachm.

,, **Potassæ Permanganatis** :—$\frac{1}{2}$ grain in the drachm.

Liquor Sodæ (see p. 119) :—About $2\frac{1}{3}$ grains in the drachm. About the same saturating power as Liq. Potassæ.

,, **Sodæ Arseniatis** :—$\frac{1}{2}$ grain of *dehydrated* S. Arsenias in the drachm.

,, **Sodæ Chloratæ** (see p. 119).

Liquor Zinci Chloridi (see p. 134):—About 40 grains in the drachm.

(Effervescent.)

Liquor Potassæ Effervescens :—30 grains of Potassæ Bicarbonas in a pint of water, saturated with Carbonic Acid under a pressure of 7 atmospheres.

Liquor Sodæ Effervescens:—A similar preparation of Sodæ Bicarbonas.

Liquor Lithiæ Effervescens :—A similar preparation of Lithiæ Carbonas, 10 grains in the pint.

Liquor Magnesiæ Citratis :—100 grains of Magnes. Carbonas dissolved in a solution of 200 grains of Citric Acid, and flavoured with Syrup of Lemons ; made up to half a pint with water ; 40 grains of Pot. Bicarb. added, and the bottle secured to retain the Carbonic Acid.

Tinctura Ferri Perchloridi :—Liquor F. Perchl. Fortior diluted with
Brown. 3 parts of Rectified Spirit. Same strength as the Liquor. Contains free acid.

,, **Ferri Acetatis** (see p. 127).
Deep brown.

Spiritus Ammoniæ Aromaticus :—Distilled from Ammoniæ Carbonas, Liq. Ammon. Fortior, Volatile Oil of Nutmeg, and Oil of Lemon, with Rectified Spirit and Water.

Vinum Antimoniale :—Tartar Emetic in Sherry, $\frac{1}{4}$ grain in the drachm.
Brown.

Vinum Ferri (see p. 126):—Contains Ferric Tartrate, Malate, etc., in Sherry.
Brown.

,, **Ferri Citratis** :—F. et Amm. Citras in Orange Wine,—1 grain in the drachm.
Brown.

Syrupus Ferri Iodidi (see p. 125) :—$4\frac{1}{2}$ grains in the drachm.
Becomes decolorised on keeping, unless a coil of Iron wire is kept in it (*Squire*).

,, **Ferri Phosphatis** (see p. 126):—1 grain in the drachm.

Glycerinum Boracis :—$11\frac{1}{3}$ gr. in the drachm.
(1 oz. with 4 fl. oz. of Glycerine.)

Mel Boracis :—8 gr. in the drachm.
Yellow.

Pilula Aloes et Ferri :—Ferri Sulphas and Barbadoes Aloes, with Pulv. Cinnamomi Co. and Conf. of Roses ; $\frac{3}{4}$ gr. of the Sulphate and 1 of the Aloes in 5 grains.

Pilula Ferri Carbonatis :—F. Carbonas Saccharata with Confection of Roses ; 4 grains in 5.

,, **Ferri Iodidi** (see p. 125):—With sugar and Liquorice root ; nearly $1\frac{1}{2}$ grain in 5.

Pilula Hydrargyri :—Metallic Mercury, with Confection of Roses and Liquorice Root ; 1 grain in 3.

,, **Hydrargyri Subchloridi Co.**:—Calomel and Antim. Sulphuratum (1 grain of each in 5), with Guaiac Resin and Castor Oil.

Pilula Plumbi cum Opio :—Plumbi Acetas and Opium, with Confection of Roses ; 3 grains of the Acetate, $\frac{1}{2}$ grain of the Opium in 4.

Pilula Saponis Co.:—Opium with Castile Soap and water ; nearly 1 grain of the Opium in 5.

Trochisci Bismuthi :—2 grains of Bism. Subnitras in each.

Trochisci Ferri Redacti :—1 grain in each.

Trochisci Potassæ Chloratis :—5 grains in each.

Trochisci Sodæ Bicarbonatis :—5 grains in each.

Unguentum Antimonii Tartarati :—1 in 5.

Unguentum Cadmii Iodidi :—1 in 8.

Unguentum Hydrargyri :—Nearly 1 in 2 (of metallic Mercury).
Bluish grey.

,, **Hydrargyri Co.**:—About 1 in $4\frac{1}{2}$ (of metallic Mercury) with Camphor.
Bluish grey.

,, **Hydrargyri Ammoniati** :—1 in 8.

Unguentum Hydrargyri Iodidi Rubri:—1 in 28.
Bright scarlet.

,, **Hydrargyri Nitratis**:—1 in 15.
Lemon yellow.

,, **Hydrargyri Oxidi Rubri**:—1 in 8.
Dull red.

,, **Hydrargyri Subchloridi**:—1 in 6½.
Cream colour.

Unguentum Plumbi Acetatis:—1 in 37½.

,, **Plumbi Carbonatis**:—1 in 8.

,, **Plumbi Iodidi**:—1 in 8.
Orange.

,, **Plumbi Subacetatis Co.**:—1 in 20 (of Plumbic "Subacetate"), with Camphor.

Unguentum Potassii Iodidi:—Nearly 1 in 9.

,, **Potassæ Sulphuratæ**:—1 in 15½.
Greenish grey.

Unguentum Zinci:—1 in 6½ (of Zinci Oxidum).

Linimentum Ammoniæ:—Liquor Ammoniæ, with 3 parts of Olive-oil.
Creamy.
A species of *Ammonia Soap* is produced, which forms an emulsion with the rest of the oil.

Linimentum Calcis:—Equal parts of Liquor Calcis and Olive Oil.
Creamy. A similar preparation.

Linimentum Hydrargyri:—Equal parts of Unguent. Hydrargyri, Liq. Ammoniæ, and Lin. Camphoræ.
Creamy, bluish grey. 1 part of Mercury in 6.

Linimentum Potassii Iodidi cum Sapone:—Potass. Iodidum, with Castile Soap, Glycerine, and water; scented with Oil of Lemon.
Soft jelly. 1 of Iodide in 9.

Linimentum Saponis:—Castile Soap and Camphor dissolved in spirit; scented with Rosemary.
Pale yellow.

Emplastrum Ferri:—Ferri Peroxid. Hydrat., with Burgundy Pitch and Lead Plaster.
Red.

Emplastrum Hydrargyri:—Mercury triturated with oil in which Sulphur is dissolved, added to Lead Plaster.
Blue.

,, **Ammoniaci cum Hydrargyro**:—The same, Ammoniacum being substituted for Lead Plaster.
Brownish grey.

Emplastrum Plumbi:—Lead-Soap; made by boiling Litharge (Pl. Oxidum) with Olive Oil and water.
Pale yellow.

,, **Plumbi Iodidi**:—Iodide of Lead, with Soap and Resin Plasters; 1 in 9.
Pale orange

Emplastrum Saponis:—Hard Soap, Resin, and Lead Plaster.
White.

,, **Cerati Saponis**:—Hard Soap boiled to dryness with a
Brown. solution of Subacetate of Lead, made by boiling Litharge in vinegar; mixed with Bees-wax and Olive Oil by the aid of heat.

Mistura Cretæ:—Prepared Chalk, suspended by gum and syrup in Cinnamon water; about 13 grains in the fluid ounce.

Mistura Ferri Co:—A solution of Ferrous Sulphate in Rose-water, added
Bluish green. to a milky fluid obtained by rubbing Potassic Carbonate, Myrrh, and sugar with Rose-water and Spirit of Nutmeg. Ferrous Carbonate is precipitated and suspended by the "resin soap" that the Potash (which is in excess) forms with the Myrrh.

2½ grains of Ferri Sulphas to the fl. oz.

,, **Ferri Aromatica**:—An infusion of Cinchona, Calumba, and
Dark brown. Cloves in Peppermint water, macerated on Iron wire, flavoured with Tr. Cardam. Co. and Tincture of Orange-peel.

Contains very little iron.

Enema Magnesiæ Sulphatis:—An ounce of Epsom Salts in 15 fl. oz. of Mucilage of Starch, with a fl. oz. of Olive Oil.

Suppositoria Hydrargyri:—5 grains of Ung. Hydrargyri (2½ of
Bluish grey. Mercury) in each.

Suppositoria Plumbi Co. 3 grains of Pb. Acetas, and 1 of Opium in each.

Lotio Hydrargyri Flava (see p. 130):—Mercuric Oxide precipitated from
Yellow. Corrosive Sublimate by Lime Water (18 grains to the half-pint).

