MATERIA MEDICA

WITH

COMPOUNDS AND PREPARATIONS.

Not Official.

ABSINTHIUM.

WORMWOOD.

The leaves and flowering tops of *Artemisia Absinthium*, L. The drug possesses an aromatic odour and a very bitter taste. It contains a crystallisable bitter principle, **Absinthin,** slightly soluble in Water, readily in Absolute Alcohol, Chloroform and Ether; also a volatile oil, to which its physiological properties are due.

Medicinal Properties.—Cerebral stimulant. Absinthe, an alcoholic beverage used on the Continent, contains the chief constituents of Wormwood; its excessive use causes the disease known as absinthism.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Fr., (Absinthe), Ger. (Wermut), Hung., Ital. (Assenzio), Jap., Mex., Norw., Port. (Losna), Russ., Span. (Ajenjo), Swed. and Swiss. An extract is official in Belg., Fr., Ger., Ital., Port., Russ., Span., Swed. and Swiss.

Descriptive Notes.—Wormwood has silvery leaves, due to the surface on both sides being covered with appressed silky hairs, each attached by a central stalk of two to four cells. The leaves are tripinnatisect near the root with short pinnules about ½ inch long. The upper leaves are less divided, becoming trifid or simple on the inflorescence, which is a panicle of small globular greenish-yellow capitula about ⅛ of an inch in diameter. It is a local plant often occurring about old farmyards, especially near the sea. The mugwort (*Artemisia vulgaris*, L.) bears a resemblance to Wormwood, but the flower heads are oblong and the leaves are dark green on the upper surface, but silvery beneath. The leaves are larger and more acute.

TINCTURA ABSINTHII.—Wormwood, 1; Alcohol (60 p.c.), to make 10.

Dose.—1 to 4 fl. drm. = 3·6 to 14·2 c.c.

Foreign Pharmacopœias.—Official in Belg., Dan., Ger., Ital., Mex., Norw., Port., Russ. and Swiss, 1 in 5; Austr. and Hung. (compound), 1 in 10, Mex. (compound), 1 in 40; Swed. and Swiss (compound), 1 in 12½; all by weight.

ACACIÆ GUMMI.

GUM ACACIA.

FR., GOMME ARABIQUE; GER., ARABISCHES GUMMI; ITAL., GOMMA ARABICA; SPAN., GOMA ARABIGA.

A colourless or yellowish product obtained from *Acacia Senegal* and other species.

Solubility.—1 in 1 of Water. Insoluble in Absolute Alcohol, Ether and Oils.

Medicinal Properties.—Demulcent. Allowed to dissolve slowly in the mouth, allays tickling cough. For a demulcent drink, 1 of Mucilage, 1 of Syrup, and 20 of Water.

Prescribing Notes.—*It is chiefly used in the form of Mucilage in cough linctuses and lozenges, and to render oils, etc., emulsive with aqueous fluids.*

In an 8 oz. mixture 3 drm. of Mucilage of Gum Acacia are usually required for 1 oz. of oils or resinous tinctures, and 10 drm. for 1 oz. of Balsam of Copaiba. The Mucilage should be put into a mortar and the oil added by degrees with constant trituration until an emulsion is formed, then the Water or other aqueous fluid can be added by degrees. Resinous tinctures should be added to the Mucilage which has been first diluted with twice its volume of Water, but Fixed and Volatile Oils are best added to the undiluted Mucilage. It is impossible to make a nice emulsion with Oil of Male Fern unless the Mucilage be quite fresh; in such case it is better to make the Mucilage at the time by rubbing 2 of powdered Gum with 3 of Water. Another method, which gives good results with fixed oils, is to replace the Mucilage by half its weight of powdered Gum Acacia, rub the oil with the powder, then add all at once Water equal to double the weight of the powder and rub till an emulsion is formed; now add by degrees the remainder of any aqueous liquid ordered in the prescription. Resin of Copaiba makes a nice emulsion with powdered Gum and Water: the Resin is liquefied in a warm mortar, the powdered Gum mixed with it and then the Water added as in the last instance. Mucilage is used to suspend insoluble powders in mixtures, but in some cases (Bismuth salts, for instance) Tragacanth answers better. It used to be employed for making powders into pills, but they soon became hard, and it is now displaced by 'Dispensing Syrup' (see '*Glycerin*'), *Glucose, Syrup of Glucose, 'Diluted Glucose,' or Glycerin of Tragacanth.*

Official Preparations.—Mucilago Acaciæ; also used in the preparation of Pulvis Amygdalæ Compositus, Pulvis Tragacanthæ Compositus, and all Trochisci.

Not Official.—Mucilago Acaciæ, Mistura Mucilaginosa, Potion Gommeuse, Sirop de Gomme, Syrupus Acaciæ; also used in the preparation of Unna's Gum Pastes.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex., Norw., Port., Russ., Span., Swed., Swiss and U.S.

Descriptive Notes.—Gum Acacia is derived from different species of *Acacia* occurring in different countries, and in some cases from more than one species in the same district, and consequently is not uniform in character. It is sorted on its arrival in European ports into different qualities for various economic uses; hence for medicinal use, only the selected or 'picked' gum corresponding to the *B.P.* description should be used. The finest for this purpose is the Khordofan, or 'Turkey' gum of commerce, and is derived from *Acacia Senegal*, Willd.

The Gum Acacia official in the *B.P.* for medicinal use is limited to the finer commercial qualities, and is characterised by the opaque outer surface, translucent interior, nearly white or faint yellowish-white colour, by readily breaking up into angular fragments, being almost odourless, with a mucilaginous but insipid taste. *See* also Tests.

Gum that gives a glairy or ropy mucilage, like some samples of Talca and Sennaar gum, is not admissible.

Senegal gum is derived from *A. Seyal*, Delile, in the Soudan, and from *A. Adansonii*, Guill. and Perr., in Senegal. It differs from the Khordofan gum in the less cracked surface and the tough and less easily fractured interior, and is characterised by the presence of vermicular amongst the rounded pieces. The mucilage is very adhesive, and is valuable for technical purposes.

East African gum of Senegal character, and similar gum exported from Jafferabad reach England *viâ* Bombay, and are known in commerce as East India or Bombay gum. That exported from Senegal comes *viâ* Bordeaux, but all possess the same characters. True East Indian gum is very mixed in character, and several commercial varieties are recognised derived from different trees, the term amrad being applied to the reddish kinds.

West African gum (*A. nilotica*, Delile) resembles Senegal gum, but occurs in larger pieces, without vermicular pieces intermixed.

Cape gum (*A. horrida*, Willd., and *A. Kraussiana*, Meissn.) is distinguished by its very brittle character, and by giving a weak and not strongly adhesive mucilage.

Australian gum (*A. pycnantha*, Benth.) is usually reddish, and contains Tannin. Selected white qualities of these gums can only be used if they comply with the above tests.

The Talca or Sennaar gum (*A. Fistula*, Schweinf.) that gives a ropy mucilage is not easily distinguished from small gum of good quality until dissolved, except by the presence of a faint greenish tinge.

The Gummi Indicum of the *Ind.* and *Col. Add.* is derived from *Anogeissus latifolia*, Wall., and occurs in vermicular or rounded nodules, almost white if of good quality, translucent when fractured, but tough rather than brittle, and often with small fragments of bark attached, a characteristic feature which is not recognised in the Pharmacopœia. It is required, nevertheless, to yield not more than 4 p.c. of ash. The mucilage differs from that of Gum Acacia in being proportionally twice as viscid and in having a more pronounced taste.

Tests.—Gum Acacia dissolves entirely in Water, forming a distinctive more or less transparent mucilaginous liquid, which possesses a feebly acid reaction towards blue Litmus paper; it is insoluble in Alcohol (90 p.c.); its aqueous solution is precipitated by Solution of Lead Subacetate, but not by Lead Acetate Solution; and is also precipitated by strong solutions of Borax.

The more generally occurring adulterations are gums of inferior origin, Starch or Dextrin, Tannic Acid, certain Sugars, and an excessive amount of mineral matter. Inferior gums are detected by the glairy mucilage produced when the gum is dissolved in an equal weight of Water, and by the formation of a gummy deposit when this mucilage is further diluted with Water and allowed to stand; Starch or Dextrin is readily detected by Iodine Solution; Tannic Acid by the bluish-black coloration produced with Ferric Chloride Test-solution; the Sugars by Fehling's (Potassio-cupric Tartrate) Solution, and excess of mineral matter by the amount of ash left on ignition. This should not amount to more than 4 p.c. Three samples recently examined in the author's laboratory yielded 2·8, 2·9, and 3·0 p.c. The limit of ash adopted by the *B.P.* and *U.S.P.* is 4·0 p.c.; by the *P.G.*, 5·0 p.c.

Preparation.

MUCILAGO ACACIÆ. Mucilage of Gum Acacia.

4 of washed Gum Acacia dissolved in 6 of Water; the product measures about 8¾.

Dose.—1 to 4 fl. drm. = 3·6 to 14·2 c.c. or more.

Mucilage keeps well if made cold, poured into small bottles quite full, and stored in a cool place, but if kept carelessly it becomes sour very quickly in hot weather, and its emulsive property is impaired; if made with hot Water the change is more rapid.

Incompatibles.—Strong Alcohol and Sulphuric Acid; Borax, Ferric salts and Lead Subacetate render it gelatinous. It is not affected by neutral Lead Acetate.

Foreign Pharmacopœias.—Official in Dutch and Port., 2 and 3; Fr. and Mex., 1 and 1; Dan., Ger., Hung., Ital., Jap., Norw., Russ., Swed. and Swiss, 1 and 2; Span., 1 and 3; Belg., 1 and 9; Austr. and U.S., 34 in 100. All by weight.

Not Official.

MUCILAGO ACACIÆ (*U.S.*).—Washed Gum Acacia, 34; Lime Water, 33; Water, to make 100; all by weight.

MISTURA MUCILAGINOSA.—Syrup, 30 minims; Mucilage of Gum Acacia, 2 fl. drm.; Water, to 1 oz.—*Guy's.*

POTION GOMMEUSE.—Powdered Gum Arabic, 1; Simple Syrup, 3; Orange Flower Water, 1; Water, 10; all by weight.—*Fr.*

This has been incorporated in the *B.P.C.* as follows:—

Mistura Acaciæ. *Syn.* Potion Gommeuse.—Gum Acaciæ, in coarse powder, 6; Syrup, 16; Orange Flower Water, 6; Distilled Water, *q.s.* to produce 100.

SIROP DE GOMME.—Gum, 10; Sugar, 56; Water, 34; dissolve the Gum in cold Water, then the Sugar by the aid of a water-bath, and strain.—*Fr.*

SYRUPUS ACACIÆ (*U.S.*).—Selected Gum Acacia, 10; Sugar, 80; Distilled Water, to make 100 by volume.

The formula in the previous edition of the *U.S.P.* reads:—

Syrupus Acaciæ.—Mucilage of Acacia, 25; Syrup, 75.

This latter has been incorporated in the *B.P.C.*

It has been suggested that the Mucilage of Acacia should be made with Chloroform Water to overcome the tendency to fermentation.

UNNA'S GUM PASTES.—A mixture of equal parts of Mucilage of Gum Acacia and Glycerin, with which are incorporated various medicaments such as Zinc Oxide and Mercuric Oxide.

ACACIÆ CORTEX.—The dried bark of *Acacia Arabica*, and also the dried bark of *Acacia decurrens*, Willd., the Sydney Black Wattle, or of the Victorian and Tasmanian Black Wattle, are official in *Ind.* and *Col. Add.* for India and the Australian and Eastern Colonies.

Decoctum Acaciæ Corticis (1 in 16) is also official in *Ind.* and *Col. Add.* for India and the Australian and Eastern Colonies.

See also **Gummi Indicum.**

Not Official.

ACALYPHA.

The fresh and the dried herb of *Acalypha Indica*, L., are official in the *Ind.* and *Col. Add.* for India and the Eastern Colonies.

Extractum Acalyphæ Liquidum (1 in 1 with Alcohol 90 p.c.), dose 5 to 30 minims = 0·3 to 1·8 c.c.

Succus Acalyphæ, the juice expressed from the bruised fresh Acalypha 3; Alcohol (90 p.c.), *q.s.* to yield 4; dose, 1 to 4 fl. drm. = 3·6 to 14·2 c.c.

Both the Liquid Extract and the Succus are official in the *Ind.* and *Col. Add.* for India and the Eastern Colonies.

ACETANILIDUM.

ACETANILIDE.

C_8H_9NO, eq. 134·10.

B.P.Syn.—PHENYL-ACETAMIDE. Commonly known as 'Antifebrin.'

Colourless, glistening, crystalline lamellæ, having a burning and somewhat bitter taste, or a white crystalline powder.

It is the Monacetyl derivative of Aniline, and is prepared by the action of Glacial Acetic Acid upon Aniline.

Solubility.—1 in 190 of Water; 1 in 18 of boiling Water; 1 in 12 of Alcohol (60 p.c.); 1 in 4 of Alcohol (90 p.c.); about 1 in 40 of Glycerin; it is also soluble in Ether, Benzol, and Chloroform.

Medicinal Properties.—A powerful antipyretic. Useful in the pyrexia of typhoid fever, erysipelas, phthisis, acute rheumatism, and smallpox. An analgesic in neuralgia and other painful nerve affections, such as locomotor ataxia.

In some cases it produces profuse sweating, accompanied with cyanosis and rigor; it is therefore safer to commence with small doses.

From the report of a committee of the British Medical Association, it would appear that Antifebrin is less safe and less constant in its action than Antipyrine, and still less so than Phenacetin; but it is possible that the ill-effects noted were brought about by injudicious dosage. To give it in doses of 5, 6, 8, or even 10 grains, still more to repeat these after a short interval, is highly injudicious; such doses are excessive. The relative dose appears to be about one-fifth that of Antipyrine (*see* Phenazonum).—*B.M.J.* '94, i. 89.

Cases of poisoning by Acetanilide—death after taking 60 grains in 6 powders.—*B.M.J.E.* '02, i. 20; *L.* '02, i. 243.

Antidotes.—Alcohol, Strychnine, Ether, warmth to feet, etc., Oxygen inhalation.

Dose.—1 to 3 grains = 0·06 to 0·2 gramme.

Ph. Ger. maximum single dose, 0·5 gramme; maximum daily dose, 1·5 grammes.

Prescribing Notes.—*Best given in wafer paper or* **cachets**, *or dissolved in some weak spirit. May also be suspended in Water by Compound Powder of Tragacanth or Mucilage of Gum Acacia. It is sometimes given as a compressed tablet, or as an effervescent granule.*

Not Official.—Mistura Acetanilidi, Pulvis Acetanilidi Compositus, Ammonol, Hydracetin, Neuronal, Phenalgin, Bromoacetanilide.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Jap., Mex., Norw., Russ., Span., Swed., Swiss and U.S. Not in the others.

Tests.—Pure dry Acetanilide melts at 113° to 114° C. (235·4° to 237·2° F.); commercial Acetanilide melts at 111·36° C. (232·45° F.); dried Acetanilide at 112·42° C. (234·35° F.), and purified Acetanilide at 113·49° C. (236·28° F.). The *B.P.* gives the melting point when dry as 113·5° C. (236·5° F.); the *U.S.P.* gives 113° C. (235·4° F.); the *P.G.* 113° to 114° C. (235·4° to 237·2° F.). The melting point given in the *B.P.* will only be found in samples which have been purified, and dried at 100° C. (212° F.). Most commercial samples melt somewhat lower. It visibly softens several degrees below the actual melting point. If heated below Water it fuses considerably under 100° C. (212° F.). The method of determining melting points adopted by the *B.P.* has been commented upon (*Y.B.P.* '99, 427; *C.D.* '99, ii. 219, 231) and the melting points of several substances taken by four different methods compared. Great variation was found between dried and undried commercial articles and purified products. It would appear that the *B.P.* figures are compiled, and not the result of actual determination. This surmise is confirmed by a statement made by Professor Attfield that 'in the future it must be distinctly understood that the method described in the *B.P. Appendix* had not necessarily been the one by which the melting points recorded in the Pharmacopœia had been determined.' The boiling point usually given is 295° C. (563° F.), but it volatilises to a considerable extent at 100° C. (212° F.), and if an aqueous solution be distilled, Acetanilide may be detected in the distillate by the Isonitrile test. The *U.S.P.* gives the boiling point as 295° C. (563° F.) and states that it boils without decomposition.

The distinguishing test for Acetanilide is the formation of the disagreeable and highly-poisonous odour of Phenyl-Isonitrile when a minute quantity of the specimen is heated with Potassium Hydroxide Solution, a few drops of Alcohol (90 p.c.) and a little Chloroform. When heated with Potassium Hydroxide Solution alone, the characteristic aromatic odour of Aniline is evolved. The test is common to the *B.P.*, *U.S.P.* and *P.G.*, the *U.S.P.* giving quantities 0·1 gramme Acetanilide, 5 c.c. of Potassium Hydroxide Solution, and 1 c.c. of Chloroform. Various other substances yield odours somewhat resembling Phenyl-Isonitrile when treated by the Isonitrile test, but the interfering action of these substances may be destroyed by the following modification of the test, which has been tried in the author's laboratory and found to be very satisfactory, readily detecting an addition of 2 p.c. of Acetanilide. The substances experimented on were Methacetin, Phenacetin, Lactophenin, Salophen, and Phenocoll Hydrochloride. The test was carried out in the following manner:—A weighed quantity of 0·1 gramme of each of the substances is boiled with 10 c.c. of Water (Salophen is the only one not soluble in 10 c.c. of boiling Water), the mixture is cooled quickly by immersion in cold Water and filtered through Cotton-Wool. To 2 or 3 c.c. of the filtrate is added an equal volume of Potassium Hydroxide Solution (5 p.c.). The liquid is boiled, and small fragments of Potassium Permanganate added until the green colour first produced gives way to violet or purple. Two or three drops of a mixture made of 10 c.c. of Chloroform, 10 c.c. of Alcohol (90 p.c.), and 5 c.c. of Ammonia Solution are added, the mixture boiled, and a little more of the Chloroform, Alcohol, and Ammonia mixture added if the Permanganate has not been reduced completely. After the Chloroform has vaporised by standing a few moments, the odour is noted, and compared, if doubtful, with that yielded by a minute fragment of Acetanilide or a dilute Acetanilide solution. In testing Exalgin omit the Potassium Permanganate, otherwise the test is made as above.

The *U.S.P.* and the *P.G.* give a confirmatory test for Aniline, the former requiring that 0·1 gramme of Acetanilide, when boiled with 2 c.c. of Hydrochloric Acid for several minutes, shall yield a clear solution which, when mixed with 3 c.c. of a 1 in 20 aqueous Phenol Solution and 5 c.c. of filtered saturated Chlorinated Lime Solution, shall produce a brownish-red colour, changing to deep blue on supersaturation with Ammonia Solution. The *B.P.* does not give a similar test, neither does it specifically require Acetanilide to afford 'the reactions characteristic of Acetic Acid.' The acetic radical may be satisfactorily tested for, by warming a little of the specimen with Potassium Hydroxide Solution, cooling and removing the Aniline by means of Ether. The residue left after the evaporation of the Ether from the ethereal liquid, may be examined for Aniline by the Chlorinated Lime and Ammonia test. A portion of the aqueous liquid, after the removal of the dissolved Ether, is mixed with an equal volume of Sulphuric Acid (the mixture being meanwhile kept cool), a few drops of Alcohol (90 p.c.) are added and the liquid warmed, the characteristic odour of Acetic Ether is evolved.

A cold saturated aqueous solution decolorises Bromine Water and at the same time throws down a white precipitate quite distinct even at a dilution of 1 in 2000. If the Bromine Water precipitate be dissolved by heat, it crystallises out on cooling in long tufted needles. The production of this insoluble Bromine compound distinguishes Acetanilide from Phenacetin. The Isonitrile test distinguishes it from Methylacetanilide (Exalgin), Phenacetin, and Phenazone (Antipyrine), neither of these substances yielding the reaction with this test.

The more generally occurring impurities are free Acetic Acid, unconverted Aniline, Aniline salts and mineral matter. Acetanilide should be neutral in reaction towards Litmus solution, as is also Phenacetin, but with Acetone and Aniline salts the solution becomes red, and with Phenazone blue, so that the reaction towards Litmus at once detects the presence of free Acetic Acid and affords confirmatory evidence of the presence of Acetone, Aniline salts or Phenazone. The reaction in the cold towards Ferric Chloride Test-solution ensures the absence of Acetone, Phenazone and salts of Aniline. The aqueous solution of Acetanilide should not be affected by this reagent. Acetone is a most unlikely impurity, and the object of answering a test is therefore not apparent. The value of Ferric Chloride as a reagent for Acetone is, moreover, open to question. Phenazone gives a deep red coloration, which is discharged by strong Hydrochloric Acid. On boiling, Acetanilide and Phenacetin solutions become red, and in both cases the colour is discharged by strong Hydrochloric Acid. Aniline Chloride with this reagent gives no change at first, but in a few moments becomes green. Very little importance can be attached to the behaviour of Acetanilide when boiled with Ferric Chloride Test-solution, as the Ferric Chloride itself becomes of a reddish-brown colour on boiling, owing to the formation of basic Iron salts. Acetanilide should form practically colourless solutions with Sulphuric or Nitric Acid, indicating the absence of readily charred organic impurities, Phenacetin and

Phenazone. Phenacetin gives a colourless solution with Sulphuric Acid, but a deep orange colour with Nitric Acid. Phenazone gives a green coloration with Nitric Acid. The latter impurity on account of its much higher price is unlikely to appear as an adulterant of this substance. The tests with Sulphuric Acid and Nitric Acid are common to the *B.P.* and *P.G.* The *U.S.P.* includes a Sulphuric Acid test but no Nitric Acid test. The sample should leave no weighable residue after ignition. This statement is common to the *B.P.*, *U.S.P.* and *P.G.*

Not Official.

MISTURA ACETANILIDI.—Acetanilide, 5 grains; Compound Tincture of Lavender, 1 fl. drm.; Spirit of Chloroform, 15 minims; Water, to 1 fl. oz.

PULVIS ACETANILIDI COMPOSITUS (*U.S.*). — Acetanilide, 7; Caffeine, 1; Sodium Bicarbonate, 2.

Dose.—3 to 5 grains = 0·2 to 0·32 gramme.

This formula was in the *B.P.C. Formulary* 1901, and is now incorporated in the *B.P.C.*

The specialities, **Antikamnia, Antisepsin,** and **Antitoxine,** all contain Acetanilide.

AMMONOL.—An ammoniated derivative of Acetanilide. Soluble about 1 in 110 of Water; partly soluble in Alcohol (90 p.c.).

Dose.—5 to 10 grains = 0·32 to 0·65 gramme. The doses of the **Salicylate, Bromide,** and **Lithiate** are practically the same. The Salicylate darkens on exposure to light; it is soluble 1 in 50 of Water.

HYDRACETIN (Acetylphenylhydrazin). — Colourless prismatic crystals, soluble in Water and in Alcohol (90 p.c.). It is a powerful but dangerous antipyretic; has been given internally in doses of 1 to 2 grains, and has been used externally as a 10 p.c. ointment in psoriasis.

It should be reckoned as a poisonous rather than as a therapeutic agent (Stockman).—*B.M.J.* '98, ii. 1054; decidedly harmful (Leech).—*B.M.J.* '98, ii. 1056.

NEURONAL (Bromo-diethylacetamide). — A crystalline substance only slightly soluble in Water. It contains about 41 p.c. of Bromine. Introduced as a hypnotic and sedative.

Dose.—10 to 20 grains = 0·65 to 1·3 grammes.

It is stated (*B.M.J.* '04, ii. 1414; *B.M.J.E.* '05, i. 21) to be of special value in cases of epilepsy.

It contains a large proportion of Bromine and is said (*B.M.J.* '05, ii. 4) to act well in conditions of excitement and nervous irritability. The hypnotic action is pure and is added to the sedative action which is dependent on the Bromine.

In 40 cases in an asylum for the insane (*B.M.J.E.* '05, ii. 16), ½ grain as a commencing dose, when excitement was present as much as 3 grains was given for a single dose, and 6 grains for a daily dose. The rapidity of its action gives it an advantage over other hypnotics.

It is a very useful hypnotic (*L.* '05, ii. 119) in cases of simple insomnia and in states of mental confusion or a sub-acute mania. It has no cumulative effect when given for many days. Dose does not require increasing, and when the drug is left off no trouble apparently arises.

PHENALGIN.—An ammoniated derivative of Acetanilide. A white powder, soluble about 1 in 110 of Water; partly soluble in Alcohol (90 p.c.).

Dose.—5 to 20 grains = 0·32 to 1·3 grammes.

BROMOACETANILIDE (Antisepsin; Asepsin).—Colourless crystals, practically insoluble in Water and Alcohol (90 p.c.).

Dose.—3 to 15 grains = 0·2 to 1 gramme.

Not Official.

ACETUM.

VINEGAR.

Fr., Vinaigre; Ger., Essig; Ital., Aceto; Span., Vinagre.

A clear colourless or yellowish-brown liquid, possessing an acetous odour and taste. It should contain about 5 p.c. of Hydrogen Acetate. It is produced by the alcoholic and acetous fermentation of a vegetable juice or infusion.

Medicinal Properties.—Refrigerant and sialagogue. As a cooling **lotion** in bruises and sprains. Sponged on the skin in fever, or given internally, checks excessive perspiration and lowers temperature. A wineglassful of Vinegar is useful to counteract the intoxicating effects of Alcohol.

The most ready and safe antidote in cases of poisoning by alkalis.

A hæmostatic in post-partum hæmorrhage.—*B.M.J.* '85, i. 56.

Recommended to prevent sickness after Chloroform, immediately replacing the inhaler by a linen cloth soaked in Vinegar, and allowing this to remain over the patient's face for at least three hours after the completion of the operation.—*B.M.J.E.* '95, ii. 63.

Dose.—1 fl. drm. to 1 fl. oz. = 3·6 to 28·4 c.c., diluted.

Incompatibles.—Ammonia, Lime, fixed Alkalis, and Carbonates.

Foreign Pharmacopœias.—Official in Austr., Belg., Fr., Ger., Hung. and Russ., 6 p.c. Acetic Acid; Dan., 4·7 p.c.; Ital., 5–6 p.c.; Port., 7–9 p.c.; Russ., 6 p.c.; Span., 6 to 8 p.c.; Swiss, 5 p.c.: all are without Sulphuric Acid; Mex., (Vinagre). Not in the others.

Tests.—Sp. gr. about 1·02. 10 c.c. should require for neutralisation not less than 8·2 c.c. Volumetric Sodium Hydroxide Solution corresponding to 4·8 p.c. Hydrogen Acetate. The neutralised liquid should yield a deep red coloration on the addition of a few drops of Ferric Chloride Test-solution, and should be free from empyreumatic odour or taste. Vinegar should yield no reaction when tested with Hydrogen Sulphide (absence of Lead, Copper, and Arsenic), and only the slightest reaction with Barium Chloride, Silver Nitrate, or Ferrous Sulphate solution (absence of more than traces of Sulphates, Chlorides, and Nitrates). The residue left on evaporation to dryness should be free from any signs of charring, and the ash remaining after ignition should be alkaline, indicating the absence of free Sulphuric Acid. The *P.G.* allows not more than 0·5 p.c. residue on evaporation, and this residue must leave an alkaline ash on incineration.

ACIDUM PYROLIGNEOSUM CRUDUM.—A brown liquid, having an odour of Tar and Acetic Acid, and containing about 6 p.c. of the latter. Deposits a tarry substance on standing some time. It is a good antiseptic.

Foreign Pharmacopœias.—Official in Austr., Ger., Jap., Norw., Russ. and Swiss. Not in the others.

A **Rectified Pyroligneous Acid** is also official in Dutch, containing 6 p.c. of Acetic Acid; Ger., 5 p.c.; Russ., 4·5 p.c.; Swiss, 5 to 5·4 p.c.

ACIDUM ACETICUM.

ACETIC ACID.

Fr., Acide Acétique; Ger., Essigsaure; Ital., Acido Acetico.

A clear colourless liquid, possessing an acetous odour, and containing 33 p.c. of Hydrogen Acetate, $HC_2H_3O_2$, eq. 59·58.

It is produced during the destructive distillation of Wood, and by the oxidation of Ethyl Alcohol.

Medicinal Properties.—Rubefacient; skin parasiticide. A good application for ringworm. As a **gargle**, 15 minims to 1 oz. of Water. Diluted Acetic Acid is used for the same purposes as Vinegar.

Official Preparations.—Acidum Aceticum Dilutum. Used in the preparation of Liquor Ammonii Acetatis, Oxymel, and Oxymel Scillæ.

Incompatibles.—Ammonia, Lime, fixed Alkalis, and Carbonates.

Foreign Pharmacopœias.—Official in Jap., 36 p.c., sp. gr. 1·048; U.S., 36 p.c., sp. gr. 1·045 at 25° C. (77° F.); Norw., 30 p.c., sp. gr. 1·042; Dan., 29 p.c., sp. gr. 1·041; Dutch and Russ., 30 p.c., sp. gr. 1·041; Port. (Acido Acetico Hydratado), 38 p.c., sp. gr. 1·050; Fr., 50 p.c., sp. gr. 1·060; Swed., 25 p.c., sp. gr. 1·036.

The Acidum Aceticum of Belg., Fr., Ger., Span. and Swiss is practically Glacial; Belg. and Ger., 96 p.c., sp. gr. 1·064.

The Acidum Aceticum Dilutum of Austr., Ger., Hung. and Swiss more resembles *B.P.* Acidum Aceticum; Hung., 20 p.c.; Austr., Ger. and Swiss, 30 p.c.

Tests.—Acetic Acid has a specific gravity of 1·044, which corresponds with the *B.P.* figure; the *U.S.P.* gives 1·045 at 25° C. (77° F.); the *P.G.* Dilute Acetic Acid, which corresponds to the Acetic Acid *B.P.*, is required to possess a specific gravity of 1·041. The acid is required to contain 33 p.c. of absolute Acetic Acid, as indicated by titration with Volumetric Sodium Hydroxide Solution, 1 gramme of an acid of the official strength neutralising 5·5 c.c. of the Normal Solution. The *U.S.P.* acid is required to contain not less than 36 p.c. by weight of absolute Acetic Acid, a weighed portion of the acid being diluted with Water and an aliquot portion of the dilution titrated with Normal Volumetric Potassium Hydroxide Solution, the *U.S.P.* stating that Phenolphthalein Test-solution is to be used as an indicator of neutrality; the *P.G.* acid contains 30 p.c. w/w of pure acid. The exactly neutralised liquid yields on the addition of Ferric Chloride Test-solution a deep red coloration, and on boiling the liquid, a reddish-brown precipitate is thrown down; the red coloration is destroyed by Hydrochloric Acid. A portion of the neutralised liquid mixed with an equal volume of Sulphuric Acid, the mixture meanwhile being carefully kept cool affords when warmed, after the addition of a few drops of Alcohol (90 p.c.), a characteristic ethereal odour of Acetic Ether.

The more generally occurring impurities are empyreumatic matter, Sulphurous and Formic Acids, Arsenic, Copper and Lead, Chlorides and Nitrates and fixed impurities.

All three Pharmacopœias employ the Permanganate test for fixing a limit to the quantity of empyreumatic matter; the *B.P.* and the *U.S.P.* both employ 2 c.c. of the acid previously diluted with 10 c.c. of Water. The *B.P.* directs 1 drop of Potassium Permanganate Solution (1 p.c. w/v), and requires that after the lapse of half a minute the liquid shall still retain a shade of crimson; the *U.S.P.* adds 5 drops of Tenth-normal Volumetric Potassium Permanganate Solution, and requires that the liquid shall not become entirely free from pinkish-brown in less than half a minute. Both Pharmacopœias require that the Permanganate Solution shall not be immediately decolorised; the *P.G.* employs 20 c.c. of the acid and 1 c.c. of Potassium Permanganate Solution (0·1 p.c. w/w) requiring that the red coloration shall not disappear within 10 minutes. The ammoniacal Silver Nitrate test may be employed for the detection of Formic and Sulphurous Acid, 5 c.c. of the acid should yield no dark deposit when boiled for one or two minutes with 10 c.c. of Ammonia Solution and 5 c.c. of Volumetric Silver Nitrate Solution. The *B.P.* uses a solution of the acid exactly neutralised with Ammonia Solution; the *P.G.* does not include a test. A 1 in 10 dilution of the acid slightly acidified with diluted Hydrochloric Acid Solution shall give no coloration on the addition of Hydrogen Sulphide Solution, indicating the absence of Arsenic, Copper and Lead; the *P.G.* includes a specific test for Arsenic requiring that 1 c.c. of the acid and 3 c.c. of Stannous Chloride Solution shall not assume a dark coloration after the lapse of an hour. The presence of Copper is also shown when the liquid is slightly supersaturated with Ammonia Solution, the liquid assuming a bluish tint if that metal be present. A 1 to 10 dilution should not yield a precipitate or turbidity with Silver Nitrate Solution or with Barium Chloride Solution, indicating the absence of Chlorides and Sulphates. It should leave no residue when evaporated to dryness, indicating the absence of fixed impurities; this requirement is common to the *B.P.* and the *U.S.P.*

Volumetric Determination.—5 c.c. require 26 c.c. of Potassium Hydroxide Solution, *P.G.*; when 10 grammes are diluted with Water to 100 c.c., 59·6 c.c. of the dilution should require 36 c.c. of Normal V.S. of Potassium Hydroxide, Phenolphthalein Solution being used as an indicator, *U.S.P.*

Preparation.

ACIDUM ACETICUM DILUTUM. DILUTED ACETIC ACID.

Acetic Acid, $2\frac{1}{2}$, diluted with Distilled Water, *q.s.* to yield 20.

Dose.—$\frac{1}{2}$ to 2 fl. drm. = 1·8 to 7·1 c.c.

Official Preparations.—Used in the preparation of Acetum Ipecacuanhæ, Acetum Scillæ, and Liquor Morphinæ Acetatis.

Foreign Pharmacopœias.—Official in Austr., Ger., and Swiss, 30 p.c. Acetic Acid, sp. gr. 1·041; Hung., 20 p.c.; Ital., A. A. Conc. 1, Water 4, sp. gr. 1·027; Belg., A. A. 3, Water 7; Jap. and Dutch, 6 p.c.; Port. (A. A. Aquoso), 10 p.c., sp. gr. 1·015; U.S., 6 p.c., sp. gr. 1·009 at 25° C. (77° F.); Mex., 3·63 p.c.; Fr., 10 p.c., sp. gr. 1·014. *See* also Acetum.

Tests.—Diluted Acetic Acid has a sp. gr. of 1·006 and is officially required to contain 4·27 p.c. by weight of Hydrogen Acetate, $HC_2H_3O_2$, eq. 59·58, as ascertained by titration with Deci-normal Volumetric Sodium Hydroxide Solution. Acetic Acid *B.P.* is used in the preparation of the diluted acid, which is therefore naturally required to answer the tests given under Acetic Acid. The Diluted Acetic Acid of the *U.S.P.* is required to contain not less than 6 p.c. w/w of absolute Acetic Acid; Diluted Acetic Acid *P.G.* corresponds very closely to the Acetic Acid *B.P.*

ACIDUM ACETICUM GLACIALE.

GLACIAL ACETIC ACID.

FR., ACIDE ACÉTIQUE CRISTALLISABLE; GER., ESSIGSAURE; ITAL. AND SPAN., *see* below.

A clear colourless liquid, having a pungent acetous odour. It crystallises in the cold, but again becomes fluid at temperatures above

15·5° C. (60° F.). It should contain 99 p.c. of Hydrogen Acetate. $\mathbf{HC_2H_3O_2}$, eq. 59·58.

It is three times as strong as Acidum Aceticum, and nearly twenty-four times as strong as Acidum Aceticum Dilutum.

Solubility.—It **dissolves** Camphor, Gum-resins, Resins, and Volatile Oils. It mixes with Water and Absolute Alcohol.

Medicinal Properties.—Escharotic; used for corns and warts; it speedily vesicates, and thus is useful in cases where Cantharides may do harm by being absorbed, but it causes much pain, and if applied incautiously may produce a most troublesome sore. When scented, it is employed to fill vinaigrettes containing sponge or fragments of Potassium Sulphate.

Official Preparations.—Used in the preparation of Acetum Cantharidis Linimentum Terebinthinæ Aceticum, and Liquor Ferri Acetatis.

Not Official.—Acidum Aceticum Aromaticum, Acetum Aromaticum, Acetum Odoratum, Vinaigre Anglais, Vinaigre des Quatre Voleurs, Vapor Acidi Acetici, Acidum Trichloraceticum.

Antidotes.—Large quantity of Soap and Water to be swallowed; Lime Water, or Chalk and Water; Fluid Magnesia. Stomach-tube *not* to be used.—*Murrell.*

Foreign Pharmacopœias.—Official in Austr., Hung. and Swed. (A. A. Concentratum), Belg., Ger. and Swiss (Acidum Aceticum), Ital. (Acido Acetico Concentrato), Russ. (A. A. Glaciale), all 96 p.c., sp. gr. 1·064; Dutch (A. A. Concentratum), not less than 97·2 p.c.: Jap., 96 p.c., sp. gr. 1·056–1·064; Mex. (Acido Acetico Cristalizable), sp. gr. 1·063; Span. (Acido Acetico), 94–98 p.c., sp. gr. 1·060–1·067; U.S., sp. gr. not above 1·049 at 25° C. (77° F.), not less than 99 p.c.; Fr. (Acide Acétique), and Port. (A. A. Glacial), nearly 100 p.c. Not in the others.

Tests.—Glacial Acetic Acid melts at about 15° C. (59° F.). *B.P.* melting point and the strength of the acid as estimated volumetrically do not coincide. The official figure of 'above 60° F. (15·5° C.)' indicates, according to Rudorff's table, an acid containing 99·5 p.c., whereas the titration figure shows 98·9 p.c., corresponding to a m.p. of 58·6° F. (14·8° C.).

The author has pointed out (*P.J.* '02, ii 414) that the abstract of Rudorff's table given in *Pharmaceutical Journal,* [3] ii. 241, is incorrect. Rudorff's paper originally appears in 1870 in the *Berichte der deutschen chemischen Gesellschaft* (vol. 3, p. 390), which was copied into Wittstein's *Vierteljahresschrift für praktische Pharmacie,* 1871, band. xx. p. 84, and thence translated into the *Pharmaceutical Journal.* The figure given for an acid containing 0·497 p.c. of Water is incorrectly copied by Wittstein as 16·65° C., instead of 15·65° C., and the error has been perpetuated in the translation of the abstract given in the *P.J.*

It has a specific gravity of about 1·055; the *B.P.* states 1·058; the *U.S.P.* not above 1·049 at 25° C. (77° F.); the *P.G.* at most 1·064. The boiling point of the acid, official in the *U.S.P.* and the *P.G.* is 117° to 118° C. (242·6° to 244·4° F.). When exactly neutralised with Ammonia Solution it answers the tests with Ferric Chloride Test-solution and Sulphuric Acid and Alcohol (90 p.c.) characteristic of Acetates given under Acidum Aceticum. It is officially required to contain 98·9 p.c. w/w of absolute Acetic Acid as determined by titration with Volumetric Sodium Hydroxide Solution, 1 gramme diluted with 50 times its volume of Water neutralising 16·6 c.c. of the Volumetric Solution; the *U.S.P.* requires it to contain not less than 99 p.c. w/w of absolute Acetic Acid, mentioning that Phenolphthalein Test-solution is to be used as an indicator; the *P.G.* requires it to contain at least 96 p.c. w/w of absolute Acetic Acid. The two latter Pharmacopœias employ Normal Volumetric Potassium Hydroxide Solution for the titration, as shown in the small type below. Both the *B.P.* and the *U.S.P.* require the acid to answer the tests of purity given under Acidum Aceticum, the latter Pharmacopœia includes an additional recommendation, that in carrying out the Permanganate test 2 c.c. of the acid diluted with 10 c.c. of Water should be used, that two drops of Tenth-normal Volumetric Potassium Permanganate Solution should be added and that the tint produced should not be changed to brown within two hours.

The miscibility of Turpentine with an equal volume of Glacial Acetic Acid has been proposed as a test of strength of the latter (*P.J.* '99, ii. 201); but the author has shown (*P.J.* '02, i. 513) that an acid conforming strictly to the *B.P.* titration test cannot be expected to form a clear solution with all samples of Oil of Turpentine when mixed in equal volumes. It becomes, however, a delicate test for a strength of 99·5 p.c. acid or stronger.

Volumetric Determination.—Each 5 c.c. of a mixture of 1 part Acid and 9 parts Water by weight should require at least 8 c.c. Normal Volumetric Potassium Hydroxide Solution, *P.G.* 3 grammes of Acid are accurately weighed, diluted with 50 c.c. of Water, and titrated with Normal Volumetric Potassium Hydroxide Solution, Phenolphthalein T.S. being used as indicator, *U.S.P.*

Not Official.

ACIDUM ACETICUM AROMATICUM.—Glacial Acetic Acid, 72; Oil of Cloves, 9; Oil of Lavender, 6; Oil of Orange, 6; Oil of Bergamot, 3; Oil of Thyme, 3; Oil of Cinnamon, 1. All by weight; mix and filter.

This has been incorporated in the *B.P.C.* as follows—

Acidum Aceticum Aromaticum.—Oil of Bergamot, 2·50; Oil of Cinnamon, 1·25; Oil of Cloves, 10; Oil of Lavender, 5; Oil of Orange, 5; Oil of Thyme, 2·50; Glacial Acetic Acid, *q.s.* to produce 100.—*B.P.C.*

ACETUM AROMATICUM (*Ger.*).—Oils of Lavender, Peppermint, Rosemary, Juniper, and Cinnamon, of each 1; Oil of Lemon, 2; Oil of Cloves, 2; Spirit, 441; Diluted Acetic Acid, 650; Water, 1900. All by weight; digest 8 days, and filter.

Preparations containing similar ingredients but in different proportions are given in Austr., Fr., Hung., Ital., Jap., Mex., Norw., Port., Russ., Swed. and Swiss.

Acetum Aromaticum.—Eau de Cologne, 930; Tincture of Benzoin, 10; Glacial Acetic Acid, 60.—*Belg.*

Acetum Odoratum.—Oil of Bergamot, 0·50; Oil of Cassia, 0·10; Oil of Cloves, 0·30; Oil of Lavender, 0·20; Oil of Lemon, 0·50; Tincture of Balsam of Tolu, 1; Simple Tincture of Benzoin, 10; Alcohol (90 p.c.), 50; Glacial Acetic Acid, 4; Distilled Water, *q.s.* to produce 100.—*B.P.C.*

VINAIGRE ANGLAIS.—Glacial Acetic Acid, 500; Camphor, 50; Oil of Cinnamon, 1; Oil of Cloves, 1; Oil of Lavender, ½. All by weight; mix.

VINAIGRE DES QUATRE VOLEURS.—Tops of the Greater and Lesser Wormwood (*Artemisia Absinthium* and *A. pontica*), Rosemary, Sage, Peppermint, Rue, and Lavender Flowers, of each 15; Calamus Root, Cinnamon, Cloves, Nutmeg, and Garlic, of each 2; Camphor, 4; Glacial Acetic Acid, 15; Strong White Vinegar, 1000. Dissolve the Camphor in the Glacial Acid; macerate the other ingredients in the Vinegar for ten days; press and mix.

VAPOR ACIDI ACETICI.—Glacial Acetic Acid and Acetic Acid, equal parts; mix. Two teaspoonfuls in a pint of Water at 140° F. for each inhalation. Sedative and antiseptic; used for inflammatory sore throat of scarlet fever.—*Throat.*

ACIDUM TRICHLORACETICUM.—A substitution product of Acetic Acid, but it is most readily prepared by acting on Chloral Hydrate with Nitric Acid in sunlight. Colourless, deliquescent crystals, which fuse at 55° C. (131° F.), and boil at 195° C. (383° F.).

Readily soluble in Water and in Alcohol (90 p.c.).

It is a powerful antiseptic and caustic. 1 or 2 p.c. solutions have been used as a dressing for wounds, and as a lotion and spray in acute coryza. Internally, in dilute solution, 2 to 5 grains for adults, ½ to 1 grain for children, in gastric catarrh and summer diarrhœa.—*L.M.R.* '83, 285; *T.G.* '85, 63; and '94, 349.

A test for albumen in urine.—*B.M.J.* '89, ii. 1114; and '90, i. 681.

Foreign Pharmacopœias.—Official in Dutch, Ger., Jap., Mex., Swiss, U.S.

ACIDUM ARSENIOSUM.

ARSENIOUS ANHYDRIDE.

B.P.Syn.—ARSENIC; WHITE ARSENIC; ARSENIOUS ACID.

FR., ANHYDRIDE ARSENIEUX; GER., ARSENIGESAURE; ITAL., ANIDRIDE ARSENIOSA; SPAN., ANHIDRIDO ARSENIOSO.

As_4O_6, eq. 393·28.

A heavy white odourless and tasteless powder, or white opaque and crystalline or glassy and amorphous masses, obtained from arsenical ores.

Solubility.—1 in 100 of cold Water; 1 in 20 of boiling Water; 1 in 500 of Alcohol (90 p.c.); 1 in 6 of Hydrochloric Acid; 1 in 8 of Glycerin; 1 in 11 of Solution of Potash; 1 in 40 of saturated solution of Sodium Carbonate.

These figures are approximate. The published solubilities of Arsenious Acid are very contradictory, owing, no doubt, to the specimens examined being either vitreous, opaque, or a mixture of the two, and therefore of different solubilities.

Medicinal Properties.—A general tonic and alterative. Valuable in chorea, chronic (not acute) eczema, lichen, acne and psoriasis, in gout and chronic rheumatism, in painful dyspepsia, in neuralgia and spasmodic asthma, especially if anæmic or malarial in origin; in the intervals between the attacks of angina pectoris; recommended in hay fever. Given in pernicious anæmia and allied blood diseases with good result. Indispensable in all forms of weak heart accompanied by pain. Antiperiodic in malaria; in small doses it is stimulant to nervous system. In the form of **paste** it is used to destroy the pulp before stopping carious teeth.

Small doses of Arsenic, from 3 to 5 minims of Fowler's Solution, well diluted, three times a day, the best tonic treatment of the rapid heart of influenza.—*L.* '99, ii. 1079.

Arsenical mixture for the removal of malignant tumours. Arsenious Acid, 1; Absolute Alcohol, 75; Aqua Dest. 75, increasing the strength of Arsenic to 1 in 100, or even 1 in 80.—*B.M.J.E.* '01, ii. 15.

Large doses in chorea. Fowler's Solution, 15 to 20 minims three times daily, reduced to 5 minims, and discontinued on the eighth day.—*B.M.J.* '01, ii. 1452.

Arsenic may be administered in solution, in pills, or by injection; injections are painful; Asiatic pills are much used on the Continent; but on the whole the advantages are all in favour of the time-honoured Fowler's Solution.—*L.* '03, i. 784; *B.M.J.* '03, i. 656.

Dose.—$\frac{1}{60}$ to $\frac{1}{15}$ of a grain = 0·001 to 0·004 gramme.

Ph. Ger. maximum single dose, 0·005 gramme; maximum daily dose, 0·015 gramme.

Prescribing Notes.—In solution, tablet *or* **pill.** *A good pill is made by well triturating with Milk Sugar and massing with 'Diluted Glucose.' Arsenic is usually given immediately after a meal. Solution of Arsenic is frequently prescribed with Solution of Strychnine; in such cases the (acid) Liq. Arsenici Hydrochloricus should be ordered, and not the (alkaline) Liquor Arsenicalis.*

Incompatibles.—Salts of Iron, Magnesia, Lime Water, and vegetable astringents.

Official Preparations.—Liquor Arsenicalis, Liquor Arsenici Hydrochloricus. Other preparations containing Arsenium: Arsenii Iodidum, Ferri Arsenas, Sodii Arsenas, Liquor Sodii Arsenatis and Liquor Arsenii et Hydrargyri Iodidi.

Not Official.—Liquor Ammonii Arsenitis, Pilula Asiatica, Granula Dioscoridis, Arsenical Paste, Arsenical Fibre, Arsenical Caustic Powders, Levico Water and La Bourboule Water. *See* also Liq. Auri et Arsenii Bromidi (*U.S.N.F.*), Sodium Cacodylicum, Arsenii Bromidi Liquor.

Antidotes.—The freshly-prepared moist Ferric Hydroxide, or large quantities of Calcined Magnesia; Dialysed Iron, followed by some Common Salt (to ensure precipitation of Ferric Hydroxide); Stomach-tube, Emetics; Mucilaginous drinks, Olive Oil, or Carron Oil; stimulants freely, if much prostration; warmth (hot blankets and bottles).

Antidotum Arsenici (*Belg., Dan., Dutch, Hung., Ital., Jap., Port., Russ., Swiss* and *U.S.*).

They vary considerably in the quantities of Iron, Magnesia, and Water. Hung., Jap., Russ., Swiss and U.S. employ Ferric Sulphate; Belg., Dan., Dutch and Port. use Ferric Chloride.

U.S. formula (Ferri Hydroxidum cum Magnesii Oxido).—Mix 40 c.c. of Solution of Ferric Sulphate (sp. gr. 1·432) with 125 c.c. of Water, and keep the liquid in a large, well-stoppered bottle. Rub 10 grammes of Magnesium Oxide with cold Water to a smooth and thin mixture, transfer this to a bottle capable of holding about 1000 c.c., and fill it with Water to about three-fourths of its capacity. When the preparation is wanted for use, shake the Magnesium Oxide mixture to a homogeneous, thin magma, gradually add to it the diluted solution of Ferric Sulphate, and shake them together until a uniform smooth mixture results.

Note.—The diluted Solution of Ferric Sulphate, and the mixture of Magnesium Oxide with Water, should always be kept on hand, ready for immediate use.

Foreign Pharmacopœias.—Official in Belg., A. Arseniosum; Austr., Dan., Dutch, Ger., Hung., Jap., Norw., Russ., Swed. and Swiss, A. Arsenicosum; Fr., Ital.; Mex. and Port., Acido Arsenioso; Span.; U.S., Arseni Trioxidum.

Tests.—Arsenious Acid is distinguished by the following tests: (1) the microscopical appearance of the sublimate produced on heating a small quantity in a test-tube, brilliant transparent octahedral crystals being formed; (2) the pale yellow-coloured precipitate, soluble in Ammonia Solution and in Nitric Acid, which is thrown down when Silver Ammonio-nitrate Solution is added to its aqueous solution; (3) when dropped upon red-hot charcoal it produces the characteristic alliaceous odour of Cacodyl, and when gently heated with charcoal in a tube it is reduced, yielding a sublimate of Arsenic.

It is officially required to contain from 99·89 to 100 p.c. of pure Arsenious Anhydride as volumetrically determined by means of Deci-normal Volumetric Iodine Solution, a weighed quantity of 0·25 gramme of the acid being dissolved in Water by boiling it with five times its weight of Sodium Bicarbonate, the solution cooled, three drops of Hydrochloric Acid added to neutralise or to reconvert into Bicarbonate any Sodium Carbonate produced during the boiling. It should require from 50·8 to 50·9 c.c. of the Volumetric Solution.

The *U.S.P.* requires it to contain not less than 99·8 p.c. of pure Arsenic Trioxide; the *P.G.* not less than 98·32 p.c. of pure Arsenious Anhydride. It will be noticed from the small type below under the heading of Volumetric Determination that neither the *U.S.P.* nor the *P.G.* employ Hydrochloric Acid in performing the test. The necessity for the addition of Hydrochloric Acid is stated to be to neutralise or to reconvert into Bicarbonate any Sodium Carbonate produced during the boiling, but experiments made in the author's laboratory, using the *B.P.*, *U.S.P.* and *P.G.* processes, showed that it made very little difference whether the Hydrochloric Acid was added or not.

The more generally occurring impurities are mineral residue, Antimony, Cadmium, Lead, Tin and Arsenious Sulphide. The specimen should be entirely volatilised on heating, indicating the absence of mineral residue. The aqueous solution acidified with Hydrochloric Acid yields with Hydrogen Sulphide Solution a lemon-yellow precipitate; it should be completely soluble in Ammonium Carbonate Solution, indicating the absence of Antimony, Cadmium, Lead and Tin. It should dissolve entirely in about ten times its weight of Ammonia Solution, forming a colourless solution when diluted with Water; it should not assume a yellow colour when acidified with Hydrochloric Acid. The *B.P.* gives no quantities; the *U.S.P.* employs 1 gramme of the substance and 10 c.c. of Ammonia Solution; the *P.G.* 1 part of Arsenious Acid in 10 parts by weight of Ammonia Solution; the test indicates the absence of Arsenious Sulphide. The *U.S.P.* has an additional test for the absence of this latter impurity, and requires that the sublimate obtained on carefully heating the substance in a dry test-tube of hard glass should not at first show a yellow colour. The *U.S.P.* states that it may be distinguished from Arsenic Acid by the lemon-yellow precipitate produced on the addition of Silver Ammonio-nitrate Test-solution to its aqueous solution, this precipitate dissolving on the addition of Ammonia Solution and depositing metallic Silver when heated.

Volumetric Determination.—A weighed quantity of 0·1 of a gramme of Arsenic Trioxide mixed with 1 gramme of Sodium Bicarbonate dissolved by the aid of a gentle heat in 20 c.c. of Water should require for decolorising not less than 20·3 c.c. of Tenth-normal Volumetric Iodine Solution, *U.S.P.*; a weighed quantity of 0·5 of a gramme of the acid dissolved in 3 grammes of Sodium Bicarbonate and 20 c.c. of boiling Water is cooled and made up to 100 c.c. 10 c.c, of this solution should decolorise 10 c.c. of Deci-normal Volumetric Iodine Solution, *P.G.*

Preparations.

LIQUOR ARSENICALIS. ARSENICAL SOLUTION. *B.P.Syn.*—LIQUOR POTASSÆ ARSENITIS. FOWLER'S SOLUTION.

Arsenious Anhydride, 87½ grains; Potassium Carbonate, 87½ grains; Compound Tincture of Lavender, 5 fl. drm.; Distilled Water, *q.s.* to form 20 fl. oz. (1 in 100)

A clear red liquid possessing a Lavender odour and an alkaline reaction towards red Litmus paper. It contains 1 p.c. w/v of Arsenious Anhydride. The Liquor Potassii Arsenitis of the *U.S.P.* contains 1 p.c. w/w of Arsenic Trioxide; the Liquor Kalii Arsenicosi of the *P.G.* contains 1 p.c. w/w of Arsenious Acid. The *Brussels Conference* recommends a standard of 1 p.c. w/w.

It is officially directed to be prepared by dissolving 87½ grains each of Arsenious Anhydride and Potassium Carbonate in 10 fl. oz. of Water, but it is preferably prepared by dissolving this quantity of the solid ingredients in ½ oz. of the Water in a flask by the aid of heat, and diluting the solution to 10 fl. oz. with more of the Water; when cooled the compound Tincture of Lavender is added and the product diluted with sufficient Distilled Water to produce 20 fl. oz. The *U.S.P.* employs relatively about 2 fl. oz. for the purpose; the *P.G.* also uses a minimum amount of Water to first effect solution of the ingredients, subsequently diluting with Water to the required volume. The *P.G.* uses simple Spirit of Lavender and the preparation is colourless.

11 minims contain $\frac{1}{10}$ grain ; 1 c.c. = 0·01 gramme.

Dose.—2 to 8 minims = 0·1 to 0·5 c.c.

Larger doses are given in chorea.

Ph. Ger. maximum single dose, 0·5 gramme; maximum daily dose, 1·5 grammes.

An interesting account of the introduction of Fowler's Solution is given *C.D.* '04, ii. 685; also in *L.* '04, ii. 1472.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex., Norw., Port., Russ., Span., Swed., Swiss and U.S., 1 Arsenious Acid in 100. All by weight.

Tests.—Liquor Arsenicalis has a specific gravity of 1·010 to 1·015. The *B.P.* gives no figure for the sp. gr. It is officially required to contain from 0·99 to 1·0 p.c. of Arsenious Anhydride, as determined by titration of the neutralised solution with Volumetric Iodine Solution, a faintly alkaline reaction being maintained throughout the titration by a slight excess of Sodium Bicarbonate. The *U.S.P.* dilutes 24·6 grammes of solution with Water to 100 c.c., acidifies the mixture very slightly with diluted Hydrochloric Acid, adds 2 grammes of Sodium Bicarbonate and titrates with Tenth-normal Volumetric Iodine Solution, of which it is required not less than 50 c.c. should be necessary. The *P.G.* mixes 5 c.c. of solution with 1 gramme of Sodium Bicarbonate and 20 c.c. of Water, and after the addition of a few drops of Starch Solution adds Tenth-normal Volumetric Iodine Solution; no permanent blue coloration should be produced by the addition of 10 c.c., but a permanent blue coloration should be produced on the further addition of 0·1 c.c of the Volumetric Iodine Solution.

LIQUOR ARSENICI HYDROCHLORICUS. Hydrochloric Solution of Arsenic.

Arsenious Anhydride, 87½ grains; Hydrochloric Acid, 2 fl. drm.; Distilled Water, *q.s.* to form 20 fl. oz. (1 in 100)

A clear colourless liquid possessing a strongly acid reaction towards blue Litmus paper. It contains 1 p.c. w/v of Arsenious Anhydride, and is thus of the same strength as Liquor Arsenicalis. The *U.S.P.* Liquor Acidi Arsenosi corresponding to this preparation contains 1 p.c. w/w of Arsenic Trioxide. The official directions for its preparation are to dissolve 87½ grains of Arsenious Anhydride and 2 fl. drm. of Hydrochloric Acid in 10 fl. oz. of Water by the aid of heat, subsequently diluting the solution to the required volume, but solution is more readily effected by dissolving the Arsenious Acid with the Hydrochloric Acid in 5 fl. oz. of Water by the aid of heat, and diluting the cool solution with sufficient Distilled Water to produce 20 fl. oz. The *U.S.P.* employs relatively about 5 fl. oz. of Water for this purpose.

11 minims contain $\frac{1}{10}$ grain; 1 c.c. = 0·01 gramme, Arsenious Anhydride.

De Valangin's Solution was ⅓ of this strength.

Dose.—2 to 8 minims = 0·1 to 0·5 c.c.

Tests.—Hydrochloric Solution of Arsenic has a specific gravity of 1·010 to 1·014; no figure for the specific gravity is given in the *B.P.* It is officially required to indicate 0·99 to 1·0 p.c. of Arsenious Anhydride as determined by the titration of 25 c.c. of the liquor with Volumetric Iodine Solution, sufficient Sodium Bicarbonate being added to ensure an alkaline reaction during titration; from 50·8 to 50·9 c.c. should be required. The *U.S.P.* employs a weighed quantity of 24·6 grammes of the solution, about 2 grammes of Sodium Bicarbonate, and 100 c.c. of Water; not less than 50 c.c. of Tenth-normal Volumetric Iodine Solution should be required.

LIQUOR ARSENII ET HYDRARGYRI IODIDI. *See* Arsenii Iodidum.

ARSENAS FERRI. *See* Ferri Arsenas.

ARSENAS SODII. *See* Sodii Arsenas.

ARSENATIS SODII LIQUOR. *See* Liquor Sodii Arsenatis.

Not Official.

LIQUOR AMMONII ARSENITIS is made of the same strength as Liquor Arsenicalis; Ammonium Carbonate being substituted for Potassium Carbonate.

PILULA ASIATICA.—Arsenious Acid, $\frac{1}{12}$ grain; Black Pepper, ¾ grain; for one pill.

The quantities vary in different books. *Gray's Supp.* gives Arsenious Acid, $\frac{1}{12}$ grain; Black Pepper, 1 grain. Swed. Pil. Acidi Arseniosi containing $\frac{1}{65}$ grain in each. *B.P.C.* gives the formula which was official in Dutch Supp. 1902, but which was omitted in Dutch 1905:—Arsenious Anhydride, $\frac{1}{16}$ grain; Black Pepper, $\frac{3}{4}$ grain.

Used in various chronic skin diseases.

GRANULA DIOSCORIDIS (*Fr.* and *Dan.*).—Each granule contains 1 milligramme of Arsenious Acid.

ARSENICAL PASTE for Dentists.—Arsenious Acid, 2; Morphine Sulphate, 1; Creosote, to make a stiff paste. A quantity of the size of a pin's head is ample for one application. It should be spread on Cotton-Wool and placed in the tooth. It will thus destroy the sensibility of a carious tooth, and in a few hours the tooth will be ready for stopping. Cocaine has been used in place of Morphine, but it is not so good.

ARSENICAL FIBRE for Dentists.—Arsenious Acid, 5; Tannin, 2; Morphine Sulphate, 5; make into a paste with Creosote, mix with Cotton-Wool, and dry. This preparation is an improvement on the paste, for the latter is apt to be squeezed out over the gum edge of the cavity and cause inflammation of the surrounding tissue.

ARSENICAL PASTE (Frère Côme's).—For cancer, applied after the surface has been laid bare by the application of Caustic Potash. Arsenic, 1; Charcoal, 1; Red Mercury Sulphide, 4; Water, *q.s.*

ARSENICAL CAUSTIC POWDERS.—Each contains from $\frac{1}{16}$ grain to $\frac{1}{8}$ grain of Arsenious Acid to 1 grain of Calomel, Vermilion or Antimony Sulphide, or of any combination of them.

La Bourboule Water contains about $\frac{1}{12}$ grain of Arsenious Anhydride in 20 fl. oz.

Levico Water (strong) contains about $\frac{1}{13}$ grain of Arsenious Anhydride in 20 fl. oz.

ACIDUM BENZOICUM.

BENZOIC ACID.

$HC_7H_5O_2$, eq. 121·13.

Fr., Acide Benzoïque; Ger., Benzoesäure; Ital. and Span., Acido Benzoico.

Light colourless, or almost colourless, feathery crystals, which are odourless or have a faint odour of Benzoin.

It should be preserved from the air and light in well-stoppered amber-tinted bottles and should be kept in a cool atmosphere.

B.P. and *U.S.P.* permit the use of synthetic Benzoic Acid, but Austr., Ger., Swiss and Swed. Pharmacopœias recognise only the Acid prepared from Benzoin.

The *B.P.* states that it is obtained from Benzoin by sublimation, or it may be prepared synthetically from Toluene, from Hippuric Acid, and from other organic compounds, from which it would appear that the authorities give a preference to the resin sublimed Acid, but their description, 'odourless when quite pure, but when obtained from Benzoin possesses an agreeable aromatic odour,' conveys an impression just the reverse of this.

The Commercial varieties of this Acid are:—

1. **Resin Sublimed Acid.**—Characterised by its strong empyreumatic odour, colour (varying from a pale yellow to light brown), and reducing action on both Permanganate Solution and ammoniacal Silver Nitrate; it may or may not contain Cinnamic Acid, according to the variety of the Benzoin from which it is made.

2. **Resin Precipitated Acid.**—This is prepared from Benzoin by one of the 'wet processes,' such as boiling with Milk of Lime to form a soluble Benzoate, which is afterwards decomposed by an Acid with separation of the slightly soluble Acid Benzoic. It is practically a pure chemical; has no empyreumatic odour; and has no reducing action either on Permanganate or ammoniacal Silver solution. This is the variety commonly sold as *B.P.* and is that intended to be used in the *U.S.*, the latter, however, will pass a sufficiently purified Acid, from whatever source derived.

3. **Hippuric Benzoic Acid.**—When imperfectly purified this Acid retains a distinct urinous odour, and is guarded against in most Foreign Pharmacopœias, but it has been shown (*P.J.* (3) xiv. 463) that acid from this source, after resublimation, will pass the purity tests of any Pharmacopœia, so that its use is mainly a question of price.

4. **Toluene Benzoic Acid.**—This is manufactured in very large quantities, principally for conversion into alkali Benzoates, but partly for sale as Benzoic Acid. In the latter case it is frequently said to be sublimed over a little Gum Benzoin to give it something of the aromatic odour of the Natural Acid. This Artificial Acid conforms with most tests, but is practically certain to be contaminated with Chlorine compounds, easily detected by mixing ½ gramme of the Acid with slaked Lime (free from Chlorine), damping with Water, igniting, dissolving the residue in Nitric Acid and adding Silver Nitrate Solution. A turbidity or precipitate is practical proof of the Toluene source of the Acid.

Solubility.—1 in 390 of Water; 1 in 12 of boiling Water; 1 in 2¾ of Alcohol (90 p.c.); 1 in 2¾ of Ether; nearly 1 in 6 of Chloroform; 1 in 12 of Benzol; about 1 in 30 of Glycerin. Borax increases its solubility in Water; 1 of Borax and 1 of Acid are soluble in 100 of Water; Sodium Phosphate also aids its solution. Soluble in aqueous solutions of the Caustic Alkalis and in hot Milk of Lime, forming Benzoates, from which it is precipitated on the addition of Hydrochloric Acid unless the solutions are very dilute.

Medicinal Properties.—Most useful in acidifying and disinfecting an alkaline and decomposing urine; a stimulating and disinfecting expectorant in chronic bronchitis and phthisis; an antipyretic in acute rheumatism.

The Sodium and Ammonium salts are preferable, as they are less irritating to the alimentary canal.

It is also useful in preventing fats from becoming rancid, and it is used as a food preservative.

Dose.—5 to 15 grains = 0·3 to 1 gramme.

Prescribing Notes.—*Given in* **cachets,** *in* **pills** *made up with 'Diluted Glucose' or in the form of Sodii Benzoas.*

Official Preparation.—Trochiscus Acidi Benzoici, ½ grain in each. Contained in Tinctura Camphoræ Composita, 2 grains in each oz.; Tinctura Opii Ammoniata, 9 grains in each oz. Used in the preparation of Ammonii Benzoas and Sodii Benzoas.

Not Official.—Vapor Acidi Benzoici, Benzoic Gauze, Anæsthesin, Subcutin.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex., Norw., Port., Russ., Span., Swed., Swiss and U.S.

Tests.—Pure Benzoic Acid melts at 121·4° C. (250·5° F.), the acid obtained from Benzoin at 120° C. (248° F.). The *U.S.P.* states 121·4° C. (250·5° F.) and mentions that the acid sublimed from Benzoin has a lower melting point. The *P.G.* does not include a melting point. The pure acid possesses a boiling point of 249° C. (480·2° F.), the acid prepared from Benzoin at 238·9° C. (462° F.). The carefully neutralised aqueous solution yields on the addition of Ferric Chloride Test-solution a buff-coloured precipitate. The *U.S.P.* and the *P.G.* adopt the following method of applying this test. The *U.S.P.* adds Ferric Chloride Test-solution diluted with 2 volumes of Water to the carefully neutralised solution of Benzoic Acid in an alkali Hydroxide Solution; the *P.G.* mixes 0·2 of a gramme of the acid with 20 c.c. of Water and 1 c.c. of Normal Volumetric Potassium Hydroxide Solution, and after shaking vigorously filters after 15 minutes and adds 1 drop of Ferric Chloride Solution to the filtrate. In the case of this acid the *B.P.* does not require it to yield 'when neutralised the reactions characteristic of Benzoic Acid.' The *U.S.P.* states that when heated in a dry test-tube with 3 parts of slaked Lime, Benzene is evolved. The acid may be readily determined by titration with Normal Volumetric Sodium Hydroxide Solution, using Phenolphthalein Solution as an indicator of neutrality, 1 c.c. of Normal Volumetric Sodium Hydroxide Solution corresponding to 0·12113 gramme of Benzoic Acid. The method for its determination in Compound Tincture of Camphor will be found under the heading of Tinctura Camphoræ Composita.

The more generally occurring impurities are mineral matter, Chlorobenzoic Acid, Cinnamic and Hippuric Acids. The *U.S.P.* includes a test for readily carbonisable organic impurities. Mineral matter, if present, is at once detected by a residue remaining after ignition. Chlorobenzoic Acid and Chlorine compounds (indicating when present the synthetic origin of the acid) are readily detected by the addition of Silver Nitrate Solution to the solution in Nitric Acid of the residue remaining after igniting the acid with twice its weight of Calcium Carbonate. The tests adopted by the *B.P.*, *U.S.P.* and *P.G.* are compared below in the small type paragraph headed Silver Nitrate. Potassium Permanganate and Diluted Sulphuric Acid and Potassium Permanganate Solution serve to detect Cinnamic and Hippuric Acids, and organic substances capable of reducing Potassium Permanganate Solution. The tests adopted by the *B.P.*, *U.S.P.* and *P.G.* for the detection of these substances are described in the small type paragraph under the heading of Potassium Permanganate.

The addition of Calcium Chloride Solution to a solution of the acid rendered faintly alkaline with Ammonia Solution should produce no turbidity or precipitate, indicating the absence of Oxalic Acid. The *U.S.P.* employs Sulphuric Acid to detect readily carbonisable organic impurities.

Silver Nitrate.—The solution obtained by dissolving in diluted Nitric Acid the residue left when 0·5 gramme of the Acid is heated with twice its weight of Calcium Carbonate in a closed vessel, should yield only the slightest cloudiness with Silver Nitrate Solution, indicating the absence of Chloro-Benzoic Acid, *B.P.* The quantities for this test given in the *P.G.* and *U.S.P.* are 0·2 gramme of Acid with 0·3 gramme of Calcium Carbonate, and 0·5 gramme of Acid with 0·8 gramme of Calcium Carbonate respectively. These Pharmacopœias direct that the Acid and Carbonate be mixed with a little Water and dried before ignition. The *P.G.* residue after ignition is dissolved in Nitric Acid and diluted to 10 c.c. with Water, while the *U.S.P.* residue is dissolved in 20 c.c. of Distilled Water with the aid of a slight excess of Nitric Acid, before the addition of the test reagent. The degree of opalescence permitted in the *U.S.P.* is not much more than that produced by a blank experiment with the same Calcium Carbonate as used in the test.

Potassium Permanganate.—A mixture of 1 part of the Acid and 1 part of Potassium Permanganate when warmed with 10 parts by weight of Diluted Sulphuric Acid, should not evolve the odour of Benzaldehyde (Bitter Almond Oil), *B.P.* The *P.G.* and *U.S.P.* tests are made with Water instead of Diluted Sulphuric Acid, and they direct that the mixture be gently warmed for a short time [45° C. (113° F.) for about 10 minutes, *U.S.P.*] in a loosely-stoppered test glass, and then cooled.

The colour of 2 drops of Potassium Permanganate Solution (1 p.c. w/v) should not be immediately destroyed by 0·2 gramme of the Acid suspended in 10 c.c. of Water, indicating the absence of Hippuric and Cinnamic Acids, *B.P.* A yellow to brownish cloudy solution should be obtained with 0·1 gramme Benzoic Acid and 1 c.c. Solution of Ammonia, from which Benzoic Acid is again precipitated on the addition of 2 c.c. of Diluted Sulphuric Acid; this acid mixture should almost completely decolorise 5 c.c. of Potassium Permanganate Solution (0·1 p.c.) after the lapse of 4 hours, *P.G.*

Sulphuric Acid.—On gently warming a solution of Benzoic Acid in pure cold Sulphuric Acid the colour of the solution should not become darker than light brown, and when poured into Water Benzoic Acid should separate, yielding a colourless liquid, indicating absence of readily carbonisable matter, *P.G.*

Preparation.

TROCHISCUS ACIDI BENZOICI. BENZOIC ACID LOZENGE.

½ grain of Benzoic Acid in each, with Fruit Basis.

Dose.—1 to 5 lozenges.

Not Official.

VAPOR ACIDI BENZOICI.—Benzoic Acid, 3 grains; Kaolin, 12 grains; rub together and add Water, ½ oz.; Tincture of Tolu, 18 minims. Shake and make up with Water to 1 oz.—*Throat.*

Extremely serviceable in sub-acute affections of the air passages.

BENZOIC GAUZE.—Contains 4 p.c. of Benzoic Acid.

ANÆSTHESIN (the Ethyl-ester of para-amido-benzoic acid).—A white, odourless powder, soluble 1 in 1200 of cold Water, soluble 1 in 6 of Alcohol (90 p.c.); and in Ether. Introduced as a local anæsthetic and as a substitute for Orthoform. Given in cases of gastric irritation.—*B.M.J.E.* '03, ii. 32. Insufflated, dusted on or used as an ointment, is most efficient (*B.M.J.* '05, ii. 1008) in allaying the pain of burns, ulcerative stomatitis, tuberculous and malignant ulceration, whether of the larynx or other regions, or it may be given internally up to 8 grains in gastric ulcer, carcinoma, or nervous dyspepsia.

Dose.—5 to 10 grains = 0·32 to 0·65 gramme. Maximum daily dose, 40 grains = 2·6 grammes.

Subcutin (Anæsthesin paraphenol-sulphonate) is a product of greater stability.

ACIDUM BORICUM.

BORIC ACID.

B.P.Syn.—BORACIC ACID; HYDROGEN BORATE.

FR., ACIDE BORIQUE; GER., BORSAURE; ITAL. AND SPAN., ACIDO BORICO.

H_3BO_3, eq. 61·49.

Colourless and odourless pearly scales, or a fine, white, odourless powder, unctuous to the touch, and possessing a faintly acid and slightly bitter taste. It volatilises in the vapour of boiling Water. It is obtained by the decomposition of Borax with a mineral acid, preferably Sulphuric Acid, or by the purification of native Boric Acid.

Solubility.—1 in 25 of cold Water; 1 in 3 of boiling Water; 1 in 4 of Glycerin; 1 in 28 of Alcohol (90 p.c.); insoluble in Ether.

Medicinal Properties.—An unirritating local antiseptic and desiccant; it is used as a **dressing** for granulating and suppurating surfaces in general; as an **eye-wash,** 2 to 5 grains in an oz. of Water; as a **lotion, douche,** or as a **mouth-wash,** 10 to 15 grains to an oz. of Water; as a **paint** for the throat, 1 in 5 of Glycerin; as a **pessary,** 10 or 20 grains with Gelatin Mass or Oil of Theobroma.

Given internally in cystitis associated with decomposing urine.

Used as a **dusting powder** it prevents fetid perspiration.

Small doses internally to sterilise the urine, 48 hours before operation for stricture of the urethra.—*L.* '98, i. 1106.

As a *preservative*, a mixture with equal parts of Borax is more convenient than Boric Acid alone.

So-called danger from the use of Boric Acid in Milk. It is far from proved that small quantities of Boric Acid, if used for a long time, are poisonous to adults or children. Large doses are, however, not considered so innocuous.—*L.* '00, i. 13, 131, 574, 730.

Report of the Departmental Committee appointed to inquire into the uses of preservatives and colouring matters in foods; Boric Acid or mixtures of Boric Acid recommended to be recognised as a legal addition to cream, in amount not exceeding 0·25 p.c. expressed as Boric Acid; and in butter not exceeding 0·5 p.c. expressed as Boric Acid.—*L.* '01, ii. 1683; *J.S.C.I.* '01, 1228.

Report of evidence taken before the Departmental Committee.—*L* '99, ii. 1484, 1588, 1786, 1866; '00, i. 207, 279, 429, 507, 586, 1409; '00, ii. 276. Opinions differ as to the use of Boric Acid as a preservative of foods.—*L.* '03, i. 749, 837, 920.

Influence of Boric Acid on the metabolism of children. Neither Boric Acid nor Borax in any way affected the general health and well-being of the children. —*B.M.J.* '01, i. 1337; *J.C.S.* '01, *Abs.* ii. 517.

Influence of chemical preservatives of food on health. Extremely improbable that Boric Acid if used in proper proportions would cause any injurious effect whatever to the average adult, but because of certain possible injurious effects which might be produced, the use of such preserved milk for invalids and young children is to be condemned.—*L.*, '99, ii. 1427, 1577.

A record of 22 cases of toxic symptoms certainly caused by Boric Acid. General conclusion is that it is capable of producing dangerous pathological effects and ought not to be considered harmless.—*L.* '04, ii. 1817.

Use of Boric Acid and Borates in surgery and their internal administration, though usually free from danger, ought to be carefully guarded in patients suffering from kidney affections, and immediately discontinued should dermatitis or other toxic symptoms appear.—*L.* '99, i. 23.

Skin eruptions caused by the use of Boric Acid. Attention drawn to the possibility of fomentations or ointment as sources of toxic symptoms when applied to large areas of skin. Almost all the serious cases of toxic effects of Boric Acid have occurred where it had been locally applied to an absorptive surface.—*L.* '99, i. 261.

Toxic effects following the use of Boric Acid given internally, also, after irrigation with strong solutions. Erythema followed by dermatitis, which disappeared on discontinuing its use.—*B.M.J.* '99, i. 17, 209; *B.M.J.E.* '01, ii. 91; *L.* '01, ii. 1514.

Dose.—5 to 15 grains = 0·32 to 1 gramme.

Prescribing Notes.—*Can be given in* **mixture, powders,** *or* **cachets.**

Official Preparations.—Glycerinum Acidi Borici and Unguentum Acidi Borici.

Not Official.—Boric Acid dressings, Collyrium Acidi Borici, Collyrium Acidi Borici et Zinci Sulphatis, Lotio Acidi Borici, Mistura Acidi Borici, Pastillus Acidi Borici, Boro-Glyceride, Liquor Magnesii Boratis, Magnesii Borocitras, Pulvis Acidi Borici Comp., Pulvis Magnesiæ Borocitratis Comp.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex., Norw., Port., Russ., Span., Swed., Swiss and U.S.

Tests.—Boric Acid is distinguished by its behaviour with Turmeric paper, and the green coloration which it imparts to a non-luminous flame. The Turmeric test is conveniently performed by so immersing the Turmeric paper in the fluid to be tested that only one half becomes moistened; the fluid is evaporated on a water-bath, and any brownish-red colour produced is instantly noted; the paper can then be moistened with Ammonia Solution, and any further alteration in colour observed. In performing the 'flame' test, the *B.P.* uses 'Alcohol,' but it is preferable to employ purified Methylic Alcohol. The behaviour of Boric Acid towards the usual indicators of neutrality does not permit of its volumetric determination under ordinary circumstances, but in a solution containing not less than 30 p.c. of Glycerin the end reaction is quite definite with Phenolphthalein Solution. One gramme of Boric Acid should require for its neutralisation about 16·1 c.c. of Volumetric Sodium Hydroxide Solution equivalent to 99·0 p.c. of Hydrogen Borate. The *U.S.P.* has adopted the process recommended (*P.J.* '02, i. 345; *C.D.* '02, i. 660) for inclusion in the *B.P.*, and dissolves 1 gramme of the Boric Acid in 50 c.c. of Water after the addition of 50 c.c. of Glycerin, and states that it should require 16·2 c.c. of Normal Volumetric Sodium Hydroxide Solution, equivalent to at least 99·8 p.c. of Boric Acid. The *B.P.* does not mention a method of determination. When carefully heated Boric Acid fuses and swells up, and is finally converted into a transparent glassy hygroscopic mass. With slight modifications in the wording this statement appears in the *B.P.* and the *P.G.*, the former stating the loss of weight which should occur, namely 43·6 p.c.; the *U.S.P.* states that dehydration takes place at 100° C. (212° F.) with formation of Metaboric Acid, and on further heating it fuses at 160° C. (320° F.) to a glassy mass of Tetraboric Acid, and at a higher temperature loses all its Water and is converted into Boron Trioxide.

The more generally occurring impurities are Calcium, Copper, Lead, Iron and Magnesium; also Sulphates and Chlorides. Copper, Lead and Iron may be detected by the Hydrogen Sulphide test given in the small type below, Calcium and Magnesium by the Ammonium Oxalate or Sodium Phosphate test, Chlorides by the Silver Nitrate test and Sulphates by the Barium Chloride or Nitrate test each of which appears under its individual heading. The *B.P.* includes tests for Potassium, Sodium and Ammonium. The two former may be detected by the characteristic colours which they impart to a non-luminous flame, the latter by boiling a small quantity of the sample with Potassium Hydroxide Solution, when no ammoniacal odour should be perceptible, nor should the issuing vapour possess an alkaline reaction towards moistened red Litmus paper. The *U.S.P.* includes the modified Gutzeit test for Arsenic, but no special test for this substance appears in either *B.P.* or *P.G.* A test indicating a limit of Iron is included in the *U.S.P.* and *P.G.*, but not in *B.P.*; it is given in the small type below under the heading of Potassium Ferrocyanide. A figure of less than 10 parts per million has been suggested (*C.D.* '08, i. 795) as a fair limit for Lead, and there seems no reason for adopting a higher limit than 5 parts per million for Arsenic.

Litmus and Turmeric.—The aqueous solution reddens blue Litmus; Turmeric paper moistened with it and dried is coloured brownish-red, even in presence of Hydrochloric Acid. This brownish-red colour is changed to greenish-black (bluish-black, *U.S.P.*) by Alkali Hydroxide Solution (*B.P.* gives Potassium Hydroxide Solution; *U.S.P.* and *P.G.* give Ammonia Solution).

Flame Test.—The alcoholic solution when ignited imparts to the flame a greenish tinge (especially when the solution is acidulated with Sulphuric Acid, *B.P.*), *B.P.*, *P.G.* and *U.S.P.* Glycerin solutions also colour the flame green when ignited, *P.G.* and *U.S.P.*

Barium Chloride or Nitrate.—An aqueous solution (*P.G.* 1–50, *U.S.P.* 1–25) should not be affected by Barium Chloride Solution, *U.S.P.*; or by Barium Nitrate Solution, *P.G.*

Ammonium Oxalate or Sodium Phosphate.—An aqueous solution (*P.G.* 1 in 50, *U.S.P.* 1 in 25) should not be affected by Ammonium Oxalate Solution; or by Sodium Phosphate Solution in presence of Solution of Ammonia, *P.G.* and *U.S.P.*

Hydrogen Sulphide.—An aqueous solution (1 in 25) should not respond to the time-limit test for heavy metals, *U.S.P.*; Hydrogen Sulphide Solution should not affect an aqueous solution (1–50), *P.G.*

Potassium Ferrocyanide.—The *P.G.* and *U.S.P.* require that 0·5 c.c. Solution of Potassium Ferrocyanide should not immediately produce a blue colour with 30 c.c. of a 2 p.c. Solution of Boric Acid in 1 part of Hydrochloric Acid and 49 parts of Water.

Modified Gutzeit Test.—5 c.c. of an aqueous solution (1 in 25) should not respond to the modified Gutzeit test for Arsenic, *U.S.P.*

Preparations.

GLYCERINUM ACIDI BORICI.

6 of Boric Acid in powder, treated with 9 of Glycerin (by weight) at 302° F. (150° C.), until the whole is reduced to 10 by weight; it is then mixed with 10 of Glycerin.

If the liquid is kept constantly stirred, instead of only 'frequently' as officially ordered, the length of time required to complete the process is considerably reduced and the product is more likely to be a good colour. Boric Acid in crystals gives rather a lighter coloured product. It is too viscid for general use.

Foreign Pharmacopœias.—Official in Russ. (Acidum Boroglycerinatum); U.S. (Glyceritum Boroglycerini) 31 p.c.; Mex. (Glicerina Borica) 5 p.c. Not in the others.

UNGUENTUM ACIDI BORICI. BORIC ACID OINTMENT

Finely powdered Boric Acid, 1; Paraffin Ointment, white, 9. (1 in 10)

The commercial 'Pulv. Subtil' contains coarse particles; before use it should be passed through a fine lawn sieve.

Foreign Pharmacopœias.—Official in Austr., Dutch, Fr. (Pommade d'Acide Borique), Mex., Norw. (Vaselinum Boricum), Span. and Swiss:—Boric Acid 1, Vaseline 9; Belg., Boric Acid 1, Simple ointment 9; Dan., Boric Acid 1, Washed Lard 9; Dan. has also Vaselinum Boricum, Boric Acid 1, Vaseline 9; Ger. and Jap., Boric Acid 1, Paraffin ointment 9; Swed., Boric Acid 1, Wool Fat 1, Vaseline 8; U.S., Boric Acid 1, Paraffin 1, White Petrolatum 8. Not in Hung., Ital., Port. or Russ.

Not Official.

COLLYRIUM ACIDI BORICI.—Boric Acid, 10 grains; Distilled Water, 1 oz.—*King's.*

COLLYRIUM ACIDI BORICI ET ZINCI SULPHATIS.—Boric Acid, 5 grains; Zinc Sulphate, ½ grain; Distilled Water, to 1 oz.—*Middlesex.*

Boric Acid, 1; Zinc Sulphate, 0·10; Distilled Water, *q.s.* to produce 100.—*B.P.C.*

The *B.P.C. Supplement* now employs diluted Rose Water in place of Distilled Water.

LOTIO ACIDI BORICI.—Boric Acid, 15 grains; Water, 1 oz.—*St. Thomas's.* Boric Acid, 3; Water, 100.—*B.P.C.*

LINTEUM ACIDI BORICI.—Lint dipped in a hot saturated aqueous solution of Boric Acid and then dried. Should contain 50 p.c. of Boric Acid, and not be scaly. It is usually coloured pink.

Used as an antiseptic dressing for wounds and ulcers.

Boric Gauze, 20 p.c.; **Boric Wool**, 25–50 p.c. *Fr.* Gaze Boriquée, 10 p.c.

MISTURA ACIDI BORICI.—Boric Acid, 10 grains; Dilute Nitro-Hydrochloric Acid, 10 minims; Compound Tincture of Gentian, 1 drm.; Water, to 1 oz. —*Lock.*

PASTILLUS ACIDI BORICI.—2 grains in each pastille.

BORO-GLYCERIDE.—A patented preparation for preserving different kinds of food. A combination of Boric Acid and Glycerin.

A **solution**, 1 in 20 of Water, has been used as an antiseptic in operative surgery. Used as a **paint** in throat affections, 1 in 2 of Glycerin; as a **tampon** in dysmenorrhœa.

LIQUOR MAGNESII BORATIS.—*Light* Magnesium Carbonate, 4; Boric Acid, 27; Water, 128; boil and filter. They dissolve almost completely, but crystallise out within forty-eight hours. Half the quantity of Light Calcined Magnesia can be used in the place of the Carbonate.

MAGNESII BORO-CITRAS.—A white powder, or in glistening scales, prepared by the interaction of Boric and Citric Acids with Magnesium Oxide. Stated to be useful in the uric acid diathesis and for the removal of urinary calculi.—*L.* '03, i. 837, 920.

Inferior to Magnesium Lactate as a hæmostatic in hæmophilia.—*L.* '08, i. 96.

Dose.—15 to 30 grains = 1 to 2 grammes, several times daily.

Pulvis Magnesiæ Borocitratis Compositus.—Magnesium Borocitrate, 1; Powdered Sugar, 2.

Dose.—30 to 60 grains = 1·8 to 3·6 c.c.

PULVIS ACIDI BORICI COMP.—Boric Acid, 1; Zinc Oxide, 3; Starch, 6.—*Guy's.*

Boric Acid, 24; Potassium Bromide, 24; Starch, 99; Iodoform, 2; Morphine Acetate, 1. For insufflation.

Boric Acid and Starch Powder, equal parts.—*St. Thomas's* and *B.P.C.*

Listerine and **Zymocide** are liquid specialities containing Boric Acid together with other antiseptics.

Antipyonine, Aseptin, Branalcane, and **Glacialine** are preservative mixtures containing Boric Acid.

ACIDUM CARBOLICUM.

PHENOL.

C_6H_6O, eq. 93·34.

FR., PHÉNOL OFFICINAL; GER., KARBOLSAURE; ITAL., FENOLO CRISTALIZZATO; SPAN., ACIDO FENICO.

Small crystals which are colourless, but have a tendency to deliquesce and acquire a pink colour on exposure to light and air. Phenol has a characteristic odour and taste, and a strongly cauterising action upon the skin. The chief commercial source is the fraction of coal tar distilling between 150° and 200° C. (302° and 392° F.). It may also be synthetically prepared from Benzol, and is supplied commercially of very good quality. It should be kept in dark amber-coloured well-stoppered bottles.

Carbolic Acid, or Phenol, is prepared in a crude state by treating certain oils, heavier than Water, obtained in the distillation of Coal Gas Tar, with a dilute solution of Caustic Soda, and by subsequently separating the crude Carbolic Acid from the alkaline solution by the addition thereto of a mineral Acid (usually Sulphuric). The crude Carbolic Acid thus obtained is submitted to fractional distillation and crystallisation, with other purification processes, having for their object the entire removal of the last traces of Cresylic and other Tar acids and bases, Sulphur compounds, etc.

Solubility.—1 in 13 (or a little less) of Water; 1 in 2 of Olive Oil; 3½ in 1 of Glycerin; 3 in 1 of Chloroform; 4 in 1 of Ether; 6 in 1 of Alcohol (90 p.c.); 2¼ in 1 of Benzol; 2½ in 1 of Carbon Bisulphide; freely in Liquor Potassæ, in Liquor Sodæ, and in Volatile Oils.

The *B.P.* requires that at 60° F. (15·5° C.) 100 parts of Phenol should be liquefied by the addition of 10 parts of Water, should form a clear liquid with 30 to 40 of Water, and should be completely dissolved by 1200 of Water.

When 1 or 2 parts of melted Carbolic Acid are mixed with 1 of Water, the Acid separates on cooling in oil-like globules; but when 3, 4, 5, 6, 7, 8, and even 9 of Acid to 1 of Water are mixed, the solution is perfect at ordinary temperatures; when, however, the temperature sinks to 40° F. or under, the 8 and the 9 will crystallise out again.