,, **Hydrargyri Nigra** (see p. 130):—Mercurous Oxide similarly pro-
Black. duced from Calomel (30 grains to the half-pint).

Cataplasma Sodæ Chloratæ:—A poultice made from 4 oz. of Linseed Meal, with 2 fl. oz. of Liq. Sodæ Chloratæ added.

Vapor Chlori:—The vapour arising from 2 oz. of Calx Chlorata ("bleaching powder"), moistened with water.

SYNOPSIS

OF THE

COMPOUND PREPARATIONS OF THE PHARMACOPŒIA, AND THEIR INGREDIENTS.

POWDERS.

Pulv. Amygdalæ Co.

Sweet Almonds	3
Gum	1
Sugar	4
	8

Pulv. Antimonialis.

Oxide of Antimony	1
Phosphate of Lime	2
	3

Pulv. Catechu Co.

Catechu	4
Kino	2
Rhatany	2
Cinnamon	1
Nutmeg	1
	10

Pulv. Cinnamomi Co.

Cinnamon	1
Cardamoms	1
Ginger	1
	3

Pulv. Cretæ Aromaticus.

Cinnamon	4
Nutmeg	3
Saffron	3
Cloves	1½
Cardamoms	1
Sugar	25
Chalk	11
	48½

Pulv. Cr. Ar. c. Opio.

P. Cretæ Aromat.	39
Opium	1
	40

Pulv. Elaterii Co.

Elaterium	1
Sugar of Milk	9
	10

Pulv. Glycyrrhizæ Co.

Liquorice Root	1
Senna	1
Sugar	3
	5

Pulv. Ipecacuanhæ Co. (*Dover's Powder.*)

Ipecacuanha	1
Opium	1
Sulphate of Potash	8
	10

Pulv. Jalapæ Co.

Jalap	5
Acid Tartrate of Potash	9
Ginger	1
	15

Pulv. Kino Co.

Kino	15
Opium	1
Cinnamon	4
	20

Pulv. Opii Co.

Opium	3
Pepper	4
Ginger	10
Caraway	12
Tragacanth	1
	30

Pulv. Rhei Co. (*Gregory's Powder.*)

Rhubarb	2
Light Magnesia	6
Ginger	1
	9

Pulv. Scammonii Co.

Scammony	4
Jalap...	3
Ginger	1
	8

Pulv. Tragacanthæ Co.

Tragacanth	1
Gum...	1
Starch	1
Sugar	3
	6

CONFECTIONS.

Conf. Opii.

Pulv. Opii Co.	1
Syrup ... (by weight)	3
	4

Conf. Piperis.

Black Pepper	2
Caraway	3
Honey	15
	20

Conf. Scammonii.

Scammony	2
Ginger	1
Oil of Caraway	$\frac{1}{12}$
„ Cloves	$\frac{1}{24}$
Syrup	2
Honey	1
	$6\frac{1}{8}$

Conf. Sennæ.

Senna	$2\frac{1}{2}$
Coriander	1
Figs	4
Tamarinds	3
Cassia	3
Prunes	2
Liquorice (Extract) ...	$\frac{1}{4}$
Sugar	10
	—
After manufacture :—	25

Conf. Sulphuris.

Sulphur	4
Acid Tartrate of Potash ...	1
Syrup of Orange-peel ...	4
	9

Conf. Terebinthinæ.

Oil of Turpentine	1
Liquorice Root	1
Honey	2
	4

The Confections of Roses and of Hips (Conf. Rosæ Gallicæ, Conf. Rosæ Caninæ) contain no ingredient besides the drug and the sugar.

PILL-MASSES.

a. Aloetic. 9.

Pil. Aloes Barbadensis.

Barbadoes Aloes	2
Soap	1
Oil of Caraway	$\frac{1}{8}$
Confection of Roses ...	1
	$4\frac{1}{8}$

Pil. Aloes et Ferri.

Barbadoes Aloes	2
Sulphate of Iron	$1\frac{1}{2}$
Pulv. Cinn. Co.	3
Confection of Roses ...	4
	$10\frac{1}{2}$

Pil. Cambogiæ Co.

Gamboge	1
Barbadoes Aloes	1
Pulv. Cinn. Co.	1
Soap	2
Syrup	q.s.
	6

Pil. Colocynthidis Co.

Colocynth	1
Barbadoes Aloes	2
Scammony	2
Sulphate of Potash ...	¼
Oil of Cloves	¼
	5½

Pil. Col. et Hyoscyami.

Pil. Colocynth. Co.	2
Extract of Henbane ...	1
	3

Pil. Aloes Socotrinæ.

Socotrine Aloes	2
Soap	1
Oil of Nutmeg	
Confection of Roses ...	1
	4

Pil. Aloes et Assafœtidæ.

Socotrine Aloes	1
Assafœtida	1
Soap	1
Confection of Roses ...	1
	4

Pil. Al. et Myrrhæ.

Socotrine Aloes	2
Myrrh	1
Saffron	½
Confection of Roses ...	2½
	6

Pil. Rhei Co.

Rhubarb	3
Socotrine Aloes	2¼
Myrrh	1½
Soap	1½
Oil of Peppermint	
Treacle	4
	12¼

β. Opiate. 3.

Pil. Saponis Co.

Opium	1
Soap*	4
Water	q.s.
	5

Pil. Plumbi c. Opio.

Acetate of Lead	6
Opium	1
Confection of Roses ...	1
	8

Pil. Ipecac. c. Scilla.

Dover's Powder (p. 152) ...	3
Squill	1
Ammoniac	1
Treacle	q.s.
	7

γ. Squill.

Pil. Scillæ Co.

Squill	1¼
Ammoniac	1
Ginger	1
Soap	1
Treacle	2
	6¼

δ. Resinous. 2.

Pil. Assafœtidæ Co.

Assafœtida	2
Galbanum	2
Myrrh	2
Treacle	1
	7

Pil. Scammonii Co.

Scammony Resin	1
Jalap Resin	1
Curd Soap	1
Tr. Zingib. Fort.	1
Rectified Spirit	2
After manufacture :—	3½

* Unless otherwise stated, "Soap" signifies *Castile Soap* **(Sapo Durus).**

ε. Conium.

Pil. Conii Co.

Extract of Hemlock ...	5
Ipecacuanha...	1
Treacle	q.s.
	7

ζ. Mercurial. 2.

Pil. Hydrargyri (*Blue Pill*).

Mercury	2
Liquorice Root	1
Confection of Roses ...	3
	6

Pil. Hydrarg. Subchloridi Co. (*Plummer's Pill.*)

Calomel	1
Sulphd. Antimony	1
Guaiac Resin	2
Castor Oil	1
	5

η. Martial. 2.

Pil. Ferri Carbonatis.

Saccharated Carbonate of Iron	4
Confection of Roses ...	1
	5

Pil. Ferri Iodidi.

Iron	4
Iodine	8
Sugar	7
Liquorice	14
Water	5
	38

After manufacture :—30

θ.

Pil. Phosphori.

Phosphorus	1
Tolu	60
Beeswax	30
	91

Pil. Quiniæ.

Sulphate of Quinia... ...	3
Confection of Hips... ...	1
	4

MIXTURES.

α. Emulsions and Suspensions. 7.

Mist. Amygdalæ.

Pulv. Amygd. Co. (p. 152)	1
Water	8

Mist. Ammoniaci.

Ammoniac	1
Water	32

Mist. Scammonii.

Scammony *Resin*	2 gr.
Milk	1 oz.

Mist. Guaiaci.

Guaiac Resin	2
Sugar	2
Gum	1
Cinnamon Water ...	80

*** Ammoniacum, being a gum-resin, emulsifies with water alone. The simple resins require the aid of an emulsifying agent (p. 53).

Mist. Cretæ.

Prepared Chalk	1
Gum	1
Syrup	2
Cinnamon Water ...	30

Mist. Ferri Co. (*Griffith's Mixture.*)

Ferri Sulphas ...	1¼ gr.
Potassæ Carbonas	1½ gr.
Myrrh	3 gr.
Sugar	3 gr.
Spirit of Nutmeg	12 min.
Rose Water, to ...	1 oz.

Result :—Ferrous Carbonate and Myrrh, suspended by the aid of a "resin-soap" formed by the Myrrh and Potash.

Mist. Spiritus Vini Gallici (*Egg Flip*).

Egg Yolks	Two.
Sugar	¼ oz.
Brandy	4 oz.
Cinnamon Water... ...	4 oz.

β. Solutions. 4.

Mist. Creasoti.