Pure Carbolic Acid readily absorbs Water from the air, and combines with it to form a definite crystalline Hydrate $2C_6H_6O.H_2O$, containing 8·74 p.c. of Water and melting at 63° F. (17·2° C.).—*Allen.*

Medicinal Properties.—Antiseptic, disinfectant, and local anæsthetic. Given as an intestinal and gastric antiseptic in flatulence; and in dilated stomach with fermentative change; it is most efficacious in typhoid in the form of 1½-grain pills. It relieves the itching of psoriasis. It has been used with advantage internally in phthisis, bronchitis, gangrene of the lung, whooping-cough, and puerperal fever; as a prophylactic against scarlet fever. Placed in a carious tooth, or cautiously applied to the gum, relieves toothache. Used as a **paint** for the throat (30 grains to 1 oz. of Glycerin); as a **gargle** (2 grains to 1 oz.) for tonsillitis; if used with a **spray apparatus,** 3 grains in an *oz.* of Water; or for **inhalations,** 20 grains dissolved in a pint of hot Water; as an **injection** (1 grain to 1 oz. of Water), for the vagina or the bladder, as an antiseptic. Externally, used alone is a powerful caustic; as a **lotion** (15 to 30 grains to 1 oz.) for foul or syphilitic ulcers, carbuncles, scabies, ringworm and other parasitic skin diseases; (5 grains to 1 oz.) excellent for eczema and eruptions attended with itching; or as the official **ointment.** For a **mouth-wash,** *see* Phenate de Soude, p. 35.

Carbolic Oil, 1 or 2 in 40 of Olive Oil; used for dressing scalds and burns.

Carbolic Solution, 1 or 2 in 40 of Water; used in surgery as an antiseptic.

2 p.c. solutions have been used for **hypodermic injection.**

Deep hypodermic injections (½ grain to 20 minims Water) have been found most successful in erysipelas, poisoned wounds and deep-seated inflammations.—*Whitla.*

As solutions of Carbolic Acid in strong Alcohol or concentrated Glycerin are not caustic, but become so when diluted with Water, it is suggested that in cases of burning with concentrated Carbolic Acid it would be better to remove the Acid with strong Alcohol rather than with Water.—*P.J.* (3) xix. 783.

Actual contact would appear to be necessary for Carbolic Acid to act as a germicide. A few inches from the surface of pure Carbolic Acid in a bottle (open to the air) putrefaction and fermentation go on as rapidly as in the open air.—*P.J.* (3) ii. 545.

As an ointment or plaster (1 in 15 or 20) in lupus.—*M.A.* '94, 416.

Carbolic Acid mixed with 5 to 10 p.c. of Glycerin injected for hydrocele.—*B.M.J.* '86, i. 1164, 1214.

2 p.c. spray for erysipelas.—*B.M.J.* '86, ii. 947.

Injection of a 5 p.c. solution for anthrax.—*B.M.J.* '86, ii. 601; *L.* '87, ii. 1186; *L.M.R.* '89, 422; *M.A.* '94, 79.

1 grain in 1 oz. of Water every 4 hours for vomiting in pregnancy.—*L.* '89, i. 1121.

Enteric fever treated with Carbolic Acid.—*B.M.J.* '97, i. 1344.

Keratin-coated pills in acute diarrhœa.—*L.* '93, ii. 1305.

Hypodermically in the treatment of tetanus, 2 minims in 30 minims of Water injected 3 times a day.—*L.* '99, i. 1497; '99, ii. 1589; *B.M.J.E.* '99, i. 15; '00, i. 32.

Treatment of tetanus in horses by hypodermic injections.—*L.* '00, i. 538.

Treatment of influenza.—*L.* '99, i. 958; '00, i. 143, 509, 667, 1030.

The offensiveness of the pustular stage of eruption in smallpox successfully treated by the pure liquefied acid, applied with a small camel's-hair brush to the rash over a certain area of the body each day, commencing with the face and head, until the whole of the vesicles had been touched; care being taken to prevent the acid running on the healthy skin.—*L.* '03, i. 518; '03, ii. 1153, 1781.

In the treatment of plague, 12 grains given in a mixture every two to four hours.—*L.* '99, ii. 1589; '00, i. 614; '03, ii. 753.

Fixation of movable kidney by means of strong Carbolic Acid, six cases.—*L.* '02, i. 1142.

Treatment of erysipelas.—*B.M.J.* '02, i. 1142.

Cases of Carbolic Acid gangrene.—*T.G.* '01, 739; 132 cases of gangrene due to weak solutions of Carbolic Acid.—*Med. Review* '00, 449.

Treatment of vulvar vegetations with pure Carbolic Acid.—*T.G.* '01, 639.

A 5 p.c. solution failed to destroy anthrax spores after twenty-four hours' exposure; but destroyed the bacillus pyocyaneus, staphylococcus pyogenes aureus, and the bacilli of typhoid fever, diphtheria, cholera, and tuberculosis.—*London County Council's Report on Disinfectants, L.* '02, i. 758.

Carbolic Acid (5 p.c.) and Mercuric Chloride Solution (1 in 1000) proved to be the only real germicides for tubercle bacilli.—*Report of the London County Council on Disinfectants, L.* '02, i. 759.

Poisoning from the application of Carbolic Acid to the unbroken skin. A 2 p.c. solution being used as an application for pruritus, followed by the use on another day, after a bath, of a 4 p.c. solution applied to the abdomen, the thighs and the lumbar region. Recovery in ten days.—*L.* '02, i. 1551.

Alcohol stated to be one of the best antidotes in Carbolic Acid poisoning. The patient is made to drink promptly a few oz. of brandy, whisky, or other spirit. Immediately after this a soft india-rubber tube is passed through the œsophagus and into the stomach. A funnel is attached to the upper end and about a pint of Water (more or less, according to the circumstances) is poured into the stomach. The upper end of the tube is now depressed and the fluid is syphoned out. Washing the stomach is repeated two or three times, and finally 1 drm. Sodium Sulphate dissolved in a wineglassful of Water is given.—*Merck's Archives* (*December* '99); *L.* '00, i. 481; *T.G.* '01, 587; '01, 797; '02, 144; *P.J.* '00, i. 1; '02, ii. 85; *Squibb*, '01, 2563.

Bacterial standardisation of disinfectants.—In the 'drop' method of testing the bactericidal power of disinfectants, originated by Rideal and Walker, pure Phenol is recommended as the standard control disinfectant. It is employed in aqueous solution, and the proportion of absolute Phenol present should be determined by titration with Bromine as given under Tests. The method ascertains what dilution of the disinfectant under examination kills a given bacterial culture within the same time as the standard Phenol dilution. The quotient of the two dilutions indicates the efficiency of the disinfectant and is called its Carbolic Acid coefficient, or its Rideal-Walker coefficient. Thus if a 1 in 3000 dilution is found to be as germicidal as a 1 in 100 Phenol, the disinfectant is said to have a Phenol coefficiency of 30; that is, it possesses a germicidal power thirty times stronger than Phenol. In the routine testing of disinfectants the typhoid bacillus is generally used because of its medium resistance, its easy cultivation, and because it forms a good suspension; but it is noteworthy that the coefficients of a disinfectant for different bacteria are not always identical.

The presence of organic matter has been found to exert an appreciable effect on the Carbolic Acid coefficients as determined by the Rideal-Walker method. Meredith Blyth is of opinion that disinfectants, containing the higher Phenols, suffer great loss of efficiency when mixed with fat, albumen, fæces and urine. The germicidal value of the disinfectant acting on a 'naked' organism gives little, if any, indication of its value in the presence of organic matter. It appears impossible in the Phenol class to combine a low toxic value with a high germicidal value in the presence of much organic matter.—*Analyst*, '06, 154.

Dose.—1 to 3 grains = 0·06 to 0·2 gramme.

Ph. Ger. maximum single dose, 0·1 gramme; maximum daily dose, 0·3 gramme.

Prescribing Notes.—*Usually given internally in the form of a* **pill.** *12 grains of Carbolic Acid make a good pill mass with 24 grains of Liquorice Powder; another good formula is, Carbolic Acid 12 grains, Liquorice Powder 18 grains, Compound Tragacanth Powder 6 grains. Used in various forms as an application.*

Compressed tablets are supplied for extemporaneously preparing a solution.

The addition of free Ammonia to solution of Carbolic Acid slowly turns the colour blue, which darkens on keeping.—*P.J.* (3) xxi. 593.

Sulphurous Acid, added in very small proportion to Carbolic Acid melted, has been stated (*C.D.* '05, i. 859) to counteract the tendency of the acid to acquire a red tint.

Official Preparations.—Acidum Carbolicum Liquefactum, Glycerinum Acidi Carbolici, Suppositorium Acidi Carbolici, Trochiscus Acidi Carbolici, Unguentum Acidi Carbolici. Used in the preparation of Salol, Sodii Sulphocarbolas and Zinci Sulphocarbolas. Contained in Injectio Ergotæ Hypodermica and Liquor Thyroidei.

Not Official.—Anti-catarrhal Salts, Gargarisma Acidi Carbolici, Kraus's Catheter Lubricant, Lotio Acidi Carbolici, Lotio Acidi Carbolici et Boracis, Liquor Sodii Carbolatis, Mistura Acidi Carbolici, Lund's Oil, Oleum Lubricans, Pasta Lubricans, Pastillus Acidi Carbolici, Resina Carbolica, Vapor Acidi Carbolici, Antiseptic dressings, Carbolic Soap, Solution de Phenate de Soude, Acidum Carbolicum Crudum, Phenosalyl, Phenol Camphor, Phenol Iodatum, Pigmentum Phenol Iodati, Tribromphenol, Para-mono-chlorophenol, Trichlorphenol, Sulphaminol, Sulphocarbolic Acid and Sulphocarbolates.

Foreign Pharmacopœias.—Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital. (Fenolo cristalizzato), Jap., Mex. (Acido Fenico), Norw., Port., Russ., Span., Swed., Swiss and U.S.

Melting Point (Centigrade) compared with Foreign Pharmacopœias: Brit., 38·8°; Port., 35°; Dan., 39°; Fr., Span. and Swiss, 42°; Hung., 35°–44°; Ital., 40°; Mex., 40°; Norw., 40°; Austr., Belg., Dutch, Ger., Jap., Russ. and Swiss, 40°–42°; Swed., 39°; U.S., not lower than 40°.

Boiling Point (Centigrade) compared with Foreign Pharmacopœias: Austr., 178°–180°; Brit., not higher than 182°; Ital., 182°; Dutch, 181°–182°; Port. and Swed., **b.p.** not given; Fr., 182°; Belg., Ger., Jap., Norw. and Russ., 178°–182°; Hung., 180°–184°; Span., 186°; Swiss, 178°–184°; U.S., not higher than 188°.

Antidotes.—Stomach-tube, Emetics. Alcohol, Albumen, Saccharated Solution of Lime, soluble Sulphates (Magnesium or Sodium); Olive or Castor Oil; stimulants to counteract narcotism; warmth to the extremities. Hypodermic injection of Atropine Sulphate $\frac{1}{60}$ grain. Inhalations of Amyl Nitrite.

Case of Carbolic Acid poisoning by absorption treated successfully with 1-grain doses of Camphor (dissolved in Syrup) every hour for four hours.—*L.M.R.* '84, 217. 100 grammes of Camphorated Oil administered in case of Carbolic Acid poisoning: complete recovery.—*C.D.* '99, ii. 1055. Recovery after swallowing 3 oz. Carbolic Acid, treated by hypodermic injection of $\frac{1}{10}$ grain Apomorphine, Olive Oil and Lime Water being given freely.—*B.M.J.* '88, i. 1336; Soap.—*L.* '89, ii. 445. Vinegar neutralises the effects of Carbolic Acid on the skin and mucous membrane, and is useful when Carbolic Acid has been swallowed.—*L.* '96, i. 255; *Pr.* lvii. 220; *B.M.J.* '97, ii. 595.

Tests.—Carbolic Acid is distinguished by the following tests: (1) its melting point, (2) the boiling point, (3) its specific gravity at the melting point, (4) the production of a deep purple-violet colour when its aqueous solution is mixed with Ferric Chloride Test-solution, (5) the production of a white precipitate of Tribromphenol when an excess of Bromine Solution is added to its cold aqueous solution, and (6) the production of a bluish colour when 4 parts of its aqueous solution are mixed with 1 part of Ammonia Solution and a few drops of Chlorinated Soda Solution, and the mixture gently warmed.

The melting point is officially required to be not lower than 102° F. (38·8° C.). The melting point 91·5° F. (33° C.), given in *B.P.* 1885, was lower than that of any other Pharmacopœia; it has very properly been raised to a maximum of 102° F. (38·8° C.). It is possible with special precautions to raise the melting point of Carbolic Acid to 108° F. (42·2° C.); but the highest melting point commercially obtainable appears to be about 106° F. (41·1° C.), and no exception can be taken to a melting point of 104° F. (40° C.). The *P.G.* gives the melting point as 40° to 42° C. (104° to 107·6° F.); the *U.S.P.* requires that when Phenol is gently heated till liquid, then slowly cooled, with constant stirring until partial recrystallisation occurs, the semi-liquid mass formed should have a temperature (remaining stationary for some time) not lower than 39° C. (102·2° F.). A lower boiling point or a higher melting point indicates a less hydrated Phenol. The melting point and the boiling point are influenced by the presence of Water or Cresylic Acid, so that to eliminate the first it should be boiled for a few seconds and cooled. Starting with an acid melting at 104° F. (40° C.), 1 p.c. of added Water reduced the melting point to 98° F. (36·6° C.), 3 p.c. to 86° F. (30° C.), and 5 p.c. to 74° F. (23·3° C.).

The boiling point of the acid is about 180° C. (356° F.); the *B.P.* states not higher than 182° C. (359·6° F.); the *U.S.P.* and the *P.G.* 178° to 182° C. (352·4° to 359·6° F.). The acid has a specific gravity at its melting point of about 1·060; the *B.P.* states 1·060 to 1·066.

Lunge has shown (*P.J.* (3) xxii. 593), that the addition of 1·3 p.c. of Cresylic Acid to pure Phenol reduces the melting point from 40·5° C. (104·9° F.) to 32·5° C. (90·5° F.). The lower the melting point and the higher the boiling point, the more impure is the acid. The pure acid melts at 42° C. (107·6° F.), and boils at 182° C. (359·6° F.). A useful method of judging of the purity of a commercial acid is by determining the solidifying point of the 62·5 p.c. fraction, after the first 10 p.c. fraction containing the Water and light oils has been removed.

The aqueous solution of Phenol is faintly acid to blue Litmus paper. The *B.P.* states that it does not immediately redden blue Litmus; the *U.S.P.* that it is faintly acid to blue Litmus paper. An aqueous solution of Phenol yields a fine violet colour on the addition of Ferric Chloride Test-solution, the colour being pronounced even in very dilute solution. The *U.S.P.* gives quantities for this test, 1 drop of Ferric Chloride Test-solution to 10 c.c. of a 1 p.c. aqueous Phenol Solution yielding a violet-blue colour. The *P.G.* employs a solution of 20 parts of Phenol in 10 parts of Alcohol (90 p.c.) and states that when this solution is mixed with 1 part of Ferric Chloride Test-solution a dirty green coloration is produced, the solution when diluted with Water to 1000 parts assuming a nearly permanent light violet colour. Phenol even in dilute solution affords a white precipitate with Bromine Water. The test is common to the *B.P.*, *U.S.P.* and *P.G.* The *U.S.P.* states that the precipitate of Tribromphenol first formed is redissolved, but becomes permanent with more of the reagent, and that when examined under the microscope it appears crystalline. The *P.G.* directs a 1 in 50,000 solution of the Phenol to be employed, and states that the precipitate is flocculent.

Phenol coagulates Albumen Solution and Collodion, and forms a liquid with Camphor.

No process of assay has been introduced into the *B.P.* The Eighth Decennial Revision of the *U.S.P.* has adopted the Tribromphenol or Koppeschaar's process. The Phenol is precipitated as a Bromine compound by the addition of Bromine Solution and the excess of Bromine is determined by the addition of solution of Potassium Iodide (20 p.c.), and titration of the liberated Iodine with

Tenth-normal Volumetric Solution of Sodium Thiosulphate. The acid is required to show 96 p.c. of absolute Phenol. An outline of the process is given in the small type below under the heading of Volumetric Determination. The process originally recommended by Koppeschaar is given (*Zeitschrift für analitische Chemie*, xvi. 233), and consists in precipitating Phenol from its aqueous or dilute alcoholic solution with Bromine Water, the strength of the Bromine Water being determined by titration with Volumetric Sodium Thiosulphate and Potassium Iodide. The process is modified by Allen as follows:—A quantity corresponding to about 0·1 of a gramme of Phenol is carefully weighed and transferred to a stoppered bottle; to this is added a solution prepared by gradually adding Bromine to 7 c.c. of Normal Volumetric Sodium Hydroxide Solution until a permanent yellow colour appears, and then boiling the liquid. When cold a measured quantity of 5 c.c. of concentrated Hydrochloric Acid is rapidly introduced, the bottle stoppered and shaken. A solution of 1·25 grammes of pure Potassium Iodide is added, the bottle shaken and allowed to stand; the liberated Iodine is titrated with Deci-normal Volumetric Sodium Thiosulphate Solution, using Starch Mucilage as an indicator. In calculating out the result 7 c.c. of Normal Volumetric Sodium Hydroxide Solution neutralises 0·56 gramme of Bromine, all of which is liberated by Hydrochloric Acid. 0·1 of a gramme of Phenol requires 0·4068 gramme of Bromine, leaving a surplus of 0·1532 gramme, which would be sufficient to neutralise 19·5 c.c. of Deci-normal Volumetric Sodium Thiosulphate Solution, each c.c. of Volumetric Thiosulphate used over and above this indicates 0·00197 gramme of impurities in 0·1 gramme of the sample.

The more commonly occurring impurities are excess of Water and the presence of Cresylic Acid and Creosote. The presence of excess of Water is indicated by the lowering of the melting point, which may also indicate the presence of Cresylic Acid. The latter acid and Creosote are detected by the behaviour of a mixture of equal volumes of the liquefied acid and of the Glycerin when mixed with 3 volumes of Water. The *B.P.* and *U.S.P.* state that a clear liquid should be formed when 1 volume of Phenol liquefied by the addition of 10 p.c. of Water (8 p.c., *U.S.P.*) is mixed with 1 volume of Glycerin, and it is not rendered turbid when 3 volumes of Water are added.

Volumetric Determination.—The following process, which is a modification of that originally devised by Koppeschaar, is included in the *U.S.P.* A measured quantity of 25 c.c. (= 0·0389 gramme of Phenol) of a solution obtained by dissolving 1·556 grammes of the specimen in sufficient Water to produce 1000 c.c. is mixed in a glass stoppered bottle with 30 c.c. of Tenth-normal Volumetric Bromine Solution; 5 c.c. of Hydrochloric Acid added, followed by 5 c.c. of an aqueous Potassium Iodide Solution (20 p.c. w/v), rapidly introduced; the mixture is shaken, the stopper and neck of the bottle rinsed with a little Water, allowing the washings to run into the bottle, 1 c.c. of Chloroform added and the mixture well shaken. The liberated Iodine is titrated with Tenth-normal Volumetric Sodium Thiosulphate Solution, of which the number of c.c. used subtracted from 30 and the remainder multiplied by 4 yields the percentage of absolute Phenol present in the specimen operated upon.

Preparations.

ACIDUM CARBOLICUM LIQUEFACTUM. Liquefied Phenol. Liquefied Carbolic Acid.

Phenol, 10; Distilled Water, 1; by weight.

It forms a clear, colourless, highly refractive liquid possessing the characteristic odour of Phenol. It has a tendency to acquire a pinkish tint, and should therefore be preserved in well-stoppered dark amber-tinted glass bottles.

Dose.—1 to 3 minims = 0·06 to 0·2 c.c.

Foreign Pharmacopœias.—Official in Austr., Belg., Fr., Ger., Hung., Jap. and Russ., Carbolic Acid, 100; Water, 10. Dan., Ital., Norw., Span., Swed. and Swiss, Carbolic Acid, 90; Water, 10. Dutch, Carbolic Acid, 100; Water, 20; U.S., not less than 86·4 p.c. Not in the others.

A weak **Solution of Carbolic Acid** is official in the following Pharmacopœias.—Ital. (Aqua Phenicata), and Port. (Agua Phenica), 1 in 100, also 1 in 1000; (Aqua Carbolisata), Austr., Belg., Dutch and Ger., 1 in 50; Hung. (Aqua Carbolata), Mex. (Solucione de Acido Fenico), and Swiss (Aqua Phenolata), 1 in 100; Dan. (Solutio Phenoli), Fr. (Soluté de Phénol), Norw. (Solutio Acidi Carbolici) and Swed. (Solutio Phenoli), 1 in 50; Span. (Agua Fenicada), 1 in 50. The *Brussels Conference* adopted a strength of 2 p.c. w/w for Phenoli Solutio seu Aqua Phenolata.

Tests.—Liquefied Carbolic Acid has a specific gravity ranging from 1·064 to 1·069, a boiling point not higher than 182° C. (359·6° F.), and it should answer the tests of identity and purity given under Acidum Carbolicum.

When a small quantity of solution (say, 2 fl. drm., in a test-tube with a thermometer dipping into the solution) is cooled to about 10° C. (50° F.) and gently stirred, it becomes a mass of crystals, which will entirely disappear when the temperature rises to 14·4° C. (58° F.).

GLYCERINUM ACIDI CARBOLICI. Glycerin of Phenol.

Phenol, 1; Glycerin, sufficient to produce 5. (1 in 5)

Used as an antiseptic packing in cases of acute middle-ear catarrh, and has given good results.—*B.M.J.* '04, ii. 1210. A 10 p.c. aqueous solution of the acid with Cocaine affords relief of pain in non-suppurative middle-ear disease.—*B.M.J.* '04, ii. 1211.

Mixed with an equal bulk of Water, may be applied to aphthous stomatitis, or to ulcers in the mouth, or to inflamed tonsils. Mixed with 20 or 30 parts of Water, it makes an excellent gargle.

Foreign Pharmacopœias.—Official in U.S., 1 in 5; Mex., 1 in 50; Port., 1 in 100; Span., 1 in 100. Not in the others.

SUPPOSITORIA ACIDI CARBOLICI. Phenol Suppositories.

Each suppository contains 1 grain of Phenol, 2 grains of White Beeswax, and about 12 grains of Oil of Theobroma.

The addition of Wax to Oil of Theobroma raises the melting point of the mass without producing the required firmness. Suggested that future *B.P.* basis should be Theobroma alone.—*P.J.* '00, ii. 85.

TROCHISCUS ACIDI CARBOLICI. Phenol Lozenge.

1 grain of Phenol in each, flavoured with Tolu.

Dose.—1 to 3 lozenges.

UNGUENTUM ACIDI CARBOLICI. Phenol Ointment. Ointment of Carbolic Acid.—*B.P.* '85.

Phenol, 1; Glycerin (by weight), 3; white Paraffin Ointment, 21. (1 in 25)

In *B.P.* '85 ointment, part of the Phenol crystallised on keeping, and acted as a caustic. To avoid this the Phenol is now dissolved in Glycerin.

Attention has been directed (*L.* '05, i. 514) to the tendency of the *B.P.* **Ointment** to crystallise, and a modified formula suggested:—Phenol, 1; Hard Paraffin, 6; Soft Paraffin, 18. This formula is stated to be superior to the official one, and to be recommended especially for obstetric use. The desirability is also suggested of inserting alternative formulas for ointment bases in the *B.P.* According to Hallberg, ointment bases may be classed into: (1) Non-absorbent protective epidermatic bases, *e.g.*, Hard and Soft Paraffin; (2) Emollient absorbent endermatic bases, *e.g.*, Lard and Olive Oil; (3) Systematic absorptive diadermatic bases, *e.g.*, Wool Fat.

The ointment made according to the directions contained in the British Pharmacopœia has been the subject of a good deal of discussion from time to time, some authorities holding that even now it is not a satisfactory product, whilst others hold that it is. According to *P.J.* '06, i. 344, the formula as it stands has been well designed, and it produces an excellent ointment.

The *B.P.* 1885 ordered Carbolic Acid 1, Soft Paraffin 12, Hard Paraffin 6 = 1 in 19. The *Companion* noted the fact that the Carbolic Acid did not dissolve until the melted mixture was heated to 60° C. (140° F.) or over, and that part of the Carbolic Acid crystallised on keeping the ointment, but no crystals were formed when the strength was reduced to 1 in 30. The *U.S.P.* has now been altered to 3 in 100, and this has been incorporated in the *B.P.C.* under the title **Paraffinum Carbolisatum.**

Foreign Pharmacopœias.—Official in Fr. (Pommade de Phénol), Phenol 1, Vaseline 99; Ital. (Pomata Fenata), Carbolic Acid 1, Benzoated Lard 99; Mex. (Pomada de Acido fenico), Carbolic Acid 1, Alcohol 1, Vaseline 98; U.S. (Unguentum Phenolis), Phenol 3, White Petrolatum 97. Not in the others.

Not Official.

ANTI-CATARRHAL SALTS.—Phenol, 1; Eucalyptus Oil, 1; Pumilio Pine Oil, ½; Strong Iodine Solution, ½; Camphor, 1; Ammoniated Alcohol, 2; Pine Sawdust, 2, or *q.s.*—*Martindale.*

This has been incorporated in the *B.P.C.* under the title **Vapor Eucalypti Compositus** with the *syn.* Anti-catarrhal Salts.

GARGARISMA ACIDI CARBOLICI.—Glycerin of Phenol, 1 fl. oz.; Water, to 1 pint.—*St. Thomas's.*

This has been incorporated in the *B.P.C.*

Glycerin of Carbolic Acid, 25 minims; Water, to 1 fl. oz.—*London.*

LOTIO ACIDI CARBOLICI.—Carbolic Acid, 30 grains; Water, 8 oz. This lotion applied to mosquito bites relieves the itching, pain, and swelling. If mixed with a little Glycerin and sponged over the face and hands before retiring to rest, the mosquitoes will not bite until the Acid be thoroughly evaporated by the heat of the skin.—*L.* '78, ii. 280.

See also Foreign Pharmacopœias under 'Acidum Carbolicum Liquefactum.'

Lotio Acidi Carbolici.—Carbolic Acid (crystals), 1 oz.; Water, to 20 fl. oz.—*London.*

Liquefied Carbolic Acid, 24 minims; Water, to 1 oz.—*Westminster.*

Phenol Crystals, 1; Water, to 20. Usually diluted with Water before use, as an antiseptic in surgery.—*B.P.C.* *See* also **Carbolic Solution,** p. 28.

LOTIO ACIDI CARBOLICI ET BORACIS.—Glycerin of Phenol, 2 fl. oz.; Glycerin of Borax, 2 fl. oz.; Water, to 1 pint. To be diluted with five to ten parts of Water.—*St. Thomas's.*

This has been incorporated in the *B.P.C.*

Lotio Boracis cum Acido Carbolico.—Bicarbonate of Sodium, 20 grains; Borax, 20 grains; Glycerin of Carbolic Acid, 1 fl. drm.; Distilled Water, to 1 oz. —*Royal Free.*

Lotio Acidi Carbolici cum Borace.—Glycerin of Carbolic Acid, 6 minims; Glycerin of Borax, 6 minims; Water, to 1 oz.—*Children's Hospital,* G.O.S.

MISTURA ACIDI CARBOLICI (*Rothe*).—Pure Carbolic Acid, 12 minims; Tincture of Iodine, 16 minims; Tincture of Orange, 90 minims; Syrup, 3 drm.; Water, to 8 oz. Recommended for use in typhoid fever; 1 oz. every 4 hours.—*L.* '88, i. 1244.

LUND'S OIL.—Phenol, 1; Castor Oil, 4; Almond Oil, 20.—*Lock.*

Phenol, 1; Castor Oil, 4; Almond Oil, 15.—*Companion* (1899).

This has been incorporated in the *B.P.C.* under the title **Oleum Lubricans.**

A solution of Carbolic Acid in Oil is frequently used to lubricate and at the same time disinfect catheters; but Koch's experiments show that such a solution has no antiseptic power, and they ought to be first disinfected with an aqueous solution, and afterwards oiled.—*Brunton.*

Kraus's Catheter Lubricant.—Tragacanth, 2·5; Glycerin, 10; Phenol Water (3 p.c.), 90.

This paste facilitates the passage of the catheter and is easily washed off in warm Water.—*P.J.* '99, ii. 529.

This has been incorporated in the *B.P.C.* as under:—

Pasta Lubricans. *Syn.* Catheter Paste.—Carbolic Acid, 3; Glycerin, 10; Tragacanth, 2·50; Distilled Water, *q.s.* to produce 100.—*B.P.C.*

PASTILLUS ACIDI CARBOLICI.—Carbolic Acid, ½ grain; Glycogelatin, 18 grains in each.

RESINA CARBOLICA.—Resin, 4; Carbolic Acid Crystals, 4; Chloroform, 3.—*R.D.H.*

Resin, 45; Carbolic Acid, 35; Chloroform, 20.—*B.P.C.*

VAPOR ACIDI CARBOLICI.—Pure Carbolic Acid, 420 grains; Water, 1 drm.; dissolve. 20 drops in a pint of Water at 140° F. for each inhalation. Antiseptic, very serviceable in syphilitic and carcinomatous ulcerations.

CARBOLIC ANTISEPTIC DRESSINGS.—Absorbent **Wool** and **Lint** containing 5 and 10 p.c. of absolute Phenol; **Gauze,** 5 p.c. **Tow,** 5 p.c., **Ligatures; Protective** Oiled Skin; Silk **Sutures.** Fr. (Gaze Phénolée), 2 to 5 p.c.; Belg., Gauze, 5 p.c.; Jap., Cotton-Wool, 5 p.c.; Ital., Gauze, 5 p.c.; Wool, 2 p.c.; Mex., Gauze, 10 p.c.; Stupa Carbolisata (*B.P.C.*), Carbolic Acid, in crystals, 5; Methylated Ether (0·720), 100; Jute Tow, dried, 95; Stupa Carbolisata Composita (*B.P.C.*), Jute Tow, dried, 86; Tar, 4; Carbolic Acid, 10; Methylated Ether, 100.

CARBOLIC SOAPS.—These contain 10 p.c. and 20 p.c. of Phenol.

SOLUTION DE PHENATE DE SOUDE.—Phenol, 100; Solution of Caustic Soda (sp. gr. 1·332), 20, by weight; Water to measure, 1000.—*Fr.*

One part of this solution to 30 of Water makes a good **antiseptic mouthwash.**

Liquor Sodii Carbolatis.—Phenol, 8; Caustic Soda, 3½; Distilled Water, 100.—*Martindale.*

Liquor Sodii Carbolatis. *Syn.* Solution of Sodium Phenate.—Carbolic Acid, 8; Sodium Hydroxide, 4; Glycerin of Cochineal, 1; Distilled Water, *q.s.* to produce 100.—*B.P.C.*

A formula is given (*A.J.P.* '90, 169) as representing the proprietary article sold under the name 'Phénol Sodique': Coal-tar, 2 troy oz.; Soda, 120 grains; Water sufficient to make 20 fl. oz.

ACIDUM CARBOLICUM CRUDUM.—A yellowish, yellowish-brown, or reddish-brown liquid, having a strongly empyreumatic and disagreeable odour. It consists chiefly of **Cresylic Acid** (*see* p. 42), and is largely used for disinfecting drains, etc.

Foreign Pharmacopœias.—Official in Hung., Ital., Jap. and Russ. Not in the others.

PHENOSALYL.—A speciality containing Phenol and Salicylic Acid introduced as an antiseptic.

PHENOL-CAMPHOR.—Carbolic Acid and Camphor will form a liquid in any proportion between Camphor 3, Carbolic Acid 1 and Camphor 1, Carbolic Acid 3; but most authorities appear to use an excess of Camphor. The formula $C_8H_{11}O$, attributed to this compound, corresponds with molecular weights of each, Carbolic Acid and Camphor (Carbolic Acid 2 parts, and Camphor 3 parts).

A colourless refractive liquid with an odour of Camphor. Soluble in Alcohol (90 p.c.), Ether, Chloroform, and Oils. Insoluble in Glycerin and in Water.

Used as a local anæsthetic for toothache.—*T.G.* '85, 269; *L.* '89, ii. 867.

Camphor, 60; Phenol, 19; Water, 1; is not so caustic as Carbolic Acid.—*Pr.* xl. 128, and xlii. 52.

Acidum Carbolicum Camphoratum (*Hager*).—Camphor, 3; Carbolic Acid, 1.

This has been incorporated in the *B.P.C.*

Camphora Carbolisata (*Hager*). — Camphor, 25; Carbolic Acid, 9; Spirit, 1.

Carbolic Acid 1, Camphor 3, has been applied in diphtheria, etc., either pure or mixed with an equal volume of Oil of Almonds.

PHENOL IODATUM (Iodised Phenol. Pigmentum Phenol Iodati).—Iodine, 40 grains; Liquefied Carbolic Acid, 1 oz.—*Hosp. Women*, and *Samaritan*.

Applied on a dressed sound or forceps in chronic endometritis and endocervicitis, with or without a previous curetting. A fl. drm. diluted with 20 oz. of Water is used as a vaginal douche in midwifery.—*L.* '88, ii. 862.

Iodine, 10; Liquefied Carbolic Acid, to make 100.—*B.P.C.*

Pigmentum Iodi Carbolicum.—Iodine, 1; Liquefied Phenol, 4.—*Guy's.*

Pigmentum Iodi Carbolisatum.—Iodine, Potassium Iodide, and Phenol, of each 4 grains Glycerin, ½ oz.; Water, to 1 oz.—*Central Throat.*

This is sometimes used at half strength.

It has been incorporated in *B.P.C.* as follows:—Iodine, 1; Potassium Iodide, 1; Phenol, 1; Glycerin, 50; Distilled Water, *q.s.* to produce 100.

TRIBROMPHENOL (Bromol).—White crystalline powder, with a slightly aromatic odour. A sample melted at 185° F. (85° C.).

Solubility.—1 in 2 of Alcohol (90 p.c.); 1 in 1 of Ether; 1 in 2 of Chloroform; almost insoluble in Water, but dissolves in Caustic Alkaline Solutions; 1 in 260 of Glycerin; 1 in 7½ of Olive Oil.

It possesses considerable antiseptic properties.

PARA-MONOCHLOROPHENOL.—Occurs in crystalline needles. Soluble in Alcohol, Ether, and Fixed Oils, but practically insoluble in Water. It possesses a stronger microbicidal power than Phenol, but its employment requires careful watching.—*B.M.J.E.* '95, i. 11; *P.J.* '95, ii. 551; '98, i, 61; *C.D.* '95, i. 224.

5 or 10 p.c. Glycerin solution in laryngeal phthisis, by intralaryngeal injection, also ¼ to ½ p.c. solutions for inhalations. Under the name of **Menthosol,** a mixture of Menthol and Parachlorophenol in 5, 10 and 15 p.c. solutions has been introduced.—*B.M.J.E.* '02, i. 43.

TRICHLORPHENOL.—White crystalline powder, with a pungent, somewhat tarry odour.

Solubility.—1 in 1 of Alcohol (90 p.c.); 2 in 1 of Ether; 1 in 1¼ of Chloroform; 1 in 1000 of Water; 1 in 9 of Glycerin; 1 in 3 of Olive Oil.

It forms salts with Ammonium, Potassium, Magnesium, Calcium and Lead.

It is stated to be an antiseptic and deodorant much stronger than Carbolic Acid.

SULPHAMINOL (Thio-oxydiphenylamine).—Yellow, odourless, tasteless powder. Insoluble in Water, soluble in Alcohol and Ether. Antiseptic dusting powder. Internally in doses of 3 to 4 grains = 0·2 to 0·36 gramme, three or four times a day in cystitis.

SULPHOCARBOLIC ACID $(H.C_6H_5SO_4)$.—Phenol-para-sulphonic Acid is formed by the action of Sulphuric Acid upon Carbolic Acid when warm. Phenol-ortho-sulphonic Acid is produced in the cold.

A few years ago it was revived under the name **ASEPTOL**, a syrupy liquid, mixing in all proportions with Water, Alcohol, and Glycerin.

AMMONIUM, MAGNESIUM, POTASSIUM, and **SODIUM SULPHOCARBOLATES** all crystallise in tufts of acicular crystals more or less white; **COPPER SULPHOCARBOLATE**, in transparent light blue interlacing prisms; the **IRON** salt, in small brown micaceous crystals; the **ZINC** salt, in tabular crystals.

The Sodium and Zinc Sulphocarbolates are official. *See* SODII SULPHOCARBOLAS and ZINCI SULPHOCARBOLAS.

ACIDUM CHROMICUM.

CHROMIC ANHYDRIDE.

CrO_3, eq. 99·38.

FR., ACIDE CHROMIQUE CRISTALLISÉ; GER., CHROMSAURE; ITAL., ANIDRIDE CROMICA; SPAN., ACIDO CROMICO.

Small purplish-red crystals, which are slightly hygroscopic even when absolutely free from Sulphuric Acid, but much more so when a trace of the latter is present. They possess a strong corrosive action on animal and vegetable tissues.

It should be kept in well-stoppered, dark amber-tinted glass bottles.

It is produced by the action of Sulphuric Acid upon Potassium Bichromate.

Solubility.—About 2 in 1 of Water; Alcohol decomposes it.

It is a powerful oxidising agent, and is liable to cause sudden combustion or *explosion* in contact with strong Alcohol, Ether, Glycerin, and some other organic matters.

Medicinal Properties.—Disinfectant, antiseptic, deodorant. It is a powerful caustic (1 in 1 of Water), and is used by means of a pointed glass rod, great care being taken to protect the adjacent parts by plaster or ointment, having moist lint ready to absorb any superfluous Acid; 100 grains to 1 oz. Water is used to remove warts, lupus, and condylomata; 1 in 40 of Water may be applied to ulcers of mouth or pharynx; and 1 in 2000, or even 4000, is used as a lotion for putrid sores, leucorrhœa and ozœna.

It is of great importance for its use as a caustic that Chromic Acid should be free from Sulphuric Acid.

A warm concentrated solution rapidly dissolves all animal tissues.

5 p.c. Solution of Chromic Acid applied with a brush to the feet after bathing gave excellent results in the German Army as a remedy for excessive perspiration.—*P.J.* (3) xx. 504.

The pure Acid fused on the point of a probe has been applied with success to nasal mucous membrane in cases of hay fever and paroxysmal sneezing.—*M.A.* '94, 317.

Official Preparation.—Liquor Acidi Chromici.

Not Official.—Gargarisma Acidi Chromici, Lotio Acidi Chromici and Pigmentum Acidi Chromici.

Foreign Pharmacopœias.—Official in Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex. (Acido Chromico), Norw., Port., Russ., Span., Swed., Swiss and U.S. (Chromii Trioxidum).

Tests.—Chromic Acid is distinguished by its melting point, which should be from 192° to 193° C. (377·6° to 379·4° F.), the *B.P.* gives 192° C. (377·6° F.) the *U.S.P.* 192° to 193° C. (377·6° to 379·4° F.), whilst the *P.G.* does not include a melting point; the production of green coloured liquids when its aqueous solutions are mixed with reducing agents, the evolution of Oxygen when strongly heated, and the evolution of Chlorine when warmed with Hydrochloric Acid. It liberates Iodine from Potassium Iodide Solution, and this reaction has been utilised by the *U.S.P.* as a means of determining the percentage of Chromic Anhydride. The Iodine liberated when the specimen is treated with an excess of Potassium Iodide, in a solution acidified with Hydrochloric Acid, being titrated with Tenth-normal Volumetric Sodium Thiosulphate Solution; it is required to contain not less than 90 p.c. of pure Chromium Trioxide.

The more generally occurring impurity is Sulphuric Acid, which is tested for, in an acidified solution, by Barium Chloride Solution, only a slight opalescence should be afforded.

Barium Chloride or Nitrate.—An aqueous solution 1 in 50 (1 in 100 *P.G.* and *U.S.P.*) previously acidulated with Hydrochloric Acid. Should be unaffected by Barium Chloride Solution. (*P.G.* uses Barium Nitrate Solution.) This test is common to *B.P.*, *P.G.* and *U.S.P.*; the *B.P.* test permits a slight opalescence.

Volumetric Determination.—A weighed quantity of 1 gramme is dissolved in 100 c.c. of Water. A measured quantity of 8·3 c.c. of this solution is mixed with 2 c.c. of Hydrochloric Acid and about 1 gramme of Potassium Iodide and diluted with 100 c.c. of Water. The Iodine liberated should require not less than 22·5 c.c. of Tenth-normal Volumetric Sodium Thiosulphate Solution to decolorise it, using 5 c.c. of Starch Test Solution as an indicator. 1 c.c. of Tenth-normal Volumetric Sodium Thiosulphate indicates 4 p.c. of pure Chromium Trioxide, *U.S.P.*

Preparation.

LIQUOR ACIDI CHROMICI.—Solution of Chromic Acid.

Chromic Anhydride, 1; Distilled Water, 3.

It forms an orange-red caustic liquid, possessing an acid reaction. It is officially required to contain the equivalent of 25 p.c. of Chromic Anhydride, CrO_3; or 29·5 p.c. of Chromic Acid, H_2CrO_4.

Foreign Pharmacopœias.—Official in Belg. and Fr., Chromic Acid, 1 Distilled Water, 1; dissolve.

Tests.—The specific gravity is officially stated to be 1·185; but a solution prepared by dissolving 10 grammes of Chromic Anhydride (free from Sulphuric Acid) in 30 c.c. of Distilled Water had a sp. gr. of 1·214. As the official Chromic Acid is used in its preparation, it is naturally required to answer the tests of identity and purity given in the monograph on this Acid.

Not Official.

GARGARISMA ACIDI CHROMICI.—Chromic Acid, 1 grain; Water, to 1 oz.—*Lock.*

This has been incorporated in the *B.P.C.* as follows:—Chromic Acid, 1; Distilled Water, *q.s.* to produce 500.

LOTIO ACIDI CHROMICI.—Chromic Acid, 10 grains; Water, 1 oz.—*University* and *Westminster.*

PIGMENTUM ACIDI CHROMICI.—Chromic Acid, 10 grains; Water, to 1 oz. In chronic superficial glossitis and secondary syphilis.—*Throat.*

ACIDUM CHRYSOPHANICUM.

See CHRYSAROBINUM.

Not Official.

ACIDUM CINNAMICUM.

$C_9H_8O_2$, eq. 146·95.

There are two varieties of Cinnamic Acid: (1) Medicinal; (2) Artificial.

Medicinal Cinnamic Acid is obtained from natural Cinnamic Acid derivates, *e.g.*, Styrax, etc. Colourless, glistening crystals, having a faint, fragrant odour. Sparingly soluble in Water, soluble in Alcohol (90 p.c.), and in Ether. It is converted into Benzaldehyde on oxidation with Potassium Permanganate. Used in the form of intravenous or intermuscular injection in pulmonary tuberculosis. In 5 p.c. alcoholic solution as an application in laryngeal tuberculosis.

Artificial Cinnamic Acid is prepared synthetically by the interaction of Benzaldehyde and Acetylchloride. Colourless crystals, sometimes possessing a faint odour of Benzaldehyde. Sparingly soluble in Water, readily soluble in Ether and Alcohol. Its use is limited to the preservation of solutions, dressings, etc.

See also **Sodii Cinnamas**, p. 1112.

ACIDUM CITRICUM.

CITRIC ACID.

$H_3C_6H_5O_7, H_2O$, eq. 208·50.

FR., ACIDE CITRIQUE; GER., CITRONENSAURE; ITAL. AND SPAN., ACIDO CITRICO.

Large colourless crystals, or a white crystalline powder, possessing an acid taste. Obtained principally from Lemon Juice, which may contain from 5 to 8 p.c.

Solubility.—10 in 6 of Water, and measures 12½; 1 in 2 of Glycerin; 10 in 15 of Alcohol (90 p.c.); 1 in 8 of Ether; almost insoluble in Benzol and Chloroform.

The solubility of Citric Acid in Ether naturally varies with the amount of Alcohol and Water which the Ether contains. The above figure represents its solubility in Ether (sp. gr. 0·735). The figure for Ether Purus (sp. gr. 0·720) is 1 in 40.

Medicinal Properties.—Refrigerant and sialagogue; relieves thirst in fevers. Efficacious in scurvy, for which it is also prophylactic.

Citric Acid 1, dissolved in Distilled Water 12½ (or 35 grains in 1 oz.) is a substitute for Lemon Juice, but does not keep long without spoiling.

17 grains of Citric Acid neutralise about	24¼	grains	Potassium Bicarbonate.
	20	,,	Potassium Carbonate.
	20½	,,	Sodium Bicarbonate.
	34¾	,,	Sodium Carbonate.
	12¾	,,	Ammonium Carbonate.
	11¾	,,	Magnesium Carbonate.

Dose.—5 to 20 grains = 0·32 to 1·3 grammes.

Prescribing Notes.—*Usually given in powders to be taken with each dose of an alkaline mixture during effervescence; or in solution, directing the quantity to be taken with the alkaline mixture.*

Incompatibles.—Potassium Tartrate, alkaline Carbonates, Acetates, and Sulphides.

Official Preparations.—Used in the preparation of Liquor Ammonii Citratis, Liquor Bismuthi et Ammonii Citratis, Caffeinæ Citras, Ferri et Ammonii Citras, Ferri et Quininæ Citras, Lithii Citras, Potassii Citras, Sodii Citro-Tartras Effervescens, and in all the granular effervescing Citrates.

Not Official.—Syrupus Acidi Citrici.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex., Norw., Port., Russ., Span., Swed., Swiss and U.S.

Tests.—Citric Acid is distinguished by the following tests: (1) the production of a white precipitate insoluble in solution of Potassium Hydroxide, but soluble in Ammonium Chloride Solution and in solution of alkali Citrates, when its neutralised solution is boiled with Calcium Chloride Solution; (2) the white precipitate soluble in Ammonia Solution, produced when the neutralised solution is treated with Silver Nitrate Solution. In contradistinction to Tartrates no mirror is produced when this ammoniacal solution is warmed. The melting point of Citric Acid is rather a variable figure (*P.J.* [3], xxi. 1051). The fully Hydrated Acid melts at about 70° C. (158° F.), and the anhydrous acid at 153° C. (307·4° F.), but the crystals, and more particularly the powder, begin to dehydrate even below 70° C. (158° F.), so that intermediate figures will be obtained according to the manner in which it is heated. No melting point is given in the *B.P.*; the *U.S.P.* gives between 152° and 153° C. (305·6° and 307·4° F.), and states that at about 75° C. (107° F.) it begins to lose Water of crystallisation and becomes anhydrous at about 135° C. (275° F.).

It is officially required to indicate 99·38 p.c. of Hydrogen Citrate as ascertained by titration with Volumetric Solution of Sodium Hydroxide; Phenolphthalein Solution should be employed as an indicator of neutrality, Litmus Solution not being suitable; the *U.S.P.* requires it to contain not less than 99·5 p.c. of pure Citric Acid; the *P.G.* does not state a requisite percentage.

The more generally occurring impurities are Lead, Tartaric Acid, and mineral matter. Calcium, Iron, heavy metals, Oxalic and Sulphuric Acids may also be present. The most important and most likely impurity is Lead, and the official method of testing for this metal has given rise to severe criticism. The *B.P.* directs the solution to be nearly neutralised before the addition of Hydrogen Sulphide and omits reference to limiting the quantity of Hydrogen Sulphide Solution to be employed. *P.G.* directs the solution to be nearly neutralised, whilst the *U.S.P.* makes the solution acid by the addition of a few drops of Hydrochloric Acid, and then requires that it shall not respond to the time-limit test for heavy metals. The methods employed by the Pharmacopœias for testing for Tartaric Acid are also different; the *B.P.* adopting the tests with Ferrous Sulphate and Hydrogen Peroxide; and with Ammonium Molybdate and Hydrogen Peroxide, requiring that an aqueous solution of the acid should not afford a purple or violet coloration when supersaturated with Potassium Hydroxide Solution after the previous addition of a little Ferrous Sulphate Solution and a few drops of Hydrogen Peroxide Solution. The Ammonium Molybdate test is performed by mixing 1 gramme of the acid with 5 c.c. of Ammonium Molybdate Solution, and adding a few drops of Hydrogen Peroxide Solution. The test is not entirely satisfactory, as other substances besides Tartaric Acid yield a similar coloration, notably metallic particles, such as Lead; the *U.S.P.* adopts the test with Solution of Potassium Acetate. The mineral residue left on incineration with free access of air should according to the *B.P.* and *U.S.P.* not amount to more than 0·05 p.c. and according to *P.G.* 0·5 gramme should leave no weighable residue.

A standard of 5 parts per million for Lead and 1 part per million for Arsenic has been suggested (*C.D.* '08, i. 795).

Potassium Acetate Solution.—1 gramme of the powdered Acid dissolved in 5 c.c. of Solution of Potassium Acetate (1–3) should remain clear even after the addition of an equal volume of Alcohol (absence of Tartaric or Oxalic Acid) *U.S.P.*

Pure Sulphuric Acid.—1 gramme Citric Acid with 10 c.c. pure Sulphuric Acid should become at most yellow in colour but not brown, when warmed in a test-tube on a water-bath for 1 hour, *P.G.*

Ammonium Oxalate Solution.—A 10 p.c. w/w aqueous solution should not be affected by Ammonium Oxalate Solution, *P.G.*; 5 c.c. of a 1 in 10 aqueous solution nearly neutralised with Ammonia Solution should remain clear on the addition of 1 c.c. of Ammonium Oxalate Test Solution, *U.S.P.*

Barium Chloride or Barium Nitrate.—A 10 p.c. w/w aqueous solution should not be affected by Barium Nitrate Solution, indicating the absence of Sulphates, *P.G.* 10 c.c. of a 1 p.c. w/w aqueous solution after the addition of a few drops of Hydrochloric Acid should not be rendered turbid within 5 minutes on the addition of 1 c.c. of Barium Chloride Test Solution, indicating limit of Sulphuric Acid, *U.S.P.*

Volumetric Determination.—34·75 c.c. of a solution of 5 grammes Citric Acid in Water to measure 100 c.c., should require not less than 24·87 c.c. of Normal Volumetric Potassium Hydroxide Solution using Phenolphthalein Test Solution as indicator; which is equivalent to not less than 99·5 p.c. of pure Citric Acid, *U.S.P.*

Not Official.

SYRUPUS ACIDI CITRICI. *Syn.* Syrupus Citri.

Belg.—Citric Acid, 20; Syrup, 950; Water, 20; Spirit of Lemon, 2; Alcohol (94 p.c.), 8.

Fr.—Citric Acid, 10; Syrup, 970; Alcoolature de Citron, 20.

Hung.—Citric Acid, 2; Sugar, 100; Water, 50.
Mex.—Citric Acid, 10; Simple Syrup, 970; Water, 20.
Port.—Citric Acid, 1; Syrup of Lemons, 98; Water, 1.
Russ.—Citric Acid, 3; Syrup, 150; Elæosacchari Citri, 1.
Swed.—Citric Acid, 1; Syrup, 19.
Swiss.—Citric Acid, 2; Spirit of Lemon, 1·5; Water, 2·5; Simple Syrup, 94.
U.S.—Citric Acid, 10; Water, 10; Tincture of Fresh Lemon Peel, 10; Syrup, to make 1000.
B.P.C.—Citric Acid, 3; Tincture of Lemon, 3; Syrup, *q.s.* to produce 100.

All by weight except U.S. and *B.P.C.*

Not Official.

ACIDUM CRESYLICUM.

CRESYLIC ACID. CRESOL.

C_7H_8O, eq. 107·25.

A colourless or slightly yellow liquid, with a tarry odour, obtained from Coal-tar. It should be preserved in well-stoppered glass bottles of a dark amber colour.

There are three isomeric Cresols, but the principal constituent of the 'crude Carbolic Acid' of commerce (the source of commercial Cresylic Acid) is the Para-cresylic Acid, with more or less of its isomers.—*Allen.*

A mixture of the three was introduced as an antiseptic under the name of **Trikresol.**

By the same process which yields Salicylic Acid from Phenol, the three isomeric Cresols yield three corresponding Cresotic or Cresotinic Acids, the Sodium salts of which have been used in Medicine.

Solubility.—1 in 80 of Water, and mixes in all proportions with Alcohol (90 p.c.), Ether, Chloroform, Glycerin, and Olive Oil.

Medicinal Properties.—Disinfectant and antiseptic. Used as an **inhalation** in whooping-cough, and other respiratory affections.

Prescribing Notes.—*It is far less soluble in Water than Carbolic Acid, and therefore not so convenient.*

Foreign Pharmacopœias.—Official in Fr., Ger., Jap. and Swiss, Cresolum crudum, a yellowish liquid; Austr., Kresolum, acicular crystals which become yellow or brown on keeping, soluble in 38 parts of Water. Austr. has also Kresolum Liquifactum (Kresol, 100, Water, 10), and Aqua Kresolica (about 1 of liquefied Kresol in 50). Belg., Cresolum crudum, yellow or brownish liquid; Dutch, Cresolum crudum, yellow, yellowish-brown, or reddish-brown liquid; Mex., Cresilol, colourless fluid; Span., Cresol, yellowish-red liquid; U.S., Cresol, colourless or straw-coloured liquid.

Tests.—Cresol has a specific gravity of 1·045 to 1·048, and a boiling point when pure of 203° C. (397·4° F.), but a good commercial sample may boil 10° C. lower. The *U.S.P.* specifies a sp. gr. at 25° C. (77° F.) of 1·036 to 1·038 and a boiling point from 195° to 205° C. (383° to 401° F.). Neither sp. gr. nor boiling point are given in *P.G.* It does not crystallise at the freezing point of Water. Its aqueous solution gives a transient blue colour with solution of Ferric Chloride.

The converse of the test for Cresol (Cresylic Acid) in Phenol applies here. Equal volumes of Cresol and Glycerin should form a clear solution from which on the addition of three volumes of Water most of the Cresol should separate.

The more generally occurring impurities are hydrocarbon oils.

These are readily detected by mixing equal volumes of Cresol and Sodium Hydroxide Solution (10 p.c.) which should form an almost clear liquid from which on standing no appreciable oily layer shall separate.

Sodium Hydroxide Solution.—1 c.c. of Cresol should dissolve in 1 c.c. of a 10 p.c. solution of Sodium Hydroxide leaving no appreciable liquid residue, *U.S.P.*; when a volume of 10 c.c. of Cresol is shaken in a 200 c.c. stoppered graduated measure, with 50 c.c. of a 15 p.c. aqueous solution of Sodium Hydroxide and 50 c.c. of Water only a few flocks shall separate out. On the subsequent addition of 30 c.c. of Hydrochloric Acid and 10 grammes of Sodium Chloride and shaking, an oily layer collects on the top of the liquid, when allowed to remain at rest, which shall amount to 8·5 to 9 c.c., *P.G.*

A similar test to the above is official in the P. Belg.

Ferric Chloride Solution.—When 0·5 c.c. of Cresol is shaken with 300 c.c. of Water a liquid is obtained which is coloured bluish-violet by the addition of solution of Ferric Chloride.—*Belg.* and *P.G.*

LIQUOR CRESOLIS COMPOSITUS.—Cresol, 50; Linseed Oil, 35; Potassium Hydroxide, 8; Water, *q.s.* to make 100; all by weight.—*U.S.P.*

Germicidal value stated to be greater than Carbolic Acid.—*L.* '07, ii. 544; '08, i. 576.

Cresylic Acid, by weight, 50; Linseed Oil, by weight, 35; Potassium Hydroxide, 8; Alcohol, 4; Distilled Water, to produce by weight 100.—*B.P.C.*

LIQUOR CRESOLI SAPONATUS (*Ger.*, *Jap.* and *Swed.*).—Crude Cresol, 1; Sapo Kalinus (*see* Sapo), 1; warm and mix to form a yellowish-brown fluid.

A similar mixture is official in Belg. and Swiss, under the title of Cresolum Saponatum.

The liquor Cresoli Saponatus of the Dutch Pharmacopœia is the same as above, but the product is finally made up to 2 with Water, and **Lysol** is given as a synonym.

Aqua Cresolica (*Belg.* and *Ger.*).—Cresol Soap Solution, 1; Distilled Water, 9.

Cresol Soap Solution, 6; Water, 94.—*Jap.*

Liquor Cresolis Glycerinatus.—Cresol, 50; Linseed Oil, 18; Potassium Hydroxide, 4·25; Alcohol, 2; Glycerin, 6; Distilled Water, *q.s.* to produce 100; all by weight.—(*W. J. Uglow Woolcock*) *P.J.* '07, ii. 334.

This has been incorporated in the *B.P.C.* under the title **Solutio Cresolis Saponatus,** with synonym as above.

The following is understood to be the composition of the various proprietary preparations:—

JEYES' FLUID.—A preparation of Tar Oil containing 20 p.c. Tricresol saponified with resin and alkali. It forms a permanent emulsion with Water.

Used in 1 or 2 p.c. solution, and for the same purposes as Carbolised Solutions. An injection of 1 in 400 is excellent in gonorrhœa and ozœna, and in obstetric practice on account of its hæmostatic as well as its antiseptic properties. It is useful as an ointment in erysipelas.

PEARSON'S ANTISEPTIC is a similar preparation to Jeyes' Fluid. The Carbolic Acid coefficient for *B. Typhosus* is 2·6.—*Public Health, Dec.* 1903.

ARTMANN'S CREOLIN.—A solution of Tar hydrocarbons in Sulphocresylic Acid. It forms a turbid liquid with Water.

EUROPHEN (Di-isobutyl-orthocresol Iodide).—A fine light, brownish-yellow, amorphous powder, having an aromatic saffron-like odour. Introduced as a substitute for Iodoform. Insoluble in Water or Glycerin; freely soluble in Absolute Alcohol, Chloroform or Ether. Applied as a dusting **Powder**, or 10 p.c. **Ointment.**

Losophan (Tri-iodometacresol), a white or yellowish-white powder, insoluble in Water, soluble 1 in 7 of Alcohol (90 p.c.); 1 in 4 of Ether; 1 in 6 of

Chloroform; and **Traumatol** (Iodocresol), are compounds of Cresol and Iodine, introduced into medicine chiefly as substitutes for Iodoform.

LYSOL.—Sp. gr. 1·047. A transparent brown syrupy liquid, which forms a clear solution with Water. It is a solution in neutral Soap, of Tar Oils which distil between 187° and 200° C., and are present to the extent of about 47 p.c.

Foreign Pharmacopœias.—Official in Dutch, Mex. and Russ.

Injection of 9 to 12 c.c. of a 1 p.c. solution of Lysol into the spinal canal in cerebro-spinal meningitis.—*L.* '02, ii. 1188.

SAPROL.—Tar Oils dissolved in large excess of Hydrocarbons. Inflammable.

SOLUTOL.—Sodium Cresylate in excess of Cresol, powerfully disinfectant, but caustic, and not intended for surgical purposes.

SOLVEOL.—Cresols in Sodium Cresotate, soluble in Water. Non-caustic, and used for surgical purposes.

METAKALIN.—A readily soluble solid preparation of Cresol. Supplied in two forms (*a*) In cartridges of 2½ drm. each; (*b*) In the form of tablets of 15 grains each, each tube containing ten tablets.

CRESOTINIC ACID.—There are three varieties of Cresotinic Acid, the ortho- meta-, and para-cresotinic acid. The only one of these which has received attention as a medicinal agent is the para-cresotinic acid.

PARA-CRESOTINIC ACID occurs in long white needles or in rhombic prisms. Antiseptic, antirheumatic and antipyretic.

SODIUM PARACRESOTINATE.—The Sodium salt of Para-cresotinic acid. A white crystalline powder. Employed in doses and for purposes similar to Sodium Salicylate.

A **Calcium Cresotinate** is also known as a disinfectant.

Not Official.

ACIDUM FORMICUM.

FORMIC ACID, AMINIC ACID.

H_2CO_2, eq. 45·67.

A clear, colourless, volatile liquid, possessing an irritating odour and strongly acid taste. It is miscible in all proportions with Water.

It is a powerful stimulant of muscular action, retards fatigue, and gives a markedly increased capacity for work. In its tonic effects it is closely allied to Kola, Coca and Caffeine. It has also a diuretic effect, but not to the same extent as Theobromine. In small doses it markedly improves the appetite and general nutrition.

Dose.—2 to 5 minims = 0·12 to 0·3 c.c. in aerated Water.

The acid has been given (*B.M.J.E.* '03, ii. 56) in doses of from 8 to 10 drops, taken four times daily in a little Vichy or aerated Water.

It has been used in the treatment of lupus, and in cancer in the form of a subcutaneous injection in doses of 0·1 to 1·0 c.c. of a solution 1 to 100,000 to 1 in 1000, according to the age and condition of the patient.

Three hundred cases of diphtheria treated with 5 to 20 minims of 25 p.c. solution of Formic Acid 4-hourly for 10 to 14 days, plus antitoxin; the death-rate from cardiac failure reduced from 8·6 to 2 p.c.—*Edin. Med. Jour.* '06, ii. 337.

No drug so good in chorea, as it steadies the muscular system without weakening it.—*L.* '07, ii. 1686.

Formates are stated (*L.* '05, i. 892; '07, i. 1176) to increase the power of resistance to fatigue and to promote energy. They are also slightly diuretic. 3 grammes (45 grains) of the Potassium or Sodium salt may be given daily, or a gramme and a half (23 grains) of the Lithium salt. The treatment is generally continued for ten days, followed by an interval of ten days' rest.

The acid has been given (*B.M.J.E.* '05, ii. 39) in rheumatic conditions in the orm of a 2½ to 3 p.c. solution, eight drops as an injection after injecting five to eight drops of a 1 p.c. solution of Cocaine as a local anæsthetic; and has been administered (*L.* '05, ii. 907) in doses of 4 grammes of the normal solution in the treatment of tremor. The remedy may also prove useful in certain forms of chorea.

Foreign Pharmacopœias.—Official in Ger. and Swiss.

Tests.—Formic Acid has a specific gravity of 1·060 to 1·063. A white crystalline precipitate is produced when it is mixed with Lead Acetate. When either the acid itself or its neutralised solution is warmed with Silver Nitrate Solution a precipitate of metallic Silver is thrown down, when warmed with Mercuric Oxide metallic Mercury is precipitated, with Mercuric Chloride a white precipitate of Calomel is produced. On the addition of Ferric Chloride Test-solution a reddish-brown solution is produced, which on heating throws down a reddish-brown precipitate; when warmed with concentrated Sulphuric Acid, Carbon Monoxide gas is evolved which burns with a blue flame. The percentage of acid may be determined by titration with Normal Volumetric Sodium Hydroxide Solution, using Phenolphthalein Solution as an indicator of neutrality; 5 c.c. of Formic Acid should require 28 to 29 c.c. of the Volumetric Solution, indicating 24 to 25 p.c. w/w of absolute acid. When diluted with Water and acidified with Nitric Acid, it should yield no immediate precipitate or turbidity with Silver Nitrate Solution, indicating the absence of Chlorides; when neutralised with Ammonia Solution it should neither yield a precipitate nor a turbidity on the addition of Calcium Chloride Solution, nor a coloration on the addition of Hydrogen Sulphide Solution, indicating the absence of Oxalic Acid and of Lead and Copper. When heated it should be entirely volatilised without leaving a weighable residue.

ACIDUM GALLICUM.

GALLIC ACID.

TRIHYDROXYBENZOIC ACID.

$H_3C_7H_3O_5$, H_2O, eq. 186·65.

FR., ACIDE GALLIQUE; GER., GALLUSSAURE; ITAL., ACIDO GALLICO; SPAN., ACIDO AGALLICO.

White or light brownish-yellow crystalline needles or prisms; odourless, and possessing an astringent and faintly acidulous taste.

It is produced by the hydrolysis of Tannic Acid, Sulphuric Acid being the acid generally employed for this purpose. It is also present in small proportion in Galls. It should be preserved in dark amber-tinted glass bottles.

Solubility.—1 in 100 of cold Water; 1 in 3 of boiling Water; 1 in 8 of Alcohol (90 p.c.); 1 in 50 of Ether; 1 in 6 of Glycerin with heat. Gallic Acid 1, and Potassium Citrate 1, will dissolve in 30 of Water.

Medicinal Properties.—It was at one time used as a local astringent, but it is far inferior to Tannic Acid for this purpose. As Tannic Acid is converted into Gallic Acid in passing through the circulation, the latter has been given for the purpose of arresting hæmorrhage in remote vessels, but is now generally believed to be useless in such cases.

Useless for pulmonary or renal hæmorrhage.—*B.M.J.* '00, ii. 1070.

Dose.—5 to 15 grains = 0·32 to 1 gramme.

Prescribing Notes.—*With twice its weight of Sugar, may be taken three times a day in Water, in* **powders** *or in* **cachets.** *It is also given in* **pills***: 30 grains of Acid and 3 minims of Glycerin will make 6 pills.*

Incompatibles.—Spiritus Ætheris Nitrosi, metallic salts.

Not Official.—Gallanol, Galloformin, Gallobromol.

Foreign Pharmacopœias.—Official in Belg., Fr., Ital., Jap., Mex., Port., Span., Swiss and U.S. Not in the others.

Tests.—Gallic Acid dissolves in Water, forming a solution which is acid in reaction towards blue Litmus paper, and which yields a bluish-black precipitate on the addition of a few drops of Ferric Chloride Test-solution. Solutions of pure Ferrous salts are unaffected by the addition of solution of Gallic Acid, but with Ferric salts precipitation takes place as above. The *U.S.P.* states that at about 200° C. (392° F.) it begins to melt.

The more generally occurring impurities are excess of Water, Tannic Acid, Sulphates and mineral matter. The crystalline acid should lose 9·5 p.c. of its weight at a temperature of 100° C. (212° F.), indicating one molecule of Water of crystallisation. This statement is common to the *B.P.* and *U.S.P.* The absence of Tannic Acid is shown by the aqueous solution of the acid failing to give a precipitate with solutions of Isinglass or Albumen. The *B.P.* adds or Tartarated Antimony. The *U.S.P.* substitutes Solution of Gelatin for Solution of Isinglass, omits the Solution of Tartarated Antimony, but includes Test-solution of Starch. It also includes tests with Calcium Hydroxide Solution and with Sodium Hydroxide Solution, which are described below. It has been pointed out (*P.J.* '98, ii. 684; '99, i. 58) that what is ordinarily understood as 'Gallic Acid' gives a precipitate with Tartarated Antimony Solution, contrary to the official statement.

The absence of Sulphates is ensured by the usual tests, and the absence of mineral matter by the absence of ash when the acid is ignited at a low red heat.

Residue.—When incinerated with free access of air, Gallic Acid should leave no residue, *B.P.*; *U.S.P.* states that at about 200° C. it begins to melt, and at a high temperature it is gradually decomposed, being consumed at a low red heat without leaving a residue.

Sodium Hydroxide Solution.—If 6 drops of Sodium Hydroxide Test Solution be added to 5 c.c. of a saturated aqueous solution of Gallic Acid on a watch glass, the liquid will gradually acquire a deep green colour, which is changed to red or brownish-red by acids. Difference from and absence of Tannic Acid, *U.S.P.*

Calcium Hydroxide Solution.—When Calcium Hydroxide Test Solution is added to a cold saturated solution of Gallic Acid, a bluish-white precipitate forms where the test solution is temporarily in excess and disappears on shaking. When the test solution has been added in excess the precipitate no longer dissolves, and the liquid acquires a tint that is blue by reflected and green by transmitted light and becomes pink on the addition of a large excess of Calcium Hydrate Test Solution. Distinction from Tannic Acid, *U.S.P.*

Not Official.

GALLANOL (Gallic Acid Anilide).—Colourless crystals, melting at 205° C. Insoluble in Water. Introduced as a substitute for Chrysophanic Acid in psoriasis.—*B.M.J.E.* '93, ii. 99; '94, i. 12; ii. 44. In eczema.—*M.A.* '95, 226.

GALLOFORMIN.—A compound of Gallic Acid with Hexamethylenetetramine. Glistening needles, almost insoluble in cold Water. Used externally and internally as a disinfectant.

GALLOBROMOL (*Dibromogallic Acid*).—Colourless needles or prisms, or as a white crystalline powder. Soluble 1 in about 8 of Water, readily soluble in Alcohol and Ether. Used internally as a substitute for the alkali Bromides in daily doses of 2 to 3 grammes (30 to 45 grains). Also in the form of a 1 to 2 p.c. solution as an injection in gonorrhœa.

Dose.—8 to 16 grains = 0·52 to 1 gramme, three times a day.

Under the name of **Gallogen**, Ellagic Acid, the astringent principle of Divi-divi, has been introduced as an astringent.

Not Official.

ACIDUM GLYCEROPHOSPHORICUM.

See CALCII GLYCEROPHOSPHAS.

Not Official.

ACIDUM HYDRIODICUM.

This Acid is best prepared and kept in the form of a 20 p.c. solution (sp. gr. 1·17) by passing Hydrogen Sulphide gas through four parts of Water containing one part of Iodine. The action is rather slow at first, but becomes more rapid as more Iodine is dissolved by the Hydriodic Acid formed, till the absorption becomes very rapid. When the solution is colourless, the excess of Hydrogen Sulphide may be boiled off and the liquid filtered from separated Sulphur.

Though colourless when first made, it rapidly decomposes, even in diffused light, with liberation of Iodine, but may be readily decolorised by warming with a small proportion of Hypophosphorous Acid; 60 minims to 4 oz. is usually sufficient even for a highly coloured Acid.

Acidum Hydriodicum Dilutum (U.S.).—A solution containing not less than 10 p.c. w/w of absolute Hydriodic Acid.

SYRUPUS ACIDI HYDRIODICI.—Colourless Hydriodic Acid (20 p.c.), 3½ oz.; Distilled Water, 8 oz.; Simple Syrup, sufficient to make up the measure to 80 oz.

An acid syrupy liquid, colourless, or of a pale straw tint. Sp. gr. 1·300. Contains 1 p.c. of absolute Hydriodic Acid, HI. The *U.S.P.* preparation contains the same percentage of absolute Hydriodic Acid, but is of a much lower specific gravity (1·190 at 25° C. (77° F.)). A test is included for a limit of free Iodine, also a confirmatory test for Hydriodic Acid by means of Test-solution of Silver Nitrate, and the amount of absolute Hydriodic Acid is determined by the addition of a definite volume of Tenth-normal Volumetric Solution of Silver Nitrate, a little diluted Nitric Acid, followed by the addition of Test-solution of Ferric Ammonium Sulphate. The excess of Volumetric Silver Solution is determined by titration with Tenth-normal Volumetric Solution of Potassium Sulphocyanate.

Dose.—20 to 40 minims = 1·2 to 2·4 c.c., well diluted.

Foreign Pharmacopœias.—Official in U.S. Not in the others.

Diluted Hydriodic Acid (10 p.c.), 10; Water, 30; Syrup, 60; all by weight to make 100.—*U.S.P.*

Diluted Hydriodic Acid (10 p.c.), 10; Water, 30; Syrup, to produce 100; all by weight.—*B.P.C.*

ACIDUM HYDROBROMICUM DILUTUM.

DILUTED HYDROBROMIC ACID.

FR., ACIDE BROMHYDRIQUE DISSOUS; GER., BROMWASSERSTOFFSAURE;
ITAL., ACIDO BROMIDRICO; SPAN., ACIDO BROMHIDRICO OFICINAL.

A clear, colourless liquid, containing 10 p.c. by weight of Hydrogen Bromide, **HBr**, eq. 80·35.

It may be obtained by the decomposition of Potassium Bromide by concentrated Phosphoric Acid and distillation. Considerable trouble has been experienced (*P.J.* '00, i. 315; *Y.B.P.* '00, 19) in obtaining pure Hydrobromic Acid by the use of red Phosphorus, owing to the Arsenic present in the latter. The method suggested in the reference consists of blowing Sulphur Dioxide into a mixture prepared by covering a quantity of pure Bromine with six times its volume of Water. On distilling the liquid the remaining Bromine goes over first, and is easily got rid of.

It should be preserved in stoppered glass bottles of a dark amber tint, and as far as possible protected from the light.

Medicinal Properties.—Sedative and hypnotic, but not so reliable as the Bromides, though producing less depression. When continued sedative action is indicated, the acid can be used to supplement or replace the Bromide salts. It is stated to be less likely to produce acne.

Dr. Fothergill stated that it prevents headache after taking Quinine and Iron, and may be given with Quinine (which it readily dissolves) for nervous exhaustion.

It is said to prevent the after-effects of Morphine if given with that drug.

Dose.—15 to 60 minims = 0·9 to 3·6 c.c.

Prescribing Notes.—*Larger doses may be given, 2 to 4 fl. drm., well diluted with Water, or Syrup and Water.*

60 minims = 8⅔ grains of Potassium Bromide in the quantity of Bromine.

Foreign Pharmacopœias.—Official in Dutch, sp. gr. 1·224; Fr., Span., Swiss and U.S., 10 p.c., sp. gr. 1·076 to 1·077; Ger. has 25 p.c., sp. gr. 1·208. Not in the others.

Tests.—Diluted Hydrobromic Acid has a specific gravity of 1·077; the *U.S.P.* states 1·076 at 25° C. (77° F.); *P.G.* 1·208. A solution of the neutralised acid should give with Silver Nitrate Solution a yellowish curdy precipitate, insoluble in Nitric Acid, but soluble in Potassium Cyanide Solution, and soluble with difficulty in strong Ammonia Solution; Chlorine Solution causes a yellowish or reddish coloration due to the liberation of Bromine, which dissolves on shaking with a few drops of Chloroform or Carbon Bisulphide forming a reddish solution. It is officially required to indicate 9·98 p.c. of absolute Hydrobromic Acid as determined by titration with Volumetric Sodium Hydroxide Solution, or by precipitation with Volumetric Silver Nitrate Solution. The *P.G.* Volumetric test indicates an acid containing 25 p.c. by weight, and the *U.S.P.* test not less than 9·99 p.c. by weight of absolute Hydrobromic Acid. A comparison of the methods adopted by the *B.P.*, *U.S.P.* and *P.G.* appears below under the heading of Volumetric Determination.

The more generally occurring impurities are solid residue, Arsenic, Copper, Lead and Iron; Barium, Chlorides, Phosphates, Sulphates and Sulphites, impurities which are present in the materials used in the manufacture and escape removal during the purification of the acid. Mineral residue is readily detected by evaporation to dryness. Arsenic is the most important impurity, as Phosphorus and Phosphoric Acid are both liable to contain this substance. The *U.S.P.* introduces a special test (the modified Gutzeit's test) for Arsenic, and also requires that this should not respond to the time-limit test for heavy metals. The *B.P.* does not include a test for the latter. The *P.G.* includes a test for Iron with Potassium Ferrocyanide Solution, which is given in the small type below.

Copper and Lead, if present, may be detected by the test with Hydrogen Sulphide given in the small type below, and if the solution be made alkaline with Ammonia the test also affords an indication of the presence of Iron. Iodine, if present, may be detected by the test described under the heading of Chloroform. Barium, Chlorides, Phosphates, Sulphates and Sulphites may be detected by the tests in small type below under the respective headings of Potassium Sulphate Solution, Silver Nitrate Solution followed by Ammonium Carbonate Solution, Magnesium Sulphate Solution, Barium Nitrate or Chloride Solution.

Distillation.—The *U.S.P.* states that on distilling it, Water and a weak acid first pass over; when the temperature of 126° C. (258·8° F.) is reached an acid of 48 p.c. remains, which may be distilled unchanged.

Residue.—*B.P.* requires that it should yield no residue on evaporation to dryness. In this test the *U.S.P.* directs that after evaporation to dryness the temperature be brought to 110° C. (230° F.), when 10 c.c. of the acid should leave no appreciable residue.

Chloroform.—Hydrobromic Acid when shaken with Chloroform should not impart to the Chloroform a yellow colour, nor on the subsequent addition of a drop of Ferric Chloride Solution should a violet colour be produced, *P.G.* The *U.S.P.* gives 10 c.c. of the Acid and 2 c.c. of Chloroform, and the *P.G.* uses equal volumes. Chloroform shaken with Hydrobromic Acid previously mixed with Chlorine Water is coloured a brownish-yellow, *P.G.* The *U.S.P.* directs that Chlorine Water be diluted with an equal volume of Water and added drop by drop with agitation to 10 c.c. of Hydrobromic Acid and 2 c.c. of Chloroform, previously shaken together, when the Chloroform should be coloured orange, with no trace of violet, indicating the absence of Iodine.

Hydrogen Sulphide Solution.—Diluted with 5 volumes of Water, and nearly neutralised with Solution of Ammonia, Hydrobromic Acid should be unaffected by Hydrogen Sulphide Solution, *P.G.* The *U.S.P.* requires that 10 c.c. of Diluted Hydrobromic Acid should not, without further acidulation, respond to the time-limit test for heavy metals.

Barium Nitrate or Chloride Solution.—10 c.c. of the Acid should not be rendered more than slightly cloudy by the addition of 1 c.c. of Barium Chloride T.S., indicating a limit of Sulphuric Acid, *U.S.P.*; *P.G.* nearly neutralises with Ammonia Solution, and uses Barium Nitrate Solution.

Potassium Sulphate Solution.—10 c.c. of the Acid should yield no turbidity with 1 c.c. T.S. of Potassium Sulphate, *U.S.P.*

Magnesium Sulphate Solution.—1 c.c. of Acid with 1 c.c. of Nitric Acid, boiled, cooled, and then supersaturated with Solution of Ammonia should be unaffected by Magnesium Sulphate Solution even after standing for some time, *P.G.*

Modified Gutzeit's Test.—5 c.c. should not respond to the modified Gutzeit's test for Arsenic.

Silver Nitrate Solution followed by Ammonium Carbonate Solution.—If a mixture of 0·5 c.c. Diluted Hydrobromic Acid, 10 c.c. of Water, 8 c.c. Silver Nitrate Test Solution, and 6 c.c. Ammonium Carbonate Test Solution, be digested for 10 minutes on a bath of boiling Water, then cooled and filtered, the filtrate when supersaturated with Nitric Acid should not become more than slightly opalescent, *U.S.P.*

Potassium Ferrocyanide Solution.—The *P.G.* requires that 10 c.c. of Hydrobromic Acid diluted with Water (1–10) should not immediately turn blue with 0·5 c.c. Potassium Ferrocyanide Solution.

Volumetric Determination.—The *B.P.*, *U.S.P.* and *P.G.* differ in their method of determining the amount of absolute Hydrobromic Acid. The *B.P.* employs both titration with Volumetric Sodium Hydroxide Solution and precipitation with Volumetric Silver Nitrate Solution; the *U.S.P.* employs direct titration with Tenth-normal Volumetric Silver Nitrate; the *P.G.* titration with Normal Volumetric Potassium Hydroxide Solution. It is officially required that 4 grammes of diluted Hydrobromic Acid should neutralise 5 c.c. (4·98) of the Volumetric Sodium Hydroxide Solution, *B.P.*; 5 c.c. of the *P.G.* Acid should require 18·7 c.c. Normal Potassium Hydroxide Solution, *P.G.* The *B.P.* requires that 4 grammes of the dilute Acid should be completely precipitated by 50 c.c. (49·8) of the Volumetric Solution of Silver Nitrate. The *P.G.* directs that 10 c.c. of a mixture of Hydrobromic Acid and Water (3 grammes in 100 c.c.) be exactly neutralised with Ammonia Solution and a drop of Potassium Chromate Solution added, when 9·3 c.c. at most of Deci-normal Volumetric Silver Nitrate Solution are necessary to produce a permanent red colour, *P.G.*; the *U.S.P.* test is similar, 10 grammes of Acid being diluted to 100 c.c., then 8·04 c.c. of this solution exactly neutralised with diluted Ammonia Water (using Litmus Test-solution as indicator), and 3 drops of Potassium Chromate Test-solution added, should require not less than 10 c.c. of Tenth-normal Silver Nitrate Volumetric Solution to impart a permanent red tint.

ACIDUM HYDROCHLORICUM.

HYDROCHLORIC ACID.

FR., ACIDE CHLORHYDRIQUE OFFICINAL; GER., SALZSAURE; ITAL., ACIDO CLORHIDRICO CONCENTRATO; SPAN., ACIDO CLORHIDRICO.

A colourless fuming liquid, containing 31·79 p.c. by weight of Hydrogen Chloride (**HCl**, eq. 36·19), possessing an irritating pungent odour, and even in dilute solutions an intensely acid taste.

It may be obtained by the decomposition of a Chloride, generally Sodium Chloride with Sulphuric Acid.

Acidum Hydrochloricum *B.P.* 1885 contained 32 p.c. of Hydrogen Chloride.

Medicinal Properties.—A powerful escharotic. When diluted it is given internally, *see* Acidum Hydrochloricum Dilutum.

Treatment of ulceration of the œsophagus and stomach due to swallowing strong Hydrochloric Acid.—*B.M.J.* '01, ii. 1468; '02, i. 511.

Treatment of lupus by thoroughly rubbing crude Hydrochloric Acid over the patch previously frozen by Æthyl Chloride.—*L.* '07, ii. 81.

Incompatibles.—Salts of Silver and Lead, Tartar Emetic, Alkalis and their Carbonates.

Official Preparations.—Acidum Hydrochloricum Dilutum. Used in the preparation of Acidum Nitro-hydrochloricum Dilutum, Apomorphinæ Hydrochloridum, Cocainæ Hydrochloridum, Extractum Cinchonæ Liquidum, Glycerinum Pepsinæ, Liquor Arsenici Hydrochloricus, Liquor Ferri Perchloridi Fortis, Liquor Zinci Chloridi, and Podophylli Resina.

Antidotes.—In cases of poisoning by Hydrochloric Acid, the antidotes are Chalk, Magnesia, Potassium Bicarbonate, with White of Egg, Carron Oil, or Soap-suds; followed by enemata of Beef Tea and Brandy (with Tincture of Opium) to prevent collapse; and emollient drinks.

Foreign Pharmacopœias.—Official in Austr., 25 p.c., sp. gr. 1·124; Belg., sp. gr., 1·186; Port. and Span., sp. gr. 1·180; Dutch and Swiss, 25 p.c., sp. gr.

1·126; Fr., 33·65 p.c., sp. gr. 1·171; Jap., 30 p.c., sp. gr. 1·15; Mex., 1·17; Dan., Norw. and Swed., 25 p.c., sp. gr. 1·127; Ger., Hung. and Russ., 25 p.c., sp. gr. 1·124; Ital., 35·39 p.c., sp. gr. 1·18; U.S., 31·9 p.c., sp. gr. 1·158 at 25° C. (77° F.). An **Acidum Hydrochloricum Crudum** is included in the Fr., Ital., Russ. and Swed.

The Crude Acid made with Pyrites Vitriol is generally yellow, and contains considerable traces of Iron and Arsenic.

Tests.—Hydrochloric Acid has a specific gravity of 1·160; the *U.S.P.* gives about 1·158 at 25° C. (77° F.); the *P.G.* 1·124. The diluted or neutralised solutions afford, when treated with Silver Nitrate Solution, a curdy white precipitate, insoluble in dilute Nitric Acid, but readily soluble in Ammonia Solution. Another characteristic test for Hydrochloric Acid, which in the *P.G.* and *U.S.P.* is performed upon the pure undiluted or unneutralised acid, but in the *B.P.* appears amongst the miscellaneous collection of tests suitable for application to the neutralised acid, is that when warmed with Manganese Oxide, Chlorine gas is evolved, which may be recognised by its colour, odour, and bleaching action upon moistened Litmus paper, and by liberating Iodine when brought into contact with Potassium Iodide Solution. The acid is officially required to contain 31·49 p.c. of absolute Hydrochloric Acid as indicated by titration with Volumetric Solution of Sodium Hydroxide; the *U.S.P.* test indicates 31·9 p.c. by weight of absolute Acid, and the *P.G.* 25 p.c. by weight. The processes are compared below under the heading of Volumetric Determination.

The more generally occurring impurities are mineral residue, Arsenic, Lead, Copper, Iron, Aluminium, free Chlorine, Bromine, Iodine, Sulphates and Sulphurous Acid. The most important of these are Arsenic, Iron, and free Chlorine. Mineral matter is readily detected by the residue left on evaporation. The *B.P.* characteristically groups Arsenic amongst the general list of impurities, and employs the tests mentioned in the Appendix for its detection. The *U.S.P.* adopts the modified Gutzeit's test, and the *P.G.* the test with Stannous Chloride Solution. The *P.G.* includes a specific test for Iron with Potassium Ferrocyanide Solution, *see* below. The three Pharmacopœias differ in their manner of testing for free Chlorine. All three use the diluted acid, the *P.G.* in addition partially neutralising the liquid; the *B.P.* employs Potassium Iodide and Starch Solution as a reagent; the *P.G.* Zinc Iodide and Starch Solution; the *U.S.P.* uses Potassium Iodide Solution, but shakes with Chloroform, and notes the absence of a violet coloration in the chloroformic layer in preference to the Starch test. A 1 to 20 dilution of the Acid almost neutralised with Ammonia Solution should not be altered by the addition of Hydrogen Sulphide Solution, indicating the absence of Lead and Copper. The *U.S.P.* requires that the 1 in 20 aqueous dilution should not respond to the time-limit test for heavy metals; the *P.G.*, that the 1 to 5 dilution, when almost neutralised with Ammonia Solution, shall not be altered by Hydrogen Sulphide Solution. Bromine and Iodine, Sulphates and Sulphites may be detected by the respective tests under the headings of Chlorine Water, and Barium Chloride or Nitrate Solution.

A standard of 5 parts per million for Arsenic is suggested (*C.D.* '08, i. 795) as sufficient for a pharmaceutical acid, and 10 parts per million for Lead.

Stannous Chloride.—A mixture of 1 c.c. of Acid and 3 c.c. Stannous Chloride Solution should not assume a dark colour in the course of an hour, *P.G.*

Modified Gutzeit's Test.—5 c.c. of diluted Acid (1·10) should not respond to the modified Gutzeit's test for Arsenic.

Potassium or Zinc Iodide Solution.—When largely diluted with Water it should yield no blue coloration on the addition of Potassium Iodide Solution and Starch Mucilage, *B.P.*; the *P.G.* directs the Acid to be diluted with 5 volumes of Water, and nearly neutralised with Solution of Ammonia; and requires that this solution should not immediately turn blue with a Solution of Zinc Iodide and Starch. The *U.S.P.* dilutes 1 c.c. of Acid with 5 c.c. of Water, then on the addition of 1 c.c. of Potassium Iodide T.S. and 1 c.c. of Chloroform, and the mixture agitated, the Chloroform should be free from any violet coloration.

Chlorine Water.—If Chlorine Water diluted with an equal quantity of Water be added cautiously, drop by drop with constant agitation, to Hydrochloric Acid diluted with an equal volume of Water, and 1 c.c. of Chloroform added, the Chloroform should be free from any yellow, orange, or violet colour, *U.S.P.*

Barium Chloride or Nitrate Solution.—Hydrochloric Acid diluted 1 to 5 with Water and nearly neutralised with Ammonia Solution should be unaffected within 5 minutes by Barium Nitrate Solution, *P.G.* The *U.S.P.* uses Barium Chloride T.S., a few drops added to 1 c.c. of the Acid previously diluted with 5 c.c. of Water, when no turbidity or precipitate should be produced within 1 hour, nor should the addition of a few drops of Tenth-normal Iodine V.S. to the mixture produce any turbidity.

Potassium Ferrocyanide Solution.—10 c.c. Hydrochloric Acid diluted with Water (1–10) should not immediately turn blue on the addition of 0·5 c.c. Potassium Ferrocyanide Solution, *P.G.*

Volumetric Determination (by neutralisation).—The *B.P.* requires that 1 gramme diluted with Water should neutralise 8·7 c.c. of the Sodium Hydroxide Volumetric Solution; precipitation with Volumetric Silver Nitrate Solution is also adopted as a means of determining the amount of absolute Acid present, 8·7 c.c. of Volumetric Silver Nitrate Solution being required to precipitate 0·1 of a gramme of the acid. The *P.G.* uses Normal Potassium Hydroxide Solution, 38·5 c.c. of this solution being necessary for 5 c.c. of Acid. The *U.S.P.* directs that 3 c.c. of Acid be accurately weighed, diluted with 5 c.c. of Water and titrated with Normal Potassium Hydroxide Solution, using Methyl Orange Test-solution as indicator. The number of c.c. required, multiplied by 3·618 and divided by the weight of Acid taken, represents the percentage of absolute Hydrochloric Acid in the sample taken.

Preparation.

ACIDUM HYDROCHLORICUM DILUTUM.—DILUTED HYDROCHLORIC ACID.

Dilute 6 of Hydrochloric Acid with Distilled Water to make 20.

3½ minims contain about 1 minim of Strong Acid.

It is a clear, colourless and odourless liquid, possessing a strong acid taste and acid reaction to Litmus.

Medicinal Properties.—Stimulant, sialagogue, stomachic tonic, cholagogue. Externally and diluted it is refrigerant. Given about two hours after meals in dyspepsia due to deficient secretion of Hydrochloric Acid; given before meals in cases of acid eructation and heartburn, to prevent excessive secretion of acid; used also in gargles; given internally also to diminish night sweating.

10 to 20 drops of a 38 p.c. solution of pure Hydrochloric Acid in a little simple Syrup at the beginning of a meal in the treatment of chronic diarrhœa.—*B.M.J.E.* '02, ii. 7.

Dose.—5 to 20 minims = 0·3 to 1·2 c.c.

Prescribing Notes.—*Usually given with aromatic or bitter infusions; for children, 1½ to 2 minims; 1 drm. in 8 oz. of Infusion of Roses or Decoction of Cinchona as a gargle for ulcerated sore throat.*

Official Preparations.—Used in the preparation of Extractum Ergotæ, Injectio Apomorphinæ Hypodermica and Liquor Morphinæ Hydrochloridi.

Foreign Pharmacopœias.—Austr., 12·5 p.c., sp. gr. 1·061; Belg., sp. gr. 1·037; Fr., Hung., Swiss and U.S., 10 p.c., about sp. gr. 1·049; Dutch, sp. gr. 1·067; Jap., 10 p.c., sp. gr. 1·050; Dan., Norw. and Swed., 10 p.c., sp. gr. 1·050 to 1·052; Ger., 12·5 p.c., sp. gr. 1·061; Ital., 8·07 p.c., sp. gr. 1·036; Russ., 8·2 p.c., sp. gr. 1·040; Mex., Acid 1, Water 3. Not in the others.

Tests.—Diluted Hydrochloric Acid has a specific gravity of about 1·052. When its neutralised or diluted aqueous solution is mixed with Silver Nitrate Solution, a curdy white precipitate insoluble in Nitric Acid, but readily soluble in Ammonia Solution and in Potassium Cyanide Solution is produced.

As the diluted Acid is directed to be prepared with the official Hydrochloric Acid, it is required to be free from the impurities mentioned under the concentrated Acid. It is officially required to contain 10·49 p.c. by weight of absolute Hydrochloric Acid, as indicated by titration with Normal Volumetric Sodium Hydroxide Solution.

ACIDUM HYDROCYANICUM DILUTUM.

DILUTED HYDROCYANIC ACID.

HCN, eq. 26·85.

FR., ACIDE CYANHYDRIQUE DISSOUS; GER., CYANWASSERSTOFFSAURE; ITAL., ACIDO CIANIDRICO; SPAN., ACIDO CIANHIDRICO MEDICINAL.

A clear, colourless liquid, possessing a characteristic odour somewhat resembling bitter almonds. It is officially required to contain 2 p.c. by weight of Hydrogen Cyanide, and may be prepared by the interaction of Potassium Ferrocyanide and Sulphuric Acid, or when only a small quantity is required occasionally, it may be convenient to prepare it extemporaneously from dry Silver Cyanide, as in the *U.S.P.*:—Silver Cyanide, 6 parts; Diluted Hydrochloric Acid (*B.P.*), 15·54 fluid parts; Distilled Water, 44·1 parts. Shake for a short time and filter. The product should contain 2 p.c. w/w of Hydrogen Cyanide.

It should be kept in dark amber-tinted, well-stoppered glass bottles, in a cool and dark place, the bottles being maintained in an inverted position.

Medicinal Properties.—As this Acid is a dangerous poison, it should never be prescribed undiluted. Moreover, a diluted solution retains its strength better than a strong one.

It is sedative, antispasmodic, allays vomiting, is useful in gastrodynia, in visceral neuralgias, in dyspeptic palpitations, but chiefly valuable in the dry resultless cough of asthma, phthisis and whooping-cough, and prevents the vomiting brought on by food in phthisis. Used externally to allay itching in urticaria, lichen, etc., if the skin be unbroken; as a **lotion**, 2 drm. to 8 oz. of Rose Water and Glycerin; as an **ointment**, from $\frac{1}{2}$ to 1 drm. to each oz. of Zinc ointment.

The **vapour** is sometimes applied to the eye, but it is more generally used as a sedative inhalation in the cough of laryngeal phthisis and in some spasmodic affections.

Dose.—2 to 6 minims = 0·12 to 0·36 c.c.

Prescribing Notes.—*Given in Almond Emulsion for cough; and with Sodium Bicarbonate, Bismuth Carbonate and Peppermint Water for dyspepsia.*

As the Acid is susceptible to the action of light and air, and is very volatile, it is the practice to keep it in amber-coloured bottles, stopper downwards.

Incompatibles.—Silver, Copper, and Iron salts, and Mercuric Oxide.

Official Preparations.—Used in the preparation of Tinctura Chloroformi et Morphinæ Composita.

Not Official.—Acidum Hydrocyanicum (*Scheele*). Brompton Cough Mixture, Mistura Acidi Hydrocyanici Composita.

Antidotes.—In cases of poisoning, the antidotes are fresh air and artificial respiration, with cold affusion; the recent precipitate obtained by swallowing 10 grains of Ferrous Sulphate, with 1 fl. drm. of Tincture of Ferric Chloride in 1 oz. of Water, followed by 20 grains of Potassium Carbonate dissolved in 1 oz. of Water; this will render insoluble 110 minims of *B.P.* Acid. Stimulants, Ammonia and Brandy; Hypodermic injection of Atropine, $\frac{1}{60}$ grain.

Suggested that in mines and places where Cyanide is used the following antidote should be kept ready: (1) 1 oz. of a 23 p.c. solution of Ferrous Sulphate; (2) 1 oz. of a 5 p.c. solution of Potassium Hydrate; (3) 30 grains of powdered Magnesium Oxide to be added to the above in half a pint of Water.—*L.* '01, ii. 497.

Injection of a 3 p.c. solution of Hydrogen Peroxide subcutaneously recommended in cases of poisoning by fumes of Hydrocyanic Acid.—*J.C.S.* '01, *Abs.* ii. 535.

Foreign Pharmacopœias.—Official in Belg., 2·0 p.c.; Dutch, 2 p.c.; Fr., 2 p.c.; Jap. 2 p.c.; Norw., 2 p.c.; Port., strength not given; Mex. (Acido cianhidrico medicinal; U.S., 2 p.c.; Span., 2 p.c. Not in the others. *See* also Aqua Amygdalæ Amaræ.

The *Brussels Conference* adopted a strength of 2 p.c. for Acidum Hydrocyanicum Dilutum.

Tests.—Hydrocyanic Acid has a specific gravity of about 0·997; the *U.S.P.* does not give a specific gravity; the acid is not included in the *P.G.* When Silver Nitrate Solution is added to its neutralised solution there is produced a white curdy precipitate, soluble in Potassium Cyanide Solution, in Ammonia Solution, and in Nitric Acid. A blue precipitate is produced when a mixture of Ferrous and Ferric salts in solution is added to the neutralised acid, followed by the addition of Sodium Hydroxide Solution and then an excess of Hydrochloric Acid.

The Acid is officially required to contain 1·98 p.c. by weight of absolute Hydrocyanic Acid as indicated by titration with Volumetric Silver Nitrate Solution after the liquid has been rendered alkaline by the addition of Sodium Hydroxide Solution; 1 gramme of the Acid should require 3·7 c.c. of Deci-normal Volumetric Silver Nitrate

Solution. This process of titration is not altogether satisfactory, and, moreover, estimates any Chloride present. A very useful method for determining the strength of Diluted Hydrocyanic Acid is:—Place 10 c.c. of Ammonia Solution in a beaker; add 40 c.c. of Water and 0·2 gramme of Potassium Iodide and 5 c.c. of the Acid to be tested; titrate with Volumetric Silver Nitrate Solution, of which 18·7 c.c. will be required for a 2 p.c. Acid. The presence of Hydrochloric Acid (a trace of which is understood to be purposely added by manufacturers to retard decomposition) will not affect the results of the test, and the end reaction is very definite.

The more generally occurring impurities are mineral residue, Sulphates and Chlorides. The mineral residue is readily determined by evaporating the fluid to dryness.

When diluted with Water and slightly acidified with Hydrochloric Acid Solution it should not yield a distinct turbidity on the addition of Barium Chloride Solution, and when acidified with Nitric Acid should not yield a distinct turbidity on the addition of Silver Nitrate Test-solution, indicating the absence of more than traces of Chlorides and Sulphates.

Volumetric Determination.—A weighed quantity of 5 grammes of the Acid is diluted to 50 c.c. with Water; 26·9 c.c. (26·84) of this solution, after the addition of 5 c.c. of Ammonia Water and 3 drops of Potassium Iodide T.S., should require for the production of a slight permanent precipitate the addition of not less than 10 c.c. Deci-normal Volumetric Silver Nitrate Solution, *U.S.P.*

The *B.P.* and *U.S.P.* Acids contain not less than 2 p.c. by weight of Absolute Hydrocyanic Acid.

Not Official.

BROMPTON COUGH MIXTURE.—Diluted Hydrocyanic Acid, 2½ minims; Solution of Morphine Hydrochloride, 7½ minims; Syrup of Tolu, 40 minims; Acid Infusion of Roses, to make 4 fl. drm.—*Pharm. Form.*

This has been incorporated in the *B.P.C.* under the title **Mistura Acidi Hydrocyanici Composita** with the *syn.* Brompton Hospital Mixture.

ACIDUM HYDROCYANICUM (SCHEELE) *B.P.C. Formulary* 1901 — A colourless liquid. Sp. gr. 0·994. It should contain 4 p.c. HCN, as volumetrically determined by Volumetric Silver Nitrate Solution; it should give no precipitate with Barium Chloride Solution, but with Silver Nitrate a white precipitate entirely soluble in boiling concentrated Nitric Acid.

Dose.—1 to 3 minims = 0·06 to 0·24 c.c.

This has been incorporated in the *B.P.C.* under the title **Acidum Hydrocyanicum Fortius.**

It is known that the weaker strengths of Hydrocyanic Acid keep better than the stronger, and the only practical use for a double strength Acid is to poison dogs or cats.

Not Official.

ACIDUM HYDROFLUORICUM.

A colourless liquid, usually redistilled, containing about 30 p.c. of Hydrofluoric Acid gas; owing to its action on glass it is usually stored in gutta-percha bottles.

It is strongly corrosive. Great caution must be used in handling this Acid, as contact with the liquid or gas may result in sores difficult to heal, or permanent destruction of tissue; no pain is felt until the injury is beyond remedy. It also gives off a pungent irritating vapour.

In experiments made to determine the most suitable indicator for the titration of Hydrofluoric Acid, Phenolphthalein Solution answered well with Potassium or Sodium Hydroxide. Rosolic Acid Solution was equally useful and had the additional advantage of being capable of use with Ammonia. Cochineal and Brazil Wood Solutions answered fairly well, but Methyl Orange Solution was useless. With Litmus Solution the colour change is somewhat complicated.—*P.J.* (3) xxv. 701.

ACIDUM HYDROFLUORICUM DILUTUM.—Dilute the 30 p.c. Acid so as to contain 0·2 p.c., and preserve in gutta-percha bottles.—*B.P.C. Formulary* 1901.

Dose.—5 to 20 minims = 0·3 to 1·3 c.c.

This has been incorporated in the *B.P.C.* giving the dose 5 to 15 minims.

AMMONII FLUORIDUM.—Colourless crystals soluble in Water. Given in hypertrophy of the spleen and in goitre as a $\frac{3}{4}$ p.c. solution, in doses of 5 to 20 minims = 0·3 to 1·3 c.c.

FERRI FLUORIDUM.—A mixture of Ferric and Ferrous Fluoride. A purplish-grey powder, insoluble in Water.

Under the proprietary titles of *Antitussin* and *Fluorrheumin*, bodies containing Fluorine have been introduced; the former as an application in whooping-cough, the latter for rheumatism.—*P.J.* '99, ii. 11; '00, ii. 775.

Fluoroform (CHF_3) is analogous in composition to Chloroform ($CHCl_3$), but contains the halogen Chlorine replaced by Fluorine (CHF_3). The pure product is at ordinary temperatures a gas, and is prepared by the action of Silver Fluoride on Iodoform, the gas being subsequently purified from Carbonic Oxide by passing through a solution of Cuprous Chloride. This gaseous Fluoroform was tested pharmacologically and proved to be very similar in action to Chloroform. The commercial article is a 2·8 p.c. aqueous solution of the gas, and it is in this form that it is generally employed. It possesses very little odour or taste, and is comparatively harmless even in large doses. It has been mostly used in cases of phthisis, lupus, and tuberculous diseases of the joints. It is administered in doses of 1 to 3 teaspoonfuls taken in Water 4 or 5 times a day.

Sodium Fluoride has been introduced in the treatment of tuberculosis and stated to possess distinct antiseptic properties. Toxic effects of same.—*P.J.* '99, ii. 235. The Fluorides have been used as preservatives of foods.

Solutions of **Sodium Silicofluoride** and the **Saluferbath**, which is a mixture of various silicofluorides, have been introduced as antiseptics—*B.M.J.E.* '03, i. 712.

Not Official.

ACIDUM HYPOPHOSPHOROSUM.

H_3PO_2, eq. 65·56.

A clear, colourless and odourless liquid, possessing an acid taste and an acid reaction to Litmus. It contains 30 p.c. of absolute Hypophosphorous Acid. It should be kept in dark amber-tinted, well-stoppered bottles and in a cool place.

Dose.—2 to 5 minims = 0·12 to 0·3 c.c.

A good preservative for preparations otherwise liable to change by oxidation.

Used principally in the manufacture of the Solution and Syrup of Iron Hypophosphite, etc.

Dissolve 8 oz. of Barium Hypophosphite (containing not less than 95 p.c. $Ba.2(PH_2O_2)\,H_2O$) in 36 fl. oz. of hot Distilled Water. Add slowly to the solution 17 fl. oz. of Diluted Sulphuric Acid, after which continue the addition, drop by drop, until no further turbidity is produced. Set aside in a warm place, and pass the clear liquid through a filter. Wash the precipitate by decantation with successive portions of hot Distilled Water, until the washings have no longer an acid reaction. Filter, unite the filtrates, and evaporate the liquid on a water-bath to the prescribed density. The product will weigh about 11½ oz.

The process is better than the treatment of Calcium Hypophosphite with Oxalic Acid. But still a pure Hypophosphorous Acid is a commercial desideratum.

Tyrer compares the Barium and Calcium methods, and decides in favour of Barium.—*P.J.* '96, ii. 94.

Used in the manufacture of the Solution and Syrup of Iron Hypophosphite, etc.

Foreign Pharmacopœias.—Official in U.S. contains 30 p.c. by weight; sp. gr. 1·130 at 25° C. (77° F.).

Tests.—Sp. gr. 1·1367. Its strength as determined by Volumetric Sodium Hydroxide Solution corresponds to 30 p.c. of absolute Hypophosphorous Acid. Its aqueous solution is not precipitated by Diluted Sulphuric Acid, nor by an excess of Ammonia Solution, nor by Ammonium Oxalate Solution after neutralisation, and gives not more than a faint opalescence with Barium Chloride Solution. If Magnesium Ammonio-sulphate Solution be added after an excess of Ammonia Solution, no precipitate is produced. Calcium Chloride Solution added to a neutralised solution yields no precipitate.

Heated with excess of Mercuric Chloride Solution and a little Hydrochloric Acid to 100° C. (212° F.), Calomel is precipitated, from the weight of which the percentage of Hypophosphorous Acid may be calculated.

As the reaction follows the equation $H_3PO_2 + 4HgCl_2 + 2H_2O = H_3PO_4 + 4HgCl + 4HCl$, 100 parts of Calomel produced are equivalent to 7 parts of Anhydrous Acid.

Acidum Hypophosphorosum Dilutum.—Hypophosphorous Acid, 20; Distilled Water, 40, both by weight.—*U.S.P.*

Sp. gr. 1·042 at 25° C. (77° F.) contains 10 p.c. by weight of absolute Hypophosphorous Acid.

Hypophosphorous Acid, 33; Distilled Water, *q.s.* to produce 100.—*B.P.C.*

This is obviously intended to yield the same result as the *U.S.P.* given above, but in that case the quantities should be by weight and not by volume.

ACIDUM LACTICUM.

LACTIC ACID.

FR., ACIDE LACTIQUE; GER., MILCHSAURE; ITAL., ACIDO LATTICO; SPAN., ACIDO LACTICO.

A colourless and odourless syrupy hygroscopic liquid, possessing a purely acid taste. It should contain 75 p.c. of Hydrogen Lactate, $HC_3H_5O_3$, eq. 89·37.

It is produced by the fermentation of Lactose, and is extracted in the form of Zinc Lactate, the latter salt being subsequently decomposed. It is also obtainable by various synthetical processes.

Solubility.—It is miscible in all proportions with Water, Alcohol (90 p.c.), and Ether. It dissolves, but is not dissolved by, Chloroform.

Medicinal Properties.—It is used as a 'swab' in diphtheria; a solution (50 to 75 p.c.) has been used successfully for pharyngeal and laryngeal tubercle, and for lupus after scraping.

50 p.c. solution applied to corneal ulcers.—*L.* '95, i. 1452.

A 2 p.c. solution is recommended in the treatment of laryngeal papillomata. —*B.M.J.* '04, ii. 1224.

Official Preparation.—Syrupus Calcii Lactophosphatis.

Not Official.—Calcii Lactas, Ferri Lactas, Plumbi Lactas, Sodii L., Zinci L., Bismuthi L., Acidum Lacticum Dilutum, Syr. Calcii Lactophosphatis c. Ferro.

Foreign Pharmacopœias.—Official in Fr., sp. gr. 1·24; Port. and Span., sp. gr. 1·215; Austr., Belg., Dan., Dutch, Ger., Ital., Jap., Norw., Russ., Swed. and Swiss, sp. gr. 1·21 to 1·22; U.S., sp. gr. 1·206 at 25° C. (77° F.); Mex., sp. gr. 1·315.

Tests.—Lactic Acid has a specific gravity of 1·210; the *U.S.P.* gives 1·206 at 25° C. (77° F.); the *P.G.* 1·210 to 1·220. It vaporises at a temperature above 148·9° C. (300° F.), giving off inflammable vapours at a temperature of 176·7° C. (350° F.), which on ignition burn with a blue flame. The readily recognised odour of Aldehyde is evolved when the Acid is warmed with Potassium Permanganate. The *B.P.* and *U.S.P.* employ for this test solid Potassium Permanganate, but the *U.S.P.* warms it with a mixture of equal volumes of the Acid, Potassium Permanganate, and Sulphuric Acid, whereas *B.P.* uses Lactic Acid and Potassium Permanganate; the *P.G.* uses a Potassium Permanganate Solution and Lactic Acid. It is officially required to contain 74·18 p.c. by weight of absolute Lactic Acid, as determined by titration with Volumetric Sodium Hydroxide Solution. It will therefore be noticed that the *B.P.* statement, 'a liquid containing 75 p.c. of Hydrogen Lactate,' is at variance with the volumetric determination. In the case of the Acid the *B.P.* has not distinctly specified 'per cent. by weight,' though this is clearly intended. Using the atomic weights official in the *B.P.* 1885 in calculating the result of the volumetric test, the official figure would indicate 74·7 p.c. by weight of absolute Acid. It seems, therefore, as if this were another instance in which the *B.P.*, after adopting new atomic weights, have omitted to bring their monographs into accordance with them. The test would read better, 'each gramme should require for neutralisation 8·4 c.c. of the Volumetric Sodium Hydroxide Solution.' The *U.S.P.* acid is required to contain not less than 75 p.c. by weight; the *P.G.* about 75 p.c. by weight of absolute Acid.

The more generally occurring impurities are heavy metals, *e.g.*, Arsenic, Copper, Lead and Iron, Sarco-lactic, Malic, and Sulphuric Acids, Glycerin, Cane, Grape or Milk Sugar, Fatty Acids, organic impurities, Calcium Phosphate, Gum, Mannite, mineral residue, Chlorides, Citrates, Oxalates, Phosphates, Sulphates, or Tartrates.

Heavy metals are grouped collectively in the *B.P.*; in the *U.S.P.* they are covered by the time-limit test, and by the Hydrogen Sulphide test described below. *B.P.* and *U.S.P.* test for Sarco-lactic Acid with Copper Sulphate Solution, but no similar test is included in the *P.G.*

Tests for Malic and Sulphuric Acids are not included in the *U.S.P.* or *P.G.* The *B.P.* uses Lead Subacetate Solution as a reagent requiring that no precipitate should be produced.

The tests adopted by the *B.P.* and *U.S.P.* in examining for Glycerin are essentially the same, and consist in converting the acid into a Zinc salt, drying and extracting with Absolute Alcohol; the *P.G.* does not include a test for Glycerin.

Cane, Grape and Milk Sugars are readily detected by their reducing action on Potassio-cupric Tartrate Solution, and the method of carrying out the test is essentially the same in the *B.P.* and *U.S.P.*, the latter Pharmacopœia definitely stating the relative quantities to be employed. The Fehling test does not appear in the *P.G.*

Foreign fatty acids are tested for in an almost identical manner by the three Pharmacopœias by warming the acid and observing the odour, as are also organic impurities by the Sulphuric Acid test, the *U.S.P.* and *P.G.* allowing a limit of time (15 minutes) within which no darkening in colour shall take place, and the *U.S.P.* in addition maintaining the temperature of the mixed Sulphuric and Lactic Acids at or below 15° C. (59° F.).

Advantage is taken of the insolubility of Calcium Phosphate, Gum, Mannite and Sugar in Ether to utilise the latter substance as a test for them in the Acid. The test appears in the *B.P.* and *P.G.*, but not in the *U.S.P.* The three Pharmacopœias differ in the amount of mineral residue permitted. The *B.P.* allows 0·5 p.c., the *P.G.* no weighable residue from 0·5 gramme, and the *U.S.P.* 1·0 p.c.

Chlorides, Citrates, Oxalates, Phosphates, Sulphates or Tartrates are readily detected by the tests given in the small type below under the respective headings of Silver Nitrate, Lime Water, and Barium Chloride.

Warming.—When gently warmed the Acid should not evolve the odour of rancid fat. Indicating the absence of Butyric and other fatty acids, *B.P.*, *P.G.* and *U.S.P.*

Potassium Permanganate.—On warming with Potassium Permanganate (Potassium Permanganate Solution, *P.G.*), Lactic Acid evolves the odour of Aldehyde, *B.P.* and *P.G.*; the *U.S.P.* test directs equal volumes of Lactic and Sulphuric Acids and Potassium Permanganate.

Sulphuric Acid.—If Lactic Acid be carefully poured on an equal volume of Sulphuric Acid in a clean test-tube (previously rinsed out with Sulphuric Acid, *P.G.*), no darkening in colour should occur (*B.P.*) within 15 minutes, indicating the absence of more than traces of organic impurities, *P.G.* and *U.S.P.* *U.S.P.* also directs that the temperature be maintained at or below 15° C. (59° F.).

Copper Sulphate Solution.—Diluted with Water (1–10 *P.G.* and *U.S.P.*) Lactic Acid should be unaffected by Copper Sulphate T.S., indicating the absence of Sarco-lactic Acid, *B.P.* and *U.S.P.*

Potassio-cupric Tartrate Solution.—Diluted with Water the Acid should give no precipitate, or only the slightest, even after prolonged boiling with Potassio-cupric Tartrate Solution, *B.P.*; the *U.S.P.* orders a few drops of the Acid to be added to 10 c.c. of the hot Alkaline Cupric Tartrate Volumetric Solution, indicating the absence of Grape, Cane and Milk Sugars.

Zinc Carbonate.—If Lactic Acid be heated with an excess of Zinc Carbonate and evaporated to dryness (dried at 100° C. (212° F.), *U.S.P.*), and if this mixture be exhausted with Absolute Alcohol, and the alcoholic liquid evaporated, no sweet residue should be left, indicating the absence of Glycerin, *B.P.* and *U.S.P.*

Ether.—If Lactic Acid be added drop by drop to twice its volume of Ether, the mixture should not show any permanent or transient turbidity, indicating absence of Gum, Sugar, Mannite, Calcium Phosphate, *B.P.* and *P.G.*

Volumetric Determination.—One gramme neutralises 8·3 c.c. of the Volumetric Sodium Hydroxide Solution, *B.P.* If 5 grammes be diluted to 50 c.c. with Water, then 44·7 c.c. of this solution should require for complete neutralisation at boiling temperature not less than 37·5 c.c. of Potassium Hydroxide Solution (each c.c. = 2 p.c. absolute Lactic Acid); Phenolphthalein T.S. being used as indicator, *U.S.P.*

Barium Chloride or Nitrate Solution.—10 c.c. of an aqueous solution of a strength of 1 in 20 should be unaffected by 1 c.c. of Barium Chloride Test-solution, *U.S.P.*; or by Barium Nitrate Solution, *P.G.*; indicating the absence of Sulphates.

Hydrogen Sulphide Solution.—An aqueous solution of a strength 1 in 10 shall not be altered by the addition of Hydrogen Sulphide Solution, *P.G.*; nor should an aqueous solution of similar strength respond to the time-limit test for heavy metals, *U.S.P.*; indicating the absence of Arsenic, Copper, Lead and Iron.

Silver Nitrate Solution.—An aqueous solution of a strength of 1 in 10 shall not be altered by the addition of Silver Nitrate Solution, *P.G.*; 10 c.c. of an aqueous 1 in 100 solution should not be rendered opalescent by 1 c.c. of Silver Nitrate Solution, *U.S.P.*

Ammonium Oxalate Solution.—An aqueous 1 in 10 solution shall not be altered by the addition of Ammonium Oxalate Solution, indicating the absence of Calcium, *P.G.*

Lime Water.—An aqueous 1 in 10 solution shall not be altered by the addition of excess of Lime Water even on heating, *P.G.*

Preparation.

SYRUPUS CALCII LACTOPHOSPHATIS. Syrup of Calcium Lactophosphate.

Precipitated Calcium Carbonate, 2½ oz.; Concentrated Phosphoric Acid, 4 fl. oz. and 262 minims; Lactic Acid, 6 fl. oz.; Refined Sugar, 70 oz.; Orange Flower Water of commerce, undiluted, 2½ fl. oz.; Distilled Water, sufficient to produce 100 fl. oz. of Syrup.

The Lactic Acid is diluted with four times its volume of Distilled Water, and the Calcium Carbonate is added in small portions. As soon as the Carbonate is completely in solution the concentrated Phosphoric Acid is added and trituration continued until the precipitate at first formed redissolves. The solution is diluted with some Distilled Water, the undiluted Orange Flower Water added, and the mixture filtered. The Refined Sugar is dissolved without the aid of heat in the filtrate, strained, and sufficient Distilled Water added to produce 100 fl. oz. of Syrup.

Dose.—30 to 60 minims = 1·8 to 3·6 c.c.

The occasional change of colour in this syrup is stated to be due to inversion of the Sugar by the Acid.—*P.J.* '99, ii. 221; *A.J.P.* '98, 589.

Foreign Pharmacopœias.—Official in Belg., contains 1·5 p.c. Bi-Calcic Phosphate; Mex., and Span. contain 1·25 p.c. by weight of Bi-Calcic Phosphate; Swiss and U.S. from Calcium Carbonate, *see* below.

Not Official.

ACIDUM LACTICUM DILUTUM.—Lactic Acid, 3 fl. oz.; Distilled Water, *q.s.* to produce 20.—*B.P.* 1885.

This has been incorporated in the *B.P.C.*

SYRUPUS CALCII LACTOPHOSPHATIS.—Precipitated Calcium Carbonate, 2·5; Lactic Acid, 6; Phosphoric Acid, 3·6; Orange Flower Water, 5; Sugar, 72·5; Water, *q.s.* to make 100.—*U.S.P.*

Calcium Carbonate, 1; Lactic Acid, 2·4; Diluted Phosphoric Acid, 2; Simple Syrup, 80; Water, *q.s.* to make 100. All by weight.—*Swiss.*

SYRUPUS CALCII LACTOPHOSPHATIS C. FERRO.—Ferrous Lactate, 8·5; Potassium Citrate, 8·5; Water, 62·5; Syrup of Calcium Lactophosphate (*U.S.P.*), *q.s.* to make 1000.—*U.S.N.F.* 1906.

The *B.P.C.* has incorporated the formula of the *U.S.N.F.* 1896, but employs *B.P.* Syrup of Calcium Lactophosphate in place of the *U.S.P.* Syrup as follows:—

Ferrous Lactate, 0·85; Potassium Citrate, 0·85; Distilled Water, 6; Syrup of Calcium Lactophosphate, *q.s.* to make 100.

Other Not Official salts of Lactic Acid are:—**Plumbi Lactas,** a heavy white crystalline powder, soluble in Water. **Sodium Lactate,** a colourless or light yellow liquid of a syrupy consistency and mild salty taste; readily soluble in Water; commercial samples frequently contain an undesirable excess of alkali in the form of Sodium Carbonate. **Zinc Lactate,** a white crystalline powder, or in glistening needle-shaped crystals; it has been used internally, in doses of 1 to 3 grains = 0·06 to 0·2 gramme, four or five times a day in the treatment of epilepsy.

CALCII LACTAS.—White, mammillated tufts; or as a white odourless powder. Soluble 1 in 10 of Water, but solubility varies with the age of the preparation. Insoluble in Ether. Given in rachitis and scrofula, and in chilblains. As it increases the coagulability of the blood, it is given in hæmophilia, and before surgical operations on those who bleed unduly.

Dose.—3 to 10 grains = 0·2 to 0·65 gramme. Also combined with Ferri Lactas.

Foreign Pharmacopœias.—Official in Belg., Ital. and Span.

FERRI LACTAS.—Pale greenish-white crusts consisting of some needle-shaped crystals, or as a crystalline powder. Odourless when quite pure, but usually possessing a mild, peculiar odour and sweet, ferruginous taste. It should be kept in well-stoppered bottles, as it tends to oxidise on exposure to air.

Solubility.—1 in 40 of cold Water, 1 in 12 of hot Water.

Dose.—5 to 15 grains = 0·32 to 1 gramme. In the form of a cachet or as a syrup.

Foreign Pharmacopœias.—Official in all except U.S.

Tests.—Aqueous solutions of the salt give a deep blue precipitate with Potassium Ferricyanide, and a light blue precipitate with Potassium Ferrocyanide Solutions. When dissolved in diluted Sulphuric Acid and gently warmed after the addition of a little Potassium Permanganate the odour of Aldehyde is evolved.

1 gramme of the salt moistened with Nitric Acid and carefully ignited should leave a residue of Ferric Oxide amounting to not less than 0·27 gramme, indicating 27·0 p.c. of Iron Oxide. This residue should not be alkaline in reaction to Litmus paper.

25 c.c. of a 1 in 50 aqueous solution of the salt after being boiled for a few minutes with 5 c.c. of diluted Sulphuric Acid, the Iron precipitated with an excess of Potassium Hydroxide Solution and filtered, the filtrate when boiled with a few drops of Potassio-cupric Tartrate Solution should afford no reddish precipitate, indicating the absence of Sugar.

On trituration of a portion of the salt with strong Sulphuric Acid, no disagreeable odour should be evolved, no gas should be disengaged, nor should the mixture assume a dark colour after standing for some time. These tests show respectively the absence of fatty acids, Carbonates, and readily carbonisable organic impurities. A 1 in 50 aqueous solution of the salt should not produce more than a whitish opalescence with either Lead Acetate Solution or with Hydrogen Sulphide Solution after acidification with Hydrochloric Acid, indicating the absence of more than traces of Chloride, Citrate, Malate, Sulphate, Tartrate, and of heavy metals.

A 1 in 50 aqueous solution acidulated with dilute Nitric Acid shall yield no reaction with either Silver Nitrate Solution or with Barium Nitrate Solution, affording additional evidence of the absence of Chlorides and Sulphates.

The salt on being strongly heated evolves a caramel-like odour, when more strongly heated gives off dense white fumes and finally leaves a brownish-red residue.

ACIDUM NITRICUM.

NITRIC ACID.

FR., ACIDE AZOTIQUE; GER., SALPETERSAURE; ITAL., ACIDO NITRICO CONCENTRATO; SPAN., ACIDO NITRICO.

A clear, colourless fuming liquid, which evolves characteristic choking fumes, and possessing even in diluted solutions a strongly acid and corrosive action.

It may be prepared by the decomposition of a Nitrate, generally Sodium or Potassium Nitrate by Sulphuric Acid.

It is officially required to contain 70 p.c. by weight of Hydrogen Nitrate, $\mathbf{HNO_3}$, eq. 62·58.

It should be preserved in well-stoppered bottles, and in a cool place.

Medicinal Properties.—It is strongly corrosive, and is applied as a caustic to warts, phagedænic sores, chancres, and condylomata, by means of a pointed glass rod. When diluted it is refrigerant, a stomachic tonic and cholagogue, and if very much diluted forms a drink in febrile diseases, and is used also as an injection to dissolve phosphatic calculi when of small size.

An acid of greater strength, **'Fuming Nitric Acid'** (sp. gr. 1·5), is sometimes employed as a caustic.

Incompatibles.—Alcohol, Alkalis, Carbonates and Sulphides, Ferrous Sulphate, Lead Acetate.

Official Preparations.—Acidum Nitricum Dilutum and Acidum Nitrohydrochloricum Dilutum. Used in the preparation of Acidum Phosphoricum Concentratum, Argenti Nitras, Liquor Ferri Perchloridi Fortis, Liquor Ferri Pernitratis, Liquor Ferri Persulphatis, Liquor Hydrargyri Nitratis Acidus, Spiritus Ætheris Nitrosi, Unguentum Hydrargyri Nitratis.

Antidotes.—In case of poisoning by Nitric Acid, the antidotes are Chalk, Magnesia, or Carbonated Alkalis, with White of Egg, Carron Oil, or Soap-suds; followed by enemata of Beef Tea and Brandy, with Tincture of Opium to prevent collapse; emollient drinks.

Foreign Pharmacopœias.—Official in Austr., sp. gr. 1·300, Dan. and Norw., sp. gr. 1·180; Dutch, sp. gr. 1·316; Belg., sp. gr. 1·390; Fr., sp. gr. 1·394; Ger., Jap. and Swed., sp. gr. 1·153; Hung., sp. gr. 1·310; Ital., sp. gr. 1·400; Mex., sp. gr. 1·42; Port., sp. gr. 1·300 to 1·330; Russ., sp. gr. 1·200; Span., sp. gr. 1·31; Swiss, sp. gr. 1·151; also Acidum Nitricum Fumans, sp. gr. 1·45 to 1·5; U.S., sp. gr. 1·403 at 25° C. (77° F.). Austr., Dan., Ger., Jap. and Norw., also Acidum Nitrico-nitrosum, sp. gr. 1·48 to 1·50.

Fr., Ger., Jap., Russ., Swed. and Swiss have an **Acidum Nitricum Crudum.**

Tests.—Nitric Acid has a specific gravity of 1·420; the *B.P.* states 1·42; the *U.S.P.* about 1·403 at 25° C. (77° F.); the *P.G.* 1·153. The boiling point should be about 120° C. (250° F.); the *B.P.* states 121° C. (250° F.); the *U.S.P.* 120·5° C. (248° F.). It evolves dense red fumes when brought into contact with metallic Copper; it produces a dark brown coloration at the junction of the two liquids when a solution of the Acid is poured carefully upon a cooled mixture of Ferrous Sulphate and Sulphuric Acid, and when neutralised discharges the colour of a Sulphuric Acid Solution of Indigo, rapidly when warmed. The Acid is officially required to contain 69·46 p.c. of absolute Nitric Acid as indicated by titration with Volumetric Sodium Hydroxide Solution. As in the case of Lactic Acid, so here it would appear as if the atomic weights official in *B.P.* 1885 were employed in determining the number of c.c. of Volumetric Solution equivalent to the 1 gramme of Acid used, the yield of absolute Acid corresponding to 11·1 c.c. when so calculated being 69·93 p.c.

Calculating with the atomic weights of the 1898 Pharmacopœia, 11·2 c.c. would have been a nearer equivalent, which shows 70·08 p.c. of absolute Acid. The *U.S.P.* requires it to contain 68 p.c. by weight of absolute Acid; the *P.G.* 25 p.c. by weight.

The more generally occurring impurities are Arsenic, Copper, Lead and Iron, Bromic Acid or Bromine, Chlorides, Iodic Acid or Iodine, Sulphates and mineral residue. These are covered in the *B.P.* by the customary elastic expression; it should yield no characteristic reaction with the tests mentioned in the Appendix for those substances. Both *U.S.P.* and *P.G.* indicate the dilutions of the Acid to be employed, and in particular cases also the quantity of reagent to be used. The *U.S.P.* gives the modified Gutzeit test for Arsenic, and the time-limit test for heavy metals. A standard of 5 parts per million by weight is suggested (*C.D.* '08, i. 795) for Arsenic; but 20 parts per million (by weight) is suggested for Lead, on account of the property of dissolving Lead from glass which this acid possesses. *P.G.* gives a special test for Iron, with Potassium Ferrocyanide Solution. In testing for Iodic Acid it will be noticed that the *U.S.P.* uses metallic Tin for the reduction, and the *P.G.* metallic Zinc.

The Pharmacopœias differ in the amount of mineral residue permitted. The *B.P.* states first that it shall yield no residue, and then 'not more than 0·005 p.c.'; the *P.G.* omits all reference to the residue remaining after evaporation; whilst the *U.S.P.* states explicitly that 10. c.c. on evaporation to dryness, and further heated to 110° C. (230° F.), should leave no appreciable residue.

Modified Gutzeit Test.—5 c.c. of a 1 in 10 aqueous solution of Nitric Acid should not respond to the modified Gutzeit's test for Arsenic, *U.S.P.*

Potassium Ferrocyanide Solution.—10 c.c. of a 1 in 10 aqueous solution should not be immediately turned blue on the addition of 0·5 c.c. Potassium Ferrocyanide Solution, *P.G.*

Chloroform.—Nitric Acid diluted 1–3, with a small piece of Zinc introduced for a short time, should not, on agitation with a small quantity of Chloroform, colour the Chloroform violet, *P.G.*

The *U.S.P.* directs such a diluted Acid to be shaken with a few drops of Chloroform, which should remain colourless (absence of Iodine and Bromine) even after the introduction of a small piece of Tin (absence of Iodic and Bromic Acids).

Hydrogen Sulphide Solution.—An aqueous 1 in 6 solution nearly neutralised with Ammonia Solution shall not be altered by the addition of Hydrogen Sulphide Solution, *P.G.* When neutralised with Ammonia Solution and diluted with Distilled Water 1 to 20, the Acid should not respond to the time-limit test for heavy metals.

Barium Chloride or Nitrate Solution.—A 1 in 6 aqueous dilution of the Acid should not become more than opalescent within 5 minutes with Barium Nitrate Solution, *P.G.* A separate portion of a 1 in 10 aqueous dilution should be unaffected by Barium Chloride Test Solution, *U.S.P.*

Silver Nitrate Solution.—A 1 in 6 aqueous dilution should not be affected by Silver Nitrate Solution, *P.G.* A 1 in 10 aqueous dilution should be unaffected by Silver Nitrate Test Solution, *U.S.P.*

Volumetric Determination.—One gramme neutralises 11·1 c.c. of the Volumetric Sodium Hydroxide Solution, *B.P.*; 5 c.c. should require 22·9 c.c. of the Normal Volumetric Potassium Hydroxide Solution, *P.G.* The *U.S.P.* directs that 3 c.c. of Nitric Acid be accurately weighed, diluted to 50 c.c. with Water and titrated with Normal Volumetric Potassium Hydroxide Solution, using Methyl Orange Solution as an indicator. The number obtained by multiplying the number of c.c. of Alkali used by 6·257 and dividing this product by the weight of Acid taken represents the percentage of absolute Acid present.

Preparations.

ACIDUM NITRICUM DILUTUM. Diluted Nitric Acid.

A clear, colourless acid liquid, prepared by diluting 3 fl. oz. and 7 fl. drm. of Nitric Acid with Distilled Water to make 20 fl. oz.

Dose.—5 to 20 minims = 0·3 to 1·2 c.c.

5 minims contain about 1 minim of strong Acid.

Prescribing Notes.—*Usually diluted with Water or with bitter infusions and Tincture of Orange.*

Foreign Pharmacopœias.—Official in Belg., sp. gr. 1·072; Dutch, sp. gr. 1·133; Hung., sp. gr. 1·067; Ital., sp. gr. 1·1; Russ., sp. gr. 1·096; Fr., Jap. and Swiss, sp. gr. 1·056; U.S., sp. gr. 1·054 at 25° C. (77° F.). Not in the others. Dan., Norw. and Swed., *see* Acidum Nitricum.

Tests.—Diluted Nitric Acid has a specific gravity of 1·101; the *U.S.P.* states 1·054 at 25° C. (77° F.); the *P.G.* does not include a diluted Acid. It is officially required to contain 16·89 p.c. w/w of Hydrogen Nitrate as indicated by titration with Volumetric Sodium Hydroxide Solution; 1 gramme neutralising 2·7 c.c. The number of c.c. required to neutralise 1 gramme of the diluted Acid seems to have been based on the atomic weights official in the *B.P.* 1885, and using these latter would calculate to 17·01 p.c. of Hydrogen Nitrate. Each gramme should require for neutralisation 2·8 c.c. of the Volumetric Solution would have been more consistent with the statement of strength (17·4 p.c.) given in the official description of the diluted Acid.

As Nitric Acid (*B.P.*) is employed in its preparation, the diluted Acid is naturally required to answer the principal characteristic qualitative tests for Nitric Acid, and also be free from the impurities mentioned under the concentrated Acid.

ACIDUM NITRO-HYDROCHLORICUM DILUTUM. Diluted Nitro-Hydrochloric Acid.

Nitric Acid, 3; Hydrochloric Acid, 4; Distilled Water, 25.

A clear, colourless, or pale yellow liquid, possessing a strong acid taste and faint chlorinous odour.

B.P. directs the Acids to be mixed with the Water and kept for 14 days before use; but scarcely any action takes place between the diluted Acids, free Chlorine and Nitrous Acid existing only in *traces*.

When the strong Acids were mixed, and after 3 days diluted, the resulting fluid liberated about fifty times as much Iodine from Potassium Iodide Solution as the *B.P.* preparation.

Medicinal Properties.—Cholagogue and gastric tonic. Externally as a **lotion** or **bath**, as well as by stomach administration for tropical enlargement and chronic congestion of the liver. Internally also in biliousness, in oxaluria, and in torpid conditions of stomach, intestinal glands and liver; and in catarrhal jaundice,

Nitro-Hydrochloric Acid Bath.—Mix 8 oz. by measure of Diluted Nitro-Hydrochloric Acid with 1 gallon of Water, temperature 96° or 98° F. Let a flannel roller of ten or twelve inches wide, and sufficient to encircle the body twice, be soaked in the fluid and then wrung, so as to remain only damp. Apply this instantly to the body, covering it with a piece of oiled silk to avoid damping the dress. It should be worn constantly, but should be changed, soaked, and wrung morning and evening. Glass, glazed earthenware, or wooden vessels should be used. Sponges and towels to be kept in Water to prevent them corroding.

The St. Thomas's Hospital employ ½ oz. of the Diluted Nitro-Hydrochloric Acid to the gallon for a full size bath of 25 to 30 gallons, and this has been incorporated in the *B.P.C.*

Dose.—5 to 20 minims = 0·3 to 1·2 c.c.

Prescribing Notes.—*Usually diluted with Water and given with Tincture of Gentian or Tincture of Orange, and Tincture of Nux Vomica.*

16 *minims equal* 1½ *minims of Nitric Acid and* 2 *minims of Hydrochloric Acid.*

Incompatibles.—Alkalis, Carbonates, Sulphides, salts of Silver and Lead.

Antidotes.—*See* Acidum Nitricum.

Foreign Pharmacopœias.—U.S. orders the undiluted—Nitric Acid, 18; Hydrochloric Acid, 82; also the diluted—Nitric Acid, 4; Hydrochloric Acid, 18; Water, 78.

Norw., Nitric Acid, 1; Hydrochloric Acid, 2. By weight. *Syn.* Aqua Regia.
Dublin Pharmacopœia was—Nitric Acid, 1; Muriatic Acid, 2.
Not in the other Pharmacopœias.

Tests.—Diluted Nitro-Hydrochloric Acid has a specific gravity of about 1·07. 1 gramme should require for neutralisation about 2·5 c.c. of Volumetric Sodium Hydroxide Solution. When mixed with Potassium Iodide Solution, Iodine is liberated, which is readily recognised by the colour produced with Starch Solution.

ACIDUM OLEICUM.

OLEIC ACID.

FR., ACIDE OLÉIQUE; GER., OLEINSAURE; ITAL. AND SPAN., ACIDO OLEICO.

A pale brownish-yellow, oily liquid, which has a tendency to become rancid and to darken in colour on exposure to light and air. Pure Oleic Acid is represented by the formula $\mathbf{HC_{18}H_{33}O_2}$, eq. 280·14, but the commercial article is usually not quite pure.

It is prepared from the Olein of fats, in which it exists as a Glyceryl ester, by saponification or hydrolysis, the former being accomplished by the Hydroxides of the fixed alkalis, the latter by the influence of superheated steam. After saponification the Oleate formed is decomposed by a mineral Acid.

It should be preserved in well-stoppered, dark amber-tinted glass bottles.

Solubility.—Mixes in all proportions with Alcohol, Chloroform, Ether, Benzol, Oil of Turpentine, and fixed Oils. Insoluble in Water.

Medicinal Properties.—Used in pharmacy for dissolving various metallic oxides and the alkaloids Morphine, Aconitine, Atropine, Cocaine, and Veratrine; the oleates thus formed are more readily absorbed than ointments made with fats, oils, or paraffins.

Official Preparation.—Hydrargyri Oleas. Used in the preparation of Unguentum Aconitinæ, Unguentum Atropinæ, Unguentum Cocainæ, and Unguentum Veratrinæ. Of **Mercuric Oleate,** Unguentum Hydrargyri Oleatis.

Foreign Pharmacopœias.—Official in Jap. (Acidum Oleinicum), sp. gr. about 0·9; Mex. (Acido Oleico); U.S., sp. gr. 0·895 at 25° C. (77° F.). Not in the others.

Tests.—Oleic Acid has a specific gravity of from 0·890 to 0·910; the *U.S.P.* states 0·895 at 25° C. (77° F.). The solidifying point is 4·5 to 5° C. (40° to 41° F.), subsequently melting at 13·3 to 15·5° C. (56° to 60° F.); the *U.S.P.* states that it becomes semi-solid when cooled to from 9° to 4° C. (48·2° to 39·2° F.) and congeals to a whitish solid on further cooling. It has a peculiar characteristic odour. The acid may be determined by titration with Volumetric Sodium Hydroxide Solution, using Phenolphthalein Solution as an indicator of neutrality. 1 gramme of the acid should require about 3·5 c.c. of Volumetric Sodium Hydroxide Solution, indicating 98·0 p.c. of absolute Oleic Acid. No volumetric assay is included in either the *U.S.P.* or *B.P.*

The most likely impurities are fixed oils, Stearic and Palmitic Acids. The solubility in Alcohol (90 p.c.) detects the presence of fixed oils; though the solubility is not specifically mentioned as a test for these in the *B.P.*; advantage is taken of the comparative insolubility of Lead Stearate and Lead Palmitate in Ether to use this agent as a test for the presence of these two Acids.

The *U.S.P.* states that heated to a temperature of 95° C. (203° F.) decomposition commences; on heating to a higher temperature it is entirely dissipated.

The Acid is not official in the *P.G.*

Solubility in Alcohol.—The *U.S.P.* requires that an alcoholic solution of the Acid should have a feebly acid reaction on blue Litmus paper, and that equal volumes of Acid and Alcohol should form a clear solution at 25° C. (77° F.) without the separation of oily drops, indicating absence of fixed oils.

Lead Acetate Solution.—A weighed quantity of 1 gramme of Oleic Acid is dissolved in about 20 c.c. of Alcohol (94·9 p.c.) and 2 drops of Phenolphthalein Solution added. The mixture is warmed and saponified by the addition drop by drop of a Solution of Sodium Hydroxide (1–4) until the Acid is neutralised, and the mixture after agitation remains a permanent red colour. Then gradually add Acetic Acid until the red tint is discharged, filter, and mix 10 c.c. of the filtrate with 10 c.c. purified Ether. This solution should not become any more than slightly turbid with 1 c.c. of Lead Acetate Solution, indicating the absence of notable quantities of Stearic and Palmitic Acids, *U.S.P.*

An almost identical test is employed by the *B.P.* for the detection of more than traces of these acids.

Not Official.

ACIDUM STEARICUM. Stearic Acid. $HC_{18}H_{35}O_2$, eq. 282·14.—A hard white glistening solid, possessing very little odour or taste. It is an organic acid appearing commercially in a more or less impure form as Stearine. It is a monobasic acid. It is insoluble in Water, soluble in Alcohol (90 p.c.), and readily dissolves in Ether.

Tests.—Stearic Acid melts at 69·2° C. (156·6° F.). This melting point is given in the *U.S.P.*, which further states that the commercial acid should have a melting point not lower than 56° C. (132·8° F.). The solidifying point of the commercial acid should not be lower than 54° C. (129·2° F.). It may be determined volumetrically by titration of a weighed quantity with Normal Volumetric Sodium Hydroxide Solution, using Phenolphthalein Solution as an indicator of neutrality. 1 c.c. of the Volumetric Solution corresponding to 0·28214 gramme of pure Stearic Acid. Hydrocarbon oils and unsaponified fat are the more generally occurring impurities. If present in more than traces both are readily detected by the saponification test. If 1 gramme of the acid be saponified by boiling with a solution of 0·5 of a gramme of exsiccated Sodium Carbonate in 30 c.c. of Water, the resulting liquid should not be more than opalescent. It should leave no weighable residue when ignited with free access of air, indicating the absence of mineral matter, Soap, etc.

Not Official.

ACIDUM OSMICUM.

OSMIC ACID.

OsO_4.

FR., ACIDE OSMIQUE; GER., OSMIUMSÄURE.

A pale yellow crystalline substance giving off an excessively irritating vapour, which attacks the eyes and nostrils. It is more convenient in the form of 1 p.c. aqueous solution, which must be carefully protected from dust or organic matter which will reduce it and form a black deposit.

Solubility.—1 in 17 Water. Should not be dissolved in Alcohol or Ether, as decomposition ensues.

Medicinal Properties.—4 to 10 minims of a 1 p.c. **aqueous solution** of Osmic Acid or Potassium Osmate have been injected hypodermically for sciatica and other forms of neuralgia.

5 to 10 minims in two or three separate injections in certain forms of neuralgia.—*L.* '99, ii. 1250; '03 ii. 970.

In trigeminal neuralgia the main branches of the fifth nerve were exposed, and a few drops of a 2 p.c. solution injected at several points.—*M.P.* '04, ii. 470. Injected into Gasserian ganglion.—*L.* '07, ii. 1603.

Used as 1 p.c. **aqueous solution** for fixing and staining in histological work. Fat and nerve tissues are blackened by it.

Foreign Pharmacopœias.—Official in Mex.

Not Official.

ACIDUM OXALICUM.

$H_2C_2O_4$, $2H_2O$, eq. 125·10.

FR., ACIDE OXALIQUE; GER., OXALSÄURE; ITAL., ACIDO OSSALICO.

This is noticed here rather as a poison than a medicine, although it has been used in America in the treatment of amenorrhœa, and as a sedative in acute cystitis (*T.G.* '91, 164) in ½-grain doses every four hours. It is used in households for cleaning brass, and removing ink-stains, iron-moulds, etc. It has been mistaken for Epsom Salts, which it somewhat resembles. Murrell states that death has occurred from 2 drm., but recovery from ½ oz.

Antidotes.—Chalk, Lime, or Whitening are given freely in Water. Saccharated Solution of Lime may be given in drm. doses, frequently repeated; also emollient and stimulant drinks.

Foreign Pharmacopœias.—Official in Mex. and Port.

ACIDUM PHOSPHORICUM CONCENTRATUM.

CONCENTRATED PHOSPHORIC ACID.

Fr., Acide Phosphorique Officinal; Ger., Phosphorsäure; Ital., Acido Fosforico; Span., Acido Fosforico.

A clear, colourless, and odourless syrupy liquid, containing 66·3 p.c. of Hydrogen Orthophosphate, $\mathbf{H_3PO_4}$, eq. 97·32.

It is prepared from Phosphorus by oxidation. The official method is stated to be the oxidation, by means of Nitric Acid, of the aqueous solution of the residue from the atmospheric oxidation of Phosphorus. The more general method of production is the direct oxidation of Phosphorus by means of Nitric Acid.

It should be preserved in well-stoppered glass bottles, preferably of an amber tint.

Medicinal Properties.—This concentrated Acid is used in making phosphatic preparations. Only given internally in the diluted form. *See* Acidum Phosphoricum Dilutum.

Official Preparations.—Acidum Phosphoricum Dilutum. Used in the preparation of Acidum Hydrobromicum Dilutum, Ammonii Phosphas, Syrupus Calcii Lactophosphatis, Syrupus Ferri Phosphatis, and Syrupus Ferri Phosphatis cum Quinina et Strychnina.

Foreign Pharmacopœias.—Official in Austr., sp. gr. 1·12 (20 p.c.); Belg., 1·056 to 1·057 (10 p.c.); Fr. and Ital., sp. gr. 1·349 (50 p.c.); Dutch, sp. gr. 1·153 (25 p.c.); Ger. and Russ., sp. gr. 1·154 (25 p.c.); Jap., Hung., sp. gr. 1·120 (20 p.c.); Mex., 1·34; Port., sp. gr. 1·880; Span., sp. gr. 1·35 (50 p.c.); U.S., sp. gr. not below 1·707 at 25° C. (77° F.) (85 p.c.). Not in the others.

Tests.—Phosphoric Acid has a specific gravity of 1·5; the *U.S.P.* acid 1·707 at 25° C. (77° F.); the *P.G.*, 1·154. A white crystalline precipitate is produced when its diluted neutralised aqueous solution is mixed with Magnesium Ammonio-sulphate Solution. A yellow precipitate soluble in Ammonia Solution is produced when its diluted aqueous solution acidified with Nitric Acid is treated with Ammonium Molybdate Solution containing free Nitric Acid. A canary-yellow precipitate readily soluble in Ammonia Solution, and in cold dilute Nitric Acid is produced when Silver Ammonio-nitrate Solution is added to a dilute neutralised aqueous solution of the Acid. The Acid is officially required to indicate when assayed according to the Lead process given below, 66·3 p.c. of Hydrogen Orthophosphate; the *U.S.P.* Acid should contain 85 p.c. by weight of absolute Orthophosphoric Acid; the *P.G.* contains 25 p.c. of pure Acid. The process of determination adopted by the *B.P.* is a gravimetric one, and consists in converting the Phosphoric Acid into a Lead salt by means of Lead Oxide, evaporating and heating the residue to dull redness. A weighed quantity of 1 gramme of the Acid treated with 2·5 grammes of finely powdered Lead Oxide is required to yield a residue weighing 2·98 grammes. As pointed out in the 17th Edition of the *Companion* the percentage acidity of Phosphoric Acid may be conveniently determined by titration with standard alkali, using Phenolphthalein Solution as an indicator; the change of colour takes place when two-thirds of the Hydrogen is replaced by alkali metal; with Methyl Orange Solution as the indicator, neutrality is reached with half the quantity of alkali; with Litmus Solution the end reaction is too indefinite. The process adopted by the *U.S.P.* is volumetric, Normal Volumetric Sodium Hydroxide Solution being employed and Phenolphthalein Test-solution used as an indicator of neutrality. A definite weight of the Acid is diluted with Water, and the quantity removed for the determination is then diluted with about an equal quantity of a cold aqueous solution containing 5 grammes of Sodium Chloride. The *P.G.* gives neither a gravimetric nor a volumetric process of determination.

The more generally occurring impurities are Meta- and Pyro-phosphoric Acids, Phosphorous Acid, Arsenic, heavy metals (*e.g.*, Copper, Iron, and Lead), Calcium, Chlorides, Sulphates, Phosphates, and Nitrates. The *B.P.* are content to include most of these under the general expression it 'shall yield no characteristic reaction,' etc.

The *B.P.* and the *U.S.P.* employ Albumen Solution for proving the absence of Meta-phosphoric Acid, and Tincture of Ferric Chloride for proving the absence of Pyro-phosphoric and Meta-phosphoric Acids. The tests in each Pharmacopœia are virtually the same, requiring that when diluted with 5 volumes of Water no precipitate should be produced on the addition of Albumen Solution, nor should any precipitate be formed, even after several hours, on the addition of an equal volume of Tincture of Ferric Chloride.

Individual tests for Arsenic are given by the *U.S.P.* and *P.G.*, the former employing the modified Gutzeit's test, the latter Solution of Stannous Chloride. Both these Pharmacopœias employ Hydrogen Sulphide for the detection of heavy metals, the *U.S.P.* adopting the time-limit test. In testing for Nitrates both *U.S.P.* and *P.G.* employ equal volumes of Phosphoric and Sulphuric Acids, the former using a crystal of Ferrous Sulphate, the latter a Solution of Ferrous Sulphate. In testing for Phosphates *U.S.P.* employs a mixture of three parts of Alcohol (94·9 p.c.) and one of Ether, whilst *P.G.* uses Alcohol (90 p.c.) alone. No such test appears in the *B.P.* A test for the absence of Silica is included in the *B.P.*, but not in *U.S.P.* or *P.G.*

The *B.P.* employs Mercuric Chloride Test-solution as a reagent for the detection of Phosphorous Acid; the *U.S.P.* both Mercuric Chloride Test-solution and Silver Nitrate Solution; the *P.G.* Solution of Silver Nitrate and gentle warming. When made alkaline with Ammonia Solution it should not give (even after long standing) a crystalline precipitate of Ammonio-magnesium Phosphate, indicating absence of Magnesium, which is present to a considerable extent in some commercial samples.

The acid when diluted with Water should yield no precipitate when allowed to remain at rest for some time, indicating the absence of Silica.

Mercuric Chloride.—The *B.P.* requires that, if the Acid be diluted, mixed with an equal volume of Mercuric Chloride Solution and heated, no precipitate should form; the *U.S.P.* gives 1 c.c. of Acid diluted with 5 c.c. of Water, but no specified quantity of reagent; a similar dilution when gently warmed and with the addition of a few drops of Silver Nitrate T.S. should not be blackened, indicating the absence of Phosphorous Acid.

Silver Nitrate Solution.—Phosphoric Acid (diluted with 5 volumes of Water, *U.S.P.*) should yield no precipitate with Silver Nitrate T.S., indicating the absence of Chlorides, *P.G.* and *U.S.P.* (not even on warming, indicating the absence of Phosphorous Acid, *P.G.*).

Barium Chloride or Nitrate Solution.—A diluted Acid (1-4, *P.G.*) should be unaffected by Barium Nitrate Solution, *P.G.*, indicating the absence of Sulphates.

0·1 c.c. of the Acid diluted with Water to 7 c.c. should not afford a cloudiness or precipitate within 30 seconds on the addition of 1 c.c. of Barium Chloride Test-solution, *U.S.P.*

Ammonium Oxalate Solution.—A 1-4 aqueous dilution of the Acid, after the addition of excess of Ammonia Solution should not be changed by the addition of Ammonium Oxalate Solution, indicating the absence of Calcium, *P.G.*

Hydrogen Sulphide.—The Acid should nót be affected by Hydrogen Sulphide Solution, *P.G.*, and 10 c.c. of a 1-20 dilution should not respond to the time-limit test for heavy metals.

Modified Gutzeit's Test.—5 c.c. of a 1-10 aqueous dilution should not respond to the modified Gutzeit's test for Arsenic, *U.S.P.*

Stannous Chloride Solution.—The *P.G.* requires that a mixture, 1 c.c. of Phosphoric Acid with 3 c.c. Stannous Chloride Solution, should not assume a dark colour in the course of an hour, *P.G.*

Alcohol or Alcohol and Ether.—In a mixture of 1 c.c. Phosphoric Acid, 3 c.c. Alcohol (94·9 p.c.) and 1 c.c. Ether there should be no turbidity (absence of Phosphates), *U.S.P.* The *P.G.* directs that a mixture of the Acid with 4 volumes of Alcohol (90 p.c.) should remain clear.

Ferrous Sulphate.—The *U.S.P.* requires that no brown or brownish-black colour should appear around a crystal of Ferrous Sulphate dropped into a cooled mixture of 1 c.c. Phosphoric Acid and 1 c.c. Sulphuric Acid. No coloured zone should be formed when 1 c.c. Ferrous Sulphate Solution is poured as a layer on a mixture of 2 c.c. Phosphoric Acid and 2 c.c. Sulphuric Acid, *P.G.*

Volumetric Determination.—If 10 grammes of Phosphoric Acid be diluted with Water to measure 100 c.c., then 9·73 c.c. of this, diluted with 10 c.c. of cold saturated aqueous solution containing 5 grammes of Sodium Chloride, should require 17 c.c. of Normal Volumetric Potassium Hydroxide Solution for neutralisation (each c.c. corresponding to 5 p.c. of absolute Phosphoric Acid), Phenolphthalein T.S. being used as indicator, *U.S.P.*

Preparation.

ACIDUM PHOSPHORICUM DILUTUM. DILUTED PHOSPHORIC ACID.

A clear colourless liquid possessing an acid taste and strong acid reaction towards blue Litmus paper. It is prepared by diluting 3 of Concentrated Phosphoric Acid with Distilled Water to make 20.

Medicinal Properties.—Tonic and refrigerant, hæmatinic and anhidrotic; diuretic in the phosphatic diathesis. Given with Calcium Phosphate in rickets. Quenches the craving for fluids in diabetes.

Used as a partial substitute for organic acids in cooling drinks and acidulated waters.

Dose.—5 to 20 minims = 0·3 to 1·2 c.c.

Prescribing Notes.—*Usually largely diluted with Water, and given with some bitter and aromatic tinctures and syrups; should not be mixed with the Syrup of Iron Pyrophosphate, as the mixture becomes solid.*

Incompatibles.—Lime Water and all alkalis.

Foreign Pharmacopœias.—Official in Norw. and Port., 13·8 p.c.; Russ., 12·5 p.c.; Fr., Jap., Mex., Swed., Swiss and U.S., 10 p.c.

Tests.—It has a specific gravity of 1·08; the *U.S.P.* diluted acid has a specific gravity of 1·057; the *P.G.* does not include a diluted acid. It is officially required to contain 13·8 p.c. w/w of Hydrogen Orthophosphate as gravimetrically determined by converting 1 gramme into a Lead salt by the addition of 0·5 of a gramme of Lead Oxide, heating to a dull redness, cooling and weighing the residue, which should amount to 0·6 gramme; the *U.S.P.* diluted acid is required to contain 10 p.c. w/w of absolute Ortho-phosphoric Acid as determined volumetrically by titration with Normal Volumetric Potassium Hydroxide Solution, using Phenolphthalein Test-solution as an indicator of neutrality. The quantity (4·87 gramme) of the diluted Phosphoric Acid used for the titration is diluted with 5 c.c. of a cold saturated Sodium Chloride Solution. Concentrated Phosphoric Acid answering the official description is used in the preparation of the diluted acid, and it is therefore required to answer the tests and to be free from the impurities given under the Concentrated Acid.

Not Official.

ACIDUM PICRICUM.

$C_6H_2(NO_2)_3OH$, eq. 227·44.

PICRIC ACID. CARBAZOTIC ACID. TRINITROPHENOL.

Pale yellow crystalline scales, prepared by the action of hot Nitric Acid on Phenol-sulphonic Acid.

Picric Acid, Picrates, and Mixtures of Picric Acid when in process of manufacture or when kept, conveyed, imported, or sold for any purpose, come within the Explosives Act 1875, except when it is mixed with not less than half its own weight of Water. For the dealer in these substances there are special conditions as to storing, etc.

With Ammonia, Potassium Hydroxide and Sodium Hydroxide it forms crystalline salts, which are explosive.

Solubility.—1 in 90 of Water; 1 in 10 of Alcohol (90 p.c.).

Medicinal Properties.—A solution (1 or 2 p.c.) of Picric Acid has been recommended as an application to scalds and burns, and also in acute eczema.—*B.M.J.* '96, ii. 651 and 1826; '97, i. 331 and 457; '99, i. 1152; *L.* '03, ii. 640, 799.

It has also been given in ½ to 1 grain doses as a bitter tonic.

Specially useful as a first dressing in burns; has all the advantages of boric acid, plus that of relieving pain.—*B.M.J.* '07, ii. 524.

Solution for Removal of Picric Acid Stains.—Sodium Benzoate, 1; Boric Acid, 1; Water, 100.

A saturated aqueous solution is a delicate test for the presence of Albumen in fluids; even in very dilute solutions a white cloud is formed at the junction of the two liquids, and in stronger solutions the Albumen is precipitated. Used in histological work.

Foreign Pharmacopœias.—Official in Fr., Jap. and Mex. Not in the others.

Tests.—The pure Acid melts at 122° C. (241·6° F.). At a higher temperature it partially sublimes, and boils, giving off bitter yellow suffocating vapours. It may be determined by titration with Volumetric Sodium Hydroxide Solution, using Phenolphthalein Solution as an indicator of neutrality; 1 gramme of the Acid should require about 4·4 c.c. of the Volumetric Solution. A dark red liquid is produced when a solution of Picric Acid is boiled with a strong Solution of Potassium Cyanide. When boiled with a strong Solution of Calcium Hypochlorite it gives off pungent, tear-producing vapours. It should be free from mineral impurities, and from more than traces of Sulphates.

AMMONII PICRAS.—Yellow, odourless, glistening crystalline needles. Soluble 1 in 93 of Water, 1 in 82 of Alcohol (90 p.c.). Given as a substitute for Quinine, also in exophthalmic goitre and malaria.

Dose.—¼ to 1 grain = 0·016 to 0·06.

Not Official.

ACIDUM PYROGALLICUM.

PYROGALLIC ACID. PYROGALLOL.

$C_6H_3(OH)_3$, eq. 125·10.

Fr., Pyrogallol; Ger., Pyrogallol; Ital., Pirogallolo.

Light, white crystalline tufts, which have a tendency to become coloured on exposure to strong light, more particularly in solution. The change is more rapid in alkaline solution. Usually prepared by heating Gallic Acid to 185° to 200° C. (365° to 392° F.).

It should be kept in well-closed, dark amber-tinted glass bottles as far as possible from the light.

Solubility.—1 in 2 of Water, and measures 2½; 9 in 10 of Alcohol (90 p.c.).

Medicinal Properties. — Escharotic, antiseptic, and disinfectant. Its use requires care.

Not more than 15 to 25 grains should be used in the twenty-four hours, as violent toxic symptoms may result from its absorption.—*T.G.* '85, 59.

Used in the form of a 10 p.c. **salve**, and applied with a brush twice a day, it proved very useful in Hebra's wards in the treatment of psoriasis. The parts were then covered with cotton wadding or linen, and when very extensive were covered with flannel.—*Pr.* xxv. 377.

An **ointment**, Pyrogallic Acid 40, Starch 40, Vaseline 120, also a **powder**, Pyrogallic Acid 20, Starch 80, have been used for venereal ulcers.—*L.M.R.* '82, 228; '84, 68.

Mixed with Collodium Flexile, 40 grains to the oz., for psoriasis.—*T.G.* '86, 181.

Largely used in photography. It has also been used for blackening the hair. 1 in 16 of Water is used with a Solution of Silver Nitrate (1 in 30 of Water).

To remove stains of Pyrogallic Acid, rub a little Ammonium Persulphate on the fingers and rinse with Water.—*P.J.* '98, i. 504*a*.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex., Norw., Russ., Swed., Swiss and U.S. Not in Port. or Span.

Tests.—Pyrogallic Acid melts at 131° to 132° C. (267·8° to 269·6° F.), and sublimes at a higher temperature without leaving any mineral residue. Solutions of the acid gradually absorb Oxygen from the air becoming darker in colour, and this absorption is much accelerated in the presence of alkalis, the solutions then rapidly becoming dark brown or almost black. A freshly prepared dilute Solution of Ferrous Sulphate yields an indigo blue coloration with a solution of Pyrogallic Acid, and solutions of Ferric salts a brownish-red coloration; solutions of Mercuric, or Silver salts are rapidly reduced.

UNGUENTUM ACIDI PYROGALLICI (Jarisch's Ointment).—Pyrogallic Acid, 60 grains; Lard, 1 oz.

This has been incorporated in the *B.P.C.* as follows:—
Pyrogallic Acid, 12; Lard, 88.

UNGUENTUM PYROGALLOL COMPOSITUM.—Pyrogallic Acid, 30 to 60 grains; Ichthyol, 30 grains; Salicylic Acid, 15 grains; Soft Paraffin, to 1 oz.—*Middlesex.*

Pyrogallol, 20 grains; Ammonium Sulpho-ichthyolate, 20 grains; Salicylic Acid in powder, 8 grains; Soft Paraffin to 1 oz.—*London.*

Unguentum Pyrogalloli Compositum (*Unna*).—Pyrogallic Acid, 5; Salicylic Acid, 2; Ammonium Ichthyosulphonate, 5; Yellow Vaseline, 88.—*Hager*, and *Pharm. Form.*

This has been incorporated in the *B.P.C.* under the title Unguentum **Acidi Pyrogallici Compositum** *syn.* Unna's Compound Pyrogallol Ointment, employing Soft Paraffin.

Unguentum Pyrogallol Oxydati.—Oxidised Pyrogallic Acid, 5; Salicylic Acid, 5; Hydrous Wool Fat, *q.s.* to make 100.—*B.P.C.*

UNNA'S PYROGALLIC PLASTER MULL.—Contains 40 p.c. of the Acid, equal to ½ grain in each square inch of surface.

ACID PYROGALLIC OXIDISED (Pyraloxin).

Some attention has been directed to this drug by its recent employment in dermatological practice. It is a brownish-black powder readily soluble in Water, prepared by oxidising Ammonium Pyrogallate in a current of air. It possesses no toxic properties, nor is it liable, as a rule, to excite any dermatitis. It has been employed (*Edin. Med. Jour.* '05, 437) in the treatment of lupus erythematosus.

In the treatment of psoriasis it stands next to Chrysarobin in efficiency. It is unsuited for the acute or rapidly extending phase, but when the disease has come to a standstill, or is showing distinct evidences of retrogression, its advantages are said to be incontestable. It may be applied as an **ointment** (½ drm. to the oz.), made up with Vaseline, or with the addition of 10 grains of Salicylic Acid as a mordant. A cleaner method is to employ 10 parts dissolved in 20 of Benzol and 80 of Acetone.

In lupus erythematosus applied as an **ointment**: Zinc Oxide, 10; Kaolin, or terra silicia, 2; Oxidised Pyrogallic Acid, 5; Vaseline, 28.

In infantile eczema of the face the most brilliant results have been obtained. It is applied to the reddened and irritable surface of the skin in the form of a thin coating of Lassar's Paste, to which 10 grains of Pyraloxin have been added.

For the eradication of ringworm of the scalp in children it is applied in the form of an **ointment**: Oxidised Pyrogallic Acid, 10 grains; Precipitated Sulphur, ½ drm.; Ammoniated Mercury, 15 grains; and Vaseline, 1 oz.

Eugallol (Pyrogallol mono-acetate), a brownish-yellow thick syrupy liquid; **Gallacetophenone**, a yellowish-brown powder; **Lenigallol** (Pyrogallol triacetate), a white powder; and **Saligallol** (Pyrogallol di-salicylate), a resinous solid, are preparations which have received attention in the treatment of skin diseases.

ACIDUM SALICYLICUM.

SALICYLIC ACID.

$HC_7H_5O_3$, eq. 137·01.

FR., ACIDE SALICYLIQUE; GER., SALICYLSAURE; ITAL., ACIDO SALICILICO; SPAN., ACIDO SALICILICO.

Colourless, odourless, prismatic crystals when prepared synthetically from Carbolic Acid, but the Acid derived from the Oil of Wintergreen or of Sweet Birch, commonly called 'natural acid,' is usually supplied in large crystals possessing a yellowish or pinkish tint, and generally possesses a faint odour of Methyl Salicylate.

It may also occur as a light, white crystalline powder. It possesses at first a sweetish and subsequently an acrid taste.

Prepared by passing Carbonic Acid Gas into a mixture of Carbolic Acid and Sodium Hydroxide at a high temperature, and decomposing the Sodium Salicylate with a mineral Acid, and subsequent purification; or by treating Oil of Wintergreen (*Gaultheria procumbens*), which is mainly composed of Methyl Salicylate, also Oil of Sweet Birch (*Betula lenta*) and *Andromeda leschenaultii* (a native of India), with a Solution of Potassium Hydroxide, and distilling it, decomposing the residue with Hydrochloric Acid, and purifying the Salicylic Acid by recrystallisation.

Salicylic may be sublimed, but there is almost certain to be some slight decomposition with liberation of Phenol.

Solubility.—About 1 in 550 of Water; 1 in 9 of boiling Water; 1 in 3½ of Alcohol (90 p.c.); 1 in 11 of Alcohol (60 p.c.); 1 in 35 of Alcohol (45 p.c.); 1 in 2 of Ether; 1 in 55 of Chloroform; 1 in 120 of Olive Oil; 1 in 195 of Glycerin; 1 in 8 of Lard (at 180° F.). 20 grains Salicylic Acid are rendered soluble in a fl. oz. of Water by the addition of 25 grains of Borax or 40 grains of Potassium Citrate; but it is better to use Sodium Salicylate.

Medicinal Properties.—Antiseptic and powerfully antipyretic; specific in acute rheumatism.

A good **preservative** of medicated solutions, such as Cocaine salts and Boric Acid, which are otherwise liable to fungoid growths; 1 in 1000 is sufficient for the purpose, but in the eye causes temporary smarting.

Used as a **lotion** (4 p.c.) in pruritus and urticaria, and some forms of eczema; as an **injection** (1 in 300) in the dysenteric diarrhœa of children; as an **ointment** (1 in 6) for pruritus (*Ringer*). With Zinc Oxide and Starch it is used as a '**dusting powder**' for infants.

In **collodion** form it is very useful when applied to hard and soft corns and warts. It softens and removes them.

The collodion is recommended in lupus.—*Pr.* lii. 96.

The injection of Salicylic Acid in uterine cancer, recommended as a palliative method when the disease is too far advanced to admit of surgical extirpation.—*P.J.* (3) xxv. 1219.

A solution in spirit, increased 1 p.c. daily from 1 to 6 p.c., applied to remove the stumps left after removal of papillomatous growths. It also forms a useful application dissolved in Sodium Sulpho-ricinate solution.—*B.M.J.* '04, ii. 1221, 1224.

A daily application of a 10 p.c. solution of Salicylic Acid in Sulpho-ricinate of Soda for pharyngo-mycosis. This salt of soda seems to be the vehicle with which Salicylic Acid can be incorporated so as to be as unirritating as possible.—*B.M.J.* '07, i. 1155; *L.* '07, i. 1248.

Recommendation of the Departmental Committee appointed to inquire into the use of preservatives and colouring matters in food. Salicylic Acid be not used in greater proportions than 1 grain per pint in liquid food; and 1 grain per lb. in solid food, its presence in all cases to be declared.—*L.* '01, ii. 1683; *J.S.C.I.* '01, 1228; *P.J.* '01, ii. 620; *C.D.* '01, ii. 880; *Analyst*, '01, 332.

Salicylic Acid as a preservative for foods has been stated to be injurious, for three reasons: (1) That it is antiseptic and antifermentative, and therefore liable to interfere with the digestive processes; (2) after absorption is apt to injure the general health; (3) that it is an irritant and apt to injure the mucous membrane of stomach and intestinal canal; but the results of experiments by Macalister and Bradshaw are opposed to these conclusions, and they contend that there is no justification for them.—*L.* '02, ii. 1544; '03, i. 717.

Prescribing Notes.—*On account of its slight solubility in Water, it is usually given internally in the form of Sodium Salicylate, which is readily soluble, and is less irritating to the mucous membrane. It is also given in combination with Bismuth and Lithium.*

Dose.—5 to 20 grains = 0·32 to 1·3 grammes.

Incompatibles.—Spirit of Nitrous Ether, Iron salts.

Official Preparations.—Sodii Salicylas, Unguentum Acidi Salicylic. Used in the preparation of Injectio Cocainæ Hypodermica, Liquor Atropinæ Sulphatis, and Salol. *See* also Bismuthi Salicylas.

Not Official.—Collemplastrum Salicylatum, Collodium Salicylicum, Collodium Lacto-salicylicum, Collodium Callosum, Salicylic dressings, Glycerinum Acidi Salicylici, Lotio Acidi Salicylici Co., Parogen Salicylatum, Pulvis Salicylicus cum Talco, Pulvis Talci Salicylicus, Salicylic and Creosote Plaster Mulls, Salicylic Acid Suet, Unguentum Acidi Salicylici, Vasolimentum Salicylicum, Salacetol, Aspirin, Acetylsalicylic Acid, Agathin, Glycosal, and Salitannal.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Jap., Ital., Mex., Norw., Port., Russ., Span., Swed., Swiss and U.S.

Tests.—Salicylic Acid melts at 156° to 157° C. (312·8° to 314·6° F.); the *U.S.P.* states it begins to melt at 156° C. (312° F.) and is completely melted at 157° C. (314·6° F.); the *P.G.* that it melts at about 157° C. (314·6° F.). According to the *U.S.P.* it is gradually dissipated at a higher temperature than 157° C. (314·6° F.). The distinctive test is the violet colour imparted to an aqueous solution by Ferric Chloride Test-solution, and the production of the peculiar odour of Methyl Salicylate when a little of the Acid is warmed with Methyl Alcohol and strong Sulphuric Acid. The latter test is included in *U.S.P.* but not in *B.P.* or *P.G.* The Acid is not officially required in this instance to 'afford when neutralised the reactions characteristic of Salicylates.' According to the *B.P.* the acid volatilises at 200° C. (392° F.) 'without decomposition,' but unless the Acid is very carefully heated there is almost certain to be some slight decomposition, with liberation of Phenol, which fact is noted in *P.G.* The Acid may be readily determined by titration with Volumetric Sodium Hydroxide Solution, using Phenolphthalein Solution as an indicator of neutrality. Each gramme of the Acid should require about 7·3 c.c. of the Volumetric Solution, indicating 100·0 p.c. of absolute Salicylic Acid. Neither the *B.P.* nor *P.G.* includes a volumetric method of determination.

The more generally occurring impurities are unconverted Phenol, isomers, or homologues of Salicylic Acid, organic impurities, Hydrochloric Acid, Carbolates or Sulphocarbolates, and mineral residue. The test for Phenol, viz., its extraction from alkaline solution with Ether, is practically the same in the *B.P.*, *U.S.P.*, and *P.G.*, the latter Pharmacopœia giving the relative quantities to be used in performing the test. The method adopted by each Pharmacopœia is compared in the small type below, under the heading of Ether. Isomers or homologues of Salicylic Acid are detected by their influence on the melting point and by the evaporation test. The *B.P.* evaporates an aqueous solution, whilst *P.G.* and *U.S.P.* employ an alcoholic one. The test is more severe when water is employed with excess of the sample, for as pointed out (*P.J.* (3) xxi. 478), the impurities are more soluble in this fluid than the Acid, it therefore tends to magnify the proportion of impurity on solution, and to separate it on evaporation. A filtered saturated aqueous solution prepared by shaking the acid with a small quantity of Water, when evaporated to dryness is officially required to leave a white residue free from any buff coloured fringe, which according to the *B.P.* indicates the absence of Iron, organic impurities and colouring matter. Concentrated Sulphuric Acid serves to detect organic impurities; the *B.P.* requiring no colour to be developed in 15 minutes, but making no reference to the relative proportions of the two acids, the *U.S.P.* and *P.G.* giving the latter but no time limit; the *U.S.P.* employs about 0·5 of a gramme of Salicylic Acid in 10 c.c. of Sulphuric Acid; the *P.G.* requires one part of Salicylic Acid should be dissolved by 6 parts of Sulphuric Acid without coloration. A test for Chlorides is included in *U.S.P.* and *P.G.* The *U.S.P.* allows not more than 0·6 p.c. and the *P.G.* no weighable residue; the *B.P.* makes no mention of mineral residue.

The test distinguishing Salicylic Acid from Carbolates and Sulpho-carbolates by means of Solution of Uranium Nitrate is peculiar to the *B.P.*; but this reaction would not detect the presence of either of the latter in a sample of Salicylic Acid. It depends upon the assumption that Uranium Nitrate Solution produces a yellowish-brown precipitate in solutions of the acid not weaker than 1 p.c., whereas solutions of Carbolates and Sulpho-carbolates are not precipitated.

Evaporation.—In the *P.G.* and *U.S.P.* an alcoholic solution of the Acid (1–10, *P.G.*; saturated, *U.S.P.*) is allowed to evaporate spontaneously in a place protected from dust, when a perfectly white residue should remain.

Ether.—If 1 gramme of Salicylic Acid be dissolved in excess of cold Sodium Carbonate Solution and the liquid agitated with an equal volume of Ether, and the ethereal solution be allowed to evaporate spontaneously, the residue, if any, should be free from the odour of Phenol, *B.P.* and *U.S.P.* The *P.G.* test gives as quantities 0·5 gramme of Acid dissolved in 10 c.c. of a 1–10 Sodium Carbonate Solution.

Silver Nitrate.—The *P.G.* and *U.S.P.* require that an alcoholic Solution of Salicylic Acid (1–10, *P.G.*; 1–20, *U.S.P.*) should be unaffected by Silver Nitrate T.S. after the addition of a few drops of Nitric Acid, indicating the absence of Chlorides.

Preparation.

UNGUENTUM ACIDI SALICYLICI. SALICYLIC ACID OINTMENT.

Salicylic Acid, 1; White Paraffin Ointment, 49.

Foreign Pharmacopœias.—Official in Mex. (Pomada de Acido Salicilico), Acid 1, Alcohol 2, Vaseline 9; Austr., Sebum Salicylatum (*see* below). Not in the others.

SODIUM SALICYLATE. *See* SODII SALICYLAS.

Not Official.

COLLEMPLASTRUM SALICYLATUM (*Austr.*). — Collemplastrum adhesivum mass, 100; Acid Salicylic, 4; Petroleum Ether, 20.

COLLEMPLASTRUM ADHÆSIVUM (*Austr.*).—Resin Oil, 6; purified sliced India-rubber, 10; Petroleum Ether, 45; allow to stand with frequent agitation until dissolved; add Balsam Copaiba and Colophony Resin, of each, 4; Adeps Lanæ, Cera Flava and Sandarach, of each, 2; powdered Orris Root, 9; and Ether, 16.

COLLODIUM SALICYLICUM. — Salicylic Acid, 60 grains; Flexile Collodion, 1 oz.—*Guy's* and other Hospital Pharmacopœias.

Salicylic Acid, 12; Acetone Collodion, *q.s.* to produce 100.—*B.P.C.*

The *B.P.C. Supplement* now dissolves the Acid in 30 of Acetone before making up to 100 with the Collodion.

Salicylic Acid, 1; Flexile Collodion (by weight), 9.—*Fr.*

COLLODIUM CUM ACIDO SALICYLICO.—Salicylic Acid, 20; Spirit of Ether, 20; Collodium, 60.—*Dutch.*

COLLODIUM SALICYLICUM COMPOSITUM.—Salicylic Acid, 60 grains; Extract of Indian Hemp, 10 grains; Flexile Collodion, to 1 oz.

Collodium Salicylicum Compositum. *Syn.* COLLODIUM CALLOSUM.—Salicylic Acid, 12; Extract of Indian Hemp, 2; Acetone Collodion, *q.s.* to produce 100.—*B.P.C.*

The *B.P.C. Supplement* now dissolves the Acid and Extract in 30 of Acetone before making up to 100 with the Collodion.

COLLODIUM LACTO-SALICYLICUM. — Salicylic Acid, 60 grains; Lactic Acid, 1 fl. drm.; Flexile Collodion, to 1 fl. oz.

COLLODIUM SALICYLICUM CUM ZINCI CHLORIDO.—Salicylic Acid, 60 grains; Zinc Chloride, 30 grains; Flexile Collodion, 1 oz.—*Guy's.*

SALICYLIC DRESSINGS.—**Gauze, Lint,** and **Wool,** 4 p.c.; **Jute,** 4 and 10 p.c. Jap. has Cotton 5 p.c. and Gauze.

GLYCERINUM ACIDI SALICYLICI.—Salicylic Acid, 1 part; Glycerin, 9 parts. Also called Pasta Acidi Salicylici.

LOTIO ACIDI SALICYLICI CUM BORACE. — Salicylic Acid, 120 grains; Borax, 60 grains; Glycerin, 1 oz.; Rectified Spirit, 1 oz.; Distilled Water, to 10 oz.—*Middlesex.*

PULVIS SALICYLICUS CUM TALCO (*Dan., Dutch, Ger., Jap., Norw.* and *Swed.*).—Salicylic Acid, 3; Wheat Starch, 10; Talc, 87; mix to a fine powder.

Pulvis pro pedibus (*Swiss*).—Same formula as above. Used in the German Army as a preventive against perspiring and sore feet. It is applied dry, on a march daily, or in garrison every two or three days.

Pulvis Talci Salicylicus.—Salicylic Acid, 3; Boric Acid, 10; Talc in fine powder, 87.—*U.S.N.F.*

This has been incorporated in the *B.P.C.* under the title **Pulvis Acidi Salicylici Compositus.**

SALICYLIC AND CREOSOTE PLASTER MULLS (*Unna*).—Contain ½ grain of Salicylic Acid and 1 grain of Creosote to the square inch; also twice this strength. Possess a solvent power on horny epidermis, the Creosote acting as an anæsthetic. Also used in the treatment of lupus.—*L.* '86, ii. 574; *B.M.J.* '87, ii. 451.

Salicylic Acid and Creosote can also be applied as an **ointment** with Lard and Wax.

SEBUM SALICYLATUM.—Salicylic Acid, 2; Benzoin, 10; Mutton Fat, 98.—*Austr.*

Used in the German Army for sweaty feet and soreness from riding.

Salicylic Acid, 2; Benzoic Acid, 1; Prepared Suet, 97.—*Ger.*

The German formula appears in the *B.P.C.* as **Sevum Salicylatum.**

UNGUENTUM ACIDI SALICYLICI.—Salicylic Acid, 30 grains; Benzoated Lard, 1 oz.; melt over a water-bath, and stir till cold.

Used for eczema, psoriasis, ringworm, and for foul ulcers.

VASOLIMENTUM SALICYLICUM.—Salicylic Acid, 2; Liquid Vasoliment, 98.—*Hager.*

Parogen Salicylatum. *Syn.* SALICYLATED VASOLIMENT.—Salicylic Acid, 10; Parogen, *q.s.* to produce 100.—*B.P.C.*

SALACETOL.—Is obtained by the action of Monochloro-acetone on Sodium Salicylate. Crystallises in long needles, melting at 71° C. (159·8° F.); soluble 1 in 2200 of Water, 1 in 15 of Alcohol. It is unaffected by dilute acids, but decomposed by weak alkali with liberation of Salicylic Acid. Introduced as an intestinal disinfectant, resembling Salol in its action.—*B.M.J.E.* '96, i. 92; *L.* '96, ii. 1821.

Dose.—15 to 30 grains = 1 to 2 grammes, for adults; 4 to 8 grains = 0·26 to 0·52 gramme for children.

ACETYLSALICYLIC ACID. Aspirin. $C_7H_5O_2$, $C_2H_3O_2$, eq. 178·71.—Minute, white, odourless crystalline needles. Soluble 1 in 400 Water, 1 in 5 of Alcohol (90 p.c.); soluble in Ether.

Dose.—10 to 15 grains = 0·65 to 1 gramme, three times a day.

Antipyretic and antirheumatic.—Given as a substitute for the Salicylates in rheumatism, also in pleurisy, the advantage being that it does not produce gastric irritation nor singing in the ears to the same extent as the Salicylates. Is best prescribed in the form of cachets or wafers.—*B.M.J.E.* '99, ii. 3, 68, 96; '01, i. 92; ii. 56; *L.* '99, ii. 219; *P.J.* '99, ii. 135; '00, ii. 734, 775; '01, i. 665.

In various children's diseases, rheumatic affections, and in whooping-cough. Action slower than Sodium Salicylate, but effect is more prolonged.—*Pr.* lxx. 141; *B.M.J.E.* '02, i. 12.

15 grain doses once or twice daily given with beneficial effects in cases of inoperable carcinoma.—*L.* '03, i. 984.

In chorea, 10 to 15 grains 3 or 4 times a day.—*L.* '03, i. 526.

Acetylsalicylic Acid should not be prescribed with alkalis or Sodium Bicarbonate.—*P.J.* '03, i. 2, 39.

Superiority of Aceto-salicylic Acid in rheumatic fever, in certain cases when a salicylate has had a good trial.—*L.* '07, i. 733.

In diabetes, alkalis (Soda Water, etc.) and Milk should not be taken with, or just after, the Aspirin.—*Pr.* '07, ii. 139.

Is stated (*L.* '05, i. 84) not to possess any advantage over Salicylic Acid and the Salicylates. In some patients dyspeptic symptoms followed its use, in addition to very profuse perspiration.