Creasote	1 min.
Glacial Acetic Acid	1 min.
Spirit of Juniper...	2 min.
Syrup	30 min.
Water, to	1 oz.

Mist. Sennæ Co.

Epsom Salts ...	88 gr.
Extract of Liquorice	11 gr.
Tr. Cardam. Co. ...	½ drm.
Tincture of Senna	1 drm.
Infusion of Senna, to	1 oz.

Mist. Gentianæ.

Gentian.
Orange-peel.
Coriander.

A tincture of the above in proof spirit, diluted four times with water.

Mist. Ferri Aromatica.

Pale Cinchona.
Calumba.
Cloves.
Iron Wire.

An infusion of the above in Peppermint Water, with

Tincture of Orange-peel.
Tr. Cardam. Co.

Contains a minute proportion of organic salts of Iron.

EXTRACT.

Ext. Colocynthidis Co.

A spirituous extract of

Colocynth, ...	6

to which is added

Extract of Socotrine Aloes	12
Scammony Resin... ...	4
Soap	3
Cardamoms	1

After manufacture, 24

INFUSIONS.

Infus. Gentianæ Co.

Gentian.
Orange-peel.
Lemon-peel.

Infus. Aurantii Co.

Orange-peel.
Lemon-peel.
Cloves.

Infus. Rosæ Acidum.

Red Rose Petals ...	11 gr.
Ac. Sulphuricum Dil.	6 min.
Water, to	1 oz.

DECOCTIONS.

Decoct. Aloes Co.

Extract of Socotrine Aloes.
,, ,, Liquorice.
Myrrh.
Saffron.
Carbonate of Potash.
Tr. Cardam. Co.

FLAVOURED PREPARATIONS.

Besides the above—

Infus. Catechu is flavoured with Cinnamon.
,, **Lini** ,, Liquorice.
,, **Sennæ** ,, Ginger.

Decoct. Hæmatoxyli ,, Cinnamon.

Decoct Sarsæ Co.
Sarsaparilla.
Sassafras.
Guaiac Wood.
Mezereon.
Liquorice.

TINCTURES.

Tr. Cardamomi Co.
Cardamoms.
Caraway.
Raisins.
Cinnamon.
Cochineal.

Tr. Chloroformi Co.

Chloroform	... ...	1
Tr. Cardam. Co.	... ...	5
Rectified Spirit	... ...	4

Tr. Lavandulæ Co.
Red Sandal Wood.
Cinnamon.
Nutmeg.
Oil of Lavender.
Oil of Rosemary (a trace).

Tr. Cinchonæ Co.
Pale Bark.
Orange-peel.
Serpentary.
Saffron.
Cochineal.

Tr. Gentianæ Co.
Gentian.
Orange-peel.
Cardamoms.

Tr. Benzoini Co. (*Friar's Balsam.*)

Benzoin	... 44 gr.
Storax	... 33 gr.
Socotrine Aloes ...	... 8 gr.
Tolu	... 11 gr.
	in the ounce.

Tr. Camphoræ Co. (*Paregoric.*)

Camphor	1½ gr.
Opium	2 gr.
Benzoic Acid ...	2 gr.
Oil of Anise ...	1½ min.
	in the ounce.

Tr. Catechu is flavoured with Cinnamon.
Tr. Aloes ,, Liquorice.
Tr. Quiniæ ,, Orange-peel; being made with Tr. Aurantii.
Tr. Sennæ ,, Raisins, Coriander, and Caraway.
Tr. Rhei ,, Coriander and Cardamoms, and coloured with Saffron.

Tr. Iodi contains Iodide of Potassium.

Vin. Opii is flavoured with Cinnamon and Cloves.
Vin. Aloes ,, Cardamoms and Ginger.
Vin. Rhei ,, Canella Alba.

Vin. Quiniæ and **Vin. Ferri Citratis,** with orange-peel, being made with Orange wine. The former contains free citric acid.

Syr. Rhamni is flavoured with Ginger and Pimento.
Syr. Rhei ,,
Syr. Sennæ ,, } Coriander.
Syr. Limonis ,, Lemon-peel.

Syr. Ferri Phosphatis contains free Phosphoric Acid. **Syr. Scillæ** free Acetic Acid

Tr. Opii Ammoniata (*Scotch Paregoric*).

Opium	... ...	5 gr.
Saffron	... ...	9 gr.
Benzoic Acid	...	9 gr.
Oil of Anise	...	3 min.
Liq. Ammon. Fort.		96 min.
		in the ounce.

*** For the Ammoniated Tinctures of Guaiac, Valerian, and Quinine, see page 6.

SPIRITS.

Sp. Armoraciæ Co.
Horse-radish.
Orange-peel.
Nutmeg.

Sp. Ammoniæ Fœtidus.
Assafœtida.
Liq. Ammon. Fort.

Sp. Amm. Aromaticus (*Sal Volatile*).
Amm. Carbonas.
Liq. Amm. Fort.
Oil of Nutmeg.
Oil of Lemon.

*** In each case the ingredients are distilled with Spirit.

LOZENGES.

Troch. Bismuthi.

Bismuthi Subnitras	...	2 gr.
Magnesiæ Carbonas	...	$2\frac{2}{3}$ gr.
CalcisCarbonasPræcipitata		$3\frac{1}{2}$ gr.
Rose water	... ...	q.s.
		in each lozenge.

Troch. Morphiæ et Ipecacuanhæ.

Morphiæ Hydrochloras	...	$\frac{1}{36}$ gr.
Ipecacuanha	... ...	$\frac{1}{12}$ gr.
Tr. Tolutana.	...	... a trace
		in each lozenge.

DILUTE ACID.

Ac. Sulphuricum Aromaticum.
Cinnamon.
Ginger.
macerated in

Ac. Sulphuricum...	3 parts.
Rectified Spirit ...	40 parts.

SOLUTIONS.

Liquor Calcis Saccharatus.

Slaked Lime	... ...	7 gr.
Sugar	... ...	44 gr.
		in the ounce.

Liquor Epispasticus.
Cantharides.
Acetic Acid.
Ether.

Troch. Opii are flavoured with Liquorice and Tolu.
Troch. Morphiæ ,, } Tolu.
Troch. Ac. Tannici ,, }

Liquor Arsenicalis is coloured with Tr. Lavandulæ Co.
Liquor Bism. et Amm. Citr. is flavoured with Syrup of Lemons.

Liq. Arsenici Hydrochloricus.
Liq. Ferri Perchloridi (and L.F.P. Fort.).
Liq. Ferri Pernitratis.
Liq. Hydrargyri Nitratis Acidus.
Liq. Morphiæ Acetatis.
Liq. Morphiæ Hydrochloratis.
Liq. Strychniæ.
} contain free acid.

Liq. Hydrarg. Perchloridi contains Chloride of Ammonium.
Liq. Iodi ,, Iodide of Potassium.

SUPPOSITORIES.

Suppositoria Plumbi Co.

Opium	1 gr.
Acetate of Lead	3 gr.

in each suppository.

*** **Suppos. Hydrargyri** are made with Ung. Hydrargyri.

LINIMENTS.

α. *Strong Tinctures, made with Rectified Spirit, for* painting on *the skin.* 4.

To 1 fluid ounce of Rectified Spirit.

Lin. Aconiti.

Aconite Root	1 oz.
Camphor	22 gr.

Lin. Belladonnæ.

Belladonna Root	1 oz.
Camphor	22 gr.

Lin. Iodi.

Iodine	55 gr.
Iodide of Potassium ...	22 gr.
Camphor	11 gr.

Lin. Camphoræ Co.

Camphor	55 gr.
Liq. Amm. Fort....	2 drms.
Oil of Lavender ...	15 min.

β. *Oily or Saponaceous Mixtures for* rubbing into *the skin.* 12.

Lin. Ammoniæ.

Liq. Ammoniæ	1
Olive Oil	3

An Ammonia Soap is formed, which emulsifies the rest of the oil.

Lin. Calcis (*Carron Oil*).

Liquor Calcis. } equal parts.
Olive Oil. }

A similar reaction.

Lin. Camphoræ.

Camphor	1
Olive Oil	4

Solution takes place.

Lin. Crotonis.

Croton Oil	2
Oil of Cajeput	7
Rectified Spirit	7

Lin. Terebinthinæ.

Soft Soap	2
Camphor	1
Oil of Turpentine	16

Lin. Saponis (*Opodeldoc*).

Soap	50 gr.
Camphor	25 gr.
Oil of Rosemary ...	9 min.
Water	40 min.
Rectified Spirit, to ...	1 oz.

Lin. Pot. Iodidi cum Sapone.

Iodide of Potassium ...	66 gr.
Soap (*Castile or Curd*) ...	66 gr.
Glycerine	44 min.
Oil of Lemon	6 min.
Water, to	1 oz.

Lin. Sinapis Co.

Oil of Mustard	12 min.
Ethereal Extract of Mezereon	8 gr.
Camphor	24 gr.
Castor Oil	1 drm.
Rectified Spirit, to ...	1 oz.

Lin. Chloroformi.

Chloroform } equal parts.
Camphor Liniment }

Lin. Hydrargyri.

Ung. Hydrargyri (p. 160) } equal
Liquor Ammoniæ } parts.
Camphor Liniment }

Lin. Terebinth. Aceticum.

Oil of Turpentine }
Acetic Acid } equal parts.
Camphor Liniment }

Lin. Opii.

Laudanum } equal parts.
Soap Liniment }

OINTMENTS.

α.

Adeps Benzoatus. See p. 13.

Unguentum Simplex.

White Wax	...	...	2
Lard	...	...	3
Almond Oil	...	...	3

β. *Made on a basis of Lard.* 10.

Ung. Aconitiæ.
,, **Atropiæ.**
,, **Veratriæ.**
,, **Belladonnæ.**
Made with the extract.
,, **Sabinæ.**
Contains beeswax.
,, **Iodi.**
Contains as much Iodide of Potassium as Iodine.
,, **Sulphuris Iodidi.**
,, **Potassii Iodidi.**
Contains a little Pot. Carbonas.
,, **Potassæ Sulphuratæ.**
,, **Hydrargyri Subchloridi.**

γ. *On a basis of Benzoated Lard.* 5.

Ung. Sulphuris.
,, **Zinci.**
Oxide of Zinc.
,, **Plumbi Acetatis.**
,, **Gallæ.**
,, **Gallæ cum Opio.**

δ. *On a basis of Simple Ointment.* 9.

Ung. Creasoti.
,, **Elemi.**
,, **Resinæ.**
Contains beeswax.
,, **Antimonii Tartarati.**
Ung. Cadmii Iodidi.
,, **Hydrarg. Iodidi Rubri.**
,, **Hydrarg. Ammoniati.**
,, **Plumbi Iodidi.**
,, **Plumbi Carbonatis.**

ε. *On a basis of Beeswax.* 1.

Ung. Picis Liquidæ.

ζ. *On a basis of Suet and Lard.* 1.

Ung. Hydrargyri (*Blue Ointment*).

η. *On a basis of Beeswax and Lard.* 1.

Ung. Terebinthinæ.

θ. *On a basis of Lard and Olive Oil.* 1.

Ung. Hydrargyri Nitratis (*Citrine Ointment*).
Contains some free Nitric Acid.

ι. *On a basis of Beeswax and Olive Oil.* 2.

Ung. Cantharidis.
,, **Hydrargyri Co.** (*Scott's Dressing*).
Made with Ung. Hydrargyri and Camphor.

κ. *On a basis of Beeswax and Almond Oil.* 1.

Ung. Hydrarg. Oxidi Rubri.

λ. *On a basis of White Wax a Almond Oi .* 2.

Ung. Cetacei.
,, **Plumbi Subacetatis Co**
Contains Camphor.

PLASTERS.

α.

Empl. Plumbi (*Diachylon*).
Lead Soap, *i.e.*, Oleate and Margarate of Lead (see p. 150).

Empl. Cerati Saponis.
Acetate of Lead.
Soap.
Beeswax.
Olive Oil.

Empl. Ammoniaci c. Hydrargyro.
Ammoniac.
Mercury.
Olive Oil.
Sulphur.

Empl. Picis.
Burgundy Pitch.
Frankincense.
Rosin.
Beeswax.
Nutmeg Butter.
Olive Oil.

Empl. Cantharidis (*Blister*).
Cantharides.
Beeswax.
Suet.
Lard.
Rosin.

β. *Made on a basis of Lead Plaster.*

Empl. Ferri.
With Peroxide of Iron.
Burgundy Pitch.

Empl. Hydrargyri.
With Mercury.
Olive Oil.
Sulphur.

Empl. Galbani.
With Galbanum.
Ammoniac.
Beeswax.

Empl. Saponis. }
Empl. Resinæ. }
With Soap.
Rosin.
The former with six times as much Soap as Rosin; the latter with only half as much.

γ. *On a basis of Rosin Plaster.* 2.

Empl. Belladonnæ.
Made with equal parts of a *Spirituous Extract of* Extr. Belladonnæ.

Empl. Opii.
With powdered Opium, 1 in 10.

δ. *On a basis of Soap and Rosin Plasters.* 2.

Empl. Calefaciens.
With Cantharides.
Rosin.
Beeswax.
Nutmeg Butter.

Empl. Plumbi Iodidi.

PAPERS.

Charta Sinapis.
Black Mustard Seeds in powder.
Gutta Percha.

Charta Epispastica.
Cantharides.
Canada Balsam.
Rosin.
Spermaceti.
Olive Oil.
White Wax.

*** **Hydrargyrum cum Creta** (*Grey powder*) :—see page 147.
Lotio Hydrargyri Flava (*Yellow wash*) } see page 130.
Lotio Hydrargyri Nigra (*Black wash*) }
Collodium Flexile:—see page 111.

POPULAR DESIGNATIONS OF CERTAIN PHARMACOPŒIAL PREPARATIONS AND COMPOUNDS.

Aromatic Confection	of	Pulv. Cretæ Aromaticus.
Bhang ; Gunjah ; Hashish ...	„	Cannabis Indica ; and its extracts.
Black Wash	„	Lotio Hydrargyri Nigra.
Blue Pill,—Ointment... ...	„	Pil.,—Ung. Hydrargyri.
Calomel	„	Hydrargyri Subchloridum.
Carron Oil	„	Linim. Calcis.
Chloric Ether	„	Sp. Chloroformi.
Citrine, or Golden, Ointment...	„	Ung. Hydrargyri Nitratis.
Corrosive Sublimate	„	Hydrargyri Perchloridum.
Cream of Tartar	„	Potassæ Tartras Acida.
Diachylon	„	Emplastrum Plumbi.
Dover's Powder	„	Pulv. Ipecac. Co.
Epsom Salts	„	Magnesiæ Sulphas.
Flowers of Sulphur	„	Sulphur Sublimatum.
Fowler's Solution	„	Liq. Arsenicalis.
Friar's Balsam...	„	Tr. Benzoini Co.
Glauber's Salt...	„	Sodæ Sulphas.
Granular Effervescent Citrate of Magnesia	„	Sodæ Citro-Tartras Effervescens.
Goulard's Extract	„	Liq. Plumbi Subacetatis.
Goulard Water	„	Liq. Plumbi Subacetatis Dil.
Gregory's Powder	„	Pulv. Rhei Co.
Grey Powder	„	Hydrargyrum cum Cretâ.
Griffith's Mixture	„	Mist. Ferri Co.
Hartshorn	„	Ammonia.
Laudanum	„	Tr. Opii.
Lenitive Electuary	„	Confect. Sennæ.
Litharge	„	Plumbi Oxidum.
Liver of Sulphur	„	Potassa Sulphurata.
Lunar Caustic...	„	Argenti Nitras.
Milk of Sulphur	„	Sulphur Præcipitatum.
Mindererus Spirit	„	Liq. Ammoniæ Acetatis.
Nitre ; Saltpetre	„	Potassæ Nitras.
Oil of Male Fern	„	Extract. Filicis Liquidum.
Oil of Vitriol	„	Acidum Sulphuricum.
Opodeldoc	„	Lin. Saponis.

Paregoric Elixir	of	Tr. Camphoræ Co.
Plummer's Pill	„	Pil. Hydrarg. Subchloridi Co.
Prussic Acid	„	Ac. Hydrocyanicum.
Rochelle Salt	„	Soda Tartarata.
Sal Ammoniac...	„	Ammonii Chloridum.
Sal Volatile	„	Sp. Ammoniæ Aromaticus.
Scotch Paregoric	„	Tr. Opii Ammoniata.
Scott's Ointment	„	Ung. Hydrargyri Co.
Sugar of Lead	„	Plumbi Acetas.
Sweet Spirits of Nitre ...	„	Sp. Ætheris Nitrosi.
Tartar Emetic...	„	Antimonium Tartaratum.
Vitriol : Blue, Green, White...	„	Cupri,—Ferri,—Zinci Sulphas.
White Arsenic...	„	Acidum Arseniosum.
White Precipitate	„	Hydrargyrum Ammoniatum.
Yellow Wash	„	Lotio Hydrargyri Flava.