This drug still continues to be very largely used, and numerous references to its advantages appear in Continental literature. Two cases are recorded (*B.M.J.* '05, ii. 21) in which a dose of 15 grains caused violent palpitation, difficult respiration, a feeling of extreme weakness and gradually approaching unconsciousness with voiding of dark green urine. On continuing with 7½ grain doses good results were obtained. Toxic symptoms following the administration of Aspirin (*B.M.J.* '05, ii. 1692), 100 grains having been taken in all, in 10 grain doses. The acute inflammation of the middle ear attributed to the Aspirin indicates caution in the administration of the drug in any cases complicated with ear trouble. 7½ grains suggested as a sufficiently large dose to begin with. If no unpleasant results occur after taking this amount, it can be then easily increased.

Foreign Pharmacopœias.—Official in Dan., Jap. and Swiss, Acidum Acetyl-Salicylicum.

Tests.—Aspirin melts at 135° C. (275° F.); when warmed with Potassium Hydroxide Solution it is saponified with the formation of Potassium Acetate and Potassium Salicylate. The cooled solution when acidified with diluted Sulphuric Acid yields a crystalline precipitate of Salicylic Acid, which, when removed, carefully washed till free from mineral acid and dried, possesses the melting point and answers the test characteristic of Salicylic Acid. A portion of the filtrate when warmed with concentrated Sulphuric Acid and a little Alcohol (90 p.c.) evolves a characteristic odour of Acetic Ether. A weighed quantity of 0·1 of a gramme of Aspirin treated with 5 c.c. of Alcohol and diluted with 20 c.c. of Water should not be coloured violet on the addition of 1 drop of diluted Ferric Chloride T.S., indicating the absence of free Salicylic Acid. A weighed quantity of 0·5 of a gramme should leave no weighable residue when ignited with free access of air, indicating the absence of mineral residue.

Novaspirin, a new preparation of Aspirin, it is said to produce no unpleasant gastric symptoms. It is not so strong, and therefore can be given for longer periods and in larger doses.—*B.M.J.E.* '07, i. 79.

AGATHIN.—A compound of Salicylic Aldehyde with Methyl-phenylhydrazine. Pale greenish crystals, insoluble in Water, soluble in Alcohol (90 p.c.) and Ether. Has been recommended as an analgesic in sciatica, rheumatic and neuralgic affections.—*M.A.* '95, 8, 603; *Y.B.T.* '94, 463; unreliable and dangerous.—*B.M.J.* '98, ii. 1055.

Dose.—5 to 10 grains = 0·32 to 0·65 gramme.

GLYCOSAL (Monosalicylic Acid Glycerin Ester).—White crystalline powder, moderately soluble in Water, readily in Alcohol (90 p.c.). Introduced as a substitute for Salicylates. Antiseptic, antirheumatic.

Dose.—5 to 30 grains = 0·32 to 2 grammes.

SALITANNAL.—A condensation product of Salicylic Acid and Gallic Acid. Introduced as an antiseptic application for wounds.

Iodo-Salicylic Acid and **Di-Iodo Salicylic Acid** are Iodine compounds of Salicylic Acid in which one or two atoms of Hydrogen respectively are replaced by Iodine.—*B.M.J.* '97, ii. 734.

ACIDUM SULPHURICUM.

SULPHURIC ACID.

Fr., Acide Sulfurique Officinal; Ger., Schwefelsaure; Ital., Acido Sulforico; Span., Acido Sulfurico.

A heavy, colourless, odourless liquid, of oily consistence, possessing a strong corrosive action. It may be produced by the suitable oxidation of Sulphurous Anhydride, itself a product of the oxidation of Sulphur or of the combustion of pyrites. It is officially required to contain about 98 p.c. by weight of Hydrogen Sulphate, $\mathbf{H_2SO_4}$, eq. 97·34.

A fuming Sulphuric Acid is known under the title of **Nordhausen Sulphuric Acid,** and is prepared by the distillation of dry Ferrous Sulphate.

Under the name of **Solid Sulphuric Acid,** Sulphuric Anhydride has been introduced into commerce.

Medicinal Properties.—A powerful **caustic,** and when so used it is made into a paste with an equal quantity of charcoal. In the form of Nordhausen Sulphuric Acid it has been used in cancer (*see* **Michel's Paste,** p. 83). When **diluted** it is a tonic refrigerant, exciting the appetite and promoting digestion; it is a valuable intestinal astringent, and therefore it is useful in controlling diarrhœa; it diminishes night sweating, more particularly when given with Zinc Sulphate; useful in treating chronic lead poisoning; given with doubtful success in hæmatemesis, hæmaturia and hæmoptysis.

Incompatibles.—Alkalis and their Carbonates, salts of Calcium and Lead.

Official Preparations.—Acidum Sulphuricum Aromaticum, and Acidum Sulphuricum Dilutum. Used in the preparation of Acidum Hydrochloricum, Acidum Nitricum, Acidum Sulphurosum, Æther, Æther Aceticus, Cupri Sulphas, Ferri Sulphas, Liquor Ferri Persulphatis, Magnesii Sulphas, Potassii Sulphas, Sodii Sulphas, Sodii Sulphocarbolas, Spiritus Ætheris Compositus, Spiritus Ætheris Nitrosi, Zinci Sulphas and Zinci Sulphocarbolas. **Aromatic**

Sulphuric Acid is contained in Infusum Cinchonæ Acidum. **Dilute Sulphuric Acid** is contained in Infusum Rosæ Acidum. Used in the preparation of Acidum Hydrocyanicum Dilutum, Antimonium Sulphuratum and Atropinæ Sulphas.

Not Official.—Liquor Acidus Halleri, Mistura Acidi Sulphurici Aromatica, Mynsicht's Elixir of Vitriol, Michel's Paste.

Antidotes.—In case of poisoning by Sulphuric Acid, Magnesia is preferable to Chalk. For other antidotes *see* Hydrochloric and Nitric Acids.

Foreign Pharmacopœias.—Official in all the Pharmacopœias, ranging from sp. gr. 1·835 to 1·845. U.S. sp. gr. not below 1·826 at 25° C. (77° F.). Fr., Ger., Jap., Swed. and Swiss contain also a crude Acid.

Tests.—Sulphuric Acid has a specific gravity of 1·843, the *U.S.P.* states not below 1·826 at 25° C. (77° F.); the *P.G.*, 1·836 to 1·840; neither the *B.P.* nor the *P.G.* gives a boiling point for the acid, the *U.S.P.* states 338° C. (640·4° F.). The distinguishing test is the production of a white precipitate, insoluble in Hydrochloric Acid, when Barium Chloride Solution is added to its diluted or neutralised aqueous solutions. It is officially required to contain 97·82 p.c. w/w of Hydrogen Sulphate as volumetrically determined by suitably diluting with Water and titrating with Volumetric Sodium Hydroxide Solution, each gramme should require 20·1 c.c.; the *U.S.P.* should contain not less than 92·5 p.c., and *P.G.* 94 to 98 p.c. of absolute Acid.

The more generally occurring impurities are Arsenic and Lead, Selenium, Nitrous, Nitric and Sulphurous Acids. Unlike the *U.S.P.* and *P.G.*, the *B.P.* indicates no special test for either Arsenic or Lead, but is content to group these two important impurities with others of considerably less importance under the elastic expression 'it should yield no characteristic reaction,' etc. The *U.S.P.* employs the modified Gutzeit's test for Arsenic, whilst the *P.G.* employs the Bettendorf's test with Stannous Chloride Solution; both are given in the small type below. A standard of 5 parts per 1,000,000 for Arsenic by weight and 20 parts per 1,000,000 for Lead has been suggested.—*C.D.* '08, i. 795. *U.S.P.*, in their test for Lead, have adopted a time limit within which no precipitation shall occur when the Acid is carefully mixed with 4 or 5 volumes of Alcohol (94·9 p.c.). It is required to leave no appreciable residue on evaporation.

Selenium, Nitrous, Nitric and Sulphurous Acids may be detected by the tests given in the small type below under the headings of Hydrochloric Acid and Sodium Sulphite; Ferrous Sulphate and Sulphuric Acid; Potassium Permanganate Solution.

Ferrous Sulphate and Sulphuric Acid.—If Ferrous Sulphate T.S. be carefully poured as a layer on Sulphuric Acid in a test-tube, there should be no coloured zone at the junction of the liquids, *P.G.* and *U.S.P.*

Sulphuric Acid diluted with 20 volumes of Water should not respond to the following tests: It should yield no precipitate, nor become turbid with T.S. of Silver Nitrate, *P.G.* and *U.S.P.* It should not respond to the time-limit test for heavy metals, *U.S.P.*, and when nearly neutralised with Solution of Ammonia should not be affected by Hydrogen Sulphide Solution, *P.G.* When supersaturated with Ammonia Water, evaporated and ignited, no appreciable fixed residue should be left, *U.S.P.*

Potassium Permanganate Solution.—Sulphuric Acid diluted and cooled, should not, on the addition of Potassium Permanganate Solution, immediately discharge its colour. *P.G.* gives 10 c.c. of Acid diluted with 5 volumes of Water and 3 or 4 drops Potassium Permanganate Solution; *U.S.P.* gives 1 c.c. of Acid, 5 c.c. of Water, and 0·1 c.c. Potassium Permanganate Solution.

Modified Gutzeit's Test.—5 c.c. of a 1-10 dilution of Sulphuric Acid should not respond to the modified Gutzeit's test for Arsenic, *U.S.P.*

Stannous Chloride.—No dark colour should be produced in the course of an hour in a mixture of cooled diluted Sulphuric Acid (1-3) and 3 c.c. Stannous Chloride Solution, *P.G.*

Hydrochloric Acid with Sodium Sulphite.—Let Hydrochloric Acid containing Sodium Sulphite be carefully poured on an equal volume of Sulphuric Acid contained in a test-tube. At the junction of the liquids there should be no red-coloured zone, and on warming no reddish precipitate should be formed, *B.P.*, *P.G.*, and *U.S.P.* (for Selenium); *P.G.* and *U.S.P.* give quantities, viz., 2 c.c. of each Acid and a fragment of Sodium Sulphite is dissolved in the Hydrochloric Acid.

Volumetric Determination.—3 c.c. of Sulphuric Acid are accurately weighed and diluted with 50 c.c. of Water. The solution is then titrated with Normal Volumetric Potassium Hydroxide Solution, using Methyl Orange Test-solution as indicator. The number of c.c. of alkali used is multiplied by 4·8675 and divided by the weight of Acid taken, the quotient representing the percentage of absolute Sulphuric Acid present, *U.S.P.*

Preparations.

ACIDUM SULPHURICUM AROMATICUM.

AROMATIC SULPHURIC ACID. *B.P.Syn.*—ELIXIR OF VITRIOL.

Mix gradually 6 of Sulphuric Acid with 59 of Alcohol (90 p.c.); add Tincture of Ginger 20, and Spirit of Cinnamon 1.

Tests.—The specific gravity should be 0·922 to 0·926, and 1 gramme should require 2·84 c.c. of the Volumetric Sodium Hydroxide Solution for neutralisation, indicating the equivalent of 13·8 p.c. w/w of absolute Sulphuric Acid. No reference to an indicator of neutrality is given. The *U.S.P.* requires a specific gravity at 25° C. (77° F.) of about 0·933, and that when suitably titrated with Volumetric Solution of Potassium Hydroxide, with Methyl Orange Test-solution as indicator, it shall not indicate less than 20 p.c. of absolute Sulphuric Acid by weight partly in the form of Ethyl Sulphuric Acid.

Dose.—5 to 20 minims = 0·3 to 1·2 c.c.

Sulphovinic Acid stated to occur in Acidum Sulphuricum Aromaticum, its quantity being dependent on age of sample.—*P.J.* '02, ii. 137; *C.D.* '02, ii. 292.

Foreign Pharmacopœias.—Dutch and Jap. (Tinctura Acida Aromatica), Cort. Cinnamoni 5, Rad. Zingib. 5, Acidi Sulphurici 10, Spiritus Diluti 90. Mex. (Acido Sulfurico Aromatico), Sulphuric Acid 10, Tincture of Ginger 5, Tincture of Cinnamon 5, Alcohol 80. U.S. (Acidum Sulphuricum Aromaticum), Sulphuric Acid 111, Tincture of Ginger 50, Oil of Cinnamon 1, Alcohol sufficient to measure 1000; add the Sulphuric Acid gradually and with great caution to 700 of Alcohol and allow it to cool, then add to it the Tincture of Ginger and Oil of Cinnamon, and finally enough Alcohol to make the product measure 1000. Tinctura Aromatica Acida, Norw., Acid Sulph. 1½, Aromatic Tincture 8½; Swed., Acid Sulph. 1, Aromatic Tincture 19. Not in Ger. or Russ.

Tinctura Aromatica (Dan., Norw. and Swed.). Cardamoms, 1; Cloves, 1; Galangal Root, 1; Ginger, 1; Cinnamon, 4; diluted Alcohol, 40.

Ger., Russ. and Swiss contain same ingredients, but have Ginger, 2; Cinnamon, 5; diluted Alcohol, 50.

Austr., Cinnamon, 5; Ginger, 2; Zedoary, 1; Caryophyllus, 1; Cardamom, 1; Alcohol (68 p.c.), 50. It should not yield less than 1·5 p.c. of solid residue.

Jap., Cloves, 2; Cinnamon, 10; Cardamom, 2; Ginger, 5; Dilute Alcohol, 100; extract in the cold for seven days; press, filter, and to the filtrate add Spirit of Lemon, 5.

U.S.N.F. preparation is practically identical with that official in *P.G.*

See also below Liquor Acidus Halleri.

ACIDUM SULPHURICUM DILUTUM. Diluted Sulphuric Acid.

Mix gradually 4 of Sulphuric Acid with 40 of Distilled Water, and when cold add more Distilled Water to make 48½ of Dilute Acid at 60° F.

A clear, colourless liquid, possessing a strong acid reaction.

As great heat is developed in mixing strong Sulphuric Acid and Water, it is always safer to add the Acid to the Water than the Water to the Acid. When Acid 1, Water 1, were mixed the temperature rose to 270° F. (132·2° C.).

12 minims contain about 1 minim of strong Sulphuric Acid.

Dose.—5 to 20 minims = 0·3 to 1·2 c.c.

Prescribing Notes.—*Prescribed, much diluted, in mixtures; or in cough linctuses, with Squill, Poppies, and Syrup of Mulberries; also to dissolve Quinine.*

Foreign Pharmacopœias.—Official in Austr., Acid 1, Water 4 76, sp. gr. 1·12; Ital., Acid 1, Water 4, sp. gr. 1·180; Dutch, sp. gr. 1·124; Ger. and Russ., Acid 1, Water 5, sp. gr. 1·110 to 1·114; Dan. and Norw., Acid 1, Water 7, sp. gr. 1·081 to 1·085; Belg., Fr., Hung., Jap., Port. and Span, Acid 1, Water 9; Fr., Swed., Swiss, 10 p.c.; U.S., 10 p.c., sp. gr. about 1·067 at 25° C. (77° F.). All by weight.

Tests.—Diluted Sulphuric Acid is officially required to possess a specific gravity of 1·094, and to contain 13·63 p.c. of Hydrogen Acetate, as officially determined by titration with Volumetric Solution of Sodium Hydroxide; the *U.S.P.* diluted acid is required to have a specific gravity of about 1·067 at 25° C. (77° F.), and to contain not less than 10 p.c. w/w of absolute Sulphuric Acid as determined by titration with Normal Volumetric Potassium Hydroxide Solution, using Methyl Orange Test-solution as an indicator; that of the *P.G.* has a specific gravity of 1·110 to 1·114, and contains from 15·6 to 16·3 p.c. w/w of pure acid.

The diluted Acid should naturally respond to the tests of identity and purity given under 'Acidum Sulphuricum,' but *B.P.* does not say so; the *U.S.P.*, on the other hand, duly notes this.

Not Official.

LIQUOR ACIDUS HALLERI. *Syn.* Acidum Sulphuricum Alcoholisatum, Mistura Sulphurica Acida, Aqua Rabelli, Aqua Rabelii, Agua de Rabel, Eau de Rabel.

Austr., Ger., Hung., Mex., Port., Russ., Span. and Swiss.—Sulphuric Acid, 1; Alcohol (90 p.c.), 3.

Dan., Dilute Sulphuric Acid, 1; Syrup of Raspberries, 9; Distilled Water, 40.

Fr., Sulphuric Acid, 1; Alcohol (95 p.c.), 3; Poppy Petals, 0·04.

Dutch, Ital. and Norw.—Sulphuric Acid, 1; Alcohol, 1.

All by weight.

MISTURA ACIDI SULPHURICI AROMATICA.—Aromatic Sulphuric Acid, 10 minims; Red Mixture, to 1 oz.

MYNSICHT'S ELIXIR OF VITRIOL.—Cinnamon, Ginger and Cloves, of each 3; Calamus Aromaticus, 8; Galangal, 12; Sage, 4; Peppermint, 4; Cubebs, 2; Nutmeg, 2; Aloes Wood, 1; Lemon Peel, 1; Sugar Candy, 32; Alcohol (90 p.c.), by weight, 144; Sulphuric Acid, by weight, 96. Digest for three weeks.

Dose.—5 to 10 minims = 0·3 to 0·6 gramme.

MICHEL'S PASTE.—Nordhausen Sulphuric Acid, 3, by weight; Asbestos, finely powdered, 1. Should be prepared fresh as required.

ACIDUM SULPHUROSUM.

SULPHUROUS ACID.

FR., ACIDE SULFUREUX; GER., SCHWEFLIGSAURE; ITAL., ACIDO SOLFOROSO.

A colourless liquid, with a strong characteristic odour of burning Sulphur, officially required to contain 6·4 p.c. of Hydrogen Sulphite, $\mathbf{H_2SO_3}$, eq. 81·46.

It is prepared by the oxidation of Sulphur or by the reduction of Sulphuric Acid by boiling with Carbon or Copper.

Medicinal Properties.—It is a powerful deoxidising agent, disinfectant and antiseptic. In 1 drm. doses, freely diluted, it is valuable in vomiting depending on fermentation in the stomach; and as an intestinal antiseptic in enteric fever. Diluted with 1 or 2 parts of Water, it is used as a **spray** in diphtheria and follicular tonsillitis; mixed with equal parts of Glycerin, as an **application** in erysipelas, ringworm, and other parasitic skin diseases; also for chapped hands and chilblains; very effectual in chapped nipples; as a **lotion**, 1 or 2 drm. to 1 oz. of Water, for wounds, cuts, ulcers, and bed-sores; as an **inhalation** in nasal catarrh and influenza, 60 minims in 20 oz. of Water at 60° to 100° F.

Pfeiffer found that 0·5 to 1 p.c. aqueous solution caused excessive and extensive gastritis. Even 20 minims largely diluted caused irritation of the digestive organs (*A.J.P.* '90, 626); Brunton, however, strongly recommends 1 drm. doses thoroughly diluted, in gastric fermentation; 20 to 30 minims every two or three hours, stated (*B.M.J.* '04, ii. 1450) to check fermentative changes in the bowel in enteric fever.

Dose.—½ to 1 fl. drm. = 1·8 to 3·6 c.c.

Foreign Pharmacopœias.—Official in Port., Soluto de Gaz Sulfuroso; U.S., 6·0 p.c., SO_2.

Tests.—Sulphurous Acid has a specific gravity of 1·025; the *U.S.P.* gives not less than 1·028 at 25° C. (77° F.); it is not official in the *P.G.* The distinguishing tests are its strong sulphurous odour, its power of decolorising Iodine Solution (which is utilised in its quantitative determination), the production of Hydrogen Sulphide when reduced by Hydrochloric Acid and Zinc, and its bleaching action on certain vegetable colouring matters.

It is officially required to contain 6·4 p.c. of Hydrogen Sulphite, as determined by titration with Volumetric Solution of Iodine, using Starch Mucilage as an indicator.

The most likely impurities are an undue amount of Sulphate due to oxidation on keeping and the presence of other Sulphur compounds, notably Hydrogen Sulphide and mineral residue. The presence of Sulphate is guarded against by tests with Barium Chloride Solution, and the mineral residue by the fact that it is required to leave no residue on evaporation.

Mercurous Nitrate Solution.—The gas, evolved on gently heating a few c.c. of the Acid in a test-tube, blackens a strip of paper moistened with T.S. of Mercurous Nitrate, *U.S.P.*

Lead Acetate Solution.—The gas, evolved on gently heating a few c.c. of the Acid in a test-tube, does not affect a strip of paper moistened with T.S. of Lead Acetate, *U.S.P.*

Barium Chloride Solution.—It is officially required to yield only a slight precipitate with Barium Chloride Solution, but if the Sulphurous Acid be oxidised by the cautious addition of Chlorine Solution it yields on the addition of Barium Chloride Solution a copious white precipitate. The *U.S.P.* test gives quantities, 1 c.c. Sulphurous Acid diluted with 99 c.c. of Water, 1 c.c. diluted Hydrochloric Acid, and then 1 c.c. Barium Chloride T.S. yielding not more than a slight turbidity at once.

Volumetric Determination.—1 gramme of the Acid diluted with about 100 c.c. of Water requires 15·7 c.c. of Volumetric Iodine Solution, *B.P.* 2 c.c. of the Acid are accurately weighed in a stoppered weighing bottle. To this are added 50 c.c. of Deci-normal Volumetric Iodine Solution, and the mixture is allowed to stand for 5 minutes. Tenth-normal Volumetric Sodium Thiosulphate Solution is now slowly added until the mixture is just decolorised. Subtract the number of c.c. of the Tenth-normal Volumetric Sodium Thiosulphate Solution used from 50, and multiply the difference by 0·318, and divide this product by the weight of the Acid taken; the quotient represents the percentage of absolute Sulphurous Acid in the latter, *U.S.P.*

Not Official.

SULPHUR DIOXIDE LIQUEFIED.—This is also commonly known as **Liquefied Sulphurous Acid Gas.** It is supplied in syphons, and in tinned iron vessels with soft lead exit-tube.

Disinfecting with Sulphur.—This is usually done with liquid Sulphur Dioxide. The room to be disinfected should be sealed up so as to prevent any ventilation, by blocking up the fireplace and pasting paper over the cracks of the windows. The small leaden exit-tube of the vessel is cut in the room, so as to allow the gas to escape somewhat slowly, and the operator retires quickly, shuts the door and papers up the cracks of the door so as to complete the sealing of the room. The room is allowed to remain closed for 12 hours, and then opened cautiously. About 20 oz. gas is required for a room of a size 1700 cubic feet. When the liquefied gas is unobtainable, Sulphur which is sold in the form of Sulphur Candles can be used as a substitute, but the gas is much more effectual.

In order to obtain the maximum disinfecting power of the Sulphur Dioxide it is necessary to introduce moisture, and this may be done by placing open pans of steaming water in the room, or by injecting steam.

ACIDUM TANNICUM.

TANNIC ACID.

B.P.Syn.—TANNIN.

$C_{14}H_{10}O_9$, eq. 319·66.

FR., TANNIN OFFICINAL; GER., GERBSAURE; ITAL., ACIDO TANNICO; SPAN., ACIDO TANICO.

B.P. gives the formula as $C_{14}H_{10}O_9$, $2H_2O$, but the $2H_2O$ is discountenanced by most of the standard works on chemistry.

A pale buff-coloured, micro-crystalline powder, possessing an acid reaction and a characteristic astringent taste. It is obtained from Nut Galls.

Solubility.—10 in 5 of Water; 10 in 6 of Alcohol (90 p.c.); 3 in 1 of Absolute Alcohol; 1 in 3 of Glycerin, or if warmed, 1 in 1; sparingly in Olive Oil; almost insoluble in Benzol, in Chloroform, and in Ether.

These solubilities were made with Tannic Acid which was very soluble, but different samples vary in solubility.

Commercial Tannic Acid frequently contains some proportion of Gallic Acid, which when dissolving in Water is the last portion to go into solution, and which may be detected by the Potassium Cyanide test mentioned under Gallic Acid.

Medicinal Properties.—Styptic and local astringent. 60 grains in 10 oz. of Rose Water are used as a **spray** for relaxed sore throat; the same strength is also used as an **injection** in leucorrhœa and in chronic gonorrhœa with advantage; 3 grains to the oz. is used as a **nasal douche**; 60 grains to the oz. as an **ointment**; the powder has been used as a **snuff** in epistaxis. Internally for gastric and intestinal hæmorrhage acting as a direct styptic. A dose of 1 drm. is often successful in hæmorrhage from gastric ulcer. For **suppositories** and **pessaries**, *see* p. 87. The **glycerin** is used as a **paint** in relaxed throat, and for nasal discharges; also locally as a styptic.

Equal parts of Glycerin of Tannin and Glycerin of Alum form a good application for relaxed throat.

As an injection into nasal polypi.—*L.* '87, i. 543.

Warm Tannin **enemata** were given with success in the cholera at Naples.—*L.* '85, i. 352.

Tannic Acid is no doubt a local styptic by its albumen-coagulating power. But the careful researches of Stockman have demonstrated the futility of using it as a remote astringent.—*B.M.J.* '00, ii. 1070.

A solution, 2 in 10 of spirit, the best application in alveolar pyorrhœa, loose teeth becoming tight, and regaining their power of mastication; also in dental neuralgia, applied to the gums and round the teeth.—*B.M.J.E.* '07, ii. 12.

Dose.—2 to 5 grains = 0·13 to 0·32 gramme.

Prescribing Notes.—*Prescribed in Water, and may be combined with the Ferrous (but not with the Ferric) salts of Iron. Can be given in* **cachets** *or Compressed Tablets. 4 grains with ½ minim of Glycerin make a nice* **pill.** *60 grains to 1 oz. of Chalk with 30 grains of Powdered Soap make an astringent* **dentifrice.**

Incompatibles.—Mineral Acids, Alkalis, Antimony salts, Lead and Silver, Ferric salts, the vegetable alkaloids, and Gelatin.

Official Preparations.—Glycerinum Acidi Tannici, Suppositoria Acidi Tannici, and Trochiscus Acidi Tannici.

Not Official.—Crayons de Tannin, Gargarisma Acidi Tannici, Lotio Acidi Tannici Sulphurosa, Nebula Acidi Tannici, Pessary or Vaginal Suppository, Schuster's Pastilles, Suppositorium Acidi Tannici c. Opio, Supp. Ac. Tann. et Belladonnæ, Supp. Ac. Tann. et Morphinæ, Unguentum Acidi Tannici, Unguentum Acidi Tannici c. Opio, Tannic Wool, Tannalbin, Honthin, Glutanol, Tannigen, Tannoform, Tanocol, and Tannone.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex., Norw., Port., Russ., Span., Swed., Swiss and U.S.

Tests.—The distinguishing test for Tannic Acid is its behaviour with Ferric Chloride Test-solution, which yields a bluish-black colour or precipitate. The *U.S.P.* states that a 1 p.c. w/v aqueous solution of Tannic Acid yields on the addition of a small quantity of Calcium Hydroxide Test-solution a pale bluish-white flocculent precipitate which is not dissolved on shaking, and which becomes more copious and of a deeper blue on the addition of a moderate excess of Calcium Hydroxide Test-solution, a large excess imparting a pale pinkish tint.

Tannic Acid may be distinguished from Gallic Acid by its aqueous solution yielding precipitates with solutions of Isinglass, Albumen or alkaloids. The *U.S.P.* states that it may be distinguished by the test with Calcium Hydroxide Test-solution given above, and by the fact that its aqueous solution produces precipitates with most alkaloids and glucosides, and with Test-solutions of Gelatin, Albumen and Starch. The *B.P.* states Tartarated Antimony, but it has been shown that the latter reagent produces a precipitate in Gallic Acid Solutions also; the *U.S.P.* omits reference to Tartarated Antimony.

Mineral acids and certain mineral salts precipitate Tannic Acid from solution, and the filtrates obtained possess no astringency; the *P.G.* states that it is precipitated from its 1 to 5 aqueous solution by the addition of Sulphuric Acid or by Sodium Chloride.

The most likely impurities are Gum or Dextrin, resinous substances and mineral matters. Traces of Gallic Acid may also be present. Both *U.S.P.* and *P.G.* include specific tests for Gum or Dextrin and resinous substances, which are described in the small type below under the heading of Alcohol and Ether, or Alcohol. Gallic Acid may be detected by the Potassium Cyanide test mentioned under Gallic Acid. No appreciable residue should be left on ignition with free access of air. *U.S.P.* requires it to leave not more than 0·2 p.c., and *P.G.* that 0·5 gramme should not leave a weighable residue. Austr. and *P.G.* require that the Acid shall not lose more than 12 p.c. by weight on drying at 100° C. (212° F.), indicating two molecules of Water of crystallisation.

Alcohol and Ether, or Alcohol.—A mixture of 2 c.c. of an aqueous solution of the Acid and 2 c.c. of Alcohol (90 p.c.) should remain clear; also on the further addition of 1 c.c. of Ether, *P.G.* The *U.S.P.* dissolves 2 grammes in 10 c.c. of boiling Water, 5 c.c. of which solution when cooled and diluted with 10 c.c. of Alcohol (94·9 p.c.) should produce no turbidity; or (for resinous substances) when diluted with 10 c.c. of Water.

Preparations.

GLYCERINUM ACIDI TANNICI. Glycerin of Tannic Acid.

Tannic Acid, 1; Glycerin, sufficient to produce 5. (1 in 5)

Foreign Pharmacopœias.—Official in Belg., 3 and 17; Port., 1 and 9; U.S., 1 and 4; Fr. and Mex., 1 and 5 of Glycerin of Starch. Not in the others.

SUPPOSITORIA ACIDI TANNICI. Tannic Acid Suppositories.

Contains 3 grains=0·2 gramme of Tannic Acid in each suppository, mixed with Oil of Theobroma.

TROCHISCUS ACIDI TANNICI. Tannic Acid Lozenge.

½ grain Tannic Acid in each, with Fruit Basis.

Dose.—1 to 6 lozenges.

Foreign Pharmacopœias.—Official in Jap., ¾ grain each; U.S., about 1 grain each with Sugar and Orange Flower Water.

Not Official.

CRAYONS DE TANNIN (*Fr.*).—Tannin, 20; Gum Acacia, 1 (both in powder); mix and make into a mass of pilular consistence by means of equal parts Glycerin and Water, then roll into cylinders of the size required.

GARGARISMA ACIDI TANNICI.—Glycerin of Tannic Acid, 1 fl. oz.; Water, to 10 fl. oz.—*St. Thomas's.*

This has been incorporated in the *B.P.C.*

Glycerin of Tannic Acid, 1 fl. drm.; Water, to 1 fl. oz.—*Charing Cross, London* and *St. Bartholomew's.*

LOTIO ACIDI TANNICI SULPHUROSA.—Glycerin of Tannic Acid, 1; Sulphurous Acid, 1; Distilled Water, to make 8.—*St. Bartholomew's.*

NEBULA ACIDI TANNICI.—Glycerin of Tannin, 1 fl. drm.; Distilled Water, to 1 fl. oz.—*City of London Chest.*

Glycerin of Tannin, 40 minims; Water, to 1 oz.—*Throat.*

Glycerin of Tannin, 1; Distilled Water, *q.s.* to produce 10.—*B.P.C.*

PESSARY OR VAGINAL SUPPOSITORY.—Tannic Acid, 10 grains Stearin, or Oil of Theobroma, sufficient to make 2 drm.; for one pessary. Used in leucorrhœa.

This has been incorporated in the *B.P.C.*

SCHUSTER'S PASTILLES.—Tannic Acid, 30 grains; Opium, 1 grain; Glycerin, *q.s.* to form suitable cylinders for the male urethra.

SUPPOSITORIUM ACIDI TANNICI C. OPIO.—Tannic Acid, 3 grains; Powdered Opium, 1 grain; Stearin, or Oil of Theobroma, 11 grains.

SUPPOSITORIA ACIDI TANNICI ET BELLADONNÆ.—Tannic Acid, 3 grains; Extract of Belladonna (*B.P.* '85), ½ grain; Oil of Theobroma, to 15 grains.—*St. Bartholomew's.*

SUPPOSITORIA ACIDI TANNICI ET MORPHINÆ.—Tannic Acid, 3 grains; Morphine Hydrochloride, ½ grain; Oil of Theobroma, to 15 grains.—*Westminster.*

UNGUENTUM ACIDI TANNICI.—Tannic Acid, 20; Glycerin, by weight, 20; Ointment, 60.—*U.S.P.*

This has been incorporated in the *B.P.C.*, but the simple ointment of the *U.S.P.* is different from the *B.P.C.*, which resembles *B.P.* 1885.

UNGUENTUM ACIDI TANNICI C. OPIO.—Tannic Acid, 30 grains; Powdered Opium, 30 grains; Lard, 1 oz.

TANNIC WOOL.—Dissolve 2 of Tannic Acid in 60 of Water, and with it thoroughly moisten 8 of Absorbent Cotton-Wool; press so as to remove 30 of the fluid, then dry the Wool in a warm chamber. When dry remove any discoloured portion. This is sold as **Wool for cigarettes.**

TANNALBIN.—A light brown, tasteless powder, insoluble in Water. A combination of Tannic Acid with albumin, which by a special treatment has been so altered that it is insoluble in the gastric juice, ordinary Albumin Tannate being readily soluble.

Tannalbin and Bismuth Subnitrate given early in the morning, as astringents in treatment of catarrhal ulcers of the large intestine.—*B.M.J.E.* '99, i. 59.

It has been introduced as an intestinal astringent.

Adult Dose.—15 grains = 1 gramme, given at intervals of one or two hours.

Foreign Pharmacopœias.—Official in Austr., Belg., Dutch and Swed. Not in the others.

Tests.—When shaken with Water and filtered, the filtrate affords with Ferric Chloride Test-solution a bluish-black coloration. When boiled with Water, cooled, and filtered, the filtrate gives a precipitate with Albumin Solution. When shaken with solution of Sodium Hydroxide (15 p.c.) the mixture gelatinises. When further heated to the boiling point, cooled, and supersaturated with Hydrochloric Acid, an odour of Sulphuretted Hydrogen is evolved, and a white precipitate is thrown down.

The Austr. Ph. gives the following test: 1 gramme of Tannalbin digested for 4 hours at 40° C. (125° F.) with 0·1 gramme of Pepsin, 50 c.c. of Water and 1·5 gramme of Dilute Hydrochloric Acid leaves a residue which after washing with 30 c.c. of water and drying at 100° C. (212° F.) shall not weigh more than $\frac{1}{2}$ gramme. The Dutch Ph. requires that it shall not yield more than 1 p.c. of ash.

HONTHIN (Albumin Tannate).—Greenish-brown tasteless odourless powder. Insoluble in water.

Dose.—10 to 30 grains = 0·65 to 2 grammes, three to five times a day for adults; 5 grains = 0·32 gramme, for children.

GLUTANOL.—Combination of Tannic Acid with vegetable fibrin. Similar in action and properties to Tannalbin. Administered in powder form.

Dose.—5 to 15 grains = 0·32 to 1 gramme.

TANNIGEN (Di-acetyl Tannin).—A greyish-white tasteless powder. Practically insoluble in Water, but readily in alkaline solutions. Recommended in diarrhœa, principally of children, but also in that of adults. It passes through the stomach unchanged, but on entering the alkaline intestinal tract it breaks up and acts as an astringent.

Dose.—1 to 3 grains = 0·06 to 0·18 gramme for children, and 5 to 10 grains = 0·32 to 0·65 gramme for adults. Small doses can be mixed with an equal quantity of Milk Sugar, and larger doses for adults can be taken in **cachets.**

Tests.—When shaken with Water and filtered, the filtrate is coloured bluish-black by Ferric Chloride Test-solution. When warmed with Potassium Hydroxide Solution, cooled, mixed with diluted Sulphuric Acid and a little Alcohol (90 p.c.) and warmed, the odour of Acetic Ether is evolved. It should leave not more than 1 p.c. of mineral residue when ignited at a dull red heat.

TANNOFORM (Methyl-Ditannin).—A light, pinkish-brown, odourless and tasteless powder. A condensation product of Tannic Acid and Formic Aldehyde. It is claimed to possess the astringent effects of Tannin with the antiseptic and drying properties of Formaldehyde. Used as an application in skin diseases, and to wounds, either alone or mixed with Starch, or diluted 1 to 4 with French Chalk, as a dusting powder.

As a 10 p.c. ointment in eczema.—*B.M.J.E.* '99, ii. 48; *M.A.* '00, 182.
Rubbed into the chest for night sweats in phthisis.—*B.M.J.E.* '01, ii. 59.

Foreign Pharmacopœias.—Official in Swed. and Swiss.

TANOCOL.—A white or nearly white odourless and tasteless powder, a combination of Gelatin and Tannic Acid. Insoluble in Water. Stated to be useful as an intestinal astringent.

Dose.—10 to 15 grains = 0·65 to 1 gramme, for an adult; 5 grains = 0·32 gramme, for children.—*L.* '03, i. 1039.

TANNONE.—A condensation product of Tannic Acid and Hexamethylenetetramine. A light brown tasteless powder, almost insoluble in Water and weak Acids, and dissolves slowly in weak alkalis.

Dose.—15 grains = 1 gramme for adults; children, 3 to 5 grains = 0·2 to 0·32 gramme.

ACIDUM TARTARICUM.

TARTARIC ACID.

$H_2C_4H_4O_6$, eq. 148·92.

FR., ACIDE TARTRIQUE; GER., WEINSAURE; ITAL., ACIDO TARTARICO; SPAN., ACIDO TARTRICO.

Colourless and odourless, translucent monoclinic prisms, possessing a strongly acid taste.

It is a di-basic acid prepared from Argol or crude Tartar, and is chemically a Di-oxysuccinic or Di-hydroxysuccinic Acid.

Solubility.—10 in 8 of Water, and measures 14; 1 in 2½ of Alcohol (90 p.c.); 1 in 4¼ of Glycerin; 1 in 40 of Ether; 1 in 5 of Absolute Alcohol; nearly insoluble in Benzol and Chloroform.

The solubility of this acid in Ether naturally varies with the amount of Water and Alcohol contained in the Ether. The above figure represents the solubility in *B.P.* Ether (sp. gr. 0·735), but the figure for Ether Purus (sp. gr. 0·720) is 1 in 195.

Medicinal Properties.—The same as Citric Acid.

Dose.—5 to 20 grains = 0·32 to 1·3 grammes.

Incompatibles.—Salts of Potassium, Calcium, Mercury and Lead, Alkaline Carbonates, and the vegetable astringents.

Official Preparations.—Used in the preparation of Pulvis Sodæ Tartaratæ Effervescens, Sodii Citro-Tartras Effervescens, and the other granular effervescing preparations.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Jap., Ital., Mex., Norw., Port., Russ., Span., Swed., Swiss and U.S.

Tests.—The distinguishing test for Tartaric Acid is the formation of a white crystalline precipitate on the addition of Potassium Acetate Solution to its aqueous solution, the precipitate being soluble in Ammonium Chloride Solution or in Sodium Hydroxide Solution; also the mirror test with Silver Nitrate Solution in its neutralised solutions. Its aqueous solution is officially required to be dextrorotatory. It is officially required to contain 99·0 p.c. of Hydrogen Tartrate, as determined by titration with Volumetric Sodium Hydroxide Solution; 1 gramme when dissolved in Water neutralises 13·3 c.c. of Volumetric Sodium Hydroxide Solution. *U.S.P.* requires it to contain not less than 99·5 p.c. of pure Tartaric Acid; the *P.G.* does not mention a requisite percentage; the *U.S.P.* states that Phenolphthalein Test-solution is to be used as an indicator of neutrality. Tartaric Acid may be distinguished from Citric Acid, and its presence detected in the latter by its power of decolorising a weak solution of Potassium Chromate, upon which Citric Acid has no action (Alcohol and other reducing agents must be absent). The Pusch's test (*P.J.* [3] xv. 693) with Sulphuric Acid at 100° C. (212° F.) which easily detects 1 p.c. of Tartaric Acid in Citric Acid. The Resorcinol Sulphuric test (*C.D.* '91, i. 6) is also a delicate test for Tartaric Acid, but in the presence of a large proportion of Citric Acid the red colour is rather obscure, and in that case it offers no advantage over Pusch's test.

The more generally occurring impurities are Arsenic, Calcium, Copper, Iron and Lead, Oxalates and Sulphates. The most important impurity is Lead.

A standard of 10 parts per 1,000,000 for Lead, and 1 part per 1,000,000 for Arsenic has been proposed (*C.D.* '08, i. 795). Arsenic, Copper, Iron and Lead may be detected, if present, by the Hydrogen Sulphide test; Calcium by the test with Ammonium Oxalate Solution; Oxalates and Sulphates by the tests with Calcium Sulphate Solution and the Barium Chloride or Nitrate test. Each of these tests is given under its respective heading in the small type below.

When ignited with free access of air it should leave not more than 0·05 p.c. of mineral matter. This is the requirement of both the *B.P.* and the *U.S.P.*; the *P.G.* requires that 0·5 of a gramme of the acid should leave no weighable residue. The *B.P.* standard is considered (*C.D.* '08, i. 795) as too severe, and a limit of 0·1 p.c. of ash is suggested.

Melting Point.—135° C. (275° F.), *U.S.P.* When kept at a temperature of 100° C. (212° F.) for some time, the powdered crystals do not suffer a sensible loss of weight, *U.S.P.*; at a temperature above 135° C. (275° F.) the acid chars, emitting an odour resembling that of burning sugar, *P.G.* and *U.S.P.*

Potassium Acetate Solution. — A (1–3) aqueous solution yields with Potassium Acetate Solution a crystalline precipitate, soluble in Ammonium Chloride Solution and in Sodium Hydroxide Solution; the solution in Sodium Hydroxide gelatinises on warming, but becomes fluid again on cooling, *P.G.* The *U.S.P.* Potassium Acetate test is made with a (1–2) aqueous solution and a (1–3) Potassium Acetate solution, and the crystalline precipitate obtained is soluble in solutions of the alkalis and mineral acids, but not in Acetic Acid.

Hydrogen Sulphide.—There should be no darkening in colour within 5 minutes in a solution of 10 grammes of Tartaric Acid in 20 c.c. of Water nearly neutralised with solution of Ammonia and sufficient saturated solution of Hydrogen Sulphide added to produce 100 c.c., *B.P.*

It should not, after the addition of a few drops of Hydrochloric Acid, show any colour when submitted to the time-limit test for heavy metals, omitting the subsequent addition of Ammonia Water, *U.S.P.*

5 grammes dissolved in 10 c.c. of Water, and solution of Ammonia added until only faintly acid, should be unaffected by Hydrogen Sulphide Solution, *P.G.*

Barium Chloride or Barium Nitrate.—A (1–10) aqueous solution of Tartaric Acid should be unaffected by Barium Nitrate Solution, *P.G.*; by Barium Chloride T.S. after acidulation with a few drops Hydrochloric Acid, *U.S.P.*

Ammonium Oxalate.—A (1–10) aqueous solution of the acid should be unaffected by Ammonium Oxalate Solution, *P.G.*; *U.S.P.* allows a faint turbidity in 10 c.c. of a solution (1–10) supersaturated with Ammonia Water on the addition of Ammonium Oxalate T.S.

Calcium Sulphate Solution.—A (1–10) aqueous dilution should be unaffected by Calcium Sulphate T.S. after nearly but not quite neutralising with Solution of Ammonia, *P.G.* and *U.S.P.*

Volumetric Determination.—3·73 grammes should require not less than 49·8 c.c. normal Potassium Hydroxide Volumetric Solution (each c.c. corresponding to 2 p.c. of pure Tartaric Acid), *U.S.P.* Phenolphthalein Test-solution is used as the indicator.

Not Official.

ACONITI FOLIA.

ACONITE LEAVES.

The fresh leaves and flowering tops of *Aconitum Napellus*, L., gathered when about one-third of the flowers are expanded, from plants cultivated in Britain.

This plant and the Extract from the fresh herb were formerly official, but are now omitted.

Foreign Pharmacopœias.—Official in Fr., Mex., Port., Russ. and Span. Not in the others.

Descriptive Notes.—The leaves only of the plant having flowers shaped like a shallow or navicular helmet should be used, since in some districts *Aconitum paniculatum*, Lam., is cultivated for sale on account of giving a smoother and less resinous extract. It differs from *A. Napellus* chiefly in the helmet being twice as deep as broad and in the more branched inflorescence, and as it does not contain Aconitine, and consequently does not produce the characteristic tingling and numbing sensation when chewed, the leaves should not be used in medicine for that drug. The leaves are most active when about one-third of the flowers are expanded.

Aconite leaves are rarely used in the dried state. The lower leaves are long-stalked and have five or seven lobes, each of which is pinnatifid with linear acute segments. The upper leaves have three to five lobes; they are quite smooth, and paler beneath. The leaves are most active before the flowers are fully formed.

For microscopical detail *see Vogl Anat. Atlas Tab.* 16.

The dried leaves imported from Germany should not be used since it is impossible to distinguish the active and inactive leaves when mixed, and unless the flowers are present there can be no certainty as to the species collected.

ACONITI RADIX.

ACONITE ROOT.

FR., TUBERCULE D'ACONIT; GER., EISENHUTKNOLLEN; ITAL., TUBERO DI ACONITO; SPAN., ACONITO.

The root collected in the autumn from *Aconitum Napellus*, L., cultivated in Britain, and dried.

The *U.S.P.* orders 'root collected in autumn, containing not less than 0·5 p.c. of Aconitine'; *P.G.* states 'collected at the end of flowering time and requires it to yield not less than 0·5 p.c. of alkaloid reckoned as Aconitine.' *B.P.*, *U.S.P.* and *Ger.* all specify the root of *Aconitum Napellus*. *B.P.* does not give a standard of alkaloid.

Medicinal Properties.—Anodyne, antiphlogistic, antipyretic, diaphoretic. Externally it relieves the pain of acute and chronic rheumatism, facial neuralgia, and of itching, as in erythema. Given internally it lessens the frequency and tension of the pulse, relieves pain and high temperature, and is thus useful in all acute local inflammations (not advanced), such as those of pneumonia, eruptive fevers, erysipelas, tonsillitis, peritonitis, and painful neuralgic affections; contra-indicated when valvular disease of heart is present, or when fever is prolonged as in typhoid.

Beneficial in lowering blood pressure in acute uræmia.—*B.M.J.* '06, ii. 1450.

It is better given in small doses and very frequently, ½ to 1 minim of Tincture every ten minutes or quarter of an hour for two hours, then hourly.—*Ringer*.

Five minims of Tincture given every three or four hours, increasing the dose to 20 minims, succeeded in curing a case of neuralgia in the face, when every other remedy tried had failed.

Ph. Ger. maximum single dose, 0·1 gramme; maximum daily dose, 0·3 gramme.

Antidotes.—In case of poisoning by Aconite, use emetics, Apomorphine ⅒ grain, Alcoholic stimulants; Atropine or Belladonna, Digitalis, Amyl Nitrite.

Atropine is antagonistic to the action of Aconitine on the heart.

Official Preparations.—Linimentum Aconiti and Tinctura Aconiti. Used in the preparation of Aconitina.

Not Official.—Extractum Aconiti Radicis Alcoholicum, Chloroformum Aconiti, Linimentum Aconiti et Chloroformi, Linimentum Aconiti Compositum, Pastillus Aconiti, Pigmentum Iodi cum Aconito; Tinctura Aconiti Fortior and Trochisci Aconiti.

Foreign Pharmacopœias.—Official in Belg., Dutch, Fr., Ger., Hung., Ital., Jap., Mex., Port., Russ., Span., Swiss and U.S. Not in the others.

Descriptive Notes.—The Aconite root met with in commerce varies considerably in quality and appearance. The root cultivated in Britain is either dried whole or split into two or three longitudinal segments. The latter form enables the soundness of the root to be seen, but the structure is not so easily observed as in the roots dried whole. When collected in autumn the root is solid, brownish externally and white and starchy within; but if collected in summer when in full flower, the old root to which the flowering stem is attached is spongy and porous or hollow, being exhausted by the flowering process; such roots are excluded by the *B.P.* The root dried entire exhibits, when broken across the centre, a seven-angled portion or pith, with a small group of vessels visible at each angle, and well-marked dark cambium line, and is, if carefully dried, white and starchy, but if overheated it has a resinous fracture. It is about 2½ to 3½ in. (62 to 87 mm.) long, and ⅝ in. to ⅞ in. (15 to 22 mm.) in diameter at the widest portion. If cautiously applied to the tongue, it should cause a numbing sensation after a short interval; the *Aconitum paniculatum*, Lam., does not do so. The root collected in autumn consists of the new root, and may be recognised by having only leaf scales at the apex, and not any portion of stem. The *B.P.* requires the root to be crowned with the remains of an undeveloped bud, and therefore excludes the German root, which is usually collected when the plant is in flower, and consequently crowned with the base of the stem; it is also collected indiscriminately by peasants from any blue-flowered species, and therefore varies considerably in strength. Japanese root is shorter, grey-brown externally, conical, and tapering abruptly to a point; it is obtained from a different species, stated to be *A. Fischeri*, Reicht.

Tests.—Both *U.S.P.* and *P.G.* require the root to yield a definite content of alkaloid; the *U.S.P.* stipulating that it shall yield not less than 0·5 p.c. of Aconitine; the *P.G.* that it shall contain not less than 0·5 p.c. of alkaloid calculated as Aconitine. The process adopted by the *U.S.P.* is essentially as follows:—A weighed quantity of 10 grammes of the root is treated in an Erlenmeyer flask with 75 c.c. of a mixture of 7 parts of Alcohol (94·9 p.c.) and 3 parts of Water, and shaken at intervals for five hours. The contents of the flask are then transferred to a small glass percolator, and after the liquid has passed through the percolation is continued with more of the above mixture of Alcohol and Water until 150 c.c. of percolate is obtained. The percolate is then evaporated at a temperature not exceeding 60° C. (140° F.), and 5 c.c. Tenth-normal Volumetric Sulphuric Acid Solution and 10 c.c. of Distilled Water added. The liquid is filtered into a separator, the dish and filter being washed with about 40 c.c. of Distilled Water and the washings added to the separator, 25 c.c. of Ether and 2 c.c. Ammonia Solution are added, and the mixture agitated for one minute. The lower stratum is drawn off, the Ether-solution is filtered. The lower stratum is returned to the separator and shaken with 15 c.c. of Ether for one minute, the process of drawing off being repeated. The lower stratum is washed with two further portions of 10 c.c. each of Ether. The combined Ether-solutions are evaporated to dryness, and the residue dissolved in 3 c.c. of Tenth-normal Volumetric Sulphuric Acid Solution, and titrated back with Fiftieth-normal Volumetric Potassium Hydroxide Solution until a violet colour is produced, 5 drops of Cochineal Test-solution being used as an indicator of neutrality.

The process of the *P.G.* is essentially as follows:—A weighed quantity of 12 grammes of root, dried at 212° F. (100° C.), and in a moderately coarse powder, is treated with a mixture of 90 grammes of Ether and 30 grammes of Chloroform; after brisk agitation 10 c.c. of a mixture of 2 parts by weight of Sodium Hydroxide Solution (15 p.c.) and one part by weight of Water is added, and the mixture allowed to stand for three hours, shaking well at frequent intervals. Add 10 c.c., or at any rate sufficient Water to cause the powdered root to agglomerate on shaking and the supernatant liquid to clear completely. After standing for one hour 100 grammes of the clear Chloroform-Ether Solution is filtered through a dry, well-covered filter into a flask and about one-half distilled off. The remaining Chloroform-Ether Solution is introduced into a separator, the flask washed three times with a mixture of 3 parts by weight of Ether and 1 part by weight of Chloroform, and the mixed liquids well shaken with 25 c.c. of Centi-normal Volumetric Hydrochloric Acid Solution. After the addition of sufficient Ether to cause the Chloroform-Ether Solution to float on top of the acid liquid and after the fluids have become completely clear, the acid liquid is filtered through a small filter paper previously moistened with Water, into a flask holding about 100 c.c. The Chloroform-Ether solution is shaken three times in succession with 10 c.c. of Water, passing the washings through the same filter paper; the latter is washed with Water and the mixed fluids diluted with Water to 100 c.c. A measured quantity of 50 c.c. is removed, 50 c.c. of Water and sufficient Ether to form a layer of 1 cm. are added, and after the addition of 5 drops of Iodeosin Solution, Centi-normal Volumetric Potassium Hydroxide Solution is added until the lower aqueous layer assumes a pale red coloration, shaking vigorously after each addition. Not more than 8·5 c.c. of

Centi-normal Potassium Hydroxide Solution should be required to effect this.

Preparations.

LINIMENTUM ACONITI. Liniment of Aconite.

Powdered Aconite Root percolated with Alcohol (90 p.c.) to produce a liquid, of which 30 represents 20 of root and contains 1 of Camphor. (1 in 1½)

This liniment was introduced by Peter Squire, who made it 1 in 1, and it was kept this strength in *B.P.* '64 and '67. It was diluted to 1 in 1½ in *B.P.* '85, but more recent experiments (*P.J.* '03, i. 458) show that it can be made 1 in 1 and practically contain all the alkaloid.

Applied with a camel's-hair pencil, alone, or mixed in equal proportions with Soap Liniment or Ammoniated Camphor Liniment, and rubbed on the part (but not upon an abraded surface), relieves acute neuralgia.

TINCTURA ACONITI. Tincture of Aconite.

Fr., Teinture d'Aconit; Ger., Akonit Tinktur; Ital., Tintura di Aconito; Span., Tintura Alcoholica de Aconito.

1 of Aconite Root, in No. 40 powder, percolated with Alcohol (70 p.c.) to yield 20. (1 in 20)

Dose.—5 to 15 minims = 0·3 to 0·9 c.c.; if very frequently repeated, 2 to 5 minims = 0·1 to 0·3 c.c.

Ph. Ger. maximum single dose, 0·5 gramme; maximum daily dose, 1·5 grammes; of the 1 in 10 Tincture.

Tests.—Tincture of Aconite has a specific gravity of about 0·890, it contains about 1·0 p.c. w/v of total solids and about 70 p.c. w/v of Absolute Alcohol.

Dr. Fleming's Tincture of Aconite (sometimes known as Tinctura Aconiti Fortior) was much stronger, being about the same strength as the present Liniment, 1 in 1½, but without the Camphor. **Dr. Turnbull's Tincture of Aconite** was rather weaker than Fleming's.

Foreign Pharmacopœias.—Official in Mex. and Hung., 1 **Root** and 5. Fr., Alcoolature, 1 fresh **Leaves** and 1; also 1 **Root** in 10. Ger. and Jap., 1 **Root** and 10. Ital., 1 **Root** and 5. Port., 1 dried **Leaves** and 5; also 1 **Root** and 5; and 1 fresh **Leaves** and 1. Span., 1 **Root** in 10. All by weight. U.S., **Root** 10, Alcohol to measure 100. U.S. has also Fluidextractum Aconiti, 1 in 1, standardised to contain 0·4 p.c. w/v of Aconitine.

Dutch, Root percolated with Alcohol (70 p.c.) to produce a tincture containing 0·025 p.c. of alkaloids.

The *Brussels Conference* adopted a standard of 0·05 p.c. of total alkaloids, the tincture being prepared with Alcohol (70 p.c.). Belg., Fr. and Swiss adopt the *Brussels Conference* standard.

Not Official.

EXTRACTUM ACONITI RADICIS ALCOHOLICUM.—Aconite Root in powder, percolated with Alcohol (90 p.c.), and the product evaporated to a pilular consistence.

Dose.—⅙ to ½ grain = 0·01 to 0·03 gramme.

This must not be confounded with Extractum Aconiti, *B.P.* '85, which was made from the **herb** and was much weaker.

Foreign Pharmacopœias.—Official in Fr., Hung. and Russ., use 70 p.c., Alcohol; Mex., 60 p.c. Alcohol; Ital., standardised to contain not less than 0·5 p.c. of alkaloid.

CHLOROFORMUM ACONITI.—Powdered Root, 20; Chloroform, to percolate, 20. Painted on with a camel's-hair brush, relieves neuralgia in almost every form. The above formula was that introduced by Peter Squire about fifty years ago. It is preferably prepared by a similar method to that given under Chloroform Belladonna, by mixing the root in No. 40 powder with Slaked Lime and powdered Ammonium Carbonate and percolating with sufficient Chloroform to produce a 1 in 1 percolate. The *B.P.C.* process employs Ammonia Solution, necessitating the use of Absolute Alcohol to allow the Chloroform to exert its full solvent action. Squire's original process yielded a product having a specific gravity of 1·479, and contained 1·09 p.c. w/v of total solids. When assayed according to the process recommended by the *U.S.P.* for the assay of Aconite, it yielded gravimetrically 0·09 p.c. w/v of Aconite alkaloids yielding the same figure on titration; when assayed according to the process recommended by Farr and Wright it yielded a similar figure both gravimetrically and volumetrically. Samples of the preparation prepared by the modified Squire process and by the process of the *B.P.C.* (which consists in moistening 100 of the root in No. 60 powder with 25 of Ammonia Solution, and percolating with a sufficient quantity of a mixture consisting of 1 of Absolute Alcohol to 7 of Chloroform to produce a 1 in 1 product) to some extent confirmed the results published by Farr and Wright (*P.J.* '07, ii. 107), and showed that the former yielded a lower percentage of Aconite alkaloids than the latter. A better idea of the relative efficiency of the two processes is obtained by employing the method adopted by the 8th Decennial Revision of the *U.S.P.* for the assay of Aconite. When assayed by the *U.S.P.* process, a Chloroform of Aconite prepared by the modified Squire process showed on gravimetric determination 0·16 p.c. of Aconite alkaloids, which gave 0·163 p.c. on titration. The *B.P.C.* product assayed by the *U.S.P.* process showed 0·264 p.c. by gravimetric determination and 0·266 p.c. on titration; when assayed by Farr and Wright's process Chloroform of Aconite prepared by the modified Squire process showed gravimetrically 0·133 p.c. and 0·153 p.c. by titration; Chloroform of Aconite prepared by the *B.P.C.* process showed 0·26 p.c. gravimetrically and 0·268 p.c. by titration. Chloroform of Aconite by the modified Squire process had a specific gravity of 1·472 and contained 0·73 p.c. w/v of total solids; Chloroform of Aconite prepared by the *B.P.C.* process had a specific gravity of 1·412 and contained 1·67 p.c. of total solids.

LINIMENTUM ACONITI COMPOSITUM (*Squire*).—Chloroform of Aconite, 1; Liniment of Aconite, 7. Sprinkled on impermeable Piline and applied for neuralgia.

Linimentum Aconiti et Chloroformi.—Chloroform, 12·50; Liniment of Aconite, *q.s.* to produce 100.—*B.P.C.*

LINIMENTUM ACONITI COMPOSITUM. *Syn.* A.B.C. Liniment.—Aconite Liniment, Belladonna Liniment, Chloroform Liniment, equal parts.—*Guy's.*

Liniment of Chloroform contains Olive Oil, which will not dissolve in the other Liniments, but it is useful as a lubricant for rubbing. Some prescribers prefer to use Chloroform in place of Chloroform Liniment as follows: Aconite Liniment, 2; Belladonna Liniment, 2; Chloroform, 1.

This form has been included in *B.P.C.*

PIGMENTUM IODI CUM ACONITO.—*See* Iodine.

TROCHISCI ACONITI.—Each lozenge contains ½ minim Tincture of Aconite.

Dose.—One Lozenge every half-hour or hour in tonsillitis and febrile affections of the throat.

Pastilles of Aconite are made of two strengths, ½ minim of Tincture of Aconite and 1 minim of the Tincture. Prescribers should indicate the strength required.

Emplast. Aconiti, also **Emp. Aconiti et Belladonnæ,** are made in rubber combination.

ACONITINA.

ACONITINE.

$C_{33}H_{45}NO_{12}$, eq. 642·53.

A crystalline Alkaloid, obtained from Aconite Root. It forms colourless or white odourless hexagonal rhombic prisms, which should be preserved in well-stoppered glass bottles of a dark amber tint.

Solubility.—Almost insoluble in Water; 1 in 35 of Alcohol (90 p.c.); 1 in 45 of Ether; 1 in 1 of Chloroform; soluble in Oleic Acid.

Medicinal Properties.—It relieves acute nervous pain when rubbed on the part in the form of **ointment**, producing a tingling sensation followed by numbness. Care must be taken that it does not come in contact with a mucous surface, such as the conjunctiva, or with abraded skin.

It has been applied with marked benefit in trigeminal neuralgia, and to relieve the pain of *acute* rheumatism and gout.

Dose.—As a pure crystalline Aconitine would probably be fatal to an adult in a dose of 3 milligrammes ($\frac{1}{22}$ grain), the maximum dose should not exceed $\frac{1}{10}$ milligramme ($\frac{1}{660}$ grain) pro dosi, or $\frac{5}{10}$ milligramme ($\frac{1}{132}$ grain) per diem, and the commencing dose should be smaller.

Solutions of the alkaloid are prone to decomposition; aqueous or alcoholic solutions should therefore be slightly acidified with **Hydrochloric Acid**, or crystallised **Aconitine Nitrate** (official in *Fr.*) should be used.

Two new Aconitines, extracted from Aconite roots indigenous to India, have formed the subject of lengthy papers in the *J.C.S. Trans.* '05, 1621, 1636. Indaconitine is the alkaloid of *Aconitum chasmanthum*, Stapf, and Bikhaconitine, the alkaloid of *Aconitum spicatum*, Stapf. The pharmacology of these two alkaloids has been studied, and the conclusions arrived at (*L.* '05, ii. 1347) that Indaconitine and Bikhaconitine may be substituted for Aconitine and Pseudaconitine for internal use. Indaconitine is administrable in the same dose as Aconitine from *A. Napellus* and Bikhaconitine in proportion of 0·75 of the unit dose of Aconitine, whilst for local application they may be used as constituents of ointments in similar proportions to the Aconitine of *A. Napellus*.

Official Preparation.—Unguentum Aconitinæ.

Not Official.—Oleatum Aconitinæ.

Foreign Pharmacopœias.—Official in Fr., m.p. 194° C.; Ital., m.p. 186°; Mex., m.p. not given; Span., m.p. 183°; U.S., m.p. *see* below; all are crystalline products; Hung. specifies 'German Aconitine,' a powder, m.p. 85°; Port., a powder, m.p. 85°. Not in the others.

Pseudaconitine.—A highly toxic crystalline alkaloid obtained from *Aconitum ferox;* only slightly soluble in Water, but readily in Alcohol and Chloroform, less readily in Ether. Dunstan gives m.p. as 201° C.—*J.C.S. Trans.* '97, 353.

Tests.—Aconitine melts at 188·5° C. (371·3° F.); 189° to 190° C. (372·2° to 374° F.), *B.P.* It is distinguished by the characteristic sensation of tingling and numbness which is produced on moist mucous surfaces by extremely dilute solutions of the alkaloid or its salts. The solution of the alkaloid in Alcohol (90 p.c.) is dextrogyrate, whilst solutions of the salts are lævogyrate. A dilute aqueous solution of the alkaloid rendered faintly acid by the addition of Acetic Acid yields a characteristic red crystalline precipitate when Potassium Permanganate Solution is added in slight excess. On saponification Aconitine yields Acetic and Benzoic Acids and Aconine. The preparation of the Aurichloride and a determination of its melting point have been recommended as a means of identifying the alkaloid, but *B.P.* makes no reference to these characteristics. The melting point of pure Aconitine Aurichloride is 135·5° C. (275·9° F.). Aconitine is distinguished from Pseudaconitine, Veratrine and Atropine by not yielding any violet-red coloration when the residue left on the evaporation of a small quantity with a few drops of Nitric Acid is moistened with one or two drops of an alcoholic solution of Potassium Hydroxide.

Melting Point.—383° F. (195° C.) on rapidly heating, *U.S.P.*; when slowly heated it decomposes and melts at 182° C. (359·6° F.), and on ignition it leaves no residue, *U.S.P.*

Sulphuric or Nitric Acid.—No colour is produced when Aconitine is dropped upon Sulphuric Acid or Nitric Acid, but an orange colour is produced when it is rubbed with Sulphuric Acid containing a crystal of Ammonium Vanadate, *U.S.P.*

Potassium Permanganate Solution.—Dilute solutions (up to 1-4000) of the alkaloid, when faintly acidulated with Acetic Acid, give a red crystalline precipitate with a few drops of 1 p.c. w/v Potassium Permanganate Solution, *B.P.*; the *U.S.P.* uses a 1-1000 dilution with 1 drop of Tenth-normal Permanganate Solution and does not acidulate. Aconitine containing decomposition products (Amorphous Aconitine) produces this precipitate only in solutions of not less than 1-200, while Cocaine, Hydrastine and Papaverine yield similar precipitates, but only when in more concentrated solutions, *U.S.P.*

Mercuric Potassium Iodide T.S., Tannic Acid T.S., and Gold Chloride T.S. give precipitates with dilute solutions of Aconitine, but Platinic Chloride T.S., Mercuric Chloride T.S., and Picric Acid T.S. only in concentrated solutions, *U.S.P.*

Preparation.

UNGUENTUM ACONITINÆ. ACONITINE OINTMENT.

Dissolve 10 grains of Aconitine in 80 grains of Oleic Acid by the aid of gentle heat; and mix with 410 grains of Lard (1 in 50).

Not Official.

OLEATUM ACONITINÆ.—Aconitine, 2 grains; Oleic Acid, 98 grains; dissolve.

Dr. Shoemaker states that this has a slight local action, and it can be used in mild cases of neuralgia.—*B.M.J.* '84, ii. 750.

This has been incorporated in the *B.P.C.* under the title **Oleinatum Aconitinæ,** *syn.* Oleate of Aconitine.

ACTÆA RACEMOSA.

See CIMICIFUGÆ RHIZOMA.

ADEPS.

LARD.

FR., AXONGE; GER., SCHWEINESCHMALZ; ITAL., GRASSO SUINO; SPAN., GRASA DE CERDO.

A soft white solid having a characteristic though not rancid odour and a bland taste. It is the purified abdominal fat of the Hog, *Sus scrofa.*

Adeps Induratus is Lard deprived of its oil by pressure, and the oil is known as **Lard Oil.**

Solubility.—1 in 22 of Ether, and 1 in 16 of Oil of Turpentine; almost insoluble in Alcohol (90 p.c.).

Medicinal Properties.—Emollient. Added to poultices to prevent them drying and sticking to the skin.

Official Preparation.—Adeps Benzoatus. Used in the preparation of Emplastrum Cantharidis, Pilula Phosphori, and the following Ointments: Aconitine, Atropine, Cocaine, Iodine, Mercury, Mercuric Nitrate, Resin, and Veratrine,

Foreign Pharmacopœias.—Official in Austr. (Axungia Porci), Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap. (Adeps Suillus), Norw. (Axungia), Mex. (Manteca de Cerdo), Port. (Banha), Russ., Span., Swed., Swiss and U.S.

Tests.—The distinguishing tests for Lard are its physical appearance, melting point, specific gravity, the percentage of Potassium Hydroxide absorbed in saponification, and its Iodine absorption. *B.P.* and *P.G.* include the melting point, but no specific gravity. Melting point and specific gravity are both included in *U.S.P.* Lard melts at from 35° to 45° C. (95° to 113° F.); the *B.P.* states that it fuses at 37·8° C. (100° F.) yielding a clear liquid at a somewhat higher temperature; the *U.S.P.* gives 38° to 40° C. (100·4° to 104° F.); the *P.G.* 36° to 42° C. (96·8° to 107·6° F.). It has a specific gravity at 99° C. (210·2° F.) compared with Water at 15·5° C. (60° F.) of about 0·860; the *U.S.P.* states about 0·917 at 25° C. (77° F.) and about 0·904 at 40° C. (104° F.) compared with Water at 25° C. (77° F.). It has a Saponification value of 192 to 196·5. It has an Iodine value of 52 to 62, and should contain but a trace of free acid. Samples examined in the author's laboratory possessed a Saponification value of 192 to 197, and an Iodine value of 50 to 56. Neither *B.P.*, *U.S.P.* nor *P.G.* include the percentage of Potassium Hydroxide absorbed on saponification; the *Austr.* gives a Saponification value of 194 to 197. *P.G.*, *Ital.* and *Austr.* include an Iodine absorption; *P.G.* not less than 46 p.c. nor more than 66 p.c.; *Ital.*, 55 p.c. to 60 p.c.; *Austr.*, 48 p.c. to 60 p.c.; the *U.S.P.* does not include this constant.

The more generally occurring impurities are Water, Salt, an undue proportion of free Acid, Cotton Seed Oil, Beef Stearin, and Starch. No official test is given for Beef Stearin, but the Lard is required to be entirely soluble in Ether. The amount of Water may be determined by heating a weighed quantity of 5 grammes of the sample in a flat-bottomed porcelain dish at a temperature of about

105° C. (221° F.). A rough idea of the amount of Water may be obtained by the behaviour of the sample when shaken with Carbon Bisulphide. Salt, if present, is shown by the Silver Nitrate test described below. Cotton Seed Oil may be detected by the test with Alcoholic Silver Nitrate Solution given in the small type below. The *B.P.*, *U.S.P.* and *P.G.* methods of determining the free acid are essentially the same, and require that when a weighed quantity of 10 grammes of the Lard is dissolved in 10 c.c. of Chloroform and mixed with 10 c.c. of Alcohol of the strength required by the respective Pharmacopœias, after the addition of 2 drops of Phenolphthalein Test-solution not more than 0·2 c.c. of Volumetric Sodium Hydroxide Solution should be required to produce a permanent red colour. This indicates a limit of 0·56 p.c. calculated as Oleic Acid.

The test given for Cotton Seed Oil in the *B.P.* and *P.G.* is the Becchi's Silver Nitrate test, and it is still included in the *U.S.P.* for determining the presence of more than about 5 p.c. of Cotton Seed fats. The test is preferably performed on the fatty acids and not on the Lard direct. Mr. E. J. Bevan has informed the author that a test which will readily detect even 1 p.c. of Cotton Seed Oil consists in heating in a salt bath for about half an hour 3 c.c. of the Lard with 1 c.c. of a 1 p.c. solution of Sulphur in Carbon Disulphide. This test slightly modified has been included in the Eighth Decennial Revision of the *U.S.P.* to prove the absence of Cotton Seed Oil and certain other fats. For the detection of Beef Stearin the microscopical appearance of the crystals separating out from the ethereal solution of the Lard is generally relied upon. A portion of the sample when boiled with Water, cooled, and a few drops of Iodine Solution added, should yield no blue coloration, indicating the absence of Starch.

Silver Nitrate Solution.—Distilled Water boiled with Lard, filtered, and acidulated with Nitric Acid should yield no white precipitate soluble in Ammonia Water, with T.S. of Silver Nitrate, *U.S.P.*

Alcoholic Silver Nitrate Solution.—If 5 c.c. of melted and filtered Lard be thoroughly mixed with a solution prepared by dissolving 0·1 gramme Silver Nitrate in 10 c.c. Alcohol (94·9 p.c.) and 2 drops of Nitric Acid, and then heated for 5 minutes on a water-bath and vigorously shaken, the fatty layer on separation should not have assumed a dark reddish or brown colour; nor should there be any dark colour at the junction of the two liquids, *U.S.P.* The *B.P.* test is essentially the same as the *U.S.P.*, except that the *B.P.* prepares the 5 c.c. of Silver Nitrate Solution by dissolving 0·05 gramme of Silver Nitrate in 5 c.c. of Alcohol (90 p.c.). The *P.G.* test is made with 5 grammes of melted Lard and a solution of 0·05 gramme Silver Nitrate in 2 grammes of Ether and 10 grammes Alcohol, and the mixture is warmed for 15 minutes on the water-bath.

Sulphur in Carbon Bisulphide.—2 c.c. of melted and filtered Lard are mixed with 1 c.c. each of Amyl Alcohol and a 1 p.c. solution of Sulphur in Carbon Disulphide in a test-tube. The test-tube is immersed to one-third or half its depth in boiling salt Water. No reddish colour should develop in the mixture in from 10 to 15 minutes, *U.S.P.*

Saponification.—A mixture of 2 parts Lard, 3 parts Potassium Hydroxide Solution, and 2 parts of Alcohol, when boiled until it clarifies, should produce, on the addition of 50 parts of Water and 10 parts of Alcohol, a clear or only faintly opalescent liquid, *P.G.*

Preparation.

ADEPS BENZOATUS. BENZOATED LARD.

Digest 210 grains of Benzoin in 16 oz. of melted Lard on a water-bath for two hours, strain, and stir whilst cooling. (1 in 33)

Benzoated Lard should not be used for **eye ointments** as it is irritating.

Benzoated Suet (**Sevum Benzoatum**) *Ind.* and *Col. Add.* should be used in India, in place of Benzoated Lard.

Official Preparations.—Used for making the following Ointments: Belladonna, Cantharides, Chrysarobin, Galls, Mercuric Iodide, Mercuric Oleate, Mercurous Chloride, Potassium Iodide, Stavesacre, Sulphur, Sulphur Iodide, and Zinc.

Foreign Pharmacopœias.—Official in Dan., Dutch, Ital. (Grasso con Benzoino), Norw., Swed. and U.S., Benzoin 2, Lard 100; Russ., Benzoin 2, Lard 100, dried Sodium Sulphate 5; Mex. (Pomedo Benzoada), Tincture of Benzoin 5, Lard 100; Fr., Benzoin 3, Lard 100; Ger. and Jap., 1 Acid. Benz. in 100; Swiss, Lard 100, Benzoin 4, Dried Sodium Sulphate 6; or Lard 10, Ethereal Tincture of Benzoin 1. Not in the others.

Not Official.

UNNA'S SALVE MULLS.—The bases of these are hog's lard and beef suet (singly or combined), with which are incorporated various medicaments, spread on muslin.

ADEPS LANÆ.

WOOL FAT.

FR., GRAISSE DE LAINE; GER., WOLLFETT; ITAL., LANOLINA; SPAN., LANOLINA.

A pale yellow, tenacious, unctuous product possessing a faint characteristic odour. It is the purified fat of sheep's wool, consisting chiefly of Cholesterin, Iso-cholesterin, and their Esters.

Solubility.—Readily soluble in Chloroform and Ether, but only partially so in Alcohol (90 p.c.). Its own weight of Water can be incorporated with it.

Medicinal Properties.—Emollient; is very readily absorbed by the skin, and thus promotes the action of remedies combined with it.

Official Preparation.—Adeps Lanæ Hydrosus.

Not Official.—Unguentum Lanolini, Unguentum Adipis Lanæ, Adeps Lanæ cum Oleo.

Foreign Pharmacopœias.—Official in Austr., Dan., Dutch, Fr., Ger., Ital. (Lanolina), Jap., Russ., Span., Swed., Swiss and U.S. Not in the others.

Tests.—The distinguishing tests for Adeps Lanæ are the melting point, which should be about 40° C. (104° F.), and the formation of the purple-red colour of Cholesterin when its solution in Chloroform is poured gently on to the surface of Sulphuric Acid. It is preferable to use an acid containing a trace of Water for performing this test.

The *B.P.* gives the melting point as 40° to 44·4° C. (104° to 112° F.); the *U.S.P.* and the *P.G.* about 40° C. (104° F.); the *U.S.P.* states that at a higher temperature it vaporises and burns with a luminous sooty flame; the *P.G.* that Wool Fat burns with a luminous very smoky flame.

The percentage of Potassium Hydroxide required for saponification, as based upon Helbing's saponification test, affords a good criterion of the purity of the sample, but no official mention is made of this test. A thoroughly purified Wool Fat will combine with about 8 to 9 p.c. of Potassium Hydroxide; Glycerin Fats give much higher figures (Lard, 19·5 p.c.; Olive Oil, 18·0 p.c.; Cocoa Nut Fat, 26 p.c.); while Petroleum bases, being unsaponifiable, do not consume any.

The more generally occurring impurities are mineral matter, an undue amount of free acid, and nitrogenous organic matter. The *B.P.*, *U.S.P.* and *P.G.* all require that the residue left on ignition shall not be alkaline to Litmus, but differ in the amount of mineral residue permissible. *B.P.* and *U.S.P.* state not more than 0·3 p.c.; *P.G.* allows at the highest 0·5 p.c. The *B.P.* does not allow more than 0·28 p.c. of free Acid calculated as Oleic Acid; *P.G.* not more than 0·14 p.c.; and *U.S.* not more than 0·7 p.c. In carrying out the determination of the free acid, the *B.P.* uses 25 c.c. Ether as a solvent for the 10 grammes of Wool Fat and employs Volumetric Sodium Hydroxide Solution, of which not more than 0·1 c.c. should be required; the *U.S.P.* and *P.G.* use 2 grammes of the Wool Fat for the determination, employing 10 c.c. of Ether as a solvent; the *U.S.P.* uses Normal Volumetric Potassium Hydroxide Solution for the titration and the *P.G.* Tenth-normal Volumetric Potassium Hydroxide Solution; the *U.S.P.* stipulates that only 1 drop of the Normal Volumetric Solution shall be required; the *P.G.* 0·1 c.c. of Tenth-normal Volumetric Potassium Hydroxide. The *B.P.* does not include a test for the absence of Glycerin, but such a test is included in both the *U.S.P.* and *P.G.*, as well as a test for ensuring the absence of Chlorides, due to Chlorine-substitution products formed during the bleaching process. In carrying out the test for Glycerin both the *U.S.P.* and the *P.G.* work upon the filtrate obtained by shaking the Wool Fat with boiling Water, both Pharmacopœias employing 10 grammes of the Wool Fat and 50 c.c. of Water, and requiring that the clear separated aqueous liquid shall not yield a residue of Glycerin on evaporation; nor vapours of Ammonia when boiled with a solution of an alkali Hydroxide, the *U.S.P.* employing Potassium Hydroxide T.S., the *P.G.* Calcium Hydroxide Solution; the latter portion of the test is intended to detect nitrogenous organic matter. In carrying out the test the *B.P.* boils the Wool Fat itself with Sodium Hydroxide Solution. The *P.G.* tests another portion of 10 c.c. of the clear separated aqueous liquid with 2 drops of Potassium Permanganate Solution (0·1 p.c. w/w), requiring that the mixture shall maintain its red colour. This test is intended as confirmatory evidence of the absence of Glycerin and other readily oxidisable organic impurities. The absence of Chlorides is determined by the test with Alcoholic Silver Nitrate Solution given in the small type below.

Sulphuric Acid.—If a solution of Wool Fat in Chloroform (1-50 *P.G.* and *U.S.P.*) be poured as a layer over Sulphuric Acid, a zone of deep brownish-red colour gradually appears at the line of contact of the two liquids, *P.G.* and *U.S.P.* (the *B.P.* gives no quantities and states purple-red colour); it attains its deepest shade after about 24 hours, *P.G.*

Alcoholic Silver Nitrate Solution.—1 gramme of Wool Fat boiled with 20 c.c. Alcohol, and filtered, yields a filtrate which on cooling should not be rendered turbid by alcoholic Solution of Silver Nitrate (1–20), *P.G.*, *U.S.P.*, or a turbidity disappearing on warming, *P.G.*

Preparation.

ADEPS LANÆ HYDROSUS. Hydrous Wool Fat.

A nearly white, or yellowish-white, unctuous mass prepared by incorporating 3 of Distilled Water with 7 of Wool Fat by rubbing together in a warm vessel. Used as a basis for ointments. It does not become rancid. Mixes with about half its weight of Water. It is better for ointments when mixed with an equal weight of Soft Paraffin.

Official Preparations.—Used in the preparation of Unguentum Conii, and Unguentum Hamamelidis.

Foreign Pharmacopœias.—Official in Austr. (Adeps Lanæ Hydrosus), Norw. (Lanolinum), Fr. (Lanoléine), Ital. and Mex. (Lanolina), Dan., Dutch, Ger., Jap. and Russ. (Adeps Lanæ cum Aquâ), Swed. (Adeps Lanæ), Swiss (Lanoline), U.S. Not in the others.

Tests.—Hydrous Wool Fat melts at about 40° C. (104° F.) separating into two layers, an upper oily layer and a lower aqueous layer. It is officially required to yield not less than 70 p.c. of residue when dried till constant in weight at a temperature of about 100° C. (212° F.), thus indicating a loss of not more than 30 p.c. This is also the *U.S.P.* limit, the latter Pharmacopœia stating in addition that the yellowish tenacious unctuous mass remaining should be completely soluble in Ether or Chloroform, and only sparingly soluble in Alcohol, should respond to the tests given under Adeps Lanæ. The *P.G.* requires that at the temperature mentioned it shall not lose more than 26 p.c. of its weight, and that the residue remaining after the separation of the Water shall answer the tests for Wool Fat and may be tested for its purity by similar methods to those employed for the anhydrous fat.

Not Official.

UNGUENTUM LANOLINI.—Hydrous Lanoline, 2; Soft Paraffin, 1.

UNGUENTUM ADIPIS LANÆ (*Ger.*).—Wool Fat (anhydrous), 20; Water, 5; Olive Oil, 5. All by weight.

An improvement on this is the following:—

ADEPS LANÆ CUM OLEO.—Hydrous Wool Fat, 9; Almond Oil, 1.

This has been incorporated in the *B.P.C.* as follows:—Hydrous Wool Fat, 90; Olive Oil, 10; under the title **Unguentum Adipis Lanæ.**

Not Official.

ADHATODA.

The fresh and the dried leaves of *Adhatoda Vasica*, are official in *Ind.* and *Col. Add.* for India and the Eastern Colonies: as are also **Extractum Adhatodæ Liquidum** (1 in 1), dose 20 to 60 minims=1·2 to 3·6 c.c.; **Succus Adhatodæ**, the freshly expressed and strained juice of the bruised fresh leaves, dose 1 to 4 fl. drm.=3·6 to 14·2 c.c., and **Tinctura Adhatodæ** (1 in 8), dose 30 to 60 minims=1·8 to 3·6 c.c.

Not Official.

ADONIS.

The leaves and stalks of *Adonis vernalis*, L.

Medicinal Properties.—A cardiac tonic. Useful in mitral and aortic regurgitation, relieving intracardiac pressure and præcordial pain.—*L.* '88, ii. 1012. A useful adjunct to bromides in epilepsy.—*L.* '94, ii. 1288; *B.M.J.E.* '95, i. 12, and '98, i. 44.

Dose.—2 to 6 grains = 0·13 to 0·4 gramme in **powder,** or the equivalent of an **infusion, tincture,** or **fluid extract.**

Foreign Pharmacopœias.—Official in Ital., Russ., Span. and Swiss. Not in the others.

ADONIDIN.—A glucoside, very deliquescent, soluble in Water and Alcohol (90 p.c.).

Dose.—$\frac{1}{6}$ to $\frac{1}{2}$ grain = 0·01 to 0·03 gramme. Generally given in **pill.**

ADRENALIN.—*See* SUPRARENAL GLAND.

ÆTHER.

ETHER.

FR., ETHER; GER., AETHER; ITAL., ETERE; SPAN., ETER.

A light, colourless, volatile, mobile liquid, possessing a strong characteristic odour and containing not less than 92 p.c. by volume of Ethyl Oxide $(\mathbf{C_2H_5})_2\mathbf{O}$, eq. 73·52. It is also known as Ethyl Ether, and Sulphuric Ether. It is very volatile, and gives off a very inflammable and very heavy vapour.

It is prepared by the action of Sulphuric Acid upon Alcohol, and subsequent distillation and rectification of the product.

This product contains both Alcohol and Water, but Æther Purificatus (*see* below) is almost free from both.

Solubility.—1 in 10 of Water; mixes in all proportions with Alcohol (90 p.c.).

B.P. states that it is miscible in all proportions with Chloroform, but the mixture forms a turbid liquid, owing to the presence of Water in the Ether.

Water dissolves a tenth of its volume of Ether, and reciprocally Ether takes up about the same proportion of Water.

Æther dissolves Corrosive Sublimate, Red Mercuric Iodide, Iodine and Bromine freely, Sulphur and Phosphorus sparingly. It is also a solvent of the volatile and fixed oils, many resins and balsams, caoutchouc, and most of the organic vegetable alkaloids. It does not dissolve Potassium or Sodium Hydroxides, in which respect it differs from Alcohol.

Medicinal Properties.—It is a rapid and powerful diffusible stimulant, antispasmodic and carminative, and is of great use in syncope or heart-failure from any cause, dyspnœa, gastralgia, flatulence, spasmodic asthma and angina pectoris. It excites secretion from the mucous surfaces of the alimentary tract, and, as it stimulates the pancreas, it is sometimes given with Cod Liver Oil.

As an anæsthetic, *see* Æther Purificatus and Æther Methylatus.

Dose.—For repeated administration, 10 to 30 minims = 0·6 to 1·8 c.c.; for a single administration, 40 to 60 minims = 2·4 to 3·6 c.c.

When used **hypodermically** for heart failure the dose is 15 to 30 minims = 0·9 to 1·8 c.c.

Prescribing Notes.—*Best prescribed as Spirit of Ether, which mixes readily with Water.* **'Perles'** *are prepared.*

Official Preparations.—Æther Purificatus, Spiritus Ætheris, Spiritus Ætheris Compositus. Used in the preparation of Collodium, Extractum Filicis Liquidum. **Æther Purificatus** is used in the preparation of Extractum Stophanthi, and **Spiritus Ætheris** in Tinctura Lobeliæ Ætherea.

Not Official.—Æther Methylatus, Mistura Ætheris cum Ammonia, Sirop d'Ether, Spiritus Ætheris Muriaticus.

Foreign Pharmacopœias.—*See* under Æther Purificatus.

Tests.—The distinguishing tests for Æther are its volatility as indicated by its boiling point, the specific gravity, and the odour. It has a boiling point of about 40° C. (104° F.); the *B.P.* gives the boiling point as below 40·5° C. (105° F.). Æther sp. gr. 0·735 has been official in Great Britain for many years, but Foreign Pharmacopœias only recognise the fluid which is official in the *B.P.* as Æther Purificatus, *see* below.

The more generally occurring impurities are an undue amount of Acid, or of Alcohol, extractive matter, and organic impurities produced during its manufacture and which have escaped separation during the process of rectification.

It should not possess an acid reaction towards blue Litmus paper, indicating the absence of acidity. When shaken with Water the volume should not be decreased by less than one-tenth, indicating the absence of excess of Alcohol. It should be completely volatilised without leaving a residue, indicating the absence of extractive matter; when mixed with an equal volume of Sulphuric Acid, the mixture kept well cooled, it should yield little or no coloration, indicating the absence of organic impurities.

ÆTHER PURIFICATUS. Purified Ether.

A colourless, transparent, very volatile, mobile and inflammable liquid from which the greater part of the Alcohol has been removed by washing with Water, and the Water by distillation over a dehydrating agent. *U.S.P.* describes it as containing about 96 p.c. by weight of Ethyl Oxide.

It is the **Æther pro narcosi** of the German and Swedish Pharmacopœias and the official Æther of the U.S.

Medicinal Properties.—Used for producing general **anæsthesia** by **inhalation.**

It has also been used as a **spray** for obtaining local anæsthesia in minor surgery, and to relieve severe neuralgic pain, but as the lower the boiling point of the Ether the more complete is the anæsthesia, **Methylated Ether**, sp. gr. 0·717 (*see* below), is preferable for use with the **spray.**

Ether was first used as an anæsthetic for capital operations in 1846, and

Purified Ether is preferred by some to Chloroform, as it has a less depressing effect upon the heart, vessels, and respiratory centre. It is used also in conjunction with Nitrous Oxide for minor operations in dentistry and surgery.

Official Preparation.—Used in the preparation of Extractum Strophanthi.

Foreign Pharmacopœias.—Official in Austr., sp. gr. 0·720; Russ., sp. gr. 0·725; Belg., Dutch, Fr., Ger. and Jap., sp. gr. 0·720; Fr., also sp. gr. 0·724; Hung., sp. gr. 0·724 to 0·728; Port., sp. gr., 0·728; Span. (Eter), sp. gr. 0·720; Dan., Norw., Ital. (Etere), Swed. and Swiss, sp. gr. 0·720 to 0·722; U.S., sp. gr. 0·716 to 0·717 at 25° C. (77° F.); Mex. (Eter Sulfurico), sp. gr. 0·720.

Tests.—The distinguishing tests for Æther Purificatus are its boiling point, its specific gravity, its peculiar odour and physical appearance. The *B.P.* does not give a boiling point, but requires that it should not commence to distil below 34·5° C. (94·1° F.); the *U.S.P.* gives the boiling point at 35·5° C. (96° F.); the *P.G.* as 35° C. (95° F.). The specific gravity given in the *B.P.* is from 0·720 to 0·722, that of the *U.S.P.* 0·716 to 0·717 at 25° C (77° F.); that of the *P.G.* 0·720.

The more generally occurring impurities are Methylic Ether, extractive matter, excess of Water, Aldehyde, acid, organic impurities, and Hydrogen Peroxide. Methylic Ether may be detected, if present, by the lowering of the boiling point. Both the *U.S.P.* and the *P.G.* require that Ether shall leave no residue on evaporation, indicating the absence of extractive matter. The *P.G.* states that when allowed to evaporate at ordinary temperature it leaves a damp ring which should not redden blue Litmus paper. The three Pharmacopœias differ considerably in their methods of testing for Aldehyde, Hydrogen Peroxide, and excess of Water. All three employ Potassium Hydroxide as a test for Aldehyde; the *B.P.* and *P.G.* use the solid form, *U.S.P.* the solution. The *B.P.* gives neither a time limit within which no coloration shall be produced, nor quantities; *U.S.P.* uses 10 of Ether to 1 of Potassium Hydroxide Solution and a time limit of 'within one hour,' whilst *P.G.* states no quantity for the test, but requires that no yellow colour shall be produced within six hours, the mixture being protected from the light.