Substitutes for Patent Remedies are introduced in Pulvis Antimonialis, for "James's Fever Powders," and in Confectio Piperis, for "Ward's Paste."

LATIN PHRASES EMPLOYED IN PRESCRIBING.

The following are among those in most frequent use.

R, recipe. M, misce ... ... take. Mix.
Aa., ana, singulorum (—arum) ... of each.
Partes æquales ... ... equal parts.
Q. s., quantum sufficiat ... .. a sufficiency.
F., fiat haustus statim sumendus ... make a draught to be taken at once.
Cujus (quorum, quarum, e quibus) sum-
a(n)tur, capia(n)tur... ... ... of which let there be taken.
Cochleare, C. modicum, amplum ... a tea-, dessert-, table-spoon.
Tertiâ quâque horâ, nocte ... ... every third hour, night.
Omni, quoque die. Alternis diebus... every day. Every other day.
Quotidie. Semel, bis, ter, quater die. daily. Once, twice, thrice, four times daily.
Cras mane. Mane primo. Vespere... to-morrow morn. The first thing in the morning. In the evening.
Sequenti nocte. Horâ somni ... the following night. At bed-time.
Post horas sex, si opus sit ... ... six hours after, if necessary.
P. r. n., pro re natâ ... ... as circumstances arise.
Alvo adstrictâ. Tusse molestâ ... when (if) the bowels be confined, the cough be troublesome.
Donec alvus dejiciat ... ... until the bowels act.
Repetatur. Sæpe utendus ... ... repeat. To be used frequently.
Ejusdem mitte... ... ... send of the same.
Dimidium. Ss., Semis ... ... a half. Half.
Semihora. Uncia cum semisse ... half an hour. An ounce and a half.
Quadrans. Tertia, quinta pars ... a quarter. A third, fifth part.
Divide in partes duodecim ... ... divide into twelve parts.
Deaurentur pilulæ ... ... gild the pills.
Aqua fervens, calida, tepida, frigida... boiling, hot, warm, cold water.
Applicetur lotio; —ntur hirudines undecim ... ... apply the lotion, eleven leeches.
Partibus affectis. Lateri dolenti ... to the affected parts, the painful side.
Femori, brachio interno, externo ... to the inner, outer side of the thigh, arm.
Tempori dextro, sinistro ... ... to the right, left temple.
Regioni hepatis, cordis ... ... to the region of the liver, heart.
Injiciatur sub cute ... ... inject subcutaneously.
Modo præscripto ... ... as directed.
Signa ... ... label as follows.

SYNOPSIS OF THE DOSES OF THE PHARMACOPŒIAL DRUGS AND PREPARATIONS,

AND OF THE LEADING NON-OFFICINAL DRUGS.*

a. OF THE DRUGS.

Phosphorus	$\frac{1}{40}$ to $\frac{1}{10}$ grain.
Iodine	$\frac{1}{2}$ grain, gradually increased.
Charcoal and Sulphur	a scruple to a drachm.
Iodoform	1 to 5 grains.
Croton-Chloral Hydrate	1 to 10 grains.
Chloral Hydrate	5 to 30 grains.
Nitroglycerin	$\frac{1}{50}$ to $\frac{1}{20}$ minim.
Creasote	1 to 3 minims.
Amyl Nitrite *(inhaled)*	2 to 5 minims.
Chloroform	3 to 10 minims.
Ether and Acetic Ether	20 minims to a drachm.
Glycerine	1 to 2 drachms.

Acids.

Arsenious	$\frac{1}{60}$ to $\frac{1}{12}$ grain.
Carbolic	1 to 3 grains.
Gallic and Tannic	2 to 10 grains.
Benzoic	10 to 15 grains.
Citric, Tartaric, and *Salicylic*	10 to 30 grains.
Dilute Hydrocyanic	2 to 8 minims.
Dilute Nitrohydrochloric	5 to 20 minims.
Dilute Sulphuric, Nitric, Hydrochloric and Phosphoric, and Aromatic Sulphuric	5 to 30 minims.
Sulphurous	$\frac{1}{2}$ to 1 drachm.
Dilute Acetic, also Vinegar and Oxymel	1 to 2 drachms.

Lactic Acid is chiefly used as a spray, diluted 8-16 times. Sometimes internally in $\frac{1}{2}$—1 drachm doses.

* The names of the non-officinal drugs are printed in *italics*.

The Metals and

Arseniates	$\frac{1}{16}$ to $\frac{1}{2}$ grain.
Valerianates	1 to 5 grains.
Hypophosphites	5 to 10 grains.
Salicylates	10 to 60 grains.

Potassium Compounds	**10 to 30 grains.** (*½ scruple to ½ drachm.*)
Except the following :—	
The Permanganate and Potassa Sulphurata ...	1 to 5 grains.
„ Iodide	1 to 10 grains.
„ Bromide	5 to 30 grains.
„ Acetate, Citrate, and Tartrates	20 to 60 grains.

Lithium Compounds.	
The Carbonate	3 to 6 grains.
„ Citrate	5 to 10 grains.

Iron and its Compounds	**1 to 5 grains.**
Except the following :—	
The Dehydrated Sulphate	½ to 3 grains.
„ Magnetic Oxide, Phosphate, Tartrated Iron and the Double Citrates	5 to 10 grains.
„ Hydrated Peroxide	5 to 30 grains.
„ Moist Peroxide	2 to 4 drachms.
The Arseniate :—see above.	

Alum ; Bismuth and Calcium Compounds ...	**5 to 20 grains.**
Except—	
Sulphide of Calcium	¼ to 1 grain.
Chalk, and Precipitated Carbonate of Lime ...	10 to 60 grains.
Hypophosphite of Lime :—see above.	

Salts used as Purgatives.	
Calomel	2 to 5 grains.
Alum	1 scr. to 1 drachm.
Sulphate of Potash	1 scr. to 2 drachms.
Sulphate of Magnesia	1 to 4 drachms.
Tartrates of Potash, and Tartrated Soda	2 to 4 drachms.
Sulphate of Soda, Acetate of Potash, and Phosphate of Soda	2 to 8 drachms.

Metallic Compounds.

Arsenious Acid	$\frac{1}{60}$ to $\frac{1}{12}$ grains.
Nitrate of Silver	$\frac{1}{4}$ to $\frac{1}{2}$ grain.
Oxide of Silver, Iodide of Lead, Acetate and Chloride of Zinc, Oxalate of Cerium, and Sulphate of Copper	$\frac{1}{4}$ to 2 grains.
Acetate of Lead	1 to 4 grains.

Sodium and Magnesium Compounds ... ... 20 to 60 grains.

(*A scruple to a drachm.*)

Except the following Sodium Compounds :—

The Dehydrated Carbonate...	3 to 10 grains.
„ Carbonate	5 to 30 grains.
„ Phosphate and Citro-tartrate	1 to 2 drachms.

The Arseniate, Valerianate, Hypophosphite, *Salicylate*:—see above.

Ammonium Compounds ... ... 5 to 20 grains.

Except the following :—

The Carbonate	3 to 10 grains.
„ Bromide	2 to 20 grains.

The *Salicylate*:—see above.

Mercury and its Compounds.

The Red Iodide, and Corrosive Sublimate ...	$\frac{1}{10}$ to $\frac{1}{4}$ grain.
The Green Iodide	1 to 3 grains.
Calomel *as an alterative*	$\frac{1}{2}$ to 1 grain.
Calomel *as a purgative*	2 to 5 grains.
Hydrarg. cum Cretâ...	3 to 8 grains.

Antimonial Compounds.

Tartar Emetic *as a diaphoretic*	$\frac{1}{10}$ to $\frac{1}{6}$ grain.
„ „ „ *depressant*	$\frac{1}{6}$ to 2 grains.
„ „ „ *emetic*	1 to 5 grains.
Oxide of Antimony and Sulphurated Antimony ...	1 to 5 grains.

Salts used as Emetics.

Tartar Emetic	1 to 5 grains.
Sulphate of Copper	5 to 10 grains.
Acetate of Zinc	10 to 20 grains.
Sulphate of Zinc	10 to 30 grains.
Carbonate of Ammonia	30 gr. freely diluted.

Animal Drugs.

Pepsin	2 to 5 grains.
Oxgall, Castor, and Musk	5 to 10 grains.
Spermaceti	1 scr. to 1 drachm.
Cod-Liver Oil	1 drm. to 1 oz.

Vegetable Drugs.

Ignatia...	$\frac{1}{8}$ to 1 grain.
Capsicum	$\frac{1}{2}$ to 1 grain.
Digitalis and Ipecacuanha	$\frac{1}{2}$ to 2 grains.
Squill	1 to 2 grains.
Nux Vomica	1 to 3 grains.
Calabar Bean	1 to 4 grains.
Rhubarb	1 to 5 grains.
Conium, Colocynth, Colchicum	2 to 8 grains.
Savin	5 to 10 grains.
Quassia, Calumba, Gentian, and most Aromatics ...	5 to 20 grains.
Jalap, Ipecacuanha as an emetic, Rhubarb as a purgative...	10 to 30 grains.
Ergot	20 to 30 grains.
Cinchona Bark	20 to 60 grains.
Cusso, Cubebs, Wurrus, and *Guarana*	1 to 2 drachms.
Mustard as an emetic, and Cassia	2 drms upwards.

Resins, Gum-resins, Oleo-resins, Balsams, Gums.

Gamboge, and Jalap-resin (or "*Jalapine*," p. 88) ...	1 to 5 grains.
Red Gum	3 to 6 grains.
Scammony-resin	3 to 8 grains.
Scammony	5 to 10 grains.
Assafœtida, Storax, and Tolu	5 to 20 grains.
Ammoniac, Benzoin, Galbanum, Guaiac, and Myrrh	10 to 30 grains.
Mastic	20 to 40 grains.
Tragacanth	20 grains upwards.
Balsam of Peru	10 to 15 minims.
,, Copaiba	$\frac{1}{2}$ to 1 drachm.

Concrete Juices, etc.

Elaterium	$\frac{1}{16}$ to $\frac{1}{2}$ grain.
Opium	$\frac{1}{2}$ to 2 grains.
Aloes	2 to 6 grains.
Camphor	2 to 10 grains.
Black Catechu	5 to 15 grains.
Galls	10 to 20 grains.
Catechu and Kino, *Lactucarium*	10 to 30 grains.
Manna	1 drm. to 1 oz.

Fixed Oils.

Croton Oil	$\frac{1}{3}$ to 1 minim.
Cod-Liver and Castor Oils	A drm. to an oz.

Volatile Oils ... 1 to 5 minims.

Except—

The Oils of Copaiba, Cubebs, and Turpentine	5 to 20 minims.
Oil of Turpentine as an Anthelmintic	1 to 4 drachms.
Oil of Eucalyptus, *Oil of Winter Green*	5 to 10 minims.
Oil of Chenopodium	5 to 20 minims.
Oil of Eucalyptus as an antiperiodic	$\frac{1}{2}$ to 1 drachm.

Active Principles (*officinal*).

Digitaline and Atropia (or Atr. Sulph.)	$\frac{1}{60}$ to $\frac{1}{30}$ grain.
Strychnia	$\frac{1}{30}$ to $\frac{1}{12}$ grain.
Veratria	$\frac{1}{12}$ to $\frac{1}{6}$ grain.
Salts of Morphia	$\frac{1}{8}$ to $\frac{1}{2}$ grain.
Podophyllin	$\frac{1}{4}$ to 1 grain.
Santonin	2 to 6 grains.
Sulphates of Quinia and Beberia, as tonics	1 to 5 grains.
" " " as antiperiodics	5 to 10 grains.

(*non-officinal*)—

Apomorphia	$\frac{1}{20}$ to $\frac{1}{5}$ grain.
Pilocarpin	$\frac{1}{8}$ to $\frac{1}{2}$ grain.*
Codeia, *Convallamarin*	$\frac{1}{2}$ to 2 grains.
Ergotin	2 to 4 grains.†
Caffein and its *Citrate*	2 to 6 grains.
Salicin	5 to 30 grains.

Cinchona alkaloids, the same as Sulphate of Quinia.

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* Usually administered hypodermically in doses of $\frac{1}{16}$ to $\frac{1}{3}$ grain.
† " " " " " 1 to 2 grains.

β. OF THE OFFICINAL PREPARATIONS.

Extracts.

Of Calabar Bean	$\frac{1}{16}$ to $\frac{1}{4}$ grain.
„ Stramonium	$\frac{1}{4}$ to $\frac{1}{2}$ grain.
„ Belladonna and Bhang	$\frac{1}{4}$ to 1 grain.
„ Colchicum, Nux Vom., Aconite, and Opium ...	$\frac{1}{2}$ to 2 grains.
„ Quassia, Poppy, Hemlock, and Aloes	2 to 5 grains.
„ Gentian, Colocynth, Chamomile, Calumba ...	2 to 10 grains.
„ Henbane	5 to 10 grains.
„ Rhubarb, Lettuce, Jalap, and Hop	5 to 15 grains.
„ Pareira, Krameria	5 to 20 grains.
„ Taraxacum, Logwood, and Liquorice	5 to 30 grains.

Liquid Extracts.

Of Cinchona, Fern, and Ergot	10 to 30 minims.
„ Opium	10 to 40 minims.
„ Liquorice, Bael, Pareira	1 to 2 drachms.
„ Sarsaparilla	2 to 4 drachms.

Juices.

Of Belladonna	5 to 15 minims.
„ Hemlock and Henbane	$\frac{1}{2}$ to 1 drachm.
„ Scoparium and Taraxacum...	1 to 2 drachms.

Essences of Anise and Peppermint ... ... 10 to 20 minims.

Infusions, Decoctions, Mixtures, and Waters, 1 to 2 ounces.

With the following exceptions.

Infusions.

Of Digitalis	1 drm. to $\frac{1}{2}$ ounce.
„ Chamomile, Matico, Bucco, and Cloves ...	1 to 4 ounces.
„ Cusso	4 to 8 ounces.
„ Linseed	ad libitum.

Decoctions.

Of Aloes	$\frac{1}{2}$ to 1 ounce.
„ Scoparium, Elm, Taraxacum	2 to 4 ounces.
„ Sarsaparilla (both simple and compound) ...	2 to 10 ounces.

Mixtures.

Of Ammoniac and Gentian	$\frac{1}{2}$ to 1 ounce.
„ Senna	1 to $1\frac{1}{2}$ ounce.

Water.

Of Cherry-laurel	5 to 30 minims.

Tinctures	**½ to 2 drachms**
With the following exceptions: namely, those	
Of Aconite	5 to 15 minims.
„ Belladonna, Iodine, Nux Vomica, Cantharides, Capsicum, Cannabis Indica, Hellebore, and Ginger (strong tincture)	5 to 20 minims.
„ Opium	5 to 40 minims.
„ Digitalis, Colchicum, Iron-Salts, Stramony, Sumbul, Squill, Lobelia, Larch	10 to 30 minims.
„ Hemlock, Chloroform, Ergot, Savin, Camph. Co. and Ginger...	15 to 60 minims.
„ Tolu	20 to 40 minims.
„ Henbane, Castor, Assafœtida, Myrrh, Benzoin, and the Ammoniated Tinctures of Opium, Guaiac, and Valerian	30 to 60 minims.
„ Senna...	2 to 4 drachms.
„ Rhubarb (as a purgative)	4 to 8 drachms.

Wines.

Of Antimony, Ipecac., Opium, and Colchicum ...	5 to 40 minims.
„ Rhubarb and Aloes	1 to 2 drachms.
„ Iron and its Citrate...	1 to 4 drachms.
„ Ipecac. as an emetic...	3 to 6 drachms.
„ Quinine; and Antimony, as an emetic	4 to 8 drachms.
Spirits	**½ to 1 drachm.**
With the following exceptions, viz.:—	
Of Camphor, Chloroform, and Rosemary	10 to 30 minims.
„ Nitrous Ether	½ to 2 drachms.
Syrups	**1 drachm.**
With the following exceptions, viz. :—	
Of Squill and Iodide of Iron	½ to 1 drachm.
„ Rhubarb and Senna...	1 to 4 drachms.
Oxymel of Squill	½ to 1 drachm.
Vinegar of Squill	1 to 2 drachms

Solutions (Liquors).