In testing for Hydrogen Peroxide, *B.P.* uses Potassium Bichromate acidified with Sulphuric Acid, requiring that the ethereal liquid shall not develop a blue colour; the *P.G.* employs Potassium Iodide Solution and protects the mixture from the light, no coloration should be produced within one hour; whilst the *U.S.P.* does not include a test for Hydrogen Peroxide. Excess of Water is officially detected by mixing equal volumes of Ether and Carbon Bisulphide, when a clear solution should be obtained; in the *U.S.P.* the test is performed with Ether-saturated Water, and is made quantitative by employing equal volumes of the menstruum and Ether, and noting the decrease in volume of the ethereal liquid, 20 c.c. of the sample shaken with 20 c.c. of Ether-saturated Water should not measure less than 19·2 c.c. The *P.G.* does not include a test for excess of Water.

Odorous impurities, if present, may be detected by the odour imparted to clean, odourless filter paper when the Ether is allowed to spontaneously evaporate. Neither the *B.P.* nor the *P.G.* states the quantity to be used for the test; the *U.S.P.* evaporates 10 c.c. in portions; all three Pharmacopœias require that the filter paper, after the evaporation of the Ether, shall possess no odour.

Evaporation.—Clean, odourless filter paper moistened with Ether, and the Ether allowed to spontaneously evaporate, should be free from any foreign odour when the Ether has evaporated, *B.P.*; the *P.G.* and *U.S.P.* allow 10 c.c. to evaporate.

Preparations.

SPIRITUS ÆTHERIS. SPIRIT OF ETHER. The HOFFMANN'S ANODYNE of the Continental Pharmacopœias.

Ether, 1; Alcohol (90 p.c.), 2. (1 in 3)

Specific Gravity.—0·806 to 0·811.

Dose.—For repeated administration, 20 to 40 minims = 1·2 to 2·4 c.c.; for single administration, 60 to 90 minims = 3·6 to 5·4 c.c.

Foreign Pharmacopœias.—Official in Austr., Dan., Ger., Hung., Jap., Norw., Swed. and Swiss, 1 and 3; Belg. (Æther Sulphuricus Alcoholicus), 468 in 1000; Dutch (Æther cum Spiritu), 1 and 1, sp. gr. 0·777 to 0·782; Fr. (Ether Alcoolisé), 1 and 1, sp. gr. 0·783; Ital. (Liquore Anodino di Hoffmann), 1 and 1; Mex. (Licor de Hoffmann), Æther 1, Alcohol 90 p.c., 1; Port. (Æther Alcoolisado), 7 and 3; Russ., 1 and 2, sp. gr. 0·800; Span. (Eter Sulfurico Alcoholizado), 4 and 1; U.S., 3¼ in 10. All by weight, except U.S.

Dan., Norw. and Swed. include also **Æther Spirituosus Camphoratus**, containing 15 p.c. of Camphor.

SPIRITUS ÆTHERIS COMPOSITUS. COMPOUND SPIRIT OF ETHER. *B.P.Syn.*—HOFFMANN'S ANODYNE.

Ether, 5½; Alcohol (90 p.c.), 38; and an undefined quantity of ethereal liquid, obtained by the action of 36 of Sulphuric Acid on 40 of Alcohol (90 p.c.), and subsequent treatment.

The official directions are founded on the formula of the old Dublin Pharmacopœia.

Dose.—For repeated administration, 20 to 40 minims = 1·2 to 2·4 c.c.; for a single administration, 60 to 90 minims = 3·6 to 5·4 c.c.

Foreign Pharmacopœias.—Official in U.S., Ether, 325; Alcohol, 650; Ethereal Oil, 25. Not in the others.

Tests.—The distinguishing tests are the sp. gr. which should be about 0·810, and the production of an opalescent mixture on the addition of Water. The more generally occurring impurities are those of an empyreumatic nature, having their origin in the process of manufacture, and which may be detected by any objectionable odour imparted to the residue left on the spontaneous evaporation of a few c.c. of the sample.

Not Official.

ETHER FROM METHYLATED SPIRIT. *Syn.* ÆTHER METHYLATUS; METHYLATED ETHER.—Sp. gr. 0·717. It can be purified to such an extent by washing and redistillation as to be scarcely distinguishable from that made from pure Spirit. The Methylic Ether being so extremely volatile is almost wholly lost during the purification.

An Ether, sp. gr. 0·715, can be obtained in limited quantity by careful working; occasionally samples are drawn over at 0·713, in cold weather.

Medicinal Properties.—It is largely employed as a **spray** for local anæsthesia, as well as for **inhalation.** As in the case of 'Methylated Chloroform,' the impurities from the Wood Spirit, employed in the manufacture, can be completely eliminated.

Ether can be made more volatile for use with the **spray** by the addition of 20 per cent. of a light Petroleum Ether.

Ether from Methylated Spirit, sp. gr. 0·720 washed and redistilled, is also supplied for **inhalation.** It is *not* so suitable as the above for the **spray** because it volatilises less rapidly.

MISTURA ÆTHERIS CUM AMMONIA.—Spirit of Ether, 30 minims; Aromatic Spirit of Ammonia, 30 minims; Distilled Water, to 1 fl. oz.—*St. Thomas's.*

This has been incorporated in the *B.P.C.*

Mistura Ammoniæ et Ætheris.—Aromatic Spirit of Ammonia, 30 minims; Spirit of Ether, 30 minims; Chloroform Water, to make 1 oz.—*St. Mary's.*

SIROP D'ETHER. Syrupus cum Æthere.—Ether (sp. gr. 0·720), 2; Distilled Water, 23; Alcohol (90 p.c.), 5; Syrup, 70; all by weight.—*Fr.*

This has been incorporated in the *B.P.C.* under the title **Syrupus Ætheris Compositus.**

SPIRITUS ÆTHERIS MURIATICUS. *Syn.*—Sp. Salis Dulcis; Clutton's Febrifuge Spirit.

A colourless liquid. Sp. gr. 0·860.

A very old preparation, still prescribed for pyrexia, and cold in the head.

Dose.—30 to 60 minims = 1·8 to 3·6 c.c.

Foreign Pharmacopœias.—Official in Norw. (Æther Chloratus Spirituosus).

ÆTHER ACETICUS.

ACETIC ETHER.

Fr., Acétate d'Ethyle; Ger., Essigäther; Ital., Etere Acetico; Span., Eter Acetico.

A transparent, colourless, volatile, inflammable liquid, possessing a characteristic ethereal odour and taste. It consists almost entirely of Ethyl Acetate, $\mathbf{C_2H_5C_2H_3O_2}$, eq. 87·40, with a small quantity of Ethylic Alcohol, Water and possibly traces of organic impurities.

A good commercial specimen should contain 90 p.c. of Ethyl Acetate and about 10 p.c. of Ethylic Alcohol.

It should be kept in well-stoppered, amber-tinted bottles, and in a cool atmosphere.

Solubility.—About 1 in 9 of Water. Pure Acetic Ether is miscible in all proportions with Alcohol (90 p.c.), and with Ether, but Acetic Ether of *B.P.* specific gravity is not soluble in all proportions in Chloroform, but if such Ether be dehydrated over Calcium Chloride or Potassium Carbonate it will then mix with Chloroform in all proportions, but the purified product has a specific gravity of 0·895.

Medicinal Properties.—Antispasmodic, stimulant, and carminative. It is also used as a sedative **inhalation** in irritation of the larynx, 30 minims in a pint of Water.

Dose.—For repeated administration, 20 to 40 minims = 1·2 to 2·4 c.c.; for a single administration, 60 to 90 minims = 3·6 to 5·4 c.c.

Official Preparation.—Used in the preparation of Liquor Epispasticus.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Ger., Jap., Norw. and Russ., sp. gr. 0·900 to 0·904; Hung., sp. gr. 0·900; Belg., sp. gr. 0·890; Fr., sp. gr. 0·920; Ital. (Etere Acetico), sp. gr. 0·900 to 0·904; Mex. (Eter Acetico) sp. gr. 0·920; Port., sp. gr. 0·920; Span., sp. gr. 0·915; Dan. and Swed., sp. gr. 0·902 to 0·906; Swiss, sp. gr. 0·904; U.S., sp. gr. 0·883 to 0·885 at 25° C. (77° F.).

Tests.—The distinguishing tests for Acetic Ether are its sp. gr. of about 0·900, its boiling point, which should be about 162° C. (323·6° F.), and the limits of temperature between which it distils, 165° and 172° F. (73·9° and 77·8° C.).

It is officially required to have a specific gravity of 0·900 to 0·905; the *U.S.P.* gives 0·883 to 0·885 at 25° C. (77° F.); the *P.G.* 0·900 to 0·904. The official Acetic Ether is the fraction boiling between 73·9° and 77·8° C. (165° and 172° F.); the *U.S.P.* gives the boiling point of Acetic Ether from 72° to 77° C. (161·6° to 170·6° F.); the *P.G.* 74° to 76° C. (165·2° to 168·8° F.).

The more generally occurring impurities are Ethylic Alcohol, Water, free Acetic Acid, readily carbonisable organic impurities, and Ethers other than Acetic derived from impurities in the Ethylic Alcohol used in the process of manufacture. Except by inference the *B.P.* omits a test for excess of Ethylic Alcohol and Water, but both *U.S.* and *P.G.* stipulate that it shall not contain more than 10 p.c., as ascertained by the decrease in volume of the ethereal layer or the increase in volume of the aqueous layer, when a saturated aqueous solution of Acetic Ether is shaken with an equal volume of the specimen under examination. A free acid test performed either with Litmus Solution or paper is common to all three Pharmacopœias, as is also a test with Sulphuric Acid for readily carbonisable organic impurities. The latter test is included in all three Pharmacopœias, but in performing it the *B.P.* simply directs the liquids to be mixed; the *U.S.P.* and the *P.G.* direct that the Acetic Ether be carefully poured as a layer on the acid, and no coloured zone should be produced at the point of contact.

The *B.P.* and *P.G.* require that when evaporated from filter paper no odour shall remain, but do not mention the specific impurities indicated by the test. *U.S.*, on the other hand, state that the final odour should not resemble that of pineapple, indicating the absence of Butylic and Amylic Ethers. It should be completely volatile, and should leave no weighable residue on evaporation.

ÆTHERIS NITROSI SPIRITUS.

See SPIRITUS ÆTHERIS NITROSI.

Not Official.

ÆTHYL BROMIDUM.

ETHYL BROMIDE. HYDROBROMIC ETHER.

FR., BROMURE D'ETHYLE; GER., AETHYLBROMID; ITAL., BROMURO DI ETILE; SPAN., ETER BROMHIDRICO.

C_2H_5Br, eq. 108·17.

A heavy, colourless, mobile and very volatile liquid, which should be preserved in well-stoppered dark amber-tinted bottles. It is best prepared by acting upon Potassium Bromide with Sulphuric Acid in the presence of Alcohol. Its liability to decomposition may be prevented by exclusion of light and air, and by the addition of Alcohol, which lowers the sp. gr.

Shown that the process recommended in the *Companion* (17th edit.) is the correct one. 60 p.c. of the commercial samples stated to be quite unfit for use.—*P.J.* '02, i. 491.

Solubility.—1 in 120 of Water, but will vary with sp. gr. of sample; it mixes in all proportions with Alcohol (90 p.c.) and Ether.

Medicinal Properties.—It is a local and general anæsthetic, more rapid in its action than Chloroform, and occasionally used in conjunction with it. It is useful in minor surgery, also in obstetric practice and in dental operations.

It should be administered in the same manner as Ether; it is very prompt in its action. It should not be given in prolonged operations or in renal disease. Has been used as a **spray** to produce local anæsthesia.

Strongly recommended in dental operations.

Recommended as a general anæsthetic in short operations. Action rapid, and particularly well adapted for children. Dangerous when administered with air, or if administration is protracted. Amount required varies up to 3 fl. drm. = 10·6 c.c.—*L.* '99, ii. 850; *B.M.J.* '02, ii. 589.

Administered by inhalation in a single dose of from 15 to 30 grammes was free from risk, but prolonged administration of repeated doses was dangerous. More than one warning, however, has been given that 30 grammes (6 fl. drm.) is too large and may occasionally give rise to unpleasant symptoms.—*L.* '03, ii. 745.

A **solution**, 1 in 200 of Water, in angina pectoris, dose ½ to 2 oz. = 14·2 to 56·8 c.c.—*M.A.* '87, 24.

Foreign Pharmacopœias.—Fr. (Bromure d'Ethyle); Dutch and Swed. (Brometum Aethylicum); Belg., Ger. and Swiss (Æther Bromatus); Ital. (Bromuro di etile); Mex. and Span. (Eter Bromhidrico); Jap. and Russ. (Æthylum Bromatum). Not in the others.

Tests.—Pure Ethyl Bromide has sp. gr. 1·473. Sp. gr. given in *P.G.* is 1·453 to 1·457. A very pure sample sold as containing 1 p.c. of Alcohol had sp. gr. 1·461, but ordinary samples may run as low as 1·34.

The boiling point of pure Ethyl Bromide is 101·3° F. (38·5° C.).

Boiling point of a sample sp. gr. 1·45 was 38·5° C. (101° F.), and dissolved in 120 parts of Water.

It should give no reaction with pure Sulphuric Acid, or no more than a yellow colour after an hour, indicating the absence of organic Sulphur compounds, Amyl and Ethylene compounds. When evaporated should leave no residue, indicating the absence of fixed residue. When shaken with an equal volume of Water it should be a little, if anything, decreased in volume, indicating the absence of more than a trace of Alcohol, and when the aqueous layer is separated it should not be acid in reaction towards Litmus paper, nor should an immediate turbidity be produced on the addition of a few drops of Silver Nitrate Solution, indicating the absence of Hydrobromic Acid, etc. When 1 c.c. of Ethyl Bromide is warmed with 3 drops of Aniline and 2 c.c. of Alcoholic Potassium Hydroxide Solution the characteristic odour of Carbylamine should not be evolved, indicating the absence of Chloroform. Its vapour should have a pleasant ethereal odour.

ÆTHYLENE BROMIDE, $C_2H_4Br_2$.—A heavy, colourless, somewhat volatile liquid, obtained from the hydrocarbon Ethylene. Boils at 264·2° F. (129° C.), sp. gr. 2·17. Given in epilepsy.

Dose.—1 to 2 minims = 0·06 to 0·13 c.c., dissolved in oil.

Not Official.

ÆTHYL CHLORIDUM.

ETHYL CHLORIDE. HYDROCHLORIC OR MURIATIC ETHER.

FR., CHLORURE D'ETHYLE; GER., CHLORÄTHYL; ITAL., CLORURO D'ETILE.

C_2H_5Cl, eq. 64·01.

A colourless, ethereal, inflammable liquid, which is supplied in glass capsules closed by a screw or spring cap.

It has a characteristic ethereal and somewhat agreeable odour and a sweetish burning taste.

It is produced by the action of Hydrochloric Acid gas on absolute Ethylic Alcohol.

On account of its highly inflammable and volatile nature it should be preserved in hermetically-sealed glass tubes, and should not be opened when near a naked flame.

Medicinal Properties.—Used for producing local anæsthesia in minor surgery and dentistry, and as an analgesic in neuralgic and rheumatic pains.—*T.G.* '93, 387; '94, 119. *See* also Methyl Chloride.

Description of an apparatus for administering volatile anæsthetic agents, such as bromide and chloride of ethyl. A mask which hermetically seals the mouth and nose of patient.—*L.* '02, ii. 49. Caution required in the use thereof; such volatile bodies are depressants, and their capacity for danger culminates when mouth and nose are hermetically sealed.—*L.* '02, ii. 171.

A few cases of ethyl chloride narcosis. Its use recommended in place of nitrous oxide gas.—*L.* '01, i. 699; '01, ii. 123. Treatment of lupus with ethyl chloride.—*B.M.J.E.* '01, i. 76; *T.G.* '01, 603.

Review of 450 cases in which it was used as a general anæsthetic, with no trouble during narcosis ascribable to the drug itself.—*L.* '03, i. 952.

A record of 100 successful administrations each of Ethyl Chloride and of Soemnoform alone, and in mixture with Nitrous Oxide. The dose was generally determined by the amount of operative work necessary in each individual case, the largest dose given being 6 c.c.—*L.* '05, ii. 1176. A dose of 5 c.c. may be trusted (*B.M.J.* '05, ii. 616) to give at least 5 minutes' anæsthesia in midwifery cases, and gives great command over uncontrollable pains at the end of the second stage.

As an anæsthetic for young children aged from 5 days old and upwards, it is regarded (*L.* '05, ii. 1542, 1922) as one of the best means of procuring an anæsthesia of from 5 to 15 minutes. A celluloid inhaler is used, and the dose employed for infants of a few days or a few weeks old is 3 c.c., for those of 6 months and upwards 5 c.c.

An examination recorded (*L.* '05, ii. 1631) of seven makes of this liquid obtainable in London showed that all the branded samples were pure, as was also one of the unbranded samples. One branded and one unbranded sample were found to contain traces of impurity, but the former was not intended for general anæsthesia. The boiling point of the pure-product is 12·5° C. (54·5° F.). It should be free from Water, from foreign chlorides, from acids, from aldehydes, from Ether or Alcohol, and from organo-metallic substances.

The death of a patient (*L.* '06, i. 615; *B.M.J.* '06, i. 538) while under its influence for the purpose of having four teeth removed gave rise to considerable discussion regarding its safety. The statistics published (*B.M.J.* '06, i. 616) indicate that it is not so innocuous as previous collections appeared to indicate. The dangers seem formidable (*B.M.J.* '06, i. 1058), but should not blot out its undeniable advantages. It occupies a distinct place in the armamentarium of the anæsthetist; it conveniently and safely leads up to Ether narcosis and may take the place of Nitrous Oxide when this is not available, not efficacious, or unsatisfactory. The dose recommended is 2 or 3 c.c. for a child, 3 or 4 c.c. for a woman or weakly man, and 4 or 5 for a man. Minimal dosage and not too great deprivation of air when anæsthesia is complete are the patient's safeguards.

It is stated (*L.* '05, ii. 1026) to occupy a position as an anæsthetic midway between Nitrous Oxide and Ether. It is an ideal preliminary to etherisation, and more especially for great smokers, alcoholics, and nervous patients. Patients with obstructed breathing are regarded as bad subjects for its administration. Mixtures of Ethyl Chloride, Ethyl Bromide, etc., appear to possess no advantages.

Although in point of safety (*L.* '05, ii. 1922), Ethyl Chloride, when administered by skilled hands, as a general anæsthetic, comes between Ether and Chloroform, it is far from being an absolutely innocuous anæsthetic.

A record of twenty-two fatalities which have occurred under Ethyl Chloride. —*L.* '06, i. 1233.

A remarkable uniformity (*L.* '06, ii. 106) is noticed in the qualitative effects of Ethyl Bromide, Chloride, and Iodide. Their physiological action differs in degree only, depending simply on the volatility of the drugs. Their action on the circulatory system appears to be almost directly upon the heart.

Acid intoxication following Ethyl Chloride anæsthesia.—*L.* '08, i. 284.

Tests.—Sp. gr. 0·921 at 0° C. (32° F.). It is but slightly soluble in Water, but mixes in all proportions with Alcohol (90 p.c.), Chloroform, and Ether. It boils at 12° C. (53·6° F.). On ignition it burns with a green-edged, smoky flame producing Hydrochloric Acid gas. It should volatilise completely at ordinary temperatures without leaving a residue, and if allowed to evaporate from pure filter paper should leave no unpleasant odour. Its aqueous or alcoholic solution should have no acid reaction towards blue Litmus paper, nor should a turbidity be produced by the addition of Silver Nitrate Solution.

U.S.P. requires that no odour of Aldehyde shall be developed when the aqueous layer, which remains after shaking 10 c.c. of Ethyl Chloride with 10 c.c. of cold Water and spontaneously evaporating the Ethyl Chloride layer, is treated with Potassium Dichromate and diluted with Sulphuric Acid; indicating the absence of Alcohol.

Foreign Pharmacopœias.—Austr. (Aethylum Chloratum); Belg. and Swiss (Æther Chloratus); Dutch (Chloretum Aethylicum); Fr. (Chlorure d'Ethyle); Ital. (Cloruro d'Etile); U.S.

NARCOTILE (Methylene bi-chloride).—A transparent, colourless, mobile, highly volatile and inflammable liquid. Introduced as a new general anæsthetic. —*L.* '03, i. 1091.

SOEMNOFORM.—Stated to be a mixture of Ethyl Bromide 1, Ethyl Chloride 12, and Methyl Chloride, 7; a rapid, safe and easily eliminated anæsthetic for use in dentistry.—*L.* '03, ii. 635; *P.J.* '03, i. 872.

Two fatal cases have been recorded in connection with Soemnoform, and it is stated (*L.* '04, ii. 1408) that, although the mixture was employed for the object of testing its effect, its use was not likely to be repeated.

Kelene is a proprietary article stated to consist of pure Ethyl Chloride, and put up in tubes fitted with patented automatic stoppers. Useful for producing local anæsthesia. For general anæsthesia it is put up in graduated tubes.

Anæsthyl and **Coryl** are stated to be mixtures of Ethyl and Methyl Chlorides.

Not Official.

ÆTHYL IODIDUM.

ETHYL IODIDE. HYDRIODIC ETHER.

C_2H_5I, eq. 154·72.

A colourless, volatile, heavy and non-inflammable liquid, with an agreeable ethereal odour and pungent taste.

It is produced by the action of resublimed Iodine on pure Ethylic Alcohol in the presence of amorphous Phosphorus. The coloured product is freed from uncombined Iodine by shaking with a solution of Sodium Bisulphite and purified by digestion over fused Calcium Chloride and redistillation.

It should be kept in well-stoppered glass bottles of a dark amber tint and in a cool place.

It soon acquires a reddish-brown colour on exposure to light; but if no deeper than a pale wine colour it may be disregarded.

The change of colour can be prevented by putting in the bottle a globule of Mercury.

Solutions which have already become discoloured may be shaken with some finely-powdered Sodium Bisulphite, filtered and redistilled.

Solubility.—1 in 440 of Water, mixes in all proportions with Alcohol (90 p.c.).

Medicinal Properties.—Antispasmodic. It is used as an **inhalation;** 15 to 20 drops inhaled through the nose from a wide-mouthed bottle is more accurate and economical than dropping it on a handkerchief. It is said not to weaken the digestive organs but rather to have a tonic effect. It has been inhaled with success to relieve the dyspnœa in chronic bronchitis and asthma; also in secondary and tertiary syphilis as an adjunct to the administration of Potassium Iodide, the Iodine being very rapidly absorbed.—*Squibb; B.M.J.* '89, ii. 1216; *P.J.* (3) xix. 46.

Prescribing Note.—*Can be obtained in* **glass capsules,** 5 *minims* = 0·3 *c.c. in each.*

Foreign Pharmacopœias.—Mex. (Eter Yodhidrico). Not in the others.

Tests.—Sp. gr. at 15·5° C. (60° F.) 1·943. Boiling point 71° to 72° C. (159·8 to 161·6° F.). It should leave no residue upon evaporation. When shaken with an equal volume of Water and a little fuming Nitric Acid free Iodine is liberated, recognised by the reddish-brown colour produced. The aqueous layer remaining after shaking together equal volumes of Ethyl Iodide and Water shall yield no turbidity with Silver Nitrate Solution (absence of Hydriodic Acid).

Not Official.

AGARICUS ALBUS.

AGARIC OF THE LARCH. WHITE OR PURGING AGARIC.

A species of mushroom, found growing on old Larches in Southern and Central Europe.

Medicinal Properties.—Has been used with success in night sweating of phthisis, checking cough and promoting sleep; also in hæmoptysis. It has a strong cathartic action.—*Pr.* xxix. 321; *M.T.* '81, ii. 442; *T.G.* '88, 41, 371.

Dose.—5 to 30 grains = 0·32 to 2 grammes of the powder given in jam.

Foreign Pharmacopœias.—Official in Fr., Ital. (Agarico Bianco), Mex. (Agarico Blanco), Port. (Agarico Brancho), Span. and Swiss. Not in the others.

Descriptive Notes.—This fungus is not a true agaric, but belongs to the *Polyporei* in which the gills are replaced by slender tubes, giving a porous appearance to the under surface of the cap or pileus. The commercial article consists of the fleshy part or stroma of the fungus deprived of the brown-ringed white cuticle of the upper surface and, almost entirely, of the short tubular portion or hymenium of the lower surface. It grows on various species of Larch, from Central Europe to Siberia, chiefly on *Larix Sibirica*, Led., and comes to England *viâ* Hamburg. It varies in size from 3 to 8 inches (7·5 to 20 cm.) or more in diameter. It is whitish, spongy and friable. Although normally of the form of a rounded cone, it is often broken up into irregular pieces. The taste is sweetish at first and afterwards bitter and acrid, but it has no characteristic odour. It can be rubbed to powder in a sieve, but becomes flattened when pounded in a mortar. The active principle Agaricin is official in the *P.G.* Under the microscope the drug is seen to consist of slender hyphal threads, mixed with minute calcareous concretions.

AGARICIN (Agaricic Acid).—A white crystalline powder. Melts at 138° C. (280·4° F.).

Solubility.—1 in 140 of Alcohol (90 p.c.); practically insoluble in Water and in weak Alcohol.

Dose.—$\frac{1}{4}$ to $1\frac{1}{2}$ grains = 0·016 to 0·1 gramme. Generally given with Dover's Powder in a pill.

Ph. Ger. maximum single dose, 0·1 gramme.

It should not be given hypodermically.—*L.M.R.* '84, 118.

In pill form $\frac{1}{12}$ grain very successful in night sweats of phthisis.—*T.G.* '94, 627.

Foreign Pharmacopœias.—Official in Dan., Ger., Ital., Jap., Mex. and Norw. Not in the others.

ALCOHOL ABSOLUTUM.

ABSOLUTE ALCOHOL.

FR., ALCOOL ETHYLIQUE; GER., ABSOLUTER ALKOHOL; ITAL., ALCOOL ASSOLUTO; SPAN., ALCOHOL ANHIDRO.

A clear colourless, mobile, hygroscopic liquid, volatile and inflammable. It possesses a spirituous odour and a burning taste, and contains Ethyl Hydroxide, $\mathbf{C_2H_5OH}$, eq. 45·70, with not more than 1 p.c., by weight, of Water. It is obtained by the dehydration and rectification of Ethylic Alcohol of weaker strengths. It is possible to rectify Alcohol up to 98 p.c.; beyond this dehydrating agents are necessary.

On account of its hygroscopic nature and its inflammability it should be preserved in well-stoppered bottles in a cool place.

Foreign Pharmacopœias.—Official in Ital., sp. gr. 0·800; Span., sp. gr. 0·794; Dutch, sp. gr. 0·794 to 0·799; Austr., Belg., Dan., Ger. and Jap., sp. gr. 0·796 to 0·800; Fr., sp. gr. 0·79433; Swed., sp. gr. 0·7955 to 0·8005; Swiss, sp. gr. not higher than 0·796; Mex. (Alcohol Vinico), sp. gr. 0·790; U.S., sp. gr. not higher than 0·797 at 15·6° C. (60° F.); or 0·790 at 25° C. (77° F.). Not in the others.

Official Preparations.—Used in the preparation of Chloroform, Liquor Ethyl Nitritis, and Liquor Sodii Ethylatis.

ALCOHOL (90 p.c.).—This is described under the heading SPIRITUS RECTIFICATUS, as are also the weaker strengths of Alcohol, which are prepared from it.

Tests.—The distinguishing tests for Absolute Alcohol are the sp. gr. which should be about 0·794, and the boiling point 78·5° C. (173·3° F.); the latter is not included in *B.P.* or *U.S.P.*; the *P.G.* gives 78·5° C. (173·3° F.).

The official figure for the sp. gr. is 0·794 to 0·796; the *U.S.P.* gives not higher than 0·797 at 15·6° C. (60° F.), or 0·790 at 25° C. (77° F.); the *P.G.* 0·796 to 0·800.

The more generally occurring impurities are excess of Water, extractive matter, substances of an oily or resinous nature, Amylic Alcohol, Fusel Oil, organic impurities, Aldehyde, and Tannic Acid. Absolute Alcohol is required to be neutral to blue Litmus paper by *U.S.* and *P.G.*, but *B.P.* makes no mention of its reaction.

B.P. uses 1 to 2 p.c. of anhydrous Copper Sulphate as a test for excess of Water, requiring that when mixed with this quantity of the reagent and shaken occasionally within 2 or 3 hours the salt shall not become decidedly blue, but *U.S.P.* relies upon the sp. gr. alone.

All three Pharmacopœias agree that no fixed residue shall be left upon evaporation, and that it shall mix with Water without any turbidity, indicating the absence of oily and resinous substances.

The *B.P.* and *U.S.P.* require that it shall leave no unpleasant or foreign odour when allowed to evaporate from clean filter paper, indicating the absence of Fusel Oil and allied impurities; the *P.G.* states that the Alcohol itself should possess no foreign odour.

The *B.P.* and *U.S.P.* differ in their method of testing for Amylic Alcohol, and in the quantities used for the test. *B.P.* indicates 100 c.c. of Absolute Alcohol and 2 c.c. of Volumetric Silver Nitrate Solution, decanting the supernatant liquid from the black precipitate formed during the first 24 hours' exposure to bright light, and requiring that the liquid shall undergo no further change when exposed to the light after the addition of more Volumetric Silver Nitrate Solution; *U.S.P.* employs 20 c.c. of Absolute Alcohol for the test and 1 c.c. of Silver Nitrate Test-solution, stipulating that no more than a faint opalescence nor more than a faint brownish tint shall be acquired when exposed for six hours to diffused daylight. The *P.G.* employs 10 c.c. of the Alcohol and 5 drops of Silver Nitrate Solution, requiring that it shall neither become turbid nor coloured on warming. The *P.G.* includes a test for Fusel Oil by evaporating a mixture of 10 c.c. of Absolute Alcohol and 0·2 c.c. Potassium Hydroxide Solution (15 p.c. w/w) to one-tenth its volume, and supersaturating the residue with Sulphuric Acid; when no odour of Fusel Oil should be developed.

The *P.G.* performs the test for readily carbonisable organic impurities on the Absolute Alcohol direct, without evaporation, but *U.S.P.* directs the spontaneous evaporation of the Alcohol (carefully protecting the liquid from dust during the evaporation) and the application of a few drops of colourless Sulphuric Acid to the residue. Both Pharmacopœias require that no red coloration should be produced.

U.S.P. and *P.G.* give practically the same test for limit of Aldehyde.

The Ammonia test for Tannic Acid and excess of Aldehyde is common to *B.P.* and *P.G.*, but is omitted from *U.S.P.* The *B.P.* requires that no immediate coloration shall be produced on the addition of Ammonia Solution; the *P.G.* that no coloration shall be yielded on the addition of Ammonia Solution.

The *U.S.P.* includes a test for the absence of not more than 2 p.c. of Methyl Alcohol which does not appear in either *B.P.* or *P.G.* It depends upon the oxidation of the Methyl Alcohol by means of Copper wire, and a test for Formaldehyde in the oxidised liquid by the Resorcin test. The Acetaldehyde produced by the oxidation of the Ethylic Alcohol is previously removed by boiling. The test is given in the small type under Spiritus Rectificatus, under the heading of Copper Wire and Resorcin.

The *P.G.* requires that the red coloration produced in a mixture of 10 c.c. of Absolute Alcohol and 1 c.c. of Potassium Permanganate Solution (0·1 p.c. w/w), shall not change to yellow within 20 minutes; the test is intended to detect the presence of Aldehyde or Formic Acid, Fusel Oil and other organic impurities. This latter Pharmacopœia also requires that Absolute Alcohol shall not be coloured by Hydrogen Sulphide Solution, indicating the absence of Copper and Lead.

Except so far as strength is concerned, both *B.P.* and *U.S.P.* require Absolute Alcohol to respond to the respective tests given under 'Spiritus Rectificatus.'

Not Official.

ALCOHOL METHYLICUM.

METHYLIC ALCOHOL.

Syn.—Rectified Pyroxylic Spirit.

A colourless liquid, with a peculiar spirituous odour, and which has been submitted to various processes of rectification. It is produced by the destructive distillation of wood.

Its vapour forms explosive mixtures with air, and as it is very volatile it should be kept in well-stoppered bottles and in a cool atmosphere.

Solubility.—It mixes readily with Water, Ethylic Alcohol, Chloroform, and Ether. It dissolves Fats and volatile Oils.

Medicinal Properties.—Narcotic, sedative, and anti-emetic. It palliates the cough and lessens the febrile excitement of phthisis. It has been mixed with Chloroform for use as an anæsthetic (Regnauld's Anæsthetic Mixture). *See* Chloroform.

In cases of poisoning, the use of the stomach-pump and rectal injections are recommended (*B.M.J.* '05, i. 262) to get rid of the poison. Stimulants and application of heat to the body and extremities. The treatment of the amaurosis is unsatisfactory. In the early stages, Pilocarpine and Potassium Iodide are indicated, and in the later stages Strychnine hypodermically or by the mouth.

The deodorised product has received considerable attention on account of its poisonous properties. Injected in small and continuous doses, its effect is far more deadly than grain Alcohol. The fumes are a distinct menace to eyesight and general health, and its external use is also objected to.—*L.* '04, ii. 1255.

Tests.—Sp. gr. about 0·803. Boiling point about 55° to 66·5° C. (131° to 151·7° F.). It should be without action on Litmus paper, and should not be rendered turbid by admixture with Water. It should leave no empyreumatic odour on evaporation, and should be free from fixed residue. It should yield little or no reaction for Iodoform when tested with Potassium Hydroxide Solution and Iodine (absence of Acetone).

Dose.—5 to 10 minims = 0·3 to 0·6 c.c.

Wood Spirit, Wood Naphtha, Pyroxylic Spirit are names applied to the crude article of commerce, which may contain from 75 to 90 p.c. of real Methylic Alcohol.

METHYLATED SPIRIT.—*See* Spiritus Methylatus.

METHYLIC ETHER.—It is gaseous at ordinary temperatures, but is condensed by cold and pressure to a liquid boiling at −20° C. (−4° F.). A solution of this in Ethylic Ether is useful for producing local anæsthesia.

Not Official.

ALETRIS.

STAR GRASS. COLIC ROOT.

A perennial plant indigenous to U.S. The root was formerly included in the U.S. secondary list. It is stated to be useful as a uterine tonic, and has been employed with asserted benefit in colic, dropsy, and in chronic rheumatism.

Descriptive Notes.—The rhizome occurs in pieces about 1 to 2 inches (25 to 50 mm.) long, rarely branched, ⅙ to ½ inch (4 to 12·5 mm.) in diameter, compressed, covered with the brownish-grey scaly remains of leaves, and root-fibres, so that its outer surface is hidden. The transverse section is yellowish-white, spongy and porous, exhibiting here and there glistening points. The taste is mucilaginous and then bitter. It contains much starch, and unless kept in a bottle it is liable to be attacked by insects. It is derived from *Aletris farinosa*, L., and belongs to the nat. ord. Hæmodoraceæ.

EXTRACTUM ALETRIDIS LIQUIDUM.—A 1 in 1 fluid extract of the rhizome prepared by percolation. The Alcohol is removed by distillation from the last portion of the percolate, the residue is dissolved in the reserved portion, and sufficient of the menstruum (Alcohol 45 p.c.) added to produce the required volume.—*B.P.C. Formulary* 1901.

This has been incorporated in the *B.P.C.*

ELIXIR ALETRIDIS.—Fluid Extract of Aletridis, 1; Fluid Extract of Liquorice, ¼; Tincture of Orange, ¼; Syrup, 1½; Distilled Water, to yield 4.—*B.P.C. Formulary* 1901.

Dose.—30 to 60 minims = 1·8 to 3·6 c.c.

Elixir Aletridis.—Liquid Extract of Aletris, 25; Liquid Extract of Liquorice, 6; Simple Elixir, 45; Distilled Water, *q.s.* to produce 100.—*B.P.C.*

ALOES.

FR., ALOES; GER., ALOE; ITAL., ALOE; SPAN., ACIBAR.

Both Aloe Barbadensis and Aloe Socotrina are official in *B.P.* and *U.S.P.* *P.G.* has the African varieties only. *See* below.

Medicinal Properties.—Bitter tonic, purgative, acting chiefly on the large intestine; the slowest of purgatives, taking ten to fifteen hours to act. Stomachic bitter in very small doses. A good tonic cathartic in habitual constipation and in that associated with amenorrhœa and anæmia. Emmenagogue; should not be given during advanced pregnancy nor in inflammatory conditions of the pelvic organs. Small doses relieve, large doses aggravate hæmorrhoids. Used as an enema it is anthelmintic.

The aqueous extract is more active than is the resinous portion of Aloes, and the Barbados Aloes, containing a larger amount of aqueous extract than the Socotrine, is the more purgative; thus, 2 grains are equal to 3 grains of Socotrine.

Dose.—2 to 5 grains = 0·13 to 0·32 gramme.

Prescribing Notes.—*Can be made into pills with a small quantity of diluted Alcohol; rarely prescribed alone.*

1 *grain with ⅓ grain Extract of Nux Vomica, is an excellent pill to obtain the stomachic effect, and to relieve habitual constipation. The Pilula Aloes et Ferri, and Pilula Aloes et Myrrhæ are given in amenorrhœa associated with chronic dyspepsia and constipation.*

Official Preparations.—Of **Barbados Aloes,** Extractum Aloes Barbadensis, Pilula Aloes Barbadensis, Pilula Aloes et Ferri. Contained in Pilula Cambogiæ Composita, Pilula Colocynthidis Composita, and Pilula Colocynthidis et Hyoscyami. Used in the preparation of Aloinum. Of the **Extract,** Decoctum Aloes Compositum, Extractum Colocynthidis Compositum, Tinctura Aloes. Of **Socotrine Aloes,** Pilula Aloes et Asafetidæ, Pilula Aloes et Myrrhæ, Pilula Aloes Socotrinæ. Contained in Pilula Rhei Composita, Tinctura Benzoini Composita. Also used in the preparation of Aloinum.

Not Official.—Aloe Capensis, Decoctum Aloes Compositum 'Squire,' Enema Aloes, Pilula Aloes Diluta, Pilula Aloes et Belladonnæ, Pilula Aloes et

Nucis Vomicæ, Pilula Aloes Composita, Pilula Aloes et Myrrhæ, Pilulæ Aperientes Stahlii, Pilulæ Guttæ Aloeticæ, Pilula Laxativæ Composita, Pulvis Aloes et Canellæ, Tinctura Aloes Composita, Tinctura Aloes et Myrrhæ, and Vinum Aloes.

The distinguishing tests for Barbados and Socotrine Aloes will be found under their official headings. The African varieties are official in the *P.G.*, and the Descriptive Notes and Tests are given here.

South African Aloes is the evaporated juice of the leaves of the African varieties of the genus 'Aloe,' and forms a dark brown mass possessing a characteristic odour and bitter taste. It easily breaks into large pieces with a conchoidal fracture and sharp-edged reddish splinters which are translucent and of a reddish or light brown tint, but do not possess any crystalline character under the microscope.

Descriptive Notes.—There are three forms of Aloes imported from British South Africa. First, the vitreous blackish Aloes with a conchoidal fracture, and greenish-brown translucent splinters, commonly known in this country as Cape Aloes, which give the reactions described in the *P.G.* Second, an opaque or 'Hepatic' Cape Aloes, giving an orange brown powder, imported of recent years from Mossel Bay under the name of 'Uganda' Aloes, and manufactured from the leaves of *Aloe ferox*, L., and dried by sun heat alone, in the form of square bricks about four inches square and one inch thick. Third, an opaque Aloes very brittle and giving a pale greenish-brown powder. It is rarely imported, and comes from Port Natal, but is remarkable for giving a permanent crimson colour with Nitric Acid and a bluish colour when Sulphuric Acid is added to it and the vapour of Nitric Acid blown over the mixture. It should perhaps be called Hepatic Natal Aloes, since a translucent Aloes is also prepared from *Aloe platylepis*, J. G. Baker, near Pietermaritzburg in Natal, and usually passes in commerce for Cape Aloes and gives the same chemical reaction as that prepared from *Aloe ferox*, L. The botanical source of Hepatic Natal Aloes is unknown.

Tests.—The distinguishing test for African Aloes is that if a particle be treated with Nitric Acid no red but only a pale greenish zone shall be formed within three minutes (differing thus from Barbados Aloes).

About 40 p.c. should be soluble in cold Water, and it should be completely soluble 1 in 5 (by weight) of warm Alcohol (90 p.c.), the solution remaining clear even after cooling.

5 parts of Aloes treated with 60 parts of boiling Water should yield an almost clear solution, from which about 3 parts again separate on cooling, *P.G.*

Aloes dissolved in hot Water produces with Concentrated Solution of Borax a greenish fluorescence, *P.G.*

It should impart to boiling Chloroform and Ether only a very faint yellow colour, and Ether so coloured should leave only a very slight residue, *P.G.*

Thoroughly dried Aloes is used for the preparation of Powdered Aloes. The powder should not agglutinate at 100° C. (212° F.) nor alter in colour, *P.G.*

ALOE BARBADENSIS. BARBADOS ALOES.

FR., ALOES DES BARBADES; GER., BARBADOS ALOE; ITAL., ALOE VERA; SPAN., ACIBAR BARBADO.

They are obtained principally from the leaves of *Aloe vera*, L., and *Aloe chinensis*, Steud., in the West Indian Islands, and sold as Barbados or Curaçao Aloes.

Solubility.—Water dissolves about 75 p.c. It is almost entirely soluble in Alcohol (60 p.c.).

Dose.—2 to 5 grains = 0·13 to 0·32 gramme.

Foreign Pharmacopœias.—Official in Belg., Dutch, Fr., Ital., Jap., Port., Span. and U.S.; Mex. (Acibar). Not in the others.

Descriptive Notes.—Barbados or Curaçao Aloes as imported varies considerably in colour, consistence, and degree of opacity, and may be in the form of a stiff yellowish-brown paste, a mass of pitchy character, or hard and solid, but it always has a comparatively smooth surface; when dried it varies in colour from chocolate brown to black, or rarely exhibiting more or less translucent pieces, which become opaque on keeping. It has a characteristic somewhat nauseous odour, more evident when freshly broken, or powdered, and a very bitter taste. The best qualities conform to the requirements as to solubility given under Tests. Such Aloes as present a chocolate brown colour and freedom from air vesicles are of the finest quality and should be chosen for medicinal use, these characters indicating evaporation of the fresh, not fermented, juice by steam heat, black vesicular samples being of inferior quality, prepared from fermented juice and evaporated over a naked fire.

Aloes are now rarely imported from Barbados, and then only in small quantity, coming almost exclusively from the Dutch West Indian Islands of Curaçao, Bonaire, and Aruba.

Tests.—The distinguishing test for Barbados Aloes is the crimson colour imparted to Nitric Acid by the powder.

The more generally occurring impurity is an undue amount of insoluble matter. This is guarded against by the requirement that not less than 70 p.c. shall be soluble in Water, and that it should be almost entirely soluble in a mixture containing Alcohol (90 p.c.) diluted with half its volume of Water.

Barbados Aloes yields about 2 p.c. of ash, and 3 p.c. should not be exceeded.

1. **Borntrager's test.**—Shake out with Benzene, and treat separated Benzene with Ammonia; pink colour on standing.

2. **Klunge's test.**—Warm with Copper Sulphate and a little Sodium Chloride; yellow colour, changing to red or violet. Fair test for West Indian Aloes, but not much good for the other varieties.

3. **Fluckiger's test.**—Sulphuric Acid and Nitric Acid Vapour; deep blue colour. Specific test for Natal Aloes.

3. **Bainbridge's test.**—Nitric Acid; red colour, changing to green. Distinguishes it from Cape Aloes.

5. **Cripp's and Dymond's test.**—Triturate 1 grain of sample with 16 drops Sulphuric Acid, add 4 drops Nitric Acid and dilute with an oz. of Water. A deep orange to crimson colour is developed, intensified by the addition of Ammonia. This appears to be the best general test for Aloes.—*P.J.* (3) xv. 633. The reaction is also given by all bodies containing or yielding Chrysophanic Acid, but these yield a pink colour with Ammonia alone while Aloes only gives a pale yellow.

ALOE SOCOTRINA. Socotrine Aloes.

Fr., Aloes Socotrin; Ger., Socotrinische Aloe; Ital., Aloe di Socotora; Span., Acibar Sucotrino.

Socotrine or Zanzibar Aloes, obtained from *Aloe Perryi*, J. G. Baker, and possibly other species. Imported principally through Bombay.

Solubility.—Water dissolves about 50 p.c.; the residue is pretty well inert; almost entirely soluble in Alcohol (60 p.c.).

Dose.—2 to 5 grains = 0·13 to 0·32 gramme.

Foreign Pharmacopœias.—Official in Belg., Ital., Mex., Port., Span. and U.S.; U.S. has also Aloe Purificata, which is Socotrine Aloes dissolved in Alcohol, strained and evaporated to dryness. Cape Aloes is official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Norw., Port., Russ., Span., Swed. and Swiss.

Descriptive Notes.—Socotrine Aloes is usually imported in barrels, in a semi-liquid or pasty condition, and sometimes in a fermented or more or less fetid state. When dried it presents an extractiform or irregular surface, is opaque, and if of good quality is of a dark brown colour and gives an orange-brown powder. It possesses a not unpleasant odour. Inferior qualities are black and vesicular and have a rancid or butyric odour, and are unfit for medicinal use. Zanzibar Aloes is imported in skins, containing several pounds, packed in rectangular cases. It is usually of better quality than the Socotrine Aloes, and is commonly sold as 'Hepatic' Aloes, the opaque fractured surface being of a liver colour. Samples of which the splinters are garnet red and translucent are now rarely met with in either the Socotrine or Zanzibar varieties. These Aloes should conform to the requirements as to solubility given under Tests, and also the reactions with Nitric Acid. An East African Aloes met with in commerce is sold as Socotrine which does give a crimson colour with Nitric Acid, and therefore is excluded by the *B.P.* test, whilst its geographical source prevents its inclusion under Barbados Aloes; this kind exhales a faint odour like that of Curaçao Aloes, when freshly broken or powdered. There is also an Aloes, which comes *viâ* Bombay, from Jafferabad and other parts on the Arabian coasts, which does not give a crimson colour with Nitric Acid, but this kind yields a powder of a dull brown, not of an orange-brown colour like the Zanzibar and Socotrine Aloes, and possesses hardly any odour. The official description does not exclude Jafferabad Aloes, except in so far as that name is not used.

Tests.—The distinguishing test for Socotrine Aloes is the reddish or yellowish-brown colour produced when the powder is treated with a drop or two of Nitric Acid.

The more generally occurring impurities are leaves of *Calotropis* and stones, and an undue proportion of insoluble matter; but the opaque Natal Aloes might be mistaken for it, although its powder has a greenish-brown hue, not the orange-brown tint of Socotrine and Hepatic Aloes. The distinction of Barbados Aloes from Natal Aloes is ensured by the official requirement that no blue coloration shall be produced when the vapour of Nitric Acid is blown over the powder, previously moistened with Sulphuric Acid; the absence of the other impurities by the fact that *B.P.* requires about 50 p.c. to be soluble in Water, and that it should be almost entirely soluble in a mixture of Alcohol (90 p.c.) with half its volume of Water. The *U.S.P.* fixes a standard for moisture, which should not exceed 10 p.c.

Socotrine Aloes yields about 2 p.c. of ash, and 3 p.c. should not be exceeded.

ALOINUM. Aloin. $C_{16}H_{16}O_7$, $3H_2O$, eq. 371·36.

A yellow crystalline powder possessing a faint odour of Aloes and a very bitter taste. It is a neutral, non-glucosidal, bitter principle, obtained chiefly from Barbados Aloes.

It may be assumed that commercial 'Aloin' is α-Barbaloin. Its formula is $C_{16}H_{16}O_7$, with about three molecules of Water of crystallisation.

Solubility.—1 in 120 of Water; 1 in 18 of Alcohol (90 p.c.); freely soluble in hot Water; nearly insoluble in Ether.

B.P. states sparingly soluble in cold Water; *U.S.P.* gave the figure as 1 in about 65 at 25° C. (77° F.), but this was subsequently altered in the list of corrections and additions to 1 in 120; 3 samples obtained (1903) from different manufacturers yielded a solution at 1 in 120.

Dose.—½ to 2 grains = 0·03 to 0·13 gramme.

Prescribing Note.—*Generally given in* **pills** *or in* **cachets** *with other ingredients. 'Diluted Glucose' is a good excipient for Aloin in pills.*

Not Official.—Pilula Aloini Composita, Pilula Aloini et Podophylli.

Foreign Pharmacopœias.—Official in U.S. Not in the others.
Aloins may be classified as follows:—

BARBALOINS.—Yielding on oxidation Chrysammic, Aloetic, and Picric Acid.

- **α-barbaloin,** which gives a red colour with *cold* Nitric Acid (1·42), obtained from Barbados and Curaçao Aloes.
- **β-barbaloin,** which requires either fuming Nitric Acid, or a *hot* Acid of ordinary strength to give the *red* coloration. This variety is yielded by Jafferabad, and by some varieties of Socotrine and Zanzibar Aloes, *see* p. 119.

NATALOIN.—Yields on oxidation Picric but not Chrysammic Acid. This is a distinct species, from Natal Aloes only, having a formula $C_{24}H_{26}O_{10}$. H_2O. Softens at 180° C., and melts at 210° C.

Tests.—The distinguishing tests for Barbaloin are its melting point, which, when anhydrous, should be 147° C. (296·6° F.), and the red coloration produced on the addition of Nitric Acid. Both *U.S.P.* and *B.P.* state that Aloin is rapidly affected in alkaline solutions, but only slowly in neutral or acidified solutions.

B.P. gives no tests for impurities, but those more generally occurring are mineral residue, Aloins derived from Natal or Cape Aloes, and Emodin. Mineral matter is detected by the ash left on ignition, whilst Emodin is detected by treating the 10 p.c. Benzene Solution with an equal volume of 5 p.c. Ammonia Water. It should leave no weighable residue when ignited with free access of air. In testing for Emodin a weighed quantity of Aloin is shaken with 10 c.c. of Benzin for 1 minute and filtered, the filtrate should not impart more than a faint pink colour to an equal volume of Ammonia Solution (5 p.c.) when shaken with it. Its distinction from Nataloin, Socaloin and Capaloin is carried out by the colour tests mentioned below.

Colour reactions of the *U.S.P.* (*a*) The solutions in Ammonia and the Alkalis are yellow, turning red, with a greenish-red fluorescence. (*b*) Nitric Acid gives with Curaçao Aloin a cherry-red solution (distinction from Nat. Soc.

and Capaloins). (*c*) Sulphuric Acid with a minute quantity of Aloin forms a yellowish-red solution, which with a small crystal of Potassium Dichromate added becomes olive green, then dark green, and finally blue on standing; with a larger amount of Potassium Dichromate, the yellowish-red solution first turns purple, then brown, and finally green. (*d*) Bromine Water colours an aqueous solution pink. (*e*) Gold Chloride T.S. to carmine-red, turning to violet. (*f*) Ferric Chloride T.S. with an alcoholic solution gives a brownish-green colour. (*g*) Copper Sulphate T.S. gives with a dilute aqueous solution of Curaçao Aloin a bright yellow colour, this mixture with a few drops concentrated solution of Sodium Chloride gives a red colour, and on further adding a little Alcohol the colour becomes violet (distinction from Nataloin and Capaloin).

Preparations.

DECOCTUM ALOES COMPOSITUM. COMPOUND DECOCTION OF ALOES. *N.O.Syn.*—BAUME DE VIE.

An aqueous solution prepared by boiling together for five minutes Extract of Barbados Aloes 1, Myrrh ½, Potassium Carbonate ½, Extract of Liquorice 4, and Distilled Water 40. Immediately after the boiling is finished add Saffron ½, and, when the liquid has cooled down, Compound Tincture of Cardamoms 30, and more Distilled Water to make 100 of product. (1 of Extract in 100)

Dose.—½ to 2 fl. oz. = 14·2 to 56·8 c.c.

Tests.—Decoction of Aloes, *B.P.*, has a specific gravity of about 1·005, contains about 5·5 p.c. w/v of total solids and about 20 p.c. w/v of Absolute Alcohol.

DECOCTUM ALOES COMPOSITUM 'SQUIRE.' Made with Socotrine Aloes and the Fluid Extract of Liquorice.

Dose.—½ to 2 fl. oz. = 14·2 to 56·8 c.c.

The fluid extract is much better than the solid extract for covering the taste of Aloes; there is a marked difference in the taste of the two preparations, even when they practically contain the same amount of Liquorice. This suggestion has been adopted in *B.P.* in the case of Tincture of Aloes, but not in that of the Compound Decoction where it is of more importance.

Tests.—Squire's Decoction of Aloes has a specific gravity of about 1·009; it contains about 10 p.c. w/v of total solids and about 22 p.c. w/v of Absolute Alcohol.

EXTRACTUM ALOES BARBADENSIS.—EXTRACT OF BARBADOS ALOES.

An aqueous Extract, of which about ¾ grain is equal to 1 grain of the Aloes.

Dose.—1 to 4 grains = 0·06 to 0·26 gramme.

Foreign Pharmacopœias.—Extract of Aloes is Official in Austr., Dan., Dutch, Ger., Hung., Ital., Jap., Norw., Russ., Swed., Swiss and U.S. Not in the others.

PILULA ALOES BARBADENSIS. PILL OF BARBADOS ALOES.

4 of the pill is about equal to 2 of Barbados Aloes, 1 of Hard Soap, ⅛ of Oil of Caraway, and 1 of Confection of Roses.

Dose.—4 to 8 grains = 0·26 to 0·52 gramme.

PILULA ALOES SOCOTRINÆ. Pill of Socotrine Aloes.

4 of the pill is about equal to 2 of Socotrine Aloes, 1 of Hard Soap, $\frac{1}{8}$ of Oil of Nutmeg, and 1 of Confection of Roses.

Dose.—4 to 8 grains = 0·26 to 0·52 gramme.

Foreign Pharmacopœias.—Official in Fr. (Pilules d'Aloes et de Savon), Jap. and U.S. (Pilulæ Aloes), Aloes and Soap, equal parts; Mex. (Pildoras de Acibar), Aloes 10, Soap 2; Swiss (Pilulæ Aloeticæ), Aloes 10, Soap 1, Glycerin 8 drops, Spirit *q.s.* Not in the others.

PILULA ALOES ET ASAFETIDÆ. Pill of Aloes and Asafetida.

4 of the pill is about equal to 1 of Socotrine Aloes, 1 of Asafetida, 1 of Hard Soap, and 1 of Confection of Roses.

Dose.—4 to 8 grains = 0·26 to 0·52 gramme.

Foreign Pharmacopœias.—Official in U.S., 1 in 3; Jap., equal parts of Aloes, Asafetida, Soap and Honey. Not in the others.

PILULA ALOES ET FERRI. Pill of Aloes and Iron.

$4\frac{1}{2}$ of the pill is about equal to 1 of Barbados Aloes, $\frac{1}{2}$ of Exsiccated Ferrous Sulphate, $1\frac{1}{2}$ of Compound Powder of Cinnamon, and $1\frac{1}{2}$ (by weight) of Syrup of Glucose.

Dose.—4 to 8 grains = 0·26 to 0·52 gramme.

Foreign Pharmacopœias.—Official in U.S., Purified Socotrine Aloes 1, Exsiccated Ferrous Sulphate 1, Aromatic Powder 1, Confection of Roses *q.s.*; Ger., Cape Aloes 1, Exsiccated Ferrous Sulphate 1, Sp. Saponis *q.s.*; Jap., equal parts of Aloes and Spirit *q.s.*; Swiss, Aloes 5, Ferrous Sulphate 5, Soap 1, Glycerin 5 drops, Alcohol *q.s.* Not in the others.

PILULA ALOES ET MYRRHÆ. Pill of Aloes and Myrrh.

$4\frac{1}{2}$ of the pill is about equal to 2 of Socotrine Aloes, 1 of Myrrh, and $1\frac{1}{2}$ (by weight) of Syrup of Glucose.

The composition of this pill, known also as Pil. Rufi, remained much the same for about 300 years, but in 1898 the *B.P.* omitted the Saffron, the proportions of Aloes and Myrrh remaining the same.

Dose.—4 to 8 grains = 0·26 to 0·52 gramme.

Foreign Pharmacopœias.—Official in Port. and U.S., with Aromatic Powder in place of Saffron, Purified Aloes 13, Myrrh 6, Aromatic Powder 4, in grammes, Syrup *q.s.* to make 100 pills. Not in the others.

TINCTURA ALOES. Tincture of Aloes.

Extract of Aloes, 1; Liquid Extract of Liquorice, 6; Alcohol (45 p.c.), *q.s.* to make 40.

(1 Extract in 40)

Dose.—$1\frac{1}{2}$ to 2 fl. drm. = 5·4 to 7·1 c.c.; when repeated, $\frac{1}{2}$ to 1 fl. drm. = 1·8 to 3·6 c.c.

Foreign Pharmacopœias.—Official in Belg., 1 in 5; Dutch, Fr., Ger., Ital., Jap., Russ., Span., Swiss, 1 and 5; Hung. and Port., 15 in 100; U.S., 1 in 10. All are by weight, except U.S.

Tests.—Tincture of Aloes has a sp. gr. of 0·970 to 0·980; it contains from 7 to 8 p.c. w/v of total solids and about 40 p.c. w/v of Absolute Alcohol.

Not Official.

ALOE CAPENSIS (Cape Aloes).—A translucent variety. *See* p. 117.

Official in all the Foreign Pharmacopœias.

DECOCTUM ALOES COMPOSITUM 'SQUIRE.'—*See* p. 121.

ENEMA ALOES.—Aloes 40 grains, Carbonate of Potassium 15 grains, Mucilage of Starch 10 fl. oz.—*B.P.* 1885.

Aloes 0·75, Potassium Carbonate 0·25, Glycerin 10, Mucilage of Starch *q.s.* to produce 100.—*B.P.C.*

PILULA ALOES DILUTA.—Marshall Hall's Pill. Barbados Aloes 4, dissolve in Water and strain; then add Extract of Liquorice 4, Treacle 4, thinly sliced Hard Soap 4; mix and evaporate to a pilular consistence.

Dose.—3 or 4 grains = 0·2 or 0·26 gramme.

This has been incorporated in the *B.P.C.* as a 4-grain pill.

PILULA ALOES ET BELLADONNÆ.—Extract of Aloes, 1 grain; Extract of Belladonna, ¼ grain.

PILULA ALOES ET NUCIS VOMICÆ.—Extract of Aloes, 1 grain; Extract of Nux Vomica, ¼ grain.

Barbados Aloes, 2 grains; Extract of Nux Vomica, ¼ grain; Alcoholic Extract of Belladonna, ⅙ grain; in each pill.—*St. Thomas's.*

This has been incorporated in the *B.P.C.*, using Alcohol (60 p.c.) as an excipient.

PILULA ALOINI COMPOSITA.—Aloini, Extract Nucis Vomicæ, Ferri Sulphatis, Pulv. Myrrhæ, Saponis, ana ½ grain.—*L.* '87, i. 2. (Sir Andrew Clark's Liver Pill.)

This has been incorporated in the *B.P.C.*

PILULÆ APERIENTES STAHLII (*Swed.*).—Extract Aloes, 6; Extract Rhei Co., 3; Reduced Iron, 2; Rad. Althææ, 2; Alcohol (64 p.c.) and Simple Syrup, *q.s.* to make 100 pills.

PILULÆ ALOES COMPOSITÆ. *Syn.* BAIRD'S PILLS.—Barbados Aloes, in powder, 30; Ipecacuanha Root, in powder, 6; Scammony, 30; Green Extract of Hyoscyamus, 30; Syrup of Glucose, *q.s.*; in 100 parts. Mix to form a mass and divide into pills weighing 4 grains each.—*P.J.F.* and *B.P.C.*

Dr. Mair's Pills.—Ipecacuanha Powder, 25 grains; Scammony, in powder, 2 drm.; Extract of Aloes, 2 drm.; Extract of Hyoscyamus, 2 drm.; make a mass and divide into 5-grain pills.—*Pharm. Form.*

Aloes Pilulæ Composita.—*Belg.*, Aloes 10, Scammony 3, Jalap 3, Ginger 4, Soap 10; *Ital.*, Aloes 3, Jalap 3, Soap 3.

Pilulæ Aloes et Jalap.—Equal parts of Aloes, Jalap, Soap and Liquorice. —*Jap.*

PILULÆ ALOES ET MASTICHES.—Purified Aloes, in fine powder, 13 grammes; Mastic, in fine powder, 4 grammes; Red Rose, in powder, 3 grammes; Alcohol (49 p.c.), *q.s.* to make 100 pills.—*U.S.P.*

Each pill will weigh about 3 grains. They are in imitation of Lady Webster's Dinner Pills, and one of them may be given as a laxative at bedtime or before a meal.

Barbados Aloes, in powder, 65; Mastic, in powder, 20; Confection of Roses, 15; in 100 parts. Divide into pills weighing 4 grains each.—*B.P.C.*

In Gray's Supplement these pills are given as 3 grains each.

PILULA ALOINI ET PODOPHYLLI COMPOSITA.—Aloin 2, Capsicin 1, Jalapin 2, Podophyllum Resin 4, Green Extract of Hyoscyamus 1, Extract of Nux Vomica 1; dose of the mass, ½ to 2 grains.—*P.J.F.*

Aloin 2, Oleoresin of Capsicum 1, Jalap Resin 2, Podophyllum Resin 3, Extract of Nux Vomica 1, Green Extract of Hyoscyamus 1; in 10 parts. Divide into pills weighing ½ grain each.—*B.P.C.*

Little Antibilious Pills.—Podophyllin, 8 grains; Aloin, 6 grains; Jalapin, 6 grains; Capsicin, 3 grains; Ipecacuanha Powder, 3 grains; Extract of

Hyoscyamus, 3 grains; Extract of Nux Vomica, 2½ grains; Glycerin Tragacanth, *q.s.* to make a mass. Divide into 60 pills.—*Pharm. Form.*

PILULÆ LAXATIVÆ COMPOSITÆ.—Aloin, 1·3; Strychnine, 0·05; Extract of Belladonna Leaves, 0·8; Ipecac., in powder, 0·4; Glycyrrhiza, 4·6, in grammes; Syrup, *q.s.* to make 100 pills.—*U.S.P.*

A modification of this has been incorporated in the *B.P.C.* as follows:—

Pilulæ Aloini et Strychninæ Compositæ.—Aloin, 50; Strychnine, 5; Green Extract of Belladonna, 25; Ipecacuanha, 12·50; Milk Sugar, *q.s.*; Syrup of Glucose, *q.s.*; in 100 parts; divide into ½-grain pills.—*B.P.C.*

PIL. GUTTÆ ALOETICÆ (*Swed.*).—Aloes, 7; Camboge, 3; Gum Arabic, 3; Galbanum, 4; Carvone, 1·5; Syrup, *q.s.* to make 100.

PULVIS ALOES ET CANELLÆ (Hiera Picra).—Powdered Socotrine Aloes, 4; Powdered Canella Bark, 1.

This has been incorporated in the *B.P.C.*

TINCTURA ALOES COMPOSITA. *Syn.* ELIXIR AD LONGAM VITAM.—*Ger.*—Aloes, in coarse powder, 3; Gentian, cut middling fine, 0·5; Rhubarb, cut middling fine, 0·5; Zedoary, cut middling fine, 0·5; Saffron, 0·5; Alcohol 70 p.c.), 100.

This has been incorporated in the *B.P.C.*, but with the Alcohol by volume instead of by weight.

Austr.—Aloes, 30; Gentian, 5; Rhubarb, 5; Zedoary, 5; Saffron, 5; Alcohol, (68 p.c.), 1000.

Fr.—Aloes, 25; Agaric, 2·5; Gentian, 2·5; Rhubarb, 2·5; Zedoary, 2·5; Saffron, 2·5; Alcohol (60 p.c.), 1000.

Ger. and *Jap.*—Aloes, 30; Gentian, 5; Rhubarb, 5; Zedoary, 5; Saffron, 5; Alcohol (68 p.c.), 1000.

Mex.—Aloes, 8; Gentian, 1; Rhubarb, 1; Saffron, 1; Agaric, 1; Treacle, 1; Alcohol (60 p.c.), 400.

Russ.—Aloes, 45; Gentian, 5; Rhubarb, 5; Saffron, 5; Alcohol (70 p.c.), 1000.

Swiss.—Aloes, 6; Saffron, 1; Agaric, 1; Myrrh, 1; Gentian, 1; Rhubarb, 1; Zedoary, 1; Alcohol (68 p.c.), 200.

All are by weight.

TINCTURA ALOES ET MYRRHÆ.—Purified Aloes, 1; Myrrh, 1; Powdered Liquorice Root, 1; Alcohol (94 p.c.), 75; and Water, 25, mixed *q.s.* to make 10.—*U.S.P.*

Socotrine Aloes, in powder, 10; Saffron, 5; Tincture of Myrrh, 100.—*Edin. Ph.* 1841. *Syn.* Elixir Proprietatis.—*P.L.* 1721; *B.P.C.*

VINUM ALOES.—Socotrine Aloes, 1½ oz.; Cardamom Seeds, bruised, 80 grains; Ginger, in coarse powder, 80 grains; Sherry, 2 pints.—*B.P.* 1885.

This has been incorporated in the *B.P.C.* as follows:—

Socotrine Aloes, crushed, 3·75; Cardamom Seeds, bruised, 0·50; Ginger, in coarse powder, 0·50; Sherry, sufficient to produce 100.

Not Official.

ALSTONIA.

The dried bark of *Alstonia Scholaris*, R. Br., and of *Alstonia Constricta*, F. Müll. **Infusum Alstoniæ** (1 *in* 20), dose ½ to 1 fl. oz. = 14·2 to 28·4 c.c.; and **Tincture Alstoniæ** (1 in 8), dose 30 to 60 minims = 1·8 to 3·6 c.c.; are official in *Ind.* and *Col. Add.* for India and the Australian and Eastern Colonies.

Not Official.

ALTHÆÆ RADIX.

MARSHMALLOW ROOT.

FR., GUIMAUVE; GER., EIBISCHWURZEL; ITAL., ALTEA; SPAN., ALTEA.

Descriptive Notes.—The root of the *Althæa officinalis*, Linn. Marshmallow root occurs in commerce in two forms, viz.:—(1) The natural root dried, and (2) the root with the outer bark removed. The former is usually sold by herbalists, the latter by pharmacists. The natural root bears some resemblance to Liquorice root, in its external characters, the surface having short transverse scars, the bark being tough and finely fibrous. It is, however, white internally (Liquorice is yellowish-white) and finely fibrous and has a mucilaginous instead of a sweet taste. The decorticated root is often larger than the natural root, and deeply grooved longitudinally. The larger decorticated roots are probably often derived from the allied species *A. Narbonensis*, L. Both are very mucilaginous. It is necessary to preserve the root in a dry place, or the syrup prepared from it will turn yellowish and have a disagreeable odour. Lozenges made of the powdered root with gum and flavoured with orange flower water are sold as Pastilles de Guimauve. The powder is also used in pill masses.

Medicinal Properties.—It is much employed on the Continent as a demulcent in irritation and inflammation of the mucous membranes of the mouth and pharynx.

Official in all the Foreign Pharmacopœias.

The two substances **Asparagin** and **Betain** have been extracted from Althæa root.

Asparagin dissolves Mercuric Oxide, but the Oxide must be freshly precipitated. A solution is best prepared by precipitating Mercuric Chloride Solution, washing the precipitated Oxide and dissolving it in solution of Asparagin. The solution has been employed as a hypodermic injection in the treatment of syphilis.

DECOCTUM ALTHÆÆ.—Althæa Root, 1; Water, 30; boil to 20.

This has been incorporated in the *B.P.C.*

SYRUPUS ALTHÆÆ.—Macerate 3 of Althæa Root in 40 of Water for twelve hours; strain, press, and filter until 32 have passed through; to this add 64 of Sugar, dissolve warm, and heat the Syrup to boiling; when cold, skim and strain through flannel.

This has been incorporated in the *B.P.C.*

Foreign Pharmacopœias.—Official in all except Belg., Fr. and U.S.

TROCHISCI ALTHÆÆ.—About 1 grain in each lozenge. Demulcent. Valuable after excision of tonsils or uvula.

Foreign Pharmacopœias.—Official in Ital., Mex. (Pastillas de Altea), Span. Not in the others.

ALUMEN.

ALUM.

$$Al_2(SO_4)_3,\ K_2SO_4,\ 24H_2O,\ \text{eq. } 941\cdot94.$$

$$Al_2(SO_4)_3,\ (NH_4)_2SO_4,\ 24H_2O,\ \text{eq. } 900\cdot16.$$

Fr., Alun de Potassium; Ger., Kalialaun; Ital., Solfato di Alluminio e di Potassio; Span., Sulfato Aluminico-Potasico.

Both salts are official; Potash Alum (Aluminium and Potassium Sulphate), and Ammonia Alum (Ammonium and Aluminium Sulphate). They are practically alike in appearance, occurring in large colourless octahedral crystalline masses, possessing a sweetish and very astringent taste.

Solubility.—1 in 11 of Water; 3 in 1 of boiling Water; Potash Alum, 1 in 3 of Glycerin; Ammonia Alum, 1 in 1¼ of Glycerin. Insoluble in Alcohol (90 p.c.).

Alum when heated melts in its own Water of crystallisation.

Medicinal Properties.—Astringent, used as a **gargle, mouthwash,** or **spray** for tonsillitis, aphthous conditions of the mouth, and pharyngitis, 10 grains in 1 oz. of Water; as an **injection** in leucorrhœa and gonorrhœa, 60 grains in a pint of Water; as a **nasal douche** in chronic ozœna, 4 grains in 1 oz. of Water; as a **snuff** in epistaxis, 6 grains mixed with 1 grain of Starch; as a **lotion** in purulent ophthalmia, 2 to 6 grains in 1 oz. of Water. 10 to 15 grains three times a day have been given for internal hæmorrhage, such as that of typhoid or gastric ulcer, also for menorrhagia, and in cases of lead poisoning; arrests excessive secretion in dysentery, diarrhœa and night sweats; vomiting caused by the cough of phthisis is sometimes checked by 6 to 10-grain doses of Alum. A **saturated solution** in Water forms an excellent styptic for hæmorrhage of leech bites, bleeding hæmorrhoids, epistaxis, etc.; the **glycerin** of alum is used in inflamed tonsils. 60 grains have been recommended as an emetic in croup. Dried Alum is escharotic, used for warty growths and to stimulate indolent ulcers, and to destroy exuberant granulations and to remove nævi.

Dose.—5 to 10 grains = 0·32 to 0·65 gramme.

Prescribing Note.—*Mostly used in aqueous or Glycerin solution.*

Incompatibles.—Alkalis and their Carbonates, and Tannic Acid.

Official Preparations.—Glycerinum Aluminis, Alumen Exsiccatum.

Not Official.—Alum Rose Gargle, Gossypium Aluminis, Aluminium Acetate Solution, Aluminium Aceto-Tartrate, Aluminium Chloride, Aluminium Nitrate, Aluminium Naphthol-Sulphonate, Aluminium Oleate, and Aluminium Sulphate, Pessus Aluminis, Pessus Aluminis et Zinci, Pulvis pro Pedibus.

Foreign Pharmacopœias.—Official in Austr., Bel., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex. (Sulfato de Aluminio y Potassio), Norw., Port., Russ., Span. (Sulfato Aluminico-Potasico), Swed., Swiss and U.S. All of them use Potash Alum only.

Tests.—The distinguishing tests for Alum are that it shall yield, when dissolved in Water, a white gelatinous precipitate with Ammonia Solution, or with Potassium or Sodium Hydroxide Solution; the white precipitate produced by Ammonia Solution is practically insoluble in excess of the reagents, whilst that produced by solution of Potassium or Sodium Hydroxide dissolves and is again reprecipitated by sufficient Ammonium Chloride Solution, indicating the presence of Aluminium. When boiled with Potassium or Sodium Hydroxide Solution it evolves a strong ammoniacal odour, and the issuing gas has a strongly alkaline reaction towards moistened red Litmus paper, indicating the presence of Ammonia; or a saturated aqueous solution yields with Tartaric Acid Solution or Sodium Bitartrate Solution a white crystalline precipitate within half an hour, indicating the presence of Potassium. It yields a white precipitate, insoluble in Hydrochloric Acid, on the addition of Barium Chloride Solution, indicating the presence of Sulphates.

The more generally occurring impurities are Calcium, Copper, Iron and Lead.

The aqueous solution should, when faintly acidified with Hydrochloric Acid, be unaffected by Hydrogen Sulphide Solution, indicating the absence of Copper and Lead, and when this solution is rendered alkaline by the addition of a sufficient excess of Ammonia Solution it should not materially darken in colour, indicating the absence of more than traces of Iron. The *P.G.* and *U.S.P.* include a separate test for Iron which is given under the heading of Potassium Ferrocyanide Solution in the small type below; it should not afford a distinct turbidity on the addition of Ammonium Oxalate Solution, indicating the absence of more than traces of Calcium.

In *U.S.P.* and *P.G.* only the Potash Alum is official. The *U.S.P.* requires that it shall contain not less than 99·5 p.c. pure Aluminium Potassium Sulphate, and it shall lose 45·55 p.c. of its weight when all of its Water of crystallisation is driven off.

Potassium Ferrocyanide Solution.—20 c.c. of a solution (1-20) should not be coloured blue immediately by 0·5 c.c. Potassium Ferrocyanide T.S., *P.G.* and *U.S.P.*

Preparations.

GLYCERINUM ALUMINIS. GLYCERIN OF ALUM.

Powdered Alum, 1 oz.; Distilled Water, 3 fl. drm.; Glycerin, *q.s.* to make 6 oz. (1 in 6)

Pure Alum should and does dissolve clear in Glycerin, but commercial Pulv. Aluminis, as a general rule, will not dissolve without residue except after prolonged boiling.

A powerful local astringent. When diluted with Water it forms a useful gargle.

Sometimes prescribed with an equal quantity of Glycerin of Tannic Acid.

ALUMEN EXSICCATUM. EXSICCATED ALUM. *Syn.*—ALUMEN USTUM.

Potash Alum, deprived of its Water by heat. It yields about 55 p.c. of product.

Foreign Pharmacopœias.—Official in Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Norw., Port., Russ., Span., Swiss and U.S.

Not Official.

ALUM ROSE GARGLE.—Broken Rose petals, 3 drm.; Diluted Sulphuric Acid, 3 fl. drm.; cold Distilled Water, 10 fl. oz.; digest for two hours, and strain 8 fl. oz.; then add Alum, 2 drm.; Sugar, 4 drm.; Alcohol (90 p.c.), 4 fl. drm.; dissolve. This kept well for seven years. To be mixed with an equal bulk of Water before use.

Gargarisma Aluminis.—Alum, 2; Acid Infusion of Roses, *q.s.* to produce 100.—*B.P.C.*

GOSSYPIUM ALUMINIS.—Contains about 30 p.c. of Alum.

PESSUS ALUMINIS.—Alum, 15 grains; Oil of Theobroma, 2 drm.—*Westminster.*

This has been incorporated in the *B.P.C.*

PESSUS ALUMINIS ET ZINCI.—Exsiccated Alum, 5 grains; Zinc Sulphate, 5 grains; Opium, in powder, 1 grain; Basis, 60 grains.—*London.*

Alum, 5 grains; Zinc Sulphate, 5 grains; Basis, 120 grains.—*B.P.C.*

ALUMINIUM ACETATE SOLUTION (*Austr., Belg., Dutch, Ger.* and *Russ.*).—A clear colourless liquid, with an acid reaction and a faint odour of Acetic Acid; obtained by double decomposition between Aluminium Sulphate and Calcium Acetate. Sp. gr. 1·044 to 1·048. Contains 7½ to 8 p.c. Aluminium Acetate.

This has been incorporated in the *B.P.C.*

Swiss, sp. gr. 1·055 to 1·059. Contains 10 p.c.

It is also known as **Burow's Solution.**

A good antiseptic, preferred by some to Carbolic Acid for dressing lacerated wounds.

ALUMINIUM ACETO-TARTRATE. — Crystals soluble in their own weight of Water. **Official in** Dutch.

A powerful, non-poisonous antiseptic; also an astringent caustic.

A solution has been sold under the name **Alsol.**—*P.J.* '01, i. 665.

A solution containing 10 p.c. is official in Swiss.

30 to 60 grains in a pint of Water make a useful **gargle** or **douche.**

ALUMINIUM CHLORIDE.—A colourless, crystalline mass, giving off fumes of Hydrochloric Acid gas, and becoming damp on exposure to air. The commercial product forms a crystalline powder, chiefly of a yellow colour owing to the presence of Iron as an impurity.

Dose.—5 to 8 grains = 0·32 to 0·52 gramme.

The use of Aluminium Chloride in doses of 5 grains = 0·32 gramme, and upwards several times a day has proved remarkably efficacious in locomotor ataxy.—*L.* '99, ii. 1826.

Hydrated Aluminium Chloride is official in Russ.

Under the names of **Chloralum** and **Chloralum Powder,** preparations containing Aluminium Chloride have been introduced as disinfectants.

ALUMINIUM CHLORIDE SOLUTION. — Obtained by dissolving Aluminium Hydrate in Hydrochloric Acid. A pale yellow liquid. Sp. gr. 1·250. **Gargle,** 12 minims to 1 oz. of Water; **Spray,** 3 minims to 1 oz.; **Paint,** 15 minims to 1 oz. Astringent and antiseptic.

ALUMINIUM NITRATE.—A **solution** (4 or 6 grains in 1 oz. of Water) has been used with success in pruritus vulvæ.

ALUMINIUM NAPHTHOL-SULPHONATE (Alumnol). — A whitish powder, readily soluble in Water, introduced as an antiseptic.—*P.J.* (3) xxiii. 605; *C.D.* '93, i. 94.

In treatment of metrorrhagia. Used as an intra-uterine injection, with Tincture of Iodine (Alumnol, 2·5; Tincture of Iodine, 25; Absolute Alcohol, 25) by means of an intra-uterine syringe.—*M.A.* '99, 408.

Dose.—4 to 8 grains = 0·26 to 0·52 gramme, as an astringent.

ALUMINIUM OLEATE.—A powder. Mixed with equal parts of Lard, is used as a styptic and antiseptic, in checking the muco-purulent discharges in eczema.—*L.* '84, ii. 123.

ALUMINIUM SULPHATE.—White crystalline cakes, or in a white powder, having a sweetish and somewhat astringent taste. It is soluble 1 in 1 of Water, insoluble in Alcohol (90 p.c.). Astringent and antiseptic.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Jap., Russ., Swed., Swiss and U.S.

Tests.—Aluminium Sulphate dissolves readily in Water, forming a solution which has a strong acid reaction towards blue Litmus paper, this solution yields with Ammonia Solution a white precipitate practically insoluble in excess of the reagent; with Potassium Hydroxide Solution it yields a white gelatinous precipitate soluble in excess of the reagent, but which is again precipitated on the addition of Ammonium Chloride. The solution yields with Barium Chloride Solution a white precipitate insoluble in Hydrochloric Acid. It should contain about 99½ p.c. of pure crystallised Aluminium Sulphate, and shall lose not more than 45·7 p.c. of its weight when deprived of its Water of crystallisation.

It should yield no odour of Ammonia when boiled with Potassium Hydroxide Solution, indicating the absence of Ammonium salts. When slightly acidified with diluted Hydrochloric Acid the aqueous solution should not afford an appreciable darkening in colour or a turbidity, on the addition of Hydrogen Sulphide, indicating the absence of more than the slightest traces of Copper or

Lead, nor should it be materially darkened in colour on the subsequent addition of Ammonia Solution in slight excess, indicating the absence of more than a trace of Iron.

A clear filtered aqueous 10 p.c. w/v solution of the salt should not become more than faintly opalescent within 5 minutes upon the addition of an equal volume of Tenth-normal Volumetric Sodium Thiosulphate Solution, indicating the limit of free acid.

Aluminium Caseinate.—A yellowish-white, tasteless powder. Insoluble in Water. Introduced as an intestinal astringent.

Dose.—5 grains = 0·32 gramme.

Salumin Insoluble (Aluminium Salicylate), **Salumin Soluble** (Aluminium and Ammonium Salicylate), **Alkasal** (Aluminium Potassium Salicylate), **Boral** (Aluminium Borotartrate), **Cutol** (Aluminium Borotannate), are preparations containing Aluminium, which have been noticed in medical literature.

CIMOLITE.—The mineral has yielded on analysis: Alumina, 23; Silica, 63; Ferric Oxide, 1·25; Water, 12.

A proprietary Toilet article, which is a silicate in very fine powder, is sold under the name 'Cimolite.'

FULLER'S EARTH has yielded on analysis: Alumina, 10; Silica, 53; Lime, 0·5; Magnesia, 1·25; Ferric Oxide, 9·5; Water, 24.

SOAPSTONE, CRETA GALLICA, is a Silicate of Aluminium and Magnesium. Is used in prurigo and as a dusting powder for infants, alone or mixed with equal parts of Zinc Oxide or Calamine.

AMMONIACUM.

AMMONIACUM.

FR., GOMME AMMONIAQUE; GER., AMMONIAKGUMMI; ITAL., GOMMA AMMONIACO; SPAN., GOMA AMONIACO.

A gum-resin, obtained from *Dorema Ammoniacum*, D. Don., and probably other species.

It is collected in Persia.

Solubility.—Sparingly in Water, but forms with it a nearly white emulsion; when 50 grains were digested in 2 oz. of Alcohol (90 p.c.), 40 grains were dissolved; with Alcohol (60 p.c.) 30 grains were dissolved.

Medicinal Properties.—Antispasmodic, stimulant, expectorant; useful in chronic bronchitis and asthma of old people, either in mixture or in pill; as a **plaster** to promote absorption in chronic synovitis and glandular swellings.

Dose.—5 to 15 grains = 0·32 to 1 gramme.

Prescribing Notes.—*Generally given as Mistura Ammoniaci; may be combined with Tincture of Squill, or Fetid Spirit of Ammonia.*

Official Preparations.—Emplastrum Ammoniaci cum Hydrargyro and Mistura Ammoniaci. Contained also in Emplastrum Galbani, in Pilula Scillæ Composita, and Pilula Ipecacuanhæ cum Scillâ.

Not Official.—Pilulæ Ammoniaci Opiatæ, Emplastrum Gummi Resinosum.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Ger., Hung., Ital., Jap., Mex. (Goma-resina Ammoniaco), Norw., Port., Russ., Span., Swed. and Swiss; Fr., purified by 60 p.c. Alcohol.

Descriptive Notes.—Commercial Ammoniacum is imported from Persia, and is believed to be obtained also from *D. Aucheri*, Boiss. It occurs generally in the form of rounded nodules or tears varying in size up to 1 inch (25 mm.) in diameter, although averaging only about ½ inch (12 mm.). When recently collected the tears are yellowish-white or nearly white, dull externally and opaque internally with a white, slightly polished, fracture, and have an acrid, slightly bitter, characteristic taste. Occasionally masses consisting of tears welded together are imported, but these usually contain more or less impurity. When the drug has been long kept the tears assume a brownish-yellow tint.

The official description allows the use of both pale yellow and brownish tears, which may be either white or brownish-yellow internally, and they may vary in size from ¼ to 1 inch (6 to 25 mm.). The odour must not be alliaceous.

Tests.—The distinguishing tests for Ammoniacum are its physical properties, the production of a Salicylic Acid reaction with Ferric Chloride Test-solution, a yellow to a brown coloration with Potassium Hydroxide Solution, and an orange-red coloration with Chlorinated Soda Solution.

B.P. has not yet adopted the determination of the Acid and Saponification values as a means of distinguishing gums and gum-resins. Notwithstanding the difficulty experienced in sampling and the wide variations between the figures yielded by different specimens, a determination of these constants may often afford a valuable criterion of the purity of a sample. Good commercial Ammoniacum has an Acid value of 92 to 105, and a Saponification value of 145 to 162 according to Dieterich. A sample of good commercial 'tear' Ammoniacum examined in the author's laboratory had an ash limit of 2·15, and gave an Acid value of 106·7, a Resin value of 153·03, a Gum value of 23·87, and a Saponification value of 176·9. A sample of 'mass' Ammoniacum showing an ash limit of 2·55 p.c., gave an Acid value of 101·04, a Resin value of 144·61, a Gum value of 21·06, and a Saponification value of 165·67 ; 2 samples of powdered Ammoniacum yielding respectively 4·3 and 7·05 p.c. of ash, gave in each instance Acid values of 101·04, Resin values respectively of 150·22 and 153·03, Gum values of 18·26 and 9·83, and Saponification values of 168·48 and 162·86. Dieterich gives the Resin value of commercial varieties as 99·4 to 155·4, the Gum value as 7 to 46·2, and ash of not over 10 p.c.

The more generally occurring impurities are excess of mineral matter and an excessive proportion of matter insoluble in Alcohol (90 p.c.). The absence of Umbelliferone serves to distinguish it from Asafetida and Galbanum. The *B.P.* method of performing this test by heating the gum-resin strongly in a dry test-tube, cooling, boiling with Water, diluting the resulting liquid largely with Water and making alkaline with Ammonia, is considered unsatisfactory, the value of the test depending greatly on the manner in which the gum-resin is heated. The *P.G.* test is a more scientific one and is capable of detecting 2 p.c. of Galbanum with certainty. The Ammoniacum is boiled with three times its weight of strong Hydrochloric Acid for a quarter of an hour, whereby the Umbelliferone is split off from its natural Ester, the fluid is filtered, and the filtrate supersaturated with Ammonia Solution. It should not exhibit a blue fluorescence when examined by reflected light.

The *B.P.* gives no indication of the limit of matter insoluble in Alcohol (90 p.c.), nor of the amount of mineral matter. *P.G.* on the other hand specifies that the insoluble matter remaining after complete exhaustion of the gum-resin with boiling Alcohol (90 p.c.) shall amount at the highest to 40 p.c., and fixes the ash limit at not more than 5 p.c., which is somewhat low. A limit of 7·5 p.c. of ash has been suggested. The average of a number of good commercial samples examined in the author's laboratory was 6 p.c.

Preparations.

EMPLASTRUM AMMONIACI CUM HYDRARGYRO. *See* HYDRARGYRUM.

As the value of this preparation depends chiefly upon the Mercury it contains, the formula is given under Hydrargyrum.

MISTURA AMMONIACI. AMMONIACUM MIXTURE.

Ammoniacum, in coarse powder, ¼ oz.; Syrup of Tolu, 4 fl. drm.; Distilled Water, 7½ fl. oz. (1 in 32)

Dose.—½ to 1 fl. oz. = 14·2 to 28·4 c.c.

Foreign Pharmacopœias.—Official in Span. (Emulsion), 1 in 33 with White Wine. Not in the others.

Not Official.

PILULÆ AMMONIACI OPIATÆ (*Swed.*).—Ammoniacum, 10; Myrrh, 5; Squills, 2; Opium, 1; Water, *q.s.* to make 100 pills.

EMPLASTRUM GUMMI RESINOSUM.—Is official in *Dan.* and *Norw.* *Swiss* containing 6 p.c. of Ammoniacum; *Port.* (Emplastro Gummoresinoso) containing 2 p.c. of Ammoniacum. Made with Emplastrum Plumbi.

AMMONIÆ LIQUOR FORTIS.

STRONG SOLUTION OF AMMONIA.

A transparent, colourless, very alkaline liquid, with an overpowering pungent smell, containing 32·5 p.c. (or more correctly 32·35 p.c.) by weight of Ammonia, NH_3, eq. 16·94.

It should be preserved in well-stoppered glass bottles, which should be keptin a cool atmosphere. Great care should always be exercised in dealing with the liquid.

It may be prepared by the decomposition of an Ammonium salt, usually the Chloride, with Calcium Hydroxide, the resulting gas being dissolved in Water.

In commerce Liquor Ammoniæ Fortis is generally sold of sp. gr. 0·880.

Medicinal Properties.—Usually given in the more diluted form of Solution of Ammonia. *See* below.

Official Preparations.—Of **Liquor Ammoniæ Fortis,** Liquor Ammoniæ, Spiritus Ammoniæ Fetidus. Contained in Linimentum Camphoræ Ammoniatum, Linimentum Hydrargyri, and Tinctura Guaiaci Ammoniata. Used in the preparation of Ammonii Benzoas, Ammonii Bromidum, Ammonii Phosphas, Spiritus Ammoniæ Aromaticus, and Spiritus Ammoniæ Fetidus. Of the **Liquor Ammoniæ,** Linimentum Ammoniæ. Contained in Tinctura Ergotæ Ammoniata, Tinctura Opii Ammoniata, Tinctura Quininæ Ammoniata, Tinctura Valerianæ Ammoniata. Used in the preparation of Liquor Bismuthi et Ammonii Citratis, and the scale preparations of Iron.

Not Official.—Alcohol Ammonia, Lotio Crinalis, Oleate of Ammonia, Liquor Ammoniæ Detergens, and Tinct. Ammon. Comp. (Eau de Luce).

Antidotes.—Acetic Acid or Vinegar well diluted with Water; demulcent drinks.

Foreign Pharmacopœias.—Official in Belg. (Ammonium Hydricum Solutum), sp. gr. 0·935, 17 p.c.; Fr. (Ammoniaque Officinale), sp. gr. 0·925; Ital. (Ammoniaca), sp. gr. 0·925, 20 p.c.; Mex. (Ammoniaco), sp. gr. 0·920; Port. (Ammonia Liquida), sp. gr. 0·916; Span. (Amoniaco), sp. gr. 0·923; U.S. (Aqua Ammoniæ Fortior), sp. gr. 0·897 at 25° C. (77° F.), 28 p.c.; *see* also Liquor Ammoniæ.

Tests.—The distinguishing tests are the powerful ammoniacal odour combined with the specific gravity and the volumetric determination figure. The *B.P.* specific gravity is 0·891 at 15·5° C. (60° F.); the *U.S.P.* is 0·897 at 25° C. (77° F.). It is officially required to indicate 32·35 p.c. by weight of Ammonia (NH_3) as ascertained by titration with Normal Volumetric Solution of Sulphuric Acid. It is officially described as containing 32·5 p.c. by weight of NH_3. The *B.P.* does not mention an indicator; the *U.S.P.* gives the choice of Litmus or Methyl Orange Solution.

So far as impurities are concerned Liquor Ammoniæ Fortis should respond to the tests given under Liquor Ammoniæ, *q.v.*

Aqua Ammoniæ Fortior *U.S.P.* when diluted with twice its volume of Distilled Water should respond to the *U.S.P.* volumetric test given under Liquor Ammoniæ. The *P.G.* recognises only the dilute Ammonia.

LIQUOR AMMONIÆ. SOLUTION OF AMMONIA.

A clear, colourless liquid, containing 10 p.c. by weight of Ammonia, NH_3; prepared by mixing 1 of strong Solution of Ammonia with 2 of Distilled Water.

It possesses a characteristic pungent odour, a powerfully caustic taste, and strongly alkaline reaction.

It should be preserved in well-stoppered bottles, which should be kept in a cool atmosphere.

Medicinal Properties.—A general stimulant. Externally (applied to the nostrils) in syncope; an excellent application to the sting of a wasp or the bites of insects. On the skin it is a powerful rubefacient, and in embrocations it is used as a counter-irritant for pain, stiffness of joints, bronchitis, etc. Was at one time used by injection as an antidote to snake bites, but Potassium Permanganate is now considered a better antidote.

Dose.—10 to 20 minims = 0·6 to 1·2 c.c., well diluted.

Prescribing Note.—*Ammonia is more generally prescribed internally in the form of Spiritus Ammoniæ Aromaticus or of Ammonium Carbonate.*

Official Preparations.—Linimentum Ammoniæ. Used in the preparation of Ammonii Benzoas, Ferri et Ammonii Citras, Ferri et Quininæ Citras, Ferrum Tartaratum, Liquor Bismuthi et Ammonii Citratis, Tinctura Opii Ammoniata, Tinctura Quininæ Ammoniata.

Not Official.—Liquor Ammonii Anisatus, Spiritus Ammonii Anisatus, Spiritus Ammoniæ Fœniculatus, Spiritus Ammoniæ.

Foreign Pharmacopœias.—Official in Austr., Dan., Dutch, Fr. (Ammoniaque Diluée), Ger., Hung., Jap., Norw., Russ., Swed., Swiss, 10 p.c.; U.S. (Aqua Ammoniæ), 10 p.c., sp. gr. 0·958 at 25° C. (77° F.); Belg., Fr., Ital., Mex., Port., Span. and U.S., *see* Ammon. Liq. Fort.

Tests.—The distinguishing tests for Liquor Ammoniæ are the pungent ammoniacal odour, the sp. gr. at 15·5° C. (60° F.), which should be 0·959 [0·958 at 25° C. (77° F.), *U.S.P.*; 0·960, *P.G.*], and that it is officially required to indicate 10 p.c. by weight of Ammonia (NH_3) when titrated with Normal Volumetric Sulphuric Acid Solution. Neither *B.P.* nor *P.G.* make any reference to the indicator of neutrality to be used; the *U.S.P.* states Litmus or Methyl Orange Test-solution; the latter is usually employed, Phenolphthalein Solution being useless.

The *B.P.* volumetric test indicates 10·0 p.c. by weight of Ammonia (NH_3); the *P.G.* 9·95 p.c. to 10·0 p.c. by weight. *U.S.P.* defines it as containing 10 p.c. by weight of Ammonia gas.

When a glass rod moistened with Hydrochloric Acid is brought near Ammonia Solution dense white fumes of Ammonium Chloride are given off. Ammonia Solution when sufficiently highly diluted yields on the addition of Potassio-mercuric Iodide (Nessler's) Solution a characteristic brown coloration, which in the presence of much Ammonia changes to a brown or reddish-brown precipitate.

The more generally occurring impurities are empyreumatic and mineral matter; heavy metals, *e.g.*, Arsenic, Iron, Lead, and Zinc; Ammonium Carbonate or Carbamate, Calcium, Carbonates, Chlorides, and Sulphates. The *B.P.* specifically mentions a test for absence of tarry matters, requiring that no colour or odour should be produced on the addition of a slight excess of Hydrochloric Acid to a mixture of equal volumes of Ammonia and Water, but is content to group the remainder without any regard to their relative importance under the expression 'it shall yield no characteristic reaction for,' etc. When rendered faintly acid by the addition of Hydrochloric Acid it should be unaffected by Hydrogen Sulphide Solution, indicating the absence of Arsenic and Lead. On subsequently rendering the solution again alkaline by the addition of Ammonia Solution no perceptible darkening in colour or turbidity should be produced, indicating the absence of more than a faint trace of Iron or Zinc. The solution should not effervesce on the addition of diluted Hydrochloric Acid, indicating the absence of Carbonates, when almost neutralised with Hydrochloric Acid it should not yield an opalescence on the addition of Ammonium Oxalate Solution, indicating the absence of Calcium. When supersaturated with Nitric Acid it shall yield little or no turbidity on the addition of Silver Nitrate Solution, nor on the addition of Barium Chloride Solution, indicating the absence of more than traces of Chlorides and Sulphates. The *U.S.P.* and *P.G.* require the neutralised acid to yield, on evaporation, a residue which is completely volatilised on ignition, the *P.G.* also requiring the residue to be colourless. No reference to fixed impurity or the character of the residue left on evaporation occurs in the *B.P.* The *P.G.* requires that when diluted with 4 times its volume of Calcium Hydroxide Solution it should show only a faint turbidity after the lapse of one hour, indicating the absence of Ammonium Carbonate and Carbamate. No test similar to this appears in the *B.P.* The test with Decinormal Volumetric Potassium Permanganate Solution for readily oxidisable organic impurities is peculiar to the *U.S.P.* If 0·1 c.c. of Tenth-normal Volumetric Potassium Permanganate Solution be added to 10 c.c. of Ammonia Solution, slightly supersaturated with diluted Sulphuric Acid, the pink colour produced should not be completely destroyed within 10 minutes.

Volumetric Determination.—1 gramme neutralises 5·9 c.c. of V.S. of Sulphuric Acid, *B.P.*; 5 c.c. should require 28 to 28·2 c.c. Normal V.S. of Hydrochloric Acid, *P.G.*; the *U.S.P.* gives the following directions for making the determination:—Introduce into a stoppered weighing bottle 3 c.c. of Ammonia Water and weigh accurately. Dilute with 50 c.c. of Distilled Water and titrate with normal V.S. of Sulphuric Acid, using Litmus or Methyl Orange T.S. as indicator. Multiply the number of c.c. of the V.S. of Sulphuric Acid consumed by 1·693, and divide this product by the weight of the Ammonia Water taken; the quotient represents the percentage of Ammonia gas.

Preparations.

LINIMENTUM AMMONIÆ. Liniment of Ammonia.

Solution of Ammonia, 1; Almond Oil, 1; Olive Oil, 2. Mix by shaking. (1 in 4)

Cotton Seed, Sesame and Nut Oils have each been recommended, but Cotton Seed is the only Oil which makes a satisfactory and permanent Emulsion.

Foreign Pharmacopœias.—Official in Austr., Dutch, Hung. and Jap., 1 and 4 Sesame Oil; Belg., 1 and 9 Medicinal Oil; Fr., 1 and 9 Olive Oil; Ger., Liq. Am. 1, Olive Oil 3, Poppy Oil 1; Ital., 1 and 4 Olive Oil; Mex., 1 Sesame Oil 9; also 1, Sesame Oil 4; Port., 1 and 4 Almond Oil; Russ., Liq. Am. 1, Olive Oil 3, Sesame Oil 1; Span., 1 and 9 Olive Oil; Swed., 1 and 3 Olive Oil; Swiss, 1 and 3 Sesame Oil; U.S., Am. 35, Alcohol 5, Cotton Seed Oil 57; Oleic Acid, 3. Not in Norw. All by weight, except U.S.

SPIRITUS AMMONIÆ AROMATICUS. *See* Ammonii Carbonas.

SPIRITUS AMMONIÆ FETIDUS. Fetid Spirit of Ammonia.

Asafetida, $1\frac{1}{2}$; strong Solution of Ammonia, 2; Alcohol (90 p.c.), to make 20. ($1\frac{1}{2}$ in 20)

Nervine stimulant and antispasmodic, useful in hysteria.

Dose.—For repeated administration, 20 to 40 minims = 1·2 to 2·4 c.c.; for a single administration, 60 to 90 minims = 3·6 to 5·3 c.c.

Tests.—A clear, almost colourless liquid, possessing a pungent ammoniacal and alliaceous odour. It has a specific gravity of 0·848, and it is officially required to contain 2·88 grammes of Ammonia (NH_3) per 100 c.c. as indicated by titration with Normal Volumetric Sulphuric Acid Solution, using Methyl Orange Solution as an indicator of neutrality. The *B.P.* does not include a figure for specific gravity, but gives the volumetric test; it, however, does not state what indicator of neutrality is to be employed.

Not Official.

ALCOHOL AMMONIA.—Absolute Alcohol saturated with Ammonia gas. It contains about 14 p.c. of $\mathbf{NH_3}$.

It is used in filling and renovating Smelling Salt bottles.

LOTIO CRINALIS.—Ol. Amygdal., 1 fl. oz.; Liq. Ammon. Fort., 1 fl. oz.; Sp. Rosmar., 4 fl. oz.; Aq. Mellis, 2 fl. oz.

This has been incorporated in the *B.P.C.* as follows:—

Almond Oil, 12·50; Strong Solution of Ammonia, 12·50; Oil of Rosemary, 0·50; Alcohol, 50; Honey Water, *q.s.* to produce 100.

SPIRITUS or LIQUOR AMMONII ANISATUS.

Austr. and *Ger.*—Anethol, 1; Alcohol, 24; Solution of Ammonia, 5.

Belg. (Ammoniæ Spiritus Anisatus).—Anethol, 3; Alcohol, 77; Solution of Ammonia, 20.

Hung. and *Russ.*—Oil of Anise, 1; Alcohol, 24; Solution of Ammonia, 6.

Ital. and *Span.*—Oil of Anise, 1; Alcohol, 24; Solution of Ammonia, 5.

Dan., *Norw.* and *Swed.*—Oil of Anise, 1; Alcohol, 32; Solution of Ammonia, 7.

Dutch.—Oil of Anise, 1; Alcohol, 19; Solution of Ammonia, 5.

Swiss.—Oil of Anise, 3; Alcohol, 77; Solution of Ammonia, 20.

All by weight.

B.P.C. (Liquor Ammoniæ Anisatus).—Anethol, 3·50; Solution of Ammonia, 16·50; Alcohol, *q.s.* to produce 100.

Spiritus Ammoniæ Fœniculatus.—Oil of Fennel, 3; Alcohol, 80; Ammonia Water, 17.—*Jap.*

Spiritus Ammoniæ.—Stronger Ammonia Water, 250; Alcohol, *q.s.* to make the product contain 10 p.c. by weight of Ammonia Gas.—*U.S.*

OLEATE OF AMMONIA.—Oleic Acid, 1 oz.; Spirit, 1 oz.; Solution of Ammonia, 7 oz.; Distilled Water, to 16 oz. Pour the acid into a bottle, mix the Spirit and Ammonia, and pour into the bottle. Cork tightly, and allow to stand a week or more until saponification is complete. This is suitable for adding to Solution of Ammonia (1 to 8) to make a household article.—*Pharm. Form.*

Liquor Ammoniæ Detergens. *Syn.* Household Ammonia.—Strong Solution of Ammonia, 30; Oleic Acid, 6; Alcohol, 6; Distilled Water, *q.s.* to produce 100.—*B.P.C.*

Note.—If a 'cloudy' preparation be desired, about half of the Distilled Water in the above formula should be replaced by hard tap Water, the exact proportion depending upon the amount of total solids in the hard Water.—*B.P.C.*

TINCTURA AMMONIÆ COMPOSITA. EAU DE LUCE.—Mastic, 2 drm.; Alcohol (90 p.c.), 9 fl. drm.; Ol. Lavand., 14 minims; Liquor Ammoniæ Fortis, 20 fl. oz.

This has been incorporated in the *B.P.C.* as follows:—

Mastic, 1·25; Alcohol, 5·50; Oil of Lavender, 0·15; Strong Solution of Ammonia, *q.s.* to produce 100.

Stimulant, antispasmodic. Has been used in tropical countries as an application to snake bites.

Dose.—5 to 10 minims = 0·3 to 0·6 c.c., in Water.

AMMONII BENZOAS.

AMMONIUM BENZOATE.

FR., BENZOATE D'AMMONIUM; GER., AMMONIUMBENZOAT; ITAL., BENZOATO DI AMMONIO; SPAN., BENZOATO AMONICO.

$NH_4C_7H_5O_2$, eq. 138·07.

Fine, white laminar crystals, or a crystalline powder, odourless or possessing a faint odour of Benzoin, and a saline taste. It is produced by the combination of Benzoic Acid with Ammonia. It gradually loses Ammonia on exposure to air.

Solubility.—1 in 6 of Water; 1 in 22 of Alcohol (90 p.c.); 1 in 8 of Glycerin.

It will not quite dissolve 1 in 5 of Water, as sometimes stated.

Medicinal Properties.—Valuable in chronic vesical catarrh with alkaline urine and phosphatic deposit, and in chronic bronchial catarrh with much secretion. It is more soluble than Benzoic Acid, and therefore should be preferred, and is less irritant to the alimentary canal.

An intestinal antiseptic in typhoid.—*M.A.* '94, 555.

Dose.—5 to 15 grains = 0·32 to 1 gramme.

Prescribing Note.—*Usually given in solution.*

Incompatibles.—Acids, Liquor Potassæ, and Ferric salts.

Foreign Pharmacopœias.—Official in Jap., Mex., Port., Russ., Span., Swiss and U.S.

Tests.—The distinguishing tests for Ammonium Benzoate are the odour of Ammonia, which is evolved when its aqueous solution is heated with Solution of Potassium or Sodium Hydroxide; the yellowish-brown coloration, produced when its sufficiently diluted aqueous solution is treated with Potassio-mercuric Iodide (Nessler's) Solution; the crystalline precipitate thrown down when its sufficiently concentrated aqueous solutions are acidified with a mineral acid; and the characteristic buff-coloured precipitate produced on adding Test-solution of Ferric Chloride to its aqueous solution. The *U.S.P.* requires that it should contain not less than 98 p.c. of pure Ammonium Benzoate, but does not state a method of determination.

The more generally occurring impurities are mineral matter, shown by a residue being left on ignition; free Benzoic Acid, indicating imperfections in the process of manufacture, and detected by the reaction of its cold aqueous solution towards blue Litmus paper or Solution, it should be neutral or only slightly acid; Chlorides and Sulphates, which indicate Toluene or Hippuric Acid as its probable source, and which are detected by the usual tests for Chlorides and Sulphates after removal of the Benzoic Acid. The 10 p.c. w/v aqueous solution is acidified with diluted Nitric Acid, and the precipitated Benzoic Acid is separated by filtration; the filtrate should be unaffected by the addition of either Silver Nitrate or Barium Chloride Solution. The *B.P.* includes tests for all these impurities. *U.S.P.* includes heavy metals as a likely impurity, and requires that the acidulated, filtered 5 p.c. aqueous solution of the salt shall respond to the time-limit test for heavy metals. It also requires that the Benzoic Acid prepared from the salt shall answer the tests and be free from the impurities given under Benzoic Acid. No such requirement appears in the *B.P.*, either under this heading or under Sodium Benzoate.

Residue.—On strongly heating it emits vapours having the odour of Ammonia and Benzoic Acid; and is finally volatilised, *U.S.P.*; at a red heat it leaves no residue, *B.P.*

Not Official.

AMMONII BORAS.

A crystalline salt, with an alkaline reaction.

Solubility.—1 in 15 of Water.

Medicinal Properties.—Has been used with success in renal and vesical calculi.

For renal colic, 20 grains = 1·3 grammes, every two hours until free passage of urine takes place, then 15 grains = 1 gramme, three times a day.—*T.G.* '87, 623.

AMMONII BROMIDUM.

AMMONIUM BROMIDE.

NH_4Br, eq. 97·29.

Fr., Bromure d'Ammonium; Ger., Ammoniumbromid; Ital., Bromuro di Ammonio; Span., Bromuro Amonico.

Small, colourless and odourless, prismatic crystals, or a white crystalline powder possessing a pungent saline taste.

It is prepared by the neutralisation of Hydrobromic Acid by Ammonia.

Solubility.—1 in 1½ of Water, and measures 2; 1 in 15 of Alcohol (90 p.c.).

Medicinal Properties.—An excellent nervine sedative and depressant, especially useful for sleeplessness, the result of worry or mental anxiety and fatigue; anaphrodisiac; given in epilepsy, with Chloral in acute alcoholism, in acute mania and nymphomania, and in many other conditions in which the Potassium salt is used. Not so apt to produce Bromism as the Potassium salt, and less depressing. Relieves headache, especially in migraine, and neuralgic pain. Sedative in pharyngeal and laryngeal irritation. Useful in whooping-cough and asthma.

Reference to the use of this salt in the treatment of epilepsy appears in *L.* '05, i. 710. If benefit does not follow a daily dose of from 45 to 60 grains of one or a combination of the Bromide salts in epilepsy, some other remedy or method of treatment should be sought. In confirmed epilepsy with mental deterioration, all that can be expected from the continuous use of the Bromides is diminution in the number and perhaps in the severity of the seizures. In serial epilepsy and the status epilepticus Chloral in combination with the Bromides forms the most effective remedy.

Dose.—5 to 30 grains = 0·32 to 2 grammes.

Incompatible.—Spirit of Nitrous Æther.

Not Official Preparations.—Ammonium Bromide Effervescens, Elixir Ammonii Bromidi, Pastillus Ammonii Bromidi, Trochisci Ammonii Bromidi.

Foreign Pharmacopœias.—Official in Austr., Dan., Dutch, Fr., Ger., Ital., Jap., Mex. (Bromuro de Amonio), Norw., Russ., Span., Swed., Swiss and U.S. Not in the others.

Tests.—The distinguishing tests for Ammonium Bromide are that an aqueous solution of the salt shall, when heated with Sodium or Potassium Hydroxide Solution, evolve Ammonia, the latter is readily recognised by its odour or its immediately turning a piece of moistened red Litmus paper blue; the sufficiently diluted aqueous solution yields a yellowish-brown coloration with Potassio-mercuric Iodide (Nessler's) Solution. The aqueous solution of the salt should yield with Silver Nitrate Solution a yellowish-white precipitate insoluble in Nitric Acid, practically insoluble in dilute Ammonia Solution, but soluble in Potassium Cyanide Solution. On the addition of Chlorine Solution to an aqueous solution of the salt, Bromine is set free, which on shaking with a little Chloroform or Carbon Bisulphide yields a reddish solution. It is officially required to contain not less than 99·43 p.c. nor more than 100·79 p.c. of pure Ammonium Bromide; 0·5 gramme of the salt requiring, when dissolved in Water, not less than 51·1 c.c. nor more than 51·8 c.c. of Volumetric Silver Nitrate Solution. The *U.S.P.* requires it to contain not less than 97 p.c. of Ammonium Bromide; the *P.G.* not more than 100·98 p.c. The volumetric determination adopted by the *B.P.* is carried out on the dry salt; but no indication of the limit of Water permissible is given.

The *P.G.* also employs a salt dried at 212° F. (100° C.) in carrying out the volumetric determination. The *U.S.P.* does not direct the salt to be dried.

The more generally occurring impurities are heavy metals, *e.g.*, Copper, Lead and Iron, Barium, Bromates, Chlorides, Iodides and Sulphates. A 5 p.c. aqueous solution of the salt when slightly acidified with Hydrochloric Acid should be unaffected by Hydrogen Sulphide Solution, indicating the absence of Copper and Lead. The *U.S.P.* and the *P.G.* include a separate test for Iron with Potassium Ferrocyanide Solution, which is given in the small type below. Barium, Bromates, Iodides and Sulphates may, if present, be detected by the tests given under the respective headings of Potassium Sulphate Solution, Diluted Sulphuric Acid, Chlorine Water, Chloroform and Barium Nitrate Solution. The precipitate produced on the addition of Silver Nitrate Solution to an aqueous solution of the salt should be practically insoluble in Ammonia, and the filtered ammoniacal liquid should yield little or no opalescence when supersaturated with Nitric Acid, indicating the absence of more than a trace of Chlorides. The salt should be entirely volatilised on heating leaving no weighable residue, indicating the absence of fixed matter.

Chlorine Water and Chloroform.—If Chloroform be added to an aqueous solution of the salt (1 c.c. Chloroform and 10 c.c. of a (1-20) solution, *U.S.P.*), and Chlorine Water (diluted with an equal volume of Water, *U.S.P.*) be carefully introduced with constant agitation, the Chloroform is coloured reddish-brown, *P.G.*; yellow to orange, *U.S.P.*; free from any violet tint, *U.S.P.*

Diluted Sulphuric Acid.—A small quantity of the salt spread out on a porcelain slab should not at once assume a yellow colour on the addition of a few drops of diluted Sulphuric Acid (test for Bromate), *P.G.* and *U.S.P.*

The aqueous solution (1 in 20) should be unaffected by diluted Sulphuric Acid, *P.G.*

Barium Nitrate Solution.—The aqueous solution should be unaffected by Barium Nitrate Solution, *P.G.*

Potassium Sulphate Solution.—There should be no turbidity in 10 c.c. of a (1–20) aqueous solution acidulated with Acetic Acid, on the addition of 1 c.c. Potassium Sulphate Solution, *U.S.P.*

Potassium Ferrocyanide Solution.—20 c.c. of an aqueous solution (1–20) should not be immediately turned blue on the addition of 0·5 c.c. Potassium Ferrocyanide Solution, *P.G.* *U.S.P.* uses a 1–100 solution of the salt, but does not state test quantities.

Volumetric Determination.—10 c.c. of a solution of 3 grammes in 100 c.c. of Water, with the addition of a few drops Potassium Chromate Solution (1 drop, *P.G.*) should require not more than 30·9 c.c. (*P.G.*), 31·6 c.c. (*U.S.P.*), of the Deci-normal Volumetric Solution of Silver Nitrate to produce a permanent red colour; the *U.S.P.* directs the salt itself to be used for titration without drying; the *P.G.* uses the salt previously dried at 100° C. (212° F.).

Not Official.

AMMONII BROMIDUM EFFERVESCENS, is made of 2 strengths containing 5 and 10 grains in 60 grains.

ELIXIR AMMONII BROMIDI.—Ammonium Bromide, 85; Citric Acid, 4; Aromatic Elixir (*U.S.P.*), *q.s.* to make 1000.—*U.S.N.F.* 1896.

In *U.S.N.F.* 1906 the formula remains the same without the Citric Acid, which is omitted.

Contains 5 grains of Ammonium Bromide in each fl. drm.

Ammonium Bromide, 10; Citric Acid, 0·50; Aromatic Elixir, *q.s.* to produce 100.—*B.P.C.*

Contains about 5½ grains in each fl. drm.

The *B.P.C.* appears to contain twice as much Compound Spirit of Orange as does the *U.S.P.*, but as the *B.P.C.* Compound Spirit is half the strength, the flavouring of the two Elixirs is about the same. The alterations in the *B.P.C. Supplement* leave the result much the same.

LOZENGES, containing 2 grains=0·13 gramme, of Ammonium Bromide in each. Useful in whooping-cough.

Dose.—1 to 3 lozenges.

Pastilles containing 1 grain in each with Glyco-gelatin Basis.

AMMONII CARBONAS.

AMMONIUM CARBONATE.

Fr., Carbonate (sesqui) d'Ammoniaque; Ger., Ammoniumcarbonat;
Ital., Carbonato di Ammonio; Span., Carbonato Amonico.

A mixture of Ammonium Hydrogen Carbonate, $\mathbf{NH_4HCO_3}$, with Ammonium Carbamate, $\mathbf{NH_4NH_2CO_2}$.

Hard, transparent, crystalline masses, possessing a strong ammoniacal, but not empyreumatic, odour and strong alkaline reaction. It effloresces when exposed to the air, and becomes covered on the surface with a white powder. On this account it should be kept in well-stoppered bottles and in a cool atmosphere. Only the translucent portions of the mass should be used for dispensing purposes.

Solubility.—1 in 4 of Water; 1 in 200 of Alcohol (90 p.c.); 1 in 5 of Glycerin.

Medicinal Properties.—Gastric, cardiac, and general stimulant; a valuable expectorant, frequently combined with Ipecacuanha in acute and chronic bronchitis when the phlegm is tough and scanty. Rarely as an emetic in ½ drm. doses.

Has been recommended in full and continuous doses in cholera, in the place of alcoholic stimulants.

Dose.—3 to 10 grains = 0·2 to 0·65 gramme.

Prescribing Note.—*15 grains dissolved in Water are taken with* 17 *grains of Citric Acid to form a saline draught.*

Incompatibles.—Acids, Acid salts, Iron salts, Lime Water, and salts of the alkaline earths and of the alkaloids.

Official Preparations.—Used in the preparation of Ammonii Chloridum, Bismuthi Carbonas, Ferri Carbonas Saccharatus, Liquor Ammonii Acetatis, Liquor Ammenii Citratis, and Spiritus Ammoniæ Aromaticus.

Not Official.—Linctus Ammoniæ Compositus, Liquor Ammonii Acetatis Fortior, Liquor Ammonii Citratis Fortior, Liquor Volatilis Cornu Cervi or Spirits of Hartshorn, Mistura Ammoniæ cum Senega, Hartshorn and Oil, and Ammonium Bicarbonate.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex., Port., Russ., Span., Swiss and U.S.

Tests.—The distinguishing tests for Ammonium Carbonate are its strong ammoniacal odour and alkaline reaction; when heated, either alone or with Potassium or Sodium Hydroxide Solution, it evolves Ammonia; its sufficiently diluted aqueous solution yields a yellowish-brown coloration with Nessler's reagent (Potassio-mercuric Iodide Solution); it effervesces with dilute mineral acids, evolving a gas which causes a white precipitate with Lime Water, and its aqueous solution yields with Barium Chloride Solution a white precipitate, soluble with effervescence in diluted Hydrochloric Acid.

Each gramme is officially required to neutralise not less than 18·7 c.c. of Volumetric Sulphuric Acid Solution, corresponding to 97·25 p.c. of a salt of the pharmacopœial composition. This figure is considered too high even for the best specimens, and it has been suggested (*P.J.* '01, i. 775) that the figure should be altered to 18·0 c.c. The *U.S.P.* requires that it should contain not less than 97 p.c. of a mixture of Acid Ammonium Carbonate and Ammonium Carbamate, and that it should yield not less than 31·58 p.c. of Ammonia gas. The method adopted by the *U.S.P.* for its volumetric determination is given in the small type below.

The more generally occurring impurities are empyreumatic and mineral matter, Lead, Copper, and Iron, Chlorides, Sulphates and Thiosulphates.

The presence of empyreumatic or non-volatile matter is detected by the appearance and odour of the residue left on the evaporation of the neutralised salt, and by any residue left upon gentle ignition. The test with Silver Nitrate Solution for Thiosulphate and limit of

Chloride is peculiar to the *P.G.* and *U.S.P.* A 1 in 20 aqueous solution of the salt when rendered faintly acid by the addition of Hydrochloric Acid should not be affected by Hydrogen Sulphide Solution, indicating the absence of Lead and Copper; nor on the subsequent addition of Ammonia Solution should it be darkened in colour, indicating the absence of Iron. A standard of 5 parts per 1,000,000 has been suggested (*C.D.* '08, i. 795) as a standard for Lead, Arsenic not having been found in this chemical. Chlorides, Sulphates and Thiosulphates may be detected, if present, by the tests with Silver Nitrate Solution and Barium Nitrate or Chloride Solution given in the small type below. The *P.G.* includes a test for Calcium, and requires that a 1 in 20 aqueous solution should be unaffected by Ammonium Oxalate Solution. It also gives a test with Ferric Chloride Solution, requiring that a 1 in 20 aqueous solution of the salt should not be coloured red on the addition of Ferric Chloride Test-solution.

Residue.—On heating, Ammonium Carbonate is volatilised, and should leave no residue, *B.P.*, *P.G.*, and *U.S.P.* If an aqueous solution (1 gramme of the salt, *P.G.* and *U.S.P.*) be supersaturated with Nitric Acid, and evaporated to dryness, the residue should be colourless and odourless, *B.P.*, *P.G.*, and *U.S.P.*, and on gentle ignition should be completely volatilised, *P.G.* and *U.S.P.*

Silver Nitrate Solution.—An aqueous solution (1–20) of Ammonium Carbonate should neither assume a brown colour, nor become more than slightly opalescent within two minutes, on the addition of Silver Nitrate Solution and subsequent supersaturation with Nitric Acid, indicating the absence of Thiosulphate and limit of Chloride, *P.G.* and *U.S.P.*

Barium Nitrate or Barium Chloride Solution. — An aqueous solution (1 in 20) should be unaffected by Barium Nitrate Solution, *P.G.*; or by Barium Chloride Solution, *U.S.P.*

Volumetric Determination.—2 grammes of the unaltered translucent salt, dissolved in a mixture of 50 c.c. each of Water and Normal V.S. Sulphuric Acid, and then boiled for a few minutes to expel the liberated CO_2 should, when the solution is cooled, require not more than 12·7 c.c. of Normal V.S. Potassium Hydroxide for exact neutralisation, Litmus T.S. being used as indicator, *U.S.P.*

Preparations.

SPIRITUS AMMONIÆ AROMATICUS. Aromatic Spirit of Ammonia. *B.P.Syn.*—Spiritus Ammoniæ Compositus. Spirit of Sal Volatile.

A clear, almost colourless liquid, possessing a strong ammoniacal odour and taste. It gradually darkens on exposure to light, and on this account should be kept in well-stoppered bottles of a dark amber tint and in a cool atmosphere.

It is prepared by mixing Oil of Nutmeg, 4½ fl. drm.; Oil of Lemon, 6½ fl. drm.; Alcohol (90 p.c.), 120 fl. oz.; and Distilled Water, 60 fl. oz., and distilling until 140 fl. oz. has been collected. This portion is reserved and a further 9 fl. oz. is distilled, this second distillate is transferred to a strong, well-stoppered bottle, mixed with 8 fl. oz. of Strong Ammonia Solution and 4 oz. of Ammonium Carbonate, and allowed to stand at 60° C. (140° F.) until the Ammonium Carbonate is dissolved, when the solution is filtered into the distillate first reserved. The official directions are that 149 fl. oz. should be distilled, collecting separately and reserving the last 9 fl. oz. passing over, but it is more convenient to dissolve the Ammonium Carbonate and Ammonia in 9 fl. oz. of Water while the distillation is proceeding, and not to carry it past 140 fl. oz.

Medicinal Properties.—Similar to those mentioned under Ammonium Carbonate. A domestic remedy for nervous headache, more useful when combined with Ammonium Bromide.

Dose.—20 to 40 minims = 1·2 to 2·4 c.c., for repeated administration; for a single administration, 60 to 90 minims = 3·6 to 5·3 c.c.

Foreign Pharmacopœias.—(Spiritus Ammoniæ Aromaticus) Jap., Ammonium Carbonate 40, Ammonia Water 100, Oil of Lemon 8, Oil of Cloves 1, Oil of Lavender 1, Alcohol 650, Distilled Water 200; U.S., Ammonium Carbonate 34, Ammonia Water 90, Oil of Lemon 10, Oil of Lavender 1, Oil of Cloves 1, Alcohol 700, Distilled Water, *q.s.* to make 1000. Neither are distilled. Port. (Esprito Ammoniacal Aromatico), *distilled*, contains Carbonate. Austr., Dan., Dutch, Ger., Hung., Ital., Norw., Russ., Span., Swed. and Swiss, have Liquor or Spiritus Ammonii Anisatus, a mixture of Oil of Anise, Spirit, and Liq. Ammon., but in slightly different proportions; Belg., a mixture of Anethol, Spirit and Liq. Ammon. *See* p. 135.

Tests.—The distinguishing tests for Spiritus Ammoniæ Aromaticus are its strong ammoniacal odour and taste; the specific gravity, which should be between 0·888 and 0·893. The addition of 16 c.c. of Barium Chloride Solution to 20 c.c. of the spirit should yield a precipitate, becoming more copious on heating to 71° C. (160° F.), and the filtrate from this precipitate should, on the addition of a further quantity of Barium Chloride Solution and again warming, again yield a precipitate.

The above test with Barium Chloride Solution is generally considered unreliable. It has been shown (*P.J.* '00, i. 147) that the precipitation of Barium Carbonate in the presence of Ammonium salts by Barium Chloride does not form a satisfactory basis for the determination of Ammonium Carbonate in the aromatic spirit, and the somewhat complicated method of measuring the Carbonic Acid gas in a nitrometer is suggested. The necessity for resorting to this latter method can be, however, obviated, as it has been pointed out (*P.J.* '00, ii. 105) that the addition of Ammonium Chloride to the solution alters the character of the precipitate altogether. A weighed quantity of 5 grammes of solid Ammonium Chloride is added to the 20 c.c. of aromatic spirit, and after vigorous agitation the requisite quantity of Barium Chloride Solution is added. The mixture is warmed to 71·1° C. (160° F.), cooled to the normal temperature and filtered. The filtrate, on the addition of more Barium Chloride Solution and warming, gives no further precipitate.

It is officially required to contain about 2·4 p.c. by weight of Ammonia gas, equivalent to 2·16 grammes in 100 c.c., as ascertained by titration with Volumetric Solution of Sulphuric Acid. The *B.P.* does not state the indicator of neutrality to be used; Methyl Orange Solution is suitable, 20 c.c. of the Spirit neutralises 25 c.c. of the Volumetric Acid.

The official test for total alkalinity is shown (*P.J.* '00, i. 145) to make no allowance for deterioration of the spirit during the process of manufacture or during storage, the latter obviously being a variable quantity, depending upon a number of variable conditions. The addition of a few c.c. per litre of the strong Solution of Ammonia is suggested in the same reference as a means of sufficiently raising the total alkalinity.

LIQUOR AMMONII ACETATIS. Solution of Ammonium Acetate.

1 of Ammonium Carbonate dissolved in 10 of Distilled Water, neutralised with Acetic Acid, and diluted with Distilled Water to make 20.

This dilute solution is now prepared direct from Ammonium Carbonate as recommended in the *Companion* 1894, and the concentrated solution is omitted.

Medicinal Properties.—Diaphoretic, diuretic and slightly antipyretic. A mixture of this medicine with Spirit of Nitrous Ether forms one of the oldest remedies for febrile conditions, and, there being no risk of its producing collapse, one of the safest. Given in full doses for alcoholism.

Dose.—2 to 6 fl. drm. = 7·1 to 21·3 c.c.

Incompatibles. — Potassium and Sodium Hydroxides, and alkaline Carbonates.

Foreign Pharmacopœias.—Official in Port., sp. gr. 1·029; Fr., sp. gr. 1·036; Mex. and U.S.; all made with Carbonate; Austr., sp. gr. 1·030; Ital., 1·034; Norw., sp. gr. 1·035 to 1·040; Belg., Dutch, Ger., Hung., Jap., Russ. and Swiss, sp. gr. 1·032 to 1·034; Span., sp. gr. 1·036; all made with Caustic Ammonia.

Tests.—A clear, almost colourless fluid possessing a faint acetous odour and faint saline, acidulous but not empyreumatic taste. It should have a specific gravity of about 1·018. The *B.P.* states that a small quantity of the liquid, when deprived of its Carbonic Anhydride by heating in a test-tube, shall possess a neutral reaction to test-papers. Solution of Cochineal affords a more useful means of determining the neutrality of the solution, and obviates the necessity of boiling off the Carbonic Anhydride.

LIQUOR AMMONII CITRATIS. — Solution of Ammonium Citrate.

Citric Acid 5, dissolved in Distilled Water 25, neutralised with Ammonium Carbonate, and diluted with Distilled Water to make 40.

Medicinal Properties.—Similar to Liquor Ammonii Acetatis.

Dose.—2 to 6 fl. drm. = 7·1 to 21·3 c.c.

Tests.—A clear, almost colourless and odourless liquid possessing a saline taste. It should have a specific gravity of about 1·057. The remarks upon the method of determining the neutrality of the solution appearing upon Liquor Ammonii Acetatis apply equally here.

Not Official.

LINCTUS AMMONIÆ COMPOSITUS. — Ammonium Carbonate, $\frac{1}{8}$ grain; Ipecacuanha Wine, 2 minims; Tincture of Squill, 5 minims; Essence of Anise, 1 minim; Mucilage of Acacia, 20 minims; Water, to 1 fl. drm.—*Royal Chest.*

LIQUOR AMMONII ACETATIS FORTIOR.—Carbonate of Ammonium, 15½ oz.; Acetic Acid, 50 fl. oz. or *q.s.*; Distilled Water, *q.s.* to make 60 fl. oz.—*B.P.* 1885.

This has been incorporated in the *B.P.C.* as follows:—

Ammonium Carbonate, 25; Acetic Acid, *q.s.* to neutralise; Distilled Water, *q.s.* to make 100.

LIQUOR AMMONII CITRATIS FORTIOR.—Citric Acid, 12 oz.; Strong Solution of Ammonia, 11 fl. oz. or *q.s.*; Distilled Water *q.s.* Neutralise the acid with the Ammonia, adding sufficient Distilled Water to make 24 fl. oz.—*B.P.* 1885.

This has been incorporated in the *B.P.C.*

LIQUOR VOLATILIS CORNU CERVI, or **SPIRIT OF HARTSHORN.**—Solution of Carbonate of Ammonia of the old Pharmacopœias, distilled from Hartshorn; but is now more generally represented by Liquor Ammoniæ *B.P.*

MISTURA AMMONIÆ CUM SENEGA.—Ammonium Carbonate, 4 grains; Ipecacuanha Wine, 10 minims; Infusion of Senega, ½ fl. oz.; Water, to 1 fl. oz.—*St. Thomas's.*

This has been incorporated in the *B.P.C.*, using Ammonium Carbonate 5 grains in the place of 4.

Ammonium Carbonate, 5 grains; Tincture of Squill, 12 minims; Spirit of Chloroform, 10 minims; Infusion of Senega, to make 1 fl. oz.—*Royal Free.*

HARTSHORN AND OIL.—1 of Sp. Hartshorn and 3 of Oil of Almonds.

AMMONIUM BICARBONATE.—White, crystalline powder. Soluble 1 in 5 of water, insoluble in Alcohol (90 p.c.). It is formed when Ammonium Carbonate is exposed to the air. Employed in powders and pastilles as a substitute for Ammonium Carbonate.

AMMONII CHLORIDUM.

AMMONIUM CHLORIDE.

N.O.Syn.—Ammonium Chloratum; Chloretum Ammonicum.

Fr., Chlorure d'Ammonium; Ger., Ammoniumchlorid; Ital., Cloruro di Ammonio; Span., Cloruro Amonico.

NH_4Cl, eq. 53·13.

White, odourless crystalline powder possessing a cooling saline taste. It is permanent in the air.

Solubility.—1 in 3 of Water; 1 in 55 of Alcohol (90 p.c.).

Medicinal Properties.—Stimulating expectorant in bronchitis by inhalation, or by allowing it to dissolve slowly in the mouth in the form of lozenge or tablet; is a hepatic, gastric and intestinal stimulant, diaphoretic and diuretic. In neuralgia, lumbago and migraine, in doses of 20 to 30 grains three times a day, it frequently relieves after four or five doses. Useful in sciatica, gout and chronic rheumatism; in acute and chronic congestion of the liver; said to counteract the tendency to albuminoid degeneration.

Recommended in advanced cases of pulmonary phthisis to facilitate expectoration.—*L.* '95, ii. 1524.

Dose.—5 to 20 grains = 0·32 to 1·3 gramme.

Prescribing Notes.—*Generally taken in solution; can be dispensed in the form of* **mixtures, powders,** *or Compressed Tablets. Lemon and Chloroform make it more palatable.* See *below, Haustus.*

Fluid Extract of Liquorice has been recommended, but many persons object to the taste of Liquorice.

10 grains in a claret-glassful (3 fl. oz.) of cold Water, sipped frequently, allays distressing fits of coughing in bronchitis.

The **vapour** *is also largely employed in naso-pharyngeal and eustachian catarrh; various kinds of inhalers have been introduced for mixing the vapours of Hydrochloric Acid and Ammonia. In the absence of such an inhaler, heat a small quantity of the solid salt in an iron spoon or any convenient dish over a spirit lamp and inhale the fumes.*

Incompatibles.—Alkalis and their Carbonates; alkaline earths; Lead and Silver salts.

Official Preparation.—Used in the preparation of Liquor Ammoniæ Fortis.

Not Official.—Draught, Lotion and Lozenges.

Foreign Pharmacopœias.—Official in Austr., Belg., Ger., Hung., Jap., Russ. and Swiss (Ammonium Chloratum); Dan., Dutch, Norw. and Swed. (Chloretum Ammonicum); Fr. (Chlorure d'Ammonium); Ital. (Cloruro di Ammonio); Mex. (Cloruro de Amonio); Port. (Chloreto de Ammonio); Span. (Cloruro Amonico); U.S. (Ammonii Chloridum).

Tests.—The distinguishing tests for Ammonium Chloride are the evolution of Ammonia when the salt is heated with Potassium or Sodium Hydroxide Solution and the production of a yellowish-brown coloration when a sufficiently diluted solution of the salt is treated with Potassio-mercuric Iodide (Nessler's) Solution, the depth of colour varying with the dilution of the solution; the formation of a white curdy precipitate, insoluble in Nitric Acid, but soluble in Ammonia Solution or Potassium Cyanide Solution, when Silver Nitrate Solution is added to its aqueous solution. When heated it evolves dense white fumes and volatilises completely.

Neither the *B.P.* nor the *P.G.* records a volumetric method for the determination of the salt, but a process which is described below is given in the *U.S.P.*, the latter Pharmacopœia stipulates that the salt shall contain not less than 99·5 p.c. of the pure salt.

The more generally occurring impurities are Calcium, Copper, Iron, Lead, Carbonates and Sulphates. These impurities may be detected, if present, by the tests given in the small type below under the respective headings of Ammonium Oxalate Solution, Hydrogen Sulphide, Barium Nitrate or Chloride Solution, and Diluted Sulphuric Acid. The *U.S.P.* and *P.G.* include a separate test for Iron, which is described in the small type under the heading of Potassium Ferrocyanide Solution. It may also contain Thiocyanates. The test for the latter is carried out with Ferric Chloride Test-solution, using according to the *B.P.* an aqueous solution, according to the *U.S.P.* and *P.G.* an aqueous solution acidulated with Hydrochloric Acid.

A standard of 5 parts of Lead per 1,000,000 is suggested (*C.D.* '08, i. 795) and 2 parts per 1,000,000 as a standard for Arsenic.

Hydrogen Sulphide.—An aqueous solution (1-20 *P.G.*) should not be affected by Hydrogen Sulphide Solution, neither should it respond to the time-limit test for heavy metals, *U.S.P.*

Barium Nitrate or Chloride Solution.—An aqueous 1 in 20 solution should be unaffected by Barium Nitrate Solution *P.G.*; by Barium Chloride T.S., *U.S.P.*

Diluted Sulphuric Acid.—An aqueous 1 in 20 solution should be unaffected by diluted Sulphuric Acid, *P.G.* and *U.S.P.*

Ammonium Oxalate Solution.—An aqueous 1 in 20 solution should be unaffected by Ammonium Oxalate Solution, *P.G.* and *U.S.P.*

Potassium Ferrocyanide Solution.—20 c.c. of a 1-20 solution should not immediately turn blue with 0·5 c.c. Potassium Ferrocyanide Solution, *P.G.*; *U.S.P.* uses 5 drops of the reagent.

Volumetric Determination.—10 c.c. of a solution obtained by dissolving 1 gramme of Ammonium Chloride in sufficient Water to measure 100 c.c., should, after the addition of 5 drops Potassium Chromate T.S., require not less than 18·7 c.c. of Tenth-normal Volumetric Silver Nitrate Solution to produce a permanent red colour, *U.S.P.*

Not Official.

HAUSTUS AMMONII CHLORIDI.—Ammonii Chloridi, gr. xv.; Tinct. Limon., ♏xlv.; Sp. Chloroformi, ♏x.; Aquæ, ad ℥iss.

LOTIO AMMONII CHLORIDI.—1 oz. with 1 fl. oz. Alcohol (90 p.c.) and 10 fl. oz. Water. Vinegar is sometimes added, to be applied as a dressing for bruises.

TROCHISCI AMMONII CHLORIDI.—2 grains =0·13 gramme, in each, with Black Currant Paste, are much used for bronchitis.

Dose.—2 to 4 lozenges.

These have been incorporated in the *B.P.C.*

Foreign Pharmacopœias.—Official in Belg., Dutch and U.S.

Each lozenge contains about 2 grains of Ammonium Chloride with Black Currant Paste.—*Throat.*

Ammonium Chloride, 10; Extract of Glycyrrhiza, 20; Tragacanth, in fine powder, 2; Sugar, 40, in grammes; Sugar of Tolu, *q.s.* to make 100 troches.—*U.S.P.*

Trochisci Ammonii Chloridi cum Glycyrrhiza.—Ammonium Chloride, 3 grains; Liquorice Extract, 3 grains in each.—*Martindale.*

This has been incorporated in the *B.P.C.*

Not Official.

AMMONII IODIDUM.

AMMONIUM IODIDE.

Fr., Iodure d'Ammonium; Ger., Ammonium Jodatum; Ital., Yoduro di Ammonio; Span., Yoduro Ammonico.

A white granular deliquescent salt, or in cubical crystals, readily becoming yellow on exposure to air.

The salt possesses practically no odour unless highly coloured, when a faint odour of Iodine is perceptible, and it has a sharp saline taste.

When deeply coloured, it is advisable in dispensing to remove the colour by shaking it in a bottle with a piece of Ammonium Carbonate. It has been pointed out that the resulting Iodate would be decomposed by the Hydrochloric Acid of the stomach, and result in the re-formation of free Iodine; but as the quantity would generally be very small it may be disregarded.

The *U.S.P.* uses Ammonium Sulphide Test-solution for decolorising a deeply coloured salt. Sufficient of the solution to decolorise it being added to a concentrated solution, the liquid filtered and evaporated to dryness.

It should be kept in well-stoppered glass bottles of a dark amber tint.

Solubility.—4 in 3 of Water; 1 in 3 of Alcohol (90 p.c.); 3 in 4 of Glycerin.

Medicinal Properties.—Similar to the Potassium Iodide, but less depressing.

Dose.—2 to 5 grains =0·13 to 0·32 gramme, three times a day; but much larger doses can be given.

Foreign Pharmacopœias.—Official in Fr., Mex., Port., Russ., Span. Swiss and U.S. Not in the others.

Tests.—The salt answers the usual distinguishing tests for Ammonium salts, it evolves Ammonia when heated with Potassium of Sodium Hydroxide Solution, and yields a brownish-yellow coloration on the addition of Potassio-mercuric Iodide (Nessler's) Solution to its extremely dilute aqueous solutions. The addition of Chlorine water to its aqueous solution liberates Iodine, and a violet-coloured solution is given when this aqueous liquid is shaken with Carbon Bisulphide. Silver Nitrate Solution produces a curdy yellow precipitate, which is insoluble in Nitric Acid, practically insoluble in Ammonia Solution, but soluble in Potassium Cyanide Solution.

The more generally occurring impurities are heavy metals, *e.g.*, Arsenic, Copper and Lead, Barium, Iron, excess of free Iodine, and excess of Chlorides or Bromides. The presence of heavy metals is readily detected by Hydrogen Sulphide Solution, Barium by means of a solution of Potassium Sulphate. A limit of Iron is fixed by the requirement that the addition of Potassium Ferrocyanide Solution to an aqueous 1 in 150 solution of the salt should not immediately produce a blue colour. An aqueous 1 in 150 solution when shaken with 1 c.c. of Chloroform should not impart a violet colour to the chloroformic liquid, indicating the absence of excess of free Iodine. A 5 p.c. aqueous solution when acidified with Nitric Acid should neither yield a turbidity or precipitate on the addition of either Silver Nitrate or Barium Chloride Solution, indicating the absence of Chlorides and Sulphates.

In testing for excess of Chlorides or Bromides the *U.S.P.* dissolves 0·25 gramme of the salt, dried at 100° C. (212° F.), in 5 c.c. of Ammonia Solution, shakes with 16·9 c.c. of Deci-normal Volumetric Solution of Silver Nitrate and saturates the filtrate with 5 c.c. of Nitric Acid. The absence of a cloudiness within 10 minutes indicates the absence of more than 3 p.c. of Chlorides and Bromides.

AMMONII PHOSPHAS.

AMMONIUM PHOSPHATE.

$(NH_4)_2HPO_4$, eq. 131·20.

White, odourless, glistening, prismatic crystals, having a saline taste.

It may be prepared by neutralisation of Orthophosphoric Acid with Ammonia Solution, the presence of the requisite amount of Ammonia being ensured by the addition of solid Ammonium Carbonate when necessary during the evaporation. It should be preserved in well-stoppered bottles.

Solubility.—1 in 2 of Water, and measures 2½; insoluble in Alcohol (90 p.c.).

A salt corresponding to the official formula has been stated by some authorities to have a solubility of 1 in 0·76; the true figure, however, for the normal *B.P.* salt is 1 in 2, and this figure was given in the *Companion* from the 1st edition to the 15th (1890).—*C.D.*, '03, i. 944; *P.J.*, '03, i. 65.

Medicinal Properties.—Given in chronic rheumatism and in the gouty and uric acid diathesis to render the Sodium Biurate more soluble, and to prevent formation of Uric Acid calculi.

Dose.—5 to 20 grains = 0·32 to 1·3 grammes.

Prescribing Notes.—*It is given 3 or 4 times a day in Water, but should* *not be prescribed in too condensed a form when tinctures form part of the mixture, on account of its sparing solubility in spirituous menstrua.*

Foreign Pharmacopœias.—Official in Port. Not in others.

Tests.—The distinguishing tests for Ammonium Phosphate are that it evolves Ammonia when heated with Potassium or Sodium Hydroxide Solution; its aqueous solution when sufficiently diluted yields a yellowish-brown coloration with Potassio-mercuric Iodide (Nessler's) Solution; an aqueous solution yields with Silver Ammonio-nitrate Solution a pale yellow precipitate readily soluble in Ammonia Solution and in cold diluted Nitric Acid; Ammonium Molybdate Solution when added to an aqueous solution containing an excess of Nitric Acid yields a yellow precipitate soluble in Ammonia Solution; and Magnesium Ammonio-sulphate Solution added to its aqueous ammoniacal solution affords a white crystalline precipitate soluble in dilute mineral acids. The latter test forms the basis of the *B.P.* method for the gravimetric determination of the salt, and it is required that when 2 grammes are precipitated with Magnesium Ammonio-sulphate Solution, the precipitate washed with Ammonia Solution diluted with an equal volume of water, suitably dried and heated to redness, shall weigh 1·680 grammes. This corresponds to 99·68 p.c. of Di-ammonium Mono-hydrogen Ortho-phosphate. It must be pointed out that unless the precautions mentioned at the commencement of the monograph on this article are observed, a salt yielding this amount of precipitate will not be obtained. Most 'commercial' samples are mixtures of Di-ammonium Mono-hydrogen Ortho-phosphate (the official salt) and Mono-ammonium Di-hydrogen Ortho-phosphate (the Acid Ammonium Phosphate).

Six commercial samples examined in the author's laboratory, when assayed by the process described in the *B.P.*, yielded precipitates varying in weight from 1·686 grammes to 1·818 grammes, the former being the only one of the six that approximated a salt of the Pharmacopœia formula. Greenish and F. A. Upsher Smith, from an examination of two commercial samples, neither of which yielded the official weight of precipitate, concluded (*P.J.* '01, i. 777) that it appeared unlikely that an absolutely normal salt could be found in commerce and accepted the second sample for the determination of its solubility, as the best that could be furnished commercially. Later (*P.J.* '03, ii. 948), whilst confirming the investigations into the composition of commercial samples of the salt recorded in the author's paper (*C.D.* '02, ii. 944; *P.J.* '03, i. 65), Greenish's further experiments have convinced him that there is no material difficulty in preparing a salt of the composition demanded by the Pharmacopœia.

The more generally occurring impurities, other than the Acid Phosphate, are Arsenic, Copper and Lead, Iron, Chlorides, and Sulphates. Of those the most important and the most likely are Arsenic and Lead, the former is readily detected by the modified Gutzeit's test, the latter by Hydrogen Sulphide Solution.

A standard of 5 parts per 1,000,000 for Arsenic and 10 parts per 1,000,000 for Lead is suggested (*C.D.* '08, i. 795). A 1 in 20 aqueous solution when acidified with diluted Nitric Acid should yield no turbidity on the addition of Silver Nitrate Solution, indicating the absence of Chlorides. A solution of similar strength when acidified with Hydrochloric Acid should yield no turbidity on the addition of Barium Chloride Solution, indicating the absence of Sulphates.

Not Official.

AMMONIUM SALICYLATE.—White, odourless, crystalline powder, or in odourless white needle-shaped crystals. It may be prepared with either the natural or the physiologically pure Salicylic Acid. It should be kept in well-stoppered glass bottles of a dark amber colour and kept in a cool atmosphere. Antipyretic and antirheumatic, but is largely superseded by the Sodium salt.

Dose.—5 to 15 grains = 0·32 to 1 gramme.

Foreign Pharmacopœias.—Official in Dutch, Russ. and U.S. Not in the others.

Tests.—It evolves Ammonia when warmed with Potassium or Sodium Hydroxide Solution, and its dilute aqueous solution yields with Ferric Chloride Test-solution a deep violet coloration.

A small quantity of the salt warmed with concentrated Sulphuric Acid and a few c.c. of Methyl Alcohol evolves the characteristic odour of Methyl Salicylate.

Its sufficiently concentrated aqueous solution yields a white crystalline precipitate when acidified with a mineral acid; the precipitate when washed and collected should possess the melting point 156° to 157° C. (312·8° to 314·6° F.) of pure Salicylic Acid, and should otherwise conform to the tests for purity of the acid.

The more generally occurring impurities are heavy metals, *e.g.*, Copper and Lead, which are likely to be present in Salicylic Acid and mineral matter. The presence of heavy metals is readily detected by adding Hydrogen Sulphide Solution to the acidified, filtered, aqueous solution; impure Salicylic Acid is indicated by the melting point above described, and absence of mineral matter by the complete volatilisation of the salt on heating.

AMMONIUM VALERIANATE.—Colourless, deliquescent, flat prismatic crystals, possessing a sweetish taste and a strong odour of Valerianic Acid.

It should be kept in well-stoppered glass bottles of a dark amber colour and in a cool atmosphere.

Readily soluble in Water and Alcohol; soluble in Ether.

Stated to be useful in hysteria, epilepsy and neuralgia.

Dose.—1 to 3 grains = 0·065 to 0·2 gramme, several times daily. Given in form of pills or in solution.

Foreign Pharmacopœias.—Official in Fr., Mex., Span., Swiss and U.S. Not in the others.

Tests.—The salt evolves Ammonia when heated with Potassium or Sodium Hydroxide Solution; when heated it fuses, evolving an odour of Ammonia and of Valerianic Acid, and when heated to a still higher temperature, it is completely volatilised; when warmed with diluted Sulphuric Acid the odour of Valerianic Acid is emitted. The *U.S.P.* requires that it shall contain not less than 98 p.c. of pure Ammonium Valerianate.

The more generally occurring impurities are heavy metals, *e.g.*, Lead and Copper and Acetates. The presence of the former is readily detected by adding Hydrogen Sulphide Solution to the acidified aqueous solution; the presence of the latter by supersaturating the aqueous solution with Ferric Chloride Test-solution and filtering; the filtrate should not possess a red colour. Solutions of the salt exhibit an acid reaction to blue Litmus paper.

AMMONIUM VALERIANATUM SOLUTUM (Liquor Ammonii Pierlot), *Swiss.*—Valerianic Acid, 3; Extract Valerian, 2; Water, 95; Ammonium Carbonate, sufficient to neutralise.

In hysteria and epilepsy 6 to 30 drops in sweetened Water. Given in the form of the above solution in the treatment of the morphine habit.—*L.* '01, ii. 363.

AMYGDALA AMARA.

BITTER ALMOND.

FR., AMANDES AMÈRES; GER., BITTERE MANDELN; ITAL., MANDORLE AMARE; SPAN., ALMENDRA AMARGA.

The ripe Seed of *Prunus Amygdalus*, Stokes, var. *amara*, Baillon.

Introduced only as a source of Almond Oil, and from which the commercial product is chiefly obtained.

Foreign Pharmacopœias.—Official in all the Foreign Pharmacopœias except Dutch; Port. (Amendoas Amargas).

Not Official.—Aqua Amygdalæ Amaræ, Mistura Amygdalæ Amaræ, Oleum Amygdalæ Amaræ Essentiale, and Oleum Amygdalæ Essent. Persic of the Essential Oil, Spiritus Amygdalæ Amaræ, Syrupus Amygdalæ.

Descriptive Notes.—The bitter almonds of commerce are chiefly obtained from Barbary (Morocco) and Sicily, and are distinguished by their bitter taste and the characteristic odour of the aqueous emulsion. The *U.S.P.* gives the measurement of the seed as 20 to 30 mm. long, and oblong, lanceolate or ovate in form, and the *P.G.* as 2 cm. long and 1 to 2 cm. broad, and states that the seed should not have a rancid taste.

Apricot and peach kernels which are imported for making an inferior almond oil are much smaller than bitter almonds, which they resemble in taste.

AMYGDALÆ OLEUM. ALMOND OIL.

The fixed oil expressed from the Bitter or Sweet Almond, the yield being between 40 and 45 p.c.

Descriptive Notes.—A clear pale yellow, odourless oily liquid possessing a bland, nutty taste. The almond oil of commerce is obtained chiefly from the bitter almond by expression, and is known in commerce as English oil. The oil formerly sold under the name of Ol. Amygd. Exot., but now as Ol. Amygd. Persic, is derived from Peach and Apricot kernels; recently Oil of Poppy Seed has been offered under the name of Peach Kernel Oil.

Solubility.—Only slightly soluble in Alcohol (90 p.c.), entirely soluble 1 in 2¼ of Ether, and in all proportions of Chloroform.

Medicinal Properties.—Emollient, demulcent and laxative. As an enema in impaction of fæces or obstruction of bowel, 1 to 3 pints.

Dose.—1 to 4 fl. drm. = 3·6 to 14·2 c.c.

Prescribing Notes.—1 *fl. oz. of Oil, with ½ fl. oz. Mucilage, ¼ oz. Sugar, and* 6 *fl. oz. of Distilled Water, makes a nice cough mixture.*

A mixture of equal parts of this Oil and Lime Water, with a small proportion of Glycerin, scented with Lemon, has been commonly sold under the title **Glycerin and Lime Juice.**

Official Preparations.—Contained in Linimentum Ammoniæ, Oleum Phosphoratum, Unguentum Aquæ Rosæ, and Unguentum Cetacei.

Used in preference to Olive Oil, as it makes a whiter ointment and is less liable to become rancid.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr. (Huile d'Amande), Ger. (Mandelol), Hung., Ital. (Olio di Mandorle Dolci), Jap., Mex., Norw., Port., Russ., Span. (Aceite de Almendras Dulces), Swed., Swiss and U.S.

Tests.—The distinguishing tests for Almond Oil are the specific gravity which should be from 0·915 to 0·920, the congealing point which is about −20° C. (−4° F.). These tests, with an Elaïdin test for Peach Kernel and other fixed Oils, are as far as the official volume takes us. The above specific gravity is given by *B.P.* and *P.G.*; the *U.S.P.* gives 0·910 to 0·915 at 25° C. (77° F.). The *U.S.P.* and some of the recent editions of the Continental Pharmacopœias include figures for the Saponification value and Iodine absorption. The Saponification value is the number of milligrammes of Potassium Hydroxide Solution required to neutralise 1 gramme of the oil. The Iodine absorption is the percentage of Iodine which the oil absorbs. The Austr. Ph. requires a Saponification value of 190–195 and an Iodine absorption of 94–100 p.c.; the Belgian Ph., a Saponification value of not less than 185, and an Iodine absorption of 92–102 p.c. The *U.S.P.*, a Saponification value of 191–200 and an Iodine absorption of not less than 95 nor more than 100; the Dutch Ph. omits the Saponification value, but gives an Iodine absorption of not less than 95 nor more than 101. Twelve good commercial samples examined in the author's laboratory showed a Saponification value of 190·4 to 196·4, and an Iodine absorption of 95·3 to 100·3.

The more generally occurring impurities are Peach and Apricot Kernel Oils (which much resemble Almond Oil, and are known commercially as Ol. Amygdalæ Persic); and other fixed oils, *e.g.*, Arachis, Cotton Seed, Olive and Sesame. The Elaïdin test for these, which is given in small type below under the heading of Nitric Acid, is common to *B.P.*, *U.S.P.* and *P.G.* The two latter Pharmacopœias, moreover, include an additional, almost identical, test for the detection of fixed oils other than Almond Oil, which is given in small type below under the heading of Saponification, and which depends upon the production of a clear solution when the saponified alcoholic solution is diluted with Distilled Water; the Oleic Acid obtained from this solution on acidification, when washed and clarified, is required to remain liquid at 15·5° C. (60° F.), and when mixed with an equal volume of Alcohol of the respective pharmacopœial strengths to yield a clear solution which does not deposit at 15° C. (60° F.) nor become turbid on a further addition of one volume of Alcohol.

Nitric Acid.—If 2 c.c. of the Oil be well shaken with 1 c.c. of fuming Nitric Acid and 1 c.c. of water, a whitish, not brownish, red mixture should be formed which, after standing for 6 hours at about 50° F. (10° C.) (for 2 or at most 6 hours *P.G.*, for some hours *U.S.P.*), should separate into a solid white mass and a nearly colourless liquid, *B.P.*, *P.G.*, and *U.S.P.* The *U.S.P.* states that the fixed Oils of Peach and Apricot kernels give a red colour and Sesame and Cotton Seed Oils give a brown colour.

Saponification.—If 10 c.c. of the Oil be mixed with 15 c.c. of a Sodium Hydroxide Solution (1–6, *U.S.P.*; sp. gr. 1·168 to 1·172, *P.G.*), and 10 c.c. of Alcohol, and the mixture be allowed to stand (at a temperature of 35° to 40° C. (95° to 104° F.) with occasional agitation, *U.S.P.*) until it becomes clear, and if then diluted with 100 c.c. of Water, the clear solution thus obtained upon the subsequent addition of an excess of Hydrochloric Acid will set free a layer of Oleic Acid. This when separated from the aqueous liquid, washed with warm Water, and clarified by heating on a water-bath will remain liquid if cooled to 15° C. (59° F.), *P.G.* and *U.S.P.* 1 volume of this Oleic Acid when mixed with 1 volume of Alcohol should yield a clear solution which at 15° C. (59° F.) should not deposit any fatty acids, nor become turbid upon the further addition of 1 volume of Alcohol, *P.G.* and *U.S.P.*

Iodine Absorption.—If 0·3 gramme of expressed Oil of Almonds be dissolved in 10 c.c. of Chloroform in a 250 c.c. flask and 25 c.c. of a mixture of equal volumes of Alcoholic Iodine T.S. and Alcoholic Mercuric Chloride T.S. added, and if, after standing for four hours protected from light, 20 c.c. of Potassium Iodide T.S. be introduced and the mixture diluted with 50 c.c. of Water, on titrating the excess of Iodine with V.S. of Tenth-normal Sodium Thiosulphate an Iodine value of not less than 95 nor more than 100 should be obtained, *U.S.P.* The *P.G.* test uses 0·5 gramme of Oil, and directs the addition of 1·5 grammes of Potassium Iodide and 100 c.c. of Water before titration.

Not Official.

AQUA AMYGDALÆ AMARÆ.—Prepared by crushing Bitter Almonds and expressing the fixed Oil, and then distilling the residual cake with Water so that it shall contain the proper quantity of Hydrocyanic Acid ordered in any particular Pharmacopœia.

Ph. Ger. maximum single dose, 2 grammes; maximum daily dose, 6 grammes.

Foreign Pharmacopœias.—Official in the following, the percentage of Hydrocyanic Acid also given: Dan. (Conc.), 0·1 p.c., (Dil.) 0·005 p.c.; Ger., Hung., Ital., Jap., Russ. and Swed., 0·1 p.c.; Norw., 0·1 p.c.; Port., not standardised; U.S., not standardised, 1 Volatile Oil in 1000; Austr., Belg. and Swiss use Laurocerasi Water when Bitter Almond Water is prescribed. Not in the others.

The *Brussels Conference* adopts a strength of 0·1 p.c. for Aqua Amygdalæ Amaræ.

MISTURA AMYGDALÆ AMARÆ.—Made in the same proportions as Mistura Amygdalæ.

Useful in cough, and as a lotion to allay itching of the skin. It was a favourite vehicle for giving Tartarated Antimony, in doses of $\frac{1}{8}$ grain = 0·008 gramme, as a sedative expectorant in the first stage of acute bronchitis or pneumonia. The mixture contains a variable amount of Hydrocyanic Acid.

Dose.—$\frac{1}{2}$ to $1\frac{1}{2}$ fl. oz. = 14·2 to 42·6 c.c.

Mistura Amygdalæ Amaræ.—Bitter Almonds, 8; Distilled Water, *q.s.* to produce 100.—*B.P.C.*

OLEUM AMYGDALÆ AMARÆ ESSENTIALE.—A clear, colourless or pale yellowish, highly refractive liquid, with a characteristic odour, and a bitter and somewhat burning taste. Obtained from Bitter Almonds by macerating with Water the cake from which the fixed Oil has been expressed, and subsequent distillation.

It should be kept in well-stoppered glass bottles of a dark amber colour, and as far as possible from contact with air.

Chiefly used as a flavouring agent, when the oil 'sine Acido Hydrocyanico' should be employed.

Ol. Amygdal. Essent. Persic is prepared by a similar process to Bitter Almond Oil, from the kernels of the Apricot and Peach.

Solubility.—Sparingly in Water: mixes in all proportions with Alcohol (90 p.c.) and Ether.

Foreign Pharmacopœias.—Official in Belg. (Aldehydum Benzoicum), Fr., Mex. (Aceite Volatil de Almendras Amargras), Port., Span. and U.S. U.S. has also Benzaldehyde. Not in the others.

U.S. has also Spiritus Amygdalæ Amaræ, 1 in 100.

Tests.—The distinguishing tests for Bitter Almond Oil are the strong and distinctive odour; the high refraction; the specific gravity which after removal of Hydrocyanic Acid should be from 1·045 to 1·050; the boiling point, which should be 179° to 180° C. (354·2° to 356° F.); and its optical inactivity. The Oil is converted into a crystalline compound when shaken with a saturated Solution of Sodium Bisulphite, and this reaction may be utilised as a means for its quantitative determination, the non-aldehydic constituents can be measured or weighed. The *U.S.P.* process is essentially as follows:—A measured quantity of 10 c.c. of purified Kerosene is introduced into a tared 150 c.c. flask and the exact weight recorded, 12 drops of the Oil are then added and the weight again recorded; 20 c.c. of Distilled Water and 6 drops of Rosolic Acid Test-solution are added and the mixture exactly neutralised with Tenth-normal Volumetric Sodium Hydroxide Solution, agitating the flask thoroughly. A 1 in 5 aqueous solution of Sodium Sulphite alternated with Half-normal Volumetric Hydrochloric Acid Solution is added until 10 c.c. of the Sodium Sulphite Solution have been added, and sufficient Half-normal Volumetric Hydrochloric Acid Solution to maintain the neutrality of the mixture; after the addition of a few drops of Rosolic Acid Test-solution, the flask is agitated frequently, allowed to stand for 2 hours to ensure a permanent condition of neutrality, and the number of c.c. of Half-normal Volumetric Hydrochloric Acid Solution required noted. A blank test is carried out alongside of the determination, the number of c.c. of Half-normal Volumetric Hydrochloric Acid Solution is noted, the number of c.c. used in the latter is subtracted from that required in the former, the difference is multiplied first by 0·0526 and the product by 100 and divided by the weight of Oil taken yields a percentage of Benzaldehyde present in the sample.

The more generally occurring impurities are acidity, Hydrocyanic Acid, artificial Benzaldehyde, and Nitrobenzine. Acidity may arise from atmospheric oxidation of Benzaldehyde to Benzoic Acid, and may be determined with Deci-normal Volumetric Sodium Hydroxide Solution. If the Oil contains a crystalline deposit of acid it should not be used.

Hydrocyanic Acid can be detected by shaking 10 or 15 drops of the Oil with 2 to 3 drops of Potassium or Sodium Hydroxide Solution, adding a few drops of Ferrous Sulphate Solution containing a drop or two of Test-solution of Ferric Chloride, warming and slightly acidifying with dilute Hydrochloric Acid, when a blue precipitate will be produced if this acid be present.

Hydrocyanic Acid may be estimated volumetrically by weighing 1 gramme into a small flask, adding a sufficiency of freshly precipitated (Chloride free) Magnesium Hydroxide and Water, several drops of Potassium Chromate Solution and Deci-normal Volumetric Solution of Silver Nitrate until a permanent red coloration is produced. The oil generally employed in this country is free from this acid, but *U.S.P.* allows not less than 2 p.c. nor more than 4 p.c. The presence of Chlorine compounds is generally held to be indicative of artificial Benzaldehyde, but the failure to find them does not necessarily imply that the specimen is free from 'artificial Benzaldehyde' as the latter is now produced commercially of very fine quality.

Chlorine compounds are examined for as follows:—A folded strip of filter paper saturated with oil is placed in a small porcelain capsule standing within a larger one and ignited. A large beaker, the sides of which have been moistened with Water, or preferably containing filter paper (free from Chlorides) moistened with Water, is inverted over the burning Oil. The products of combustion condense on the moistened surface of the beaker or on the filter paper, and can be washed on to a filter with a little Distilled Water. The filtrate should show no turbidity on the addition of Silver Nitrate Solution, or if a turbidity is produced it should disappear on warming. The presence of Nitrobenzene (now an unlikely impurity) may be detected by diluting the Oil with 20 times its volume of Alcohol (90 p.c.), diluting the solution with Water until a turbidity is produced, adding Zinc and Sulphuric Acid, allowing the solution to remain at rest several hours, filtering, evaporating the Alcohol, and treating the remaining solution with a drop of Potassium Bichromate Solution. The production of a violet colour indicates the presence of Aniline.

SPIRITUS AMYGDALÆ AMARÆ.—Oil of Bitter Almond, 1; Alcohol (95 p.c.), 80; Distilled Water, *q.s.* to make 100.—*U.S.P.*

This spirit contains a trace of Hydrocyanic Acid and should always be used with care.

This has been incorporated in the *B.P.C.* as follows:—

Oil of Bitter Almond (sine Acid. Hydrocyanic.), 1; Alcohol (90 p.c.), 85; Distilled Water, *q.s.* to produce 100.

SYRUPUS AMYGDALÆ.—Spirit of Bitter Almond, 1; Orange Flower Water, 10; Syrup, *q.s.* to make 100.—*U.S.P.*

This has been incorporated in the *B.P.C.*

AMYGDALA DULCIS.

SWEET ALMOND.

FR., AMANDES DOUCES; GER., SÜSSE MANDELN; ITAL., MANDORLE DOLCI; SPAN., ALMENDRO DULCE.

The ripe Seed of *Prunus Amygdalus*, Stokes, var. *dulcis*, Baillon. Commonly known as the Jordan Almond.

Medicinal Properties.—Demulcent and nutrient. Biscuits are made of Jordan and Valencia Almonds for diabetic patients, as a substitute for bread or starchy food. Almonds do not contain starch.

The Mistura Amygdalæ is a good vehicle for cough medicines, and for suspending insoluble powders.

Official Preparations.—Mistura Amygdalæ and Pulvis Amygdalæ Compositus.

Foreign Pharmacopœias.—Official in all; Fr., Ital., Mex. (Almendra Dulce), Port. (Amendoas Doces), Span.

Descriptive Notes.—Almonds are met with in commerce either in the shell or endocarp, or in the form of seed only. Sweet Almonds vary in size and shape, those of Valencia and Sicily being broad and flattened, those of Barbary irregular in shape owing to two seeds often occurring in one endocarp and becoming misshapen by pressure. The Valencia Almonds are usually free from Bitter Almonds, those of Barbary and Sicily are often mixed with them. The Jordan Almond, which is alone official, is imported from Malaga in Spain. It is longer, narrower and more convex in proportion than the other varieties, being 2·5 to 3 cm. (about an inch) in length, and about 1·25 cm. ($\frac{1}{2}$ inch) in width and 0·5 cm. ($\frac{1}{5}$ inch) in thickness. It has a bland taste and triturated with Water forms a white emulsion without any marked odour, indicating the absence of Bitter Almonds. For forming emulsions, Almonds are first deprived of their skins or 'blanched' by dipping them in boiling Water for a minute or two, when slight pressure between the fingers will separate the testa. The variety official in the *U.S.P.* appears to be the Valencia Almond as it is stated to be broader than the Bitter Almond. The variety official in Germany is stated to be unsymmetrically ovate and flattened, 2·25 cm. long and 1·5 cm. broad, and at the rounded end more than 1 cm. broad. This appears to indicate the Sicilian or Valencia Almonds, since the Jordan Almonds are rarely more than 1·25 cm. broad.

Preparations.

MISTURA AMYGDALÆ. ALMOND MIXTURE.

Compound Powder of Almonds, 1; Distilled Water, 8.

Rub the powder to a smooth cream with a suitable quantity of Water, and add gradually the remainder; strain.

Dose.—½ to 1 fl. oz. = 14·2 to 28·4 c.c.

Foreign Pharmacopœias.—Official as **Emulsio** in Austr., Dan., Fr., Hung., Ital., Norw., Port. and Swed. U.S. Emulsum A.; there is much variation in the proportions. Swed. has also Emulsio Hydrocyanata, Aymgdalin, 1; Almond Emulsion, 80. Not in the others. Belg., Fr., Ger. and Swiss have Syrups.

PULVIS AMYGDALÆ COMPOSITUS.—COMPOUND POWDER OF ALMONDS.

Sweet Almonds, 8; Powdered Refined Sugar, 4; Powdered Gum Acacia, 1. Remove the skins of the Almonds after softening them in Water, and dry the Almonds by a cloth and exposure to the air until brittle (*Comp.* 1894), so that they will rub to a paste which is not too moist and with which the Sugar and Gum, previously mixed, can be incorporated to form a moderately coarse powder.

Dose.—60 to 120 grains = 4 to 8 grammes.

AMYL NITRIS.

AMYL NITRITE.

FR., AZOTITÉ D'AMYLE; GER., AMYLNITRIT; ITAL., NITRITO D'AMILE;
SPAN., NITRITO DE AMILO.

A pale yellow, volatile liquid, with a characteristic ethereal odour and pungent aromatic taste. It consists principally of Iso-Amyl Nitrite, $\mathbf{C_5H_{11}NO_2}$, eq. 116·25; which is present in variable quantity, together with other Nitrites. It may be produced by the action of Nitrous Acid upon that fraction of the higher Alcohols distilling between 127·7° and 132·2° C. (262° and 272° F.). Should be stored in well-stoppered glass bottles of an amber colour, or preferably in glass capsules of a dark amber tint.

Solubility.—Insoluble in Water. Soluble in Alcohol (90 p.c.), Ether and Chloroform.

Medicinal Properties. — Antispasmodic. Very useful in angina pectoris, aneurismal pain, hæmoptysis, dyspnœa of bronchitis and spasmodic asthma; has been used with advantage in epilepsy, in trifacial neuralgia, in migraine and sea-sickness, and hemicrania, if these conditions be accompanied by facial pallor; also in laryngeal spasm, in hepatic, intestinal and renal colic, in spasmodic forms of dysmenorrhœa and in eclampsia; a restorative in cardiac failure from Chloroform or Nitrous Oxide anæsthesia or other cause; has been found useful as an antidote to Strychnine.

In angina, where a rapid fall of arterial tension is required, the

B.P. Amyl Nitrite, which contains Iso-butyl Nitrite, is best, but in other cases, such as Bright's disease, when the prolonged action is required, pure Amyl Nitrite is more effective. As some persons are peculiarly susceptible to its action, its use demands caution.

A description of 77 cases of pneumonia treated by the inhalation of large doses.—*B.M.J.E.* '95, ii. 96; *T.G.* '96, 49.

Promptly effective and safer than Morphine in hæmoptysis, and can be used at earliest possible moment by patient himself.—*L.* '08, i. 565.

The most efficient and expeditious remedy in hæmoptysis.—*Pr.* '07, i. 679; *T.G.* '07, 323; *L.* '06, ii. 1685; '07, i. 939; '08, i. 427, 504.

Successful in postpartum hæmorrhage (*B.M.J.* '06, ii. 1125); and in menorrhagia.—*L.* '08, ii. 418.

Inhalations have been recommended (*L.* '05, i. 800) in deep-seated hemorrhage. It has also been used with success in tuberculous hæmoptysis.

Dose.—For inhalation, the vapour of 2 to 5 minims = 0·12 to 0·3 c.c.

Prescribing Notes.—*It can be obtained in small* **glass capsules** *covered with cotton wool and silk, each containing from 2 to 5 minims. The covered capsule is placed in a handkerchief, then carefully broken across, and the escaping vapour immediately inhaled.*

In mixtures to be swallowed, dose, ½ to 1 minim dissolved in Alcohol (90 *p.c.*) *and diffused through Water by means of Tragacanth* (*in powder*) *2 grains to the fl. oz.; to be used with caution.*

Should be handled carefully, as even smelling it causes violent flushings.

Not Official.—Iso-butyl Nitrite, Tertiary Amyl Nitrite, Amyl Valerianate and Mistura Amyl Nitritis.

Foreign Pharmacopœias.—Official in Austr., Dutch, Ger., Jap., Russ. and Swed., sp. gr. 0·870 to 0·880, boils at 97° to 99° C.; Belg., sp. gr. 0·870 to 0·900, boils at 99° C.; Fr., sp. gr. 0·88, boils at 96° to 99° C.; Mex. (Eter Amilnitroso), sp. gr. 0·877, boils at 95° C.; Ger., Russ. and Swed., boils at 97° to 99° C.; Hung., sp. gr. 0·900, boils at 96° to 99° C.; Ital. (Nitrito d'Amile), sp. gr. 0·87 to 0·89, boils at 97° to 99° C.; Swiss, sp. gr. 0·870 to 0·900, boils at 97° to 99° C.; U.S., sp. gr. 0·865 to 0·875 at 25° C. (77° F.).

Tests.—The distinguishing tests for Amyl Nitrite are its odour; the peculiar flushing of the face and strange sensation of fulness in the head produced by its inhalation, the specific gravity which should be from 0·870 to 0·880, the temperature [90° to 100° C. (194° to 212° F.)] at which the greater portion of the liquid passes over when distilled with the bulb of the thermometer not dipping below the surface of the residual liquid; the production of Potassium Iso-valerianate when it is dropped gradually on to fused Potassium Hydroxide. The *B.P.* and the *P.G.* give the specific gravity as 0·870 to 0·880; the *U.S.P.* gives 0·865 to 0·875 at 25° C. (77° F.). The *B.P.* requires that 70 p.c. should pass over between the temperatures indicated above; the *P.G.* states that it boils at 97° to 99° C. (206·6° to 210·2° F.); the *U.S.P.* has deleted the boiling point. The *B.P.* requires that only a pale yellow colour shall be produced in the aqueous liquid when the Nitrite is shaken with an equal volume of Potassium Hydroxide Solution; the *U.S.P.* and *P.G.* require that Silver Nitrate Solution should not turn brown or black. The *U.S.P.* and the *P.G.* both adopt a test for the limit of acidity, which is given below under that heading. The *B.P.* requires it to yield not less than 6 times its volume of Nitric Oxide gas; the *U.S.P.* requires it to contain about 80 p.c. of Amyl Nitrite, chiefly Iso-amyl Nitrite, as determined gasometrically by the process given below under the heading of Gasometric Determination. When a measured quantity of 5 c.c. of a 5 p.c. solution of the Nitrite in Alcohol (90 p.c.) is intermittently shaken for 5 minutes in a nitrometer containing saturated brine solution, with 5 c.c. of strong Potassium Iodide Solution and 5 c.c. of Diluted Sulphuric Acid, and the level of the liquid in the two limbs of the nitrometer adjusted to the same level, it should yield a volume of gas not less than 30 c.c., adjusted to the normal temperature and pressure. The number of c.c. of gas evolved multiplied by 5 (4·98) gives the weight in milligrammes of Amyl Nitrite in the quantity operated upon. The operation may be conducted in two parts, the Potassium Iodide Solution being first run into the nitrometer, followed by the Diluted Sulphuric Acid. The measure of the gas first liberated affords a criterion of the acidity of the sample. The *U.S.P.* neutralises any acidity by first treating the Amyl Nitrite with Potassium Bicarbonate and weighs the Nitrite instead of measuring it. The temperature at which the readings are taken is 25° C. (77° F.) and a correction is made for each degree above or below. A correction is also made for the barometric pressure above or below 760 mm. of Mercury.

The more generally occurring impurities are Water and Aldehyde. All three Pharmacopœias adopt the method of cooling the specimen to the temperature of melting ice, in testing for Water; if water be absent it will remain clear. Aldehyde in the *B.P.* is examined for by Potassium Hydroxide Solution, no quantities being given; in the *U.S.P.* and *P.G.* by Silver Nitrate Solution rendered slightly ammoniacal by the addition of a few drops of Ammonia Solution, both Pharmacopœias carefully stating the quantities to be employed in the test, the *U.S.P.* uses Alcohol (94·9 p.c.) for diluting, the *P.G.* Absolute Alcohol.

Acidity.—5 c.c. Amyl Nitrite should not overcome the alkaline reaction of 0·1 c.c. Solution of Ammonia with 1 c.c. of Water, *P.G.* If 5 c.c. be agitated with a mixture of 1 c.c. Normal Potassium Hydroxide Solution and 10 c.c. of Water with a drop of Phenolphthalein T.S., the red tint of the aqueous layer should still be perceptible, *U.S.P.*

Silver Nitrate Solution.—1 c.c. Amyl Nitrite should not turn brown or black a mixture of 1·5 c.c. Silver Nitrate Solution, 1·5 c.c. Alcohol and a few drops of Solution of Ammonia on gently warming (test for Aldehyde), *P.G.* and *U.S.P.* The *P.G.* uses Absolute Alcohol in the place of Alcohol.

Gasometric Determination.—Transfer about 3 c.c. of Amyl Nitrite, which has been previously shaken with 0·5 gramme of Potassium Bicarbonate and carefully decanted, to a tared 100 c.c. measuring flask, and weigh it accurately. Add sufficient Alcohol (94·9 p.c.) to bring the volume to exactly 100 c.c. and mix thoroughly. Introduce into a nitrometer exactly 10 c.c. of the alcoholic solution, followed by 10 c.c. of Potassium Iodide T.S., and afterwards by 10 c.c. of Volumetric Sulphuric Acid Solution. When the volume of gas has become constant (within 30 to 60 minutes), note the volume of gas collected. Multiply this volume in c.c. by 4·8, and divide the product by the original weight of the Amyl Nitrite, the quotient will represent the percentage of Amyl Nitrite in the liquid at standard temperature and pressure. Correction for temperature and pressure: The temperature correction is one-third of one per cent. of the total percentage just found for each degree, additive if the temperature is below, and subtractive if it is above 25° C. (77° F.). The barometric correction is fourthirtieths of 1 p.c. for each mm., additive if it is above, and subtractive if it is below 760, *U.S.P.*

For comments *see* above in large type.

Not Official.

MISTURA AMYL NITRITIS.—Amyl Nitrite, 2; Alcohol (90 p.c.), 16; mix and add to Powdered Tragacanth, 1, contained in a dry phial; then add gradually Distilled Water to 240; shake well. **Dose.**—1 or 2 drm. (3·5 to 7 c.c.). —*Martindale.*

Amyl Nitrite, 1⅕ minims; Alcohol, 12 minims; Tragacanth, 1 grain; Syrup, 30 minims; Distilled Water, to 4 fl. drm.—*B.P.C.*

ISO-BUTYL NITRITE.—Its action and uses are similar to those of Amyl Nitrite.

TERTIARY AMYL NITRITE (Bertoni's Ether).—Prepared from tertiary Amylic Alcohol (Amylene Hydrate). It possesses all the properties of the official Nitrite, but it can be taken in larger quantities without danger, and it does not cause flushing of the face.

The tertiary Nitrites have a more powerful influence generally than the secondary or primary.

Dose.—5 drops on sugar, or in capsules.

AMYL VALERIANAS.—A colourless liquid, possessing a strong fruity odour. Sedative and antispasmodic.

Dose.—2 to 3 minims = 0·13 to 0·2 c.c. in capsules.

Not Official.

AMYLENE HYDRATE.

TERTIARY AMYLIC ALCOHOL. DIMETHYL-ETHYL CARBINOL.

$C_5H_{12}O$, eq. 87·43.

A clear, colourless, oily liquid, with a strong characteristic odour and taste.

Solubility.—1 in 8 (or rather less) of Water; in all proportions of Alcohol (90 p.c.).

Medicinal Properties.—Hypnotic. Has no unpleasant after-effects, and its taste is less objectionable than that of Paraldehyde. Successful in mania (especially morphinomania, *M.A.* '94, 426), delirium tremens, and in severe forms of epilepsy where bromides are found useless.

Recommended where hypnotics are required for a long period.—*Y.B.T.* '94, 74.

1½ grammes Amylene Hydrate repeated in two hours gave six hours' uninterrupted sleep in a case recovering from the morphia habit.—*L.* '01, ii. 366.

Dose.—30 to 60 minims = 1·8 to 3·6 c.c.

Prescribing Notes.—*Dissolved in Water or Alcohol* (90 *p.c.*); *also given in* **capsules**; *sometimes given as an enema.*

Cannot be employed subcutaneously owing to pain produced.—B.M.J.E. '94, ii. 64.

Foreign Pharmacopœias.—Official in Dan., Ger., Norw. and Swiss (Amylenum Hydratum). Not in the others.

Tests.—It should possess a specific gravity of 0·812 to 0·820 and a boiling point of 99° C. (210·2° F.) to 103° C. (217·4° F.). 1 c.c. dissolved in 20 c.c. of water should not within 10 minutes either decolorise 2 drops of a 1 in 1000 Potassium Permanganate Solution, indicating the absence of Ethyl or Amyl Alcohol; or blacken Silver Nitrate Solution at 100° C. (212° F.), indicating the absence of Aldehyde.

AMYLUM.

STARCH.

Fr., Amidon de Blé; Ger., Weizenstärke; Ital., Amido; Span., Almidon.

A white, odourless, tasteless, impalpable powder, or irregular, angular or columnar masses; procured from the Fruits or grains of wheat, *Triticum sativum*, Lam.; maize, *Zea Mays*, L., and rice, *Oryza sativa*, L.

Medicinal Properties.—Protective, absorbent. A good application to the skin when irritable or inflamed, or in trivial burns. It has been given in powder for diarrhœa; and is a very good antidote for Iodine poisoning, followed by an emetic. Mucilage of Starch, 1 in 40, is useful as a basis for enemas. In the form of Violet Powder it is useful to prevent the chafing and excoriation of the skin of infants. **Glycerin** of Starch is a good application for chilblains and chapped hands, and as a protective in certain skin diseases.

Official Preparations.—Glycerinum Amyli. Used in the preparation of Pulvis Tragacanthæ Compositus.

Not Official.—Mucilage of Starch, Test Solution of Starch and Pulvis Violæ.