Hypodermic Injection of Morphia	1 to 6 minims.
Arsenical Solutions	2 to 8 minims.
Liq. Strychniæ and Liq. Ammon. Fortior	5 to 10 minims.
Sols. of Ammonia, Chlorine, and Iron Salts	10 to 30 minims.
Liq. Potassæ, Liq. Sodæ, Liq. Calcis Saccharatus, and Solutions of Morphia Salts	15 to 60 minims.
Liq. Bismuthi et Ammoniæ Citratis	30 to 60 minims.
Liq. Hydrarg. Perchloridi	30 to 120 minims.
Liq. Potassæ Permanganatis	2 to 4 drachms.
Solutions of Ammonia Salts	2 to 6 drachms.
Liq. Magnesiæ Carbonatis	1 to 2 ounces.
Liq. Calcis	1 to 4 ounces.
Liq. Magnesiæ Citratis and the Effervescent Solutions	5 to 10 ounces.
Oleum Phosphoratum	5 to 10 minims.

Powders.

Pulv. Elaterii Co.	1 to 5 grains.
„ Opii Co....	
Hydrargyrum cum Creta	3 to 8 grains.
Pulv. Antimonialis	3 to 10 grains.
„ Ipecacuanhæ Co.	5 to 15 grains.
„ Kino Co.	5 to 20 grains.
„ Scammonii Co.	10 to 20 grains.
„ Cinnamomi Co.	10 to 30 grains.
„ Cretæ Aromaticus c. Opio	10 to 40 grains.
„ Cretæ Aromaticus	10 to 60 grains.
„ Catechu Co.	1 to 2 scruples.
Comp. Powders of Jalap, Rhubarb, Liquorice, and Tragacanth	1 scr. to 1 drachm
Pulv. Amygdalæ Co.	1 to 2 drachms.
Confections	**1 to 2 drachms**

With the following exceptions, viz.:—

Of Opium	5 to 20 grains.
„ Scammony	10 to 30 grains.

Pills		**5 to 10 grains.**
With the following exceptions—		
Pil. Saponis Co. and Pil. Pb. c. Opio		3 to 5 grains.
Pil. Phosphori		3 to 6 grains.
Pil. Hydrargyri and Pil. Ferri Iodidi		3 to 8 grains.
Pil. Scammonii Co.		5 to 15 grains.
Pil. Ferri Carbonatis		5 to 20 grains.

*** *For the doses of standard preparations of non-officinal drugs, see p. 85.*

PROPORTION OF DOSE TO AGE:

The following scale (Gaubius') is of general acceptance.

	One-twelfth.	One-eighth.	One-sixth.	One-fourth.	One-third.		One-half,		Two-thirds.		Full dose.
Yrs.	1	2	3	4		7		14		21	

Beyond 65 yrs. diminish in the inverse gradation of the above.

Children tolerate almost adult doses of *Mercury*, but only the most minute quantities of *Opium*.

In injecting subcutaneously, commence with half the dose which would be given by the mouth.

PROPORTION OF ACTIVE INGREDIENTS IN THE PHARMACOPŒIAL PREPARATIONS.*

Dilute Acids.

See page 7.

Solutions.

Amount of active ingredient in one drachm.

Liq. Calcis ; Liq. Hydrarg. Perchloridi	$\frac{1}{16}$ grain.
Liq. Pb. Subacet. Dil.	$\frac{1}{5}$ grain.
Liq. Potassæ Permanganatis ;† Arsenical solutions and solutions of Alkaloids	$\frac{1}{2}$ grain.
Liq. Calcis Saccharatus	1 grain.
Liq. Magnesiæ Carbonatis	$1\frac{1}{2}$ grain.
Liq. Sodæ	$2\frac{1}{3}$ grains.
Liq. Iodi	$2\frac{1}{2}$ grains.
Liq. Potassæ	$3\frac{1}{2}$ grains.
Liq. Ferri Perchloridi	8 grains.
Liq. Plumbi Subacetatis	16 grains.
Liq. Epispasticus (*of Cantharides*)	22 grains.
Liq. F. Perchlor. Fortior	32 grains.
Liq. Zinci Chloridi‡	40 grains.

Liq. Bismuthi et Amm. Citratis contains 3 grains of Bismuthic Oxide in the drachm.

Liq. Calcis Chloratæ is made with $5\frac{1}{4}$ grains to the drachm.

Liq. Chlori contains $\frac{1}{8}$ grain of Chlorine in the drachm.
Liq. Ammoniæ ,, $5\frac{1}{6}$,, ,, Ammonia ,, ,,
Liq. Amm. Fortior contains nearly 16 grains of Ammonia in the drachm.

Inj. Morphiæ Hypodermica contains 5 grains of the Acetate in the drachm.

Oleum Phosphoratum contains $\frac{1}{16}$ grain of Phosphorus in 10 minims.

Syrupus contains 6 oz. of sugar in 7 fluid oz.

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* For the proportion of Opium in its preparations, see also p. 59.
† "Condy's Fluid" contains 1 grain of the Permanganate in the drachm.
‡ "Burnett's Solution" is a concentrated solution of Zincic Chloride, of sp. gr. 2.0.

Syrups.

Amount of the active drug contained in, or corresponding to, one drachm.

Syr. Ferri Phosphatis	1 grain.
Syr. Tolutanus	2 grains.
Syr. Scillæ	3 grains.
Syr. Rhei	4 grains.
Syr. Ferri Iodidi	4½ grains.
Syr. Chloral	10 grains.
Syr. Papaveris	25 grains.
Syr. Sennæ	27 grains.

Wines.

Ditto.

Vin. Quiniæ	⅛ grain.
Vin. Antimoniale (*of Tartar Emetic*)	¼ grain.
Vin. Ferri Citratis (*of F. et Amm. Citr.*)	1 grain.
Vin. Aloes	2 grains.
Vin. Ipecacuanhæ	2¾ grains.
Vin. Rhei	4 grains.
Vin. Opii (*of Opium*)	5½ grains.
Vin. Colchici	11 grains.

Tinctures.

Ditto.

Tr. Quiniæ, Q. Ammoniata	1 grain.
Tr. Iodi	1⅓ grain.
Tr. Cannabis Indicæ (*of the Extract*)	2¾ grains.
Tr. Ferri Acetatis	6 grains.
Tr. Ferri Perchloridi	8 grains.
Tr. Chloroformi Co. (*of Chloroform*)	6 minims
Tr. Lavandulæ Co. (*of Ol. Lavandulæ*)	¼ minim.
Tr. Opii Ammoniata (*of Opium*)	½ grain.
Tr. Cantharidis; Cardam. Co.	⅔ grain.
Tr. Aloes	1⅓ grains.
Tr. Capsici; Quassiæ	2 grains.
Tr. Arnicæ; Belladonnæ; Castorei; Croci	2¾ grains.
Tr. Opii; Gentianæ Co.	4 grains.
Tr. Aurantii; Benzoini Co.; Cinchonæ Co.; Kino; Nucis Vomicæ; Rhei	5½ grains.
Tr. Cinchonæ Flavæ; Guaiaci; Pyrethri; Veratri Viridis	11 grains.
Tr. Ergotæ	14 grains.
Tr. Zingiberis Fortior	27 grains.
Tr. Camphoræ Co. { *of Opium and of Benzoic Acid*	¼ grain.
Tr. Camphoræ Co. { *of Camphor*	⅙ grain.
In all other cases	7 grains.

Vinegars.

Ditto.

Acet. Cantharidis	5¼ grains.
Acet. Scillæ	7 grains.

Spirits.

See page 6.

Glycerines.

See page 7.

Essences.

See page 5.

Waters.

Amount of active ingredient in 1 *fluid ounce.*

Aq. Camphoræ	½ grain.
Aq. Chloroformi	2½ minims.

See also page 6.

Infusions and Decoctions.

Amount of the active drug to which 1 *fluid ounce corresponds.*

Inf. Digitalis	3 grains.
Inf. Gentianæ ; Quassiæ	6 grains.
Inf. Aurantii Co.; Chiratæ ; Caryophylli; Ergotæ ; Rhei ; Rosæ Acidum*; Serpentariæ	11 grains.
Inf. Valerianæ	12 grains.
Inf. Catechu ; Lini	16 grains.
Inf. Cusso	27 grains.
Inf. Cascarillæ ; Dulcamaræ ; Sennæ	44 grains.
Dec. Aloes Co.	4 grains.
Dec. Cinchonæ Flavæ ; Hæmatoxyli ; Quercus	27 grains.
Dec. Hordei ; Pareiræ	30 grains.
Dec. Granati Radicis ; Papaveris	44 grains.
Dec. Ulmi ; Sarsæ ; Sarsæ Co.	55 grains.

* And 6 minims of Acid. Sulphuric. Dil.

In all other cases	22 grains.

Mixtures.