Foreign Pharmacopœias.—Official in Austr., Wheat and Rice; Belg., Arrowroot, Maize, Potato, Rice and Wheat; Fr., Ger., Hung., Ital., Mex., Norw., Port., Russ., Span. and Swed.; all Wheat Starch. Dan., Arrowroot and Wheat; Dutch, Arrowroot, Potato, Rice and Wheat; Jap., Katakuri, Kuzu and Potato; Port. allows several other Starches; Swiss, Rice and Wheat Starch; U.S., Maize Starch. Fr. has also Potato Starch.

Descriptive Notes.—Starch is met with in commerce in irregular columnar or pseudocrystalline masses, which may be white or coloured slightly blue, or in powder. The starches most commonly used for food are those of Maize, Rice and Potato, although a number of others are met with, descriptions of which with measurements and excellent illustrations are given in Greenish's *Anatomical Atlas*, pl. i.–ix., pp. 6–22, and in Tschirch and Oesterle's *Anatomische Atlas* (1900).

The official Starch includes those of Wheat, Maize and Rice, and may be either in the columnar form or in powder, but should be white and inodorous. Wheat Starch is described as consisting of large and small granules, the larger being lens-shaped and faintly striated concentrically, with a nearly central hilum; Maize Starch as frequently polygonal, more uniform in size, and somewhat smaller than the large granules of Wheat Starch, with a distinct hilum but no striæ; and Rice Starch as consisting of extremely minute granules nearly uniform in size, polygonal, and without evident hilum or striæ. Potato Starch, by reason of its cheapness, is employed for many technical purposes and may be expected to occur as an adulteration of other Starches. It should be noted that the lenticular grains of Wheat Starch when seen edgewise under the microscope appear elliptical or almost linear, and might be mistaken for the flattened grains of zingiberaceous Starches; that a hilum is rarely evident.

Arrowroot, obtained from *Maranta arundinacea*, was formerly official; like all other Starches it is apt to absorb the odour and flavour of any drugs or perfumes near which it is placed and should consequently be kept in jars or tins.

The commercial Starches may to some extent be distinguished by the different tints assumed by them when placed under a bell glass around a crystal of Iodine, and differ also in the character of the jelly they form with the same proportion of Water or Glycerin. In the *P.G.* only the Starch of Wheat is official, the measurements of the grains are given as 0·015 to 0·045 mm. broad, and 0·002 to 0·008 mm. in diameter. In the *U.S.P.* Maize Starch is alone official and the diameter of the grain is given as 0·010 to 0·025 mm.

Tests.—The distinguishing tests for Starch are the production of a translucent colourless gelatinous solution when boiled with water; the production of a deep blue colour when Iodine Solution is added to this solution when cold; the ready hydrolysis with the formation of products having a strong reducing action upon Fehling's Solution (Potassio-cupric Tartrate Solution) when the gelatinised solution is treated at a temperature of 100° F. (37·7° C.), with an active solution of an amylolytic enzyme.

The more generally occurring impurities are free alkali and an excessive amount of mineral matter. The *B.P.* includes as the official Starches, Wheat, Rice and Maize; the *U.S.P.*, Maize Starch; the *P.G.*, Wheat Starch only. Both *B.P.* and *U.S.P.* requires that when triturated with cold Water it shall yield a mixture having neither an acid nor an alkaline reaction to test papers; the *P.G.* stipulates that 1 part by weight of Starch boiled with 50 parts by weight of Water shall yield a mucilage which does not alter Litmus paper. Neutral Starch is, however, seldom obtained; it is, as a rule, faintly alkaline.

The *B.P.* makes no reference to the amount of ash permissible; the *U.S.P.* and *P.G.* state that not more than 1 p.c. of residue shall remain after complete incineration.

The *U.S.P.* requires that when freed from Water by careful drying in a current of warm air, Starch should show not less than 95 p.c. of hydrolysable carbohydrates.

Preparation.

GLYCERINUM AMYLI. Glycerin of Starch.

Starch, 1; Glycerin, 6½; Distilled Water, 1½; stir them together whilst sufficient heat is applied to burst the Starch granules, and form a homogeneous mass.

The operation should be conducted as quickly as possible, to avoid excessive loss of Water; and to prevent carbonisation from overheating, the use of an oil-bath is recommended.

This formula has been altered in each successive edition of *B.P.* In 1867 the formula was Starch 1, Glycerin 8; in 1885, Starch 1, Glycerin 5, Distilled Water 3; and the proportions are now as that given above.

Foreign Pharmacopœias.—Official in Belg., Starch 10, Water 15, Glycerin 90; Fr. (Glycéré d'Amidon), Starch 1, Water 1, Glycerin 13; Ital. (Glycerolato d'Amido), Starch 7, Water 3, Glycerin 90; Mex. (Glycerado de Almidon), Starch 2·4, Glycerin 30; Port. (Glycerado Commum), Starch 1, Water 2, Glycerin 17; Span. (Glicerolado de Almidon), Starch 1, Water 2, Glycerin 8; U.S. (Glyceritum Amyli), Starch 1, Water 1, Glycerin 8. The following are called Unguentum Glycerini; Austr., Starch 1, Water 2, Glycerin 10; Dan., Starch 3, Water 3, Glycerin 14; Ger. and Jap., Starch 10, Water 15, Glycerin 90; Hung., Tragacanth 1, Alcohol 5, Glycerin 50 (no Starch); Norw. and Swed., Starch 1, Glycerin 15⅔; Russ., Starch 1, Water 1, Glycerin 14; Swiss, Starch 7, Water 7, Glycerin 93. All by weight.

Not Official.

MUCILAGE OF STARCH.—A recently prepared solution containing approximately 2 p.c. w/v of Starch prepared by first rubbing 1 gramme of Starch to a smooth paste with Water, and adding a further sufficient quantity of Water to produce 50 c.c., after boiling for a few minutes the mixture is cooled.

PULVIS VIOLÆ.—Orris Rhizome, in fine powder, 12 lb.; Oil of Bergamot, 1 fl. oz.; Otto of Rose, 144 minims; Tincture of Musk (Squire), 3½ fl. oz.; Starch, in powder, 112 lb.—*Squire.*

Orris Rhizome, in fine powder, 12·50; Oil of Bergamot, 0·25; Oil of Neroli, 0·02; Starch, in powder, *q.s.* to produce 100.—*B.P.C.*

TEST SOLUTION OF STARCH.—*See* Appendix.

Not Official.

AMYLUM IODATUM.

Iodine, 5; Starch, 95; Distilled Water, *q.s.* Triturate the Iodine with a little Distilled Water, add the Starch gradually, and continue triturating until the compound assumes a uniform blue colour approaching black. Dry at a temperature not exceeding 40° C. (104° F.) and rub it to a fine powder.

This has been incorporated in the *B.P.C.*

A teaspoonful thrice daily for lupus erythematosus.—*B.M.J.* '80, i. 652.

Not Official.

ANALGEN.

BENZANALGEN; QUINALGEN, ORTHOÆTHOXY-ANA-MONOBENZOYLAMIDOCHINOLIN.

A white crystalline powder, inodorous and tasteless.

This is similar in chemical composition and properties to Phenacetin, but with the Phenol ring replaced by the Quinoline ring.

Solubility.—Insoluble in Water; sparingly soluble in cold, more so in hot Alcohol; fairly soluble in Chloroform; almost insoluble in Ether.

Medicinal Properties.—Has been recommended in neuralgia, hemicrania, and bronchitic asthma, but it is not without unpleasant effects; the urine is frequently coloured red; toxic action and dangers.—*B.M.J.* '98, ii. 1055.

It has given relief in sciatica.—*M.A.* '94, 9; *B.M.J.E.* '93, ii. 87; *M.P.* '94, 621; *L.* '97, i. 1227.

Dose.—7½ to 15 grains = 0·5 to 1 gramme.

Prescribing Notes.—*Usually given in* **cachets,** *or Compressed Tablets.*

Tests.—Analgen melts at a temperature of 208° C. (406·4° F.), and should leave no residue on ignition. The cold saturated aqueous solution should yield a yellow coloration with Ferric Chloride Test-solution. It dissolves in cold concentrated Sulphuric Acid, forming a bright yellow coloured liquid, and on dilution with Water a lemon yellow coloured precipitate is thrown down. The cold saturated aqueous solution reduces Silver Nitrate Solution in the cold or on warming.

ANETHI FRUCTUS.

DILL FRUIT.

Fr., Aneth; Ger., Dillsamen; Ital., Aneto; Span., Eneldo.

The dried ripe Fruit of the *Peucedanum graveolens*, Benth. and Hook. f.

Cultivated in Britain or imported from Central and Southern Europe.

Descriptive Notes.—Two varieties of Dill are met with in commerce, viz., the European and the Indian. The former only is official. The fruits are oval, flat, about ⅙ inch (4 mm.) long, ⅛ inch (2 to 3 mm.) broad, brown, with the two outer ridges developed into a paler marginal wing. A transverse section shows 6 vittæ. The odour and taste are aromatic.

The Indian Dill is narrower, more elliptical, more convex, and of a greyish tint, and is usually not so free from fruit-stalks as the European drug. The oil obtained from it differs in containing Dill Apiol, and less Carvone, as well as in chemical and physical characters, from that of European Dill. The plant yielding it is *Peucedanum Sowa*, Benth. and Hook. f., considered by some botanists as only a variety of *P. graveolens*, but the *B.P.* description excludes the use of the Indian drug. The Dill Apiol separates during distillation, forming a layer at the bottom of the receiver.

Medicinal Properties.—Stomachic and carminative; chiefly given to children in cases of flatulency; sometimes given with Sodium Bicarbonate, the taste of which it covers well.

Official Preparations.—Aqua Anethi and Oleum Anethi.

Foreign Pharmacopœias.—Official in Mex. (Eneldo), Port. (Endro). Not in the others.

AQUA ANETHI. Dill Water.

Dill Fruit, 1; Water, 20; distil, 10. (1 in 10)

Not in the other Pharmacopœias.

Dose.—½ to 1 fl. oz. = 14·2 to 28·4 c.c.; for children, 60 minims = 3·6 c.c.

OLEUM ANETHI. Oil of Dill.

A pale yellow, thin, oily liquid having a characteristic odour resembling Caraway, and possessing at first a sweetish and aromatic and subsequently a sharp, burning taste.

The Oil distilled from Dill Fruit.

Yield, 3 to 4 p.c.

It darkens in colour on exposure to air and light and should be preserved in well-stoppered bottles of a dark amber tint. It contains about 40 to 60 p.c. of Carvone, and a terpene Limonene, but no Anethol.

Solubility.—Readily soluble in Alcohol and Ether.

Dose.—½ to 3 minims = 0·03 to 0·18 c.c.

Not in the other Pharmacopœias.

Tests.—The distinguishing tests for Dill Oil are the strong characteristic odour, the specific gravity, which should be 0·905 to 0·920, the optical rotation, which should be from + 70° to + 80°, in a tube of 100 mm. length. It should yield a clear solution in from 6 to 8 parts of Alcohol (80 p.c.). Not less than 15 p.c. should distil below 185° C. (365° F.), and not less than 40 p.c. above 220° C. (428° F.). The abstraction of Carvone from the oil is indicated by a decrease in the specific gravity, and a diminution in the amount distilling above 220° C. (428° F.).

Not Official.

ANILINE.

C_6H_7N, eq. 92·40.

An oily liquid, colourless when freshly distilled, but very prone to become yellow or brown on exposure to air.

It should be kept in well-stoppered bottles of a dark amber tint and protected as far as possible from the air.

Solubility.—1 in 27 of Water; 5 in 4 of Alcohol (60 p.c.); mixes in all proportions with Alcohol (90 p.c.), Ether and Glycerin.

As a vehicle for dissolving Cocaine, for the production of local anæsthesia of the ear, 10 to 15 minims of a 5 p.c. solution of Cocaine made by dissolving Cocaine Hydrochloride 5 in dilute Alcohol 50, Aniline Oil 50.—*L.* '00, i. 1125; '01, i. 698.

Dose.—Not more than 7 minims = 0·5 c.c.—*L.* '00, i. 1127.

Several cases of poisoning from boots to which a black material containing an Aniline dye had recently been applied.—*L.* '02, i. 463.

Tests.—It should possess a specific gravity of 1·020 to 1·026, and a boiling point of 183° to 184° C. (361·4° to 363·2° F.). An aqueous solution of Aniline treated with a solution of Chlorinated Lime yields a dirty violet blue coloration changing to Indigo blue on the addition of Ammonia Solution. A few drops of Aniline warmed with an alcoholic solution of Potassium or Sodium Hydroxide and a drop or two of Chloroform evolve the characteristic, disagreeable, poisonous odour of Phenyl-Isonitrile.

ANISI FRUCTUS.

ANISE FRUIT.

FR., ANIS VERT; GER., ANISSAME; ITAL., ANICE; SPAN., ANIS.

The dried ripe Fruit of *Pimpinella Anisum*, L.

Medicinal Properties.—Stomachic and aromatic, carminative, slightly expectorant; used to relieve flatulence, and to diminish the griping of purgative medicines.

Official Preparations.—Aqua Anisi and Oleum Anisi.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex. (Anis Comun), Norw., Port., Russ., Span., Swed., Swiss and U.S.

Descriptive Notes.—Anise fruit occurs in commerce in several varieties, differing considerably in size and colour, and in degree of freedom from impurity. It possesses an aromatic and characteristic odour, and has a sweet taste. The official drug is limited to such varieties as are about $\frac{1}{5}$ inch (5 mm.) long, and $\frac{1}{12}$ inch (2 mm.) broad, and therefore includes the Maltese, Alicante and German varieties. Anise fruit is greyish-brown, *B.P.* (also greyish or greenish-grey, *U.S.P.*); ovate, stalked, with the two carpels united, and rough with minute 1-celled hairs; a transverse section exhibits numerous vittæ. The German variety is brownish and that of Alicante greenish; South Russian Anise is similar in size to Conium fruit. Conium has sometimes occurred mixed with Anise fruit in Italy. Its presence may be detected by the mouse-like odour developed when rubbed with a few drops of Liquor Potassæ. It differs from Anise in being without hairs, and having the ridges distinctly crenate, and the flat surface deeply grooved as seen in transverse section, and in being without vittæ in the mature fruit.

North Russian Anise is small and dark green or brownish, and it is used as a cheap source of the essential oil. The Syrian and Chilian varieties are usually very inferior and mixed with more or less foreign matter, and are consequently reserved for veterinary medicine. The varieties richest in essential oil are the Italian, Spanish and South Russian. The residue after distillation is valued as an ingredient for cattle foods. Under the microscope the distinguishing features are the simple, thick-walled, short, erect, straight or slightly curved hairs, with a minutely warty surface, and the striated surface of the flattened polygonal cells of the outer epidermis.

AQUA ANISI. Anise Water.

Anise Fruit, 1; Water, 20; distil, 10. (1 in 10)

Dose.—½ to 1 fl. oz. = 14·2 to 28·4 c.c.

Foreign Pharmacopœias.—Official in Belg., from the Spirit; Fr., Jap., Port. and Span., from Fruits; and U.S. from Oil. Not in the others.

OLEUM ANISI. Oil of Anise.

Fr., Essence d'Anis; Ger., Anethol; Ital., Essenza di Anice; Span., Esencia de Anis.

At temperatures above 15° C. (59° F.) it is a colourless or pale yellow refractive liquid, with a pleasant aromatic odour and very sweet taste; below 15° C. (59° F.) it becomes a white crystalline solid. It is obtained by distillation from the fruits of the official variety, or from the fruit of *Illicium Verum* or Star Anise.

It should be kept in amber-coloured well-stoppered glass bottles.

Solubility.—1 of Pimpinella Oil in 3 of Alcohol (90 p.c.); 1 of Illicium Oil in 4 of Alcohol (90 p.c.); a slight rise in temperature greatly increases the solubility in Alcohol (90 p.c.); both oils dissolve in all proportions of Absolute Alcohol; 1 of Pimpinella Oil in 200 of Alcohol (60 p.c.), at which point the Illicium Oil is distinctly turbid.

These variations in solubility seem to arise from the presence in the Illicium Oil of a small proportion of a much less soluble Oil, which is absent in the Pimpinella.

Dose.—½ to 3 minims = 0·03 to 0·18 c.c.

Prescribing Notes.—*May be taken on Sugar. Before dispensing an oil which has become partly solidified, it should be completely liquefied by warming, and well mixed by shaking.*

Official Preparation.—Spiritus Anisi. Contained in Tinctura Camphoræ Comp. and Tinctura Opii Ammoniata.

Not Official.—Aniseed Cordial, Elixir Anisi, Essentia Anisi, Tinctura Anisi, Anisic Acid, Sodium Anisate and Anethol.

Foreign Pharmacopœias.—The following are from **Pimpinella**: Dan., Dutch, Fr., Ital., Norw. and Russ., sp. gr. 0·980 to 0·990; Hung., sp. gr. 0·978 to 0·984; Port., sp. gr. 0·977 to 0·983; Mex., sp. gr. 0·982; Span., sp. gr. 0·984 to 0·986; Swiss, sp. gr. 0·984 to 0·994; U.S., sp. gr. 0·975 to 0·985 at 25° C. (77° F.). The following permit the use of both kinds: Mex., Port. and U.S. *See* also Anethol.

Tests.—The distinguishing tests for Anise Oil are its distinctive odour; its sweet taste; the specific gravity, which at 20° C. (68° F.) should be from 0·980 to 0·990; its optical rotation, which should be −1° to −2° in a tube of 100 mm. length; the melting point, which should not be below 15° C. (59° F.); the solidifying point, which should not be below 15° C. (59° F.).

The *B.P.* gives the sp. gr. at 20° C. (68° F.) as 0·975 to 0·990; the *P.G.* at 25° C. (77° F.) as 0·984 to 0·986; the *U.S.P.* at 25° C. (77° F.) as 0·975 to 0·988. The melting point given in the *B.P.* is from 10° to 15° C. (50° to 59° F.); the *U.S.P.* states that it should not be below 15° C. (59° F.) and gives the method outlined below for its determination.

80 to 90 p.c. of the oil should distil between 225° and 235° C. (437° to 455° F.), indicating a due percentage of Anethol. Neither *B.P.* nor *U.S.P.* make any reference to either the boiling point or to fractionation.

The Pimpinella Oil is readily distinguished from that of Star Anise by giving a deep blue colour on the addition of saturated solution of Hydrochloric Acid gas in Alcohol, but Schimmel and Co. state that the two varieties can only be distinguished by the odour and taste, and that the reaction with alcoholic Hydrochloric Acid does not give reliable results. The balance of opinion seems to be that it does afford a means of distinction.

The more generally occurring sophistications are Fennel Oil, or its stearoptene; volatile oils containing Phenols; Alcohol; the fluid portion remaining after the extraction of the Anethol; and Petroleum. Fennel Oil or its stearoptene are detected by the optical rotation of the sample, both these adulterants being dextrogyrate; volatile oils containing Phenols are detected by a blue or brownish colour produced by the addition of Ferric Chloride Test-solution to an alcoholic solution of the oil; Alcohol by the decrease in volume when the oil is shaken in a graduated measure with Water; the fluid portion remaining after the extraction of Anethol, by the alteration in the melting and solidifying point; and Petroleum by the Alcohol solubility—the pure oil dissolves 1 in 3 of Alcohol (90 p.c.); an oil containing 5 p.c. of Petroleum will not dissolve 1 in 10. The oil undergoes oxidation by exposure to air, and its characters are greatly changed. Rise of specific gravity and lowering of the melting point are the principal indications as to the extent of oxidation.

Melting Point.—In the *U.S.P.* the following method is given to determine the congealing point, which should not be below 15° C. (59° F.). Transfer about 10 c.c. of the Oil to a test-tube placed in Water cooled with Ice; insert a thermometer at once into the Oil and allow it to remain undisturbed until its temperature has fallen to about 6° C. (42·8° F.). Induce crystallisation either by rubbing the inner wall of the test-tube with the thermometer or by the addition of a particle of Solid Anethol, remove the test-tube from the bath, and stir constantly during the solidification of the Oil. The highest temperature reached during the crystallisation is regarded as the congealing point.

Preparation.

SPIRITUS ANISI. Spirit of Anise.

Oil of Anise, 1; Alcohol (90 p.c.), *q.s.* to make 10. (1 in 10)

Dose.—5 to 20 minims = 0·3 to 1·2 c.c.

Half the strength of *B.P.* '85.

Foreign Pharmacopœias.—Belg., 1 Oil in 100; Fr., 1 Oil in 50; U.S., Spiritus, 1 Oil in 10; Austr., 1 of Fruits in 4; Span. has Alcohol de Anis Amoniacal, Oil 1, Liquid Ammonia 5, Alcohol (95 p.c.) 24. All by weight, except U.S. Not in the others.

Not Official.

ELIXIR ANISI. *Syn.* Aniseed Cordial.—Anethol, 3·5; Oil of Fennel, 0·5; Spirit of Bitter Almond (*U.S.P.*), 12; Alcohol (95 p.c.), 240; Syrup (*U.S.P.*), 625; Water, 125; Purified Talc (*U.S.P.*), 15. Average Dose for infants, 1 c.c. (15 minims).—*U.S.N.F.*

Anethol, 0·35; Oil of Fennel, 0·05; Spirit of Bitter Almond, 1·25; Alcohol (90 p.c.), 24; Syrup, 62·50; Magnesium Carbonate, 1·50; Distilled Water, *q.s.* to produce 100.—*B.P.C.*

ESSENTIA ANISI.—Oil of Anise, 1; Rectified Spirit, 4.—*B.P.* 1885.
This has been incorporated in the *B.P.C.*

TINCTURA ANISI—(*Ital.*, *Mex.* and *Russ.*).—Anise Fruit, 1; Alcohol, 5.

ANISIC ACID ($H.C_8H_7O_3$).—It occurs in colourless, shining acicular crystals obtained by the oxidation of Oil of Anise or Anethol.

Solubility.—Almost insoluble in cold Water; 1 in 700 boiling Water; 1 in 36 of Alcohol (90 p.c.); 1 in 50 of Ether.

SODIUM ANISATE.—In rhombic crystals, or a crystalline powder, frequently efflorescent, with a slight aromatic odour.

Solubility.—1 in 5 of Water; 1 in 24 of Alcohol (90 p.c.).
Anisic Acid and its Sodium salt have been stated to possess antiseptic and antipyretic properties, similar to Salicylic Acid.

Dose.—5 to 15 grains = 0·32 to 1 gramme.

ANETHOL ($C_{10}H_{12}O$).—The Stearoptene separated from either of the Anise Oils. It is said to have a finer flavour than the Oil, being free from the acridity pertaining to the non-freezing portion of the Oil. A white crystalline mass possessing a strong characteristic Anise-like odour and sweetish taste. When melted it forms a highly refractive, almost colourless, liquid.

Foreign Pharmacopœias.—Official in Austr., Belg., Dutch, Ger., Jap. and Swed. Not in the others.

Tests.—It has at 25° C. (77° F.) a sp. gr. of 0·984 to 0·986; a melting point of 22·5° to 23° C. (72·5° to 73·4° F.); and a boiling point of 232° to 234° C. (449·6° to 453·2° F.). It should form a clear solution in 3 parts of Alcohol (90 p.c.).

ANTHEMIDIS FLORES.

CHAMOMILE FLOWERS.

FR., CAMOMILLE ROMAINE; GER., ROMISCHE KAMILLE; ITAL., CAMOMILLA ROMANA; SPAN., MANZANILLA ROMANA.

The dried expanded Flower-heads of the common or Roman Chamomile, *Anthemis nobilis*, L., collected from cultivated plants.

Medicinal Properties.—Stomachic, tonic and carminative. In large doses, emetic. Useful in atonic dyspepsia; externally it is employed as a fomentation for bruises and contusions.

Prescribing Notes.—*The Extract or Oil is frequently added to Rhubarb and aperient medicines as a corrective. A little Soap added in the case of the Oil, makes a good pill-mass.*

Official Preparations.—Extractum Anthemidis, and Oleum Anthemidis. The **Oil** is contained in the Extract.

Not Official.—Aqua Anthemidis, Decoctum Anthemidis et Papaveris, Oleum Chamomillæ Infusum, Infusum Anthemidis, Infusum Anthemidis Concentratum, Liquor Anthemidis et Papaveris, and Tinctura Anthemidis.

Foreign Pharmacopœias.—Official in Austr., Belg., Dutch, Fr., Ital., Jap., Mex., Port., Span., Swiss and U.S. Not in the others. Also Matricaria in Austr., Dan., Dutch, Ger., Hung., Ital., Jap., Mex., Norw., Russ., Span. (Manzanilla ordinaria), Swed. and Swiss.

Descriptive Notes.—The drug is met with in commerce chiefly in two forms, known respectively as English and exotic. The official description as well as that of the *U.S.P.* applies to the former. The flower-heads are hemispherical, 10 to 20 mm. ($\frac{4}{10}$ to $\frac{8}{10}$ inch) in diameter, and nearly white in colour. The florets are ligulate, suddenly tapering in the lower half and about 1 cm. ($\frac{4}{10}$ inch) long, a few tubular florets usually remaining in the centre. There is no pappus, and the solid conical receptacle is covered with narrow membranous bracts or paleæ, visible when the florets are removed. The involucral scales are also membranous and obtuse, with a green central nerve. The exotic Chamomile flowers, chiefly imported from Belgium and France, differ in being rather larger and in the florets being broader and all ligulate. In Scotland the single wild Chamomile flowers are often sold under the name of Scotch Chamomiles. These differ in having only one row of ligulate florets, all the centre consisting of yellow tubular florets. Scotch Chamomiles are sometimes preferred, on the supposition that the central contain more oil then the ligulate florets, but the single Chamomiles are excluded from use in dispensing by the *B.P.* description.

The Chamomile flowers (Flores Chamomillæ) official in the *P.G.* are the single flower-heads of *Matricaria Chamomilla*, L. These are much smaller than those of *Anthemis nobilis*, averaging only $\frac{1}{5}$ inch (5 mm.) in diameter, and have a portion of the fruit-stalk attached to them. The receptacle is nearly conical, but hollow, and has no paleæ. The odour resembles that of the *B.P.* Chamomile, but is weaker.

If Chamomile flowers have a brownish tint they have either been damaged by rain, or not carefully dried, or have become brownish by keeping. In either case they must be regarded as of inferior quality and unfit for dispensing purposes. The taste of Chamomile flowers is bitter and the flavour strongly aromatic.

The double flowers of *Chrysanthemum Parthenium*, Bernh., which have occasionally been found mixed with Chamomile flowers have a slightly convex, not conical, solid receptacle, and the few paleæ sometimes present are lanceolate and acute.

Preparations.

EXTRACTUM ANTHEMIDIS. EXTRACT OF CHAMOMILE.

An aqueous extract of the Flowers treated by decoction, to which Oil of Chamomile is added just before completion of the evaporation, in the proportion of 15 minims of Oil to each pound of the Flowers employed.

The double Flowers yield about 30 p.c. of Extract.

Dose.—2 to 8 grains = 0·13 to 0·52 gramme.

Foreign Pharmacopœias.—Official in Ital., from both; Dan. and Swed., from Matricaria; Mex. (Extracto de Manzanilla). Not in the others.

OLEUM ANTHEMIDIS. OIL OF CHAMOMILE.

A light blue oily liquid, of an aromatic characteristic odour and balmy taste; distilled from the dried Flowers of *Anthemis nobilis*. On exposure to light and air the Oil acquires a greenish or yellowish-brown colour, and should therefore be kept in well-stoppered glass bottles of a dark amber colour, and exposed as little as possible.

Solubility.—Sparingly in Water; 10 in 3 of Alcohol (90 p.c.).

Dose.—$\frac{1}{2}$ to 3 minims = 0·03 to 0·18 c.c.

Foreign Pharmacopœias.—Official in Belg., from Anthemis; Fr., from Anthemis; Ital. and Swiss, from Matricaria. Not in the others.

Tests.—Oil of Chamomile has a specific gravity of about 0·910. The optical rotation should be between + 1° and + 3° in a tube of 100 mm. length. The optical rotation is not given in the *B.P.*

Not Official.

AQUA ANTHEMIDIS.—Flowers 1, Water 20, distil 10. (1 in 10)

Foreign Pharmacopœias.—Official in Austr., 1 in 10; Belg., 3 of the Spirit in 100; Port., 1 in 4. Ital., Matricaria, 1 in 2; Anthemis, 1 in $2\frac{1}{2}$. All distilled. Port, from Anthemis; Austr., from Matricaria; Ital., from both. Not in the others.

Oleum Chamomillæ Infusum.—Chamomile Flowers, 1; Olive Oil, 10; digest in a water-bath for 2 hours, strain, press and filter.

Foreign Pharmacopœias.—Official in Fr. and Port., 1 in 10; Span., 1 in 8; from Anthemis. Ital., 1 in 4; from Anthemis and from Matricaria. Belg. (Oleum Chamomillæ Camphoratum), 1 of Oil with 999 of Camphorated Oil. Span. (Aceite de Manzanilla Alcanforado), 1 of Camphor with 9 of Ol. Cham. Infus.

DECOCTUM ANTHEMIDIS ET PAPAVERIS.—Chamomile Flowers, 10; Poppy Capsules, bruised, 5; Distilled Water, *q.s.* to produce 100.—*B.P.C.*

INFUSUM ANTHEMIDIS.—Chamomile Flowers, 1; Boiling Distilled Water, 20. Infuse 15 minutes and strain.—*B.P.* 1885.

This has been incorporated in the *B.P.C.*

INFUSUM ANTHEMIDIS CONCENTRATUM.—Chamomile Flowers, in powder, 40; Oil of Chamomile, 0·2; Alcohol (20 p.c.), *q.s.* to make 100; mix the Oil of Chamomile thoroughly with the powder and submit the latter to repercolation.

Dose.—As a stomachic, 1 to 4 fl. drm.; as an emetic, 5 to 10 fl. drm.—*Farr* and *Wright*, *P.J.* '06, i. 165 and '07, i. 621; *C.D.* '06, i. 252; *Y.B.P.* 1907, 249.

This appears in the *B.P.C.*

LIQUOR ANTHEMIDIS ET PAPAVERIS.—Concentrated Infusion of Chamomiles and Liquid Extract of Poppies, equal volumes. One or two teaspoonfuls in half a pint of boiling Water, for use as a fomentation.

TINCTURA ANTHEMIDIS.—Single Chamomiles, carefully dried, 1; sufficient Alcohol (90 p.c.) to percolate, 8; or an equivalent quantity of fresh Flowers (about 3), and macerate with 8 of Alcohol (90 p.c.) for 7 days, and press.

The moisture in the fresh flowers reduces the strength of the spirit so that less resin is dissolved, and the tincture is consequently less bitter.

Foreign Pharmacopœias.—Official in Austr., 1 in 5, from Matricaria; Ital. and Mex., 1 in 5, both varieties; Belg., Chamomillæ Spiritus, 1 of the Oil in 100.

ANTIMONII OXIDUM.

ANTIMONIOUS OXIDE.

Sb_4O_6, eq. 571·28.

A white, more or less crystalline, powder.

When a solution of Antimonious Chloride is poured into Water Antimony Oxychloride is precipitated, and this, when in turn decomposed with Sodium Carbonate, yields Antimonious Oxide.

Solubility.—Insoluble in Water, Alcohol, and Nitric Acid; readily dissolved by Hydrochloric Acid and warm solution of Tartaric Acid.

Medicinal Properties.—Similar to but less active than the Tartrate because less soluble.

Dose.—1 to 2 grains = 0·06 to 0·13 gramme.

Prescribing Notes.—*The Pulvis Antimonialis is generally given in the form of* **powders, pills** *or* **cachets.**

Official Preparation.—Pulvis Antimonialis. Used in the preparation of Antimonium Tartaratum.

Foreign Pharmacopœias.—Official in Mex. (Oxido Antimonioso Precipitado), Norw. (Oxydum Stibicum), Port. and Span. Not in the others.

Tests.—The distinguishing tests for Antimony Oxide are that its slightly acidified solution yields with Hydrogen Sulphide Solution an orange-coloured precipitate soluble in Potassium Hydroxide Solution and in Ammonium Hydrosulphide Solution, insoluble in Ammonium Carbonate Solution; a cold white porcelain vessel allowed to impinge upon the upper flame produced on igniting the gas yielded by the interaction of Zinc, Hydrochloric Acid and a solution of the Oxide, acquires a dark metallic-looking stain, which is unaffected by Calcium or Sodium Hypochlorite Solution; the production of a metallic-looking coating on Copper when a piece of Copper foil is boiled with a solution of the Oxide containing free Hydrochloric Acid; the formation of a white amorphous but no crystalline sublimate when this coating is volatilised in a tube; the formation of a black deposit of Antimony on the Platinum, when a Zinc rod is allowed to rest on a piece of Platinum foil in an acidified solution of the Oxide.

It is officially required to indicate 99·98 p.c. of pure Antimonious Oxide, as indicated by titration with Deci-normal Volumetric Iodine Solution. The Oxide is brought into solution by means of Acid Potassium Tartrate or Tartaric Acid and an alkaline reaction throughout the titration ensured by the addition of Sodium Bicarbonate, this being necessary to neutralise the Hydriodic Acid set free during the reaction, Hydriodic Acid otherwise acting as a reducing agent. A weighed quantity of 0·5 gramme dissolved in twice its weight of Acid Potassium Tartrate then mixed with 3 grammes of Sodium Bicarbonate and cooled should decolorise 70 c.c. of the Volumetric Solution of Iodine.

The more generally occurring impurities are Antimonic compounds, Arsenic, Calcium, Copper, Iron, Lead, Chlorides and Sulphates. It is officially required to dissolve completely in an excess of Acid Potassium Tartrate. The extent to which it is true depends upon the age of the specimen, Antimonious Oxide undergoes oxidation on exposure to air, the resulting Antimonic compounds being insoluble. The amount of residue therefore forms a criterion of the proportion of the latter. The remaining impurities are grouped together in the *B.P.* under the elastic expression, 'it should yield no characteristic reaction with the tests for,' etc. The solution obtained by dissolving the Oxide in Hydrochloric Acid should yield no reaction with the Bettendorf's test, indicating the absence of Arsenic. When dissolved in Sodium Hydroxide Solution (15 p.c. w/w) it should yield on the addition of Hydrogen Sulphide Solution no dark coloration, indicating the absence of Copper, Lead and Iron; a white precipitate would indicate the presence of Zinc. Another portion of the sample dissolved in Sodium Hydroxide Solution (15 p.c. w/w) when supersaturated with Nitric Acid should yield only a faint turbidity on the addition of either Silver Nitrate Solution or Barium Chloride Solution, indicating the absence of more than a trace of Chlorides and Sulphates.

Preparation.

PULVIS ANTIMONIALIS. Antimonial Powder.

Antimonious Oxide, 1; Calcium Phosphate, 2.

Dose.—3 to 6 grains = 0·2 to 0·4 gramme.

Foreign Pharmacopœias.—Official in Mex., Antimonious Oxide 1, Calcium Phosphate 2; Port., Antimonious Oxide 35, Calcium Phosphate 65. Not in the others.

ANTIMONIUM NIGRUM PURIFICATUM.

ANTIMONIOUS SULPHIDE.

Fr., Trisulfure d'Antimoine; Ger., Gereinigtes Schwefelantimon; Ital., Trisolfuro di Antimonio; Span., Solfuro de Antimonio Purificada.

A heavy, inodorous, greyish-black crystalline powder, consisting of native Antimonious Sulphide Sb_2S_3, eq. 333·46, separated from siliceous material and from arsenical compounds.

Official Preparation.—Used to prepare Antimonium Sulphuratum.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Fr., Ger., Hung., Ital. (Crudo and Depurato), Mex., Port., Span. (Sulfuro de Antimonio Purificada), Swed. and Swiss. Not in the others.

Tests.—Antimonious Sulphide yields the tests distinctive of Antimony given under Antimonious Oxide; it moreover evolves on boiling with Hydrochloric Acid the characteristic disagreeable odour of Hydrogen Sulphide; and when fused with a mixture of Sodium Carbonate and sufficient Potassium Nitrate to oxidise it, yields a mass which, when dissolved in Water and filtered, affords with Barium Chloride Solution a heavy white precipitate insoluble in Hydrochloric or Nitric Acid, or in a mixture of both.

The more generally occurring impurities are Arsenic and siliceous matter. The Pharmacopœia stipulates that it should not yield more than slight characteristic reactions with the Arsenic tests. The Belgian Pharmacopœia is more precise, and requires that 1 gramme, shaken with 10 c.c. of Hydrochloric Acid until disengagement of gas ceases, mixed with 5 c.c. of Water, and cautiously heated on a water-bath with some crystals of Potassium Chlorate; the mixture, when freed from Chlorine, filtered through an asbestos plug and evaporated to 3 c.c., shall yield no brown coloration in one hour, when mixed with an equal volume of Stannous Chloride Solution. The *P.G.* and Austr. Ph. do not allow more than 1 p.c. of residue insoluble in concentrated Hydrochloric Acid.

Hydrochloric Acid.—2 grammes of the powdered salt are dissolved on warming gently with 20 c.c. of Hydrochloric Acid, and then, on boiling for 1 hour, should leave a residue amounting to not more than 0·02 gramme, *P.G.*

ANTIMONIUM SULPHURATUM. Sulphurated Antimony.

N.O.Syn.—Kermes Mineral. Stibium Sulfuratum Aurantiacum.

Fr., Pentasulfure d'Antimoine; Ger., Goldschwefel; Span., Azufre Dorado de Antimonio.

An orange-red, odourless, tasteless powder, which consists of a mixture of Antimony Penta- and Tri-sulphides and -oxides, and containing also some free Sulphur. It should be preserved from the light.

It is officially stated to be prepared by boiling 10 parts each of Antimonious Sulphide and Sublimed Sulphur for two hours with a solution of 5 parts of commercial Sodium Hydroxide in 100 parts of Distilled Water, stirring frequently; the volume of the liquid is maintained by the occasional addition of Distilled Water. Whilst still hot, add 180 parts of boiling Distilled Water, strain through calico, and add gradually diluted Sulphuric Acid in slight excess to the strained liquid. Collect the precipitate on calico, wash with Distilled Water till the washings are free from Sulphates, and dry at a temperature not higher than 100° C. (212° F.).

Solubility.—Insoluble in Water; dissolves readily in Sodium Hydroxide solution, also in hot Hydrochloric Acid evolving Hydrogen Sulphide.

Medicinal Properties.—Alterative, diaphoretic, and emetic; powerfully depressant; uncertain in action from its slight solubility, depending on the acidity of the stomach. Usually prescribed with Calomel and Guaiacum, as in Pilula Hydrargyri Subchloridi Composita, as a cholagogue in gout; for secondary syphilis and its cutaneous eruptions; or with Henbane or Hemlock in chronic rheumatism.

Objection taken (*L.* '05, i. 1610) to the use of red Antimony Sulphide in the composition of red india-rubber. The investigation arose from a case of appendicitis where a large quantity of liquid was in the habit of being drunk from bottles fitted with stoppers having a red rubber ring round them.

It is pointed out (*L.* '05, i. 1736) that this Sulphide is soluble with difficulty except in hot strong acids or strong alkali, and a series of experiments carried out with a number of the more generally occurring beverages showed that they possessed no solvent action as regards Antimony when left in contact with red rubber rings containing 16·83 p.c. of that substance.

Dose.—1 to 2 grains = 0·06 to 0·13 gramme.

Official Preparation.—Contained in Pilula Hydrargyri Subchloridi Composita.

Foreign Pharmacopœias.—Official in Austr., Belg., Hung. and Swiss (Stibium Sulfuratum Aurantiacum), Dan. and Dutch (Sulfidum Stibicum), Fr. (Pentasulfure d'Antimoine), Ger., Jap. and Russ. (Stibium Sulfuratum Aurantiacum), Mex. (Sulfuro Antimonico), Norw. (Sulfuretum Stibicum), Port. (Enxofre Dourado de Antimonio), Span. (Azufre Dorado de Antimonio), Swed. (Kermes Mineralis). Swiss has also Stibium Sulfuratum Rubeum.

Tests.—Sulphurated Antimony yields the tests distinctive of Antimony appearing under Antimonious Oxide; when treated with Hydrochloric Acid it evolves a disagreeable characteristic odour of Hydrogen Sulphide, and a separation of Sulphur occurs; and when fused with Potassium or Sodium Carbonate and sufficient Potassium Nitrate to effect oxidation, the product, when dissolved in Water and filtered, yields a solution giving with Barium Chloride Solution a dense white precipitate insoluble in concentrated Hydrochloric Acid or in Nitric Acid, or in a mixture of both.

The official gravimetric test requires that when 3 grammes of the Sulphide are fully oxidised with Nitric Acid, 2 grammes of Antimonic Oxide should be produced. It has been pointed out (*Y.B.P.* '07, 473) that it will not yield this amount of residue by this test, and it has been suggested that it should be modified so as to read, 3 grammes moistened with dilute Nitric Acid, with successive portions of fuming Nitric Acid until red fumes cease to be evolved, the excess of Water then evaporated off, and carefully heated to redness, to expel Sulphuric

Acid, should leave a whitish residue weighing not less than 1·6 and not more than 1·8 grammes. It is shown that a sample containing as much as 30 per cent. of anhydrous Sodium Sulphate yielded a figure for residue very close to that obtained from a genuine and carefully prepared sample.

The more generally occurring impurities are Arsenic, siliceous matter, Chlorides and Sulphates. The *B.P.* employs the ordinary tests for Arsenic. The *P.G.* uses saturated aqueous Ammonium Carbonate Solution for the extraction of the Arsenic, and states that when this solution is supersaturated with Hydrochloric Acid no yellow flocculent precipitate should be thrown down in six hours. The Belgian Pharmacopœia gives an Arsenic test similar to that recorded under Antimonious Sulphide. The tests described in small type below, under the heading of Silver Nitrate and Barium Nitrate, serve to detect Chlorides and Sulphates if present.

Ammonium Carbonate Solution.—Allow a mixture of 0·5 gramme of Sulphurated Antimony with 5 c.c. of an aqueous Solution of Ammonium Carbonate saturated at ordinary temperatures, to stand for 2 minutes with occasional agitation at a temperature of 50° to 60° C. (122° to 140° F.). In the solution so obtained after filtration, and saturation with Hydrochloric Acid, a yellow flocculent precipitate should not be thrown down within six hours, *P.G.*

Silver Nitrate.—1 gramme Sulphurated Antimony when agitated with 20 c.c. of Water and filtered, gives a filtrate which on the addition of Silver Nitrate T.S. should become only faintly opalescent, but should not become brown, *P.G.*

Barium Nitrate.—The filtrate obtained as above should not immediately become cloudy on the addition of T.S. of Barium Nitrate, *P.G.*

Not Official.

LIQUOR ANTIMONII CHLORIDI.—A yellowish-red liquid, sp. gr. about 1·47. A powerful escharotic.

ANTIMONIUM TARTARATUM.

TARTARATED ANTIMONY.

B.P.Syn.—Potassio-Tartrate of Antimony; Tartar Emetic.

Fr., Antimoniotartrate Acide de Potassium; Ger., Brechweinstein
Ital., Tartaro Emetico; Span., Tartrato Antimonico Potasico.

$[K(SbO)C_4H_4O_6]_2H_2O$, eq. 659·14.

N.O.Syn.—Tartarus Stibiatus.

Colourless, odourless, transparent rhombic crystals, or as a heavy white powder. Taste at first sweet, then nauseous and metallic.

It should be preserved in well-stoppered bottles of a dark amber colour.

Solubility.—1 in 17 of Water (slowly); 1 in 2 of boiling Water; sparingly soluble in Alcohol (60 p.c.); insoluble in Alcohol (90 p.c.).

Medicinal Properties.—Diaphoretic, expectorant, alterative, emetic, circulatory and nervous depressant. Useful in the head symptoms of acute febrile diseases and in delirium tremens; contra-indicated in asthenic cases; alterative in chronic skin affections and in gout.

As a diaphoretic and expectorant, it is given with great effect in the early stage of acute pneumonia, bronchitis and croup.

Externally, in the form of **ointment,** it acts as a powerful counter-irritant, producing a pustular eruption.

Too purgative and depressant for use in lowering blood pressure.—*B.M.J.* '06, ii. 1451.

A review of post-mortem examinations, after death from the administration of tartar emetic.—*B.M.J.* '03, i. 873.

Dose.—As a diaphoretic, $\frac{1}{24}$ to $\frac{1}{8}$ grain = 0·003 to 0·008 gramme; as an emetic, 1 to 2 grains = 0·06 to 0·13 gramme.

Ph. Ger. maximum single dose, 0·2 gramme; maximum daily dose, 0·6 gramme.

Prescribing Notes.—*Best prescribed in aqueous solution or as the Vinum. In* pill, *well triturated with Milk Sugar and Diluted Glucose q.s.*

Incompatibles.—Tannic Acid, the Alkalis and their Carbonates, and Lead salts, Astringent infusions, as Cinchona, Rhubarb, etc.

Official Preparation.—Vinum Antimoniale.

Not Official.—Unguentum Antimonii Tartarati.

Antidotes.—Stomach-tube or emetics, Tannic Acid, Catechu, vegetable astringents, Tea or Coffee; stimulants if much collapse.

Foreign Pharmacopœias.—Official in Austr. (Stibium Kalio-Tartaricum); Belg. (Tartarus Stibiatus); Dan., Nor. and Swed. (Tartras Stibico-Kalicus); Dutch (Tartras Kalico-Stibicus); Fr. (Antimoniotartrate Acide de Potassium); Ger. and Swiss (Tartarus Stibiatus); Hung. (Kalium Stibio-Tartaricum); Ital. (Tartrato di Antimonio e di Potassio); Mex. (Tartrato de Potassio y antimonio); Port. (Tartrato de Potassa e de Antimonio); Jap. and Russ. (Stibio-Kalium Tartaricum); Span. (Tartrato Antimonico Potasico); U.S. (Antimonii et Potassii Tartras).

Tests.—Tartarated Antimony should answer the tests distinctive of Antimony given under Antimonious Oxide; after separation of the Antimony it should also give a yellow crystalline precipitate with Platinic Chloride Solution, and a residue of Platinum and Potassium Chloride when this precipitate is ignited; when moistened with Hydrochloric Acid and introduced into a Bunsen flame it should communicate a violet coloration readily distinguished when viewed through a blue glass; it should give a white precipitate soluble in moderately concentrated Potassium Hydroxide Solution, when an aqueous solution is tested with Calcium Chloride Solution; with Silver Nitrate Solution a white precipitate soluble in Ammonia Solution, the ammoniacal solution yielding a precipitate of metallic Silver when the solution is boiled; the precipitate is also soluble in Nitric Acid; a purple or violet colour should be produced when to its solution acidulated with Acetic Acid, a drop or two of Ferrous Sulphate Solution is added, followed by a few drops of Hydrogen Peroxide Solution, and then an excess of Potassium Hydroxide

Solution. The *B.P.* states that an aqueous solution is not precipitated by Gallic Acid, but this is contrary to general experience. A note in reference to this will be found under Gallic Acid. It is officially required to indicate not less than 99·19 p.c. and not more than 100·02 p.c. of the pure salt as ascertained by titration with Deci-normal Volumetric Iodine Solution; an excess of Sodium Bicarbonate being maintained throughout the operation in order to neutralise the Hydriodic Acid produced during the reaction. The Sodium Bicarbonate must be added not long before the titration or the Antimony will be precipitated. A weighed quantity of 1 gramme when mixed with about 3 times its weight of Sodium Bicarbonate and dissolved in Water should require not less than 60·2 nor more than 60·7 c.c. of the Volumetric Solution.

The *U.S.P.* Volumetric test indicates not less than 99·5 p.c. of the pure salt, the *P.G.* indicates 99·6 p.c.; both processes are compared in small type below under the heading Volumetric Determination.

It is officially required that 1·66 grammes should slowly dissolve without leaving a residue, in 25 c.c. of Water at 15·5° C. (60° F.).

The more generally occurring impurities are Ammonium salts, Arsenic, Calcium, Copper, Iron, Lead, Sodium, Chlorides, Sulphates and Potassium Acid Tartrate. In the *B.P.* these are grouped collectively. The more important are Arsenic, Copper and Lead; Iron and Potassium Acid Tartrate. Both *U.S.P.* and *P.G.* adopt the Bettendorf's test for Arsenic. Heavy metals, *e.g.*, Copper, Lead and Iron may be detected by adding to an aqueous solution sufficient Potassium or Sodium Hydroxide Solution to redissolve the precipitate at first formed and then passing Hydrogen Sulphide into the liquid. Chlorides and Sulphates respond to the usual tests; Potassium Acid Tartrate may be detected by the effervescence produced on adding Sodium Bicarbonate Solution. The *P.G.* includes a test for Arsenic, but for no other impurity. The 1 in 100 aqueous solution acidified with Acetic Acid should be unaffected by Ammonium Oxalate Solution, indicating the absence of Calcium. The *U.S.P.* includes a separate test for Iron, which is given in small type under the heading of Potassium Ferrocyanide Solution.

Residue.—On heating to 110° C. (230° F.) it loses its Water of crystallisation (2·71 p.c.) and at a red heat chars, emitting an odour resembling that of burning Sugar, and leaving a black residue with an alkaline reaction, *U.S.P.*; it chars on heating, *P.G.*

Potassium Ferrocyanide Solution.—An aqueous 1 in 100 solution acidulated with Acetic Acid should be unaffected by T.S. of Potassium Ferrocyanide, *U.S.P.*

Stannous Chloride Solution.—A mixture of 1 gramme Tartarated Antimony and 3 c.c. Stannous Chloride Solution should not assume a dark colour in the course of an hour, *P.G.*; 2 grammes dissolved in 5 c.c. Hydrochloric Acid should not respond to Bettendorf's test for Arsenic, *U.S.P.*

Hydrogen Sulphide Solution.—If sufficient solution of Sodium Hydroxide be added to an aqueous solution (1-20) of Tartarated Antimony to redissolve the precipitate first formed, and then an equal volume of freshly prepared Hydrogen Sulphide Solution added, no coloration should be noticeable after standing in a warm place for half an hour, when viewed by reflected light, holding it against a white surface, indicating absence of heavy metals, *U.S.P.*

Sodium Bicarbonate or Carbonate.—No effervescence should occur with Solution of Sodium Bicarbonate, *B.P.*; Solution of Sodium Carbonate, *U.S.P.* Absence of Acid Potassium Tartrate

Volumetric Determination.—1 gramme is dissolved in sufficient Water to measure 100 c.c., then 33 c.c. of this solution should, after the addition of 20 c.c. of a cold saturated aqueous solution of Sodium Bicarbonate and a little Starch T.S., require not less than 19·9 c.c. of Tenth-normal Iodine V.S. to produce a permanent blue colour (each c.c. corresponding to 5 p.c. of the pure salt). Titration should begin immediately after the addition of the Sodium Bicarbonate Solution, *U.S.P.* A solution of 0·2 gramme of Tartarated Antimony and 0·2 gramme of Tartaric Acid in 100 c.c. of Water should after the addition of 2 grammes of Sodium Bicarbonate and a few drops of Starch Solution, require 12 c.c. Tenth-normal Solution of Iodine to produce a blue colour, *P.G.*

Preparation.

VINUM ANTIMONIALE. Antimonial Wine.

Tartarated Antimony, 40 grains; boiling Distilled Water, 1 fl. oz.; Sherry, *q.s.* to yield 20 fl. oz.

Boiling Water is added to dissolve the Tartarated Antimony, as recommended in former editions of the *Companion*.

Dose.—10 to 30 minims = 0·6 to 1·8 c.c.; as an emetic, 2 to 4 fl. drm. = 7·1 to 14·2 c.c.

Contains 1 grain in 240 minims.

Foreign Pharmacopœias.—Official in Belg., Dutch, Ger. and Jap. (Vinum Stibiatum), 1 in 250; Mex. (Vino estibiado), 1 in 300; Span. (Vino Emetico), 1 in 250; Russ. (Vinum Stibio-Kalii Tartarici), 1 in 250; U.S. (Vinum Antimonii), 1 in 250; all with Sherry. Austr. (Vinum Stibii Kalio-Tartarici), 1 in 250; Hung. (Vinum Stibiato-Tartaricum), 1 in 240; Swiss (Vinum Stibiatum), 1 in 250; all with Malaga Wine. Port. (Vinho Antimonial), 1 in 200 of Port Wine. All by weight, except U.S. Not in Dan., Fr., Ital., Norw. or Swed.

Tests.—Antimonial Wine has a specific gravity of about 1·006; it contains about 4·75 p.c. w/v of total solids and about 19 p.c. w/v of Absolute Alcohol.

Not Official.

UNGUENTUM ANTIMONII TARTARATI.—Tartarated Antimony, in fine powder, 1; Simple Ointment, 4.—*B.P.* 1885.
This has been incorporated in the *B.P.C.*

ANTIPYRINE.

See PHENAZONUM.

Not Official.

APIOL.

An oily liquid, with a peculiar odour and disagreeable taste, obtained from the Fruits of *Apium Petroselinum*, L. (Parsley).

Medicinal Properties.—It is useful in amenorrhœa and dysmenorrhœa.

Dose.—3 to 5 minims = 0·18 to 0·3 c.c.

Prescribing Note.—*Usually given in* **capsules.**

Foreign Pharmacopœias.—Official in Fr., Mex. and Port. (Apiol), Dan. and Norw. (Ætheroleum Petroselini), Swed. includes Fructus Petroselini, and an Aqua of it.

Apiol was described by Messrs. Joret and Homolle, who introduced the substance into medicine, as a yellow, oily, non-volatile liquid, but the Apiol obtained by us from the Homolle capsules, although yellow in colour, was volatile in the vapour of Water to the extent of 95 p.c. Witney went into the subject in 1880, and describes Apiol as an impure Essential Oil of Parsley containing minute quantities of soft resin, and the Apiol of Homolle as the Essential Oil of Parsley Seeds with small traces of a soft resin. The Essential Oil of Parsley is a yellow, oily liquid, and as such has been made official in the Danish and Norwegian Pharmacopœias.

Arising out of a discussion as to what should be the colour of liquid Apiol, it was suggested in *C.D.* '94, ii. 17, that it was simply an alcoholic extract of Parsley Seeds; but this product is green, and contains but a small proportion (under 15 p.c.) of the Essential Oil of Parsley.

The stearoptene from the Oil is known as **Crystallised Apiol.**

Not Official.

APOCYNUM.

Syn.—CANADIAN HEMP.

The dried Rhizome of *Apocynum Cannabinum*, L., is official in U.S.

Medicinal Properties.—It has been used in the United States for some years as a cardiac tonic, and diuretic in cardiac dropsy. Also as a **fluid extract** (dose 5 to 15 minims = 0·3 to 0·88 c.c.) in pleurisy with effusion.

It also possesses emetic and cathartic properties; but as it is a drastic purgative, it should be given with some caution.

The diuretic action of Canadian Hemp was favourably considered, although it was admitted that it might produce violent emesis and catharsis. These undesirable results were, however, attributed to the admixture of the bitter fibre of the wood with the bark of the root.—*B.M.J.* '97, ii. 1714.

In 1 minim doses has been successfully employed (*L.* '05, ii. 955) in a case of incompetency and ascites, increased by 2 minims up to 10 minim doses 3 times daily, and subsequently reduced to 6 minims.

The most irritant of all cardiac tonics, and not a drug to be employed advantageously in medicine.—*B.M.J.* '06, ii. 1460.

Descriptive Notes.—The root is usually 1/6 to 1/4 inch (4 to 6 mm.) thick, cylindrical, somewhat angular, and longitudinally wrinkled with a few transverse fissures. It has an orange-brown bark, which becomes grey-brown on keeping, whitish or pinkish internally, nearly as thick as the woody portion, and contains large laticiferous vessels. The yellowish wood has several concentric rings, is finely radiate and coarsely porous, taste bitterish and somewhat acrid; it has scarcely any odour. The root of *A. androsæmifolium*, L., is sometimes confused with it, but it has a white porous wood and groups of stone cells in the outer part of the bark.

FLUIDEXTRACTUM APOCYNI.—100 of Apocynum in No. 60 powder is moistened with 40 of a mixture of Glycerin 10, Alcohol (95 p.c.) 60, and Water 30, packed in a percolator, then enough menstruum added to saturate the powder and leave a stratum above it, macerated for 48 hours, and percolation allowed to proceed slowly, gradually adding, first, the remainder of the menstruum, afterwards, a mixture of Alcohol (95 p.c.) 60 and Water 40, until the Apocynum is exhausted; reserving the first 90 of percolate and evaporating the remainder at a temperature not exceeding 50° C. (122° F.) to a soft extract which is dissolved in the reserved portion, and enough menstruum added to make 100. Average Dose.—1 c.c. (15 minims).—*U.S.P.*

This has been incorporated in the *B.P.C.*

TINCTURA APOCYNI.—Root, 1; Alcohol (60 p.c.), 10; by maceration.

Dose.—5 to 10 minims = 0·3 to 0·6 c.c.

This has been incorporated in the *B.P.C.*

APOCYNIN.—An amorphous resinous substance, almost insoluble in Water, but soluble in Alcohol (90 p.c.) and in Ether.

APOMORPHINÆ HYDROCHLORIDUM.

APOMORPHINE HYDROCHLORIDE.

FR., CHLORHYDRATE D'APOMORPHINE; GER., APOMORPHINHYDROCHLORID;
ITAL., CHLORIDRATO DI APOMORFINA; SPAN., CLORURO DE APOMORFINA.

$C_{17}H_{17}NO_2$, **HCl**, eq. 301·36.

White or greyish-white, odourless, minute, shining, needle-shaped crystals, which should be kept from the light in dark amber-coloured, thoroughly dry, glass bottles, and protected as far as possible from the air.

Apomorphine is obtained from Morphine by the abstraction of a molecule of Water, and Apomorphine Hydrochloride is prepared by heating Morphine or its Hydrochloride in sealed tubes with an excess of strong Hydrochloric Acid or with Zinc Chloride. The *B.P.* mentions Morphine or Codeine, but the product of the abstraction of a molecule of Water from Codeine is generally considered to be Apocodeine.

Solubility.—About 1 in 60 of Water; 1 in 50 of Alcohol (90 p.c.); nearly insoluble in Chloroform and in Ether; 1 in 100 of Glycerin.

The solubility in Water is given in *B.P.* as 1 in 50; minimum quantity of Water required for complete solution in 3 days at 60° F. is between 1 in 56 and 1 in 60, but if dissolved by the aid of a gentle heat it will remain in solution at 1 in 50. The aqueous solution, on being gently warmed, rapidly turns green.

The material used was recrystallised, air-dried, and powdered. It lost 3 p.c. of hygroscopic moisture on heating in a water-bath, which was exactly regained after 12 hours' exposure to air.

The solubility of Apomorphine Hydrochloride has been stated (*P.J.* '05, i. 230; *C.D.* '05, i. 282) to be 1 in 53 of Water, and 1 in 48 of Alcohol (90 p.c.). The *Companion* figures have been since shown to be quite correct in references to them in *P.J.* '06, i. 345; *C.D.* '06, i. 471.

Medicinal Properties.—The most reliable emetic, $\frac{1}{10}$ grain hypodermically, or $\frac{1}{5}$ grain by the mouth, usually acts promptly (2 or 3 minutes) without the production of much preceding nausea or depression, or unpleasant after-effects. As a **hypodermic injection** in cases of poisoning, especially if unable to swallow, and if emesis be indicated.

Invaluable as an expectorant in acute and chronic bronchitis with viscid secretion, and in croup; in bronchial irritation due to inhalation of factory dust, and in asthma.

As a hypnotic, $\frac{1}{30}$ grain hypodermically. As patients are occasionally susceptible to emetic action it is well to begin with $\frac{1}{50}$ grain, as a hypnotic.—*L.* '00, i. 1083.

Absolutely inert as an emetic in alcoholic poisoning.—*L.* '00, i. 1635.

In the acute stage of alcoholism, delirium tremens, 5 drops of the Injectio are generally sufficient to produce, within 5 minutes, several hours sleep. This dose can be repeated if necessary; the patient ought to be in horizontal position; occasionally, vomiting precedes the sleep. It is not a remedy for alcoholic craving.—*B.M.J.* '07, ii. 951.

As a hypnotic, hypodermically, in acute alcoholism, it has not received the recognition it deserves.—*M.R.* '07, ii. 144.

Dose.—$\frac{1}{20}$ to $\frac{1}{10}$ grain = 0·003 to 0·007 gramme, by hypodermic injection; by the mouth, $\frac{1}{10}$ to $\frac{1}{4}$ grain = 0·007 to 0·016 gramme.

Ph. Ger. maximum single dose, 0·02 gramme; maximum daily dose, 0·06 gramme.

Prescribing Notes.—*Its aqueous solution on keeping, or on being gently warmed, rapidly turns green. This green coloration is said to be due to the liberation of free Apomorphine by the alkalinity of the glass, and can be prevented by adding a few drops of dilute Hydrochloric Acid to the preparation. The official injection keeps fairly well for a month or so. Some authorities are of opinion that the Ammonia in the air causes the alkalinity.*

Official Preparation.—Injectio Apomorphinæ Hypodermica.

Not Official.—Hypodermic Discs, Haustus Apomorphinæ Compositus, Mistura Apomorphinæ et Terebeni, Pastillus Apomorphinæ et Codeinæ, and Syrupus Apomorphinæ Hydrochloridi.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex., Norw., Russ., Span., Swed., Swiss and U.S.

Tests.—The distinguishing tests of Apomorphine Hydrochloride are the production of a white precipitate, rapidly changing to green on exposure to air, when its aqueous solution is made alkaline with Potassium or Sodium Bicarbonate. The changed alkaloid is soluble in Alcohol (90 p.c.) producing an emerald green solution, in Chloroform producing a fine violet tint, and in Ether a purple coloration. An aqueous solution affords a precipitate with Mercuric-potassium Iodide (Mayer's) Solution, with Iodo-potassium Iodide (Wagner's) Solution, and with Mercuric Chloride Solution. The two following tests serve to distinguish Apomorphine Hydrochloride from Morphine on the one hand, and from Codeine, Narceine, and Narcotine on the other. The first is given in the *B.P.*, but without any explanation of its object; the second is peculiar to the *U.S.P.*: (1) Ferric Chloride Test-solution colours Apomorphine Hydrochloride Solution red, whilst Morphine yields a dull greenish-blue coloration. (2) A solution of 0·05 gramme of Apomorphine Hydrochloride when shaken with a solution of 0·05 gramme of Ferrous Sulphate in 10 c.c. of Water, gradually acquires a blue colour, changing after some time to a bluish-black; the original blue should be restored upon the addition of Alcohol (90 p.c.), but Carbon Bisulphide, Chloroform and Ether should remain colourless when shaken with the aqueous liquid.

An aqueous solution gives with Silver Nitrate Solution a white curdy precipitate insoluble in Nitric Acid; on the addition of Ammonia Solution, the precipitate dissolves, but its solution is immediately reduced.

A number of colour reactions for the identification of the alkaloid are given in small type below, and where possible comparison is made with statements appearing in the respective Pharmacopœias.

Apomorphine Hydrochloride and Pilocarpine Nitrate are two exceptions to the usual *B.P.* requirements, that the alkaloidal salt shall afford the tests distinctive of the individual acid radical entering into its composition.

The more generally occurring impurities are acidity, the presence of salt which has undergone decomposition, and mineral matter. Acidity is covered by the requirements of the three Pharmacopœias that the salt or its aqueous solution shall be neutral, or only very feebly acid to Litmus paper or solution. A salt which has been kept under unfavourable conditions, or which has been in stock for a long while, almost invariably contains a considerable amount of salt which has undergone change. The *B.P.*, *U.S.P.* and *P.G.* state that a salt, one part of which with 100 parts of Water yields an emerald green solution should be rejected; the *P.G.* further stating that a colourless or at most only a pale reddish liquid should result on shaking the dry salt with Ether. Neither the *B.P.* nor *U.S.P.* mention the likelihood of mineral matter being present, but *P.G.* states that the salt shall leave no residue on ignition.

Colour Tests.—With Nitric Acid it yields a blood red coloration *B.P.* and *P.G.*, fading to orange *U.S.P.*; with dilute Solution of Ferric Chloride it gives a deep red coloration *B.P.* and *U.S.P.* (distinction from Morphine which yields a blue colour).

U.S.P. also includes the following colour reactions which do not appear in *B.P.* or *Ger.*

Sulphuric Acid does not colour the salt, but with Sulphuric Acid containing (*a*) a trace of Selenious Acid it produces a dark blue colour fading to violet and then turning black; (*b*) a trace of Ferric Chloride, a pale blue colour; (*c*) a trace of Ammonium Vanadate, a violet blue colour, changing to deep greenish-blue; (*d*) a little Paraldehyde, a green colour, fading to reddish-brown; (*e*) Potassium Iodate, a black colour, changing to brown and finally to pale brown; (*f*) a trace of Nitric Acid, a blood red colour, fading to orange. A crystal of Apomorphine Hydrochloride and a crystal of Potassium Nitrate with Sulphuric Acid added are coloured red, and on stirring with a glass rod the solution becomes green, then blue, then purple, and finally cherry red. Acetic Acid dissolves the salt without colour, but on adding a trace of Potassium Iodate, the solution turns blood red, changes to purple, and on adding a little Ether and shaking, the latter assumes a blue colour. Gold Chloride T.S. produces a reddish purple precipitate in a solution of the salt.

Preparation.

INJECTIO APOMORPHINÆ HYPODERMICA. HYPODERMIC INJECTION OF APOMORPHINE.

Apomorphine Hydrochloride, 1 grain; Diluted Hydrochloric Acid, 1 minim; Distilled Water (recently boiled), *q.s.* to make 110 minims.

5 minims = $\frac{1}{22}$ grain Apomorphine Hydrochloride.

Dose.—5 to 10 minims = 0·3 to 0·6 c.c.

Not Official.

DISCS OF APOMORPHINE.—$\frac{1}{15}$ to $\frac{1}{10}$ grain dissolved in 6 to 10 minims of Distilled Water at the time of using subcutaneously.—*St. Bartholomew's.*

PASTILLUS APOMORPHINÆ ET CODEINÆ.—Apomorphine Hydrochloride, $\frac{1}{32}$ grain; Codeine, $\frac{1}{16}$ grain.—*Martindale* and *B.P.C.*

HAUSTUS APOMORPHINÆ COMPOSITUS.—Apomorphine Hydrochloride, $\frac{1}{15}$ grain; Diluted Hydrochloric Acid, 1 minim; Syrup of Squills, 60 minims; Oil of Turpentine, 10 minims; Mucilage of Gum Acacia, *q.s.*; Spirit of Ether, 10 minims; Distilled Water, to 1 fl. oz.—*Middlesex.*

MISTURA APOMORPHINÆ ET TEREBENI.—Apomorphine Hydrochloride, $\frac{1}{16}$ grain; Pure Terebene, 15 minims; Peru Balsam, 10 minims; Mucilage Mixture, to 1 oz.—*Guy's.*

SYRUPUS APOMORPHINÆ HYDROCHLORIDI. — Apomorphine Hydrochloride, 5 grains; Diluted Hydrochloric Acid, 15 minims; Alcohol (90 p.c.), 7 fl. drm.; Distilled Water, 7 fl. drm.; Syrup, to produce 20 fl. oz. Dissolve the salt in the Spirit and Water mixed, then add the Acid and the Syrup.—*B.P.C. Formulary* 1901.

Dose.—$\frac{1}{2}$ to 1 fl. drm. = 1·8 to 3·6 c.c.

Contains $\frac{1}{32}$ grain in 1 fl. drm.
This has been incorporated in the *B.P.C.* as follows :—

Syrupus Apomorphinæ.—Apomorphine Hydrochloride, 0·05; Diluted Hydrochloric Acid, 0·25; Alcohol (90 p.c.), 4·50; Distilled Water, 4·50; Syrup, *q.s.* to make 100.

This contains about $\frac{1}{36}$ grain in 1 fl. drm.

AQUÆ.

WATERS.

The Waters of the British Pharmacopœia, all of which are distilled, except Aqua Camphoræ and Aqua Chloroformi, are as follows; the formulas are given under the names of the substances from which they are prepared :—

AQUA ANETHI. From the dried ripe fruit.
AQUA ANISI. From dried ripe Anise fruit.
AQUA AURANTII FLORIS. From the flowers. Imported.
AQUA CAMPHORÆ.
AQUA CARUI. From the dried fruit.
AQUA CHLOROFORMI.
AQUA CINNAMOMI. From the bark.
AQUA DESTILLATA.
AQUA FŒNICULI. From the dried ripe fruit.
AQUA LAUROCERASI. From fresh leaves.
AQUA MENTHÆ PIPERITÆ. With oil and distilled.
AQUA MENTHÆ VIRIDIS. With oil and distilled.
AQUA PIMENTÆ. From the dried unripe fruits.
AQUA ROSÆ. From the fresh flowers.
AQUA SAMBUCI. From the fresh flowers. Imported.

In preparing distilled aqueous liquids only good, natural, potable Water must be employed, as directed for 'Distilled Water.'

In India and other tropical countries the Waters of Anethum, Anisum, Carum, Cinnamomum, Fœniculum, Mentha Piperita, Mentha Viridis, and Pimenta, may be prepared from the oils without distillation, using 1 of Oil and 2 of Calcium Phosphate to 500 of Distilled Water.

AQUA DESTILLATA.

DISTILLED WATER.

FR., EAU DESTILLÉE; GER., DESTILLIRTEWASSER; ITAL., ACQUA DISTILLATA; SPAN., AGUA DESTILADA.

A clear, colourless, odourless, tasteless, neutral, limpid liquid, obtained by distilling good natural Water of a potable quality.

Foreign Pharmacopœias.—Official in all.

Tests.—Distilled Water at the normal temperature and pressure boils at 100° C. (212° F.), and should evaporate leaving scarcely a weighable residue. It should possess neither taste nor odour, and should be perfectly neutral. It may contain as impurities various metals, dissolved solids, Chlorides, Nitrates, Nitrites, Sulphates, organic matter, and Ammonia, all of which are specially mentioned in the *B.P.* The *U.S.P.* and *P.G.* examine for heavy metals. The *P.G.* and *U.S.P.* include a test for Carbonic Acid gas. The quantities used by the *B.P.* (25 c.c.) and by the *P.G.* (10 c.c.) for the determination of the amount of solid residue are ridiculously small, the *U.S.P.* quantity (1000 c.c.) is much more to the point, and admits of a quantitative determination. The tests for Chlorides, Nitrates, Nitrites, and Sulphates given in the *B.P.* are those mentioned in the Appendix, but with the exception of those for Chlorides and Sulphates are too crude unless specially applied. The *U.S.P.* employs the Diphenylamine test for Nitrates, requiring that no blue colour shall be produced; and the Sulphanilic Acid and Naphthylamine Acetate test for Nitrites, stipulating that no pink coloration shall be produced in 5 minutes. The *B.P.* test for Ammonia is carried to the other extreme, and is described with more minuteness than its importance justifies. The *B.P.*, *U.S.P.* and *P.G.* employ 100 c.c. of Distilled Water in carrying out the test for readily oxidisable organic impurities with Potassium Permanganate Solution, but the relative quantities of Sulphuric Acid and Potassium Permanganate vary, as does also the time of boiling. The *B.P.* and *P.G.* tests coincide pretty closely, with the exception of the relative strengths of the diluted Sulphuric Acid official in each Pharmacopœia. Both boil for 3 minutes, and at the end of this time the liquid should retain its pink colour. The *U.S.P.* boils for 10 minutes, and requires in addition that the pink colour should not wholly disappear if the vessel is covered to protect it from dust and set aside in a dark place for 10 hours.

A detailed comparison of the tests adopted by the three Pharmacopœias for the detection of the above impurities is for convenience made in small type below.

Residue.—The *B.P.* requires that the residue left on the evaporation of 25 c.c. should be scarcely visible; the *P.G.* states that 10 c.c. of Distilled Water when evaporated should not leave a weighable residue; and the *U.S.P.* that 1000 c.c. of Distilled Water, after evaporation to dryness on a water-bath, should not leave more than 0·050 gramme of residue.

Silver Nitrate.—It should not be affected by Silver Nitrate T.S., indicating the absence of Chlorides, *P.G.* and *U.S.P.*

Mercuric Chloride.—It should not be affected by solution of Mercuric Chloride, *P.G.*

Barium Chloride.—It should not yield the slightest turbidity on the addition of Barium Chloride T.S., indicating the absence of Sulphates, *U.S.P.*

Ammonium Oxalate.—No turbidity should result on the addition of Ammonium Oxalate T.S., indicating the absence of Calcium, *U.S.P.*

Hydrogen Sulphide.—It should not be affected by Hydrogen Sulphide T.S., even after the addition of Solution of Ammonia, *P.G.* It should not respond to the time-limit test for heavy metals, *U.S.P.*

Calcium Hydroxide.—When mixed with twice its volume of Lime Water it should remain clear, indicating the absence of Carbonic Acid, *P.G.* and *U.S.P.*

Diphenylamine.—If 10 c.c. of Distilled Water mixed with a few drops of Diphenylamine T.S. be carefully poured upon about 3 c.c. of Sulphuric Acid free from Nitrous compounds, contained in a test-tube, so as to form a separate layer, no blue colour should be formed at the line of contact of the two liquids, *U.S.P.*

Sulphanilic Acid and Naphthylamine Acetate.—If to 50 c.c. of Water contained in a glass cylinder 2 c.c. each of Sulphanilic Acid T.S. and Naphthylamine Acetate T.S. are added, and the solution well mixed, no distinct pink coloration should appear within 5 minutes, if the cylinder be placed upon a white surface and viewed from above, *U.S.P.*

Mercuric Potassium Iodide.—The *B.P.* requires that it shall not contain more than 0·005 part per million, equivalent to 0·00035 grain per gallon, of Ammonia as determined by the colour produced when 2 c.c. of Potassio-mercuric Iodide (Nessler's) Solution is added to 100 c.c. of the Water; the colour is compared with that produced by 0·25 c.c. of Nessler's Ammonium Chloride Solution diluted with 50,000 c.c. of Ammonia-free Water. A somewhat similar test is given in the *U.S.P.*, which uses 50 c.c. of Distilled Water and 2 c.c. of reagent. This should not yield a yellow or brownish tint when contained in a glass cylinder placed on a white surface and viewed from above. The *U.S.P.* does not, however, direct the use of a comparative test.

Potassium Permanganate.—If 100 c.c. of Water be heated to boiling with 1 c.c. of Diluted Sulphuric Acid (the *U.S.P.* uses 10 c.c. of Diluted Sulphuric Acid) and solution of Potassium Permanganate be added and the mixture boiled for 3 minutes (10 minutes *U.S.P.*), the liquid should not be decolorised, *B.P.*, *U.S.P.* and *P.G.* The *B.P.* states that the liquid should retain its colour for 1 hour, and the *U.S.P.* that the colour should not be completely destroyed by boiling for 10 minutes, nor should it wholly disappear if the vessel be afterwards set aside in a dark place and covered for 10 hours. The quantity of Potassium Permanganate Solution ordered in the *B.P.* is 0·1 c.c. of a mixture of 1 part solution of Potassium Permanganate (1 p.c.), and 2 parts of Water; in the *P.G.* 0·3 c.c. of a 0·1 p.c. w/w solution of the salt is used, and in the *U.S.P.* 0·1 c.c. of a Tenth-normal Volumetric Solution is used.

ARAROBA.

ARAROBA.

B.P.Syn.—Goa Powder; Crude Chrysarobin.

Fine powder, or in more or less agglomerated particles; yellow when first obtained, but rapidly becoming of a dull ochre or brown colour. Obtained from fissures in the trunk of *Andira Araroba*, Aguiar and freed from woody fragments.

Descriptive Notes.—The crude drug of commerce is usually of an umber-brown colour but yellowish internally and more or less mixed with, or attached to, pieces of the heart-wood of the tree. From these pieces it should be freed and then dried and powdered, and it may then vary in colour from brownish-yellow to umber-brown. Samples which have been imported in a damp condition and exposed to atmospheric Ammonia become deep brown or purple. It varies much in the amount of wood it contains. Good specimens yield as much as 80 p.c. of soluble matter to Benzol or Chloroform.

Official Preparation.—Used to prepare Chrysarobin.

Tests.—Araroba should be soluble in hot Chloroform to the extent of not less than 50 p.c., and when the solution is filtered and evaporated to dryness, the powdered residue is known as Chrysarobin.

Not Official.

ARECA.

The Seed of the *Areca Catechu*, L., the betel-nut tree. Imported from the East Indies.

Medicinal Properties.—Astringent, narcotic, anthelmintic. A remedy for tapeworm. 60 grains = 4 grammes, of powdered Areca Nut made into a ball with Honey, answers well as a vermifuge for a large dog. A paste is made of the powder for a dentifrice.

Areca Nut Charcoal used also as a dentifrice.

Foreign Pharmacopœias.—Official in Ger. and Swiss, Semen Arecæ.

Descriptive Notes.—The seeds of the Areca palm vary a good deal in size and somewhat in shape. In size they vary from 1 to $1\frac{1}{2}$ inches (25 to 37 mm.) in diameter in the broadest part; the transverse section is white marbled with brown, owing to the infolding of the seed coat in the albumen. The taste is astringent and slightly acrid. The hemispherical or rounded fruits, derived from the variety *alba*, are much less active as a vermifuge than the conical or typical form. The larger and more mature seeds are to be preferred to the smaller for medicinal use.

ARECOLINÆ HYDROBROMIDUM.—Fine white needles, readily soluble in Water and in Alcohol (90 p.c.), difficultly soluble in Ether and in Chloroform.

Sialagogue, diaphoretic and anthelmintic. $\frac{1}{2}$ p.c. solution applied to the eye produces tingling followed by myosis. Maximum effect in from 10 to 15 minutes, lasts about one hour. Administered internally causes vomiting and diarrhœa.—*B.M.J.* '99, i. 82.

Dose.—$\frac{1}{120}$ to $\frac{1}{64}$ grain = 0·0006 to 0·001 gramme, to be given with caution.

Foreign Pharmacopœias.—Official in Fr., Ger., Swed. and Swiss.

Tests.—It should have a melting point of 167° C. (332·6° F.); *Fr. Codex* gives 170° C. (338° F.). A 1 in 10 aqueous solution of the salt yields a brown precipitate with Iodine Solution, a brown precipitate with Bromine Water, and a light yellow precipitate with Silver Nitrate Solution, but none with Platinum Chloride Solution, Mercuric Chloride Solution, or Tannic Acid Solution. It should leave no residue when ignited with free access of air.

ARGENTI NITRAS.

SILVER NITRATE.

B.P.Syn.—LUNAR CAUSTIC.

$AgNO_3$, eq. 168·69.

FR., AZOTATE D'ARGENT; GER., SILBERNITRAT; ITAL., NITRATO DI ARGENTO; SPAN., NITRATO ARGENTICO CRISTALIZADO.

Colourless, transparent, tabular, rhombic crystals. It should be kept in well stoppered, dark amber-coloured vials protected from the light and dust.

Solubility.—100 grains in 50 minims of Water, measuring 80 minims; 1 in 18 of Alcohol (90 p.c.). Insoluble in strong Nitric Acid.

Medicinal Properties.—Astringent, sedative, antispasmodic. It is useful in hæmatemesis, gastric ulcer, diarrhœa, and cholera, as well as in chronic nervous irritability of and pain in the stomach; also in some nervous diseases, as epilepsy, chorea and locomotor ataxy. It is employed in chronic dysenteric ulcers as an **enema**, 60 grains dissolved in 60 oz. of Water, after clearing away the contents of lower bowel, and as a **bougie** in chronic gonorrhœa. A dark line on the edges of the gums, removable by a course of Acid Tartrate of Potassium, precedes the indelible discoloration of the skin and mucous membranes (argyria), produced by the long-continued internal administration of this salt. Its administration should be interrupted for fourteen days at the end of two or three months, however small the dose. More than 100 grains per month should not be given.

Externally as a local stimulant to weak and callous ulcers, fistulæ, and aphthous affections of the mouth; as a caustic to warts and poisoned wounds. As a local application to prevent pitting in smallpox, and to relieve the itching in pruritus; it is also applied, under Cocaine, to ulcers of the cornea. 1 to 3 grains to the oz. is employed for **lotions** and **collyria**, in all forms of conjunctivitis and both as a prophylactic and curative in ophthalmia neonatorum, and as an injection in urethritis, cystitis, and vaginitis. For eczema or pityriasis of the ear, a 1 in 20 solution in Spirit of Nitrous Ether answers well. Hæmostatic for leech bites.

Chilblains are sometimes painted with a strong solution of Silver Nitrate.

A weak solution (1 in 500) for obstinate forms of eczema in children.—*L.M.R.* '88, 525.

In cholelithiasis.—*B.M.J.E.* '02, i. 99.

Powdered Silver Nitrate in antral empyema.—*B.M.J.E.* '99, i. 96.

A 2 p.c. solution of Silver Nitrate by far the best prophylactic in ophthalmia neonatorum.—*B.M.J.* '03, ii. 135; *L.* '03, ii. 163; a 4 grains to the oz. solution for treating the same, *Pr.* lxxv. 561; as a prophylactic, 1 p.c. is even more efficacious than the 2 p.c. advocated by Credé, whilst the inflammatory reaction is less marked, *L.* '07, ii. 538.

Intravenous injection of a 2 or 5 p.c. solution in the treatment of septic conditions.—*B.M.J.E.* '02, i. 12.

Strong Solution of Potassium Iodide, or Potassium Cyanide, has been suggested for the removal of the black stains on the skin produced by Silver Nitrate.

Dose.—$\frac{1}{4}$ to $\frac{1}{2}$ grain = 0·016 to 0·032 gramme.

Prescribing Notes.—*Prescribed in* **pills** *with Massa Kaolini. Solutions should be dispensed in stoppered bottles.*

For application to the skin, a **solution** *in Spirit of Nitrous Ether has been recommended. This solution throws down a light coloured precipitate, but does not itself become black like a simple spirituous solution. It, however, blackens the skin in a shorter time.*

Incompatibles.—The Alkalis and their Carbonates and Alkaloids; all Bromides, Chlorides, Iodides, and Phosphates; Solutions of Arsenic, and Tannin.

Official Preparations.—Argenti Nitras Induratus and Argenti Nitras Mitigatus. Used in the preparation of Argenti Oxidum.

Not Official.—Mild Caustic Points, Argenti Iodidum Nascens, Argentum Foliatum, Actol, Albargin, Argentamin, Argentol, Argonin, Argyrol, Collargol, Ichthargan, Itrol, Largin, Novargan, Protargol, and Tachiol.

Antidotes.—Aqueous solution of Common Salt; Milk or some demulcent drink given freely; Emetic; White of Egg.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex., Norw., Port., Span., Swed., Swiss and U.S. Also fused Nitrate of Silver in all except Belg., Dan., Fr., Ger., Ital., Swed. and Swiss. Russ. now includes only a fused Nitrate.

Tests.—The distinguishing tests for Silver Nitrate are that its aqueous solution yields with Hydrochloric Acid or a soluble Chloride a white curdy precipitate insoluble in Nitric Acid but soluble in Ammonia Solution; Potassium Chromate Solution yields a red precipitate disappearing on the addition of a solution of a soluble Chloride, Bromide or Iodide, and destroyed by mineral acids; a solution of Ferrous Sulphate gently poured on to a well-cooled mixture of its aqueous solution and Sulphuric Acid, produces a brown or purplish-brown coloration at the junction of the two fluids; an aqueous solution warmed with Sulphuric Acid and a strip of Copper liberates red fumes. It is officially required to yield 84·3 p.c. of Silver Chloride as ascertained gravimetrically by precipitating 1 gramme of the salt with Hydrochloric Acid; the filtrate from the precipitate, when evaporated to dryness should leave no residue. The *P.G.* completely precipitates the Silver from 5 c.c. of an aqueous 1 to 20 solution by the addition of an excess of Hydrochloric Acid, and requires that the evaporated filtrate should leave no residue; the *U.S.P.* uses a 1 to 10 solution and requires that not more than 0·1 p.c. of residue should remain. The *B.P.* gravimetric test indicates 100·0 p.c. of the pure salt; the *U.S.P.* volumetric test indicates 99·98 p.c. of the pure salt; neither a gravimetric nor a volumetric determination is given in *P.G.* The *U.S.P.* test is performed with Deci-normal Volumetric Sodium Chloride Solution, the excess being titrated back with Deci-normal Volumetric Silver Nitrate Solution.

The more generally occurring impurities are Copper, Iron and Lead, Potassium, Sodium and Sulphates, all of which are mentioned in the *B.P.* Copper and Lead are the more important; the former is readily detected by the blue colour of the ammoniacal solution, the latter by the insoluble Sulphate thrown down on the addition of Sulphuric Acid.

Sulphuric Acid.—5 c.c. of an aqueous solution (1–10) with 20 c.c. of hot diluted Sulphuric Acid and heated to boiling should give no white precipitate (absence of Lead), *U.S.P.*

Volumetric Determination.—0·5 gramme of Silver Nitrate is dissolved in 10 c.c. of Distilled Water and well mixed with 30 c.c. Tenth-normal Volumetric Solution of Sodium Chloride and 3 drops of Potassium Chromate T.S. when not more than 0·4 c.c. Tenth-normal Volumetric Silver Nitrate Solution should be required to impart to the liquid a permanent red colour, *U.S.P.*

Preparations.

ARGENTI NITRAS INDURATUS. Toughened Caustic.

Silver Nitrate, 19; Potassium Nitrate, 1. Mix by fusion.

Foreign Pharmacopœias.—Belg. (Argenti Nitrici Styli); Fr. (Crayons d'Azotate d'Argent); Ital. (Nitrato d'Argento Fuso con Nitrato di Potassio); Mex. (Lapices de Nitrato de Plata); Span. (Nitrato Argentico Mitigado); all Silver Nitrate 9, Potassium Nitrate 1.

Argenti Nitras Fusus.—4 grammes of Hydrochloric Acid are added to 100 grammes of Silver Nitrate in a porcelain dish and melted at as low a temperature as possible, stirred well and poured into suitable moulds, which should be kept in dark amber-coloured vials protected from light.—*U.S.P.*

ARGENTI NITRAS MITIGATUS. Mitigated Caustic.

Silver Nitrate, 1; Potassium Nitrate, 2. Mix by fusion.

Foreign Pharmacopœias.—Official in Austr., Ger., Russ. and Swiss, 1 in 3; Jap., 1 in 2; all (Argentum Nitricum c. Kalio Nitrico). Dan. (Nitras Argenticus bis Mitigatus), 1 in 3; Norw. and Swed. (Nitras Argenticus Mitigatus), 1 in 3; Fr. (Crayons d'Azotate d'Argent

Mitigé), containing ½, ⅓, and ¼ of Nitrate of Silver; U.S. (Argenti Nitras Mitigatus), 1 in 3. Not in the others.

Mild Caustic Points, made by fusing Potassium Nitrate in various proportions with Silver Nitrate, are used by oculists and others.

Not Official.

ARGENTUM FOLIATUM (*Austr., Belg., Dan., Dutch, Fr., Ger., Russ.* and *Swiss*).—Thin leaves of pure Silver, which dissolve in Nitric Acid, yielding a clear colourless solution.

ARGENTI IODIDUM NASCENS.—Freshly precipitated Silver Iodide has been recommended in conjunctival catarrhs.

Silver Iodide is a heavy, amorphous, yellowish powder, which should be kept in dark amber-coloured vials, protected from light.

ACTOL (Silver Lactate).—A white amorphous powder, or as colourless crystalline needles. Soluble 1 in 20 of Water. Introduced as an antiseptic. Useful as an injection (¼ to ½ grain per oz.) in gonorrhœa. The injection is attended with some pain.

Possesses no advantage for ophthalmic work over Silver Nitrate.—*B.M.J.* '01, ii. 1333.

ALBARGIN (Gelatose Silver; Silver Glutin).—Bright yellow powder, soluble in Water. Stated to be an active antiseptic.—*P.J.* '01, ii. 345.

ARGENTAMIN.—Silver Phosphate dissolved in Ethylenediamine solution. Antiseptic and astringent. A dilution of 1 to 4000 of Water has been recommended for urethral injection in gonorrhœa. As a 5 p.c. solution in ophthalmic work.—*B.M.J.E.* '95, ii. 20; '96, ii. 64; *L.* '95, ii. 47; *B.M.J.* '01, ii. 1333.

ARGENTOL.—A compound of Silver with Oxychinolin. A sparingly soluble yellowish powder, recommended as an antiseptic application to wounds and ulcers.—*P.J.* '97, i. 369; '98, ii. 342.

ARGONIN.—Is obtained by precipitating Silver Nitrate and Casein-soda with Alcohol. Contains about 4 p.c. of Silver. It is a fine white powder, soluble in Water. It is recommended as a disinfectant.—*P.J.* (3) xxv. 1193; *J.S.C.I.* '95, 1060; *L.* '95, ii. 47. A 2 p.c. aqueous solution gradually increased to 10 p.c., recommended in the treatment of gonorrhœa.—*B.M.J.E.* '96, ii. 64; *T.G.* '97, 740; *B.M.J.* '01, ii. 1333.

ARGONIN L.—Contains 10 p.c. Silver and is readily soluble. 1 p.c. solution used successfully in the treatment of anterior and posterior urethritis.—*B.M.J.E.* '99, i. 96.