Amount of the active drug contained in, or corresponding to, 1 *fluid ounce.*

Mistura Creasoti	1 minim.
Mist. Scammonii	2 grains.
Mist. Ferri Co. (*of Ferri Sulphas*)	2½ grains.
Mist. Guaiaci	11 grains.
Mist. Cretæ	13 grains.
Mist. Ammoniaci	14 grains.
Mist. Sennæ Co. (*of Magn. Sulphas*)	88 grains.
Mist. Sp. Vini Gallici (*of Brandy*)	3 drachms.

Powders.

See pages 152, 153.

Confections.

See page 153.

Pill-masses.

Amount of active ingredient in 3 *grains.*

Pil. Phosphori	$\frac{1}{30}$ grain.
Pil. Hydrargyri; Ferri Iodidi	1 grain.
Pil. Quiniæ	2¼ grains.

Amount of active ingredient in 5 *grains.*

Pil. Aloes Barbadoes; A. Socotrinæ	2 grains.
Pil. Aloes et Assafœtidæ (*of both*)	1¼ grain.
Pil. Aloes et Ferri { *of Aloes*	1 grain.
{ *of F. Sulphas*	¾ grain.
Pil. Aloes et Myrrhæ { *of Aloes*	1⅔ grain.
{ *of Myrrh*	half as much.
Pil. Assafœtidæ Co. (*of Assafœtida and of Galbanum*) ...	1⅓ grain.
Pil. Cambogiæ Co. (*of Gamboge and of Aloes*)	1 grain.
Pil. Colocynthidis Co. { *of Colocynth*	1 grain.
{ *of Aloes*	2 grains.
Pil. Colocynth. et Hyoscyami	half the above.
Pil. Conii Co. (*of Extract of Hemlock*)	3½ grains.
Pil. Ferri Carbonatis (*of F. Carb. Sacch.*)	4 grains.

Pil. Hydrargyri Subchloridi Co. (*of Calomel and of Sulphd. Antimony*)	1 grain.
Pil. Ipecac. cum Scilla (*of Opium*)	$\frac{1}{6}$ grain.
Pil. Plumbi cum Opio { *of Pb. Acetas*	$3\frac{3}{4}$ grains.
{ *of Opium*	$\frac{5}{8}$ grain.
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Pil. Scillæ Co. (*of Squill*)	1 grain.

Lozenges.

Amount of active ingredient in each Lozenge.

Troch. Morphiæ	$\frac{1}{30}$ grain.
Troch. Morph. c. Ipecac. { *of Morphia*	
{ *of Ipecacuanha*	$\frac{1}{12}$ grain.
Troch. Opii (*of Extract of Opium*)	$\frac{1}{10}$ grain.
Troch. Ipecacuanhæ	$\frac{1}{4}$ grain.
Troch. Acidi Tannici	$\frac{1}{2}$ grain.
Troch. Catechu ; Ferri Redacti	1 grain.
Troch. Bismuthi (*of B. Subnitras*)...	2 grains.
Troch. Pot. Chloratis ; Sodæ Bicarbonatis	5 grains.

Suppositories.

Amount of active ingredient in each Suppository.

Suppositories of Morphia	$\frac{1}{2}$ grain.
Suppositories of Carbolic Acid and Opium	1 grain.
Supp. Plumbi Co. { *of Opium*	1 grain.
{ *of Pb. Acetas*	3 grains.
Suppositories of Tannic Acid	3 grains.
Mercurial Suppository	5 grains.

Enemas.

See page 9.

Inhalations.

See page 8.

Lotions.

See page 151.

Poultices.

See page 9.

Liniments.

See page 159.

Ointments.

Amount of active ingredient in 1 *drachm.*

Ung. Aconitiæ, Atropiæ, Veratriæ	1 grain.
Ung. Plumbi Acetatis	1¾ grain.
Ung. Iodi	2 grains.
Ung. Plumbi Subacetatis	3 grains.
Ung. Pot. Sulphuratæ; Sulphuris Iodidi	4 grains.
Ung. Creasoti; Pot. Iodidi	6⅔ grains.
Ung. Cadmii; Cantharidis; Plumbi Carbonatis; Pb. Iodidi	7½ grains.
Ung. Belladonnæ; Gallæ; Zinci (*of Z. Oxidum*)	9 grains.
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Ung. Resinæ; Sabinæ	17 grains.
Ung. Hydrargyri Iodidi Rubri	2 grains.
Ung. H. Nitratis	4 grains.
Ung. H. Oxidi Rubri; H. Ammoniati	7½ grains.
Ung. H. Subchloridi	9 grains.
Ung. Hydrargyri Co. (*of Mercury*)	13 grains.
Ung. Hydrargyri	1 part in 2.
Ung. Terebinthinæ	1 part in 2.
Ung. Picis Liquidæ	5 parts in 8.
Ung. Gallæ cum Opio { *of Galls*	9 grains (nearly).
Ung. Gallæ cum Opio { *of Opium*	4 grains.

Extracts.

Proportion yielded by—

Quassia	2 per cent.
Belladonna, Colchicum	4 „ „
Physostigma, Lettuce, Hemlock, Henbane, Hop, Colchicum (*Acetic Extract*)	5 „ „
Nux Vomica	6 „ „
Aconite (variable)	7 „ „
Indian Hemp, Dandelion	8 „ „
Stramony	12 „ „
Calumba	15 „ „
Pareira	20 „ „

Rhatany, Mezereon	30 per cent.
Chamomile, Rhubarb	40 „ „
Socotrine Aloes, Opium, Gentian, Jalap	50 „ „
Barbadoes Aloes	75 „ „

Colocynth (*of Compound Extract*)—four times the Colocynth.

Liquid Extracts—

Fern	9 per cent.
Cinchona	one-fourth.
Sarsaparilla	one-half.
Ergot, Bael, Pareira	equal quantities.
Opium	ten times.

These numbers are all subject to variations.

Juices

Ditto. (*The numbers are approximative.*)

Taraxacum	30 p. c.	Hemlock and Henbane ...	50 p. c.
Scoparium	40 „	Belladonna	60 „

Effervescing Draughts.

Used to neutralise 20 *grains of—*

	Ac. Citricum.	*Ac. Tartaricum.*
Potass. Bicarbonas	14 grains.	... 15 grains.
Sodæ Bicarbonas	17 grains.	... 19 grains.
To neutralize 15 *grains of—*		
Amm. Carbonas	17 grains.	... 20 grains.
Magn. Carbonas	19 grains.	.. 23 grains.
To neutralize 10 *grains of—*		
Lithiæ Carbonas	20 grains.	... 24 grains.

Half an ounce of fresh Lemon-juice contains 16 grains of Acidum Citricum.

INCOMPATIBILITY.

Most cases of chemical incompatibility between drugs treated of in the foregoing pages will be obvious to anyone possessing a rudimentary knowledge of chemistry. The following points it may be as well to direct especial attention to :—

1.—Permanganate of Potash is decomposed in presence of organic substances. Nitrate of Silver and Corrosive Sublimate are liable to decomposition in similar circumstances. Nitrate of Silver forms an explosive compound with Creasote.

2.—Acidum Nitrohydrochloricum Dil. contains free Chlorine, which is liable to decompose organic colouring and other matters.

3.—Spiritus Ætheris Nitrosi decomposes the Iodides and Bromides, blackens solutions of Ferri Sulphas, and decomposes with Guaiac Resin.

4.—Alkaloids are for the most part precipitated from solutions of their salts by caustic alkalies and their carbonates.* The various solutions, infusions, etc., contain the alkaloids in the form of salts. The volatile alkaloids, such as Conia, are liberated by caustic alkalies.

5.—Many alkaloids are precipitated by the alkaline iodides.*

6.—Alkaloids are for the most part precipitated by Tannic and Gallic Acids,* or by preparations of drugs containing them.

7.—Tannic Acid precipitates with alkalies and their carbonates, with Ferric salts, most metallic salts, Arsenious Acid, Arsenites,* and Tartar Emetic. Gallic Acid blackens solutions of Ferric salts.

8.—Preparations of Opium precipitate metallic (not alkaline) salts, and Arsenious Acid.*

9.—Solutions of Potassæ Tartras precipitate the Acid Tartrate when acidulated.

10.—Gum Acacia forms insoluble compounds with Subacetate of Lead and with Borax. It decomposes Ferric Salts.

11.—Resins are precipitated from spirituous solutions on dilution with water (see p. 48).

The presence of free acid in certain preparations should be especially noted.

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* It must not, however, be concluded that these precipitates are therapeutically inactive.

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