ARGYROL.—Fine black glistening hygroscopic scales readily reduced to a powder. Readily soluble in Water forming a dark brownish-black solution; but insoluble in Alcohol (90 p.c.). It contains 30 p.c. of Silver combined with a protein extracted from wheat. 5 p.c. injections in acute gonorrhœa.—*L.* '03, ii. 1716. Instillations of 5 to 50 p.c. solutions are useful in ophthalmic work, and are painless.

In the treatment of ophthalmia neonatorum 1 or 2 drops of a 20 to 50 p.c. solution put into each eye is stated (*Pr.* lxxv. 561) to be certainly less irritating than, and quite as effective as, Silver Nitrate. Bacteriological experiments have shown that Argyrol is more effective in killing micro-organisms than Silver Nitrate in the strengths in which the latter can be tolerated in the eye.

In the form of 'drops' of a 25 p.c. solution it is of the greatest value in checking suppuration from the conjunctiva, and in some most unpromising cases it proved to be the best remedy.—*L.* '05, i. 1416.

An ointment containing 10 grains to the oz. of Vaseline is simply invaluable (*M.P.* '05, ii. 138) in eczematous conjunctivitis or keratitis complicated with marked photophobia, blepharospasm and watering of the eyes, and when the photophobia is very intense 2 to 4 grains of alkaloidal Atropine and a similar amount of alkaloidal Cocaine may with advantage be added to the prescription.

Of the three Silver compounds, Protargol, Collargol and Argyrol, the latter

(*L.* '06, ii. 14) gives the best results in acute conjunctivitis. It is the least irritating and possesses quite a wonderful power in lessening discharge and relieving pain. It can be used in as great a strength as 50 p.c., and may be applied as an ointment or solution. It is so non-irritating that it can safely be injected into the anterior chamber to control intraocular suppuration. It is the most valuable remedy we possess in the treatment of purulent ophthalmia, either in the adult or in the new-born child. It is also useful in blenorrhagia of the lachrymal passages.

Uses and limitations in eyework of Argyrol :—Great advantage, even in strong solution, over Silver Nitrate, lies in the fact that its application is painless, and that it can be used freely by the patient without risk.—*Scot. Med. and Surg. Jour.* '07, i. 396. In ophthalmia neonatorum, solutions of Argyrol are much better than strong solutions of Silver Nitrate, because they are practically inert, and therefore do not injure the conjunctival epithelium (*B.M.J.* '07, ii. 675); as an enema, in ulcerative colitis (*L.* '04, ii. 1209); yields good results applied as 20 p.c. solution in ophthalmia neonatorum (*B.M.J.* '04, ii. 1246); 25 p.c. solution applied in acute conjunctival cases, and great improvement followed application in a case of persistent ophthalmia.—*B.M.J.* '04, ii. 1633.

See also Summary given below.

COLLARGOL (Colloid Silver).—Black or greyish-black shining scales, with a metallic lustre. Soluble 1 in 2 of Water. Antiseptic and disinfectant. Employed in the form of a 15 p.c. ointment. Intravenously as an injection, 5 to 20 c.c. of a ½ to 1 p.c. solution. As a 1 to 5 solution in ophthalmic work.—*L.* '02, ii. 1800; *B.M.J.E.* '01, ii. 95; '02, ii. 16; *M.P.* '02, i. 85; *P.J.* '02, i. 115.

Of the three Silver compounds, Protargol, Collargol and Argyrol, Collargol is to be preferred (*L.* '06, ii. 14) in recent wounds of the eyeball, and is employed for the most part in the form of Gelatin wafers containing 10 p.c. of the drug. It is also used in the form of solution and as an ointment, the strength varying from 5 to 20 p.c.

ICHTHARGAN (Silver Thiohydrocarburo-sulphonate; Silver Ichthyolate).—A light brown, odourless, amorphous powder, containing 30 p.c. Silver. Soluble 1 in 6 of Water and in Glycerin, Insoluble in Alcohol (90 p.c.) and in Ether. Powerful antiseptic. Useful as an injection, 0·02 to 0·2 p.c., in gonorrhœa. 1 to 3 p.c. solution in affections of the posterior urethra.—*B.M.J.E.* '01, ii. 104; '02, ii. 16; '03, ii. 31; *P.J.* '01, ii. 299.

ITROL (Silver Citrate).—A white odourless powder, containing about 63 p.c. of Silver. Only slightly soluble in Water (1 in 4000). Antiseptic. Useful in gonorrhœa. As an injection (1 in 8000 to 1 in 4000 solution). As an insufflation. As a dusting powder for wounds. In the form of sticks for fistulæ, deep wounds, and endometritis:—Itrol, 2 to 5; White Wax, 1·0; Ol. Theobrom., 9; melt and divide into 30.—*P.J.* '96, i. 243; '97, ii. 254; *Pr.* lx. 292; *B.M.J.E.* '99, i. 99 *T.G.* '99, 631; *P.J.* '99, ii. 135; *B.M.J.* '01, ii. 1333.

Official in Swed.

LARGIN (Silver Albuminate).—A light brown, amorphous, odourless powder. Soluble 1 in 8 of Water. Contains 11 p.c. Silver. Introduced as an antiseptic. Useful in gonorrhœa as an injection (1 in 4000). It is stated to have given very satisfactory results in superficial eye-diseases, such as acute infectious ophthalmia in 3 to 10 p.c. solution. Inferior to the Nitrate or Protargol in gonorrhœal ophthalmia. Even saturated solution stated to cause no pain.—*B.M.J.* '00, i. 622; *B.M.J.E.* '00, i. 68; *P.J.* '00, i. 413.

NOVARGAN.—A fine yellow odourless powder, yielding neutral red-brown solutions with Water, which should be kept in non-actinic glass bottles. An antiseptic in gonorrhœa.

PROTARGOL (Silver Protein).—A light brown or yellow, odourless powder, possessing a disagreeable metallic taste. It should be preserved in well-stoppered glass bottles of a dark amber tint and protected as far as possible from the light. It is soluble 1 in 2 of Water. A powerful antiseptic and germicide possessing deep penetrating powers, and stated not to precipitate albumen. Has been recommended in ¼ to 2 p.c. solution as an unirritating and successful injection in gonorrhœa.—*B.M.J.E.* '97, ii. 96; '98, i. 40; '98, ii. 2; *Pr.* lx. 293

and 311; *L.* '97, ii. 1628; '98, i. 872; *B.M.J.E.* '99, ii. 56, 58; *L.* '02, i. 1525; *B.M.J.E.* '99, i. 24; '01, ii. 103; *B.M.J.* '07, i. 912; *F.T.* '07, 46. Irritant effect sometimes seen probably due to worthless imitations of Protargol, or to the solutions not being made up freshly and with cold Water.—*B.M.J.E.* '07, i. 72. In conjunctival affections in the form of a 5 to 10 p.c. solution.—*B.M.J.E.* '99, i. 8; *T.G.* '99, 318; *Pr.* lxiv. 476; *L.* '99, ii. 1046; '01, ii. 553. In gonorrhœal ophthalmia, 10, 20, and 30 p.c. solutions may be used.—*L.* '01, ii. 553; *B.M.J.* '01, ii. 1333. 1 p.c. solution never fails to cure.—*B.M.J.* '07, i. 912. Zinc Sulphate stated to be incompatible with Protargol.—*P.J.* '02, ii. 293. In phthisis, injection of 40 c.c. of saline solution containing 1½ to 2½ grains Protargol, preceded and followed by an injection (through the same needle) of a few c.c. of pure saline solution.—*Proc. Brit. Cong. on Tuber.* iii. 444; *L.* '01, ii. 309. 1½ p.c. solution as an injection, and local application of a 10 to 20 p.c. solution to diseased area in urethral hæmorrhage in gonorrhœa.—*L.* '02, i. 1526. Two cases of argyrosis following the use of Protargol in conjunctivitis.—*L.* '02, ii. 1199. Injections of solutions of this salt, followed by astringents—*e.g.*, Zinc Chloride or Acetate—are considered (*L.* '04, ii. 1223) best in the treatment of gonorrhœa. 2 to 5 p.c. solutions are usually employed.—*Pr.* lxxiv. 225.

Of the three Silver salts, Protargol, Collargol and Argyrol, in chronic inflammation of the conjunctiva and the edges of the eyelids, Protargol, in from 10 to 25 p.c. solution or ointment brushed vigorously over the affected parts, produces far quicker and better results than are to be obtained by any other known method of treatment.—*L.* '06, ii. 13.

See also Summary below.

Prescribing Notes.—In preparing solutions of Protargol it is preferable to place the greater portion of the Water which is intended to be used into a vessel and then to introduce the Protargol, which dissolves gradually, finally adding the rest of the Water. Shaking should be avoided until solution is complete.

Foreign Pharmacopœias.—It is official in Austr., Belg., Jap. and Swiss.

Tests.—A 1 p.c. aqueous solution of Protargol is not precipitated by the addition of alkalis, Sodium Chloride Solution, or by Ammonium Hydrosulphide Solution. Hydrochloric Acid produces a precipitate soluble in excess of the reagent, and Picric Acid Solution yields a yellow precipitate. Solutions of Protargol yield the Biuret reaction when mixed with an equal volume of Potassium or Sodium Hydroxide Solution and a drop or two of a diluted Copper Sulphate Solution. It should leave on ignition about 8 p.c. of metallic Silver which should conform to the characteristic tests and freedom from impurities mentioned under 'Silver Nitrate.'

Liquor Protargol.—Protargol, 40, 80, 120, or 160 grains; Distilled Water, to 1 fl. oz.—*London Ophthalmic.*

TACHIOL (Silver Fluoride).—Colourless, transparent crystals, changing rapidly on contact with air. Readily soluble in Water, and the solutions, if not too strong, are permanent. Introduced as a new antiseptic. It is stated to possess powerful bactericidal powers, superior to Carbolic Acid, and only slightly inferior to Corrosive Sublimate. Employed in from a 1 in 1000 to 1 in 5000 solution to disinfect cavities and suppurating sinuses, in tubercular lesions, and ulcerative processes. It is also stated to have met with some success in ophthalmic practice, its non-irritating character being an advantage. Its solution, however, blackens linen fabrics.—*L.* '02, i. 393; ii. 1707; *C.D.* '02, i. 309. A 1 in 3000 to 1 in 5000 solution has been shown (*B.M.J.E.* '05, i. 24) to be an excellent antiseptic and antifermentative for the stomach, whether used for washing out or given internally.

Summary of Experiments with Organic Silver Compounds.—A series of experiments were carried out to determine the bactericidal action of Silver compounds, and the results were embodied in a report to the British Medical Association.—*B.M.J.* '06, ii. 359. The various Silver compounds investigated fall into three groups: (1) Those which are powerfully bactericidal; (2) one (Nargol) much less powerfully bactericidal; (3) two (Argyrol and Collargol) which possess practically no bactericidal action whatever. The first group includes most of the substances investigated, namely, Silver Nitrate, Silver Fluoride, Actol, Itrol, Argentamin, Argentol, Albargin, Argonin, Ichthargan, Largin, Novargan and Protargol. The bactericidal action of these in solutions containing the same percentage of combined Silver is closely similar, and it is practically impossible to place them in any order of activity which would be true under all circumstances.

As Argyrol and Collargol are not bactericidal, it is evident that the amount of Silver which a compound may contain is no criterion of its bactericidal power. Moreover, in view of the results obtained with Argyrol, it seems impossible to attribute the good effects which many clinicians have obtained with it to its bactericidal action.

Further investigations largely confirmatory of the above.—*B.M.J.* '07, ii. 1475; *L.* '07, i. 525, 675.

Silver Nitrate in eye diseases is a dangerous remedy, except in the hands of the surgeon, and its application even in a 2 p.c. solution is attended with such excruciating pain as to make the strongest shudder.—*Scot. Med. and Surg. Jour.* '07, i. 396.

ARGENTI OXIDUM.

SILVER OXIDE.

Ag_2O, eq. 230·10.

FR., OXYDE D'ARGENT; GER., SILBEROXYD.

A brownish-grey odourless powder when freshly prepared, but becoming of a blackish-brown colour on drying or on exposure to the air.

When mixed with readily oxidisable substances great heat is evolved, and the mixture is liable to explode.

It may be prepared by the interaction of solutions of Silver Nitrate and Calcium Hydroxide.

It should be preserved in dark amber-tinted dry bottles, and protected from dust and ammoniacal fumes.

Medicinal Properties.—It has the general therapeutic qualities of the Nitrate, without its escharotic effect. It is more slowly absorbed, and is said to be less liable to discolour the skin.

Dose.—$\frac{1}{2}$ to 2 grains = 0·032 to 0·13 gramme.

Prescribing Notes.—*Usually given in a* **pill**, *made with Massa Kaolini.*

If prescribed with Creosote or with the Chlorides in pills, the Oxide must be first diffused through some inert powder such as Kaolin, as the heat produced in rapidly reducing the Silver or by the Chlorine combining with it causes the mass to become red-hot, or to explode.

Incompatibles.—Bromides, Chlorides, and Iodides. Organic and readily oxidisable matter.

Foreign Pharmacopœias.—Official in U.S. Not in the others.

Tests.—The distinguishing tests for Silver Oxide are the ease with which it undergoes decomposition when mixed with readily oxidisable substances such as Creosote and Potassium Permanganate, such decomposition being accompanied with rapid disengagement of heat, and if in a confined space with explosive violence; the evolution of Oxygen when heated to dull redness leaving a residue of metallic Silver, which should, when dissolved in Nitric Acid, yield the tests distinctive of Silver given under that substance. It is officially required to indicate 100·0 p.c. of pure Silver Oxide as gravimetrically determined by solution in Nitric Acid and precipitation with Hydrochloric Acid; 1·237 grammes of Silver Chloride should be yielded by 1 gramme of Silver Oxide. The *U.S.P.* gravimetric test indicates 99·8 p.c. of pure Silver Oxide, which is equivalent to 92·9 p.c. of pure metallic Silver; determined as the residue left on igniting the Oxide in a porcelain crucible; 0·5 gramme should not leave less than 0·464 gramme. Silver Oxide is not official in the *P.G.*

The more generally occurring impurities are metallic Silver, Lead, Copper, and Iron, all of which are mentioned in *B.P.* The presence of metallic Silver is evidenced by the evolution of reddish fumes when the Oxide is dissolved in Nitric Acid. Lead and Copper are detected as described under Argenti Nitras. The *U.S.P.* includes a test for Carbonate and a limit of Chloride, requiring that the Oxide should dissolve without effervescence in Nitric Acid, and that when a weighed quantity of 0·2 of a gramme of the Oxide is dissolved in 1 c.c of Nitric Acid mixed with twice its volume of Water, and 10 c.c. of Ammonia Solution are added, the liquid diluted to 60 c.c. the addition of 1 c.c. of Nitric Acid to 10 c.c. of this dilution should not produce a cloudiness.

ARMORACIÆ RADIX.

HORSERADISH ROOT.

FR., RAIFORT; GER., MEERRETIG; ITAL., RAFANO RUSTICANO; SPAN., RABONO RUSTICANO.

The fresh Root from cultivated plants of *Cochlearia Armoracia*, L. Most active in the autumn and early spring before the leaves have appeared.

Medicinal Properties.—Sialagogue, stomachic, slightly diuretic, and diaphoretic. Used in atonic dyspepsia and as a condiment; also as a sudorific in chronic rheumatism. Externally as a rubefacient. The infusion is used as a **gargle.**

Official Preparation.—Spiritus Armoraciæ Compositus.

Not Official.—Infusum Armoraciæ Compositum, Sirop de Raifort Composé.

Foreign Pharmacopœias.—Official in Dutch; Fr., Port. (Rabao Rustico); Span. and Mex. Not in the others.

Descriptive Notes.—The root is imported from Belgium in barrels, that usually sold not being cultivated in this country. It is made up in bundles of about twenty roots. It is whitish or yellowish-white externally, about 8 to 12 inches (20 to 30 cm.) or more long, about an inch (2·5 cm.) in diameter, cylindrical, slightly enlarged and marked with leaf scars at the crown, odourless, until scraped or broken, when it gives off a pungent odour; the taste is very pungent. Aconite root has on rare occasions been mistaken for it, but the latter is conical, tapering much below, blackish-brown externally and not pungent. Horseradish root is usually sold in the fresh state, rarely in a dried condition.

Preparation.

SPIRITUS ARMORACIÆ COMPOSITUS. COMPOUND SPIRIT OF HORSERADISH.

Scraped Horseradish Root, 1 oz.; Dried Bitter-Orange Peel, 1 oz.; Nutmeg, 11 grains; Alcohol (90 p.c.), 5 fl. oz.; Distilled Water, 6 fl. oz. Mix and distil 8 fl. oz.

Dose.—1 to 2 fl. drm. = 3·6 to 7·1 c.c.

Foreign Pharmacopœias.—Not in the other Pharmacopœias. Port., compound Wine; Mex. (Alcoholato de coclearia); Span. (Alcohol de coclearia). They all differ widely from the above.

Not Official.

INFUSUM ARMORACIÆ COMPOSITUM.—Fresh Root, sliced, 1; Black Mustard Seed, 1; Compound Spirit of Horseradish, 1; boiling Distilled Water, 20. Macerate two hours; strain, and add the Spirit.

It is found in practice that a temperature of 150° to 180° F. makes the strongest infusion.

Dose.—1 to 2 fl. oz. = 28·4 to 56·8 c.c., as a warm stimulant.

SIROP DE RAIFORT COMPOSÉ (Antiscorbutic Syrup).—Cochlearia Leaves, 1000; Water-cress Leaves, 1000; Horseradish Root, 1000; Dried Leaves of Menyanthes Trifoliata, 100; Bitter-Orange Peel, 200; Ceylon Cinnamon, 50; White Wine, 4000; White Sugar, 5000; all by weight. Bruise the Water-cress and Cochlearia Leaves, cut up the Horseradish Root, the Leaves of Menyanthes Trifoliata and the Bitter-Orange Peel; break up the Cinnamon Bark. Macerate the whole in the White Wine for two days and distil on a water-bath. Collect 1000 of the aromatic liquor, and with it prepare a syrup in a closed vessel on the water-bath in the proportion of 100 grammes of Sugar for each 100 grammes of the liquor.—*Fr.*

ARNICÆ RHIZOMA.

ARNICA RHIZOME.

B.P.Syn.—ARNICÆ RADIX.

FR., RACINE D'ARNIQUE; GER., ARNIKAWURZEL; ITAL., RHIZOMA DI ARNICA; SPAN., RIZOMA DE ARNICA.

The dried Rhizome and Roots of *Arnica montana*, Linn.

Collected in the mountainous parts of Central and Southern Europe.

The dried flower-heads are official in the *Ind.* and *Col. Add.*

Medicinal Properties.—Stomachic and slightly stimulant, irritant to the stomach and bowels in large doses. The **tincture** is used externally for bruises and sprains, diluted with Water, but inflammation of the skin may be set up; equally good results have been produced by the application of Spirit and Water.

Official Preparation.—Tinctura Arnicæ.

Not Official.—Arnica Opodeldoc, Extractum Arnicæ Radicis Fluidum, Linimentum Arnicæ.

Antidotes.—Opium, Morphine.

Symptoms of poisoning by Arnica are violent vomiting, intense headache, diarrhœa, colic, feeble pulse.

Foreign Pharmacopœias.—Official in Austr., Ital. and Port., **root** and **flowers**; Hung., **root, leaves,** and **flowers**; Belg., Dan., Dutch, Fr., Ger., Jap., Norw., Russ., Swed., Swiss and U.S., **flowers**; Mex., **rhizome, leaves,** and **flowers**; Span., **rhizome** and **flowers.**

Descriptive Notes.—The rhizome as imported requires to be picked over before use, and freed from various foreign matters and vegetable fibres, which are almost always mixed with it. It is officially described as about 1 to 2 inches (2½ to 5 cm.) in length, ⅙ to ¼ inch (4 to 6 mm.) in diameter, cylindrical and curved, horizontal. It is often furnished with one or more terminal proliferations, giving it a jointed appearance, and with rather distant, wiry, unbranched, brittle roots, on the lower surface only, and is sometimes terminated at the crown by the hairy bases of the leaves. The taste is acrid and bitter, and the odour characteristic, recalling that of apples. The transverse fracture shows a greyish or dirty white centre, and resin ducts near the inner margin of the cortex. It is sometimes mixed with the rhizome of species of *Hieracium*, or of *Geum urbanum*, Linn. The former lacks the resin ducts and odour, and the latter has a clove odour, and astringent taste, and has roots all round the erect rhizome or rootstock.

In the *P.G.* and *U.S.P.* the flowers are official instead of the root, but these are liable to attacks by insects, and lose their volatile oil more quickly than the rhizome.

Preparation.

TINCTURA ARNICÆ. TINCTURE OF ARNICA.

1 of Arnica Rhizome in No. 40 powder, percolated with Alcohol (70 p.c.) to yield 20. (1 in 20)

Foreign Pharmacopœias.—Official in Fr. and U.S., 1 in 5; Belg., Dan., Dutch, Ger., Norw., Russ., Swed. and Swiss, 1 and 10, Port. 1 in 10, all from **flowers**; Port., 1 in 5, from the **root**; Ital., **root** 1, Alcohol (60 p.c.) 10; Austr., **root** 4, **flowers** 1, Alcohol (70 p.c.) 25; Hung., **root** 6, **leaves** 3, and **flowers** 1, dilute Alcohol (70 p.c.) 50; Mex., **dried leaves** 1 in 5; Span., **root** 1, **flowers** 1, Alcohol (70 p.c.) to 10; all are by weight except U.S.

Tests.—Tincture of Arnica has a specific gravity of 0·890 to 0·895; contains about 0·6 p.c. w/v of total solids and about 68 p.c. w/v of Absolute Alcohol.

TINCTURA ARNICÆ FLORUM.—Percolate 1 of Arnica flowers with Alcohol (45 p.c.) to make 10.

Official in the *Ind.* and *Col. Add.* for North American Colonies.

Not Official.

ARNICA OPODELDOC.—White Soap, 4; Alcohol (90 p.c.), 10; Tincture of Arnica, 5; Camphor, 1. Dissolve by heat, and strain.

This has been incorporated in the *B.P.C.* under the title **Linimentum Arnicæ.**

EXTRACTUM ARNICÆ RADICIS FLUIDUM.—1 in 1, made by percolation with a mixture of Alcohol 3, Water 1.—*U.S.P.* 1890.

This has been incorporated in the *B.P.C.*

Not Official.

ARSENII BROMIDI LIQUOR.

LIQUOR POTASSII ARSENIATIS ET BROMIDI (*U.S.N.F.*). CLEMENS' SOLUTION.

Arsenious Anhydride, 145 grains; Potassium Bicarbonate, 587 grains; Bromine, 235 grains; Water, *q.s.* Boil the Arsenic and Potassium Bicarbonate in 8 oz. of Water till dissolved; when cold add 16 oz. of Water, then the Bromine, and make up with Water to 32 fl. oz. Stir occasionally during a few hours, then filter.

This Liquor was originally described by Dr. Clemens as 'a chemical union of Arsenic and Bromine,' but as the action of Bromine on Arsenious Acid results in the formation of Arsenic Acid and Hydrobromic Acid, the above formula has been adjusted to yield these products as Potassium salts.

The solution contains Arsenic equal to 1 p.c. of Arsenious Anhydride.

Recommended in the treatment of diabetes.—*L.M.R.* '83, 86.

Dose.—1 to 5 minims = 0·06 to 0·3 c.c.

ARSENII IODIDUM.

ARSENIOUS IODIDE.

AsI_3, eq. 452·20.

Syn.—ARSENIC IODIDE.

Orange or orange-red coloured crystals, having a faint odour of Iodine, and which lose Iodine on exposure to air and light.

It should be kept in dark amber-coloured well-stoppered glass bottles in a cool place.

Solubility.—1 in 11 of Water; 1 in 42 of Alcohol (90 p.c.); 1 in 19 of Carbon Bisulphide.

It is gradually decomposed by boiling Water and by boiling Alcohol.

Medicinal Properties.—Has been used in obstinate cutaneous affections of syphilitic and tubercular origin.

Dose.—$\frac{1}{20}$ to $\frac{1}{5}$ grain = 0·0034 to 0·013 gramme.

Prescribing Notes.—*It is generally given as Donovan's Solution, or in a* pill *well triturated with Milk Sugar and massed with Glucose.*

Official Preparation.—Liquor Arsenii et Hydrargyri Iodidi.

Foreign Pharmacopœias.—Official in Jap., Mex. (Yoduro de Arsenico) and U.S. Not in the others.

Tests.—The distinguishing tests for Arsenious Iodide are that its aqueous solution shall, when acidulated with Hydrochloric Acid, yield on addition of Hydrogen Sulphide Solution a yellow precipitate soluble in Potassium or Sodium Hydroxide Solution, in Potassium Carbonate Solution or in Ammonium Carbonate Solution, being reprecipitated on the addition of Hydrochloric Acid; a cold porcelain vessel impinged upon the flame of the ignited gas produced by the interaction of Zinc, Hydrochloric Acid and a little of an aqueous solution of the salt, acquires a dark metallic looking stain readily dissolved by Chlorinated Soda Solution; Hydrogen Arsenide is evolved when a little of the solution is boiled with Zinc and Potassium or Sodium Hydroxide Solution, this gas yields a black stain to filter paper moistened with Silver Nitrate Solution, and a dark metallic stain on porcelain as above when ignited; Stannous Chloride Solution containing a large excess of Hydrochloric Acid yields a brown or brownish-black coloration when mixed with a little of an aqueous solution; an aqueous solution acidulated with Hydrochloric Acid yields a dark metallic looking deposit on Copper when boiled with that metal; the Copper when removed, dried between folds of bibulous paper, and heated in a clean, dry test-tube yields a sublimate of white characteristic octahedral crystals. The aqueous solution yields with Silver Nitrate Solution a curdy yellow precipitate insoluble in Nitric Acid, almost insoluble in Ammonia Solution, but soluble in Potassium Cyanide solution; with a small quantity of Chlorine Solution and Starch Mucilage it yields an intense blue coloration, disappearing on heating and reappearing as the liquid cools; when treated with Chlorine Solution and shaken with Carbon Bisulphide, the latter liquid assumes a fine violet coloration. No mention of a volumetric or gravimetric method of determination is made in the *B.P.*, but the *U.S.P.* requires it to contain not less than 16·3 p.c. of Arsenic as indicated by titration with Deci-normal Volumetric Iodine Solution by the method described in the small type below.

The more generally occurring impurities are free acid, either Arsenious or Hydriodic, and mineral matter. The neutrality of the aqueous solution to Litmus affords an indication of the former, the latter is revealed by a residue remaining after volatilisation.

Volatilisation.—When heated on a water-bath no loss in Iodine occurs, *U.S.P.*, but at a higher temperature it volatilises, *B.P.* and *U.S.P.* Violet vapours of Iodine being set free, *B.P.*

Volumetric Determination.—0·5 gramme of Arsenious Iodide and 2 grammes of Sodium Bicarbonate dissolved in 50 c.c. of Water require not less than 21·9 c.c. Tenth-normal V.S. of Iodine to impart a slight yellow tint to the solution, *U.S.P.*

Preparation.

LIQUOR ARSENII ET HYDRARGYRI IODIDI. Solution of Arsenious and Mercuric Iodides.

Arsenious Iodide, 87½ grains; Mercuric Iodide, 87½ grains; Distilled Water, *q.s.* to make 20 fl. oz. (1 of each in 100)

A yellowish, odourless liquid, with a disagreeable metallic taste, sp. gr. 1·015 to 1·018. It is also known as **Donovan's Solution.**

Dose.—5 to 20 minims = 0·3 to 1·2 c.c.

11 minims contain $\frac{1}{10}$ grain of each salt.

Incompatibles.—Acids, the salts of Morphine, or other Alkaloid, and Corrosive Sublimate.

Foreign Pharmacopœias.—Official in U.S., 1 in 100.

ASAFETIDA.

ASAFETIDA.

Fr., Asafœtida; Ger., Asant; Ital., Assafetida; Span., Asafetida.

A gum resin obtained by incision from the Root of *Ferula fœtida*, Regel, and probably other species.

Medicinal Properties.—Nervine stimulant, expectorant, laxative and carminative. Useful in cases of flatulence, in hysteric paroxysms; also in some forms of chronic bronchitis; very useful as an enema in the flatulent distension of typhoid or peritonitis, and in infantile convulsions.

As a successful preventive against abortion.—*M.A.* '93, 64; *B.M.J.E.* '95, i. 35.

Dose.—5 to 15 grains = 0·32 to 1 gramme.

Prescribing Notes.—*In* **pill** *massed with a little dilute Alcohol. They are best varnished, as silver leaf is affected by this drug. The* **Tincture** *may be prescribed with Aromatic Spirit of Ammonia, or with the Tinctures of Valerian and Hyoscyamus. When diluted with water to form a* **mixture,** *it requires the addition of Mucilage of Gum Acacia.*

Official Preparations.—Tinctura Asafetidæ. Used in the preparation of Pilula Aloes et Asafetidæ, Pilula Galbani Composita, and Spiritus Ammoniæ Fetidus.

Not Official.—Enema Asafœtida, Mistura Asafetida Composita, Pilulæ Asafœtida.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex., Norw., Port., Russ., Span., Swed., Swiss and U.S.

Descriptive Notes.—The Asafetida of commerce varies exceedingly in appearance and in purity. It may occur in whitish tears from ½ inch (12·5 mm.) in diameter, or in flattened tears up to 3 inches (75 mm.) or more in diameter, or in masses of agglomerated tears of various sizes, either whitish or brownish or reddish-brown according to age, and more or less agglutinated with darker gum resin and mixed with stones. More rarely balls of sand, about 4 cm. in diameter, made with the liquid gum resin are offered under the name of stony Asafetida. As it is very difficult to purify without loss of essential oil, it is very necessary that the purest drug obtainable should be selected for dispensing purposes. It is officially limited to the rounded or flattened tears, more or less agglutinated, which are dull yellow in colour and darken on keeping, and internally yellowish and translucent, or milky-white and opaque, the freshly exposed surfaces gradually assuming a pink colour, changing to red and finally to reddish-brown. The *U.S.P.* requirements are much the same. The *P.G.* gives *Ferula Narthex*, Boiss., also as a source of the drug. The gum resin of that species, however, never becomes red on keeping, and Aitchison ascertained that in Kashmir it is not collected. For the purpose of being powdered the *P.G.* directs that it should be dried over quicklime, and triturated at the lowest practicable temperature. The Asafetida in tears that enters into commerce does not invariably turn red on exposure. Even fine-looking specimens in the form of tears, sometimes contain half their weight of pebbles covered with a thin layer of Asafetida, and it is only from selected specimens, easily distinguished by their light weight, that a drug affording only 10 p.c. of ash can be obtained. Usually the tears met with in commerce yield only one-third of their weight of this quality. Indeed, in this as in other cases, where much impurity is present, a purified preparation extracted by Alcohol from the crude drug should be official for dispensing purposes.

Tests.—The distinguishing tests for Asafetida are that when triturated with Water it forms a milky-white emulsion, which assumes a yellowish coloration on the addition of a few drops of Ammonia Solution; the addition of Nitric Acid diluted with an equal volume of Water to the freshly fractured surface produces a greenish coloration; when strongly heated in a dry test-tube, cooled and treated with boiling Water it yields a liquid which, when largely diluted and made alkaline with Ammonia Solution, exhibits a blue fluorescence. This test is known as the umbelliferone test, and the remarks on the test appearing under Ammoniacum apply equally here. It is officially required to contain not less than 65 p.c. of matter soluble in Alcohol (90 p.c.), but only the best quality will yield this proportion. The *U.S.P.* and *P.G.* fix 50 p.c. as the limit of matter soluble in Alcohol (90 p.c.). The method adopted by the *P.G.* of weighing the insoluble residue is preferable to determining the amount dissolved, on account of the loss of volatile constituents during evaporation. The determination of the Acid, Ester and Saponification values affords useful indications of the purity, but no mention of them appears in the *B.P.* Commercial Asafetida has an Acid value of from 60 to 80; an Ester value of from 80 to 130; and a Saponification value of 120 to 185. A sample of fine selected tears examined in the author's laboratory, which yielded 3·1 p.c. of ash and contained 68·3 p.c. of matters soluble in Alcohol (90 p.c.), had an Acid value of 131·9; an Ester value of 119·3; and a Saponification value of 251·3. Another sample which contained 37·8 p.c. of ash, and 44·5 p.c. of matters soluble in Alcohol (90 p.c.), had an Acid value of 43·4; an Ester value of 127·4; and a Saponification value of 170·8.

The more generally occurring impurities are inferior varieties of Gum and mineral matter. The presence of the former is detected by the Alcohol-solubility, the latter by the ash. A lengthy controversy has taken place over the amount of ash permissible. An ash limit of 20 p.c. has been suggested (*Y.B.P.* '00, 405), and it has been stated (*C.D.* '99, ii. 983) that at that date it was practically impossible to obtain any considerable quantity which would satisfy the *B.P.* tests. On the other hand, it was stated (*C.D.* '99, ii. 1037) that provided a fair price were paid a sufficient supply of *B.P.* quality could readily be procured. The *B.P.* limit of not more than 10 p.c. is generally upheld. The *U.S.P.* and *P.G.* both state not more than 10 p.c. The *Dutch Pharmacopœia*, which in the Third Edition adopted a 20 p.c. limit, in the new Fourth Edition allows not more than 10 p.c.

Preparations.

PILULA ALOES ET ASAFETIDÆ. 1 in 4. *See* ALOES.

PILULA GALBANI COMPOSITA, about 1 in 3½. *See* GALBANUM.

SPIRITUS AMMONIÆ FETIDUS, about 33 grains in 1 oz. *See* AMMONIA.

TINCTURA ASAFETIDÆ. TINCTURE OF ASAFETIDA.

1 of Asafetida, macerated with Alcohol (70 p.c.), to yield 5. (1 in 5)

Dose.—½ to 1 fl. drm. = 1·8 to 3·6 c.c.

Foreign Pharmacopœias.—Official in Belg. (1 and 4½), Dan., Dutch, Fr., Ital., Jap., Norw., Port., Span., Mex., Swed. and Swiss, 1 and 5; U.S., 1 in 5; all by weight, except U.S.; not in Austr., Ger., Hung. or Russ.

Tests.—Tincture of Asafetida has a specific gravity of about 0·912. It contains about 9½ p.c. w/v of total solids and about 60 p.c. w/v of Absolute Alcohol.

Not Official.

ENEMA ASAFŒTIDA.—Asafetida, 30 grains; Distilled Water, 4 fl. oz. Rub the Asafetida in a mortar with the Water added gradually so as to form an emulsion.—*B.P.* 1885.

Tincture of Asafœtida, 1 fl. drm.; Mucilage of Starch, 4 fl. oz.—*St. Thomas's*.
This has been incorporated in the *B.P.C.* as follows:—
Tincture of Asafœtida, 3; Mucilage of Starch, *q.s.* to make 100.

MISTURA ASAFETIDA COMPOSITA.—Asafetida, picked, 5 grains; Liquid Extract of Cascara Sagrada, 10 minims; Ammonium Carbonate, 4 grains; Infusion of Valerian (1 in 40), to 1 fl. oz. The Ammonia in this mixture develops the taste and odour of the other constituents.—*St. Thomas's*.

This has been incorporated in the *B.P.C.*, using 5 grains of Ammonium Carbonate in place of 4.

PILULÆ ASAFŒTIDA.—Asafetida, 20 grammes; Soap, in fine powder, 6 grammes; Water, *q.s.* to make 100 pills.—*U.S.P.* Each pill contains 3 grains of Asafetida.

This has been incorporated in the *B.P.C.*

ATROPINA.

ATROPINE.

$C_{17}H_{23}NO_3$, eq. 287·05.

FR., ATROPINE; GER., ATROPIN; ITAL., ATROPINA; SPAN., ATROPINA.

Colourless, odourless acicular crystals, or as a white more or less amorphous powder. Taste bitter and acrid. Obtained from the leaves and root of Belladonna. It gradually assumes a yellowish tint on exposure to air, and should be kept in well-stoppered dark amber-tinted bottles.

It is officially regarded as an alkaloid, obtained from Belladonna Leaves or Root. The bulk of the alkaloid existing in Belladonna is Hyoscyamine, which is isomeric with Atropine; and the former has a constant tendency to change into the latter.

Atropine (uncombined with an Acid) easily decomposes when heated. A solution of 1 in 200 of Water heated in a basin or on a water-bath for two hours was so completely decomposed that it lost its alkaline reaction and ceased to precipitate with Mercuric Chloride Solution, after eight hours the reaction was faintly acid.

Solubility.—1 in 500 of Water; 1 in 3 of Alcohol (90 p.c.); 1 in 25 of Ether; 1 in 1 of Chloroform; 1 in 52 of Glycerin; 1 in 15 of Oleic Acid.

Medicinal Properties.—The **Ointment** is used for the relief of pain arising from muscular spasm, and for neuralgia. *See* also Atropinæ Sulphas and Belladonna.

Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain = 0·0003 to 0·0006 gramme.

It is freely soluble in Oleic Acid, and is sometimes applied as a 1 or 2 p.c. solution.

Official Preparation.—Unguentum Atropinæ.

Not Official.—Atropinæ Oleas, Unguentum Atropinæ, Unguentum Atropinæ Dilutum, Unguentum Atropinæ cum Acido Borico, Unguentum Atropinæ cum Cocaina, and Atropinæ Oleas.

Antidotes.—In case of poisoning by Atropine, the antidotes are the same as for Belladonna.

Foreign Pharmacopœias.—Official in Fr., Mex., Port., Span. and U.S. Not in the others.

Tests.—The distinguishing tests for Atropine are the melting point which, when pure, should be about 115·5° C. (248° F.); the Aurichloride, which should be dull and pulverulent in physical appearance, should possess a melting point of 137° C. (278·6° F.); the strongly marked mydriatic action when a drop of a very dilute solution is carefully instilled into the eye; the optical inactivity; the purple-violet coloration produced when a crystal is evaporated to dryness with fuming Nitric Acid, and the residue is moistened with a freshly prepared alcoholic Potassium Hydroxide solution, this test being known as Vitali's test; the yellow precipitate changing to red, which occurs when an alcoholic solution is warmed with Mercuric Chloride Solution; the alkaline reaction to Litmus and Phenolphthalein, which distinguishes Atropine and its isomers from almost all other known alkaloids. The *B.P.* mentions most of these tests, but not the optical inactivity or melting point of the Aurichloride, although it describes the method of producing the salt and its physical appearance and includes a melting point for Hyoscine Aurichloride. The *U.S.P.* states that pure Atropine Aurichloride melts at 136° C. (276·8° F.). The colour reaction with Vitali's test is very delicate, and although other alkaloids, Pseudaconitine, Veratrine, and Strychnine, afford colours somewhat resembling this, there is no difficulty in detecting Atropine in the pure state when unmixed with other alkaloids. The *U.S.P.* states that the presence of Strychnine masks this reaction. The latter Pharmacopœia also states that it produces no precipitate with Platinic Chloride Solution and that it yields a pink coloration not dissipated by 0·5 gramme of Chloral Hydrate, when a crystal is treated with Sulphuric Acid containing a drop of Cresol, which distinguishes it from most other alkaloids. It is also stated to give a peculiar odour indicative of a mixture of Rose, Orange flower, and Melilot when heated with a little Sulphuric Acid, the odour changing to one of Bitter Almonds on the addition of a small crystal or two of Potassium Bichromate.

Atropine may be readily titrated with Deci- or Centi-normal Volumetric Hydrochloric or Sulphuric Acid Solution, using Cochineal Solution as an indicator. 1 c.c. Deci-normal solution = 0·0287 gramme of Atropine, and 1 c.c. of Centi-normal solution = 0·00287 gramme of Atropine. Atropine is not official in the *P.G.*

The more generally occurring impurities are mydriatic alkaloids other than Atropine, *e.g.*, Hyoscyamine and Scopolamine; Morphine, and mineral matter.

Hyoscyamine and Scopolamine are readily detected by their optical activity; Morphine, if present, by the red coloration produced when a small quantity of the alkaloid is treated with a mixture of Sulphuric and Nitric Acids; mineral matter by the amount of residue left on ignition, which should be nil.

Gold Chloride.—The Chloraurate may be made by adding Gold Chloride T.S. to a solution of Atropine in dilute Hydrochloric Acid, washing, collecting, and drying the precipitate, which should be yellow and lustreless, *U.S.P.*

Vitali's Test.—If Atropine be moistened with Nitric Acid (fuming, *B.P.*), and heated in a porcelain dish on a water-bath to dryness, the residue (which is yellow, *U.S.P.*) gives with alcoholic Potassium Hydroxide solution a fugitive reddish-violet coloration, *B.P.*, an intense violet coloration, *U.S.P.* The *B.P.* directs freshly prepared alcoholic Potassium Hydroxide solution, and the *U.S.P.* directs the addition of a fragment of Potassium Hydroxide as well as the alcoholic solution. Hyoscyamine and Hyoscine will produce the same colour, but the presence of Strychnine will mask the reaction, *U.S.P.*

Sulphuric Acid.—Sulphuric Acid when added to Atropine should produce no colour (absence of readily carbonisable organic impurities), nor should the subsequent addition of Nitric Acid yield any colour (absence of and difference from Morphine), *U.S.P.*

Preparation.

UNGUENTUM ATROPINÆ.—ATROPINE OINTMENT.

Atropine, 2; Oleic Acid (by weight), 8; Lard, 90. (1 in 50)

Not Official.

UNGUENTUM ATROPINÆ.—Atropine, 4 grains; Soft Paraffin, 1 oz.; heat till dissolved, and stir till cold.—*London Ophthalmic*; *Middlesex*, same strength with Vaseline.

UNGUENTUM ATROPINÆ DILUTUM.—Atropine 1 p.c., in fine powder, incorporated in Yellow Soft Paraffin of uniform consistence having a melting point of about 35° C.—*St. Thomas's.*

This has been incorporated in the *B.P.C.*

UNGUENTUM ATROPINÆ CUM ACIDO BORICO.—Atropine, 4 grains; Powdered Boric Acid, 60 grains; Soft Paraffin, 1 oz.—*London Ophthalmic.*

UNGUENTUM ATROPINÆ CUM COCAINA.—Atropine, 4 grains; Cocaine, 8 grains; Soft Paraffin, 1 oz.; heat till the alkaloids are dissolved.—*London Ophthalmic.*

Atropine, 1 p.c.; Cocaine, 2 p.c.—*St. Thomas's.*

This has been incorporated in the *B.P.C.*

ATROPINÆ OLEAS.—Atropine, 8 grains; Oleic Acid, 1 oz.

OLEATUM ATROPINÆ.—Atropine, 2; Alcohol (95 p.c.), 2; Oleic Acid, by weight, 50; Olive Oil, *q.s.* to make 100 by weight. Triturate the Atropine in a tared mortar with the Alcohol, then add an equal volume of the Oleic Acid and, after warming the mortar, stir until the Alcohol has evaporated, add the remainder of the Oleic Acid and continue stirring until the Atropine is dissolved, then add Olive Oil to make 100 by weight.—*U.S.P.*

This has been incorporated in the *B.P.C.* with the title **Oleinatum Atropinæ.** *Syn.* OLEATUM ATROPINÆ.

HOMATROPINE.—*See* p. 598.

ATROPINÆ SULPHAS.

ATROPINE SULPHATE.

FR., SULFATE D'ATROPINE; GER., ATROPINSULFAT; ITAL., SOLFATO DI ATROPINA; SPAN., SULFATO DE ATROPINA.

$(C_{17}H_{23}NO_3)_2H_2SO_4$, eq. 671·44.

A white, or almost white, odourless, more or less crystalline powder, having a bitter, nauseous taste.

It is the Sulphate of an alkaloid obtained from Belladonna Leaves or Root and may be obtained by neutralising Atropine with Diluted Sulphuric Acid. As obtained commercially it almost invariably contains a small proportion of Hyoscyamine Sulphate.

Solubility.—10 in 4 of Water; 1 in 4 of Alcohol (90 p.c.). Insoluble in Ether and Chloroform.

Medicinal Properties.—Mydriatic, anhidrotic, antigalactagogue. Employed locally to dilate the pupil and paralyse the accommodation, in iritis, and before testing refraction or making ophthalmoscopic examination; used also to cause retraction of protruding iris; as it increases intraocular tension it does harm in glaucoma. It is frequently combined with Morphine in hypodermic administration to prevent the undesirable effects of the latter. Injected as near the nerve as possible in sciatica, hypodermically in ovarian and uterine pain. The hypodermic method is also the best to diminish the sweating of phthisis, for which purpose, in doses of $\frac{1}{200}$ to $\frac{1}{100}$ grain, Atropine is very useful; it at the same time relieves the cough; or 1 or 2 minims of the Liquor Atropinæ Sulphatis may be given by the mouth.

Hypodermically also in spasmodic asthma, in narcotic poisoning, in aiding the reduction of hernia, and, with Strychnine, in lessening the craving for Alcohol. *See* also Atropine and Belladonna.

In morphinism.—*B.M.J.E.* '94, i. 20.

In hernia, the hypodermic injection of $\frac{1}{70}$ grain of Atropine was followed by immediate spontaneous reduction. In four subsequent cases $\frac{1}{70}$ to $\frac{1}{45}$ grain were used. In another case, a second injection necessary, and in a sixth case three injections.—*B.M.J.E.* '02, ii. 92.

In intestinal obstruction, three injections of $\frac{1}{68}$ grain each.—*B.M.J.E.* '01, ii. 48; *M.A.* '02, 362.

In asthma, $\frac{1}{2}$ milligramme internally, increasing dose every second or third day by $\frac{1}{2}$ milligramme until patient is taking 4 milligrammes a day, gradually diminishing doses after a time. Duration of treatment, four to six weeks. Second and third course recommended at interval of six months.—*Pr.* lxii. 698.

In broncho-pneumonia in children.—*Pr.* lxii. 698.

Warning against the indiscriminate use of Atropine in eye diseases, particularly with patients over thirty years of age.—*B.M.J.* '02, i. 267.

In *B.M.J.* '05, i. 132, and '07, ii. 951 are the details of the treatment for inebriety.

Diabetes successfully treated.—*B.M.J.E.* '07, ii. 28.

Morphinomania successfully treated by Atropine and Strychnine.—*B.M.J.* '07, i. 1173.

In the treatment of infantile syphilitic iritis (*Pr.* lxxv. 563), the local use of a solution of 2 grains of Atropine Sulphate to the oz. of Distilled Water, together with the inunction of mercurial ointment, is recommended.

2 or 3 drops of a 4 grains to the oz. solution instilled into the eye daily, or where the patient objected one eye was merely bandaged, thus altering the principal focus, the motion of objects is not so uniformly transmitted to the brain and tendency to sea-sickness is diminished.—*B.M.J.* '05, i. 1090.

In the treatment of inebriety (*B.M.J.* '05, ii. 1691) the hypodermic injection of Atropine combined with Strychnine has proved of great value in relieving the intensity of the appetite, and when thoroughly pushed it confers indifference to Alcohol. $\frac{1}{100}$ grain Atropine increased to $\frac{1}{80}$ grain with $\frac{1}{100}$ grain Strychnine; also, the injection of 1 minim of Liquor Atropinæ Sulphatis, with 4 minims of Liquor Strychninæ Hydrochloridi, twice daily for a month, then once daily for a fortnight, then every second day for a month.—*B.M.J.* '06, i. 515.

Drops of Atropine Sulphate, 1 grain; Cocaine Hydrochloride, 4 grains; Adrenalin solution (1 in 1000), 30 minims; Water, $2\frac{1}{2}$ drm.; applied 1 drop in the eye every 3 hours in acute conjunctivitis.—*M.P.* '05, ii. 303.

Two cases of toxic symptoms following the application of Atropine drops to the eyes of children. In one case drops containing 2 grains and in the other 4 grains of Atropine to the oz. were used.—*L.* '05, ii. 964.

Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain = 0·0003 to 0·0006 gramme.

Dan., Dutch, Fr., Ger., Ital., Norw., Russ. and Swiss give the maximum single dose as 0·001 gramme; Ger., Ital. and Russ., maximum daily dose 0·003 gramme; Fr., 0·002 gramme.

Prescribing Notes.—*The Sulphate is best adapted for Aqueous Solutions, and the pure Alkaloid for Ointments. Can be given in pill well triturated with Milk Sugar and massed with 'Diluted Glucose.' Generally given in solution.*

Official Preparations.—Lamellæ Atropinæ, and Liquor Atropinæ Sulphatis.

Not Official.—Glycerinum Atropinæ, Guttæ Atropinæ Sulphatis, Guttæ Atropinæ cum Cocaina, Injectio Atropinæ Hypodermica, Linimentum Atropinæ, Linimentum Atropinæ et Chloroformi, Pilulæ Atropinæ et Morphinæ, Pessus Atropinæ, Pilula Atropinæ, Atropinæ Methylbromidum, Atropinæ Salicylas, Atropinæ Valerianas, Euphthalminæ Hydrochloridum, Guttæ Euphthalminæ Hydrochloridi, Lamellæ Euphthalminæ.

Atropine is used as an antidote in poisoning by Physostigmine, Morphine, Aconite, Gelsemine, Hydrocyanic Acid, Muscarine, Nitroglycerin, and Pilocarpine.

Antidotes.—In case of poisoning by Atropine, the antidotes are the same as for Belladonna, *q.v.*

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Hung., Ital., Jap., Mex., Norw., Port., Russ., Span., Swed., Swiss and U.S.

Tests.—The distinguishing tests for Atropine Sulphate are the melting point, which should be 189° C. (347·2° F.); the mydriatic action produced even by highly diluted solutions of the salt; the production of a purple-violet coloration when a small quantity is moistened with Nitric Acid evaporated on a water-bath and the residue treated with an Alcoholic Potassium Hydroxide Solution; the production of a white precipitate, on the addition of Sodium Carbonate to a saturated aqueous solution, and when this precipitate is collected it should answer the tests described under Atropine. The aqueous solution yields on acidification with diluted Hydrochloric Acid and addition of Barium Chloride Solution, a white precipitate insoluble in Hydrochloric Acid.

The melting point given in the *B.P.* and *P.G.* is open to criticism (*P.J.* '98, ii. 195). Will gives 196° C. (384·8° F.); *U.S.P.* about 189·9° C. (373·5° F.), and when free from Hyoscyamine about 188° C. (370·4° F.); Hesse, 180° to 181° C. (356° to 357·8° F.); Merck, 189° to 191° C. (372·2° to 375·8° F.); whilst a salt prepared by Jowett from pure Atropine melted at 190° C. (374° F.). 3 c.c. of a 1 in 60 aqueous solution mixed with 1 c.c. of Sodium Hydroxide Solution (15 p.c.) yields a precipitate, but a solution of the same strength is unaffected by a corresponding amount of Ammonia Solution. A pleasant aromatic odour is evolved when a small quantity of the salt, which has been heated until white fumes are disengaged, is warmed with Sulphuric Acid until it commences to turn brown, and then a small quantity of Water is carefully added, the addition of a few crystals of Potassium Permanganate produces an odour of Essential Oil of Bitter Almonds.

The more generally occurring impurities are Sulphates of mydriatic alkaloids other than Atropine, *e.g.*, Hyoscyamine and Scopolamine, readily oxidisable organic impurities, Morphine and mineral matter. Hyoscyamine and Scopolamine Sulphates are indicated by their optical activity; organic impurities by the colour imparted to a solution of the salt in concentrated Sulphuric Acid; Morphine by the red coloration produced on the addition of Sulphuric Acid followed by Nitric Acid to a little of the salt, and mineral matter by the ash left on ignition which should be nil. Atropine Sulphate contains 85·5 p.c. of Atropine and 14·5 p.c. of Sulphuric Acid.

Sulphuric Acid.—If 1·5 c.c. Sulphuric Acid be added to 0·01 gramme of Atropine Sulphate which has been heated in a test-tube until the evolution of white vapours occurs, and then warmed until the mixture begins to turn brown, then on immediately and carefully adding Water to this, a pleasant characteristic aromatic odour comes off. After the addition of a crystal of Potassium Permanganate the liquid smells of Essential Oil of Almond, *P.G.* *See* also *U.S.P.*, under Atropine.

Vitali's Test.—0·01 gramme Atropine Sulphate heated to dryness in a porcelain dish on a water-bath with 5 drops fuming Nitric Acid, leaves a faintly yellow residue, which on pouring over it an Alcoholic Solution of Potassium Hydroxide, and warming, assumes a violet colour, *P.G.*

Preparations.

LAMELLÆ ATROPINÆ. Discs of Atropine.

Discs of Gelatin, each weighing about $\frac{1}{50}$ grain (1·3 milligrammes) and containing $\frac{1}{5000}$ grain (0·013 milligramme) of Atropine Sulphate.

Gelatin Discs, each containing 0·001 gramme Atropine Sulphate, are official in Swed. Ital. contains $\frac{1}{10}$ milligramme.

LIQUOR ATROPINÆ SULPHATIS. Solution of Atropine Sulphate.

Atropine Sulphate, 1; Salicylic Acid, $\frac{1}{8}$; Distilled Water, 100.

(1 in 100)

Dose.—$\frac{1}{2}$ to 1 minim = $\frac{1}{220}$ to $\frac{1}{110}$ grain of Atropine Sulphate.

Foreign Pharmacopœias.—Official in Port., 1 in 100. Not in the others.

Not Official.

GLYCERINUM ATROPINÆ.—Atropine Sulphate, $25\frac{1}{4}$ grains, dissolved in Water, 5 fl. oz.; add Compound Tincture of Lavender, 100 minims, and Glycerin, to 20 fl. oz. 100 c.c. contains 0·25 gramme Atropine.—*St. Thomas's.*

Atropine Sulphate, $1\frac{1}{4}$ grains; Water, 2 drm.; Compound Tincture of Lavender, 5 minims; Glycerin, to 1 oz.—*University.*

Atropine Sulphate, 0·25; Distilled Water, 25; Compound Tincture of Lavender, 1; Glycerin, *q.s.* to produce 100.—*B.P.C.*

GUTTÆ ATROPINÆ SULPHATIS.—Atropine Sulphate, 1, 2 or 4 grains; Distilled Water, 1 oz.—*London Ophthalmic.*

GUTTÆ ATROPINÆ CUM COCAINA.—Atropine Sulphate, 2 grains; Cocaine Hydrochloride, 10 grains; Distilled Water, 1 oz.—*London Ophthalmic.*

INJECTIO ATROPINÆ HYPODERMICA.—Atropine Sulphate, 2 grains; Water, 1 oz.

Dose.—2 to 4 minims = $\frac{1}{120}$ to $\frac{1}{60}$ grain of Atropine Sulphate.

B.P.C. Injection contains 0·12 p.c.

INJECTIO ATROPINÆ ET MORPHINÆ HYPODERMICA. *See* MORPHINÆ ACETAS.

LINIMENTUM ATROPINÆ—Atropine Sulphate, $38\frac{1}{4}$ grains; Compound Tincture of Lavender, 100 minims; Alcohol (90 p.c.), to 20 fl. oz.—*St. Thomas's.*

This has been incorporated in the *B.P.C.* as follows:—

Atropine Sulphate, 0·40; Compound Tincture of Lavender, 1; Alcohol, *q.s.* to produce 100.

LINIMENTUM ATROPINÆ ET CHLOROFORMI.—Atropine Liniment, 5; Chloroform, 1.—*St. Thomas's.*

This has been modified in the *B.P.C.* as follows:—

Chloroform, 12·50; Atropine Liniment, *q.s.* to make 100.

PILULA ATROPINÆ.—Atropine Sulphate, $\frac{1}{50}$, $\frac{1}{60}$, $\frac{1}{100}$, $\frac{1}{120}$ grain; Liquorice Powder, 2 grains; Tragacanth Powder, 1 grain; Mucilage of Acacia, *q.s.*—*Brompton.*

PILULA ATROPINÆ ET MORPHINÆ.—Atropine Sulphate, $\frac{1}{100}$ grain; Morphine Hydrochloride, $\frac{1}{6}$ grain; Milk Sugar, 1 grain.—*St. Thomas's.*

This has been incorporated in the *B.P.C.*

PESSUS ATROPINÆ.—Atropine, $\frac{1}{20}$ grain; Conine, 1 minim; Oil of Theobroma, to 120 grains.—*Samaritan.*

ATROPINÆ METHYLBROMIDUM (Mydriasine).—A white crystalline powder, readily soluble 1 in 1 of Water, soluble 1 in 10 of Alcohol (90 p.c.), insoluble in Ether. Employed in the form of a 1 to 2 p.c. solution either plain, or as a solution containing 1 p.c. of Cocaine. A valuable succedaneum for Atropine Sulphate. Free from its disadvantages and possessing its advantages. Invaluable in determining static refraction or in any ophthalmoscopic examination, where dilatation of the pupil is indispensable. In large quantities (1 to 2 p.c. solution) it has the same action on the pupil and accommodation as Atropine Sulphate. In moderate quantities (1 drop of 1 p.c. solution) the mydriasis produced may last about twenty-four hours, but the paralysis of accommodation disappears in a few hours. In small quantities (1 drop 0·5 p.c. solution containing 1 p.c. of Cocaine), considerable dilatation of the pupil results with scarcely any appreciable paresis of accommodation. Atropine Methylbromide is thus a valuable diagnostic agent in the beginning of iritis, but should there be no iritis, the inconvenience produced is less than if Atropine had been instilled. One drop of a 1 p.c. solution produces a maximum dilatation of the pupil in from 30 to 45 minutes. Cocaine intensifies the dilatation; Eserine quickly diminishes the pupillary dilatation produced by Methylbromide.—

B.M.J.E. '03, ii. 52. Has been used in doses of $\frac{1}{10}$ to $\frac{1}{5}$ of a grain = 0·0065 to 0·013 gramme in pill form in the treatment of the night sweats of phthisis. In addition to its mydriatic effect it has a distinct sedative and analgesic effect (*B.M.J.E.* '06, i. 72); for ophthalmic purposes it may be used in strengths from $\frac{1}{4}$ to 5 p.c. A useful average strength is 1·0 p.c.

Tests.—Atropine Methylbromide has a melting point of 222° to 223° C. (431·6° to 433·4° F.); its aqueous solution yields a whitish precipitate with Mayer's reagent, the residue remaining after evaporating a small quantity of the salt with a few drops of concentrated Nitric Acid yields a purple-violet coloration when treated with Alcoholic Potassium Hydroxide Solution; its aqueous solution yields a white curdy precipitate with Silver Nitrate solution and a yellow coloration with Chlorine Water, the latter when shaken with Chloroform yielding a yellowish-brown solution. It should leave no residue when ignited with free access of air.

ATROPINÆ SALICYLAS, $C_{17}H_{23}NO_3.C_7H_6O_3$, eq. 424·06.—A white crystalline powder, only slightly soluble in Water. Introduced as a substitute for the Sulphate in ophthalmic practice, but its aqueous solution does not keep so well as that of the latter. The author prepared 1 p.c. solutions of each salt, and the Salicylate developed a growth more quickly than the Sulphate. To make the solution keep well an excess of Salicylic Acid is required, and then it is irritating to the eye.

Tests.—The aqueous solution yields with Mayer's reagent a whitish precipitate; a crystal evaporated on a water-bath with concentrated Nitric Acid leaves a residue which when moistened with a few drops of Alcoholic Potassium Hydroxide Solution yields a purplish-violet coloration. The diluted aqueous solution yields with Ferric Chloride Test-solution a deep violet coloration. It should leave no residue when ignited with free access of air.

It should contain 67·7 p.c. of Atropine and 32·3 p.c. of Salicylic Acid.

Liquor Atropinæ Salicylatis.—Atropine, 5 grains; Salicylic Acid, 7$\frac{1}{2}$ grains; Water, 10 oz.—*Charing Cross.*

ATROPINÆ VALERIANAS, $C_{17}H_{23}NO_3.C_5H_{10}O_2.H_2O$, eq. 406·24.—Colourless, or white hygroscopic rhomboid crystals, having an odour of Valerianic Acid, and becoming coloured on exposure to light. Readily soluble in Water and in Alcohol (90 p.c.). Antispasmodic, antineuralgic. Recommended for internal administration.

Dose.—$\frac{1}{65}$ grain = 0·001 gramme. **Official in** Mex. and Port.

Tests.—The salt softens at 20° C. (68° F.), and melts at 32° C. (89·6° F.). The aqueous solution when acidified with a mineral acid throws out an oily fluid which collects on the surface of the liquid; Sodium or Potassium Hydroxide Solution produces a white precipitate. A crystal with a few drops of concentrated Nitric Acid evaporated to dryness yields a residue which assumes a purplish-violet coloration when moistened with a few drops of Alcoholic Potassium Hydroxide Solution. When ignited with free access of air it should leave no residue. The crystallised salt should contain 70·6 p.c. of Atropine and 24·9 p.c. of Valerianic Acid.

EUPHTHALMINÆ HYDROCHLORIDUM (Phenylglycoyl-*n*-methyl-β-vinyl-diacetone-alkamine hydrochloride).—White crystalline powder. Readily soluble in Water. Mydriatic. Introduced as a substitute for Atropine and Homatropine, and used as a 2 to 5 p.c. solution. Stated to weaken the accommodation only to a very slight extent, but has no appreciable effect on the conjunctival vessels or on the corneal epithelium, and causes no hyperæmia, and effects soon pass off.—*B.M.J.* '99, ii. 775; *L.* '99, ii. 458; *Pr.* lxiv. 476. The free base **Euphthalmine** crystallises in six-sided prisms. A readily soluble **Euphthalmine Salicylate** has also been prepared.

Guttæ Euphthalminæ Hydrochloridi.—Euphthalmine Hydrochloride, 10 grains; Distilled Water, 1 oz.—*London Ophthalmic.*

Lamellæ Euphthalminæ.—Each disc contains $\frac{1}{50}$ grain Euphthalmine.—*London Ophthalmic.*

AURANTII CORTEX.

FR., BIGARADIER; GER., POMERANZENSCHALE; ITAL., ARANCIO AMARO;
SPAN., NARANJA AMARA.

Both the fresh and the dried outer part of the Pericarp of *Citrus Aurantium*, var. *Bigaradia*, are official.

In India and the Eastern Colonies, Aurantii Cortex Indicum (*Ind.* and *Col. Add.*) may be used. It is the corresponding portions of the varieties of *Citrus Aurantium* grown in India and Ceylon.

Medicinal Properties.—Carminative and bitter stomachic. The Tincture and Syrup are largely used as flavouring agents.

Prescribing Notes.—*Preparations of Orange Peel should not be prescribed with Tincture of Perchloride of Iron, as the mixture would be blackened.*

Official Preparations.—Of the **Fresh Peel,** Tinctura Aurantii and Vinum Aurantii. Of the **Tincture,** Syrupus Aurantii, contained in Tinctura Quininæ, Syrupus Aromaticus and Syrupus Cascaræ Aromaticus. Of the **Dried Peel,** Infusum Aurantii and Infusum Aurantii Compositum; used in the preparation of Infusum Gentianæ Compositum, Spiritus Armoraciæ Compositus, Tinctura Cinchonæ Composita, and Tinctura Gentianæ Composita.

Not Official.—Oleum Aurantii Corticis, Elixir Aurantii, Elixir Aromaticum, Elixir Simplex, Infusum Aurantii Concentratum, Infusum Aurantii Compositum Concentratum, Spiritus Aurantii Compositus, Vinum Aurantii Detannatum.

AURANTII CORTEX RECENS. FRESH BITTER-ORANGE PEEL.

The Fresh outer part of the Pericarp of *Citrus Aurantium*, var. *Bigaradia*, Hook. f.

Foreign Pharmacopœias.—Official in Belg., Fr., Mex., Port. and Span.; U.S., *Citrus Aurantium.* The following use the unripe fruit: Ger., Jap., Norw., Russ., Swed. and U.S.

Descriptive Notes.—The fresh rind of the Seville or bitter orange *Citrus Aurantium*, L., var. *Bigaradia*, Hook. f., is official. It is characterised by its reddish or deep orange red colour and its rough glandular surface. It should retain but little of the white spongy portion. The taste is bitter and aromatic. It is most easily purchased in the fresh state in February and March, when it usually arrives in this country.

Preparations.

SYRUPUS AROMATICUS. AROMATIC SYRUP.

Tincture of Orange, 1; Cinnamon Water, 1; Syrup, 2. The turbid fluid, formed by mixing the Tincture and Cinnamon Water, is cleared by filtration through Talc, before the Syrup is added.

Dose.—$\frac{1}{2}$ to 1 fl. drm. = 1·8 to 3·6 c.c.

SYRUPUS AURANTII. SYRUP OF ORANGE.

Tincture of Orange, 1; Syrup, 7. (1 in 8)

Dose.—$\frac{1}{2}$ to 1 fl. drm. = 1·8 to 3·6 c.c.

Foreign Pharmacopœias.—Official in Hung., Peel, weak Spirit, Sugar, and Tincture; Belg., Fluid Extract 1, Syrup 19; Dutch, Peel, Water, and Sugar;

Dan., Fr., Ital. and Swed., Peel, Spirit, Water, and Sugar; Austr., Ger., Russ. and Swiss, Peel, Wine, and Sugar; Jap., Tincture of Bitter-Orange Peel 3, Syrup 17; Norw., Tincture 1, Syrup 9; Mex., Alcoholatura 1, Syrup 9; Port., Peel, Boiling Water and Sugar; Span. (Jarabe de Corteza de Naranja), Water of Orange Peel and Sugar; (Jarabe de Corteza de Naranja Amarga), Wine of Bitter-Orange Peel and Sugar. All by weight, except U.S.

Syrupus Aurantii (*U.S.*)—Tincture of Sweet Orange 5; is triturated with Magnesium Carbonate 1, and Water 40, gradually added, filtered, sufficient Water added to produce 45, Citric Acid 0·5 dissolved in the filtrate, then Sugar 82, and sufficient Water added to produce 100 by volume.

TINCTURA AURANTII. Tincture of Orange.

Macerate 1 of Fresh Bitter-Orange Peel, cut small, with 4 of Alcohol (90 p.c.). (1 in 4)

Formerly called Tinctura Aurantii Recentis, and 6 of Fresh Peel made 20 of Tincture.

Dose.—30 to 60 minims = 1·8 to 3·6 c.c.

Foreign Pharmacopœias.—Official in Belg., Fresh Peel 1, Alcohol (60 p.c.) 5; Dutch, Peel 1, Alcohol (70 p.c.) 5; Fr. (Alcoolature d'Orange), Fresh Peel 1, Alcohol 2; Ital., Peel 1, Alcohol 2; both by weight. U.S. (Tinctura Aurantii Dulcis), from Fresh Peel, 1 in 5; not in the others. The following are made with Dried Peel: Austr., Dan., Dutch, Fr., Ger., Hung., Jap., Norw., Russ., Swed., Swiss and U.S., 1 and 5; all by weight, except U.S. Not in Port.

Tests.—Tincture of Orange has a sp. gr. of about 0·880, contains about 2 p.c. w/v of total solids and about 74 p.c. w/v of Absolute Alcohol.

VINUM AURANTII. Orange Wine.

A sherry-coloured weak alcoholic liquid, prepared by the fermentation of a saccharine solution containing Fresh Bitter-Orange Peel.

Foreign Pharmacopœias.—Official in Span., Dried Bitter-Orange Peel 1, Carinena or Alicante Wine 20. Belg. and Swiss have a compound wine, but they vary considerably in composition.

The Orange Wine of commerce.

Tests.—Orange Wine has a sp. gr. of about 1·030, it contains about 11·5 p.c. of total solids. It is officially required to contain 10 to 12 p.c. w/v of Ethyl Hydroxide. Good commercial samples contain from 15 to 18 p.c. w/v of Absolute Alcohol. In testing for Salicylic Acid 1 fl. oz. of the Wine is rendered alkaline by the addition of Sodium Hydroxide Solution, and shaken with Ether, the ethereal solution separated and rejected, the Wine may then be rendered acid with diluted Sulphuric Acid and again shaken with Ether, the ethereal solution separated, carefully washed with Water till free from mineral acid and shaken with Water to which a drop or two of Ferric Chloride T.S. has been added; Salicylic Acid, if present, is indicated by the violet coloration produced. The *B.P.* performs the test for Salicylic Acid on the distillate obtained from a mixture of 50 c.c. of Wine, 50 c.c. of Water and 5 c.c. of Normal Volumetric Sulphuric Acid Solution, rejecting the first 10 c.c. distilled and shaking the balance with Ether. Ferric Chloride T.S. is used as a reagent, and the test is carried out on the residue left on evaporation.

Not Official.

INFUSUM AURANTII CONCENTRATUM.—Dried Bitter-Orange Peel, in No. 10 powder, 40; Tincture of Orange, 5; Alcohol (90 p.c.), 22·5. Dilute Chloroform Water (1 in 1000), *q.s.* to make 100. Prepare by repercolation. Dose.—½ to 1 fl. drm.—*Farr* and *Wright*, *P.J.* '06, i. 165 and '07, i. 621; *C.D.* '06, i. 252; *Y.B.P.* 1907, 250.

This appears in the *B.P.C.*

INFUSUM AURANTII COMPOSITUM CONCENTRATUM.—Dried Bitter-Orange Peel, in No. 10 powder, 20; Dried Lemon Peel, in No. 10 powder, 5; Cloves, freshly powdered, 2·5; Tincture of Lemon, 5; Tincture of Orange, 5; Alcohol (90 p.c.), *q.s.* Dilute Chloroform Water (1 in 1000), *q.s.* to make 100. Macerate the powdered Cloves in 20 of the Alcohol for 12 hours, filter through Cotton-Wool, and pass through the marc sufficient Alcohol to make the filtrate measure 20; add the tinctures and set aside, mix the other powders, and submit them to macero-expression with dilute Chloroform Water, adding the mixed tinctures to the reserved portion. Dose.—½ to 1 fl. drm.—*Farr* and *Wright*, *P.J.* '06, i. 165 and '07, i. 621; *C.D.* '06, i. 252; *Y.B.P.* 1907, 249.

This appears in the *B.P.C.*

VINUM AURANTII DETANNATUM.—Orange Wine, 1 gallon; Gelatin, in No. 100 powder, ¼ oz.; macerate for 24 hours and decant.

It is recommended by F. C. J. Bird that Gelatin in No. 100 powder should be used in place of Gelatin cut small, as recommended in the *B.P.C. Formulary* 1901, it being found possible by this process to completely detannate an average sample of Wine in 24 hours with the aid of occasional shaking, or in 8 hours if frequently agitated. Care must be taken to keep the temperature of maceration at or below 15·5° C., or during extremely hot weather the Gelatin will probably pass into solution.—*P.J.* '99, ii. 133.

This suggestion has been incorporated in the *B.P.C.* as follows:—

Orange Wine, 100; Gelatin, in No. 100 powder, 0·15. Macerate for 24 hours at a temperature not exceeding 15·5° C., with frequent agitation, and afterwards decant.

OLEUM AURANTII CORTICIS.—A volatile Oil, extracted by mechanical means from Fresh Orange Peel; both varieties of Orange Peel are used; that from *Citrus Aurantium*, L., var. *Bigaradia*, Hook. f., is known as **Essence de Bigarade**, and that from *Citrus Aurantium*, L., as **Essence de Portugal**; the former yields the finest Oil.

A pale yellowish liquid, with neutral reaction, having the odour of Orange Peel. At least 90 p.c. of the Oil consists of dextrorotatory Limonene.

By keeping, the Oil becomes thicker and acquires a disagreeable terebinthinate taste, which may be prevented by mixing it while fresh with 10 p.c. of Absolute Alcohol. It should be kept in well-stoppered dark amber-tinted glass bottles in a cool place.

Solubility.—Soluble 1 in 7 of Alcohol (90 p.c.), and in all proportions of Absolute Alcohol.

Foreign Pharmacopœias.—Official in Austr. and Belg., sp. gr. 0·848 to 0·852; Dutch, sp. gr. 0·850 to 0·870; Fr., sp. gr. 0·848 to 0·853; Hung. and Jap., sp. gr. 0·850 to 0·860; Port., sp. gr. 0·835 to 0·850; Mex., sp. gr. 0·837; Span., 0·835 to 0·844; U.S., sp. gr. 0·842 to 0·846 at 25° C. (77° F.); not in Dan., Ger., Ital., Norw., Russ., Swed. or Swiss.

Tests.—The oil of sweet orange has a sp. gr. of 0·848 to 0·852, that from bitter orange 0·854 to 0·857. Both have a characteristic orange odour. The oil has a boiling point of 175° to 180° C. (347° to 356° F.), between which temperatures about nine-tenths of the oil distils over. The oil of sweet orange has an optical rotation in a tube of 100 mm. diameter of + 96° to + 98° at 20° C. (68° F.); that of the bitter orange is between + 90° and + 93°.

The more generally occurring sophistications are Turpentine Oil and the terpenes remaining from the manufacture of terpeneless Oil of Lemon and Oil of Orange. Turpentine Oil may generally be detected directly by the optical rotation, or by a determination of the optical activity of the first 10 p.c. fraction.

The optical rotation of this first 10 p.c. fraction should not materially differ from that of the original oil.

The terpenes remaining from the manufacture of terpeneless Lemon Oil are readily detected by the optical rotation, but terpenes from terpeneless Oil of Orange are detected with much greater difficulty. They reduce the colour of the oil and produce a difference in the odour and taste.

ELIXIR AURANTII (formerly *U.S.*, now omitted).—Sprinkle or spray 1 fl. oz. of Oil of Orange over 2 oz. of Cotton-Wool; pack it tightly in a percolator and pass through it a mixture (Alcohol 1, Water 3), sp. gr. 0·971, till 200 fl. oz. of a clear percolate are obtained, in which dissolve, without heat, Sugar 100 oz.; all by weight.

A better method of disseminating the Oil is to sprinkle it upon blotting paper pulp this with the diluted Alcohol, allow it to stand for 24 hours, and filter.

ELIXIR AROMATICUM.—Compound Spirit of Orange, 1·2; Syrup, 37·5; Purified Talc, 3; Alcohol (95 p.c.), *q.s.*; Distilled Water, *q.s.* to produce 100. To the Compound Spirit of Orange add enough Alcohol to make 25, to this solution add the syrup in several portions, agitating after each addition, then 37·5 of Distilled Water. Mix the Purified Talc with the liquid and then filter through a wetted filter, returning the first portions of the filtrate until a transparent liquid is obtained. Lastly, wash the filter with a mixture of Alcohol 1 volume and Distilled Water 3 volumes, until the product measures 100.—*U.S.P.*

This has been incorporated in the *B.P.C.*, which appears to direct twice as much Compound Spirit of Orange, but the *B.P.C.* Compound Spirit is only half the strength of the *U.S.P.* This, however, has been altered in the *B.P.C. Supplement*; the Spiritus Aurantii Compositus (*see* below) has now been doubled in strength, and half the quantity of it used, and the amended formula for Elixir Aromaticum will agree with that given above for *U.S.P.*

ELIXIR SIMPLEX.—Oil of Bitter-Orange, 30 minims; Alcohol (90 p.c.), 6 fl. oz.; dissolve and add Distilled Cinnamon Water, 7 fl. oz.; Syrup, 7 fl. oz.; mix. Filter through paper moistened with Alcohol (45 p.c.) and well sprinkled with Kaolin, returning the first portions of filtrate until it passes through bright. —*B.P.C. Formulary* 1894 omitted in 1901.

Dose.—20 to 60 minims = 1·2 to 3·6 c.c.

Tincture of Orange, 7·50; Syrup, 40; Distilled Water, *q.s.* to make 100.—*B.P.C.*

This is the same formula as given under Pepsin.

SPIRITUS AURANTII COMPOSITUS. (*U.S.*).—Oil of Orange, 10; Oil of Lemon, 2½; Oil of Coriander, 1; Oil of Anise, ¼; Alcohol (95 p.c.), to make 50.

The *B.P.C.* Spiritus Aurantii Compositus employ Alcohol (90 p.c.) to make 100 and is therefore half this strength. This has been altered in the *B.P.C. Supplement*, reducing the quantity of Alcohol (90 p.c.) to make 50, so that the formula will correspond in strength to the *U.S.* preparation, but using Alcohol (90 p.c.) in place of *U.S.P.* Alcohol (95 p.c.).

AURANTII CORTEX SICCATUS. DRIED BITTER-ORANGE PEEL.

The dried outer part of the Pericarp of *Citrus Aurantium*, L., var. *Bigaradia*, Hook. f.

Official Preparations.—Infusum Aurantii and Infusum Aurantii Compositum.

Foreign Pharmacopœias.—Official in Austr., Dan., Dutch, Fr., Ger., Hung., Ital. (Arancio Amaro), Jap., Norw., Port. (Laranjeira Azeda), Russ., Swed. and Swiss; U.S., Aurantii Amari Cortex, also Aurantii Dulcis Cortex.

Descriptive Notes.—Bitter-Orange Peel occurs in English commerce in three forms, viz., English, exotic and Maltese. The English is more carefully dried, reddish-orange externally and nearly white on the inner surface, in long strips about ⅓ in. (8 mm.) wide and more or less curled in drying. The exotic is less carefully dried and of a duller orange-red or brownish-red colour externally, and a dirty white colour on the inner surface. The Maltese resembles the exotic, except that it occurs in very slender strips about 2 lines wide only, is cut up into shorter pieces, and has less of the mesocarp or white spongy portion attached to the zest or rind. The official description simply directs that it should be in thin strips, but as the colour must be orange-red, it is evident that the English-dried kind is intended. The *U.S.P.* describes the dried peel as of a brownish-green colour, and in strips or quarters, thus apparently admitting the badly dried W. Indian peel which is usually dried in quarters. The *P.G.* describes the dried peel as brownish, and directs that it should be prepared by softening the rind in cold Water for a quarter of an hour, pouring off the Water and keeping the peel in a cool place until the next day when the white spongy tissue should be cut off and the outer portion dried. Dried Orange Peel if long kept loses its bright colour and becomes brownish-red.

Preparations.

INFUSUM AURANTII. INFUSION OF ORANGE PEEL.

Dried Bitter-Orange Peel, 1; boiling Distilled Water, 20. Infuse for 15 minutes. (1 in 20)

Dose.—½ to 1 fl. oz. = 14·2 to 28·4 c.c.

Fr. (Tisane d'Oranger), Leaves, 5; boiling Water, 1000.

INFUSUM AURANTII COMPOSITUM. COMPOUND INFUSION OF ORANGE PEEL.

Dried Bitter-Orange Peel, ½ oz.; Fresh Lemon Peel, ¼ oz.; Bruised Cloves, 55 grains; boiling Distilled Water, 20 oz. Infuse for 15 minutes. (1 in 40)

Dose.—½ to 1 fl. oz. = 14·2 to 28·4 c.c.

TINCTURA AURANTII. *See* AURANTII CORTEX RECENS.

Formerly two Tinctures were official, one from Fresh Peel and the other from Dried Peel; the latter is now omitted.

AURANTII FLORIS AQUA.

ORANGE-FLOWER WATER.

N.O.Syn.—AQUA NAPHÆ.

FR., EAU DE FLEUR D'ORANGER; GER., POMERANSENBLÜTENWASSER; ITAL., ACQUADI FIORE DI ARANCIO; SPAN., AGUA DESTILADA DE AZAHAR.

Commercial Orange-flower Water prepared by a process of distillation from the Flowers of the Bitter-Orange tree, *Citrus*

Aurantium, L., var. *Bigaradia*, Hook. f., diluted with twice its volume of Distilled Water. It keeps best in the undiluted state, and should therefore be diluted only as required.

U.S. directs the Triple Extract to be diluted with an equal volume of Distilled Water. Swiss use the undiluted Water.

Medicinal Properties.—Both the **Water** and the **Syrup** are used as flavouring agents, about 1 of the Concentrated Water to 8 of Distilled Water; it is also used in eye lotions.

Official Preparation.—Syrupus Aurantii Floris. Contained in Mistura Olei Ricini, and Syrupus Calcii Lactophosphatis.

Not Official.—Oleum Aurantii Florum (Oleum Neroli).

Foreign Pharmacopœias.—Official in Austr., Belg., Dutch, Fr. (Eau Distillée de Fleur d'Oranger), Hung., Ital. (Acqua Distillata di Arancio), Jap., Mex. (Agua destilada de corteza de naranja amarga), Port. (Agua de Flores de Laranjeira), Russ., Span. (Agua Destilada de Azahar), Swed., Swiss and U.S. Not in Dan., Ger. or Norw.

Preparation.

SYRUPUS AURANTII FLORIS. Syrup of Orange Flower.

Dissolve 6 of Refined Sugar in 2 of boiling Distilled Water; add 1 of undiluted Orange-flower Water of commerce, and make up the total weight to 9 with recently boiled Distilled Water.

Dose.—$\frac{1}{2}$ to 1 fl. drm. = 1·8 to 3·6 c.c.

Foreign Pharmacopœias.—Official in Austr., O.F.W. 1, Sugar $1\frac{1}{2}$; Belg., O.F. Spirit (1 Oil in 100) 1, Syrup 199; Fr. and Mex., O.F.W. 10, Sugar 18; Port., O.F.W. 7, Sugar 13; Span. and Swiss, O.F.W. 36, Sugar 64; all by weight. U.S., Sugar 85, O.F.W. to measure 100. Not in the others.

Not Official.

OLEUM AURANTII FLORUM. *Syn.* Oleum Neroli.—A volatile Oil, obtained by distilling fresh Orange-flowers with Water. The watery distillate constitutes the Aqua Floris Aurantii Conc. of commerce. The finest Oil is obtained from the Bitter-Orange; that from the Portugal or Sweet-Orange is not so good. From the **leaves, twigs** and **immature fruits** of both varieties is obtained the commercial **Oil of Petit Grain.**

A yellowish or brownish limpid liquid, with neutral reaction, having a powerful odour of Orange-flowers.

Solubility.—Soluble in all proportions of Alcohol (90 p.c.) or in Absolute Alcohol.

Foreign Pharmacopœias.—Official in Austr., Belg. and Swiss, sp. gr. 0·870 to 0·880; Mex., sp. gr. 0·870 to 0·878; Fr., sp. gr. 0·875 to 0·880; Span., sp. gr. 0·850 to 0·900; Ital., sp. gr. 0·872 to 0·890; Jap., sp. gr. 0·86 to 0·88; Port., sp. gr. 0·874 to 0·878. Not in Dan., Dutch, Ger., Hung., Norw., Russ., Swed. or U.S.

Tests.—The Oil has a specific gravity of 0·870 to 0·890 and a powerful characteristic odour of Orange-flowers. It should possess an optical rotation in a tube of 100 mm. diameter of + 2° to + 5° and occasionally as high as + 8°. It should form a clear solution in $1\frac{1}{2}$ to 2 volumes of Alcohol (80 p.c.). A determination of the Saponification value affords a useful criterion of the purity of an Oil; that of genuine Oils being between 20 and 52 corresponding to 7 to 18 p.c. of Esters calculated as Linalyl Acetate.

The more generally occurring sophistications are Bergamot and Petit Grain Oils, which being composed largely of the same chemical constituents as Neroli

Oil can only be detected when in relatively large quantities, the recognition of small amounts being next to impossible. The Saponification value here affords the best criterion.

Not Official.

AURI BROMIDUM.

$AuBr_3$, eq. 433·75.

In dark brown masses, soluble in Water. It has been used on the Continent for the relief of hysteria and epilepsy.

The salt should be kept in well-stoppered bottles of a dark amber tint.

The Tribromide obtained from Merck was soluble about 1 in 75 of Water.

It appears to be about ten times more active than the more commonly used Bromides, and has been given in $\frac{1}{4}$ (increased to $\frac{1}{2}$) grain doses in severe cases of hysteria and epilepsy.—*L.* '90, i. 869.

Dose.—$\frac{1}{10}$ to $\frac{1}{4}$ grain = 0·0067 to 0·016 gramme.

Prescribing Notes.—*Dispensed in* **pills** *with Massa Kaolini, or in compressed Tablets.*

Official in Mex., Bromuro de Oro.

AURI ET POTASSII BROMIDUM.—Brownish-black needle-shaped crystals. Readily soluble in Water. Used for the same purposes as for the Tribromide.

Dose.—$\frac{1}{3}$ grain = 0·021 gramme.

LIQUOR AURI ET ARSENII BROMIDI.—Arsenious Acid, 0·25 gramme; Gold Tribromide, 0·325 gramme; Bromine Water and Distilled Water, of each a sufficient quantity to make 100 c.c.—*U.S.N.F.* 1896 and 1906.

10 minims of this solution contain $\frac{1}{32}$ grain of Tribromide of Gold and the equivalent of $\frac{1}{13}$ grain of Tribromide of Arsenic.

Arsenious Acid, in powder, 40 grains; Potassium Carbonate, 40 grains; Bromine, 100 grains; Gold, in leaf, 13·5; Distilled Water, *q.s.* to 20 fl. oz. (Wright).—*Y.P.B.* 1896, 354.

10 minims contains an amount of Arsenium in combination equal to $\frac{1}{24}$ grain of Arsenious Acid and $\frac{1}{32}$ grain of Gold Tribromide.

This has been incorporated in the *B.P.C.* under the title **Liquor Auri et Arsenii Bromatus.**

This liquor has been found useful in rheumatism.—*L.* '95, ii. 921; '00, i. 72; it is also combined with Mercury Oxybromide in syphilitic affections.

Not Official.

AURI CHLORIDUM.

Under this heading are arranged the following varieties:—

1. **Pure Chloride of Gold,** $AuCl_3$, containing about 65 p.c. of metallic Gold. **Official in** Port. (Chloreto de Ouro), and Mex. (Cloruro de Oro).
2. **Chloride of Gold and Sodium** (Commercial 'Chloride of Gold'), the crystallised double salt $AuCl_3.NaCl.2H_2O$, containing 50 p.c. of metallic Gold. **Official in** Fr. (Chlorure d'Or et de Sodium), Port. Chloreto de Ouro e de Sodio), and Mex. (Cloruro de Oro y Sodio).
3. **Commercial Chloride of Gold and Sodium.** Commercial Chloride of Gold and Sodium is the above crystallised salt mixed with an equal weight of Chloride of Sodium, and contains 25 p.c. of metallic Gold.
4. **Auri et Sodii Chloridum, U.S.** A mixture composed of equal parts of anhydrous Gold Chloride and anhydrous Sodium Chloride,

and which contains not less than 30 p.c. of metallic Gold. **Official in** Russ. (Auro-natrium Chloratum).

The salts should be kept in well-stoppered bottles of a dark amber tint.

Some foreign samples of commercial Chloride of Gold are the double Chloride of Gold and Potassium $AuCl_3.KCl.2\frac{1}{2}H_2O$, corresponding to about 47 p.c. of metal.—*P.J.* (3) xxii. 902.

Medicinal Properties.—It has been given on the Continent for amenorrhœa and secondary syphilis. Chloride of Gold and Sodium has been used in tertiary syphilis, spinal sclerosis, hystero-epilepsy, asthma, chorea, and in uterine affections.

Dose.—$\frac{1}{16}$ to $\frac{1}{4}$ grain = 0·004 to 0·016 gramme.

Prescribing Notes.—*It may be given in the form of* **pills** *made with Massa Kaolini; or in aqueous solution. Its solutions should be protected from white light.*

It is also used in photography.

Not Official.

AZADIRACHTA INDICA.

INDIAN AZADIRACH.

Syns.—NEEM BARK, MARGOSA BARK.

The dried Bark of the stem of *Melia Azadirachta*, L.: **Infusum Azadirachtæ Indicæ** (1 in about 109), dose $\frac{1}{2}$ to 1 fl. oz. = 14·2 to 28·4 c.c.; and **Tinctura Azadirachtæ** (1 in 10), dose 30 to 60 minims = 1·8 to 3·6 c.c.; are official in the *Ind.* and *Col. Add.* for India and the Eastern Colonies.

BALSAMUM CANADENSE.

See TEREBINTHINA CANADENSIS.

Not Official.

BALSAMUM DIPTEROCARPI.

GURJUN BALSAM.

A balsamic exudation, obtained from the Trunk of *Dipterocarpus turbinatus*, Gärtn. f., and other species by incision and the application of heat. Imported from the East Indies. It is an oleo-resin, constituting a transparent liquid of the consistence of Olive Oil, lighter than Water, and of a dark brown sherry colour, slightly fluorescent.

Medicinal Properties.—Similar to those of Copaiba. Useful for leprosy. Mr. J. D. Hillis, of the Leper Asylum in British Guiana, is greatly in favour of it. —*L.* '80, i. 659; *M.P.* '89, i. 664; *see* also *L.* '90, i. 136. Von Reisnen gives Wood Oil internally, commencing with daily doses of 5 drops, increasing gradually to 70 or more, suspending the treatment when intolerance is shown. Externally the leprous parts are treated with an ointment of Gurjun Balsam, 3 parts; Lanolin, 1 part.—*P.J.* '95, ii. 27.

It is used in India as a substitute for Balsam of Copaiba in gonorrhœa; also as a natural varnish.

Prescribing Notes.—*Best prescribed in* **capsules** *for internal administration. As a local application in the form of an* **emulsion** *made with Lime Water, or as an ointment made with a Lanolin basis.*

Descriptive Notes.—It is also known as Wood Oil, but must not be confounded with the Wood Oil of China, which is a drying fixed Oil, used in China